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FISHING AMONG THE INDIANS OF NORTHWESTERN CALIFORNIA

BY

A. L. KROEBER and S. A. BARRETT

With special data from E. W. Gifford and G. W. Hewes

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INTRODUCTION

In aboriginal times what is now the extreme northwestern part of California was occupied by several tribes of diverse origins, as evidenced by the varied linguistic affiliations. However, they all had the same basic cultural background--the southernmost projection of the Northwest Coast culture[1]--founded upon two fundamental principles: individualism and wealth.

These tribes occupied not only the immediate coastline, but also the rivers and coastal mountains from below the mouth of Eel River on the south to the California-Oregon border on the north. Three tribes, the Yurok, Hupa, and Karok, on the lower Klamath, Trinity, and Salmon rivers were most typical. The neighboring Wiyot, Chilula, Whilkut, and Tolowa, had a culture similar to that of the Yurok, Hupa, and Karok. Together, these tribes form the central core or nucleus of this specialized Northwestern culture, with most notable dependence on salmon.

This nuclear area may be divided into two subareas or subcultures, the Riverine and the Littoral peoples, each group the result of the special environmental features of its territory. In the Klamath, Trinity, and Salmon rivers we have large, relatively swift-flowing streams. Here, the Riverine tribes, the Yurok, Hupa, and Karok (and to a lesser degree the Chilula and Whilkut), wielded large A-frame lifting nets and built large weirs.

The remainder of this nuclear area lies along the beaches, headlands, and rocks of the immediate ocean shore. Here, except at the mouth of the Klamath, were smaller rivers and creeks, with their estuaries and tidewaters. Here lived the Seashore or Littoral Tribes: the Tolowa,[2] the Coastal Yurok, the Wiyot, engaged in special types of fishing such as the beach scoop-net fishing, hook-and-line fishing from rocks, sea-lion hunting, mussel, clam, and seaweed gathering, and utilizing stranded whales. The river people and shore dwellers, however, had sufficient intercourse and enough common cultural features to form jointly the characteristic nuclear area.

While the present work primarily concerns these Riverine and Littoral tribes of this nuclear area, the marginal or peripheral groups are included in this study. These are the Shasta, New River, Konomihu, Chimariko, part at least of the hill-dwelling Northern Wintun, Mattole, Nongatl, Lassik, Sinkyone, Wailaki, and in some measure the Kato and Coast Yuki, all showing a considerable proportion of Northwestern traits.

Comparisons will also be made with what we are terming, in the tabulation accompanying map 2, "Neighboring Groups." Here, though the culture is predominantly Central Californian, there are still traces of linkage with Northwestern California.

The distributional maps,[3] maps 3-74, show the locations of these groups and indicate also their groupings as based on fishing techniques, and other features of material culture.

Despite studies like Goddard's "Life and Culture of the Hupa," no comprehensive accounts of fishing in the area have been published. The present monograph is based on all data available to us, published and unpublished.

The chief published data utilized in this study include the relevant information in Kroeber's Handbook, in Goddard's Hupa, and in special monographs like the Waterman and Kroeber Kepel Fish Dam. From volumes 13 and 14 of E. S. Curtis' The North American Indian, rare and hence often inaccessible to scholars, we have sometimes quoted passages instead of merely summarizing or referring to them.

ACKNOWLEDGMENTS

There are three large bodies of unpublished data to which we have had access. These consist of copies of field notes recorded by Kroeber, by our colleague Gifford, and by Gordon Hewes. We express our special gratitude to the two latter and make full acknowledgment. Our work would have been much more meager if it had not been for their unrestricted and generous contribution.

To permit authentication and verification of data, it is desirable to preserve record of authorship of individual sets of data. We have therefore treated our manuscript data as historians and humanists treat their manuscripts, namely as ultimate primary data, whose identity must not be blurred by intermingling or premature consolidation.

Kroeber's field notes comprise two series. The older and broader notes were written in the native habitat between 1900 and 1908, chiefly on the Yurok, but also on Karok, Hupa, and Wiyot. The second series, on the Yurok, was recorded from 1933 from Robert Spott, who is named as informant. Kroeber's earlier field notes, which tend to be more summary than those from Spott, are sometimes credited to the informant who made them, especially when they possess a coherent point of view. References to these data are sometimes made by such notations as (40-82) which indicate that these data are

[1]Kroeber definitely assigns these nuclear tribes of Northwestern California to the Northwest Coast culture area (1920, pp. 155-164; 1925, pp. 903-912; 1939, p. 30).

[2]With the Tolowa we may include also the Chetco, just across the California-Oregon border. As is pointed out by Drucker (1937, p. 222), while a relatively close cultural affinity is recognized between the Tolowa and their Athabascan-speaking kindred to the north, the culture of the Tolowa was quite strongly influenced by their Klamath River neighbors to the south, while that of their northern kin was more strongly tinged with the cultural features of such closer neighbors as the Kus and the Umpqua.

[3]The map used as the basis for this series is map No. 11 of the University of California map series; its tribal and numerical designations are followed throughout.

recorded in his field notes, Volume 40, page 82. Also in reference to a myth the annotation may be C3 or G2, which indicates that the myth is so numbered in his "Yurok Tales," now in preparation for publication.

Gifford's field work was done primarily among the Karok from 1939 to 1942. He has published papers on the World Renewal ceremony and on Karok ethnobotany; everything else he has put at our disposal and we have drawn from it what bears on fishing. His data are often valuable for their unusual detail. His authorship, when not cited in subheadings, is indicated by the reference "Gifford (F.N., 1939-42)."

In 1940 Gordon W. Hewes, now at the University of Colorado, spent his next-to-last summer as graduate student at the University of California in an intertribal field survey of native fishing methods, which he prosecuted north along the coast from San Francisco Bay into southern Oregon, and up the Klamath drainage. From these data of his own collecting he subsequently branched out into the published literature to write his doctoral dissertation on "Aboriginal Use of Fishing Resources in Northern North America," which remains unprinted but is on file as of 1947 in the University of California Library at Berkeley. We have drawn on this, but even more heavily on a typewritten copy he lent us of his 1940 field notes, of which only part could be incorporated in his dissertation, which has a wider range. Data from his field notes are listed as "Hewes (F.N., 1940)" when not identified by a subheading. Data from his thesis carry the identification "Hewes (Th., 1947)."

Finally, we drew systematically on the ethnological collections from Northwestern California in the University's Museum of Anthropology, collected principally by Kroeber, Goddard, and Philip Mills Jones in the first decade of the century, under grants then made to Anthropology by Mrs. Phoebe Apperson Hearst, Regent of the University, and under her patronage. Other specimens from the region came into the Museum subsequently, with an inevitable shift with the years from primarily ethnological to archaeological material. Specimen numbers given in the text are from the Museum's catalogue 1, the California collections, unless otherwise stated. Negative numbers are from Museum catalogue 15.

We were also able to consult and utilize the excellent Northwest California collection of the State Indian Museum at Sacramento, and our whole-hearted thanks are due its successive Directors, Mr. Jack Dyson and Mr. F. A. Riddell.

We are indebted to Mr. Grover Sanderson, a Karok Indian reared on the Klamath River, whose genuine interest in the aboriginal ways of his people has led him to take many pictures in order to preserve a record of old customs before their disappearance. We are, with his permission, reproducing in plates 29 to 31 twelve of these photographs pertaining to fishing among the Karok, all taken by him on the Klamath in 1932.

We have had the aid of grants from the share of the research funds which the Department of Anthropology receives from the University on recommendation of the Committee on Research. These grants were made in 1954-55 and 1955-56 and enabled us to arrange for copying, typing, and photographing. Certain of the notes on the Yurok were transcribed as the result of an earlier grant-in-aid (no. 543) to Kroeber from the Wenner-Gren Foundation for Research in Anthropology. These aids are acknowledged with gratitude.

BIBLIOGRAPHICAL KEYS

Immediately following most major subject headings we give a condensed list of references in the literature to topics in question, arranged alphabetically by authors, with dates and citation of the specific tribes referred to. These lists will facilitate comparisons for checking further. These and other references are, of course, predominantly on the positive side. Observers in the field tend to record the presence of a given trait, but rarely note absences.

MAPS

Map 1 is a detailed map of the extreme northwestern section of the region covered by our present study --- the only part of the region for which we have anything like complete data on weir locations. On this map the rivers and creeks are indicated in sufficient detail to permit exact locations to be given for many of these weirs. The approximate situations of other weirs are indicated. The legend accompanying this map gives these locations in detail. Outside the area covered by this map we have definite locations for only six other weirs: three on Russian River, two on the Sacramento, and one on Feather River.

Map 2 shows the culture areas in northern California, and the area of culture blending in Northwestern California.

Maps 3 to 74 are distributional maps which graphically summarize the known distribution of traits concerned with fishing and other related elements of material culture. Each map shows at a glance the territorial and tribal limits of a single trait. For some tribal groups information is scarce, so blank spaces on the maps, like gaps in our information, often indicate lack of recorded knowledge rather than a definite absence of traits.

In preparing this series of maps we were confronted with certain facts which unfortunately make for incompleteness. (1) Many of the authors, particularly the earlier ones, recorded their findings in such general terms that it is often difficult to be certain of the particular type of implement or device mentioned. (2) The absence of an implement or feature is almost never noted. Where its presence is affirmed, we have noted it on our map with shading. Where we have its absence positively stated, this fact is indicated by underscoring the areal number. When we have both positive and negative evidence, the area is shaded, and the number is underscored. Otherwise blank spaces appear. These blanks indicate lack of evidence, positive or negative. For example, very little is on record concerning the Huchnom, though their close affiliation, linguistically and culturally, with the neighboring Yuki proper and Coast Yuki makes it most likely that they had the same customs and used similar implements. The only ethnographer who has had an opportunity to make even a limited study of the Huchnom is Foster, who says (1944, p. 226), under the heading of "Fishing": "Same techniques, same varieties as described for Yuki." With this statement in mind we have shaded Huchnom areas to correspond to those of Yuki on each map. Otherwise these would have remained as blank as areas of the several other tribes which disappeared soon after white contact.

We suspect that if further inquiries could be made in the field, provided informants could be found at this late date, many of the blank spaces on these maps could be filled. This is particularly true for those blank spaces which are surrounded by indications that the neighboring tribes did possess some particular implement or custom.

For convenience of reference all maps are brought together immediately preceding the plates at the end of the paper.

CHAPTER I
RIGHTS, VARIETIES OF FISH, AND METHODS

FISHING RIGHTS

BARRETT, 1952. Pomo, pp. 40, 41, 103, 104, 148, 149.

CURTIS, 1915. Kwakiutl, pp. 22-24, 28; private or family rights to eulachon fisheries; salmon weirs communal.

DRIVER and MASSEY, 1957. General statement on ownership of fishing places, p. 256.

GARTH, 1953. Atsugewi, p. 136; private ownership of fisheries largely restricted to falls.

HEWES, Th., 1947. Yurok, pp. 81-82; wide geographical range of holdings of individual.

KROEBER, 1925. Yurok, pp. 27, 33, 34; value of a fishing place; rules governing use of fishing place and division of time and catch among owners.

_____, 1926. Yurok, p. 516; comparison of Yurok property rights to those of the Northwest Coast tribes, and to those of Central California.

_____, 1932. River Patwin, p. 277; some fishing places privately owned.

SPIER, 1930. Klamath, p. 149; no private rights, fishing or other.

SPOTT and KROEBER, 1942. Yurok, p. 188; whale rights. Pp. 182, 183, 188, 191, 192, 197; sea-lion flipper rights.

WATERMAN, 1920a. Yurok, pp. 218-226; property rights, especially regarding fishing places, sea-lion rocks, beaches, and whales; descent and inheritance; map 3 locates properties of one family; pl. 8, fig. 1, typical fishing place.

CORE AREA

The dependence in northern California upon fish as a major source of food supply was tempered, especially in the core area, by a rather elaborate system of rights assuming the force of law.

The best fishing places along the rivers were privately owned, sometimes by single individuals, sometimes jointly by several. In the latter case, a fishing place would be used by each owner in rotation, according to the proportionate share of his ownership. An owner might give someone else permission to fish there on the day or days when his turn would normally come. But no one was permitted to fish or to establish a new fishing place immediately downstream from a recognized fishing place.[4]

A share in a fishing place was a personal property of real and recognized value. It could be sold or given away by its owner, and could be passed on by inheritance. Kroeber (1925, pp. 33, 34) gives details, and specifies (p. 27) that a fishing place or right was worth from one to three strings of dentalia.

Most inferior fishing places, and a few excellent ones, were not privately owned but were open or public.

To a somewhat lesser extent the system of private claims carried out to the beaches, lagoons, and offshore rocks along the coast, but with more orientation to prestige-giving rights than to productivity of food supply. Most references are to a person or house "owning" a stretch of coast several miles long, but only for certain uncommon privileges, such as making the first cut in a stranded whale or receiving the flippers of all sea-lions taken.

Hewes (Th., 1947, pp. 81, 82) makes the following observation on the subject of fishing rights: "Throughout the Yurok area property rights were apt to be far-flung, and a native of Orick might be a shareholder in a productive eddy on the Klamath river ten or fifteen miles from its mouth. Many Klamath Yurok, for example, owned shares in the sea-lion hunting at Redding Rock."

Such geographical scattering of ownership was the cumulative result of intermarriage of families, inheritance, payments for wives, weregild, injuries, and occasional purchases. Waterman's (1920a, p. 225) map of the property owned or claimed by one family includes two deer-snaring tracts, four fishing spots, fifteen separate acorn grounds, a fifteen-mile stretch of beach (rights unspecified), and a house site, scattered over a wide range of territory from Redding Rock, with sea-lion and mussel opportunities, six miles off shore, to places strung along thirty miles of the Klamath.

In the main, use-rights to any such "properties" were simply recognized by common consent. However, Waterman (1920a, pp. 220, 221) records that among the Yurok tokens were sometimes kept, and cites two examples: (1) The special tump lines used in measuring and dragging cuts of whale meat were passed on by inheritance or marriage, and served as a guarantee of title to a definite share in any whale washed ashore on a certain stretch of beach. (2) Certain sea-lion clubs were similarly used to guarantee title to shares in rookeries. We discuss these instances more fully under "Sea Mammals" in chapter XI.

A good example of the operation of fishing rights among the Karok is shown by Gifford (F.N., 1939-42). An informant told of a half-mile stretch called pawat

[4]Kroeber in 1902 noted that "at Kenek (Tuley Rapids) the best sturgeon fishing eddy is just above the roughest rapids. There would be good sturgeon fishing below, but it is law that one may not make a new fishing scaffold below an established one--not for nearly half a mile; the owner above would drive off the newcomer. This particular sturgeon 'claim' is owned by a number of men: some own the right to fish it for a night, some for two nights."

andjsununam ("where they start fishing for Chinook salmon"), where only the owners might fish. When asked if this meant "owners of the land along the river," the informant replied emphatically, "No; it made no difference at all who owned the land; only those fished there who owned the rights though they would give away fish on request if there were sufficient."

Gifford further cites that in 1940 Happy Jack sold a share in the "fishery" at Katimin to Emily for six dollars. This share entitled her to use the spot every third night and day, from afternoon to afternoon. Since women themselves never fish, the fishing would be done by her son or a substitute.

Another fishing site is still owned by a woman through inheritance. It was presented to her family in return for care in a man's last illness and "burial in good clothes," this when the present owner was a baby. A third Karok woman owns a share in a fishing place at Ashanamkarak, and also one above the Forest Service bridge near by, as well as acorn-gathering and hunting rights. These instances show that women possessed rights even though they might not exercise them in person.

Spott and Kroeber cite details of the purchase of a salmon-taking right in Prairie Creek off Redwood Creek (1942, p. 211), and of acorn-grove ownership by both inheritance and public gift (1942, p. 148).

Hewes (F.N., 1940) found that in our nuclear area, fishing places at eddies where the large lifting net was used were always owned privately, as were also most of the important gathering tracts, hunting areas, and offshore rocks. Other types of fishing usually were not reserved. Specifically, for example, Lake Earl was an open fishing area. Any Tolowa could set a gill net or could seine in the lake itself; only the creeks emptying into the lake were privately owned.

Kroeber's Yurok information agrees. Eddies by which scaffolds were built for salmon fishing with A-frame nets were owned, but less productive spots, or the taking of less important varieties, or the use of harpoon, or gaff, or drag net were likely to be public and open.

Robert Spott told Hewes (F.N., 1940) of an interchange of open fishing privileges on the lower Klamath. People living upriver from Turip-Sa'aɬ to Pekwan might fish downriver as far as Turwer Creek. Reciprocally, those at the mouth of the river at Rekwoi and Welkwaw were privileged to fish upriver to Erliiken-pets--an overlap of six river miles (see Waterman, 1920, maps 4, 5, 9-11). These reciprocal rights were probably automatic, not calling for permission. It appears that Turwer and Erliiken (Lamb's Riffle) were famous communal fishing places, where people seasonally camped in numbers (Waterman, 1920a, map 9, sites 46, 48, and p. 236; and map 10, sites 11, 14). Also there were no permanent settlements in the stretch between them, except Turip-Sa'aɬ.

Hewes records the word for a fishing spot or for any private and localized right in several languages of the area: Yurok, mequoɬ [Kroeber, mekwoɬ, "claim"], Karok, imvir, Shasta uwe. If necessary, the name of the locality, of the species, or of the type of net used was prefixed.

PERIPHERAL AND NEIGHBORING AREAS

Out from the nuclear area the tendency toward individual or family ownership of specific sites or areas diminished, but it is probably safe to say that it rarely disappeared wholly. Even where communal ownership was dominant, the season's yield of a tree or the crop of a patch might be claimed for a family by marking it in some way.

VARIETIES OF FISH UTILIZED

BONNOT, 1930. Pp. 131, 132; several species of surf fish. Candlefish.

CHARD, 1953. Wappo, p. 244.

CURTIS, 1924a. Wiyot, pp. 193, 194; myth: "How Salmon Were Brought to the Rivers." Culture hero brings salmon from fish weir of Pleiades in the far north and stocks each river along the coast from Smith River down to the Mattole.

DRUCKER, 1937. Tolowa, pp. 231, 232.

FONT, 1931. Fr. Font (in 1775, 1776), in speaking of the vicinity of Carquinez Strait, notes the abundance of salmon (p. 371); also he saw two large fish netted which, from his description, appear to have been sturgeon (pp. 372, 373).

GIFFORD, 1939. Coast Yuki, pp. 321-325; various fish and fishing devices discussed. Also flora, crustaceans, mollusks, other marine invertebrates, and whales.

HEWES, Th., 1947. Pp. 79-82; relationship of Northwestern California rivers to the whole salmon area. General statement of topographic features governing salmon runs. Salmon runs by seasons.

ROSTLUND, 1952. Maps showing ranges of species, as follows: map 1, lampreys; map 3, sturgeon; map 8, Pacific salmon; map 9, cutthroat and rainbow trout; map 12, suckers. Pp. 149-151, 207; importance of fish as a food.

WATERMAN, 1920a. Yurok, p. 185; importance of salmon in Yurok economy.

FRESHWATER SPECIES

We owe to Professor Erhard Rostlund, of the Department of Geography at the University of California, our thanks for guidance to data, summarized here, by the California Fish and Game Commission and others, on the fauna of Smith and Eel rivers, which is presumably the same--except that no dolly-varden trout appear to have been recorded in the Eel. The Trinity and the Salmon presumably share most of the fauna of the Klamath, to which they are tributary.

Anadromous species.--Of the five species of Pacific Salmon, Oncorhynchus, only two regularly frequent the Klamath: O. tschawytscha, the King or Chinook, and O. Kisutch, the coho or silver salmon. O. nerka, the red or sockeye salmon, may occur in the Klamath, but not in

significant numbers. Two other species, O. gorbuscha, the pink or humpback, and O. Keta, the chum or dog salmon, are rare in all California rivers, although occasional stragglers may appear.

The steelheads are sea-running trouts or Salmonidae, and do not die on spawning. The usual species is Salmo gairdnerii (irideus), the rainbow trout. North of California, S. clarkii, the cutthroat trout, and Salvelinus malma, the dolly-varden, sometimes run to sea and return as "steelhead"; at least the first of these species entered the Klamath and adjacent streams. But the dolly-varden seems pretty certainly not to have frequented the Eel.

Both salmon and steelhead run up the Klamath into the Klamath Lakes and their tributaries.

There are certain significant variations in the distribution and times of run of both salmons and trouts within our area. The King or Chinook salmon has two runs a year in a few of the larger rivers. There is always a fall run if this species enters a stream at all. In addition a spring run occurs in Smith River; in the Klamath, including the Trinity but not other tributaries such as the Salmon, Scott, and Shasta; and in the Sacramento, including most of its tributaries. The presence of this spring run is evidently conditioned by a heavy flow.

All the other northwestern streams that enter the ocean, from Redwood Creek to Bear and Mattole rivers, have fall-run King salmon only. South of the Mattole, however, only the Noyo and Garcia seem to be entered by King salmon. Either the flow is too small, or perhaps it comes too late in winter.

The Eel has fall-run King salmon, but they are more usually called "black salmon" in the upper reaches, this species turning blackish after prolonged exposure to fresh water. These black King salmon are sometimes trapped in pools in the variable flows of the Eel River tributaries. The point is mentioned here because of allegations that most of the Eel drainage was not visited by King salmon: the error rests on confusion of popular names.

The Yurok on the Klamath distinguish the two runs of King salmon. The spring Kings, or "Chinooks" in local English, are called numi-nepúi, "true salmon," or nepewô after their mythical ruler and leader. It is for them that the First Salmon Rite is made by the Yurok about April at the mouth of the Klamath and by the Karok below the mouth of the Salmon. The fall run, according to the Yurok, may begin as early as July, and they speak of the fish in English as summer salmon, or King salmon, on account of their large size; the native name is ohpés.

The silver salmon is a much smaller species than the King--maximum weight 27 pounds as against 100. It is rarely above 15 pounds as against 50 for King. They do not seem to have entered the Sacramento-San Joaquin drainage at all. With this exception, however, they enter all California streams that the King salmon enter, plus a series of smaller coastal streams south of the Mattole, namely Ten Mile, Big, Albion, Navarro, Gualala, and Russian rivers, plus several large creeks in the same stretch, such as Elk, Alder, and Salmon creeks; also at least four streams on the San Francisco peninsula or draining into northern Monterey Bay, the southernmost being Soquel Creek.

The Yurok call this species tsegwún or tsegún, or silversides in English, have them run from September to November, and say they spawn along the lower river, hence include many hook-bills and sore-tails. They average only about 8 pounds; the flesh is white and contains little oil, so they can be dried without splitting into three longitudinal slices.

Of the two anadromous trouts or steelheads, the cutthroat is known to the State Fish and Game Commission to have entered only the coastal streams from the Smith to the Eel, but has not been reported from affluents such as the Trinity or Salmon. The rainbow steelhead has much the widest distribution in California, occurring wherever any other "salmon" occurs, and beyond to the south as far as Los Angeles and even San Diego counties, local run-off permitting.

The Yurok call both the rainbow and the cutthroat steelhead tskwoł, but distinguish winter and summer runs, the first lasting from about December to February, the latter until November.

The sturgeons are limited to the lower courses of the rivers. According to Karok statements to Kroeber, they are ordinarily stopped by Ike's Fall, a mile below the mouth of the Salmon River. There are two species: Acipenser transmontanus, the larger and more common "white" sturgeon, and A. medirostris (acutirostris), the smaller and less numerous "green" sturgeon.

The "eel" is Entosphenus tridentatus, the Pacific lamprey, largest and much the most common of the western lampreys. Small, dwarfed brook forms or subspecies also occur. The lampreys, like the salmon and steelhead, ascend to Klamath Lakes.

Permanent fauna.--The trouts are the same species as the steelheads: the common or rainbow trout, Salmo gairdnerii (or irideus, with some distinguishing a Klamath River subspecies as newberrii); cutthroat trout or S. clarkii; and dolly-varden, Salvelinas malma, strictly a charr rather than a trout. When individuals of these species stay in the river, they are called "trout"; when they return after having entered the ocean, they are steelhead.

The most important other group of freshwater fishes are suckers, of which there are two, the Klamath coarse-scale sucker, Catostomus snyderi, and the Klamath fine-scale sucker, C. rimiculis, the latter occurring only below Klamath Falls.

There are four other suckers, Chamistes brevirostris, C. stomias, C. copei, and Deltistes luxatus, which are confined to the Klamath Lakes and their tributaries. They thus do not live in the Klamath River itself, nor presumably in other Northwest California streams.

The rest of the freshwater fauna is notably poor; few in species, individuals also few and small. There are three or four minnows (Cyprinidae): the Klamath speckeldace, Rhinichthys osculus klamatheniis; the Klamath River tui, Siphateles obesus bicolor, formerly Rutilus bicolor; allegedly Leuciscus bicolor; and in the Klamath Lake system an endemic minnow or chub of subgenus Klamathella. There is also a small sculpin, the Klamath muddler, Cottus bairdii; and the California three-spine stickleback, Gasterosteus aculeatus subsp.

Introduced species.--At one time or another in the past century, Eastern brook trout, carp, the American eel, catfishes, large-mouth and small-mouth black bass, sunfishes, crappies, shad, and striped bass have been introduced into California rivers: none of these forms was native.

Most likely of these to be found in northwestern streams are the last two, shad and striped bass, which are anadromous like salmon, steelhead, sturgeon, and lamprey. This suggests that the Klamath and neighboring streams provide an ecologic niche particularly favorable to species that are spawned in rivers, move into the ocean, and return to the streams to breed.

SALT-WATER SPECIES

In the ocean, the Indians had more difficulty taking fish than in streams. There were undoubtedly more species of salt-water than of riverine fishes available, but as some of these were probably never fished for and others were to be seen only sporadically, it is unnecessary to list all the species. Both mollusks and sea-mammals were more important to the Indian than fish (see chaps. X, XI).

The most important in native life over the coast as a whole probably were several species of small surf fishes or smelt that spawned along sand beaches, and next to these the small eulachon that spawned in brackish river mouths.

Humboldt Bay, in possession of the Wiyot, was the only sheltered body of salt water in the region, and more kinds of sea fish were taken there, probably, than in all the remainder of the coast.

NATIVE BELIEFS AND STATEMENTS

A Wiyot informant told Hewes that the steelhead follows the King salmon upriver in the fall run to eat the King salmon eggs as these are laid.

From the Shasta, Hewes learned of salt licks near the Klamath producing spots of brackishness in the river in which the "summer salmon" (gîtar) lingered. After July they again took to the fresher water.

A Karok listed the principal species to Gifford as follows:

1. Chinook, King, spring, or black salmon: pawat, pavat (the name, binuni ama, "summer salmon," may be a translation from English). This was recognized as a large, dark-skinned fish with pale pink ("white") flesh and was the most esteemed species. It appeared in spring and continued through fall. Before the spring run, these fish were referred to honorifically as inenyari, which naming helped induce them to come in numbers. The first arrivals were called ixyats, but might not be eaten until after the ceremony made for them at Amaikiaram. This was the species for which lifting-net scaffolds were set up, though in creeks it was harpooned.
2. Coho or silver salmon (also sometimes locally called dog salmon): achawūn or ichwōn. It was very red-fleshed, rather dry, not fat. The run began late, in October.

[The three other species of Pacific salmon were not mentioned, no doubt because of their rarity.]

3. Steelhead: sa'ap. In winter, at high water, they continued to be taken with platform lifting nets after the salmon completed their runs.
4. Trout: ashkup, were in the river and creeks the year round. [Hewes adds that the Shasta did not catch them in summer.]
5. Suckers: chamuxit. Bony, not considered too desirable, but available the year round. [Hewes says the Shasta took them with dip nets in winter.]
6. Bullheads: xantiit, are probably the catfish introduced by Americans. [Hewes gives the name as hanket and says they were chiefly caught in winter with dip nets.]
7. Sturgeon: shikihas, ishrixihara, the latter alluding to the rough skin. Occurs upstream only to Ike's Fall, which it cannot hurdle; but the Karok say it fears an enemy above there and turns back. Sturgeon were caught in a strong-meshed lifting net. The flesh was considered less good than salmon, and there were no special formulae or ceremonies for sturgeon.

[This list evidently started out to name the species in the order of their native importance, but breaks down after no. 3, the sturgeon coming in as an afterthought and the lampreys being forgotten. Both were certainly more important than trout or suckers.]

According to Hewes, sturgeon, being large fish, rarely entered small streams, but to the Yurok and Wiyot were of considerable importance; and were taken in seines and lifting nets or by harpoon. The Wiyot stated that sturgeon might come in summer so near the surface to bask that they could be harpooned from a canoe. We presume this was done in Humboldt Bay.

FISHING METHODS

BANCROFT, 1883. Yurok, Wiyot, pp., 337, 338; weirs, torches, lures, harpoons, diving, traps, lifting nets, scoop nets, basketry traps, eel pots.

BARRETT, 1952. Pomo, pp. 148-156.

BONNERJEA, 1937. Yurok, Sinkyone, Yuki, Pomo, Shasta, pp. 130-133; lifting nets, seines, harpoons, eel pots, arc nets, plunge nets, spears, weirs, gaffs, driving, traps.

CURTIS, 1924a. Hupa, Wiyot, p. 8; hooks, double-toggle harpoons, traps, acute-angle hooks, single-pointed harpoons, weirs, nets (seine, A-frame, landing). Klamath, p. 169; hooks (gorge, acute-angle, double-barb), nets, spears.

_____, 1924b. Wailaki, p. 22; arc net. Pomo, p. 63; arc nets, scoop nets, traps, harpoons. Wintun, p. 77.

DRIVER and MASSEY, 1957. P. 201; general statement.

FOSTER, 1944. Yuki, p. 164; lampreys of two species (small gray, large black); only latter eaten; caught with hands or flipped onto bank with stick.

GIFFORD and KLIMEK, 1936. Yana, pp. 80, 86, 97.

GOLDSCHMIDT, 1951. Nomlaki, p. 406; salmon rare; no spearing or seining; diving, catching with hands, small nets.

HEWES, 1942. Pp. 103, 104; concise general statement.

_____, Th., 1947. Miwok, p. 61; arc net, basketry traps, gorge hooks for sturgeon, harpoon; lampreys speared, gaffed, trapped, seized by hand; trout caught by hand; shooting with bow and arrow, poisoning.

Nisenan, pp. 62, 63; spear, single-pointed toggle harpoon, gill nets, dip nets, arc nets, basketry traps, caught by hand. Maidu, p. 63; weirs, toggle harpoons, A-frame nets, arc nets, poisoning, basketry traps, gorge hooks, acute-angle hooks, noosing, diving. Patwin, p. 65; seines, arc nets, weirs, corrals, diving, noosing, gorge hooks. Yana, p. 66; double-toggle harpoon, darkened booth, basketry traps, gill nets, arc nets, poison, hooks. Wintun, p. 67; double-toggle harpoon, darkened booth, weirs, basketry traps, drives, seines, diving, gorge and angle hooks. Wappo, p. 71; harpoons, basketry traps, nets, weirs, drives, poisoning. Pomo, p. 71; arc nets, hoop nets, poison, gorge hooks, harpoons (single and double points), basketry traps, weirs, seines, giant arc net on Clear Lake. Yuki, p. 75; arc net, set gill net, bag nets, basketry traps, single and double toggle harpoons, weirs, diving. Achomawi, Atsugewi, pp. 97-98; multipronged spear, stone fish dams, ice fishing, hoop net, arc net, poison, drives, basketry traps, angle hooks. Klamath, Modoc, pp. 97-98; double-pronged toggle harpoon, gorge hook, double-pointed angle hooks, V-frame dip net (large), multipronged spear, basketry traps, stone fish dams, hoop net, ice fishing, no poisons. Shasta, pp. 98-99; A-frame dip net, harpoon, acute-angle hook, weirs, drives, plunge net, basketry traps, poison, beaver dams, movable weirs.

KNIFFEN, 1928. Achomawi, p. 305; ice fishing.

KROEBER, 1932. Patwin, p. 295.

ROSTLUND, 1952. P. 86 and maps 33-43; evaluation of fishing methods. Distribution of fishing methods.

SAPIR and SPIER, 1943. Yana, p. 252; spear, hook and line, seine.

Within the range of known fishing techniques, the methods employed are governed almost entirely by the local conditions of terrain and water. These environmental factors may be outlined as follows:

1. Pelagic. True pelagic fishing was almost entirely absent, except as noted in speaking of sea fishing and sea-lion hunting. The abundance of fish in the bays, estuaries, rivers, and smaller streams furnished an ample supply so the more hazardous pelagic fishing was really unnecessary. Furthermore, wholly reliable sea-going canoes were not available for such fishing.

The canoes used on the open ocean were large, stout, and undamaged examples of the blunt-ended craft used on river, lagoon, or bay. They were used on the ocean for sea-lion hunting, trips to mussel rocks (Redding Rock is 6 mi. offshore), and sometimes for transport. Their completely round, keelless bottoms and especially their square ends, made them dangerous any time after whitecaps began to appear on the ocean. Thus we have here a condition opposite to that found among Northwest Coast tribes such as the Nootka of Vancouver Island, where canoes with prows were made for travel at sea and for whaling.

2. Offshore rocks. On the offshore rocks and sea stacks were sea-lion rookeries and mussel beds. These places were reached in the large river canoes--in fact, some were close enough inshore to be reached by swimming. Incidental to this activity, hunters en route in a canoe might harpoon a sea lion, a seal or a sea otter asleep on the surface of the ocean.

3. Littoral fishing. The actual shore line was of two kinds: rocky cliffs and sandy beaches. The shore-dwellers took moderate numbers of fish by means of hook and throw line from the rocks along the coast; such rocks also yielded shellfish and seaweeds. Much greater quantities of fish were taken with the scoop net (and to a much lesser extent with the arc net), as these smaller species came in close to the beaches with the breakers to spawn.

4. Bays, estuaries, and "lagoons." In the relatively still waters of Humboldt Bay and its estuaries, and in some stream mouths, usually fairly shallow and affected by the ebb and flow of the tide, we find spearing, gaffing, dip-netting, gill-netting, and bag-netting, all done from canoes; and the use of setlines, trotlines, and certain special types of traps. Movable weirs were also used.

North of Trinidad, in Coast Yurok territory, were three lagoons -- Big, Stone, and Freshwater -- each separated from the ocean for most of the year by a sand bar, which in the first two broke open only in the rainy months, when the lagoons were swelled by stream discharge. The surf might soon rebuild the bar or the mouth would re-open and close several times, admitting tide flow and some salt-water species. As soon as the heavy rains were over, the bars reformed until the following winter. Big and Stone lagoons were thus prevalently freshwater instead of tidal, and Freshwater Lagoon is said to have opened to the ocean only once in the past half-century or more. These three mainly "landlocked lagoons" of the Coast Yurok shore are a quite special local feature.

5. River outlets and bars were very important in the taking of anadromous species and the species which preyed upon them. Here we find the harpoon almost exclusively in use.

Important were the bars which formed at some river mouths during the summer season of low run-off. At the mouths of Mad River and Redwood Creek such a bar extended from bank to bank and completely shut off the stream from the ocean. As the salmon congregated for their annual migration up these streams, it was sometimes necessary for the fishermen to cut through the bars. The stream then soon scoured out a narrow channel and the fish were able to ascend. This cutting was almost always a communal matter and was attended by some ceremony.

Not infrequently a bar formed only part way across a stream, in which case the fishing was good only at the opposite bank. But the vagaries of almost any bar were such that next season it might establish its outlet along the other bank, leaving the established fishing spots in backwater or even dry, while opening up a new series of fishing sites. The mouth of the Klamath did just this. The actual outlet might be for years on the north side, and then shift in a winter storm to the south side, though the flow was too great for the mouth ever to remain dammed. On the contrary, Redwood Creek, which in winter is a big stream, almost every summer is dammed by the surf and forms a freshwater lagoon behind its bar, several feet higher than mean sea level.

There is a complete gradation from the permanently open "lagoon" at the mouth of a large river like the Klamath to, say, the permanently landlocked

Freshwater Lagoon, which in summer has only an insignificant trickle or two entering it. Redwood Creek mouth has only a short slough after the rains begin and its bar opens, but by summer may develop a lagoon of tenfold extent with water several feet higher than sea level. Big Lagoon is, in a sense, the stream-mouth lagoon of Maple Creek; but the flow of this stream diminishes heavily in summer, though normally it continues to run. Mad River has Arcata Slough running south some miles from its mouth; this slough was navigable for canoes, but did not widen out into a "lagoon." Next southward, Humboldt Bay might be considered a permanently open lagoon. It has several fair-sized streams draining into it--Salmon Creek, Elk River, etc.--but the area of the bay is large enough for its volume of water to be sufficient to keep the opening scoured out by tidal flow. The outlet channel made difficulties for modern navigation until it was double-jettied, but there is no record of its ever being closed by the surf. Salmon Creek and Elk River have no notable flow in summer but are permanent tidal estuaries running some miles inland from Humboldt Bay.

6. Stream fishing.

Riffles: For harpooning, gaffing, certain types of trapping and driving.

Shallows: For weirs (often with impounding pens), for spearing, dip-netting, gaffing, and trapping. The Kepel dam was the most elaborate construction.

Eddies: Here triggered lifting nets were used from platforms. This was the most highly specialized feature of the region.

7. Falls and cascades. Here anadromous species attempting to ascend to spawn were taken with plunge nets, traps, harpoons, gaffs, and baskets.

8. Sluggish waters and deep pools. Diving, bow-and-arrow shooting (some tribes only), snaring, poisoning, sturgeon riding.

9. Creeks and smaller streams. Short weirs with basketry traps, hook-and-line fishing, sniggling.

10. Lamprey fishing. This eel-shaped species was taken with lifting nets and other types of dip nets and with basketry traps; also by means of rock piles, on the faces of certain falls, by means of gaffs and awls, by hand catching, and with eel pots (recent).

11. Ice fishing was, for climatic reasons, almost entirely absent. In fact, we find only one positive statement on the subject of ice fishing. One of Kniffen's Achomawi informants (1928, p. 305) stated that in the winter "nets were set through the ice and the fish were driven into them." No details of this procedure are given and it is hard to see just how it was done. The language seems to indicate that some sort of flat net was used. To set such a net through the ice would present some difficulties and, even if it were in place under the ice, the driving of the fish into the net would seem even more difficult.

Thus, different environmental conditions ruled the life cycles of these species, controlled the methods by which each might be taken, and gave rise to the different devices: weirs, nets, traps, spears, harpoons, gaffs, and other inventions of the primitive fishermen. And, since fish formed their most abundant food resource, the one upon which their existence chiefly depended--at any rate next to acorns--we naturally find fishing of prime interest in a study of this specialized culture.

Here the chief emphasis was upon methods of mass fishing or taking fish continuously without changing station, by weirs, nets, and traps. Only more or less incidentally do we find methods for taking fish individually: noosing or riding sturgeon, jerking trout, shooting salmon with bow and arrow. These methods were used as conditions permitted or, to some extent, as a matter of sport. The return was small when compared with the standard methods, which might yield in a relatively few days of concentrated effort a whole winter's supply of food.

CHAPTER II
WEIRS

AGINSKY, 1943. Miwok, p. 399; weirs, stone dams, and pens.

BANCROFT, 1883. Yurok, pp. 337, 338; weir with pens and scaffolds; fish harpooned or dip-netted.

BARNETT, 1937. Tolowa, Chetco; pp. 163, 164, 195.

BARRETT, 1952. Pomo, pp. 149, 150, 357.

CURTIS, 1924a. Hupa, pp. 8, 15, 16, 18. Yurok, p. 40. Wiyot, pp. 74, 75. Shasta, p. 113. Achomawi, p. 137. Tolowa, p. 98.

_____, 1924b. Wintun, pp. 85, 86. Maidu, p. 109.

DIXON, 1905. Maidu, p. 197; guide fence for salmon.

_____, 1907. Shasta, p. 428; construction and use of weir; only three weirs in Shasta territory.

DRIVER, 1936. Wappo, pp. 184, 185; weir for salmon, etc., straight line of driven posts with intertwined brush. Openings for "wicker traps or baskets" with "mouths facing downstream to receive fish coming up"; salmon and other large species of fish caught "in baskets or nets tied to dam."

_____, 1939. Tolowa, Karok, Yurok, Wiyot, Hupa, Chilula, Nongatl, Mattole, Sinkyone, Kato, Coast Yuki, pp. 312, 378; notes give details of construction; most all with scaffolds; movable weir used by Wiyot, Hupa, Mattole, Sinkyone, Kato.

DRIVER and MASSEY, 1957. Pp. 201, 203, map 26; general statement.

DRUCKER, 1937. Tolowa, pp. 232, 233; built communal fish weirs, with formulas, at specified sites; individuals built smaller weirs on creeks; small diagonal weir with cylindrical net at weir opening, with crab-claw rattle and string for closing net; lamprey weir and gaff and torch used. Salmon weir points downstream. Lamprey weir points upstream to a chute leading past platform where fisherman gaffs lampreys.

DU BOIS, 1935. Wintu, p. 17; for suckers; wings of brush or stones built out from banks; net in opening; fish driven.

ESSENE, 1942. Pomo, Kato, Lassik, Yuki, p. 6; straight across stream, dip net in opening. Pomo, Kato, platform on weir.

FOSTER, 1944. Yuki, pp. 163, 164; brush weir with dip net set in opening; also impounding corral at downstream side of opening; fish finally removed in coarse basket; weir removed after two days' fishing.

GARTH, 1953. Atsugewi, pp. 136, 137; guide fences, V-shaped. No elaborate weirs. Achomawi, p. 136.

GIFFORD, 1939. Coast Yuki, p. 325; fence weir for salmon.

GIFFORD and KROEBER, 1937. Pomo (all divisions), Patwin, Hill Wintun, pp. 133, 172; S. Pomo built platform over weir. River Patwin had weir with falling doors and string trigger.

GODDARD, 1914. Chilula, p. 270; small weirs for taking lampreys and trout.

GOLDSCHMIDT, 1951. Nomlaki, p. 407; weir with pens, booths, and fire lure on main river only.

HEWES, Th., 1947. Nongatl, Whilkut, Chilula, p. 79. Wiyot, p. 80, figs. 5, 6; portable fence weirs; simple weirs with A-frame nets; very complex weirs with corrals for lampreys. Yurok, Hupa, Karok, pp. 84, 85, fig. 7. Tolowa, p. 88, fig. 9; double weir. Wintun, p. 98; stone fish dams. Coast Yurok, fig. 8; weir, illus.

HOLT, 1946. Shasta, p. 309.

KNIFFEN, 1939. Pomo, pp. 363, 376.

KROEBER, 1925. General statement on weirs, p. 816; usually found in streams which carry salmon. Yurok, pp. 10, 24. Kepel dam, pp. 58-60. Shasta, p. 294; weirs built at three points; traps in openings. Patwin, p. 363; salmon weirs built by one functional family. Hupa, p. 132.

_____, 1929. Nisenan, p. 262; communal weirs with gates and with pens upstream. Fish dipped out with nets.

_____, 1932. River Patwin, p. 278; large weirs built at two points (koru and saka) on the Sacramento River, present Colusa and Grimes.

KROEBER and GIFFORD, 1949. Hupa weir, pl. 2, e, f. Yurok, pp. 81-85, 105, 114, 135; observations on the Kepel dam and the Rekwoi ceremony; myths of origin of Kepel dam; ritual chants for Kepel dam. Hupa, p. 60; "fish dam ceremony." Yurok, p. 79; the salmon weir above Weitspus.

LOEB, 1926. Pomo, p. 168.

McCLELLAN, 1953. Wappo, p. 283; weirs communal property.

McKERN, 1922. Patwin, p. 248.

MERRIAM, 1955. Wintun, p. 22; large weir on McCloud River.

NOMLAND, 1935. Sinkyone, p. 154; weir made of stones and brush.

POWERS, 1877. Yurok, p. 49; weir and basketry trap briefly described. Wintun, p. 233.

ROSTLUND, 1952. Pp. 101-104, 171, 172, map 34; weirs and traps.

SCHOOLCRAFT, 1860. Yurok, Vol. 3, p. 176.

SPIER, 1930. Klamath, p. 149; weirs unknown, but wing dams of rock to create eddies where fish can be netted.

VAN CLEVE, 1945. Hupa, fig. 27, p. 111.

VOEGELIN, 1942. Klamath, Modoc, Shasta, Wintun, pp. 55, 173; types of weirs, openings, pens, traps; driving fish to weir.

WILKES, 1850. Vol. 5, pp. 187-189; description with drawing; nets.

WORK, 1945. Maidu, pp. 32, 33; weirs on Feather River, 1833.

MAPS 1, 3-10, 55

INTRODUCTION

The throwing of fish weirs across the smaller streams and tributaries was no great feat, but to erect them in the Klamath or even Trinity involved a certain enterprise and skill. The historic Yurok built "fish dams," as they call them in English, at two spots in their stretch of the Klamath, and legend speaks of a third and even fourth. More about this in a moment.

The Karok have mentioned to Gifford at least half-a-dozen weir sites on the Klamath and Salmon. The Klamath used to be fordable on horseback a short distance above Orleans, at low water, and this ford appears to be where one weir was put. (See map 1.) The Karok also know of two legendary weirs in the days of the immortals, called Yu'-timin and Ka'-timin, translated "Lower Dam" and "Upper Dam," not far below and above the mouth of the Salmon. These places, however, are natural falls or high rapids, corresponding respectively to Ike's Fall at Shanamkarak and Amaikiaram villages, and to the swift rapids at the foot of A'u'ich or Sugar Loaf Peak just below Ka'timin and Ishipishi. In fact, Ka'timin is not so much a concentrated large native town as a rambling string of "suburbs" or hamlets, each designated locally by its sweathouse, Ka'timin being the term used for the collective whole, chiefly when one is speaking at a distance. An actual fish weir probably could not have been satisfactorily built at either site, since a weir requires a moderate flow of fairly even strength across the breadth of the stream and a rather smooth bottom, preferably of gravel or shingle, into which stakes can be driven, whereas Ka'timin and Yu'timin are rocky rapids or falls.

Above the Karok territory, the Klamath, while still a large stream, flows more placidly between low terraces flat enough for cultivation and could undoubtedly be weired at a number of points. Dixon (1907, p. 428) states that there were but three of these large dams within Shasta territory: one was at the "mouth of Shasta River, one at Scott River, and one at Happy Camp" (which last, however, was actually still in Karok territory).

The Trinity carries perhaps a third as much water as the Klamath where they join at Weitchpec. The Hupa erected weirs at two spots in their main valley, at their largest towns of Takimiłding and Medilding, in alternate years, according to Goddard (1903, p. 24) and Hewes. They may have erected others farther up, between Hupa Valley and South Fork. Hewes's account, summarized below, gives particularly full details of the mechanics of construction.

Undoubtedly a great many other weirs were built in various places in northern California. Besides those shown on the map we have definite locations for six other weirs: three on Russian River (one near Ukiah, a second near Calpella, and a third in Potter Valley); two on the Sacramento River (one at Grimes, the other at Colusa); one on Feather River (near Marysville).

One of Hewes's (F.N., 1940) Bear River informants stated that there were in precontact times five of six villages on Bear River and that the number of fish weirs on the river was somewhat smaller, perhaps two or possibly three less than the number of villages. He could not give exact locations for these dams. He stated that in the openings in these dams basketry fish traps were placed to catch the smaller species of fish and that nets were used to catch salmon and other large species.

A Wiyot informant drew a rough sketch map of the lower Eel River, owned by the Wiyot, and indicated two fish dams located at tepáwo and woseła. He stated that the latter was the more productive dam, though located farther upstream. He also mentioned that this was a communal dam, provided with five or six impounding pens, placed on its upstream face. Each pen had its platform from which the dip nets were used. Each pen was the property of some one man or family.

We know that in the Pomo country there were weirs at various places, the exact location of which (other than the two here mentioned) are not now certain. The latest one of which we have record is a straight brush weir built by the Pomo of Potter Valley and reported to John H. Hellard in 1927. (See California Fish and Game, 13:124, for description and photograph.) Furthermore, in Pomo mythology we find various references to fish dams. Coyote steals fish at one of these weirs used by a neighboring people and considerable trouble results (Barrett, 1933, p. 210). In addition to such ordinary dams there were magic dams, as, for instance, the one made of live snakes in the myth of Obsidian Man (Barrett, 1933, p. 214).

The most important weirs on large streams had of necessity to be fixed by setting or planting posts in the stream beds, often with reinforcement of braces. Fixed weirs were also often placed in smaller streams. In

addition, there was a class of portable weirs of simple and loose construction, which could be dragged as units up and down the stream bed, but which were confined to creeks and to rivers which got very low in summer. These movable weirs are discussed briefly at the end of the section on fixed weirs.

A separate section consists of inferences to be drawn from photographs of several Hupa, Chilula, and Pomo weirs, taken soon after 1900 by members of the University staff. An analysis of these photographs is not incorporated in the main presentation because its evidence, though less complete, is of a different order and would have burdened the descriptive presentation with details, doubts, and arguments. On the other hand, the photograph analysis seems too special, too lengthily adjudicative of fine points, to belong in the "Explanation of Plates" at the end of the memoir. We have therefore treated it as a sort of informal appendix at the end of the chapter on weirs.

We shall now review in detail the data on fish weirs of the fixed type, first in the heart of the Northwest California culture area, then in its marginal range, and third, outside, especially in the Sacramento Valley.

FIXED WEIRS: CORE AREA

YUROK WEIRS

The historic Yurok weirs were at Kepel (map 1, Y1), just above the mouth of Capell (Kepel) Creek, three or four miles below the famous fishing spot at Tuley Rapids or Kenek; and again at Heyomu or Lo'lego, in English, Saint's Rest (map 1, Y2), nearly two miles above Weitchpec and seven or eight miles above Tuley Rapids. The Kepel weir was hedged about with innumerable observances and taboos, in fact even dramatic play interludes, and marked the start of both a Deerskin and a Jumping dance, the whole constituting the most elaborate public ritual complex[5] in the region. The weir building occurred toward the beginning of low water in August-September.

The Yurok second weir, at Heyomu, is said to have been put up earlier in the season, about July (Kroeber's information), but M'Kee found it in use in October. The other name of the settlement here, Lo'lego, means "[where they] habitually make a weir." It was a small settlement of three or four houses, wealthy enough to contribute an "outfit" or "party" to the Deerskin and Jumping dances at Weitchpec-Weitspus, but not attempting a public ritual or display of their own in connection with their local weir. In fact, they were undoubtedly helped in its construction by the people of Weitspus, who looked upon it as "their" weir, for which reason they did not participate in the Kepel "dam" except as visitors. A formula was spoken at the beginning of the Heyomu construction, but such very likely was the case at all other weirs erected in the region, in fact even for the less communal affairs.

All Yurok know that in legend the Kepel Fish Dam was first made at Turip (map 1, YM2), more or less twenty-five miles downriver, seven miles above the ocean. The Kepel people are said to have come down and taken the weir and its rite away. The Turip people went up to fight and recover them; but when they came in sight, up the opposite bank, they got afraid and said, "Well, perhaps we had better let them keep it." But they would watch it, they declared, and would be paid when it was made (reference to a play episode in the ritual); and they stayed where they were standing, turned into redwood trees--the farthest grove of redwoods up the Klamath, visible from its surface.

This origin myth may have a historical basis in fact, or only a pseudogeographical one. The river bends and terrace settings are strikingly parallel at Kepel and Turip. First is a fairly long stretch of smooth current; then a slight bend to the right, toward the end of which the weir is erected at Kepel. Then follows a U-turn to the left around a semicircular grassy terrace on which stand the towns of Kepel and Turip, respectively, both facing northeast across the river; after which the flow resumes the prevalent northwesterly direction. (See Waterman, 1920a, maps 9, 17.) The idea of a transfer from Turip may rest on the analogous topography--plus a Yurok penchant for thinking up preliminary trials or experiments for their finally perpetual and unchangeable institutions. A base material is used but proves unsatisfactory, a dance line-up does not sound right until the fifth direction is faced, the Klamath used to flow into the ocean through Wilson Creek, and so on -- this is the pattern.

A bit of measuring and sounding at Turip would quickly reveal whether a weir within native capacity to build would be possible there. The Klamath does not flow materially more water at Turip and, while it is somewhat wider there, it is not very much wider; but being so much nearer the mouth, the current is slower and presumably deeper in spots.

The other reference to a weir in Yurok myths is in a long travelogue saga (Kroeber, Yurok Tales, no. C3, in preparation) of the great fighting character, Falcon (duck hawk), Kerernit, whom the Karok call Aikneich. After a successful feud with Ocean Breakers, he moves on to the Klamath, but, still hearing the surf, goes on to live at "Knetken-o-lo', -- arrowhead's weir" (map 1, YM1) probably error for Kerernit-o'lo', "Falcon's weir" or at near-by Muntse-haã'g, "white rock," both below Roach Creek mouth, about two miles down from Kepel. (Waterman, 1920a, pp. 246-247, map 17, nos. 7, 9.) There Falcon builds himself a weir. As he will not open this to let the salmon through, the Hupa of Oknuł come downriver and in his absence tear out the weir. He goes to attack the Hupa headman but cannot reach him where he is living, safe inside a rock in the Trinity. But his dam site remaining spoiled, Falcon goes far upriver, on to A'u'ich, Sugarloaf Peak overlooking Karok Ka'timin, puts in another weir there, and runs a scaffolding from it up the face of the cliff to his house on the peak. This weir his wife, Grizzly Bear, tears to pieces in jealousy

[5]The Kepel dam cycle of ceremonies was basically of the world-renewal order, with emphasis on the (first) salmon (akin to the "first fruits" features among many tribes). The whole cycle was designed to insure collective and individual health, prosperity, and abundance.

Gunther (1928, pp. 129-173) has reviewed the salmon ceremony among the tribes of northwestern America and has shown that this ceremonial cycle has been integrated with the ritual pattern of each group where it occurs. Among the principal tribes of Northwestern California, particularly the Yurok, these ceremonies are in the hands of priestly families and involve elaborate and immutable rituals. The utilization of the salmon was made to conform to a definitely prescribed pattern, strictly regulated by the formulist in charge of the whole ceremony and governed by a recognized series of taboos.

while he is off visiting a Shasta sweetheart in Scott's Valley. This last episode is told also by the Karok, as is a separate tale of Falcon's helping two girls try (vainly) to recover their lover from the land of the dead (a story not known to the Yurok). There is nothing about the river bed at Muntse-haā'g which suggests that a weir was practicable, and the story may have located one there because of other accessory natural features connected with side incidents of the story that Waterman refers to (pp. 246, 247).

The Kepel weir.--This brings us back to the Kepel weir, whose technology and ritual have been described in a special publication by Waterman and Kroeber (1938), whereas its emotional involvements have been discussed by Erikson (1943). This is the historically authenticated weir site lowest downstream on the Klamath. It was therefore presumably the largest construction of any sort attempted by people of the Northwest California culture, and it is reasonable to infer that it was this fact which led to association of the weir with a major World Renewal ritual. As a matter of fact, the association is geographically rather tenuous, the main dancing being performed at several places ten miles or so downstream from Kepel.

The particular spot at which the weir was erected is shown in Waterman's Yurok Geography (1920a, maps 4, 17). The river here is wide (perhaps 75 or 85 yds.--memory estimate by Kroeber); rather shallow (6-7 ft. by paddle measure in July, 1933--perhaps not over 6 ft. at construction time in August to September); what is perhaps most important, of fairly even depth all the way across, and with a level bottom of fine gravel, into which stakes could be driven; free of rocks, except one off the northeast shore, which served as a marker. The current is fairly strong, but steady and nearly even across the river's breadth. The dam was set slightly upstream of Kepel, which looked down on it from the upstream end of its terrace. The town of Sa' or Sha'a, which contained the dam-maker's or formulist's sacred sweathouse, lay adjacent on the same terrace, downstreamward, and looked across the river to Murek. Capell, or Kepel, Creek comes in from the north a little downstream of the weir, and opposite Kepel village. Roach Creek comes in from the southwest a mile or more below Sa'.

The weir was an elaborate structure built in ten named sections by ten groups of men, all working under the actual, as well as the ceremonial, direction of one formulist. Each section was built with an enclosure provided with a gate which could be closed when the fish entered. The fish were then easily removed with dip nets. Vast numbers of fish were taken during the ten days that the dam was allowed to stand. After that it was deliberately torn down, at least in part. The reason for tearing out the structure instead of merely abandoning it to the forces of nature is not too apparent, but its destruction again cleared the channel and permitted the fish to ascend the stream to spawn, at the same time providing the upriver residents with their essential supply of fish.

All told, the full ceremonial cycle connected with the Kepel dam covered (with certain intervals) some fifty to sixty days. It was the most elaborate undertaking of any kind among the tribes of this Northwestern California region.

However, the magnitude of the undertaking can be exaggerated. Erikson (1943, p. 300), in speaking of this Kepel weir, says: "The middle part of the river ... is obstructed by the yearly erection of a fish dam which is accompanied by sacred ceremonies and represents the most communal enterprise and the most advanced technical accomplishment of California Indian cultures." Yet the sweeping statement that this is the most pretentious communal undertaking among any of the California Indians might be challenged when we consider the building of one of the large ceremonial dance houses in the Central California area. One of the last of these dance houses built in the ancient manner was the one formerly standing at Sulphur Bank in the Clear Lake region. It is described and illustrated by Barrett (1916, pp. 10-17, pls. VI-XI). If we take the average for the dimensions of such a building (diam., 50 ft.; depth, 5 ft.) we find that these Pomo had first to excavate a pit of these dimensions with their digging sticks and to remove in their baskets about 350 cubic yards of earth. Then, after completing the wooden framework and roof of this structure, they had laboriously, basketful by basketful, to place these same 350 cubic yards of earth back on top of this roof or around its edge to make a waterproof "thatch." And the construction of the framework, rafters, and wattling was in itself no small undertaking. There were a large center pole, eight posts, eight stringers, ninety-six rafters, forty-eight wall braces, at least a thousand sheeting poles, upon which were laid two layers of mats woven of twigs, and on these a layer of tule mats, and finally a layer of grass. Next came a layer of mud to seal the roof tightly, and finally the loose earth from the excavation was placed on the roof as a final cover. The materials alone certainly bulked fully as large as those used in the Kepel dam.

Nor was this construction done without ceremonial procedure of considerable moment, probably not as involved or extensive as in the Kepel dam, but still of some importance.

Certainly the actual labor involved in the construction of one of these large semisubterranean dance houses must have been fully as great as was that involved in building the Kepel dam. And it certainly was fully as much a communal undertaking. Everybody, even the women, participated. But an assembly house would last a decade or two; a salmon weir was used only for some weeks.

According to Hewes (F.N., 1940) a Coast Yurok informant stated to him that everyone for miles downriver from Kepel helped build the dam there, the following villages participating: Tekta, Woxkero, Kootep, Pekwon, Yoxter, Sregon, Meta, Nohtskum, Murekw, and Kepel. Those whose residents did not help work were: Wa'asei-Merip, Kenek, Wahsekw (Martin's Ferry), and Weitspek, upstream; and Serper, Ayoł, Erner, and Erliiken below Tekta.

Of the above, Waterman (1920a, p. 54) includes downriver Erner and upriver Wa'asei, Merip, Kenek, and Wahsekw among the villages that contributed workers to the Kepel enterprise.

Curtis (1924a, p. 40) says it was the villages from Was'ai (Wa'asei) down to Wohtek who built the Kepel dam; and that those above, who did not participate, had the right to come down to Kepel and take all the salmon they wanted while the weir was shutting the run of fish off from them.

The Kepel dam cycle of ceremonies was basically of the world-renewal order, with emphasis on abundance of salmon and vegetal foods generically, rather than specifically on the first salmon, as in the "first fruits" rites among many tribes. The whole cycle was designed to insure collective and individual health, prosperity and abundance, and the prevention of epidemics and calamities. The Yurok did have a specific first-salmon rite at Wełkwāu at the mouth of the river, as the Karok did at Amaikiaram just below Ike's Fall; but these both came

at the beginning of the spring run, about April; and the one at Wełkwāu was without accompaniment of public dancing.

Analysis of the Waterman-Kroeber data.--The Waterman-Kroeber monograph on Kepel contains a number of apparently conflicting statements from different native sources, some probable misunderstandings, and a number of unresolved problems. These will now be analyzed here seriatim. All page references are to this monograph (UC-PAAE Vol. 35, No. 6: pp. 49-60, information by Waterman; pp. 61-80 by Kroeber).

1. Shape of the weir: The dam seems to have been V-shaped, with its point upriver. Waterman is almost certainly right on this point. The matter happened not to be mentioned to Kroeber, perhaps because his Yurok informants took it for granted, and Kroeber knew the Goddard or Jones photographs of straight dams at Hupa, so took straightness for granted for Kepel. The second historic Yurok weir, above Weitchpec, was V-shaped, and Hewes makes the main or formal dam across the Trinity at Hupa also V-shaped, though Goddard, Curtis, and Gifford are noncommittal on the point. The late photographs from Hupa show only straight barriers. (See pl. 1, a-c.)

In a stream of smaller volume, the shape might not matter much. The larger the flow, the greater the resistance which a two-way diagonal weir would possess, presumably, and experience may have shown the Indians that this gain in strength more than compensated for the additional length. Depth of water would also be a factor, on account of the leverage of the current against longer uprights and wider mat gratings. The Kepel depth was measured at 6 to 7 feet in midsummer by Kroeber; Hewes was told: about 4 feet at Hupa; and Kroeber found it not much over 3 feet when fording the Trinity at Medilding in late summer; smaller streams like Salmon River and Redwood Creek would be less than that.

It is clear that size of stream was not the only factor, for Hewes reports the Karok dams farther up the Klamath as being straight, whereas we show a photograph by Goddard of a small Chilula dam (pl. 1, e) on Redwood Creek which is V-shaped.

At any rate both Yurok dams, at Kepel and at Heyomu, were angular.

2. The falsework: Waterman's account of the falsework, or staging (p. 57), from which the Kepel weir was built is not mentioned for any other weir. It might be said that such a falsework was unnecessary elsewhere, the Kepel dam being the only one built across the conjoined Klamath and Trinity--the second Yurok dam at Heyomu-Lo'olego was situated nearly two miles above the confluence at Weitchpec. However, there are some inconsistencies or difficulties about the falsework, and it is probable that Waterman's account of it refers to the weir itself. He has construction begin with a pair of stakes being driven by workers, who "waded out" into the stream. When these two stakes or piles had been lashed together where they intersected, a long pole--no doubt a slender tree trunk--was laid from shore into the notch, projecting out over the stream. Pushing his way along this, a worker pounded in another pair (or tripod) of posts, and a new horizontal or stringer was added; until the two wings of the staging met in midstream.

"Meanwhile," says Waterman, other workers had "already begun the driving in of the innumerable stakes (rogon) which formed the permanent weir. These . . . were only a few inches apart" and constituted the barrier that held the salmon. This makes the barrier of the main dam put in place before it has any supporting timbers of its own!

The account goes on (p. 58) by telling of a substantial pile driven in every few yards "on the downstream side of the dam, to give it solidity." Until then, was the falsework holding the "innumerable" stakes against the current? And were the main supports of the permanent dam added as a sort of afterthought--merely to "solidify" it?

More difficulties follow. The main uprights or piles, the "upstream standing ones" of the Yurok, were taken out, one by one, on the falsework, aimed at the bottom, and jammed down into the gravel. "While several men held one vertically as best they could" [from the falsework?], "a volunteer climbed to the top of the pile" and clung to it, with his feet resting on a serving of withes lashed on about three feet below the top, thus "riding the pile," while he pounded it in with a stone. This feat might be possible; but it would certainly be a feat. There were 10 in all of these vertical piles, he says, although they came "every few yards" apart; and each was then shored by a diagonal brace on its downstream side.

Kroeber's informant A, Amits, says (p. 65) that the "upstream standing" posts were seven to eight inches thick--that is, he no doubt gestured the size with his hands--and that there were about 40 of them, all put in on one day. The first to be put in place, out from the north bank, were the larger two (a Douglas fir and a tan oak) of three cut by the formulist up the hill upriver some days before any other cutting or construction began. Elsewhere in the weir, there were "perhaps three petsikume in a group"--that is, forming a tripod--as Waterman says of his "falsework."

With ten traps or pens or "salmon houses" behind the weir--Waterman gives the names of nine of them--there would be 11 or more groups of piles; say 10 tripods, plus a pair near the north shore, perhaps another at the south--32 to 34 in all, as against the 40 estimated by Amits. Each fish pen also had 2 posts above the dam; but these may have had less load of current to support and have been smaller. In any event, if we count them in, the total would be more than 40. Informant B, Mack, is no help on this point--he was more interested in ritualistic than in technological deeds.

There are also the "downstream standers," the sloping piles each shoring up against the current a pair or tripod of vertical or near-vertical piles. These braces would presumably be somewhat longer than the posts, though not as long as the stringers. When Amits volunteered his "about 40" larger timbers, he may have had in mind nothing more than ten groups of three uprights each with one brace on the downstream side.

All in all, it seems to us most likely that Waterman, listening to the broken English of his informants, misconstrued their description of the skeleton frame of the dam--which obviously had to be put up first--as being a preparatory stage, and so invented the falsework scaffolding. None of the difficulties of understanding which his account raises are resolved or diminished by positing a falsework; indeed they are doubled. If there is a factual basis for the account of several men standing on the scaffolding holding a new pile "as best they could" while a rider at the same time clasped and pounded it in, it would after all provide only an additional post in the falsework; or, if it were an addition to the permanent dam, it could have been just as well put in from the skeleton of this which was already erected.

3. Width of the weir: Informant A does not explicitly mention the number of the longest timbers, the horizontal rafters or stringers. He does say that the first one, on the north, was somewhat short. The second, and then every alternate one, had a pen behind it. This may mean

that there were 20 (or 21 or 22) rafters; or again, he may have been thinking of the occasions when only five pens were built because the number of workers was small; in which case 10 full-length rafters would have carried the weir across to both shores, or virtually so.

There might, however, have been ten salmon pens plus eleven spaces of plain weir between them, twenty-one in all, with the recorded names applying primarily to the pens. In that case there would have been 20--or to be exact, probably 21--stringers along the top of the dam--unless each stringer was long enough to stretch across both a pen and a section of plain weir. For 21 stringers, a minimum of 40 piles would have been required to carry them, and more in proportion as tripods were set up in place of pairs--up to about 60, in fact, without counting any of the pen posts.

If we knew the width of the river at the weir site, we might infer at least some probabilities on these matters. Estimating from memory, Kroeber would say the river was around 250 ft. from shore to shore. This, if the weir ran straight across, would give stringers of about 25-ft. span, which a Douglas fir log 7 or 8 in. thick at the butt ought to cross easily enough, and even support a few men--in a static situation. But the stringers ultimately would also have to hold back against the current the upper ends of all the smaller stakes plus the matting behind these. That load might easily be several times greater than the gravity load of a mere catwalk. We would guess that 25-ft. stringer spans would be quite liable to give before a 6-ft.-deep current.

If, as we have decided, the dam was V-shaped, its length would be materially increased and that of the spans with it. Thus if the two wings sloped upstream at 45 degrees, forming the hypotenuse of an isosceles right triangle, the two wings together would have a length greater than a straight dam by $2\sqrt{2}:2$, or over 40 per cent additional, say 350 instead of 250 ft. It seems highly probable that 10 rafters of a 35-ft. span each would not have withstood the current; but if they numbered 20, they would have been subject to considerably less pressure than the 10 in a straight-across weir. This computation accordingly favors a dam of ten pens plus eleven neat spaces in the dam. Even this calculation involves spans twice as long as Hewes's eight feet between pairs of upright piles in the Hupa dams. To be sure, the Yurok used mainly tripods of piles, and these may have been larger to accord with their somewhat greater length, as necessitated by more depth.

What, of course, would help most in the problem would be if someone were actually to measure the width of the river at the Kepel site, which ought still to be possible, though probably not for much longer, with motorboat logging and prospects of reservoir dams and diversions.

4. The gratings: The gratings or mats of split sticks that were unrolled and set up behind the piles and rafters were of course the element of the pens, and perhaps of the weir, that ultimately kept the salmon from ascending. These gratings were not driven into the bottom, but their width--that is, the length of the sticks composing them--must have been close to seven feet--enough to set them firmly on the even gravel bottom and reach up to the top of the water or above it. They were "tied together" with grapevine (hazel shoots are also mentioned) in "four places" (p. 64); which, we take it, means that four pairs of vine lengths were twined across and around the sticks as they were laid parallel on the ground or sand bar. Then came the "tug-of-war" directed by the formulist, according to informant A. This was one of the many ritual games and plays associated with the weir building, but it also pulled tight the wefts as they passed around the split-stick warps of the mats.

Amits mentioned the length of the mats as four fathoms (span reaches) plus an arm. A customary length of Yurok canoes, irrespective of their beam or draught, is specified as three fathoms and a hand-length: the Yurok evidently were fond of such standardizations in their regulated little world. Their fathom or reach was probably a bit less than our six feet, because they are a little shorter in stature than we average. But the measure of four fathoms plus an arm would have been quite close to twenty-five feet for the mat. Informant B (p. 71) tells how all the gratings were plunged in simultaneously, at the formulist's signal, apparently on the last day of the construction, and of how sometimes a couple of workers fell into the river with their grating.

Amits also specified that "they always had six rolls [of grating] for each salmon house, but some were shorter" than standard. This gives us another line on the width of the dam: namely, ten times six times 25 feet, or 1,500 in all, less what some of the gratings were short of full length. If we deduct a third for this factor, we still have 1,000 linear feet of which half might conceivably go into lining the pens, leaving 500 linear feet for the weir as such. This seems a great deal considering the probable width of the river, and that, too, after two liberal deductions.

Hewes has the Hupa mats of any convenient length up to 30 or 40 feet, and says that usually two or three sufficed to reach each shore from the middle. These seem very reasonable figures, for a smaller stream, whereas the Kepel ones are certainly excessive if taken at face value.

5. Main row of stakes: The twined mat gratings being what ultimately prevented the passage of the salmon, they must also have done most to impede the flow of the river. It seems inconceivable that they could have resisted this enormous and persistent pressure while supported only by one edge of them being pushed against the bottom and the other held by the weir stringers. In addition, and mainly, they were held in place by the current pressing them against somewhat larger sticks or stakes than those composing the gratings, stakes which had been individually pounded into the bottom while the spanning stringers kept their tops in line. These would be Waterman's rogon or "innumerable stakes... driven only a few inches apart." Unfortunately, neither Yurok informant A or B used the word "rogon" to Kroeber nor did either make any statement that can be indubitably construed as referring to them. Quite possibly they did mention them (informant A for his fourth day--see below), but the distinction between them and the smaller sticks that went into the mats may have been lost in the Englishing. Yet "rogon" stakes seem to show in some of the photographs of the Hupa and Chilula weirs; and it stands to reason that but for their presence the mats would have been bent and pulled and washed away, whereas in a smaller weir the mats might have been dispensed with if the rogon were set close.

In distinction from the rogon, Waterman gives "woosel" as the name of the stakes of which the pens were made, and "wā'egwoya" as "reinforcing stakes" added in spots where the weir was found weak. Kroeber got the latter name in the form "wa'ewoges" for the "small upright sticks" of the weir, after they had been prepared but were still on land, which name was changed to "werarhkwa" when they were in the water, in place in the dam. The making, or inserting, of these took a day, seemingly the fourth, according to informant A's schedule

of progress summarized below, whereas the mat gratings seem to have been put in only on the tenth day, according to both informants A and B. Waterman appears to have not even any indirect reference to the gratings, only to the pair of "pepperwood" (bay, laurel) logs weighting each trap down (and no doubt bracing and stiffening it, too) and to the redwood twigs packed around the bottoms of the traps to prevent washing out, both of these sets of materials being obtained on the ninth day according to informant A. Informant B says specifically (pp. 71, 72) that the gratings were put down on the last day; that the brush or boughs were packed against the bottom only after that (as indeed is only common sense); that the formulist might then at last speak secularly once more; and that "now the dam is finished." A's schedule seems to put underwater inspection of the dam (piles and rogon stakes) by the formulist, and his resumption of secular speech, on the ninth day; trip to the redwoods and bargaining with them also on the ninth; cutting the "redwood" foliage and putting in the mats and packing the leaves against the bottom, on the tenth day.

6. Bundles of sticks and of foliage: There is a partial confusion in our Englished versions between the getting of the sticks for the mats and the securing of the "redwood" limbs for packing. Informant A (on p. 66 and referring to the tenth day) tells of branches cut off young redwoods, uphill across from Kepel, and "laid crosswise to form a circle," each man then dancing with a load of such branches, finally throwing them down where they would roll all the way to the river; after which they are ferried across and packed against the weir bottom. B tells (p. 69), also after the bargaining with the redwood trees, how on top of the hill across from Kepel they cut "top limbs of pine, three or four feet long," made into "flat bundles, tied with branches sticking out in all directions." The workers then (p. 70) dance in line, to a special song, carrying the bundles on their heads, at the end dumping the loads forward so they roll to the river. When the men arrive there, they dance in boats across the river, ferrying their loads over, while boys accompanying them hold up brush cut on the hill, after which they all dive into the stream by the dam with boughs and pack them firmly.

The two accounts agree that the loads consist of branches laid flat and radiating, in other words, forming a disk, and that each of these disks is then rolled down to the river as if it were a cart wheel. Yet that seems almost impossible with the disks made of pliable feathery branches (whether these be of pine, fir, or redwood).

On the other hand, the rolling ought to have been much easier if it were done with the cylindrical rolled-up mat gratings. And in fact B (p. 71) refers to at least one such cylinder being rolled down the same hill. Landing from a boat near the mouth of Kepel Creek--on the final day--the formulist sprinkles sung-over or prayed-over water on a huge bundle of sticks (mat), so heavy it would take half-a-dozen men to lift it, but he sings it so light that he can drag it unaided. "These are the sticks got on top of the hill, split yellow pine [limbs] five or six feet long, tied together with hazel twigs like a basket, a solid pile several feet in diameter, that have been rolled down the hill." After the formulist has started the bundle, the workers ferry it across river and up to the dam in the largest boat available.

Here we clearly have one or several of our gratings rolled up into a cylindrical mass. It is made of split yellow pine limbs or sticks five or six feet long and is "like a basket" in being twined together with hazel shoots. These split sticks of the mats are clearly different from feathery redwood twigs used for packing, as well as from "rogon" stakes driven into the gravel bottom behind the main connecting stringers of the dam.

It is also clear that both the packing and the split sticks for the matting were rolled downhill amid ritual associations--the disks of packing being danced with before they were started downhill, the matting roll being magically lightened after it arrived at the bottom.

What still is not clear mechanically is how the workers managed to roll a cart wheel or pancake of soft boughs downhill; or whether there has been a lapse in the description or Englishing of the incident, so that the soft boughs as well as the split sticks perhaps were actually massed into more of a cylindrical than a disk shape.

7. The redwoods: A close rereading of informant B clears up the episode of bargaining with the redwood trees. These are believed to be the transformed original weir owners from Turip, who followed upriver when the dam was stolen from them, but, coming in sight of Kepel across the river, decided not to press the issue by fighting, but to turn themselves into redwoods and stay where they could thereafter see the dam being built, and to exact compensation for the dancing that would begin toward the end of the construction. That is why, late on the ninth day, the workers cross and go uphill and negotiate with the trees, offering an imitation obsidian blade, whereas the tree (presumably impersonated by someone behind it) insists on two or more blades and gets them.

After that the workers go on up the hill and camp there for the night but leave a few of their number behind to impersonate the Turip owners next day. In the morning, when the workers come downhill again, they hear crying: one of the impersonators pretends to have lost his wife and will hold up all dancing until his grief has been assuaged. They offer him a blade, but he wants a woman also; and gets her, in the shape of a stone--and perhaps a spring, too, where women bathe, so he may peep at them. So "everything is settled; they have been paid twice, just like true headmen"--first, for their ownership of the dam stolen from Turip; second, as now "residents" of the area, for a death in the family. Informant A as well as Waterman ran this double episode into a single one.

This acting is ritualized drama, but it helps to clear up a special problem of construction materials. Redwood boughs may be particularly effective, as Waterman says, for stuffing into the bottom of the weir or pens. But mature redwoods are usually limbless for fifty or a hundred feet up, and the Yurok would have had no way of climbing them. Immature trees with low limbs are often wanting around isolated clumps, and none show in Waterman's plate 6, figure 2 (1920a). The Yurok may thus have been hard put to it to collect much redwood foliage for the dam pens, beyond what might come up each year or two in the shape of suckers from the roots or stumps. Hence it would seem likely that actually they gathered some redwood foliage as a token, and then took the bulk of what they needed for packing from yellow pines (B, p. 69) or Douglas firs (suggested in place of redwoods, A, p. 66).

8. Pens above or below weir: In view of both Curtis and Hewes reporting that the platforms on Hupa weirs, from which salmon were netted, were on the downstream side of the weir, it has seemed worth while to check Waterman's flat statement (p. 58) that at Kepel the pens were upstream.

Informant A says (p. 64): "They begin each salmon house by placing two posts upstream of the dam; from these, wings spread to the dam."

He says again (p. 65): "Each salmon house has two spreading posts [upstream of the dam], joined on top"; but the "upstream" is bracketed as an explanatory addition by Kroeber--no doubt on the basis of page 64.

Informant B (p. 70) says: "Each boy climbs to the upstream end of his pen and jumps in to pack brush." This is not wholly decisive, but were the pens attached on the downstream side of the weir, the boys could drop into them by just jumping off the main stringer of the dam, without climbing out to the far end of the pen. The passage is therefore probably confirmatory.

A reference by informant B on page 71 is to the gate of the pen in the middle of the dam being made by the formulist in person. It throws no light one way or the other; except in so far as a gate implies a pen above it.

The specific Yurok statements thus are all to the effect that pens were attached to the weir on its upper side, whereas the Hupa accounts speak of open bays and platforms on the lower side. This may be a characteristic difference. The Karok data are no help in the matter, because the only mention is by Gifford of a single platform in the middle of the dam, whereas Hewes denies platforms for the Karok altogether.

It thus appears that the Yurok pens or salmon houses were not the same thing as the Hupa constructions. The Yurok emphasize enclosures for the fish; the Hupa, platforms for the fishermen with their dip nets. The Hupa platforms rested on one post set a few feet down from the weir, and under each was a line or wall of stones. Between the pens and lines of stones were bays in which the salmon were stopped by the weir. They could be taken on either side of the platform or from its lower end.

Curtis (1924a, p. 15) says that several narrow openings were left in the Hupa weir, "and at each one a platform extends below the weir . . . The fisherman stands on his platform, lowers his net into the water, and draws it out at random." There obviously is no pen at all: the net takes its place. What is not clear, however, is how the salmon traveling upstream could enter the bag of a net which the current rushing through the gate would bag out distended downstreamward. The Curtis arrangement would seem to be feasible only for spent salmon drifting downstream. (Cf. our Chilula fig. 2.)

9. Sequential summary of the construction: Informant A included in his statement (pp. 65-66) a day-by-day account which is not quite complete and therefore not altogether certain but seems reliable in outline. This runs as follows.

Day 1. No construction work may be done until the formulist has set, near the north shore end of where the weir will stand, the stake wetspegar, "its ear," or "having ears," which is the first timber he cut from a small Douglas fir when he made his initial journey upriver (p. 64). Then the main vertical piles are driven in groups of twos or threes and lashed together (p. 65).

Day 2. The slanting braces that shore or prop the vertical piles against the current are put in.

Day 3. The rafters or stringers connecting the posts are laid and lashed. The three days the dam is "left open in the middle" may refer to these first days while the weir is only a skeleton.

Day 4. The many small stakes, wa'ewoges--numbering perhaps some hundreds--that constitute the body of the dam are driven behind the stringers--that is, with their tops supported against the current by the stringers.

Day 5. Cutting laurel limbs called umesa. (Some long thin limbs are saved for the salmon pens later.)

Day 6. Tying these on horizontally, under water, across the small stakes of day 4.

Day 7. Frames of salmon pens made: two posts per pen, also two horizontal braces (p. 59) for their tops, and thin laurel limbs bent U-shape over fire, put horizontally around the pen posts to connect with the weir piles.

Day 8. Not clear. Possibly the wa'ewoges small stakes were driven into the pen frames, if such were used there; there is no specific mention one way or the other.

Day 9. The formulist makes the first salmon gate, the workers make the rest; the formulist inspects under water, and may then converse secularly once more. (B, p. 71, puts this release on day 10.) A says: "The next day from that, they will finish the dam. That evening" [viz., of the ninth day] they visit the redwood clump up the north side and bargain with the trees for the right to dance. "Then they go a distance up Kepel creek, make camp, and sleep there."

Day 10. The limbs with foliage for stuffing against the weir bottom are danced with, then rolled down the hill. (The gratings of small sticks may have been rolled down previously, or perhaps they are rolled down now. The magical dragging of a huge roll bundle of these mats by the formulist is definitely put on this tenth day by B, p. 71.) A has both the grating rolls and the foliage twigs for packing ferried across the river or up to the dam in boats, while the workers and boys do a boat dance. Both gratings and packings are put in place; and this finishes construction (unless the pen gates are also added on this day). Everything further consists of ritual, dancing, and using the dam to take salmon.

This account seems to us to make sense structurally and mechanically. The uprights are driven first, then the braces, then the stringers are laid, then the long line of small stakes set; only after that are the fish pens begun and worked at in the order of cutting their heavier timbers, setting them, securing the lighter materials, then putting these in place. It is also no doubt correct that each consecutive day had one main job; in that way confusing efforts were prevented. And the Yurok no doubt approved in principle the one-by-one linear or enumerative order of events.

The extrication of this sequence from the seeming jumble of accounts of A and B--and for that matter Waterman's as well--also raises a few new doubts, or queries. Were the hundreds of wa'ewoges stakes possibly used only in the weir proper (as mentioned for day 4) and not in the salmon pen frames? Conversely, were the grating mats perhaps restricted to the pens? Kroeber had always assumed that both weir and pen corrals had not only piles and stringers but stakes and twined mats too. Yet the fact that specific mentions of stakes relate to the weir body, and of mats to the pens, suggests that such limitation may not have been due to accidental omission of statements, but have conformed to a structural reality. We are not in a position to make an unqualified decision.

Both of Kroeber's accounts from A and B were secured on the principle of giving a good old informant his head: telling him on what subject information was wanted, and then not interfering with his own development of it by questions or corrections. This method has virtues of its own, and it gets data of certain qualities that can be secured in no other way. It is however un-

fortunate when coherent accounts obtained in this way are treated as ultimate. The ordered day-by-day outline just listed might just as well have been submitted to Amits and Mack for their verification and correction. This would have given further occasion for getting, also in order and without omissions, the name of each element that went into the weir, its size and shape and placement, and the kind of tree or vine requisite or preferred for it. And this procedure would unquestionably have brought into focus points of handling or process that now are left ambiguous. Informants with knowledge such as these two old men had no longer exist among the Yurok, unfortunately. We work today, however, with sharper methods. And sins of omission are most easily seen in retrospect.

The second Yurok weir.--The only preserved description of the second Yurok salmon weir, made in the Weitchpec district at Heyomu (or Lo'lego) is in the journal of George Gibbs, who was a member of the expedition of Col. Redick M'Kee, sent in 1850 to northern California to make Indian treaties or cessions. This journal of Gibbs was published by H. R. Schoolcraft in 1860 in Volume 3 of his Archives, pages 99-177.[6]

The expedition had a pack train and, working north from Hupa, made camp on October 8 in the ridge prairie at Bloody Camp, which has an elevation of 2,656 feet and lies 1.8 miles WSW of the confluence of the Trinity and Klamath. They zigzagged down to the Klamath and crossed it by ferrying at or near what was long maintained and known as Martin's Ferry; then, on the north or east bank, they turned upriver, passed through Weitspus-Weitchpec opposite the confluence, and made camp again on October 9, less than two miles above Weitchpec, where they saw the weir at a village they called Hai-am-mu.

We quote Gibbs's brief description of the weir (p. 146) because it is a concise and intelligible account that gives about all the specific information extant on this second Yurok dam, and which enables us to establish a dozen points about it; but our discussion would mean very little to a reader who did not happen to have Schoolcraft's volumes of 1860 at hand.

> At this village there was a large fish-dam; a work exhibiting an extraordinary degree both of enterprise and skill. It crossed the entire river, here about seventy-five yards wide, elbowing up stream in the deepest part. It was built by first driving stout posts into the bed of the river, at a distance of some two feet apart, having a moderate slope, and supported from below, at intervals of ten or twelve feet, by two braces; the one coming to the surface of the water, the other reaching to the string pieces. These last were heavy spars, about thirty feet in length, and were secured to each post by withes. The whole dam was faced with twigs, carefully peeled, and placed so close together as to prevent the fish from passing up. The top, at this stage of the water, was two or three feet above the surface. The labor of constructing this work must, with the few and insufficient tools of the Indians, have been immense. Slight scaffolds were built out below it, from which the fish are taken in scoop-nets; they also employ drag-nets, or spear them, the spear having the barb movable, and fastened to the shaft with a string, in order to afford the salmon play. Similar dams to this exist on the Klamath, a few miles below the forks, and about fifteen above this one; and there is another upon the Trinity, thirteen or fourteen miles from its mouth. They form a frequent cause of quarrel among the bands inhabiting different parts of the rivers. Some understanding, however, seems to exist as to opening portions of them at times, to allow the passage of fish for the supply of those above.

The following significant points or inferences emerge from this Gibbs account.

1. Gibb's Hai-am-mu is Waterman's (1920a p. 258, no. 30) and our Heyomu town and creek, also called Lo'lego (Waterman, lo'-o-le´go) "[where] habitually they build a fishweir." The creek and a flat at the mouth are called Saint's Rest by Americans and on maps and are 1.4 miles air line upstream of Weitchpec post office. Waterman says the village site was hydraulicked away by miners; the weir was built in several slightly different spots from year to year, according to height of river and shift of current. The weir was last erected in 1868, forty-one years before Waterman's visit in 1909. Half a mile downriver, about a third of the way to Weitspus-Weitchpec, a small stream (either Muddy Cr. or the unnamed creek above it) comes in, also on the north side, near the head of which, about a mile up, perhaps around "Lake Prairie," is a place called Péikar-o-réw (no. 26 on map 25) meaning "stakes where cut" or "stakes their cutting," where stakes were got for the weir. (Peikar does not resemble any of the otherwise recorded words for weir materials.)

The towns around Weitspus--above Wahsekw, to be specific--participated in erecting the Heyomu weir and in its catch, and therefore did not take part at Kepel except as visitors.

2. Gibbs made camp at Heyomu on October 9, 1850. Kroeber was told that the weir fell in the June-July moon. Gibbs not only saw the structure, but his account gives the impression that he saw it being used. The dates for all weirs are likely to have varied according to seasonal depth of water.

3. Gibbs estimated the Klamath as about 75 yds. wide at Heyomu. This is a little less than Kroeber's estimate of 75-85 yds. or about 250 ft. at Kepel; but at Heyomu the Klamath does not yet include the Trinity. The site was no doubt chosen in part for this reason; also because, at the larger settlement of Weitchpec, the river curves rather strongly in a sweeping bend and immediately above is rocky.

4. The dam was V-shaped; "elbowing up stream in the deepest part."

5. "Stout posts"--not stakes--were driven into the river bed "some two feet apart." This agrees with Hewes's account for Hupa, below.

6. "At intervals of ten to twelve feet"--which would be presumably at or after each fifth post--"these [posts] were supported from below . . . by two braces." Of these, one, apparently with "moderate slope" like the two-foot-spaced posts, or more nearly vertical, reached up to the stringer. The other came up only to the top of the water; that is, it sloped more. These two would roughly correspond to the petsik-sume and pulik-sume of Kepel. The difference is that at Kepel there were pairs or tripods of petsik-sume for each pulik-sume brace. (Even Waterman has paired posts or tripods for his "falsework," though for the permanent dam he mentions "ten in all"--or one petsik-sume "heavy upright" for each pulik-sume diagonal brace.)

However, the Gibbs description differs in one detail

[6]The "Archives of Aboriginal Knowledge," volumes 1-6, 1860, are a reprinting of Schoolcraft's "Historical and Statistical Information, etc.," volumes 1-6, 1851-57--both Philadelphia.

from all those of the Kepel weir. Each post that is braced at all has two braces or struts on the downstream side to shore it (and all that it supports) against the current. These two differed in length. The shorter, which would also have been set into the gravel bottom nearer the upright, met the upright at about the surface of the river. The longer, set farther off, reached to the string piece--in fact probably formed a crotch with the post which it supported, into which crotch the stringer was laid. This interpretation of the position of the two braces is not enforced by the Gibbs description but the position was probably simplest and perhaps was strongest. The lower brace might have been put in more toward the horizontal, the upper more toward the vertical, but they would then have had to cross instead of standing in a plane with the post, and it is hard to see what would have been gained.

7. There would be about eighteen 12-ft. intervals in a 75-yd.-wide weir or, if we add 40 per cent for its angling upstream and down again, twenty-five intervals.

8. The stringers were "heavy spars," no doubt conifers and probably Douglas fir, about 30 ft. long, withed in place. Thirty feet of length would have carried them to the second or third pair of braced supports beyond the one where they started. Ten such stringers, five in each wing, would about have spanned the river, if the V formation was not too acute.

9. The entire dam "was faced with twigs, carefully peeled" and so close as to prevent the fish from passing. This agrees exactly with all the photographs of recent Hupa and Chilula weirs (a and d of pl. 1) even to the peeling. "Twigs" of course must be understood as slender conifer limbs, of sapling size, an inch or inch and a half in diameter. All the Kepel accounts were less interested in these than in the big timbers, the mat gratings, and the foliage for packing the bottom. These peeled "twigs" or sticks almost certainly formed the main surface of the weir at Kepel as elsewhere; they constitute Waterman's innumerable rogon stakes.

10. The top edge of the weir was probably formed mainly by the upper ends of the peeled sticks, which would have had more strength if they projected somewhat above the stringers that held them. The top was two to three feet above the surface at the stage of water seen by Gibbs.

11. "Slight scaffolds were built out below" the weir, from which salmon were taken in dip nets, plunge nets, or by harpoon with toggle. Since the downstream position of the Heyomu scaffolds agrees with almost all non-Yurok data here assembled, it would establish a possibility that the other Yurok weir at Kepel was not a unique exception, but that Waterman and Kroeber after all misunderstood their informants' explicit statement as to the upstream position of the fish-taking constructions there--if it were not for the fact that these are described as pens, corrals, or houses, plus the corroboration afforded by the Patwin dams.

12. Gibbs tells of similar dams "a few miles below" Weitchpec (at Kepel, some 10 mi., but he did not go down to it); "about fifteen" miles above this one (this would be Orleans, probably); and another, 13 or 14 miles up the Trinity in Hupa, most likely the one at Medilding that year. These identifications are cited to establish that in spite of the early date--only a year after the first recorded irruption of miners--Gibbs was able to communicate adequately with the Indians and that he was interested in having his information accurate.

This ends the interpretation of the Heyomu weir.

Hewes's informant, Weitchpec Ned, said that the Lo'lego weir was built in years when there was none put up at Kepel; which seems only common sense, since there would have been little run of fish while Kepel was functioning, and a different season could hardly have been chosen because the size of the Klamath would limit construction to the low-water period at the end of summer.

HUPA WEIRS

Hewes (F.N., 1940) records details on the Hupa weirs. Originally the weir was said to have been built each year at Takimilding, a short distance upstream from where Hostler Creek enters the Trinity. When the headman's age made it impossible for him to supervise the building, he "loaned" his authority to Medilding. Thereafter they constructed the weir in alternate years at the two places, which are, as a matter of fact, only two or three miles apart, but were the respective metropolises of the lower and upper halves or "divisions" (Goddard) of the valley.

The weir was not built until the depth of the water was right. A man waded out into the stream and, if the water did not come above his armpits (about 4 ft.), it was deemed proper to start construction.

There were certain formalities but no such elaborate ceremonial procedure as at Kepel. In the early morning, before taking any food, the "leader," assisted by a "formulist,"[7] cut a pole four or five inches in diameter and about fifteen feet in length. This pole was brought to the river and tethered to a stone by means of a "hazel withe," and allowed to float in the current for five days.

From this first morning on the leader might drink no water for ten days, purified himself by sweating in the sweathouse, and observed other restrictions not detailed.

On the fifth day all the men who were to participate in building the dam (there might be as many as a hundred) assembled and brought poles and other materials. The poles were usually fifteen to sixteen feet in length, and each was later cut in half to make two posts of proper length to form a crotch.

However, the pole which had been floating in the river was first cut in half and the resultant two posts formed the first of the crotches, driven at the point which had been selected as the center or apex of the V-shaped weir.[8]

The driving was done with a heavy flat stone, wielded from a canoe[9] (in later times the white man's sledge made it easier). This work was laborious and required, it was said, about half a day to drive a pair of these posts for a crotch. They were slanted so as to give the upper side of the weir a slope and so brace it against the current.

The subsequent crotches, each securely bound at the point of crossing, were spaced about eight feet apart in the V-shaped line across the river.

[7]This "leader" and assistant "formulist" evidently correspond to the "formulist" and "assistant" of the Waterman-Kroeber account at Kepel. Note also that the first ritual act is the cutting of a key pole five days ahead.

[8]While Hewes's account does not explicitly say so, mechanical reasons make it probable that each length of post was driven in separately and that they were tied together only after they were in place. It would seem almost impossible to drive into gravel a spreading crotch. The V-shape of this weir is not substantiated by extant photographs of other weirs, but these were taken 50 years after wholly native times.

[9]This seems more likely than Waterman's statement that the wielder of the maul stone rode the post while pounding it.

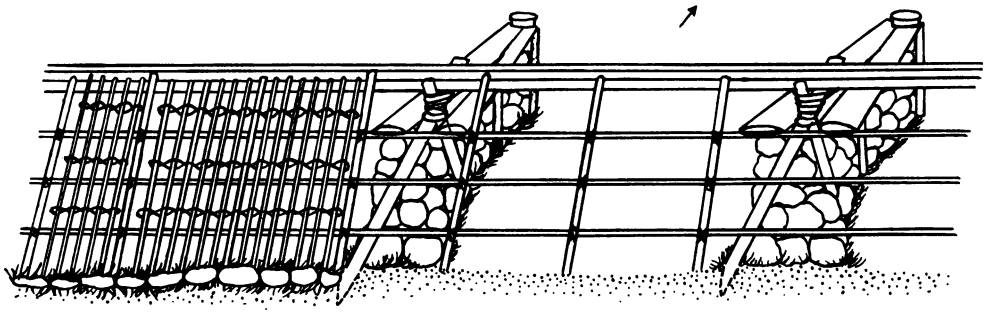

Fig. 1. Weir construction. Hupa. After Hewes (F.N., 1940).

All this post driving and crotch binding was done under the direction of the leader, who gave a verbal signal when each blow was to be struck. Meantime an assistant sighted along the crotches to see that they lined up properly, and that each pair crossed so the crotches would form a fairly level line.

Our figure 1, based on Hewes's account, shows on the right the construction of this framework; on the left the construction of the completed weir.

Into the crotches the two or more heavy poles forming the walkway on top of the weir were dropped as the work progressed. These top poles also held the tops of the smaller (3 to 4 in. diam.) intervening posts, which were placed at relatively frequent intervals between the crotches.[10]

Next, horizontal poles, usually of oak, of perhaps inch to inch and a half diameters, were securely bound to the upright posts. Workers had to dive to tie the lower ones. The binding material was wild grapevine which was heated in embers to make it pliable.

Next, a kind of slat matting was woven in sections about four and one-half feet wide and of any length up to as much as thirty or forty feet. This was woven on the ground ashore and was rolled for transportation. The slats were simply secured by three lengthwise courses of twining. The mats were then unrolled on the upstream face of the weir and made it quite fish-tight.[11]

Usually two or three of these mats were enough to reach from the apex to the shore. They required no binding to the frame since the pressure of the current was quite sufficient to hold them in place.

Finally boughs of any available kind (fir, alder, or willow) were placed along the bottom edge of the weir and weighted down with stones. These boughs effectively sealed the bottom against the passage of any fish, and against the "digging" effect of the current.

On the downstream side of the weir were constructed short platforms of wooden slabs or planks, one end resting upon the walkway atop the weir,[12] the other end on a post driven a few feet downstream. The space beneath such a platform was occupied by a line of stones resting on a base of boughs to prevent the water from "digging" away the sand. Such a line of stones was said to reach well up toward the surface of the water.

The first platform was built at the apex of the weir, another at each alternate crotch. In other words these platforms were spaced about sixteen feet apart, and with their lines of rocks they divided the weir into a series of bays, each nearly sixteen feet wide.

The platform in the center was the most important and advantageous. Not only did the fish tend, on account of the angular form of the weir, to work toward this apex, but the fishermen who occupied this platform had available to them a bay on either side of the platform.[13] This central platform was definitely reserved for the use of certain families who had legendary right to it.

All the other platforms on the weir were open to anyone who had participated in its construction, and to those whom they might invite to fish there. If a visitor came along he was given fish outright, provided there was an abundance already caught. If not, he was loaned fishing equipment and invited to use one of the platforms.

The fishing was usually done off the downstream end of the platform. Two types of dip net were used. One was a fair-sized landing net mounted on an A-frame. It had two mooring lines running back to the weir in order to hold it in place. The second type of net used was the regular plunge net.

Since most fishing was done at night, a small fire was kept burning ashore near either end of the weir, where the fishermen could warm themselves from time to time.

Women were never permitted to participate in any way in fishing or in building weirs.[14] In fact, no woman was permitted to cross the river on the weir, though men always did so. A woman must cross the river in a canoe.

Among his illustrations, Hewes (Th., 1947, fig. 7) shows a drawing of a photograph of a Hupa weir, and states that with this weir "A-frame dip-nets are used from platforms on the downstream side."

Hewes's information is corroborated in a general way by Curtis (1924a, p. 18), who makes the Hupa weir erection a "pseudo-religious event," and has everyone bring at least a few sticks so as to share in the catch.[15] He

[10]See fig. 1. These smaller posts (but bigger than stakes) which intervened between the crotched and braced main posts at intervals of two or three feet are mentioned in Gibbs's account of the second Yurok weir but not for the Kepel dam.

[11]The Hewes description of these mats agrees closely with the Kepel account.

[12]Hewes's field notes indicate that this plank was, at least sometimes, rested upon a stringer below the walkway, as is shown in our fig. 1. A modernized platform is shown in pl. 1, d.

[13]This would actually be true of each of the other platforms, but the informant mentioned this as the point of advantage. Though he did not specifically so state, we may assume that regulations restricted the users of other platforms to a single bay each.

[14]With the Yurok also. A woman might not cross the Kepel weir, and she must not look at its construction.

[15]Curtis first uses the term "stakes" to correspond to the "posts" or "piles" of Hewes, Waterman, and ourselves, but later applies it to timbers.

mentions fishing platforms on the lower side of the weir, but does not specify whether the structure ran straight across the river or was V-shaped.

Two views of a very simple Hupa weir are shown by Kroeber and Gifford (1949) in plate 2, e and f. Our plate 1, a, b shows other views of this weir, and 1, c shows another Hupa weir.

KAROK WEIRS

One of Gifford's Karok informants, Mary Ike, after whose husband Ike's Fall is named, stated (F.N., 1939-42) that weirs were built in lower Karok territory at four spots in the Klamath itself and at two in the Salmon River. In order down the main river these six locations, with names added from Kroeber, 1936, were:

1. Above the mouth of Irving Creek "below the Sancho mine." (The Irving school is between 9 and 10 mi. upriver from the mouth of the Salmon.) (Map 1, K1.)
2. On lower Salmon River, below the bridge at Somes Bar. (Probably Shakiripak or Shihtiri, a fraction of a mile from the Klamath.) (Map 1, K2.)
3. At Oak Bottom Flat. (This is Vunharuk, something over a mile above Somes Bar, about two and a half miles up from the mouth of the Salmon, and about a mile below where Wooley Cr. flows into it.) (Map 1, K3.)
4. Back on the Klamath, at Orleans (Panamnik, something over seven miles below the mouth of the Salmon). (Map 1, K4.)
5. At Tuyuvuk, Ullathorn Creek and Bar (not quite 3 mi. below Orleans). (Map 1, K5.)
6. At Wupam, (Red Cap, about 4 mi. below the last; it was the most downriver of Karok towns). (Map 1, K6.)

The total stretch involved is nearly 25 river miles.

A weir was built, in any one year, at only one of these six sites.[16]

Georgia Orcutt made an independent statement about Karok weirs. She named:

A. Aftaram, at Stanshaw Creek.
B. Afsuf, the creek next below Camp Creek, on the same side.
C. At Forks of Salmon (exact location uncertain).

Stanshaw Creek comes into the Klamath only about half a mile above Irving Creek. Since the weir was above the latter, evidently only one site is intended by the informants: 1 = A. Aftaram was a settlement of importance.

The creek next below Camp Creek is Crawford Creek, which is only a fraction of a mile from Ullathorn. In fact, the three creeks converge so that their mouths are all within 0.7 mi., according to topographic map. There can thus be no reasonable doubt that Afsuf is part of Tuyuvuk or another name for it, and that 5 = B.

As for C, Forks of Salmon was not Karok territory at all, at least not until the Konomihu had been wiped out by the 1860's, and it may be assumed that "Forks of Salmon" either was a loose statement for "somewhere up the Salmon" or refers to the postcontact period when Karok had moved into the old Konomihu territory. (This weir is indicated on map 1 by our crossed circle symbol at Forks of Salmon.)

There is therefore no essential disagreement between the two lists, except as regards completeness.

The only known statement by an American, however, as to any of these dams, is that of Gibbs in 1850, who refers to one seen by him near Orleans,[17] similar to the one seen at Yurok Heyomu and "in every respect its equal."

It is curious that while we have these accounts of weirs at several sites in the lower twenty-five miles of Karok territory on the Klamath, we do not have a single reference to any weir in the upper thirty miles from Stanshaw Creek to Happy Camp.

Gifford's notes state further that weir building among the Karok was attended by a certain amount of ceremonial procedure, though not as elaborate as that at Kepel among the Yurok. The weir at Afsuf was made only after completion of the Amaikiara Jumping Dance on a ridge near Orleans in the month of July, the formulist for the weir remaining for four days in the sweathouse at Panamnik. If the weir was built at Wupam (Red Cap), the formulist stayed in the sweathouse there for five days. These two dams were said to be rather ceremonial, and differed therein from those at other points in Karok territory, which were built without formality. Yet, even with these two weirs at Afsuf and Wupam no major dances followed their construction; though it was customary to hold a girl's puberty dance shortly after construction of any of the weirs.

After the completion of a weir the people camped there (usually during July and August) and busied themselves with curing the supply of salmon for next winter.

The actual construction of a weir involved considerable labor, according to Gifford. Heavy stakes of fir were first driven with cobblestone mauls into the river bed at frequent intervals and then crossed. (Two-foot intervals were mentioned by one informant, though this seems close.) Where needed for further strength, stones were piled around the bases of these stakes. Where these pairs of stakes crossed they were lashed securely together, and into the notches thus produced a pair of horizontal poles was placed which served as a walkway for the fishermen. Sometimes, even, other stakes were added specially to support the walk. Only one informant mentioned that out near the middle of the weir this walkway was expanded to form a platform large enough to accommodate two fishermen with their nets.

Next, smaller poles were lashed together or woven into a kind of matting which was then placed on the upstream side of the crossed stakes so as to close the spaces between them, and to fill completely the width of the river. When the weir was not actually in use some of these mats or gratings were removed so that the fish could pass on upstream.

A landing net was used on the downstream side of the weir, the fisherman standing on the walkway or the platform. While informants are not in entire agreement, it

[16] What is not clear about this statement is why weirs across the Salmon should be equated with those across the Klamath, when the flow of the former, and the presumable quantity of salmon taken, was only a fraction of that in the main stream.

[17] This may have been no. 5 near Ullathorn rather than no. 4 at Orleans. Gibbs implies that they reached Orleans Bar after "crossing another branch [tributary] of some size, the Ocketoh, at the mouth of which 'was the dam.'" The large affluent would be Camp Creek. The name is not decisive because the expedition was now traveling in Karok territory with Yurok guides. Oketo means "lake" in Yurok, and may refer to a widening in the Klamath.

seems probable that the harpoon may at times have been used from these same vantage points.

To facilitate the building of these weirs, much of the work was actually done on shore by making what may be termed large mats of withes which could be rolled onto the upriver side of the framework. Withes of suitable lengths were laid parallel one to another and these were held by courses (usually 3) of twining with willow bark. Comparably, Driver (1939, p. 378) specifies for the Wiyot that the weir was "made of split redwood slats bound together [twined?] with willow bark. It could be rolled up and carried to the site where the weir was being constructed."

Curtis (1924a, pp. 74, 75) also describes a Wiyot weir "made with close-set redwood saplings, which were held together by means of three courses of willow-bark twined-work." And a Hupa weir with platforms on the downriver side is shown by Hewes (Th., 1947) in his figure 7.

In a Karok myth (Kroeber, G2d) collected in 1902, Shammai is said to have created some of the essentials of fishing. He first made a fishing platform of long poles, bruised grapevine to lash them together, and set on them a plank and a stool. He then added a screen of brush in the water, moved it nearer shore, and finally replaced it by an "even" [flat] screen of sticks tied together. This, probably, refers to a guide fence leading to the net under a platform.

Another reference in a Karok myth from Kroeber recites that A'u'ich peak (Sugarloaf Mt.) at Ka'timin created salmon and that when they came upriver full grown, he made the lifting net, the scoop net, and the scaffold staging.

It seems that among the Karok the weir had become a rather simple type of barrier (little more than a guide fence) running straight across the river. Hewes (F.N., 1940) gives for this type of weir the Karok name isiyá, and details its construction as follows: Select two posts of proper length, according to the depth of water, and bind these with hazel withes to form an A-shaped crotch. [It is difficult to see how a crotch could be driven into the bottom.] Plant [i.e., set] this ready-formed crotch out in the stream at a distance so that a log running from the shore will rest in it. Place successive ready-made crotches and connecting logs in this way completely across the stream, perhaps 200 ft. The logs may be 6 or 8 in. in diameter and as much as 15 or 20 ft. in length. Next, brace, with additional posts and some stones if needed, the anchor crotches at the ends of the weir. Then, on a line a foot or so above the river bottom, bind a set of longitudinal poles to the upriver posts of these crotches. Then, on shore, make mats by weaving three lines of twining to hold slats of split fir 5 feet or so long, each mat several feet wide. These were placed on the upriver side of the weir and were held in place by the force of the current: no stones were needed. If rocks on the river bottom interfered with the setting of the lower edges of the slats, the rocks were rolled away so that the ends of the slats could be firmly worked down into the sand and gravel.

The building of such a weir required a couple of weeks' time, according to Hewes, including the gathering and peeling of the poles and logs. It was a matter of the communal effort of those who wished to participate, and was not attended by any special ceremonial procedure. Anyone was privileged to fish from this dam, regardless of whether he had specially concerned himself with its construction.

In this weir no special platforms were used by the fishermen. A group of perhaps three or four men would take out a canoe and moor it to one of the crossed supports of the weir. Then each fisherman, armed with a plunge net and a fish club, would stand on the top log of the weir. As he caught a fish in his plunge net, the fisherman would club his fish and throw it into the canoe. Several such groups, each with its own canoe, might operate simultaneously from the top of the weir. This fishing was done usually for a couple of hours late in the afternoon and for a similar period early in the morning. No night fishing was attempted. In fact, one informant insisted that formerly night fishing was not necessary. Now, since the introduction of the more visible white twine of commerce for net making, night fishing has become prevalent.

This weir was usually left in until it was torn out by the high water in early winter, though toward the end of the run some part of the weir might be breached, thus permitting at least some of the fish to ascend.

At such a weir plenty of fish were caught for a winter's supply for hundreds of people. The families camped near by and here the women busied themselves with preparing and drying the fish for winter storage. They gathered all the wood and performed all tasks relating to this drying and storage.

Women, however, must not go near the weir, and under no circumstances could a woman cross the river on a weir. Not only would it ruin the luck of the fishermen, but the woman's life would be curtailed.

CHILULA WEIRS

Some information is at hand from the Chilula. The main stream in their territory, Redwood Creek, is small as compared with the Klamath or even Trinity, and their dams were quite simple. Hewes (F.N., 1940) describes a barrier of brush thrown across a stream late in the season, particularly to catch the steelheads as they came back downstream after spawning. They were too emaciated for drying but were still serviceable for immediate use fresh.

In the middle of this temporary dam was an opening about three feet in width. At this opening, and on the upstream side of the dam, a small platform of redwood bark slabs provided a station from which to wield the dip net. A bed of sand on the platform provided a hearth upon which a small fire was kept burning for warmth during the chilly night hours. This hearth is illustrated in our figure 2.

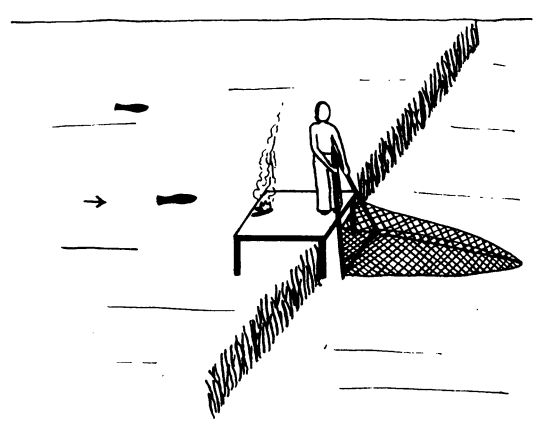

Fig. 2. Barrier of brush. Dip net used from platform. Chilula. After Hewes (F.N., 1940).

This barrier had no posts or braces and was of such a temporary nature that it was not expected to last more than a week. It could be built by anyone and without ceremony. The informant said that even women might fish here.

Hewes also describes another weir made by the Chilula, which was particularly employed in taking lampreys. At some point on a small stream, perhaps 20 ft. wide, where the water was 3 to 5 ft. deep, heavy posts were driven vertically into the stream bed at about 6-ft. intervals. Braces were set and bound on either side of each of these posts, the upstream brace forming in each instance a crotch in which the horizontal top log rested. Along the bases of the upstream braces ran a lighter horizontal pole. Next a matting, woven of split sections of poles, was rolled out on the upriver side of this framework, and finally leafy boughs weighted with stones were placed along the bottom of the weir.

Out near the middle of the dam, and on the downstream side, were usually placed two small platforms from which the eel nets were manipulated. For each platform a vertical post was driven out in the stream a few feet from the weir. A slab of redwood bark ran from the post over to the weir, and horizontal poles made a separating fence for each platform. A rock or stool served as a seat.

Here the fisherman manipulated a small, close-meshed lifting net [sic] mounted on an A-frame, provided with a simplified signal device. This structure is shown in our figure 3. Since lampreys travel almost entirely at night, this dam was used only then. The fishermen took turns using it, two men at a time.

Little ceremony and few restrictions marked the building of such a dam. The headman devoted himself to prayer during the days the dam was being constructed. However, during the first five days of the life of this dam the lampreys caught must be cooked and eaten on the adjacent stream bank. If it was deemed necessary to dry some, the drying must be done at home or at least well away from the dam. After these first five restricted days lampreys could be dried anywhere.

One Chilula informant stated that on the section of Redwood Creek occupied by his people there were never more than two or three weirs. Such a weir backed up the water so that the level above the dam was from one to two feet higher than that on the downstream side.

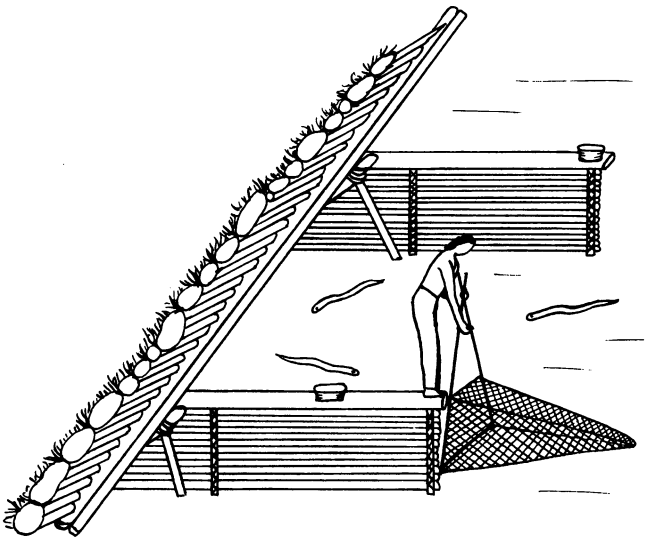

Fig. 3. Weir for catching lampreys. Chilula. After Hewes (F.N., 1940).

WIYOT WEIRS

The Wiyot territory lies along the coast line where the tides affect the streams and where bays and inlets prevail. Both straight and V-shaped weirs were present but, as would be expected, they were of simpler construction. The building of a weir by the Wiyot was governed by the depth of the water in the stream. Hewes says that a depth of four feet was preferred, and such weirs were usually constructed in late spring or early summer, depending upon weather conditions.

Another type of weir (fig. 4) (Hewes, Th., 1947, fig. 5) was set in deeper water (7-8 ft.) in the middle of a stream or tidal slough, which might be as much as 60 ft. in width. It consisted of two wings, sharply converging downstream, with an opening at the center where an A-frame net was set (Hewes, F.N., 1940; Th., 1947). At high tide such a device might be completely submerged. It was used primarily for King salmon which were carried down along with the ebbing tide into the net. It must be watched carefully by a man in a canoe, which was stationed just below the trap, not only to prevent the escape of the fish, but because a seal might go into the net after the fish. This not only lost the catch but tore the net. This is considered a dangerous method of fishing, for in a swiftly running ebb one might easily be pulled overboard when manipulating the net. Cases of drownings are known.

When Hewes mentions A-frame dip nets similar to those manipulated from scaffolds, he refers not to the large lifting net, which is the type used from scaffolds along the banks of rivers at eddies, but rather to the smaller A-frame net which we are designating as the "landing net."

Curtis (1924a, pp. 74, 75) is evidently speaking of this same weir type, but his mention of the use of a signal or trigger device by a fisherman on a platform seems to be in error in this instance. It is much more likely that Hewes is correct in stating that the fisherman operated the landing net, which he probably did from a canoe.

Curtis (1924a, p. 75) also describes two Wiyot weirs which were somewhat similar to this one. Both were V-shaped with their angles pointing downstream. [Note that the V pointed downstream when the weir was intended for descending fish.] With one a net was operated from a platform; with the other the fish were caught in a

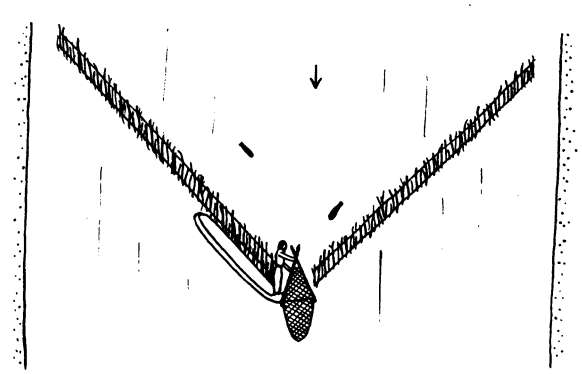

Fig. 4. Weir for taking King salmon. Wiyot. After Hewes (F.N., 1940, and Th., 1947, fig. 5).

"slender, conical basket." The middle of this basket was raised above water level, its pointed end being bent down again into the water and covered with brush to keep the sunlight off the catch.

Curtis mentions for the Hupa a similar trough trap with brush-covered end. (See fig. 28.)

Still another weir (Hewes, Th., 1947, fig. 6), and a rather elaborate one, which Hewes attributes to the Wiyot, is shown in our figure 5. It is designed for the taking of steelheads and lampreys. It extends all the way across the stream and consists of several impounding bays, each of which terminates in a basketry trap and each of which has, at its side and downstream, a platform from which a fisherman can remove the catch. Hewes does not state just how the fish are removed and we may presume that this is done with a dip net. This may be similar to the weir with compartments described by Curtis (1924a, p. 98) for the Tolowa. It is for steelheads returning downstream. Some fish are removed with a gaff. It had several short perpendicular wings projecting downstream, each with a platform from which a net was operated; also with impounding enclosures on the upper side of the weir where fish would be entrapped.

COAST YUROK WEIRS

All our data are from Hewes. A device (fig. 6), illustrated by Hewes (Th., 1947, fig. 8), a Coast Yurok trap for use in small creeks, is so constructed that the impounding portion of the device is even larger than the part which blocks the progress of the fish.

Coast Yurok informants told Hewes that in Little River, the only salmon stream in the vicinity of Trinidad, a fairly small stream, the rather swift flow travels in a relatively narrow channel, producing a condition at one spot which allowed an interesting type of weir that might be termed a triangular corral or pen.

The mouth of Little River does not close with a bar, but forms certain riffles where at high water fish can be taken with the single-pointed toggle harpoon. The people of Trinidad fished the lower three or four miles of Little River, as well as its mouth, but the special type of triangular corral was put in at the first rapids on Little River, near Crenell Mill, a mile upstream from Highway 101.

Half-a-dozen men would team up in building the corral when the water level had fallen to two feet in midstream. The apex of the triangle pointed upstream, and the third side stretched across the stream from shallow water to shallow water, with an opening in the middle by which fish entered. The sides of the corral (about 3-1/2 ft. in height) were built of horizontal poles or logs, spaced about four inches apart and bound securely by hazel withes between pairs of upright stakes driven into the river bottom, much like one type of our rail fence.

The fish were removed from this pen by gaffing--not by harpoons or dip nets. Often the fisherman simply stood in the water beside the opening and gaffed the fish as they entered, or he climbed into the pen, hooking one fish after another with a long-handled, five-foot gaff and clubbing each before throwing it onto the bank.

The informant insisted that both the shape and the horizontally laid face of this kind of weir were peculiar to the special conditions at this one spot on Little River.

Hewes (F.N., 1940) describes a relatively small Coast Yurok dam, called ló·gen like the river weirs, built on Prairie Creek at a place called tseser. It was erected without ceremony, ran straight across the stream, and had no woven mats. The creek here was about four feet deep and twenty wide. About ten stakes were driven in a straight line across the stream. To these a log, a foot or so in diameter, was fastened. Against the upstream side of this log, stakes were leaned, and a few rocks were placed along the bottom for strength. No woven stake mats and no leafy brush were added. The plunge net was used from the top of this dam, or from the two or three five-foot stagings built on the downstream side. Also the double-pointed harpoon was used here for both salmon and steelhead. This dam was left in Prairie Creek until washed away by high water.

Hewes (F.N., 1940) reports another very simple type of weir, called witcepúrh, used by the Coast Yurok in small creeks to catch salmon returning downstream to get into the river. A few posts were driven into the

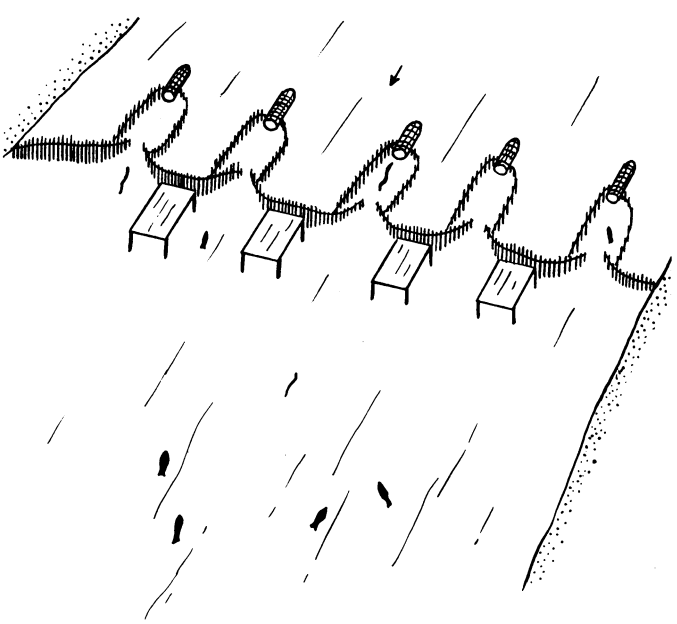

Fig. 5. Weir with impounding bays and traps. Wiyot. After Hewes (F.N., 1940, and Th., 1947, fig. 6).

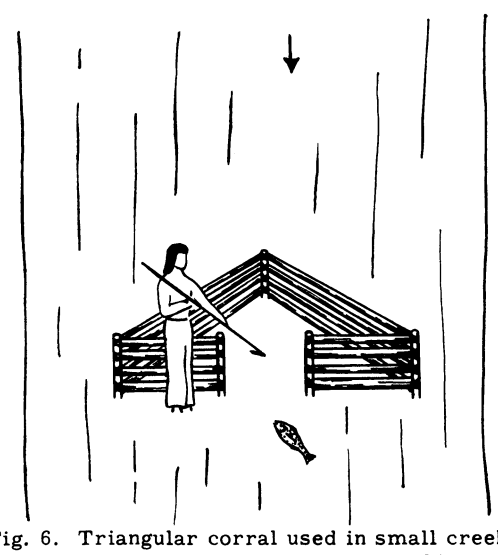

Fig. 6. Triangular corral used in small creeks. Coastal Yurok. After Hewes (F.N., 1940, and Th., 1947, fig. 8).

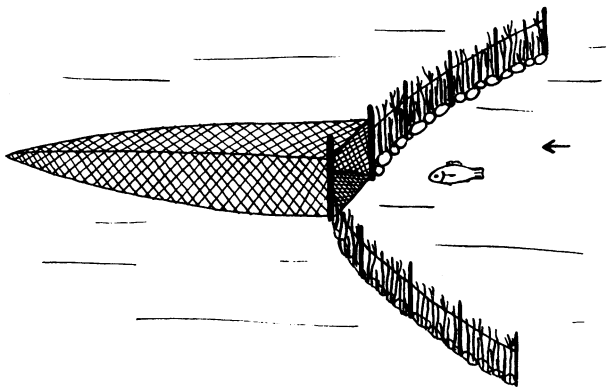

Fig. 7. Small weir, with bag net trap, used in creeks. Coastal Yurok. After Hewes (F.N., 1940).

creek bed and brush was piled against these to form two short converging wings pointing downstream. In the opening at the angle of these wings a cylindrical net, about four feet in depth, was fastened to the side posts. No hoop was needed [sic]. The salmon were clubbed in the net and removed by hand. Trout were also sometimes caught in this same net. This device is shown in our figure 7.

TOLOWA WEIRS

The Tolowa adjoined the Coastal Yurok on the north, but were Athabascans.

In Smith River they had a good-sized river, much smaller than the Klamath, but carrying salmon abundantly. In volume toward its mouth it was probably intermediate between the Trinity and the Salmon rivers.

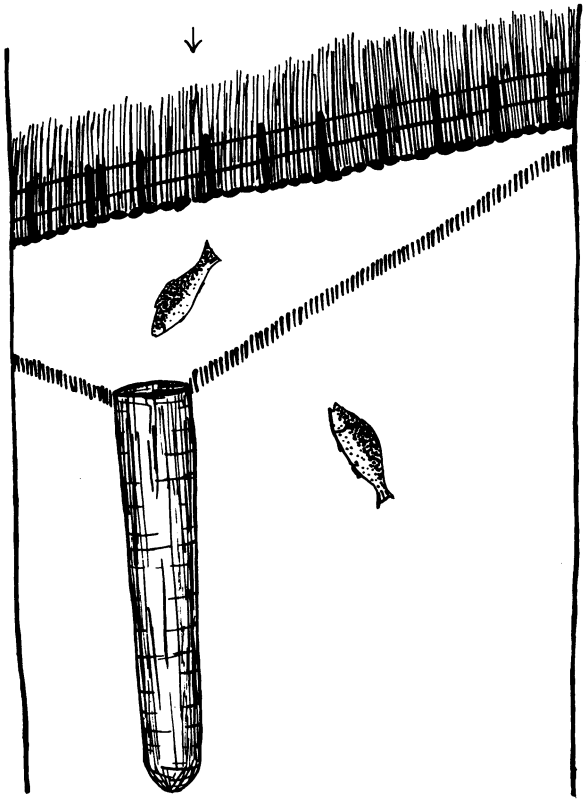

Fig. 8. Double weir and trap. Tolowa. After Hewes (F.N., 1940, and Th., 1947, fig. 9).

Hewes's data are not only excellent for the Tolowa, but, except for Drucker's, they are almost the only ones.

A device (fig. 8) which Hewes briefly describes and illustrates in his thesis (Th., 1947, fig. 9), but which he details much more fully in his field notes, was made by the Tolowa, a sort of double barrage which he says was employed for taking "spring salmon." It was a slanting, double fence, placed at a point where the water was not over three feet deep. [One informant said that these fences were parallel and gave nilíme-tceslûć (river fence) as the name of the device.] The lower fence, protruding about a foot above water, was made of posts some three inches in diameter, set two to three inches apart. The fish easily jumped over this but hesitated to try jumping back (probably because of the cramped quarters).

The second fence, about three and one-half feet upstream, "the length of good-sized Chinook salmon" (according to one informant), was built of much smaller stakes (an inch or so in diameter), even some split stakes being used. Intertwined among these were pliable hazel withes. To withstand the water pressure against this fairly tightly woven fence it was bound to heavy upright posts set into the stream bottom and then reinforced with rocks. The posts were set about two feet apart and rose about two feet above water, but the woven fence extended on up another two feet, thus bringing the top of the whole structure a good four feet above water level. This height insured against fish trying to jump the upper fence.

At the downstream end of this double barrage was placed a woven basketry trap, as much as fourteen feet long. One informant said that it was cylindrical. It was so placed that its mouth was under water, while its rear half [sic] protruded out of the water. By the time a fish had worked down to the end he found himself helpless in the dry part of the basket.

Such a pair of parallel dams might be as much as a hundred feet in length, depending upon the width of the stream and the sharpness of its downstream trend, and it required the work of quite a number of men to build this rather intricate device.

When fish were seen between the fences, a fisherman waded in at the upper end and drove them down into the basketry trap. When the water was very low, one could see the dorsal fins and the tails protruding above the water.

No dip net was used with this device. No gates were built into these fences. If it was deemed advisable to let some of the fish go on upriver, some of the stakes in the upper fence were simply removed.

This same type of weir appears in Driver's (1939, pp. 312, 378) element 193, which he lists for the Tolowa only

Hewes records another type of Tolowa dam, called naa'tína, built usually by one man, a small weir placed straight across a small stream. A double row of stakes had brush placed between them and a special type of 7-ft.-long, cylindrical net was set between two stakes at an opening in the weir. The mouth of the net was some thirty inches in diameter, was held open by means of a hazel hoop, and was faced upstream, its bag, of course, pointing downstream with the current. To a point a couple of feet back from its closed end was fastened a signal cord, which ran over to a stake planted on shore. On this cord was hund a crab-claw rattle. As the fish pushed at the end of the net in his efforts to get through, he rattled the crab claws and gave the alarm to the

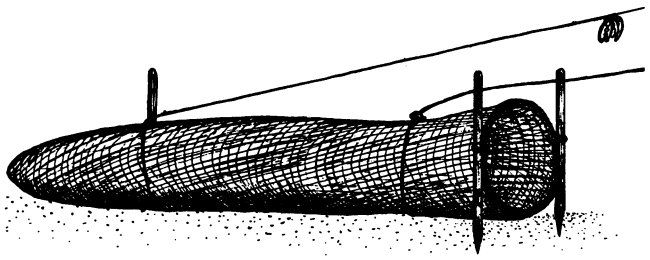

Fig. 9. Cylindrical net trap, used in weir. Tolowa. After Hewes (F.N., 1940).

fisherman on shore. (See fig. 9.) Unless there was a dam immediately above to turn ascending salmon back, this device would have taken only spent salmon or descending steelhead.

At a point near the mouth of the net another cord was so rigged onto the net that it served as a means of closing it. Then the net was lifted enough so that the fish could be clubbed and grasped by the tail; the hazel hoop of the net was then lifted and the fish dumped out of the net onto the shore. The mesh of this net was only a little larger than that of the surf net. It was used only at night so that the fish could not see the net. This type of net caught not only salmon and steelhead, but also, at times, land otter (naga'tún).

Another type of double weir, called ûstcidî'ła (fig. 10), accredited by Hewes (F.N., 1940) to the Tolowa and to the Chetco of Chetco River north of Smith River, consists of an upper fence, called ûs, made of posts about 3 in. in diameter which are driven into the stream bed at 4-ft. intervals and on a line running diagonally from bank to bank. The spaces between these posts are filled in with smaller stakes so as to make a fish-proof fence. At a distance of about 12 ft. below this fence is located the apex of a V-shaped guide fence of small stakes and brush leaving a passage around one end so that the ascending salmon may find their way around it and into the space between the two fences. At the angle of this lower guide fence, which is quite near one bank of the stream, is a long cylindrical basketry trap. Into this trap the fish eventually find their way, if not voluntarily, then when frightened by the fishermen. This tubular trap, called nagete, sometimes as much as fourteen feet in length, is so narrow that a fish cannot turn around. Escape is impossible.

The Tolowa also had another type of dam across the stream for steelhead and salmon coming downstream in the fall after spawning. In the apex of this fence there was set, in midriver, an open-topped wicker trough [or perhaps a split canoe?], 10 to 12 ft. long, and 3 ft. wide. Sticks were placed under the lower end of this trough so as to bring it up out of the water. If there was deep water above the dam, a net was stretched across (2 or 3 nets together if necessary) and this net was hauled downstream with canoes to bring the fish down to the fence.

In place of the trough-shaped trap, a cylindrical basketry trap sometimes was equally effective.

Still another device attributed to the Tolowa is one called negeté [really the name of the platform itself, cf. the name of the last-mentioned one], which consists of a V-shaped fence (pointing upstream) with a platform of hazel withes built just downstream at the opening of the fence. This fence is called na'tłai, and was usually built by older men in late summer. It is quite similar to a Chilula weir with platform, shown in our figure 2. The informant did not detail the exact method of fishing used here but it is presumably dip-netting, for he did specify that younger men preferred spearing.

This device was used on any large riffle where the water was one to two feet deep. The informant mentioned particularly a place, militcuntun (see below, Drucker), on Smith River, and said that this platform-fence was used at other points upstream where similar conditions prevailed. It was not used in smaller streams, such as Mill Creek.

Hewes (F.N., 1940) also learned from the Tolowa of a special type of lamprey weir, called tatceshã ta·crul. Choosing a spot on a riffle up Smith River where the water was about two feet deep, they set a dam or line of cobblestones across the stream. An opening about 5 ft. wide was left in this rock barrier. On its upstream side two fences of stakes and brush were constructed, each 9 or 10 ft. in length. The floor of this "chute" was covered with white pebbles in order to make the prey

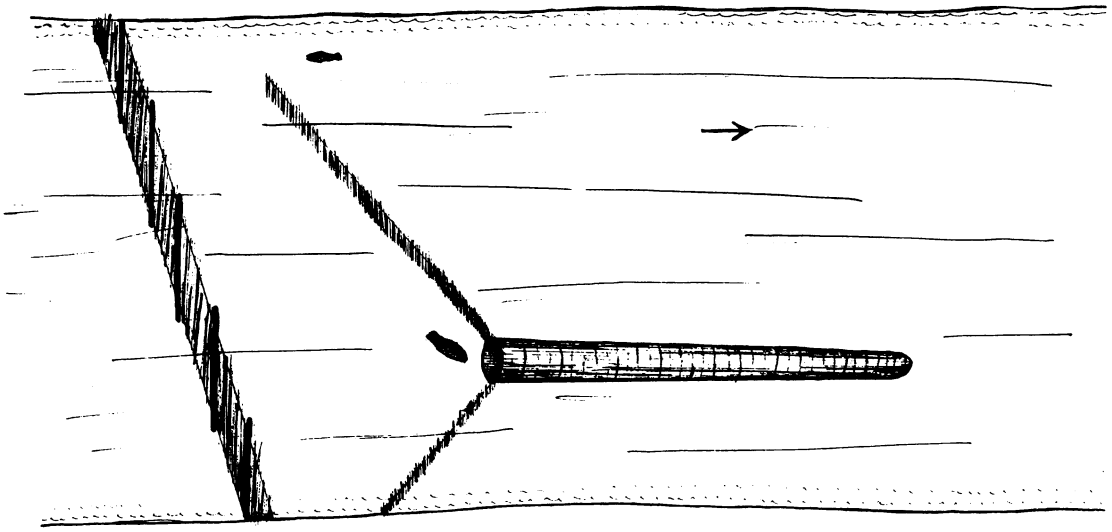

Fig. 10. Double weir with tubular basketry trap. Tolowa, Chetco. After Hewes (F.N., 1940).

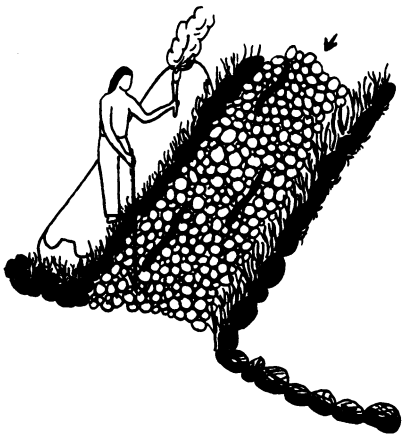

Fig. 11. Lamprey gaffing chute, with white pebble floor. Tolowa. After Hewes (F.N., 1940).

more easily visible. (See fig. 11.) The fisherman stood either on a platform built at one side of the chute or in his canoe beside the chute. In one hand he held a pitch torch to illuminate the chute. With the other he wielded the gaff. This lamprey fishing was always done at night and usually in July and August. This was the only instance known to the informant of such use of white pebbles by the Tolowa, though the same fence device with white stones was observed by him among the Chetco in Oregon.

Drucker (1937, p. 232) says that "when the fall salmon entered [Smith] river, in late summer, the people camped at the communal weir at Munsontun, or at individually owned places, to catch and dry the winter's supply." The communal weir (uss tcū´), was built at Munsontun and/or Militcuntun, with its angle pointing downstream. Here was set a trough-shaped basketry trap. Fish were then driven downstream into the trap by shouting, splashing, and throwing of stones, including heated ones.

Small weirs were built diagonally across small streams, with a conical net in a hoop at the lower end. One man tended the net at night, being wakened by crab claws on a stick rattling when a fish entered the net. Drucker's name for this, na'ti:a, "standing up" (viz., the rattle stick) corresponds to Hewes's na'atína.

Drucker's maps 2 and 3 show Munsontun as perhaps one and a half miles above Rowdy Creek mouth, and Militcuntun about three miles farther up Smith River, more or less abreast of the north part of Lake Earl and perhaps six or eight miles below where the North and South Forks of Smith River join. On our weir plat (map 1) we have entered the two weirs as T1 and T2.

FIXED WEIRS: MARGINAL OR PERIPHERAL NORTHWEST AREA

MATTOLE AND BEAR RIVER WEIRS

Hewes (F.N., 1940) says that the Mattole fish weir, called tayūts´i, was, as the informant put it, "built of rocks and sticks," usually at some place where the water was about knee-deep. Large rocks were placed in a line across the stream; then stakes eighteen inches or so apart were set slanting somewhat downstream, behind the rocks and supported by them. Finally brush was placed on the upstream side of the stakes to make the weir relatively tight. "No logs were placed on top." Three or four gaps were left for the fish to pass through. At each of these gaps and on the downstream side of the weir rocks were so placed as to support a small platform of poles. Each was about three and a half feet wide. Upon the platform the fisherman stood to do his harpooning. Such a weir was the work of a single day for half a dozen men, or even a smaller number.

A fire was kept burning on shore for warmth, but no fires were burned on the platforms. In fact such a fire, according to informants, if at all bright, would frighten fish away.

As the fish came up the river they made enough noise to be heard by a lookout, who gave warning for the fishermen to be ready with their harpoons. It is evident that this weir was essentially a device for guiding fish ascending in shallow water to prepared spots where they could easily be harpooned.

On the other hand, the same weir might be used for trapping fish instead of harpooning. In that event the platforms were unnecessary. Instead, one or more openings were left in the weir into which basketry traps were fitted. Since the salmon travel chiefly at night, these traps were raised in the morning and the catch removed, no one remaining at the weir over night. Since ascending fish could readily escape from a trap by simply drifting with the current, it appears that the traps must have been set on the downstream side of the weir--again to take descending fish.

What may be termed a drag weir, consisting of a roll or drag of brush, was sometimes used to drive fish into the basketry traps. Hewes says that among the Mattole such a roll of brush is called tailes. It was so heavy that it was handled by two men, and even then must be moved downstream. No exact description was given of this "roll" but it was apparently in the nature of a movable weir designed solely for the purpose of frightening the fish toward the traps rather than for actually impounding them in any way. As this device was being manipulated by the men in the stream, small boys busied themselves throwing stones into the water to help in keeping the fish moving in the desired direction.

When the water in Bear River was low enough in the spring, a simple weir was built across the stream so as to leave an opening near one bank or the other, depending on where the fish usually preferred to go. Here an openwork fish basket with invaginated mouth was placed to catch the fish as they ran upstream. This appears to have been on the principle of our lobster or eel pots, viz., a basketry cone in the mouth of a basketry cylinder.

NONGATL WEIRS

Among the Nongatl (Hewes, F.N., 1940), we find that, when the water level in the river had dropped far enough, a low weir was built especially for spearing.

Such a weir was built in the following manner. In a narrow place (40 to 50 ft.), where the current is sufficiently mild to render the driving of posts into the river bottom unnecessary, tripods are made by binding near the top three fairly heavy stakes. These are then set into the river so that two stakes of each tripod are on the downstream side, thus giving greater strength. These

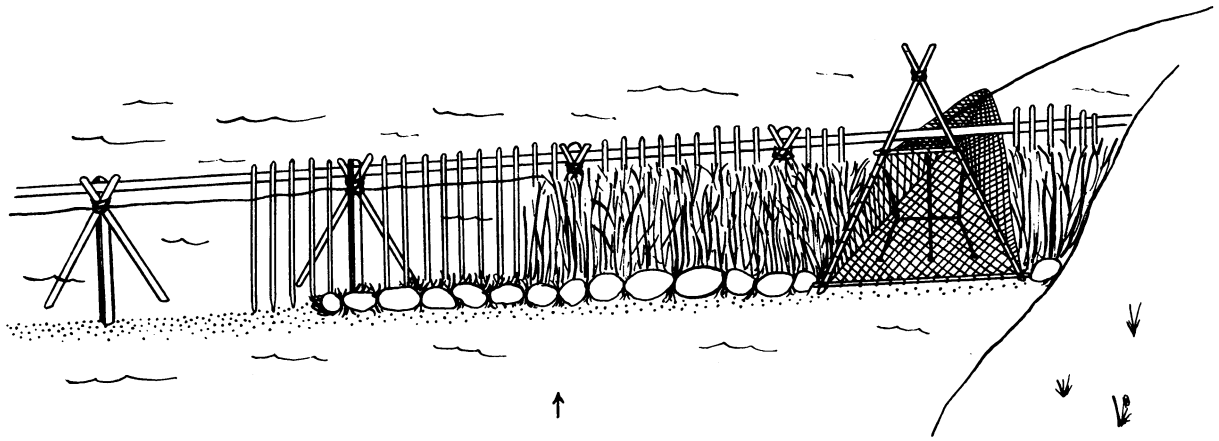

Fig. 12. Weir built on tripods. Nongatl. After Hewes (F.N., 1940).

tripods are set five to six feet apart, and each is shaken and pressed enough to firm it securely into the sand and gravel of the river bottom. [The tripods are evidently lashed together on shore and then set on the river bottom and their ends worried into the sand a bit. They could not well be driven in after lashing.] Next a single long log is laid into the series of crotches formed by these tripods. [The weight of this stringer would help hold in place the tripods.] A series of poles, each long enough to reach a few inches above the horizontal long log, is then placed so that each slants as do the upstream legs of the tripods. These poles are spaced about ten inches apart. On the upstream side of this picket-fence-like framework, brush with leaves is laid to make a tight dam. No rocks are needed.

This dam is built on a slightly diagonal line across the stream. The angle apparently induces the fish to follow along it until they find a thirty-inch gap toward the lower end of the dam where an A-frame net is set for their reception. (See fig. 12.) This is a relatively small dip net, called tekák', and is used for steelhead only ("not for black [King] salmon"). The net is provided with a signal string which is fastened to the finger [sic] of the fisherman.

The various parts of the weir are bound together with hazel withes, but inevitably these give way in time as they dry and break. The dam is simply left until it finally falls apart and washes away. Sometimes it remains for the entire summer. This weir, though it serves chiefly for netting, is also of service for spearing, when the opening is closed with brush "to form a gate" and stop the fish, whatever their direction.

Stern (1934, p. 49) describes for the Lummi of northwest Washington a similar weir, which he calls a "river trap," formed upon a set of heavy tripods and provided with a "large pocket" [pen or corral], which he terms a "basket," from which the fish find their way into a long basket so slender that it is impossible for them to turn around.

SINKYONE WEIRS

One type of dam reported by Hewes from the Sinkyone was merely a wall of rocks or a line of brush built straight across a stream. Sometimes an opening was purposely left so that some of the fish could pass through. In using this type of dam the fisherman stood on the bank. No platform was built out over the stream. When they had enough fish, the dam was torn out, or at least a hole was made near its middle.

COAST YUKI WEIRS

About the simplest weir of any is that reported by Driver (1939, p. 378) for the Coast Yuki. It consists of a "log laid across stream and single post driven in middle as reenforcement." It goes without saying that this would be effective only in a very shallow stream.

SHASTA WEIRS

For the Shasta, Hewes (F.N., 1940) records that in the wintertime they formerly built dams in Scott Creek Canyon and in Horse Creek. Winter salmon spawn up these two streams. No dam was built by the Shasta across the Klamath River in olden times. This contradicts Dixon's statement, already cited in the introduction to this section on weirs, that the Shasta built dams at the mouths of Shasta and Scott rivers, and at Happy Camp (Dixon, 1907, p. 428). (See map 1: S1, S2, S3, and "S.")

In former times beaver sometimes built dams across streams. Such a dam stopped the flow of a stream temporarily and prevented the fish from ascending it. A beaver dam was utilized by fishermen. If no such dam was found, the fisherman built his own brush dam across the stream.

Horse Creek, for instance, has a width of about thirty feet. Sometimes a tree which had fallen across the creek was utilized as the top supporting log. Otherwise, a suitable fir log was cut and floated down. Next, stakes were inserted behind this log and finally brush was so placed as to make the dam tight enough.

A basketry trap, woven in more or less of a trough shape, was inserted, sometimes in the middle, sometimes at one end or the other of this dam, the trap in the center, ahusúkailk, being usually somewhat larger than the one near the bank, an·i´kasahauailk.

FIXED WEIRS: SACRAMENTO VALLEY

MAIDU AND POMO WEIRS

Among the Northern Maidu, according to Dixon (1905, p. 197), the weir, or guide fence, was used chiefly to cause the salmon to pass through certain openings left in the weir where they could be taken with spears.

Barrett has seen in the early years of the present century similar guide fences of poles and brush used by the Pomo on the upper Russian River for the same purpose. Plate 1, f, g, shows remnants of such a Pomo weir.

PATWIN WEIRS

Kroeber (1932, p. 278) has an account of weirs of the Sacramento River Patwin. They built weirs at only two places in their stretch of river, at Koru and Saka, near Colusa and Grimes. (These locations are confirmed by both McKern and Wilkes, below.) Farther down, especially after the Feather River came in, the Sacramento carried too much water to be weired. A dam was called bôno. Posts were six to eight inches in diameter, pounded in with stones, and lashed with grapevine. Intervals, braces, stringers, etc., are not described. Willows were set an inch apart all the way across: these were what stopped the fish. Pens or corrals "woven on land" were floated down from above the dam and set behind gates that were left. This shows that the enclosures were on the upstream side of the weir, as at Kepel. The pens were dived into by swimmers who clapped a net mouth over salmon, the opening being edged by two sticks tied together at their ends and bent open by the swimmer. Sturgeon had a noose slipped around the narrow of their tail. The weirs were built in early summer and were maintained until the water rose in fall.

Salmon were slit into strips, sun-dried on grapevines, not smoked, and often powdered when dry.

McKern (1922, p. 248) describes the Patwin weir, bono-tep, at Colusa or Grimes as formed on a straight line of piles, with willow "brush" (withes?) woven across these in-and-out (in "wicker work technique"), perforated every few yards by a gateway. Conical basket traps twined of willow were set in the gateways, and lifted out--by fishermen on the dam--as salmon entered them. In the warm downriver water, salmon did not try to leap the dam, which presumably means that it was low. Some gates were always left open--no doubt to prevent hostilities by upriver groups, whose supply would otherwise be cut off.

These numerous conical traps, lifted even for single fish, give a quite different picture from the three large pens (described in the following Pickering account), within which the Indians fished around with nets.

Pickering (in Wilkes, 1850, Vol. 5, pp. 187, 188) gives us our earliest description and illustration of a fish weir on the Sacramento River. The weir was encountered by the boats of the Wilkes exploring party, which ascended the river in 1841. From the position given (lat. 39° 13' 39" N) this weir must have been in the Patwin country, and was probably either the one at Grimes or the one at Colusa. Pickering says (in Wilkes, 1850):

> This fish-weir was constructed with a great deal of art: stakes, pointing down the stream, had been driven into its bed, having three openings, which led into square pens above; over each of the entrances into the pens was a platform, on which the natives stand to take the fish; on these also there were heaps of ashes, indicating that the natives make use of fire to attract the fish. The annexed wood-cut is a representation of the weir.

This interesting early illustration has been reproduced by Goldschmidt (1951, p. 407). What it essentially shows is that the weir extended straight across the river, had three rectangular pens on its upper side and platforms over the entrances to the pens. The diagram sketched gives each pen an entrance chute as well as a fourth or front side, when of course three sides set against the back of the dam ought to have answered just as well.

NISENAN WEIRS

The Nisenan or Southern Maidu of lower American River also built weirs (perhaps a weir) according to Kroeber (1929, p. 262). All that is known of these is that they were reared communally (as would indeed presumably be necessary), and had gates, with enclosures above, from which the fish were scooped with nets. This information conforms with the nineteenth-century Pickering account and Kroeber's data for the Patwin rather than with McKern's twentieth-century description.

Work (1945, pp. 32, 33) in his journal, under date of February 24, 1833, mentions weirs found by his party. From the location given for his camp, these must have been on the Feather River, somewhere in the region of what is now Marysville.

MOVABLE WEIRS

AGINSKY, 1943. N., Pl. Miwok, pp. 399, 452.

DRIVER, 1939. Wiyot, Mattole, Sinkyone, p. 379.

ESSENE, 1942. Kato, Lassik, p. 6; movable weir used like seine.

GIFFORD and KROEBER, 1937. Pomo (N, E), pp. 133, 172; brush fence. N. Pomo dragged brush fence at low water to impound small fish which were dipped out with baskets. E. Pomo had grapevine withes with pendant brush; dragged by several men. Fish caught in baskets.

HEWES, Th., 1947. Kato, p. 76; portable fence weir. Wiyot, p. 80; portable fence weirs.

HUTCHINGS' CALIFORNIA MAGAZINE, 1858. Vol. II, No. 12 (June), pp. 534, 535. Paiute; encircling fish with movable weir of brush, described and illustrated.

KNIFFEN, 1939. N. Pomo, p. 376; drag of brush.

ROSTLUND, 1952. Pp. 93, 94, map 33.

This special class of weirs is the portable type which can be easily moved about from place to place as occasion demands, and obviously is of service only on small streams and in other shallow waters. Driver (1939, p. 378) records the movable weir as used by the Wiyot, the Mattole, and the Sinkyone, though he does not specify whether such movable weirs were made of woven mats or whether they were merely a drag of brush hauled through the stream. This drag was sometimes used by the Northern Pomo (Kniffen, 1939, p. 376) and some other tribes to the south.

Hewes (Th., 1947, p. 80) says of the Wiyot: "In the tidal channels which meander over the mud flats of Humboldt Bay, they set portable fence weirs." Presumably this may refer to the rolled-up mats which can be transported with such facility.

Further, he says (p. 76): "The Kato had a portable fence, something like a folding screen, which could be set up quickly as a weir in a creek after a rainstorm."

Hewes (F.N., 1940) gives further details concerning these movable weirs: Although a regular diagonal weir across a stream was not used by the Wiyot, they made a portable weir for use in tidewater sloughs. This was a fencelike device, four feet high and as much as sixty feet in length. It was woven of split redwood sticks with courses of string weaving to make something not unlike one of our own woven lath fences. This was rolled up and transported by canoe to the mouth of a tidewater slough. Here it was planted vertically across the mouth of the slough when the tide was high. When the tide went out the fish in the slough were impounded and could be lifted with a small dip net out of the shallow water. In this manner flounders, bullheads, herring, perch, crabs, etc., were taken. This Wiyot movable tidewater fence of split redwood boughs, which in the current of the Klamath and Trinity rivers served merely as the finishing touch of a weir of timbers, was quite similar to the movable brush fence used elsewhere. Hewes was told that the brush fence was used upstream on Eel River [by Athabascans], but that it was not used by the Wiyot in the lower river.

The portable weirs, however, were all of minor importance.

ANALYSIS OF PHOTOGRAPHS OF WEIRS

HUPA DAM 1

Plate 1, a, b (negatives 1289, 1291) shows two views of a weir photographed by Dr. P. M. Jones in Hupa Valley about 1901; the site was not specified. The current is flowing from left to right (see the boat on the near shore in both views). As the Trinity runs from south to north, we are looking across the river at its west bank; that is, out from perhaps either Medilding or Takimilding village (not at them), if this dam was the one formerly made ritually there in alternate years. There is a group of half-a-dozen or more seated figures, apparently men, just beyond the far end of the weir.

Plate 1, a shows the length of the stringers, and the slope of the braces on the downstream side--flatter than 45° rather than steeper. There appear to be about twelve of these. One might estimate them as being only 4 or 5 in. in diameter, and perhaps 8 to 10 ft. apart.

Plate 1, b presents the upstream face of the dam. Again, its slope is greater than expectable. Perhaps it had stood for some time and the pressure had gradually pushed the butts of the braces along, so the weir leaned more than when new. The near or east end of the weir does not show. Some forty to forty-five posts project above the weir edge in the visible part; the total number may have been about ten or a dozen more. If so, there would be about four to five times as many posts as strut braces on the other side. This number seems to correspond with such counting of posts and braces as is possible in the near part of 1, a. An approximate 2-ft. interval between posts also corresponds with the body-width of the Indian holding a line near the right end of the upper side in 1, b. Some of the braces also show in 1, b as they project under the stringer, having been lashed to a post which they cross. Seen from this side, the number of posts to each projecting brace is: 4, 5, 4(?), 4(?), 3, indistinguishable beyond. Thus the length of the weir would be perhaps 110 ft.

The stringer, where most visible, seems easily a foot in diameter. The weight of this alone may have helped to depress the dozen not very large braces, and to flatten the dam.

The small stakes vary from three or four to about eight between each pair of posts, which would mean they were spaced 6 to 3 in. between centers, perhaps one-third of that consisting of interstices. It is impossible to see with certainty whether these stakes were inserted individually and then bound together with twining, or twined on shore into mats and floated into place and set up; but the latter seems the more likely. There would seem to be three lines of twining across the stakes at the far end of the weir, but only one at the near end, where the water was evidently a couple of feet deeper.

A third photograph by Jones (1290) shows this same weir, end on, with P. E. Goddard crossing it on the stringer: it has been reproduced in Kroeber and Gifford's World Renewal (1949, pl. 2, f). This view confirms the size of the stringer, and makes it almost certain that the small stakes were both split and bound into a mat on shore; but apart from the near detail, the view is too much in line with the weir to reveal much as to the total structure except that this ran rather surprisingly straight and even, except where increased depth pulled the mat lower.

All in all, the construction of this dam is rather flimsy, especially as regards the scantiness of bracing. Even if the Kepel dam was only half as good as described, it was a much sturdier structure than this one. Add that this recent Hupa weir is much shorter, is straight, and without sign of pens or gates. On the other hand, it agrees point for point with Hewes's description--even to showing at least one crosswise fence making the beginning of a bay on the lower side.

HUPA DAM 2

The negative (3301) of the photograph shown in plate 1, c is labeled as taken in 1906 by Goddard, of a weir below the mouth of Mill Creek in Hupa. Mill Creek comes in about 1.25 miles below Hostler Creek, both of them on the east side of the Trinity; and it is the last tributary on that side of the valley, whose foot is formed by Bald Hill, less than a mile distant from Mill Creek where the Trinity sidles sharply to the east to enter a gorge a mile farther on, within which it resumes its general NNW

course. Mill Creek mouth is almost opposite that of the last west-side affluent in the valley, Socktish Creek. Kroeber has recorded a Yurok myth from Weitchpec (no. A4, in preparation for publication) which tells of facing houses or villages at these opposite creek mouths, and a fish weir there (in myth times).

In August, 1958, informant Mrs. Louise Jackson pointed out the traditional site of the Takimiłding dam as just below the mouth of Hostler Creek.

There seems no record of the exact spot at which the weir associated with Takimiłding (Hostler village) was erected, and it might accordingly have stood actually nearer Mill than Hostler Creek: the river is fairly placid between flat banks all through the stretch. While this remains a possibility since we have only somewhat loose statements as to locations, it also seems possible that, besides the ritualized and alternating weirs at Takimiłding and Medilding, the Hupa sometimes built a third one, with less ritual, near Mill Creek mouth; or that at least they sometimes did so when (or after) they did not (any longer) erect the more ritual-bound structure near Hostler Creek which was associated with the sacred house and sweathouse at Takimiłding.

In short, the Goddard 1906 "Mill Creek" weir of plate 1, c may be a relatively modern version or substitute for the Takimiłding-Medilding ritual weir, or again it may be nonritual and wholly independent of it.

With that uncertainty unresolved, we proceed now to an analysis of plate 1, c.

In comparison with the preceding pair of photographs, the river flows somewhat quieter, evener, and broader in this one--from right to left. The view is therefore from the west to the east or right bank. The dam is again straight across, without pens, gates, or platforms. It is less flattened forward. The braces on the downstream side seem to agree with those of the foregoing dam in diameter (to judge from those visible on the open or skeleton end in 1, c), but to be even shorter, to judge from their projecting less.

There seem to have been only two stringers in the present structure, laid butt to butt, meeting where the water is deepest. The nearer stringer is accompanied by a sort of handrail of thin poles carried above it. Just about where this handrail ends, the farther stringer begins; it is recognizable by a change of color, as if it had been debarked. Both butt diameters must be all of a foot; they taper from this to under six inches as they approach the shore. It would appear from the distribution of size that the stringers were counted on to add their weight in aiding to hold the uprights in place where there was most flow of current.

The uprights (apart from their braces) in this dam numbered around 60. About 37 of these held up grating mats: 22 along the near stringer, 15 along the farther one. The remainder of the dam--clearly so at the far end, brush-obstructed at the near end--is a mere skeleton of uprights, braces, and stringers.[18] The water was evidently too shallow here at the sides for salmon to run up it. Not even occasional stakes were put in here.

The middle of the weir apparently had no separate stakes either; the fish were blocked merely by a mat grating leaned behind the near-upright posts. No joint or overlap of gratings is visible, nor is there a break in the courses of twining--although discernment is made more difficult in the shadowed nearer half of the grating. It is therefore probable that closure was effected by a single mat sixty to seventy feet long. This mat seems to have been bound together by two courses of twining. It is possible, but seems unlikely, that there was a third course, which is wholly submerged. The sticks, or split sticks, composing the mat seem to have been bound together more closely than in plate 1, b. They completely conceal the uprights (except for the projecting tops of these), whereas in 1, b the posts show through the slatting like a thigh through a grass skirt.

Just beyond the far end of the mat, a Hupa can be distinguished walking the narrowing stringer; his figure aids in recognition of actual dimensions.

Again the correspondence of the photograph to the Hewes descriptions is notable.

[18]A similar incomplete phase at Kepel seems to be what led Waterman into his "falsework."

CHILULA DAM IN REDWOOD CREEK

Plate 1, d, e (negatives 3041, 2926) shows two Chilula photographs taken in 1902 by Goddard. In spite of the separation of the negative numbers, the two photographs show the same weir. Compare the four poles lying on shore just above the water's edge. The stream is, of course, Redwood Creek. The Indian seated[19] on the dam is Milaketz. He holds the signal line to his net, of which the top of the A-frame projects two or three feet above the water.

The stream flows from right to left. The far shore is therefore the east bank. The volume of flow is much less than the Trinity. The weir as a whole is V-shaped; but this is due to picking a spot where one wing was mainly natural, built up a little with a few stones and poles--see 1, e. The structural wing curves somewhat, but not much.

What shows better in 1, d than in any other photograph is the extent to which the water level was raised behind the weir, as shown by what pours through. This must have been at least a foot, possibly more.

Most of the sticks or stakes forming the closure of the dam look as if they might have been split. Their tops are very ragged, as if they had been inserted individually. A mat-grating made on shore would be very much easier to make, roll, and move if its edges were trimmed even; compare 1, b and c.

Three main posts show on the fisherman's left in 1, d toward the right of the photograph. They seem nearly vertical and project little above the stringers. They appear to be set two to three or four feet apart. Only one downstream-side brace is distinguishable with certainty. This brace seems under rather than over four inches in diameter. It does not cross with an upright to form a crotch supporting the stringer. It is set between two uprights and appears to be braced directly against a stringer.

Two lengthwise screens or fences can be seen extending downstream, one under the fisherman's knee, the other from an upright post three or four feet to his side. From the end of these two screens there arise two-inch-thick poles, which are tied to a (supplementary ?) stringer. Between the two screens is a bay or open-ended compartment, such as those mentioned by Hewes.

[19]The position is characteristic: the Northwest California Indian men did not ordinarily sit cross-legged. They liked a low stool, block, or stone, and then to raise their knees; but perhaps the plank here laid over the dam stringer was narrow enough to make a raised seat precarious. The fisherman could not well have hung his legs over the front of the dam: either he would have had the net at his side, or, straddling it, his legs would have been in his way when he lifted it. Moreover, in 1902 the Indians were only partly accustomed to chairs and hanging lower legs.

The purpose of these bays was obviously not to impound salmon but to collect and steer them. It will be seen that the net is set so as to have half the opening in front of the bay described, the other half in front of the space beyond. Salmon reaching the main wall of the weir and groping for a way through or around would encounter the screen at the side of their bay, follow it down to its end, and, in trying to round this, would find themselves actually in the opening of the bag of the net, whose frame will be noted as set vertically.

About four other thin sticks may be seen attached to the lower side of the weir. They are too small to serve as props, and some of them seem loose below. Their purpose is not clear.

POMO DAM IN RUSSIAN RIVER

Plate 1, f, g (negatives 2677, 2676) show two pictures taken by Barrett in January, 1906, at a point about a mile south of Calpella on the Russian River, of the remains of an abandoned Pomo weir.

CHAPTER III
FISH NETS

The fish nets of Northwestern California were of three types.

1. Conical nets: eight forms in all.
2. Flat nets: four forms in all.
3. Cylindrical nets: one form only.

CONICAL NETS

LIFTING NET

BANCROFT, 1883. Yurok, p. 339; trigger system and alarm used with net.

BARNETT, 1937. Tolowa, Chetco, p. 164; did not use A-frame net, but oval-mouthed lifting net.

BARRETT, 1952. Pomo, pp. 153-156, 275-280.

CURTIS, 1924a. Hupa, pp. 14-15; also illus.: frontispiece, and opp. pp. 40 and 46. Shasta, pp. 113, 114.

_____, 1924b. Maidu, p. 109.

DIXON, 1905. Maidu, p. 197.

_____, 1907. Shasta, pp. 428-430; described and illustrated.

DRIVER, 1939. Tolowa, Chimariko, Karok, Yurok, Wiyot, Hupa, Van Duzen, Nongatl, Mattole, Sinkyone, pp. 312, 378. Not used by Kato and Coast Yuki.

DRIVER and MASSEY, 1957. Pp. 201, 203, 208, map 25; general statement.

DRUCKER, 1937. Lower Rogue River, p. 271; here a type of lifting net was mentioned, but on a very different sort of frame. "A long stick of vine maple, one end of which was steamed and bent into a loop while the other end served as a long handle, made a frame for a lifting net for salmon."

ESSENE, 1942. Lassik, p. 6.

FOSTER, 1944. Yuki, p. 164; dip net with trigger string, probably a simplified form of the lifting net, used at falls.

HEWES, 1942. Fig. 34, e, p. 106.

_____, Th., 1947. Lassik, Wailaki, Sinkyone, Mattole, Bear River, Nongatl, Whilkut, Chilula, Yurok, pp. 76, 77, 79, 83, and fig. 67.

HOLT, 1946. Shasta, p. 309.

KROEBER, 1925. P. 816; general statement. Yurok, p. 85. Shasta, p. 294. Yurok, Karok, pls. 4, 7; Sinkyone, p. 184; Maidu, p. 410.

LOEB, 1926. Pomo, p. 179.

OLSON, 1936. Quinault, pp. 27-29, figs. 1-3; horizontal lifting net with trigger system used with weir.

POWERS, 1877. Yurok, pp. 48, 49.

ROSTLUND, 1952. Pp. 86, 93, and map 33.

SCHENCK and GIFFORD, 1952. Karok, p. 379; dip net poles made of Douglas spruce.

VOEGELIN, 1942. Modoc, Shasta, p. 55.

MAP 11

The largest of these conical nets, the lifting net, is a very large, woven, conical pouch which is rigged onto a relatively large A-shaped frame of poles and is usually operated by a fisherman from a scaffold or staging built out over an eddy or backwater where the salmon naturally congregate. (See Kroeber, 1925, pls. 4, 7; and Hewes, Th., 1947, fig. 67; also our pl. 2, a-d.)

This, the most highly distinctive of the nets of this region, was quite evidently developed as a result of the particular environmental conditions existing on the larger streams. Like the elaborate weirs, this type of net becomes gradually more simplified as we go out from the core area of the region.

It was used in taking salmon, lampreys, and sturgeon, the mesh sizes varying for each species. In essentials this net constituted one type of trap, but one quite complicated in its operation.

First of all, it can be set only in a strong eddy where the upstream current is sufficient to hold it fully distended and thus provide the fish with an apparently unimpaired opportunity to pass normally on upstream. Such an eddy is always near the bank, where the water runs less rapidly than out in midstream. For this reason the fish, in their upstream journey, always tend to keep close to the bank, where the going is easiest. At such a "fishing place" a suitable staging or platform is built out over the eddy.

Goddard (1903, p. 23) speaks of this staging as a "crib of logs and rocks," which suggests a submerged line or wall of rocks, perhaps held together by stakes or even actual logs. Kroeber recalls nothing of the sort, and the available photographs do not show what could be construed as cribbing. We believe that the "fish place" or eddy was usually natural and that, if rocks were deposited, it was only enough to firm the hold of the one or two staging poles against the bottom. A frame two meters wide with a purse net five or six meters long needed a pretty clear bottom if it was not to foul.

The only other references to anything like a cribbing are (1) by Driver (1939, pp. 312, 378), who notes for his Hupa 1 "stones piled in river upstream from scaffold to form eddy at it"; and (2) by Curtis (1924a, p. 14), who speaks of a platform "resting on a structure of logs and rocks." It seems, however, that such an artificial eddy as a crib would make would be built only under unusual circumstances. If this were a common practice, the whole value of privately owned fishing places would be nullified, for anyone could build one of these artificial eddies almost anywhere. Furthermore, neither Driver nor Curtis gives a detailed description or says whether he is reporting generic statements by informants or what he himself has seen.

It is worth noting at this point that Driver (1939, p. 378) states that "at the bottom, branches and gravel [are] piled up to block passage beneath." This statement is

made in connection with his notes on Yurok weirs. Perhaps it may have given rise to the crib idea above mentioned.

Hewes (F.N., 1940) also frequently refers to the use of rocks to reinforce posts and stakes driven in the river bottom in making weirs. This we do not in the least doubt; but the reinforcement seems secondary in the construction, and no crib, in the ordinary sense of this term, is mentioned.

Platforms for lifting nets.--The scaffold or staging is essentially a combination gangplank and operating platform built out over the river. One or possibly sometimes two planks extend out from the usually rocky shore. On this narrow platform the lone fisherman walks out to near the end, perpendicularly lowers his triangular net frame to the bottom, seats himself on a wooden block stool while holding the closure line to the bag of his net, clubs the fish, throws or carries it to shore, and then repeats the operation.

The scaffold or narrow platform overhanging the edge of the river, from which the large A-frame lifting net is used, can of course not be built in any regular or preconceived shape because it has to be fitted into idiosyncracies of shore and river bottom. All that can be said is that it consists of several more or less upright poles wedged into the bottom, of several horizontal ones (plus perhaps a grapevine guy rope or two), and at least one plank of sufficient width for the net user to walk out on and to sit on (upon a block or stool), and to operate from. The number, direction, angles, and joining of the poles and planks must conform to the given terrain of the spot, especially its rocks and the depth of water.

Analysis of photographs.--With this inevitably high variability of the scaffolds, beyond their aim and generic plan, the best data on them are photographs. We have been able to assemble eight usable photographs, all taken by Kroeber between 1901 and 1907, of five scaffolds, one Karok and four Yurok. They seem all to have stood on the left bank of the Klamath, with the exception of no. 3, which is the least distinct in its photograph.

Grover Sanderson's exceptional pictures (pls. 29-31) have already been mentioned. They show the construction and use of Karok fishing platforms.

Two additional scaffolds, Karok, appear on plates 26-28 and are discussed in an appendix.

Scaffold 1, plate 2, a-c, 1902; Karok. Just downstream of Ashanámkarak (Ike's Fall village), looking downstream diagonally across to Amáikiara (Amékiara), of which only the ridge of a native house (sacred sweathouse ?) is visible just below the skyline of Douglas firs. The bag of the net bows upstream in the eddy, as is usual. The fisherman is Little Ike, whose aged widow, Mary Ike, was one of Gifford's best Karok informants more than thirty-five years later. In successive exposures the net is shown, first, being inserted, second, awaiting entry of salmon, and third, temporarily out of use. The last is, fortunately, taken from a viewpoint slightly nearer the river's edge, in order to show how the scaffold is bound to the shore.

Scaffold 2, plate 32, a, b, 1907, Yurok. At Kenek or Tuley Rapids, the rock and famous fish-place Woweyelk (Waterman, 1920a, map 22). The rock out in the stream is Rahtek, "store basket," so-called because of a hollow in its top. Plate 32, a is shown in Waterman (pl. 8:1), but is reproduced here as complement to 32, b since each shows features not visible in the other. The fisherman, according to Waterman, is Dan of Wahsek, but may have been Kenek Dan as shown again in plate 32, e, f.

Scaffold 3 appears in the same photographs as scaffold 2, but dimly on the opposite shore of plate 32, a, b. Slightly upstream, against the face of the rock Menes, another scaffold can be seen faintly in both photographs, with perhaps two vertical poles rising above the rock, and a horizontal pole or plank along its front perhaps three or four feet above the water. From the upper ends of the verticals, a long stringer runs "inland" to rest in the crotch of two crossed poles supported by at least three more in varying directions, the whole forming the main anchorage of the scaffolding. The scaffold seems to hang by withes from the riverward end of the long stringer down to its left or downstream end, and also by withes from its right end, over the sloping face or top of the rock, to an invisible stake or rock behind. It may be that this scaffold was not only partly but wholly hung, what looks like the horizontal pole above the water being really the edge of the plank for the fisherman to sit on. In that case what has just been described as two vertical poles would not be scaffold supports but the converging poles of an A-frame net set in the eddy. The net would of course only be set with its owner there to lift it; and indeed there is, next to the upper "V" of the poles, what looks like a seated human figure (especially in 32, b) though not discernible with assurance even under magnification, on account of the mottling of shadow and sunlight on this opposite bank. However, the point of the net frame, if it is such, is about as far above the head of the figure, if that is such, as in plate 2, b.

(If there was an occupant of the scaffold in the photograph, he might have been Informant B of the Kepel Dam monograph, Mack of opposite-Kenek, who would have been somewhat more likely to fish habitually on his side of the river than across it on the Woweyelk-Kenek side.)

Scaffold 4, plate 2, d, plate 32, d. Negatives 2730, 2729, were taken in 1906 at the downriver end of Kepel-Sa'. This scaffold belonged to Amits, informant A of the Kepel monograph. Plate 32, d was probably taken from the edge of the Sa' village flat or river terrace, to which Waterman, map 19, credits an elevation of forty to sixty feet above the river. The relevant portion is therefore unfortunately small, but both elevation and direction are quite different from 2, d, so that other features show.

Scaffold 5, plate 32, c, was taken in Yurok territory at a spot which Kroeber failed to record at the time, but which the context of other exposures shows to have been in the Kenek-Kepel region. This is one of the clearest pictures as regards structure of the staging. There are three pairs of crossed uprights, side uprights and anchored horizontal extensions both backward and to the side, and a guide post for the net frame up front, well out from the shore rocks.

Plate 32, e, f, shows Kenek Dan (perhaps also of scaffold 2), full face and profile, holding to his net frame after its removal from the scaffold. It looks as if it had been set up either for drying or for binding the bag net onto its pole. It is held by two guy lines, as well as apparently being propped by one or two sticks.

The following features are discernible in these pictures of scaffolds as identified by the numbers just assigned them.

Crossed poles stood in the water in No. 1 and 4; on land, in No. 3. In No. 1 they are cross-braced with a board; in No. 3, propped by lashed-on sticks.

Single, nearly vertical poles are used in No. 1 (three), in No. 4 (four), in No. 5 (4--1 at the outside end, 3 near the rocks on shore). In all these cases the pole farthest out may be the one that carried the hazel- or grapevine-withe ring to help steady the in-pole of the net.

Scaffolds 2 and 3 seem to be largely hung over the edge or face of a large rock jutting out into the turbulent river: they are both at the Tuley Rapids. From both of these scaffolds long stringers extend back to the shore; also, in No. 2 at least, over the water across to other rocks.

None of the scaffolds shows definitely more than one plank. This also accords with Kroeber's memory as a generality--he must have seen, first or last, two or three dozen such stagings; though he does recall an occasional second, shorter plank at an angle to the main one.

A seat shows on scaffolds 1, 2, and 5, and was usual, in Kroeber's recollection. It might be a low, solid cylindrical block stool such as used inside houses (often however flaring somewhat), or perhaps a rectangular block.

Guy ropes to help hold the net frame are clear in all three views of scaffold 1; in 32, b of No. 2; also in 32, e, f; and seemingly in No. 4. There seems to be no indubitable instance of a guy line holding the scaffold itself; although the suspended ones must have had lines reaching over their rocks.

A guide fence to steer salmon is visible in No. 4. Its rising above the water may be due to having been put in earlier in the season at higher water. Hewes gives the Yurok term wilep'ola as the name for this fence.

A net and frame, stood up on the scaffold between uses, are shown in 2, c of scaffold 1, and one laid on edge immediately behind, if not on, scaffold 2 in 32, b. It is not evident how either was supported in this position, though in No. 2 a line to the left extends out to the horizontal pole crossing the long stringer.

The net frames on scaffolds 2 and 4 depart from an isosceles "A" toward the right angle, but No. 1 seems much more even-legged. It also has the upper crossbar nearer the lower end than 2 and especially than 4. Whether these differences are due to No. 1 being the only non-Yurok scaffold and net frame shown is uncertain. It is clear from plate 2, b, where the upper bar is above water, that the whole net was unusually large unless the eddy at scaffold 1 was relatively shallow and the net may have been woven accordingly. See below, in the Hewes data on Yurok platform and net, statements that Karok lifting nets were larger, and that the side-poles of the frame were uneven.

All in all, these northwestern fishing stagings look very ramshackle and patchwork. They undoubtedly were pieced out, with extra struts and braces put in where needed--or perhaps it would be more accurate to say wherever it was possible to find any hold or support. The pictures show the ruggedness of the shore, and the bottom was probably of equal irregularity and immovability. Timbers had to be pushed or crowded in where they would enter between rocks, not where one would have liked to put them. Crazy as some of these scaffolds must have looked above the swirling water, they did what they were meant to. One hears of fishermen falling off them, but not of scaffolds collapsing under them.

Some fishing places (Karok, ikhri hwadam) are in almost inaccessible spots along the rivers. A giant boulder (pl. 32, a and b) out in the stream may produce the eddy needed, and fishing places even right along the shore are often in very rugged spots. (See pls. 2, a-d, 32, d, 27, 28, 29, c, d.) Grover Sanderson's photographs (pls. 29-31) show the construction of a platform of this sort. In order to reach such a fishing place it is even sometimes necessary to cut a trail into the rock face of the canyon, as is shown in plate 29, a, b.

This particular spot (sahwarum yum in Karok) is on the left bank of the Klamath at a point about three miles downstream from Orleans. To be more exact it is the southwest face of sahwarum canyon. The old village of sahwarum is on the opposite side of the Klamath and only a short distance downstream from where the Trinity enters the Klamath. Just below this cliff face (downstream) is an excellent fishing place which has come down in the family of Grover Sanderson from ancient days. Grover's first recollection of it is when it was owned by his great-grandfather, itcfinipa. This trail along the cliff face was, according to tradition, cut there in the rock by the earliest inhabitants. It is about fifteen feet above the high-water level, which is plainly visible in a of plate 29, standing about a dozen feet above the level of the river at the time this picture was taken. The girl with the burden basket walking along this trail is Grover's niece, Nancy Sanderson.

As is evident from almost all of our illustrations showing fishing places, the building of one of these scaffolds or platforms (Karok, imwir) is attended by much arduous labor. This fact is shown particularly well in plate 29, c and d. Here Grover Sanderson's father, Antone Sanderson (wastadan in Karok) is shown rebuilding the fishing platform here at sahwarum yum in the spring of 1932. In the first of these pictures he is down in the water, wrestling with one of the brace poles forming part of the underpinning of the scaffold. In the second picture he is lashing members forming the upper part of the structure. In addition, except in unusually favorable fishing places, there must be constructed below the water surface a guide fence (Karok, tcantcákar) which will help bring the fish out into the net at the end of the platform. This fence consists of horizontal poles with interwoven brush, which forms a barrier to the passage of the fish close to the bank. As they follow along it and move out into the swifter water of the eddy, they are conducted into the mouth of the net.

Sanderson says that to facilitate the building of this guide fence the Indian owners of such a fishing place would, at a time of very low water, actually cut holes or sockets in the rock of the river bottom into which the vertical supports of such a guide fence could be inserted.

Yurok lifting net.--From the platform described above the large A-frame with its net is let down and fastened vertically in place. On the inshore pole of this A-frame is a stout ring or loop, which travels up and down the short, vertical pole driven beside the staging as a guide for this ring. The other pole of the A-frame is provided with a guy line, usually of grapevine, which runs to the shore, where it is tied to a tree, some bushes, or a rock so as to anchor the net securely. In certain instances such a guy line runs from each of these poles to the shore. These two devices, the loop and the guy line, hold the large A-frame firmly in its vertical position at the staging. Otherwise the current, at times quite swift, might sweep the net, frame and all, completely out of the hands of the fisherman. In our plate 2 both these devices are clearly shown. In 2, a the partially raised net shows both the ring and the guy line, while in 2, b only a portion of the guy line appears. Here the net is wholly depressed and set on the river bottom. Hence the ring is completely submerged.

The bottom of this A-frame is formed by a crossbar so lashed to the long side poles that one of them (the inshore pole) projects about a foot downward below the crossbar. By forcing this point down into the sand or gravel of the river bottom, the lower edge of the trap is held securely in place.

As might be expected, the large A-frame dip net is

handled with considerable ceremonial procedure. One of the Yurok myths (Kroeber, D4) recorded by Kroeber in the earliest years of this century was designated as a "formula," and describes magical practices relating to the A-frame net used from a staging. One sings and ties the net first to the middle of the upper crossbar, then leftward, then down along the left or "long" side pole; then back to the starting point, on to the right, down the right side pole (and right half of the lower crossbar). This singing is called rekwoi "entering from the ocean" (same word as the name of the town at the river mouth).

Then the man moves four times as if to dip his net into the river but draws it up again before actually setting it in place. He says at the same time that he sees the path of the salmon traveling up across the river, then up the middle, then up his side of the river, underneath and into the net, successively. After he finally puts the net down, he may not lift it again until a salmon has entered it.

These songs and speeches are derived from the Steelhead (tserhker), who sang them at Kowetsek, the legendary salmon home across the ocean, after the sweathouse owner there had told him the sweathouse was already full, and though Sturgeon complained of his singing when he wanted to sleep.

In passing, it may be noted that when a new fishing place is established or when a new scaffold is erected at a fishing place, careful watch is kept immediately after setting the big lifting net there for the first time. If driftwood floats into the net it is taken as a sure sign that this is not a good fishing place and that salmon will not be caught here.

The net opening, bag, and signal strings: The two crossbars of the A-frame produce a large trapezoidal opening about which the mouth of the conical net is securely fastened by means of its own headline and stapling line, which are attached to the edges of the net at every third mesh. A typical example of this type of apparatus is shown in figure 13, a (made from our specimens 11724 and 9367, both collected by Kroeber at Weitchpec in 1906 and 1907.) This drawing shows the relative dimensions of the various parts of this trap. From its large trapezoidal mouth the conical pouch extends back a total of about 540 cm. to its tip. Starting, in this particular specimen, with 198 meshes around the mouth of the net, these gradually decrease in number until, at the tip, they are reduced to five. These five are laced onto a heavy cord which serves as a drawstring and holds them tightly together, but which can be opened to produce an aperture 6 to 8 in. in diameter, a feature doubtless quite useful in emptying a net of such size.

As is characteristic of all of these nets, the meshes grow progressively smaller as well as fewer toward the tip. Beginning at the mouth of this particular net with a mesh about 70 by 70 mm. square, it decreases to about 42 by 42 mm. square at the point. Further specific details are given below under "Net Weaving."

The successful operation of the device depends largely upon the rather elaborate system of signal cords which

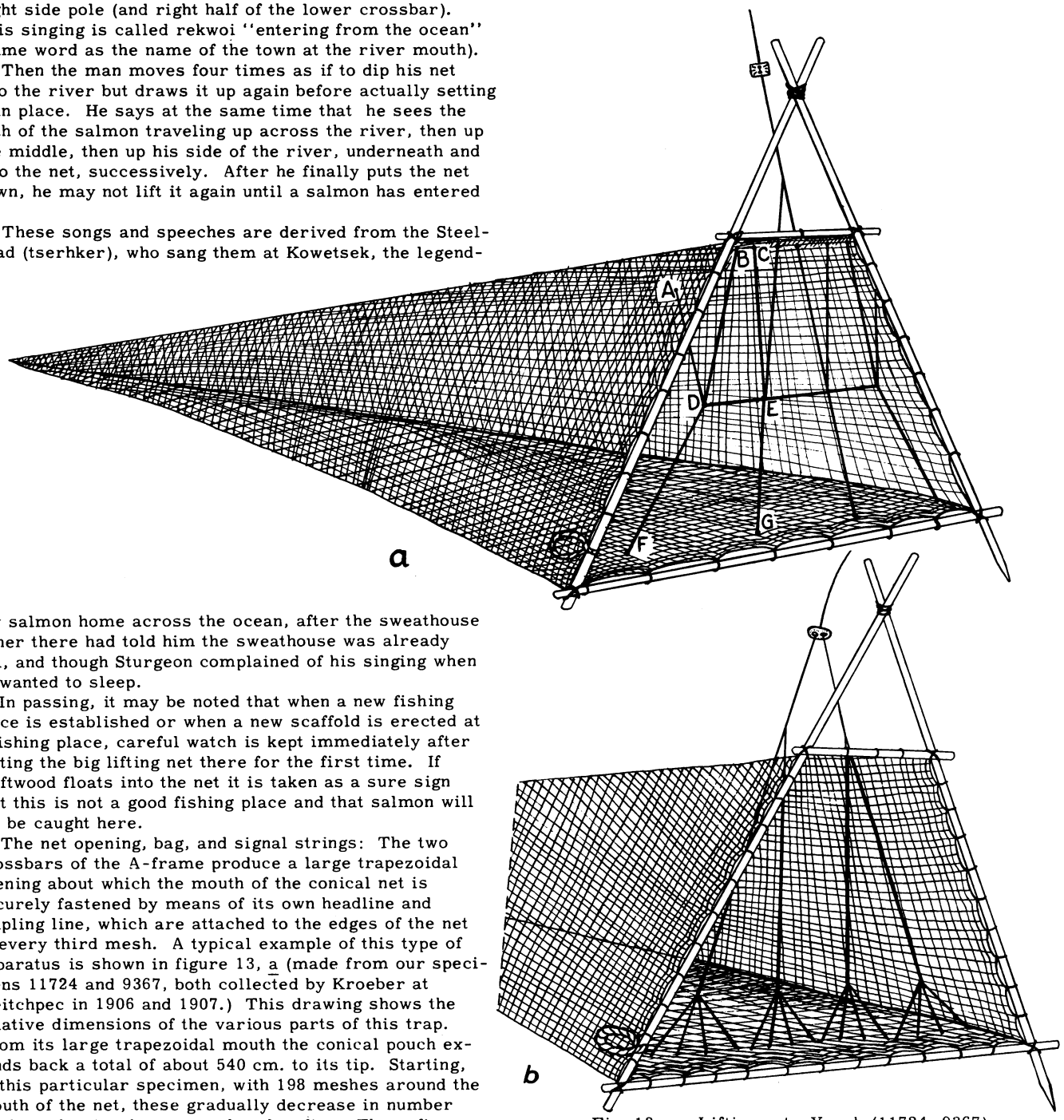

Fig. 13. a. Lifting net. Yurok (11724, 9367). Length of net, 540 cm. (104 meshes). Opening: top, 105 cm. (40 meshes); each side, 166 cm. (28 meshes); bottom, 210 cm. (102 meshes). b. A variant of the trigger system. Used by the Shasta. After Hewes (F.N., 1940).

subtends the open mouth of the net. A typical arrangement of these cords is shown in the lifting net, figure 13, a. The end of each of the cords is attached to the net at a point about 76 cm. back from the mouth.

Along the bottom are four of these cords, attached about equidistantly one from the other and passing for about 120 cm. up toward the middle of the opening. Here, each divides laterally into two members, each about 76 cm. long, which pass on up to the upper surface of the net where they are attached to the mesh itself. Thus, this lower half of the opening is divided by these four cords into segments of about equal width, while the forking of each string in the upper half of the opening cuts this area into double that number of smaller sections.

Specifically, the dimensions of these string sections forming parts of the signal device are as follows:

A - B = 46 cm. (12 meshes)
B - C = 15 cm. (4 meshes)
D - E = 46 cm.
A - D = 76 cm.
D - F = 120 cm.
F - G = 90 cm. (30 meshes)

Since the fish usually tend to swim fairly close to the river bottom, these large lower openings facilitate their passage on into the trap. On the other hand, the greater number of cords in the upper part of the opening makes it easier for the fisherman to raise the net rapidly and thus close it more quickly.

Near the middle of the upper surface of the net, and at the point of fastening of two of the cords crossing the net mouth, two cords are attached to the outer surface of the net which, after running up 54 cm., are tied together, forming a single signal cord 240 cm. long. The wooden "hand button" is tied into this cord at a point 195 cm. from the top surface of the net.[20]

The whole system of cords forms a signal and trigger device which constitutes an important feature of this trap. The fisherman, as he sits on his wooden stool on the platform above, holds this signal button in his hand, and through it and the cord receives notification that fish are in the trap.[21] They may, as they enter, touch one or another of the cords which cross the mouth of the net or they may swim against the net sides farther on in the trap. In either case the vibration passes along the signal string and notifies the fisherman that it is time to haul in his catch. By pulling up on this signal string he closes, at least partially, the mouth of the net and entraps whatever fish are farther back. Then, by hauling the net--purse and frame--up onto the platform, he has his catch.

A large wooden hook fastened onto an upright to prevent the net from slipping back into the water is described below under Karok platforms and lifting nets.

Hanging near by on the platform is the fisherman's club (pl. 18, a-c; also Goddard, 1903, p. 24) with which the fisherman stuns the fish, one after another, if several enter the net at once, before emptying them out[22] and placing them safely on shore where they cannot flop about and get back into the water. The net is then reset and the whole cycle repeated.

With such a trap it is said that a man may take, in a very short time (a matter of days) at the height of the salmon run, "a winter's supply" of fish. Kroeber has heard talk of takes of a hundred salmon in a night, but does not know whether this represents an actual count or a sort of hope. The gutting, slitting, drying, and storing of the fish are ordinarily the work of the women.

Other lifting nets are much smaller and are outfitted with more simple signal devices than the net above described. One of these in our collection has an overall length of only a meter and a half. Its signal device consists of only four strings, which cross its mouth vertically. They are fastened to the bottom of the net about 45 cm. back from the mouth and so that there are six meshes (about 25 cm.) between each string and its neighbor. Each string is 75 cm. long. The strings are attached to the top surface of the net so that there are only two meshes between each string and its neighbor. Thence they run up 20 cm. to the lower end of the meter-long signal cord, which finally terminates in a trigger button of bone. The meshes are about 35 mm. square. Further specific details concerning this net are given under "Net Weaving." [On the other hand, Hewes describes for the Shasta a trigger system which is, in some respects, even more elaborate than the one on our big net. We are illustrating this in our figure 13, b.]

The trapezoidal opening of the net last described, as nearly as may be determined in its present condition, was: top, 135 cm. (38 meshes); each side, 1 m. (16 meshes); bottom, 175 cm. (34 meshes). Thus there are a total of 104 meshes around the mouth of this net.

The top of the opening has its 38 meshes attached directly to the headline, each mesh by a lark's-head knot. All the balance of the mouth of the net (i.e., the two sides and the bottom) has a double-cord selvage. Each alternate mesh is attached to a stapling line by a wrapping of fine cord. The stapling line attaches to the headline by lark's-head knots. The side of each loop of the stapling line is 9 cm. in length.

The Yurok platform and net: Hewes data.--Hewes (F.N., 1940) states that the Yurok lifting net for salmon, called erker, was formerly provided with a short crossbar at the very top of the A-frame. This gave it added strength, but it has not been used lately. Compare the Shasta lifting-net frame described below.

The only cross member at all (other than the one forming the top of the trapezoidal mouth) used in more modern times was the long one at the bottom of the frame. This was given a special name, witegó', "its tego'."

The lifting net for sturgeon, called koko werker, "sturgeon its lift-net," was somewhat larger. Its A-frame was larger and the mesh of the net had more ample dimensions. The lifting net for lampreys was much smaller.

Great care was taken of the whole lifting net and its parts. As already mentioned, the net itself was hung on a special hook on the platform as it was raised. In case of prospective high water the net was dismounted from the frame and taken home. The poles composing the frame were taken ashore and placed well above any possible high-water mark.

Hewes's informants called attention to another point in connection with the A-frame. The longer, pointed pole is always placed on the inshore side of the frame. Also the outside, or offshore, pole of the triangle is notched so that it cannot slip.

[20]This hand button is frequently of bone or antler, and it may be tied in at any convenient point along the signal line.

[21]As a comment on his item 186, Driver (1939, p. 378) says, concerning this trigger device as used by one division of the Sinkyone, "cord runs from net to ear so fisherman can feel fish strike." This seems a most unusual use for this trigger string and we find no mention of the connection to the ear elsewhere.

[22]In speaking of the operation of this type of net among the Shasta, Dixon (1907, p. 429) says: "The loop slides off the top of the pole, thus enabling the fisherman to lift the whole net and contents to the platform." Also, in describing the operation of the trigger device, he says (p. 430): "The affair (i.e., the entire A-frame, net and all) being lifted out on the platform, the fish are then killed with a club."

While ordinarily the lifting net was manipulated from a scaffold, there were a few places where the natural conditions were such that it could be handled right off the rocks. One such spot was at Rekwoi. [This is perhaps the large flat rock, from which sea lions were also harpooned at certain stages of water, a few yards upstream from the crag Oregos. It may be Waterman's map 5, no. 49.] Another such place, a rock called rlirq, "sister of Oregos," was at the edge of the ocean abreast of Wełkwaw, which the river washes when it flows out on the south side. [This is Waterman's map 5, no. 69, "a crag."] Robert Spott told Hewes that at rlirq two guy lines (woô´xtcos) were used. These ran back for some distance. There they joined to form a single line which ran on shoreward to a rock with a natural hole, where it was moored. This pierced rock is said to have been brought across the ocean in mythical times. It was possible to fish here with a small lifting net for about an hour and a half each day when dead low tide made the river current swifter and temporarily produced an eddy which carried the net upstream. A natural rock provided a convenient seat, so no stool was used here.

At such salt-water spots no guide ring was used with the net. In fact, Hewes says that the Yurok mostly did not need the guide pole and ring. This ring was used by the Karok, whose nets and frames were larger; [also the current tended to be swifter]. The lifting nets of the Hupa were even smaller than those of the Yurok.

There were two other places near Rekwoi on the north bank where the lifting net could be manipulated directly off the rocks: su'u and otegahino. Su'u, owned by the house knäw in Rekwoi, was northwest or downstream from Oregos, about where the river bank becomes ocean shore. Waterman (map 5, no. 38) shows it as a rock offshore; it should be on shore, upstream from his no. 40. Fishing here was done without a scaffold, directly off the rock.

Otegahino was owned in Tmeri, an upriver suburb of Rekwoi on the tiny Tmeri Creek. This fishing place was downstream from the former salmon cannery and on the upstream side of weitspekw, "confluence", a point projecting into the river lagoon. A wersker platform was built at otegahino, but it rested on a single post instead of the crossed pair usual upstream. The erker net here, of the same size as at rlirq, was held by a hazel loop, and, as at rlirq, could be used only at low tide slackwater. Waterman gives this place as weitspus (p. 32) and shows it on his map 5, no. 52, as a fishing place.[23]

Hewes's informants called attention to another fact also. Not infrequently an old, established fishing place may be suddenly lost. A landslide may completely fill it in or may so alter its size and shape as to render it useless. Some eddies are caused by the presence of a bar, in which case the shifting of the bar or a change in its shape may ruin the eddy.

One place where a bar has a marked effect upon the fishing is at the mouth of the Klamath. Just below Turkey or Tucker Rock (Oregos) the sand bar has a way of shifting from time to time, thus throwing the actual opening of the river mouth from side to side, sometimes for a duration of years. When the sand spit shifts to its more usual form, so that the opening is at Oregos on the north side of the river (as it was in 1940), there is a considerable eddy and a lifting net can be used from a platform, though only when the tide is low. When the tide comes in, the eddy slackens and the lifting net is no longer of service.

One of Hewes's (F.N., 1940) informants (Williams), an old resident of the region at the mouth of the Klamath, having been born at Wełkwaw, opposite Rekwoi, gave some further details concerning shifting of this bar. When it extended out from the south bank, thus leaving the river open at the north side, fishing could be done with the regular A-frame lifting net (erker) with its signal strings, directly off [the foot of] the rock Oregos, for there was a strong eddy here, so strong in fact that the A-frame needed guy ropes to hold it in place. When, however, the bar shifted and extended out from the north bank, the rock rlirq fronted directly on the stream and became the base of the fishing place called qowseo, which, he said, was owned by the people of the near-by village of Wełkwaw. All of its inhabitants shared in this ownership for fishing purposes, just as the people of Rekwoi owned Oregos jointly. However, he pointed out that here at qowseo there was a much less powerful eddy and that conditions were not right for the use of the erker lifting net. Instead the tregépa plunge net was used, though this plunge-net frame could take two forms--one, the regular frame with the hoop-shaped lower end; the other, a frame in which this hoop was replaced by a straight bar. Otherwise, the two were the same in all other respects (narrow frame, head bar, etc.), and in name.

He further stated that more salmon came in when the south side of the river was open. Also that the sand bar itself was free fishing ground. None of it was subject to private ownership.

Spott told Hewes that the fishing place at rlirq was not owned exclusively by the people of Wełkwaw, but was open to the people of Rekwoi as well. [He and Williams may both be right for both sides of the mouth, each rock being "owned" by the people that lived near it but open to use by all residents of the river mouth, like the bar itself.] Spott differed from Williams in saying that the net used at rlirq for salmon was a relatively small lifting net; the plunge net was used around the river mouth for small species, especially eulachon.

Informants pointed out that the A-frame lifting net was generally unsuitable near the mouth of the Klamath on account of tides and slack water. The fairly strong eddies required for this type of net were found largely above tidewater.

The importance of these bars at the mouths of the rivers was emphasized to Hewes by several informants. In the smaller streams such as Redwood Creek and Mad River, the bars often built up during the dry season so as to close the streams completely for weeks or months. The flow into Big Lagoon is moderate and that into Stone Lagoon even less, and the surf piles up wide sand-beach bars in front of them, which for most of the year block all connection with the ocean except by seepage. As the dry season progresses, the water behind each bar becomes increasingly fresher. Only during the highest water of the rainy season, which coincides with the most violent wave action in the adjacent sea, is there force enough to break through. Then the salt water is carried in by the tide, and at such times the ocean species come in and these waters have a small run of salmon, steelheads, and other species. At this same time Stone and

[23]This Weitspus-Weitspek must of course not be confused with the large village some 40 miles upriver at the mouth of the Trinity. Only the meaning of the name is common; and the name occurs a third time in Yurok for the mouth of Southfork into the Trinity (Hupa łelding). Rlirq on the south side of the mouth of the Klamath must be kept separate from Erliken or Rlīiken at Lamb's Riffle at a sharp bend some 10 miles up the Klamath (Waterman, 1920a, map 10, nos. 11-14). This was a famous public salmon-taking site where people camped and dried their catch after gouging out the salmon eyes.

Big lagoons receive a new population of flounders and soles. The flat fishes adapt themselves and continue life inside after the bars reclose and while the waters become almost fresh again; until the next winter's storms bring a break-through, a fresh supply of salt water, and a new stocking of salt-water species.

Karok platforms and lifting nets.--Gifford's (F.N., 1939-42) Karok informants stated that, while building a fishing scaffold, a man must never eat deer meat. If he was out cutting poles for a fishing scaffold, and if he should hear a rattlesnake, he must cease work immediately. He might return the next day to the same spot, and if he did not then hear the rattlesnake, he might proceed with the work.

The fishing platform was supported upon crossed poles driven into the river bottom and bound securely with hazel withes at the points of crossing. These crossed poles were further strengthened by piling rocks about their bases, if needed. A plank, usually of spruce (?), ran out from the shore and a second plank was added out toward the end to make a more commodious platform upon which to operate. The inshore end of this longer plank was supported on a pair of short, crossed stakes, and it was further made firm by being weighted with rocks and with live-oak timbers.

It was a definite rule that no woman might step on or over any part of this platform or of the plank running out from the shore. Also, women and dogs must be kept away from a fishing place while a platform was being built or bad luck would ensue (these seem also to have been Yurok prohibitions).

Finally, at the outer end of the platform the pole which was to carry the guide ring of the lifting net was driven into the river bed with a stone maul.

Another feature described by the Karok is the net hook, above mentioned, called tahwuka, a heavy wooden hook some eight inches in length, which was securely bound to one of the upright poles supporting the staging. As the lifting net was hauled up onto the staging, it was thrown over this hook in such a manner as to prevent it from falling back into the water. The fish were then clubbed before being removed from the net. This same hook served to keep the net in place up on the platform during the fisherman's absence, if he should be temporarily called away.

Hewes (F.N., 1940) says that the Karok used a very large lifting net, for which he was given by one informant the native name amvaurıpa. Such a net is said to have had a spread of as much as twelve feet. Other informants gave as their names for this net ikríhar urîpi and simply ikríhar. The generic term for this net seems to be urîpi.

The Karok use the special guide pole or stake and guide ring in manipulating this net. The guide pole is called iyákakuri or ivákakuri. The ring or loop of grapevine which holds the net to the guide pole is called ikwinipkuni. Informants said that here the trigger system was quite simple, consisting of only four strings.

A smaller A-frame net for lampreys had a bottom spread of only about six feet and had no guide ring. This smaller net was called akrauripa.

We have recently secured from Grover Sanderson several photographs taken by him in 1932, showing methods of operating the lifting net among the Karok. In plate 30, a the fisherman--here Oscar Mack (half Yurok and half Karok), who lived in 1932 at Saint's Rest--is lowering the lifting net from the scaffold. Note the mooring line attached to the offshore pole of the net frame. The guide ring is indistinguishable in the picture. However, Sanderson calls attention to the fact that the Karok had, sometimes at least, a notch cut into the plank of the staging into which this ring and/or the inner pole of the net frame was fitted to help hold the frame in place and counteract the force of the current.

In plate 30, b and c the fisherman is holding the trigger device as he sits on the platform out over the eddy. Plate 30, c is a close-up, showing particularly how the trigger button is held with the line passing down between the fingers.

In plate 30, d and plate 31, a-c the net and catch are being raised. As the fish comes up in the net, it is clubbed at the first opportunity. The club is always kept near at hand. In this instance it is an unshaped club, which may be seen on the end of the plank in both b and c of this plate. This clubbing partly stuns the fish, but it is still likely to flop around. However, if grasped behind the gills, as shown in 31, b, and if pressure is put at just the right spot, the fish becomes suddenly rigid and immobile. It can then be easily removed from the net, as shown in c of this plate, without danger that it will flop around and escape back into the water.

Shasta lifting nets: Dixon and Curtis data.--Dixon (1907, pp. 428-430, figs. 100, 101) gives a very detailed description, with illustrations, of a lifting net among the Shasta, farther on up the Klamath River. However, it has some features which are quite different from the net described among the downriver tribes. Dixon shows it with an extra crossbar about three-quarters of the way up toward the top of the frame. This corresponds to what the Yurok told Hewes (see above) about their net frames formerly having had such a second crossbar. Most important of the Shasta differences, however, is the trigger device, a set of eight signal strings with their lower ends tied directly to the bottom crossbar instead of to the meshes back in the throat of the net. From this bottom crossbar these strings fan up and across the mouth of the net to a common point, where they join the trigger string. None of these strings is directly attached to the net itself, a feature which is universally found in the nets of the downriver tribes. Since other features of this Shasta net are exactly like those in the nets of their neighbors, it is difficult to reconcile these two variants, especially the signal-string feature, which must have been highly inefficient, to say the least. Furthermore the Shasta were sufficiently in touch with their downriver neighbors so that they must certainly have been familiar with their nets and fishing methods. Holt (1946, p. 309) repeats, briefly, Dixon's version. It seems possible that the string attachments were misunderstood in the museum in New York where Dixon's net specimen was figured, probably in his absence.

Curtis' (1924a, p. 113) description of the Shasta lifting net is in agreement with that given by Dixon, including the mooring line, the sliding ring, and even the details of the signaling device. Without knowing the precise source of his information, however, it is impossible to evaluate this account.

On the other hand, Hewes's informant (Sergeant Sambo) described the Shasta lifting net quite differently (see fig. 13, b). He says that the "feeler strings," as he terms this signal system, consisted of two long strings running down from the "flat bone," which was held in the hand. Each of these long strings divided at a point some distance above the top of the net, making four strings which (as his drawings show) passed through the top of the net, apparently without being attached to it. Near the bottom of the net each of these divided into four very short strings each of which was attached to the

bottom meshes of the net along a line about a foot back from the net mouth, thus giving a total of sixteen points of attachment, which should have enabled the fisherman to raise the bottom and close the net very quickly and effectively.

He further specifies a single crossbar (not two as mentioned above) at a point about four feet above the bottom bar of the A-frame. He shows a guy line of grapevine running from the outer vertical pole to the shore and also the guide ring attached to its shorter inshore pole. Furthermore he specifies that the name of the lifting net, útcir, is "after [the] ring of grapevine on [the] inside pole." The name of the platform (which, he says, is made of poles) is itcûkutcakema.

All of this information further fortifies our belief that Dixon's earlier descriptions of the Shasta lifting net are in error.

In discussing the Hupa dip net, for which he cites the native name mihltastei, Curtis (1924a, p. 14) gives the depth of the net itself as about seven feet and says that it is mounted on an A-frame ten feet high and with a six-foot spread. But he fails to mention any signal device and further states:

> From each of the two uprights [of the A-frame] a rope extends to a stake driven into the ground at the edge of the river, by which the unwieldy contrivance is prevented from being dragged out of the hands of the fisherman who stands or sits on a board projecting over the water and resting on a structure of logs and rocks.

Here again it is difficult to evaluate these details without definitely knowing the sources of Curtis' information.

Maidu, Klamath, Pomo, and Quinault parallels.--Dixon (1905, p. 197) briefly describes the Northern Maidu method of fishing in the Sacramento River, where they used a dip net with trigger strings, mounted on an A-frame and manipulated from a platform built out over the stream at a point where there was a strong eddy.

This use of a large dip net, this time on an immense V-shaped frame, is also found among the people of Klamath Lake, where other species of fish largely replace the salmon and where the seeds of the water lily, Nymphia polysepala, replace the acorn. (See Barrett, 1910, p. 249 and pl. 10.) Here, where a large body of water makes it possible, we find this type of net developed to an almost prodigious size, just as similar conditions at Clear Lake have led to a similar development among the Pomo of a gigantic arc net or semicircular-mouthed dip net. (See Barrett, 1952, pp. 154, 155.)

Hewes's (F.N., 1940) Sinkyone informants spoke of a "sack-like net," which was used from a scaffold built out over a riffle. It had a "draw string" by which it could be closed. This, they said, was used on the South Fork of the Mattole and on the lower course of Eel River.

We may, in passing, mention, as indicating the wide distribution of such trigger devices, a variant of this lifting net described and illustrated by Olson (1936, pp. 28, 29) for the Quinault. This net has an elliptical opening about five by seven feet across, and is so set that the opening lies horizontally instead of standing vertically, as does the trapezoidal opening of the Northwest California net. It is provided with a trigger device. Attached along one side of the oval mouth were eight signal strings which gave the fisherman on the platform notice that one or more salmon were passing over the net mouth. By immediately raising the net he was fairly sure to entrap a catch. This rather shallow, horizontally operated net is in striking contrast to our net with its vertical opening, but both depend for their effectiveness upon a similar signal and trigger system.

Smith (1940, pp. 261, 262) describes a similar, but smaller, net used by the Puyallup-Nisqually, in connection with what she terms a "large tripod fish trap" (a large weir made on tripods). She terms this a "lift net" and says that it was mounted on a "circular rim four or five feet in diameter." It was provided with a signal cord which vibrated if a salmon passed over the mouth of the net.

Mattole bars and channels: Hewes data.--Sometimes a completely closed bar had to be opened artificially, when the fish were due to run upriver for spawning. Hewes (F.N., 1940) obtained rather full notes on this from the Mattole.

The sand bars at the mouths of the Mattole and Bear rivers often closed completely in July or August, though they would probably open naturally sometime in September because of the higher water following the first rains. If the people did not want to wait, the headman decided upon a date and called them to open the bar. Bringing digging sticks and baskets, all assembled and dug a small channel through the bar. As the backed-up water of raised level in the river flowed through and widened and deepened the opening, the first salmon rushed in. All the men were ready with their spears, and the first salmon caught was ceremonially cut up and cooked right there on the river bank.

There was no doctor or formulist and no elaborate ceremony, but the first salmon speared was cut thus. It was split down the belly from head to tail. Next, it was cut across the gills. The head and tail were left on. It was this special method of cutting the salmon that gave it its distinction. Everybody ate a small part of the fish. After that the people could catch, cook, and eat salmon as they pleased.

On the day of the opening of the bar only a few fish (perhaps 5 or 10) were likely to be taken. By the next day fifty to a hundred, perhaps even two hundred, might be caught. As soon as the news spread that the bar had been opened, many people from other settlements came down and asked permission of the "owner" (one chief controlled the mouth of the river) for permission to fish.

The sequence in which the various species of salmon arrived at the Mattole was usually as follows:

1. About the end of September [or after] came the King or Chinook salmon. Some hookbills were usually among the Kings.
2. The silversides (blueback) came next and these, together with steelhead, continued to run up to about March first.[24]

There was nothing fixed about these dates. The salmon run depended upon the height of the water in the river--there must always be enough water in the river to let the fish come up. Informants stated that the run never started before September 10 or thereabouts. October was known as "first month" for during that month the greatest number of fish ran up the river.

The Mattole never went out to sea for the purpose of catching salmon. Their first contact with them was made here at the mouth of the river.

The mouths of Redwood Creek and probably Mad River also were at times blocked by sand bars. Redwood Creek has a definite lagoon spreading back from the mouth at all times, which in mid and late summer may

[24]The Yurok names are: salmon, generic or salmon meat, nepúi; King salmon, óxpes; hookbill, tsé·gan; steelhead, tskwoł.

have its level raised several feet above even high tide, flooding many acres. Americans usually cut it through, but if the stream flow is low, the surf may soon restore the bar.

LANDING NET

BARRETT, 1910. Klamath Lake, p. 250.

DU BOIS, 1935. Wintu, p. 15; dip-netters dipped fish out as torch-bearers drove fish into seine at communal drive.

GARTH, 1953. Atsugewi, p. 136.

KROEBER, 1925. Coast Yuki, p. 213; landing net for salmon; Klamath Lake, p. 325; very large net operated from prow of canoe.

_____, 1932. River Patwin, p. 278; bag net with spring-pole mouth used by diver for salmon in pen of weir.

MAPS 12, 15

A much smaller, shorter dip net (Yurok tcawûn), designed for dipping fish out of corrals or enclosures in weirs and for use from canoes in streams or lagoons, is made in the same general manner as the lifting net just described. It is mounted on an A-frame of smaller dimensions but lacks the signal and trigger device. This may well be termed a "landing net" to differentiate it from the larger lifting net. It is true that some informants stated that this net was at times also provided with signal and trigger strings, but it would seem less confusing to call such triggered examples "small lifting nets," and to confine the term "landing net," Yurok tcawûn, to the triggerless, small net on the A-frame.

Such nets were used especially for lampreys, eulachon, and other small species. Kroeber's field notes indicate that the dip net used regularly for lampreys was somewhat larger than that used for eulachon. This latter species goes no more than seven miles up the Klamath to about Turip. The small net for eulachon is generally used from a canoe and the fisherman keeps dipping his net until he finds a place where the fish are abundant and secures a large number in a few dips. The plunge net (tregépa) is also used for small fish and may be dipped out and down vertically or swept sidewise horizontally.

CONICAL DRAG NET

DRIVER, 1936. Wappo, p. 184; bullheads, suckers driven into nets (presumably conical).

_____, 1939. All Northwestern California tribes, p. 312.

FOSTER, 1944. Yuki, p. 164; trout caught by small conical net in opening of weir. Signal string.

GARTH, 1953. Atsugewi, p. 136.

OLSON, 1936. Quinault, pp. 29, 30, fig. 4. "Drift net" operated from two canoes.

SPIER, 1930. Klamath, p. 151.

One of the nets in our collection, of this size and general type (landing net), is catalogued as a "drag net for salmon" but should really be called a "conical drag net" to distinguish it from the larger "drag seine." Yet this net is not intended to be mounted on an A-frame, but has two old, slender sticks still attached, by which it was held and manipulated as a drag net. With these sticks held to keep the net open, we have a trapezoidal mouth, each side 47 cm. high and with top and bottom 140 cm. and 200 cm. long respectively. The length of the pouch is 250 cm. (See fig. 14.)

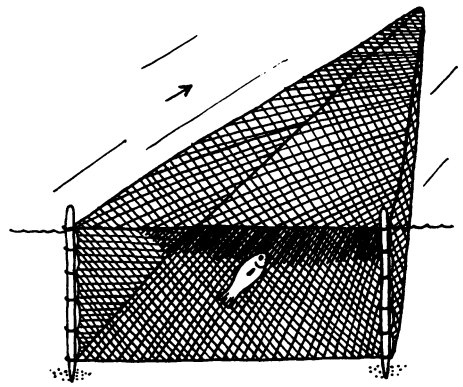

Fig. 14. Conical drag net. Yurok (1680).

Olson (1936, pp. 29, 30, fig. 4) describes and illustrates a much more elaborate net of this sort used by the Quinault. Here a single conical bag net of this type, mounted on poles, requires two canoes, two paddlers, and two net operators. An especially interesting feature is the presence in the prow of each canoe of a man or boy throwing stones ahead of the canoes in order to frighten the fish toward the net.

DOUBLE DRIFTING BAG NET

Upon occasion, two of the conical drag nets just described were spliced together side by side to make a double drifting bag net for salmon (see fig. 15), similar to the drifting bag seine for sturgeon made by joining a pair of short seines. Hewes (F.N., 1940) has the Yurok of the lower Klamath call the salmon double bag net weyû'm and mount it on poles about twelve feet long to force it deep in the water, salmon swimming near the bottom of the stream. The mesh was about six inches square (which suggests to us that only large salmon were expected to be taken).

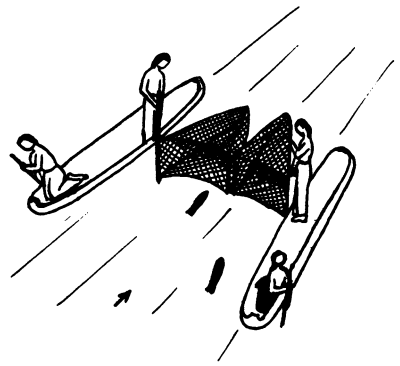

Fig. 15. Double drifting bag net for salmon. Hupa. After Hewes (F.N., 1940, and Th., 1947, fig. 90).

The Hupa, according to Hewes (F.N., 1940), also employed the drifting bag net, usually in the fall of the year when the water gets muddy. Hewes (Th., 1947, fig. 90) illustrates this net "for salmon." Four people, two canoes, and two nets were required for this type of fishing. Women were permitted to participate as paddlers

if they were strong enough. The informant stated that the nets were the same as those used for dip nets, being taken off the A-frames, and two were fastened together with a three-foot stick at their middle. At each of the outer ends of this combination a longer pole held this double bag down at a proper level. A man in each canoe manipulated one of these end poles. The canoes were headed downstream and allowed to drift at will, being paddled only just enough to keep the two nets taut and open. When fish entered the nets and the tremor was felt by the men holding the net poles, the canoes were brought closer together, the nets were hauled in and the fish were clubbed and dropped into the boat. The nets were then reset and the canoes paddled so as to pull them apart.

No sinkers or floats were used on this type of net, according to Hewes's informants. If the water was sufficiently muddy, this net could be used in the daytime. Otherwise it was usually much more effective at night. But then the fishermen felt the cold and would go ashore at intervals to a fire.

Kroeber's field notes of 1904 give the following Yurok information.

> The salmon drag net, we-yóm, was usually about 60 cm. in width [viz., height of opening--it was misunderstood as being a flat net], but fairly long [viz., deep-pouched]. Its ends were spread by means of sticks, called we-tsêł, and two such nets were fastened end to end [again seines were understood] and spread between two canoes. This position was maintained by two poles held vertically at the canoes, which were headed slightly away from each other to counteract the pull of the nets as these floated downstream with the current. The net was weighted with sinkers[25] so that it dragged on the river bottom (sand, gravel, or mud), and, when a fish was felt, the net was raised quickly so as to entrap it before it escaped. Apparently considerable deftness was required in manipulating this net for it was specifically stated that it was not raised forward like a dip net, but the pole was raised and pushed upstream [sic] to close the net. The name we-róhtso is given for the sturgeon drag net similar to the we-yóm for salmon.

What may very likely be this same type of net is referred to by Fr. Font (1931, p. 371) who, in describing (in 1775-1776) "Puerto Dulce" [San Pablo and Suisun Bays and Carquinez Strait] tells of the method of fishing with a "net which was tied to two poles."

Yurok informants said that the sturgeon drag net was handled on ropes instead of poles because, as informants said, "the sturgeon lies quietly in the net." This refers to the drifting bag seine later described.

One of the Yurok myths (Kroeber, R1), collected by Kroeber in the earliest years of this century, gives some interesting details concerning the drag net. It tells how Murun, or Murin, "White Duck" or Merganser, first fished successfully with the drag net at Wohkero, and was envied by Pigeon who had nothing but a netted carrying bag (pl. 23, c) to drag in the river. Pigeon therefore hid at night in the woodshed of Merganser's house and heard him and his housemates name the successive parts of the net, namely:

wererpin	beginning of net, where it is fastened to stick
wohpekolis	6 meshes inserted
wo'olo'oi	6 more meshes put in
winomek	net widens, 8 meshes added
na'ainolek	"second time" (that 8 meshes are inserted)
ukomek	4 meshes
ukuris	stick at far end
umułpo	string passing entire length of net.

Pigeon was discovered, was jammed against the ground, and made pigeon-breasted, but he learned how the net was made.

This account of the insertion of meshes (accrues, as they are called by net-makers) is not entirely clear as it is given above, but it evidently refers to the weaving of some type of conical net, where the cone is increased in size by additions to the numbers of meshes in succeeding courses.

Hewes (F.N., 1940) gives additional Yurok details. Two nets, without floats and sometimes without sinkers, each eight feet or so long [deep] by five or six feet wide, were fastened together at the midpoint between two canoes. At each canoe the end of such a net was fastened by means of its line to a pole which held the net open and extended down into the water far enough for the required depths. The poles were manipulated by a man in the middle of each canoe. Fore and aft were other men, who paddled just enough to keep the canoes headed apart and the double bag net open and set to catch the salmon as they swam upstream. Sometimes there was only one paddler. The canoes, with their double net, slowly drifted downstream. When a salmon was encountered, the two net manipulators raised the net to entrap the fish. The one nearest to the fish hauled the net into his canoe, clubbed the fish, and then the net was reset between the canoes for more fishing. Occasionally two or more fish might be taken at once.

This method was used especially in fall low water. In recent years the current was said to run too swift for this "two canoe drag net" or łeł quwerego, but formerly it was much employed, especially in still waters and small eddy currents--any place where the water was sufficiently slow-moving so the progress of the canoes would belly out the nets and keep them in place. An informant mentioned one spot on the Klamath, a place called wépa, a short distance downstream from Weitspus, where conditions were ideal for this type of fishing. [This place may be woxpa of Waterman, 1920a, map 23, no. 47, a spot on the right bank about two miles below Weitspus and one mile above Martin's Ferry, in the middle of a straight reach, three-fourths mile in length, where the river presumably flows slowly but steadily; the stretch begins at the end of the bend where Pine Creek comes in from the left.]

PLUNGE NET OR THRUSTING NET

BARNETT, 1937. Tolowa, Chetco, p. 164; did not use.

BONNOT, 1930. P. 134.

DRIVER, 1939. Chimariko, Karok, Yurok, Wiyot, Hupa, Chilula, Van Duzen, Mattole, Sinkyone, Kato, Coast Yuki, pp. 312, 378.

DU BOIS, 1935. Wintu, p. 127 and fig. 5.

ESSENE, 1942. Yuki, p. 6; "Snowshoe-shaped frame. Used in river."

GIFFORD and KROEBER, 1937. Patwin, Pomo (S, E, NE), p. 133.

[25]Hewes's informants stated that these nets were sometimes used without sinkers along their lower edges, evidently conforming to local conditions in the section of the river where the net was employed.

HEWES, Th., 1947. Karok, p. 85.

HOLT, 1946. Shasta, p. 310.

KROEBER, 1925. P. 816; general statement. Karok, p. 85 and pl. 6.

SNYDER, 1924. P. 165 and fig. 40.

VOEGELIN, 1942. Klamath, Modoc, Shasta, Wintu, Nisenan, p. 55.

MAP 14

Core area.--This net (fig. 16) (Yurok, tregépa; Karok, takíka), which is closely akin to the ordinary dip net, is specially effective under conditions which make it impossible for the fisherman to see into the water, particularly on a large riffle or at the foot of a fall or rapids, where the water plunges so that it becomes foamy. (See pls. 26-28.) Such a spot is very likely to have salmon congregated ready to make the leap up over the fall or ready to run the rapids. By plunging or thrusting his net in here, on a hit-or-miss basis, the chances are good that the fisherman will come up with at least one fish. Such a thrust may bring up other species as well as salmon; perhaps trout, bullheads, or even lampreys. This net type also finds extensive use in certain more still waters downstream where it is used for taking eulachon and other small species.

The net portion of this device is a relatively conical dip net. Its opening is rarely over a meter across, and its depth is about the same. It is mounted upon a frame quite different from the A type of frame above described. It consists primarily of a pair of side poles, perhaps 360 cm. in length. At the top these poles meet, in a rather acute angle, where they are securely fastened together. At a point a short distance down from this apex a crosspiece is securely bound to these side poles to serve as a "head bar" in handling the net. (See pl. 27.) The divergent lower ends of the side poles have a semicircular withe, in either one piece or two, securely bound to their ends. (See pls. 26, 27.) The upper side of this semicircle is subtended (replaced) by a heavy cord ("F" in fig. 16) tightly stretched across from pole to pole. Upon this semicircular withe and this heavy cord the net itself is made fast by means of its loops. Thus we have a conical bag, the opening of which is roughly semicircular and with a diameter of about a meter. As is shown by Kroeber (1925, pl. 6), the fisherman wears a woman's basketry hat as a head protection to take the impact of the "head bar" as he thrusts the net downward into the water while he stands between the side poles, or to protect his forehead when the net is cast out horizontally while he stands behind the poles. This hat or cap, incidentally, is the only article of woman's clothing that a man would wear. Hewes (F.N., 1940) gives the Yurok name of this basketry cap as ótłw'aiká.

Thus, this net, when employed in the rushing, foamy waters upstream may be used in two ways: (1) it may be plunged or thrust almost straight down by a fisherman standing on the bank above a deep place in the stream. In this case he is said by informants to actually stand between the long side poles. The net and frame descend until the crossbar strikes the back of the fisherman's head, where the basketry cap cushions the blow as the frame is stopped. The frame, with the net and its catch, are hauled up by alternately lifting on first one and then the other of the side poles. (2) When the net is being used in a foamy rapids, the fisherman does not stand between the side poles, but behind them. He grasps the frame up near the crossbar, perhaps only two or three feet from the apex of the triangle. He throws or casts the whole apparatus out in front of him, sometimes almost horizontally, in such a manner that the net goes as far as possible out from the bank. He then pulls it in and up. In doing so, first the apex of the frame rests on his forehead, which is protected by his basketry cap. Then, as he pulls the apparatus up, one or the other of the side poles rests upon his head, even at times sliding on the forehead; which is, of course, always protected by the basketry cap. In pulling back the plunge net in this manner the head bar may or may not touch the head depending on the circumstances of the pull.

In the summer of 1957 Barrett was fortunate enough to find a Karok using one of these plunge nets in this second manner in the rapids at Ishi Pishi Falls on the Klamath some miles above Orleans and was able to secure a series of motion pictures of the operation and to observe the fisherman for some time. These particular falls are very rapid and turbulent and such fishing is really strenuous. The fisherman always cast his net somewhat upstream but it was always carried by the rushing waters well downstream before it could be hauled out of the water, no matter how rapidly the fisherman worked. Although the fisherman observed by Barrett was a Karok in Karok territory, it is safe to assume that the plunge net would be handled in the same manner when operated by the Yurok or the Hupa under similar conditions.

Some Yurok informants maintained that the regular plunge net was used chiefly at their farthest upstream points--as between Weitchpec and Bluff Creek--for it is only there that conditions are right for it. Hewes's (F. N., 1940) informants, on the other hand, stated that a large type of the plunge net was used in taking eulachon down on the lower reaches of the river, where the water was quite slack. It was used from a canoe and was pulled with a sidewise sweep very much like that of a

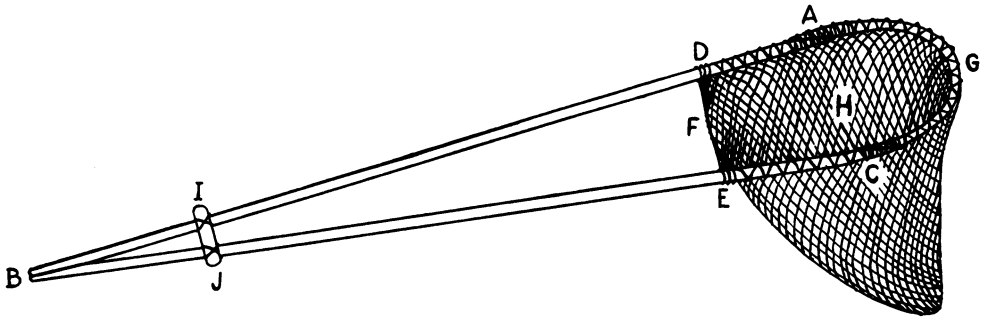

Fig. 16. Plunge net or thrusting net. Drawing from Wintu specimen, (28012). Same type as used in our nuclear area.

paddle. Another of Hewes's informants stated that when the water got low enough so that the eulachon came in close enough to the bank or to the sand bars, this same plunge net was reversed and employed as a regular dip net.

A Yurok told Hewes (F.N., 1940) of a variant of this plunge-net frame which was sometimes used at one salmon fishing place at the mouth of the Klamath. It was exactly the same as the frame above described, except that, instead of having the bowed hoop at the front end, it had a straight bar. The local conditions at this fishing place apparently made this arrangement preferable.

A smaller form of this same net, with a bow or semicircular front, one called tceske´ûl, was used farther upstream for taking small species of fish in high water. This net was plunged into the stream and pulled toward the fisherman, presumably from the river bank rather than from a canoe. This evidently refers to the same method witnessed by Barrett in 1957 and described above.

Another point brought out by Hewes's informants is that formerly the upper edge of the net itself was attached to a wooden piece bound across between the side poles and that it was only recently that this bar had been replaced by the heavy cord found in modern specimens.

Hewes (F.N., 1940) gives some further details and terms from Yurok informants, as follows:

The side poles, urútuwap, were made of fir.

The forward hoop, usually in two pieces, was made of oak, pepperwood, or hazel.

The head bar was called ikátcawûtc.

The loops used to fasten the net to the frame were called samwan.

All informants agreed that the plunge net was quite generally used by the Karok, whose territory lies upstream from that of the Yurok where the waters run more swiftly and turbulently.

Gifford's Karok informants (F.N., 1939-42) described this plunge net in some detail, calling it uruswap (Hewes gives takíka): it is a small dip net mounted on a frame whose side poles form a very acute angle. About a foot down from their meeting point is a very short head bar. The opposite end of this frame is formed by binding to the ends of the long side poles an oak arc of horseshoe shape, which produces a more or less semicircular hoop to which the net is fastened. As this net, which is especially useful in the murky waters of winter, is cast out into the stream at the foot of a fall or similar spot, it is literally plunged or thrust as far as possible downward until it is stopped by the head of the fisherman when the head bar reaches him. It is then drawn in toward the bank and up. To protect his head the fisherman wears a basketry cap.

The following observation made in the field is of interest in this connection. On September 1, 1942, Ben Goodman was given by one of the women a basketry cap so that he could use his plunge net at the near-by Ishipishi falls at K'atimin. He fished right off the rocks at the falls and had very good luck. He gave the woman whose cap he used half-a-dozen salmon as a present.

It should be noted, however, that while at times an ordinary woman's cap might be used, there was also a similar basketry cap made especially for the purpose of fishing. It was also sometimes worn by men to protect the head by taking the weight of the tump line in carrying burdens. This hat, called salipanapha, was woven by women, was twined only with the basic pine-root weft (sarup), and was entirely without the usual Xerophyllum overlay decoration. It was as carefully made as was the regular woman's hat;[26] the inner surface was scraped, as in all baskets, with a mussel shell or a sharp stone; and also the surface was pounded with a small, round-ended pebble to make it smooth and easy on the head.

Hewes (Th., 1947, figs. 68, d and 71) illustrates the plunge net used by both Yurok and Karok and makes this statement (p. 85) concerning its use among the Karok.

> The Karok, situated in the vicinity of the only important falls on the lower Klamath River, used a special thrusting net for both salmon and lamprey. The wielder of this net stopped it with the back of his head as he reached the end of its thrust, to keep it from flying out of his hands; for this reason, according to informants, the Karok men wore basketry hats.

He states specifically that the fisherman in using this net actually stands between the poles. He gives the Karok name of this plunge net as takíka.

Hewes (F.N., 1940) says that his Coast Yurok informants stated that the plunge net was much used on the bars down at the mouths of streams and elsewhere in water which was running with moderate speed. In such relatively shallow waters, however, the plunge net was not brought up vertically as it was in deeper waters, but the frame was swung sidewise and downstream just rapidly enough to cause the net to bag out upstream. If this net was used in a small eddy, it was simply plunged and held in position. The action of the current caused the net to bag out so that a fish might easily enter.

Other areas.--This same type of net was quite generally used throughout northern California, especially on streams above tidewater, where rapids and falls are more numerous. This wide distribution is attested by the fact that our University collection has an example from the northern Wintun. (See fig. 16.) It is in every way typical of the nets in Northwestern California. This specimen, which is said to be "used in winter when water is high and muddy," is illustrated and described by Du Bois (1935, p. 127), who collected it in 1929 and who says that it is "grasped at peak of triangle and at crosspiece inserted between the two sides." This would mean that the fisherman would be standing at the side of the triangle and not between the poles. This use of the crosspiece is at variance with its use as a head bar in the northwest, and, its placement being so high up on the triangle as to make its use as a hand hold impracticable, it would seem that the information given Du Bois rests on a misunderstanding and that this Wintu crosspiece also was a head bar and that this net too was used with the fisherman standing between the two side poles.

The dimensions of this Wintu net are as follows:

A - B	320 cm.	A - C	81 cm.
B - C		F - G	106 cm.
B - D	277 cm.	H - G	43 cm.
B - E		B - G	363 cm.

[26]Women's hats are of several kinds, each with its native name:

sarumpha is the everyday hat used in working [usually with designs in whitish Xerophyllum]. The tump line passes over this hat.

sipibapha', the woman's red hat, is more decorative, usually has a fairly elaborate pattern, mainly in alder-dyed fern-fiber weft.

sitapsikasibamps is the woman's full-dress hat, with weft overlay designs in black shiny stem of five-finger fern (Adiantum) and sometimes in yellow-dyed porcupine quill.

A - D H - F C - E	63 cm.	B - I B - J	76 cm.
D - E	68 cm.	I - J	28 cm.

Depth of conical pouch, 83 cm.
Mesh measurements: outer mesh, 3.5 cm.;
mesh at tip of cone, 2.5 cm.

The semicircular hoop which forms the front of the frame and upon which the net itself is rove, bows forward to bring the front edge of the net 43 cm. beyond the ends of the side poles. This flexible hoop is securely bound to each of the side poles by a cord wrapping which extends up about 40 cm. from each of the points. At a distance of 63 cm. back from the points of these poles a heavy cord ("F") subtends the angle between them and on this cord is rove the transverse edge of the net. Thus we have a conical pouch, which has a maximum opening of 81 by 106 cm. and a depth of 83 cm.

According to Hewes (F.N., 1940), the plunge net was used by the Shasta in two ways. In the deeper places on the river, in the wintertime, it was thrown straight out from the bank and was then drawn in toward the bank. It was then called erûtcid. It was also used during the summertime at certain falls in the river and was then called erûntir, or a·ráhuerûntir.

Associated apparently with the plunge net is a device made of rocks, which may be termed a "fish ladder." One informant stated that rocks were laid up more or less like steps ("built like fireplaces") on the face or side of the falls at the village of aikar, near Hamburg. As the water ran down these steps, the fish found it possible to ascend here and pass on upstream (this contrivance may be an adaptation of the white man's fish-ladder idea). The falls and the ladder bear the name aikawá apsiraka. This ladder, which was built only at the time of "low" [the first lower?] water in the spring, was called kokwer entiktúk ("where the plunge net is used"). In fact this term, it seems, may be applied to any spot where the plunge net is used.

From the informant's statements it would appear that these rocks were so arranged as to form what might be termed a succession of potholes or basins, each about three feet across, just large enough to take the rounded end of a plunge net. The first fish of the season taken here might not be given away.

Referring, probably, to these same artificial rock basins, Holt (1946, p. 310) states "at intervals along the sides of a rapids at Hamburg, rocks were piled about small cleared spaces, forming little pools, and fish running up the rapids paused in these quiet places to rest." The fish were taken from these basins with a dip net, and the author describes in some detail the ceremonial procedure attending this fishing.

This account presents a somewhat different picture from the ladder idea above mentioned. Furthermore, both investigators obtained their information from the same informant, Sergeant Sambo, though at different times (and he served Dixon too, a generation earlier). Without checking in the field it is impossible to determine which version is correct, though one is inclined toward the last and simpler one.

Snyder (1924, fig. 40, p. 165) shows a very good illustration of one of these plunge nets being used from a scaffold at a fish weir on the Trinity River.

Hewes (F.N., 1940) records the presence of the plunge net also among the Nongatl.

In summary, the plunge net has a wide distribution, is used for a variety of fish, mostly on a hit-or-miss basis in roiled or turbulent water, and with motions differing according to depth and velocity of current.

SCOOP NET

BANCROFT, 1883. Yurok, p. 339.

BARNETT, 1937. Tolowa, Chetco, p. 164.

BARRETT, 1910. Klamath, pp. 247-250, pl. 10; very large V-frame dip net used in dugout canoe on Klamath Lake.

BONNOT, 1930. Pp. 133, 135.

CURTIS, 1924a. Wiyot, Achomawi, Klamath, pp. 75, 136, 169, 170, and illus. opposite p. 80.

DRIVER, 1939. Tolowa, Yurok, Wiyot, Mattole, Sinkyone, pp. 312, 378.

DRIVER and MASSEY, 1957. Pp. 201, 203, 208, map 25; general statement.

DRUCKER, 1937. Tolowa, p. 233.

HEIZER and MILLS, 1952. P. 89 and pl. 5.

HEWES, 1942. Yurok, p. 106, fig. 34, f.

_____, Th., 1947. Tolowa, Yurok, Wiyot, Mattole, Sinkyone, Bear River, pp. 77, 80, 83, 88.

KROEBER, 1925. Klamath, Modoc, p. 325; very large; used on shovel-nosed dugouts. Coast Yuki, p. 213; used on rivers.

LOUD, 1918. Wiyot, pp. 278-281; describes in some detail what he terms "sites for surf-fishing about the mouth of Mad river."

POWERS, 1877. Yurok, p. 50; describes surf fishing with scoop net at the mouth of the Klamath River. P. 103; remarks about the surf fishing at the mouth of Eel River.

SPIER, 1930. Klamath, pp. 149, 150; large triangular dip net. Sometimes several in line; fish driven.

VOEGELIN, 1942. Modoc, Shasta, Atsugewi; p. 55. Cf. also OLSON, 1936. Quinault, pp. 36, 37; conical dip net with rectangular opening used for surf fishing.

MAP 13

The scoop net is a special type of relatively small dip net, with an apron, used in the surf. In fact it is often called a surf net. It is rigged onto a V-shaped frame. This term, "V-shaped frame," is used to differentiate this frame from the truly A-shaped frame used with lifting nets and landing nets. Though it has been a rather common practice to refer to this form also as an A-shaped frame, it really differs considerably from the true A-shaped frame in that it does not have a crossbar at the outer or spread end of the frame, as does the A-frame. This crossbar is, in the V-shaped frame, always replaced by a stout cord. The crossbar at the middle of the A-frame is straight, while that of the V-frame is arched. Furthermore, in handling, the V-frame is held most of the time in an upright position so that the diverging poles do actually point upward and form a V. Only when the net is dropped into an oncoming wave does it leave this V position, and then it never really assumes a vertical A position. The frames of the lifting and of the landing nets are almost always used vertically so that they are in the A position. While some have simply lumped all dip nets together, it seems proper to make the distinction between the A and V types of frames with divergent poles, just as we speak of arc nets and hoop nets, though these also are dip nets.

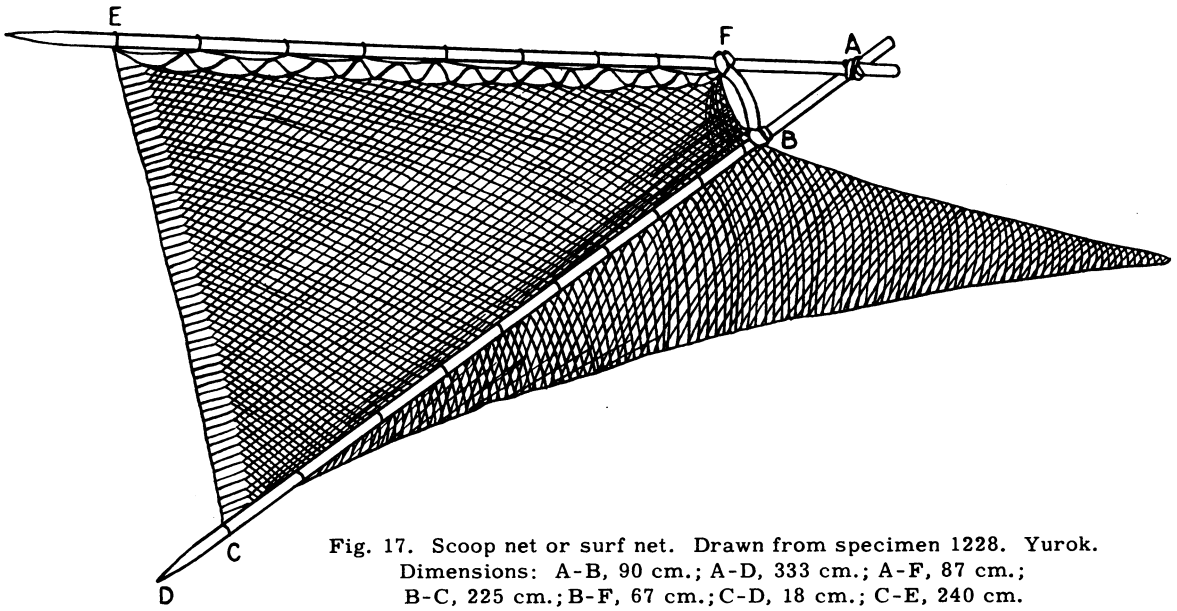

Fig. 17. Scoop net or surf net. Drawn from specimen 1228. Yurok. Dimensions: A-B, 90 cm.; A-D, 333 cm.; A-F, 87 cm.; B-C, 225 cm.; B-F, 67 cm.; C-D, 18 cm.; C-E, 240 cm.

The V-shaped frames are often as large as are the A-shaped frames upon which the larger lifting nets are mounted. One of the V-shaped frames in our collection has the measurements shown in the explanation of figure 17.

At a point back about 18 cm. from the relatively sharp fore-points of the side poles, the stout headline of the net stretches across from one pole to the other. About five-sixths of the way back to the angle formed by these side poles there is bound a strong, arched wooden bar which serves as a hand hold in handling the net. To the two side poles the net is made fast, with the apron forward.

The scoop net is especially designed for use along sand beaches, particularly at the spawning times of certain small species, notably surf fish or "smelt." The fisherman, grasping the frame by its upward-bowed crossbar and by the junction of the two side poles, and standing knee-deep or more in the surf, watches the waves as they roll in. When he catches the glint of light on the fish as they run, in numbers, in one of these waves, he lowers the front of the net to horizontal or more, so that the fish are caught on the apron and funneled by the wave back into the pouch of the net. Such a fisherman in the surf ready to lower his net at the proper moment is shown by Heizer and Mills (1952, pl. 5, p. 89).

In our plate 3, a, two fishermen are just ready to lower scoop nets into an oncoming wave. Plate 3, b shows a fisherman with his net lowered as the fish-laden wave approaches, and in plate 3, c he is holding up his net with the catch of small fish just obtained. These three photographs were made by Waterman in 1928, on the bar at the mouth of the Klamath River.

While these nets are made with the cone tapering quite uniformly, as shown in figure 17, they do, in actual use, take on quite a different form when partly filled with fish. The weight of the fish tends, as shown in plate 3, c, to draw in the middle of the net in such a manner that it has the appearance of a purposeful constriction in the construction of the net. We thus have various descriptions of this surf fishing in which the net is described in language like that used by Powers (1877, 3:50) in speaking of the Yurok:

> This net he connects by a throat, with a long bag-net floating in the water behind him, . . . After each wave he dips with his net and hoists it up, whereupon the smelt slide down to the point and through the throat into the bag-net.

Yurok informants say that they formerly had what they term "a sideways scoop net for lampreys," i.e., it was "held out horizontally and moved horizontally." Apparently this refers to the plunge net, called tregépa, which other informants said was used for eulachon down in tidewater in the lower reaches of the river and was "always scooped sideways."

These small species of fish, particularly when coming in to spawn on the beaches, arrive at very irregular intervals, but when they do come, they are in such numbers that a single dip of the net, regardless of its form, is very productive.

The mesh of the scoop net is very small, as expectable. A good example is a net (1684), listed as "for lampreys, trout, candlefish," which has a conical pouch about 70 cm. in diameter and 80 cm. in depth. Projecting forward from this pouch is an apron which measures about 100 cm. in length. Here we find, as in the other conical dip nets already described, the mesh size decreasing toward the point of the pouch. Out at the front of the apron the mesh is about 24 by 24 mm. square. At the outer edge of the pouch it is 15 by 15 mm. square, and at the tip of the pouch it is only 13 by 13 mm. or a half-inch square.

Another constant feature of these conical nets is the relative difference in gauge of the cord between the lower portion of the pocket and that up toward the mouth of the cone and on out onto the apron. The cord of the lower part or point of the cone is quite a bit heavier. Mainly this thickening must be deliberate, to keep the weight of the captured fish from bursting the net. The spawning surf fish run fitfully from hour to hour, even from moment to moment, and when they come thick, the fisherman keeps his stance in the water perhaps up to his knees or waist and awaits the next wave, meanwhile slipping his hand down the bag of the net to form what

Powers called its throat, so as to hold the already captured fish safely in. As he sees the fish glinting in the next breaker, he may step sidewise toward a school, or reach forward. He then dips the apron of the net until it is more or less horizontal, and when he lifts it up again, relaxes his hand to let the new catch wash or slide through the "throat" into the bag. In this way he wastes no time stepping back on the dry beach and dumping his catch there, but utilizes every minute of the peak of the run. While each wave may bring him only a few fish, or at best a pound or two of them, he may stay on until he finally staggers back up the beach with twenty or thirty or even fifty wriggling pounds massed in the cone of his net. It is to prevent loss of such a take--which might all slip out in a few seconds if a mesh or two parted--that the cord is twisted heavier at the point of the net, and the meshes are smaller.

Some of this thickening of cord and smaller mesh may also be due to the more constant wetting of the pouch. In use, the pouch of this net is always hanging down in the water, while the apron is much more constantly above the water level. This usage may make the cord of the pouch shrink, especially toward its tip, causing the cord to thicken and the size of the mesh to be somewhat diminished.

Aside from any question of shrinkage, however, there is usually clearly a purposeful increase in the mesh size from the point to the mouth of the pouch and from the rear to the front of the apron. In fact we find that, in the mesh measures used in making these conical nets, at least in the smaller ones, the same mesh measure provides for two, and sometimes three, sizes of mesh. One such specimen (2097), shown in plate 17, k, is recorded in the original field notes as "[elk] horn mesh-stick, two [different] widths for top and bottom of smelt [or eel] net." Furthermore, it is an interesting fact that, when this very mesh measure is applied to the net mentioned above, it is found to have three different widths which fit quite well the three different mesh sizes of the net.

Again, in reference to the heavier gauge of the cord so often found in the lower part of the cone in these nets, it should be noted that not infrequently a considerable section of the tip of the cone has these cords actually doubled so that we have eight cords forming the four sides of each mesh.

Driver (1939, p. 378, item 183) gives the dimensions of a Wiyot smelt net which he observed on a V-frame as follows: "mesh, 3/4 in.; total length, 11 ft.; length of mouth, 7 ft.; length of tail, 4 ft.; width of mouth, 5 ft. 5 in.; width at mouth of tail, 1 ft. [sic]; end of tail converges to point."

A more detailed discussion of the making of these conical nets will be found under "Net Weaving."

Hewes (F.N., 1940) gives the following data from the Coast Yurok for this scoop net (Yurok nega'). It was chiefly used for taking smelt and perch. The fisherman wades out into the surf to a depth of two or three feet. As a wave rolls in, laden with gravel and fish, he drops the net under it. The gravel passes through the meshes of the net, the fish remaining in the bag, which rests upon the sand. Dipping his net repeatedly as successive waves roll in, he finally accumulates perhaps as much as thirty or forty pounds of fish. He then carries his catch ashore and dumps it into a pit in the sand or gravel of the beach.

Finally, these fish are carried home in a burden basket, and spread out for sun-drying on the gravel of the beach or on a layer of grass, the fish being turned from time to time. If gravel adheres to the dried fish, they are shaken in an openwork basket until the gravel falls off.

At some points surf fish came in so thick that they were caught with the bare hands.

No one bothered with anchovies in olden times.

Hewes records this same scoop net for the Wiyot, as does Curtis also.

Hewes (F.N., 1940) describes the Tolowa surf net and its use in detail. It was of the regular apron type of very fine-meshed net. Its bag was said to be sometimes as much as eight to ten feet long, ending in a buckskin loop to assist the fisherman in lifting and handling it. The fisherman stood out in the surf and dipped his net as the successive fish-laden breakers rolled in. When he had his bag sufficiently filled, he carried the net back on shore above the high-water line. Here he had scooped out a hole in the sand a foot or so deep and had lined it with grass. Into this he poured the fish. The grass lining prevented the fish from picking up too much sand while they awaited the arrival of the women who came with their wood-carrying baskets to carry them to the near-by camp where they were sun-dried, as shown in plate 4, a, or dried with the aid of fire, as shown in plate 4, b.

The small "smelt" were taken in this way, but sometimes a dip of the net secured one of the larger fish, a cod for example, which had been in pursuit of the smaller fish as his own food.

The smelt were in former times so numerous that a man often got his net so full that he had to have help to carry it ashore--sometimes even so full that it was necessary to pour some of the fish back into the water for fear of tearing the net because of the weight of the fish.

Here again we find the usual restriction of fishing to the men. However, if no man was around a woman might fish in the surf, provided she had with her a small boy who assisted by holding the "sack end of the net."

We thus see that all along the immediate shore line wherever it was sandy, surf-fishing with this V-frame net was a common practice. In fact, when the smaller species ran in to spawn, surf-fishing was the major occupation of the people dwelling on the coast. So much so, in fact, that they moved down directly onto the beaches and camped there for the purpose, and were joined by relatives and friends from inland, even those of other speech and tribe. Such camp sites are found at various points; for example, Loud (1918, pp. 278-281) discusses in considerable detail certain archaeological sites along the immediate shore line, at the mouth of Mad River, which he considers were once sites of Wiyot surf-fishing camps.

ARC NET OR BOW DIP NET

AGINSKY, 1943. N, Pl. Miwok, pp. 394, 399, 453.

BARRETT, 1952. Pomo, pp. 154, 155; large type used from tule balsa.

CURTIS, 1924a. Achomawi, p. 136.

_____, 1924b. Wintun, p. 78. Maidu, p. 109.

DIXON, 1905. Maidu, pp. 142, 143, 197, and fig. 13; used in mountain streams.

DRIVER, 1936. Wappo, p. 185; not used.

_____, 1939. Kato, Coast Yuki, pp. 312, 378.

DU BOIS, 1935. Wintu, p. 127.

ESSENE, 1942. Wailaki, p. 54; for river fishing. Pomo, Kato, p. 6; used in surf. Pomo, Kato, Lassik, Yuki, used in streams.

GARTH, 1953. Atsugewi, pp. 136, 137; large dip net mounted on upward-bowing arc.

GIFFORD, 1939. Coast Yuki, p. 323 and fig. 3; smelt caught as wave recedes.

GIFFORD and KROEBER, 1937. Patwin, Hill Wintun, Pomo (N, C, SW, S, E, SE, NE), pp. 133, 173. C Pomo, used from platform; S Pomo, "feeler strings" for night fishing for salmon; E Pomo, large arc net used by boatman; SE Pomo, large arc net operated from canoe in lake, or at dam, smaller arc nets in creeks; N and SW Pomo, surf fishing probably done with arc net.

GOLDSCHMIDT, 1951. Nomlaki, p. 407.

HEWES, Th., 1947. Lassik, Wailaki, p. 76. Pomo, fig. 60.

KNIFFEN, 1939. Pomo, pp. 359, 364.

KROEBER, 1925. P. 816; general statement. Sinkyone, p. 148; arc net used for small fish in creeks. Coast Yuki, p. 213; surf fish caught in arc net as wave receded. Modoc, p. 325; Maidu, p. 415; arc net used in swift streams of mountains.

_____, 1929. Nisenan, p. 287.

_____, 1932. River Patwin, pp. 277, 295; arc net with bag; small arc net used by Hill Patwin. Two or three held abreast while fish are driven.

LOEB, 1926. Pomo, p. 168.

NOMLAND, 1935. Sinkyone, p. 154.

VOEGELIN, 1942. Achomawi, Atsugewi, Wintu, Maidu, Nisenan, p. 55.

MAP 16

This type of dip net was apparently not used by any of the most typical tribes of Northwestern California, those of the nuclear area. However, since it occurs among some of the smaller peripheral tribes, even though it is quite clearly borrowed from tribes to the south and east, it must be taken into account when considering fishing in Northwestern California.

This bow dip net takes two forms: one with points of the wooden bow down, that is, pointed away from the held end of the main pole; the other with these points up, or reversed.

Type I.--In the first type, the wooden bow which holds the net mouth open is fastened to a pole so that the cord which subtends the arc of the bow actually fastens to the point of the pole. It is upon this semicircle, formed by the bow and the cord, that the net is made fast. This arrangement brings the straight side of the semicircular dip net down. It is this type of net that is described by Nomland (1935, p. 154) as used by the Sinkyone in their surf-fishing. Here the straight edge of the net was set on the sand, with the mouth of the net facing inland. This net caught the fish as the wave receded, which is exactly the reverse of the scoop net, which is set to catch them as they roll in with the incoming wave.

Hewes (Th., 1947, fig. 65) illustrates this type for the Lassik, though they owned only inland streams.

As already pointed out, this type of arc net (with the ends of the bow pointing away from the fisherman) is typical of the tribes to the south and east of the core area. Usually it is a relatively small net used in the smaller streams. It reaches its ultimate in size in the very large dip net of the Pomo, which was formerly used for deep-water fishing from balsas out in Clear Lake. It is quite fully described by Barrett (1952, pp. 154, 155), and illustrated by Hewes (Th., 1947, fig. 60). Kniffen (1939, p. 364) and Loeb (1926, p. 168) briefly describe it. Also Gifford and Kroeber (1937, pp. 133, 173) record it in the Pomo element lists (no. 196).

It is interesting to note here, in this large lake, the development of this type of net to such great size, just as the large V-frame dip net reaches its ultimate in size on large Klamath Lake. (See Barrett, 1910, pp. 247-249, pl. 10.) In both these instances the large bodies of water have given rise to the development of especially large nets.

As further evidence of this influence of environment on the development of special cultural features we need only cite the findings in Lovelock Cave, Nevada (Loud and Harrington, 1929). Here, in the Humboldt River Valley, and hard by two large bodies of water, Humboldt Lake and Carson Sink,[27] we find an environmental condition ideal for the development of fishing gear, in spite of the fact that this whole general region is distinctly desert. In Lovelock, as well as in Ocala, Hidden, and Humboldt caves, all only a few miles distant, we find conditions ideal for the preservation of the objects used by the early inhabitants of the region, even such perishable objects as baskets, tule mats, wooden implements, rabbitskin and birdskin blankets, and nets--objects which are practically never found in more exposed archaeological sites. As a result, quantities of nets of various sorts have been recovered, mostly fragmentary to be sure, but sufficient to show how fully these people depended upon these bodies of water for their livelihood. While some of the nets were unquestionably used for rabbits, waterfowl,[28] and land birds, many were used for fish in these adjacent bodies of water.

In speaking of nets which he considers fish nets, Loud lists both conical dip nets and flat nets, these latter ranging up to 42 ft. in length and 5-1/2 ft. in width. The presence here in Lovelock Cave of many sinkers, both grooved and perforated, is ample evidence that these flat nets were used as fish nets, either as gill nets or as seines. The more recent work of Heizer and Krieger (1956) at Humboldt Cave, Nevada has brought to light still further evidence of the same type.

Quite recently F. A. Riddell obtained from Northern Paiute informants near Honey Lake in California the information that they formerly made tule balsas for use in fishing on this body of water and in the sloughs at its outlet where Susan River drains the lake. These balsas are said to have been pointed at both ends.[29] Lowie has

[27]These are vestigial remains of the once great quaternary Lake Lahontan. Other similar, but much larger, remains are Lake Winnemucca and Pyramid Lake.

[28]Loud states (p. 88): "In a cave near Ocala, 14 miles to the south of Lovelock Cave, a net was reported with birds entangled in it."

[29]Again the influence of environment is shown in the many and varied uses of tule by these same ancient inhabitants of the Humboldt Valley. As at Klamath Lake in Oregon and Clear Lake in California, great areas of marsh lands produced quantities of tule and cattail rush, and this material was used for mats, baskets, and many other objects and utensils, including balsas.

A tule balsa similar to those reported from Humboldt Valley was used in ancient times on San Francisco Bay and in the estuary of the Sacramento-San Joaquin drainage (Kroeber, 1925, p. 359). Langsdorff (1812, pl. 8) shows a view on San Francisco Bay made in 1806; in the foreground is a tule balsa with pointed prow, rounded stern, and with a small arched "rancho" astern. In this balsa are four Indians, two of whom are propelling the balsa with long paddles. This same scene is reproduced in Van Nostrand and Coulter (1948, pl. 5, p. 13).

In Fr. Font's diary (1931) covering 1775-1776, we read (p. 370) of the region of what he calls "Puerto Dulce" [San Pablo and Suisun bays and Carquinez Strait] that they found here "launches very well made of tule, with their prows or points somewhat elevated."

Kroeber (1929, p. 260) also records the use of the tule balsa by the Valley Nisenan.

Reverting to the Humboldt River valley, we find that Leonard (1904, p. 167) speaks of the great areas of rushes which his party found growing there in 1832 and says that they "built rafts out of rushes to convey us across the river," referring apparently to the Humboldt River here in the immediate vicinity of Humboldt Lake.

recently recorded (1924, p. 249 and fig. 32) a balsa with pointed ends among the Northern Paiute or Paviotso, who resided historically in the Lovelock area.

A subvariant of the arc net of type I has the pole-end fastened to the cord, but apparently does not have the wooden arc fastened across the pole farther up. In other words, the bow is there to stretch the cord, but lies loose across the pole. This arrangement facilitates the closing of the net.

Arc nets of this subtype are still in use. In the summer of 1955 W. S. Evans, Jr., and F. A. Riddell found an arc net of this type in the hands of an old Northeastern Maidu, who said that several such nets were held by fishermen standing in line across a stream while others drove the fish toward them. This particular net had a width of about four feet. The shaft was fastened to the cord subtending the bow. As far as could be ascertained the bow was not fastened to the shaft but moved freely.

Type II.--In the second type of arc or bow dip net, the horns of the bow are turned up, pointing back toward the fisherman, and it is the center of the bow, not the subtending cord, that fastens to the tip of the pole. Dixon (1905, pp. 142, 197) illustrates a Northern Maidu dip net in which the cord running from point to point of the bow is made fast at some distance up the pole, thus producing a more or less triangular opening rather than a semicircular one. This cord is rove through each mesh in the last course of its side of the net. This net, he says, was the type used in the mountains, whereas along the Sacramento River the seine prevailed. Hewes (Th., 1947, fig. 59) also illustrates this net for the Northern Maidu.

Kroeber (1932, p. 295) records the arc net for the Patwin, where, he says, two or three such nets "might be held abreast by as many men, the fish often being driven with poles."

Hewes (Th., 1947) notes the use of arc nets by a number of the other peripheral tribes: Coast Yuki, Yuki proper, Kato, Lassik, Wailaki, Yana, and, confirming Kroeber, among the Patwin.

HOOP DIP NET

BARRETT, 1910. Klamath, p. 250; dip net mounted on circular hoop on pole.

CURTIS, 1924a. Klamath, p. 170.

DRIVER, 1936. Wappo, p. 165; not used.

_____, 1939. Karok, Tolowa, p. 312.

GARTH, 1953. Atsugewi, p. 137; small dip net on circular hoop with single pole or on double V-shaped handle.

GIFFORD, 1939. Coast Yuki, p. 322; oval-mouthed bag net held by swimmer to catch black perch driven toward net by other swimmers.

GIFFORD and KROEBER, 1937. Pomo (N, SE), p. 133.

HEWES, Th., 1947. Wailaki, p. 76; oval dip net for salmon. Karok, p. 86.

KROEBER, 1925. Modoc, p. 325.

SPIER, 1930. Klamath, p. 151; circular-mouthed dip net, and its use.

VOEGELIN, 1942. Klamath, Modoc, Shasta, p. 55.

MAP 17

What may be considered a form closely related to the arc net is the one in which the net was mounted on a bowed withe of any sort. Among various tribes it was customary for a man, when hunting or abroad for any purpose, to carry with him a small conical net. Anywhere he could cut a green, pliable withe. This he simply bent into an elliptical or circular loop or hoop. Where the two ends crossed, he bound these into a convenient handle. The net was fastened to the hoop and with this improvised device he could catch trout, crayfish, and other food from any creek. This device, among the Hupa, was called test'entc.

In some other regions this type of net was more elaborate, as mentioned below, but wherever we encounter it here in northern California it is as simple in construction as possible.

Spier and Sapir (1930, p. 176) describe, for the Wishram on the Columbia River, two dip nets. Both were mounted upon wooden hoops. One "had its net loosely threaded on the hoop and fastened to [a] cross-bar by a slip-knot," thus entrapping the fish in a kind of purse.

BAG NET

GARTH, 1953. Atsugewi, p. 136.

HEWES, Th., 1947. Wailaki, p. 76; "oval-frame bag-nets which could be set at one end of a weir."

This term is a very general one, which may be applied to almost any of the nets which form a bag as they are used. Almost any of the dip nets, the drag nets, and the drifting nets above described could be included in this group. However, we sometimes find such a net set in a weir or otherwise used to form part of a trapping device, just as we do woven basketry traps. (See fig. 7.) It is in this connection that the term "bag net" seems most suitable. It is a type which is very little used in our nuclear area, though more often found among neighboring tribes to the east and south.

FLAT NETS

AGINSKY, 1943. N, Pl. Miwok, pp. 394, 453; seine, gill net.

BARNETT, 1937. Tolowa, Chetco, pp. 164, 195; gill net used; seine not used.

BARRETT, 1910. Klamath, p. 250; gill net for small fish.

_____, 1952. Pomo, p. 154 and pl. 1.

BARTLETT, 1854. Wappo, pp. 32, 33; methods of fishing with harpoons and nets. Of special interest is the net suspended from a boom and provided with a trigger string.

BERREMAN, 1944. Chetco, p. 31 and pl. X; sinkers (notched and grooved) from archaeological sites.

CURTIS, 1924a. Hupa, pp. 14-16. Klamath, pp. 169, 170.

_____, 1924b. Wintun, Maidu, pp. 78, 109.

DIXON, 1905. Maidu, p. 143; seine in Sacramento Valley.

DRIVER, 1936. Wappo, p. 185; gill net not used.

_____, 1939. Tolowa, Chimariko, Karok, Yurok, Hupa, Mattole, Sinkyone, pp. 312, 378; this is the dragged or circled net, the true seine. Tolowa, Chimariko, Yurok, Wiyot, Hupa, Mattole, Sinkyone, p. 312; gill net.

DRIVER and MASSEY, 1957. Pp. 201, 203, 208, map 25; general statement.

DRUCKER, 1937. Tolowa, p. 233; gill net. No seine, no drift nets.

DU BOIS, 1935. Wintu, p. 15; seine used in communal salmon drives. Stretched across stream. Fish driven into it.

ESSENE, 1942. Yuki, p. 5; seine and gill net.

FOSTER, 1944. Yuki, p. 164; small seine (with sinkers and tule floats) operated by two men. Others drive fish into net.

GARTH, 1953. Atsugewi, pp. 135, 136; gill net, seine.

GIFFORD and KROEBER, 1937. Lake Miwok, Patwin, Pomo (N, SW, E, SE), p. 133; Pomo (S, SE), floats of tule. Seine and gill net.

GODDARD, 1903. Hupa, p. 24 and pl. 14, fig. 1.

GOLDSCHMIDT, 1951. Nomlaki, pp. 406, 407; seines used by river people only.

HEWES, Th., 1947. Tolowa, p. 88; long gill nets.

KNIFFEN, 1939. Pomo, pp. 359, 364; gill net.

KROEBER, 1925. P. 816; general statement. Sinkers commonly notched. Grooved sinkers used only in Northwestern California. Floats of wood or tule. Yurok, pp. 84, 85; gill nets, salmon and sturgeon seines have different sizes of mesh. Achomawi, p. 309; for salmon. Modoc, p. 325; with tule floats. Maidu, p. 415; seine used in still water of sloughs and streams in valley. Patwin, p. 363; seine used by one functional family.

_____, 1929. Nisenan, p. 287.

_____, 1932. River Patwin, pp. 277, 295; short, hauled seine. Also drag seine used between two tule rafts. Three or four men also dived with seine. Short, hauled seine used by Hill Patwin.

LOUD, 1918. Pp. 364, 365, 387; sinkers and anchors from Humboldt Bay.

NOMLAND, 1935. Sinkyone, p. 154; seine used as barrage.

_____, 1938. Mattole, p. 112.

ROSTLUND, 1952. Pp. 93-100 and map 33.

SAPIR and SPIER, 1943. Yana, pp. 252, 258; seines.

SPIER, 1930. Klamath, pp. 149, 151, 152; 3 ft. by 40+ ft., floats and grooved sinkers. Set on stakes.

VOEGELIN, 1942. Atsugewi, Nisenan, Shasta, Wintun, p. 55; seine type net. Klamath, Modoc, Achomawi, Atsugewi, Nisenan, p. 55; gill net.

MAPS 19-21

These long and relatively narrow nets were made with an extra large mesh for sturgeon and with a standard mesh for salmon. They were used as true seines, as set nets or gill nets, as drag nets, and as bag nets.

SEINE

While, in general, the waters of the Northwest California rivers were too swift for seining, there were, particularly on their lower courses, some places where the water was sufficiently slack to permit the use of seines.[30] Then, there were the bays, estuaries, and lagoons at the river mouths where seining could be done with relative ease. Also Lake Earl, which is of considerable size, was ideal for this method of fishing. In such waters these long, narrow nets were employed, being hauled, usually by a pair of canoes, in such a manner as to encircle and impound the fish in a small area. The fish were then usually removed by dip nets. In the process of hauling these nets some fish were gilled, but this was secondary. The object of true seining was to impound the fish in a relatively small area.

The self-same net, when provided with sinkers and floats and anchored in one spot, served as a set net or gill net.

Hewes (F.N., 1940) states for the Shasta that a type of seine was used occasionally to "encircle fish." This net, called quaidúma, was a hundred feet or so in length by about four feet in width. Its one end was securely moored ashore opposite a point where the river showed slow, still water, with very gentle eddies, if any. Here the fish were likely to be resting quietly. The free end of this net was taken out in a dugout canoe, which circled

[30]The seine is not only one of the most widely used types of nets, but also one which dates very far back in history. Wilkinson (1878, Vol. 2, p. 102), in citing the fishing methods of ancient Egypt, shows a seine being hauled ashore, well filled with fish.

around in a wide arc, impounding the salmon and the steelheads. This, the informant maintained, was not a gill net. It simply impounded the fish and brought them into a small compass where they were more easily secured by the fisherman.

A rather elaborate type of seine used by the Patwin is described by McKern (1922, p. 248). In speaking of Trade Families McKern emphasizes the fact that such families possessed certain charms and medicines which gave them success in their special vocations. He cites as an example a man thus rendered adept in catching all kinds of small and medium-sized fish. Aided by these charms, the man's family used a large "slough net" made of native hemp string. It was, as he says, "squarely oblong" and was suspended across a slough by means of a low-hanging twisted rope, the ends of which were tied to trees on the opposite banks of the slough in such a manner that most of the net was submerged. It was held down by a line of sinkers attached to the lower edge of the net. These sinkers were mud pellets, each about the size of a baseball, and were wrapped in tule. The fish were driven into the net. Then one end of the rope was detached from its moorings and the net was pulled across the slough to the opposite shore, thus entrapping the fish and bringing them to land.

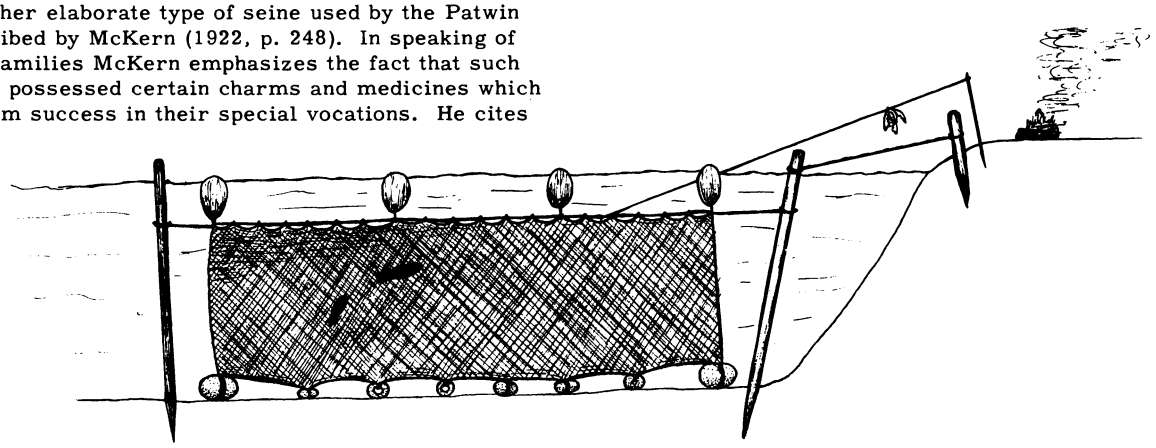

Fig. 18. Gill net, with pole supports, anchors, rattle, and fire ashore. After Hewes (F.N., 1940).

SET NET OR GILL NET

A good net of this type is a Yurok specimen (1083), collected at Weitchpec, which still retains some of its wooden floats and most of its stone sinkers. This net is shown, in part, in Goddard's (1903) plate 14, figure 1. Concerning the use of this type of net among the Hupa, Goddard says (1903, p. 24), "When the net had been set, several canoe loads of men went out and drove the fish into the net." This statement indicates that it was used as a gill net. The specimen noted above is 19.13 m. long as indicated by actual measurement of the headline, and is a meter in width. Its mesh, which is on an 8 cm. bar, is made of a relatively coarse cord and with the usual sheet bend.

Its lower edge has a relatively light footline made of two 2-ply cords twisted together. The footline is rove through each of the bottom meshes, and to it the sinkers are attached by binding at intervals averaging about 102 cm. These bindings prevent slippage of the net on the footline.

The eleven sinkers[31] which still remain attached to this edge are of various kinds of stone and of three general types: one is a natural, perforated stone measuring 8 x 9 cm., and weighting 350 gm.; five are flat, grooved sinkers ranging in size from 9 x 13 cm. to 7 x 12 cm., and weighing 671, 510, 500, 393, and 390 gm. respectively. The remaining five are thin, discoidal sinkers, each with a hole pecked through its center. One has a diameter of 9 cm. The others have diameters of 10 cm. each. Their weights are 230, 221, 321, 341, and 351 gm. respectively. Each sinker is tightly lashed to the footline of the net with several rounds of cord, as is shown in plate 5, a.

Fortunately, seven of these sinkers are still attached to this footline at one end of the net as originally used. This shows us two facts. (1) Since one of these sinkers is lashed to the corner of the net, we know that no anchor was used at this corner as it is in the nets illustrated in figures 18 and 20. (2) Since seven of these sinkers are still in a consecutive line, it is possible to obtain accurate measurements of their spacings. These range from 94 cm. up to 134 cm. The average is 102 cm. If, as seems most probable, this average was maintained throughout the 19.13 meters of the net's length, we find that there were originally nineteen such spaces calling for twenty sinkers. As above stated, eleven of these are now present and bound in place. In addition there are four other bindings still attached to the footline, accounting for a total of fifteen of the original presumed twenty sinkers.

The upper edge of this net has a heavy headline, and also a lighter line, which may be termed a handling line. The first is a heavy 3-ply line which is rove through each of the meshes, of which there are 191, all told, from end to end of the net. The handling line is a somewhat lighter 3-ply line which is made by twisting together three 2-ply lines. This handling line does not pass through any of the meshes, but is fastened at intervals of every sixth mesh (about 63 cm.) to the main headline by means of a lark's-head knot. Apparently the main purpose of this line is to prevent the rove meshes from sliding too far on the main headline as the net is being hauled or otherwise handled. It does not serve any useful purpose in connection with the floats, for these are attached by short lines [strops] to the knotting points where the headline and the handling line are fastened together.

The floats are very light ovals of redwood, measuring

[31] Originally, when the specimen was collected, at least twelve sinkers were present, as shown in Goddard's illustration.

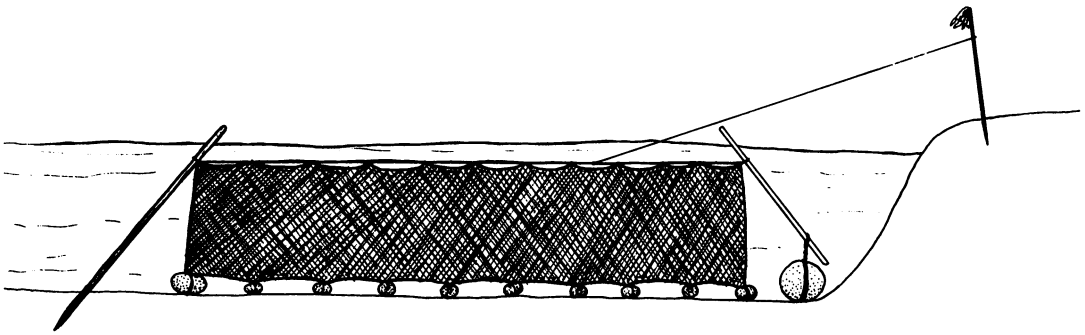

Fig. 19. Gill net, with anchors and with rattle. After Hewes (F.N., 1940).

16 x 27 cm., with a thickness of only 2 cm. The reason for using thin ovals is not clear, but their use is confirmed by Hewes, below. They may possibly have been rubbed round out of ends or pieces of house planks.

Concerning these set nets Kroeber (1925, p. 85) says:

> A long net was sometimes set for sturgeon. One that was measured [in the field] had a six inch mesh, a width of three feet, and a length of eighty-five feet, but in use was doubled to half the length and double the width.
>
> A measured salmon seine had a scant three inch mesh, a width of three and a half feet, and a length of over sixty feet.

Set nets or gill nets were quite generally used wherever the body of water was sufficiently large and wherever the current was not too swift to make their use impracticable. Usually such a net was used in conjunction with a fish drive which made the whole operation more or less of a communal affair.

Hewes (F.N., 1940) records for the Yurok and the Coast Yurok the following facts concerning their gill nets (lewet): These nets were 6 to 7 ft. wide by 50 to 60 ft. long ordinarily, though one informant among the Coast Yurok mentioned lengths up to 300 ft. The mesh of such a net was 3 to 4 in. square.

The net was weighted with stone sinkers (lewet-wal: lit., "net rock") spaced about 3 ft. apart. The headline of such a net was provided with thin, oval, wooden floats (wólenew), spaced at about 6-ft. intervals.

The net was stretched out, with one end of the headline tied to a tree or stake on shore or held by anchors, the other end being tied to a pole set firmly in the river bottom or held by an attending fisherman in a canoe. (See figs. 18-20.)

On a line running from the net to the shore usually hung a crab-claw rattle. The struggles of a catch in the net sounded the alarm which roused the watchers waiting ashore at a small fire (for warmth). They paddled out and removed the catch. (This account suggests night setting of the nets. Compare Spott and Kroeber's narrative [1942, p. 204], where an attacking party was discovered near the present highway bridge over the Klamath by a Wełkwāu man who had gone there with his wife to set a gill net for the night. The salmon were not running and they both went to sleep, but toward morning the crab claws rattled, and while he went to his net, his wife saw the enemy canoes.)

Sometimes no alarm line was used. Then the net might be left unattended. In the morning the fisherman returned, raised the net, and removed whatever fish had been caught during the night.

Such a net would catch not only any kind of fish which became entangled but also ducks and possibly other species which swam into it.

Some informants stated that gill nets were used only at night for the reason that in the daytime fish would see it and avoid it. What seems to be a more likely explanation was given by others for this night fishing, namely, that the fish usually traveled at night rather than in the daytime.

According to Gifford (F.N., 1939-42), the gill net used by the Karok was shorter than that used downriver where,

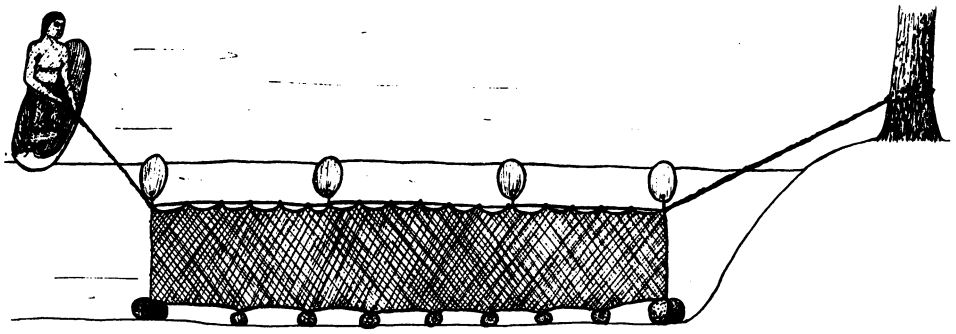

Fig. 20. Gill net, moored to a tree and attended by man in canoe. After Hewes (F.N., 1940). Tolowa.

at least toward the mouth, the stream was considerably wider.[32] One such net measured five "reaches" (fathoms) in length and about one and a half in width (a reach being the distance from fingertip to fingertip when the arms are fully extended). This particular net was used in the Salmon River, where it stretched completely across from bank to bank. [This net must have been in an especially narrow spot, as the Salmon River averages several times 30 ft. in breadth.] It was not used on the near-by Klamath for the reason that it was not long enough to reach across this large stream, although it might be stretched across some cove if desired.

Such a net was weighted with sinkers made of flat stones with grooves pecked into two edges so that the iris-string lashing could not slip. These stones were lashed directly onto the footline of the net. Other informants stated that no floats were used by the Karok and that no perforated sinkers were employed.

The net was moored to each bank, or it might be moored at only one end, the opposite end being held by a fisherman in his canoe. (See fig. 20.) Others on the banks or in canoes threw stones into the water, upstream and downstream, in order to frighten the fish toward the net, where they were gilled. The agitation of the net showed when it was time to haul in the catch.

Hewes (F.N., 1940), for the Wiyot, says that informants stated that after spearing salmon for several days, as they came in after the bar at the mouth of the [Eel] river had been opened by the first high water, the Wiyot then set their gill nets in the deeper waters of the estuary. These could not be used farther upstream because of insufficient water. The streams were neither deep enough nor wide enough in most places.

Such a Wiyot gill net was woven of iris-fiber string. This material had to be secured through barter from the mountain regions farther back from the coast. The net was 60 to 70 ft. in length and had grooved (not perforated) stone sinkers at about 18-in. intervals along the bottom. It had no floats (sic) but at each end there was a light redwood pole to keep the net upright. This pole was held in place by planting it in the sand or mud of the bottom or by anchoring with a heavy grooved stone anchor. A crab-claw rattle was placed on one of the poles so that, as the fish tried to get through the net, they gave the alarm. This rattle was made of dried crab "shells" or claws or both. It took about four such pieces to make a satisfactory rattle. (See figs. 18, 19.)

The fisherman then hurried out in his canoe lest a seal devour his catch. He hauled on the headline of his net so as to cause the meshes to close partially into diamond forms and thus more effectively entangle the fish. As he hauled in the net and came to each fish, he clubbed it, either in the net or after it had fallen into the canoe. If he came upon a fish which was not securely gilled, he tried to wrap a section of net around it to prevent its escape until it could be landed in the canoe. Almost any kind of club served his purpose. One of heavy wood, like oak, and with a knobbed end, was especially useful. No gaff was used.

A sand hearth in the canoe enabled the fishermen to have a small fire for warmth at night.

Informants stated that, because in olden times there were such great numbers of salmon, this set gill net was the only type used in the lower part of the [Eel] river. Neither the drift net nor the true seine was used. And, of course, there were, in Wiyot territory, no eddies and rushing waters where A-frame lifting nets could be employed. Some other informants, however, stated that such nets were also used by the Wiyot--perhaps elsewhere.

Hewes (F.N., 1940) also gives some details concerning the gill net of the Tolowa. The general term mecxá' is applied to all nets of this type.

His informants recognized two kinds: The larger one, called tã kaitloke-mecxá', the one used for taking Chinook salmon, was some 15 fathoms in length and had a width of about 13 ft.[33] This net was set anywhere along the lower ten miles of Smith River. Another, smaller net, one 10 fathoms in length and only 5 ft. in width, was used in the fall for taking steelheads. This net, called tĩsi'mun-mecxá', was always set in shallower water near the bank, for this is the water favored by this species. Neither of these nets was long enough to reach completely across Smith River.

Either net was moored to a stake on shore, the opposite end being anchored by means of a stone anchor weighing twenty to thirty pounds. Any natural stone served this purpose, provided it had either a natural perforation or a surface which would hold a cord which was tied around it. The bottom line of the net had lashed to it several grooved stone sinkers, while the headline carried paddle-like, wooden floats [note once more the flat, oval shape] placed at intervals of ten or twelve feet.

Such a net was mostly used at night and was watched very carefully, chiefly because a seal or sea lion, following the fish, might tangle in the net and ruin it in a very few minutes. The repair of a torn net might consume at best two or three days. Especially was it important to safeguard the net because the iris fiber used in making and in repairing it had to be obtained from the mountain regions, usually through barter with the people on the Klamath.

In watching his net the fisherman either remained ashore or in his canoe moored near the shore. In either case the watcher held the end of the headline so that he could feel the twitching caused by the struggles of the enmeshed fish. He then pulled his canoe along by the headline of the net until he felt the weight of the enmeshed fish, which he hauled into the canoe, where it was stunned with the fish club.

In order to provide against the chill of the night a small fire was kept burning on shore or, if the watcher remained in his canoe, on a small hearth of dirt in the bottom of the canoe.

Informants stated that a net intended for use in Smith River was made with a mesh about seven and a quarter inches square, while one intended for use in Lake Earl was about a half-inch smaller in each of its dimensions.[34] They maintained that no steelheads came up into Lake Earl, and that the "blue backs" (silver salmon) found there rarely exceeded eight or nine pounds in weight. However, Chinook salmon running up Smith River sometimes reached a weight of fifty to sixty pounds.

[32]Kroeber's observation is that up to about 10 mi. from the mouth of the Klamath the increase in width is not very noticeable; evidently the stream deepens more than it widens in the 30 miles below Weitchpec as compared with the 30 miles above that point.

[33]A net of this width can have been used only in the lower tidal estuary of Smith River. The Klamath has a far larger flow of water but few if any reaches of 13-ft. depth; nor have any Yurok claims been recorded of nets of such width.

[34]It looks as if one of Hewes's Tolowa informants tended to use precise figures but with a careless grandeur: a 13-ft. wide net above, and now a 7.25-in. mesh, which would let all but the occasional very largest Chinook salmon through. Even in the larger Klamath the Yurok sturgeon net mesh is rarely given as more than 6 in. The 9-lb. "blue-back" salmon in Lake Earl could have swum through the alleged 6.75 inch mesh in pairs.

One informant pointed out that these gill nets were not set in Lake Earl itself, but in the mouths of creeks flowing into the lake; hence they were usually quite short--rarely over two fathoms in length.

Another of Hewes's Tolowa informants called attention to a special setting of the gill net for catching steelheads as they ascend the river with the high water in January. It seems that, according to this informant, the steelhead naturally travels upstream very close to the bank, rarely out in midstream. Taking advantage of this fact, the fisherman builds out at right angles to the bank a short (6 to 8 ft.) fence, by driving several close-set posts with a tight brush filling on the upstream side. From the outer end of this fence a gill net, six fathoms or so in length, is run upstream. The fish, upon encountering this short barrier, make their way out around it and apparently, on trying to get back close to shore again, gill themselves in the net. This whole device is called ustagī'á ("runs out"). ~~See figure 20.~~

Hewes (F.N., 1940) further reports, for the Mattole, one type of gill net as a very temporary affair, made of the inner bark of willow. Such a net (30 to 100 ft. long by 5 or 6 ft. wide) could be woven in a single day and must never be allowed to get dry. If these fibers dried out, they became brittle and the net was useless. This net was chiefly used in the lagoon up from the river mouth, though it was employed in favorable spots on up to the upper limit of Mattole territory. It was stretched across any deep pool. No canoe was necessary in setting it; the fishermen simply waded out into the water. It was provided with a brush buoy at either end. The "floaters" were light sticks (not tules). A few stones, picked up where used, served as sinkers. When the net was in place, the fishermen waded about and disturbed the water in order to scare the fish into the net. Some fish went under it and were allowed to pass, because the fishermen knew that the people living upstream needed fish also.

The Mattole also made more permanent nets of 2-ply cord, with mesh measure and shuttle. A coarser-meshed net was used for salmon and a smaller-meshed net for steelheads. The nets were carefully dried and were stored in a dry place. Then they would last indefinitely.

For King (Chinook) salmon, always caught in the fall of the year [the Mattole does not carry enough water for them until after the winter rains have begun], the net had a mesh about six inches square. It was used when the water was high, at which time a weir is impracticable. The fishermen waded out into the stream waist-deep in order to set this net.

The smaller-meshed net, for steelheads, was used in the spring, and these fish were caught chiefly as they were coming downstream, heading out to sea. Two or three men worked together and often caught a hundred or more fish at a time. They divided with everybody. As one informant said, "One man does not eat fish alone."

The dip net was not used for King salmon by the Mattole, and a hook was not used for any kind of salmon.

Another type of gill net is recorded by Hewes (F.N., 1940). He says that the Tolowa use a long gill net, to "lay" which they run it out over the stern[35] of the canoe. This required two persons, one to paddle the canoe, the other to pay out the net. The paddler may be a second fisherman, or possibly the wife of the man who is handling the net. In order to prevent the tangling of the net, the headline with its floats was held aloft, letting the footline with its sinkers slide out over the gunwale of the canoe.

If this net was to be employed as an ordinary gill net it was moored to the shore or was secured by heavy, grooved anchor stones. Thus employed, it was usually used at night.

DRIFT NET

This same gill net was, however, sometimes employed in the daytime as a drifting net. It was paid out of the canoe in the same manner as above described and was provided with the same floats and sinkers. However, it was not moored to the shore and it did not have the heavy anchor stones. Sometimes as many as three of these gill nets might be fastened together, end to end, in order to reach well across the stream.

Some fish were actually caught as they struck the net in their attempt to pass, but the chief purpose of this drift net seems to have been to force the fish toward the weir and trap device, which was placed across the river not far away. The informant stated that the drifting of this net was sometimes carried as much as half a mile, but he did not go into details concerning the weir and trap construction. Such a net served the same purpose as a movable weir.

The fishermen usually carried their harpoons in the canoes, and secured some, at least, of their fish this way.

In connection with these set nets and with some types of traps, attempts were made to frighten the fish out of deep pools and elsewhere above or below the net or trap and to make them run into the device set for them. The fishermen, or perhaps some boys, would wade around, if the water was shallow enough, would throw stones into the stream, and would use any other means possible to get the fish moving.

One of Hewes's Tolowa informants spoke of a special device used to frighten fish into their nets or traps. He stated that they would place decaying food and refuse in bundles of brush where they also put very hot stones. When these bundles were cast into the stream the fish would be frightened for long distances. In their attempts to escape they landed in the nets or traps. [The hiss and steam of these hot stones would undoubtedly help frighten fish, but the function of decaying food is not clear.] (See also "Driving Fish.")

DRAG SEINE

The term "drag seine" applies to a net of the type above described when it is hauled through the water instead of being simply set and allowed to remain in one place. The weight of the sinkers causes its lower edge to drag on the bottom of the river, where the salmon chiefly are as they travel upstream. In this case the term drag net or drag seine is certainly proper.

This is an entirely different net from the smaller "conical drag net" described above, which is in reality a type of dip net, with two sticks or poles used as distenders to produce a trapezoidal-mouthed pouch, which is hauled through the water by two canoes. When two of these conical drag nets are hitched together and manipulated on poles long enough to force them down to the river bottom where the salmon are, they form the "conical drifting bag net" described earlier. However, two of these "drag seines," when connected, form the "drifting bag seine" next to be described.

[35] Probably means from one side toward the stern. If there is only one paddler, he must sit at the stern to control direction. The net was presumably paid out over the gunwale, somewhat forward of the paddler's feet, on the side opposite to his paddle.

DRIFTING BAG SEINE

The drifting bag seine, as we are calling it in contradistinction to the "conical drifting bag net" above described, is of two forms: a double form designed primarily for taking sturgeon and a single form designed primarily for taking salmon. Both were operated on ropes instead of poles.

Double drifting bag seine.--The double drifting bag seine was made by fastening together two short seines with vertical distenders, and by placing these on ropes, the whole being balanced with stone anchors, so that the two nets would remain in the right position and at the proper depth. (See fig. 21.)

Hewes describes what he terms a "sturgeon bag net" among the Coast Yurok, as follows: Fasten together two nets, each about 7 ft. long and with a bag about 6 ft. deep. Such a double bag net was called roxtcé. For sturgeon the mesh was about 8 in. square. The two ends of these nets were held open by vertical sticks.[36] The nets were held down by heavy sinkers (anchors) attached to the end lines, while they were dragged slowly downstream by two canoes. This caused the nets to bag out upstream. (See fig. 21.) The nets were attached to heavy lines (3/8 in.) held by men in the sterns of the canoes.

spring, almost everyone participated in this type of fishing on the lower reaches of the Klamath. Several pairs of canoes, each with its two bag nets, operated at the same time and frequently many sturgeon were caught.

Single drifting bag seine.--Gifford (F.N., 1939-42) says that, among the Karok, a bag net, primarily for salmon, was formed by stretching a single seine between two canoes. Each end of this net was held by a heavy grooved "anchor" stone so placed in each canoe as to help balance the pull of the net and facilitate the handling of the craft. The canoes were sometimes paddled by women while men handled the net. The canoes really floated downstream and only enough paddling was necessary to keep them at such distance one from the other as to hold the net properly.

Hewes (F.N., 1940) also records this type of net for the Karok. A gill net is set between two canoes which drift downstream, usually for one-eighth of a mile or so. The bottom edge of this net was weighted with regular flat, partly grooved stone sinkers. At each end of the net was a larger, heavier sinker, which may be termed an anchor. This anchor had a somewhat rounded form with the groove running completely around it. Each of these anchors was actually placed in one of the canoes and the two served to secure the ends of the net firmly.

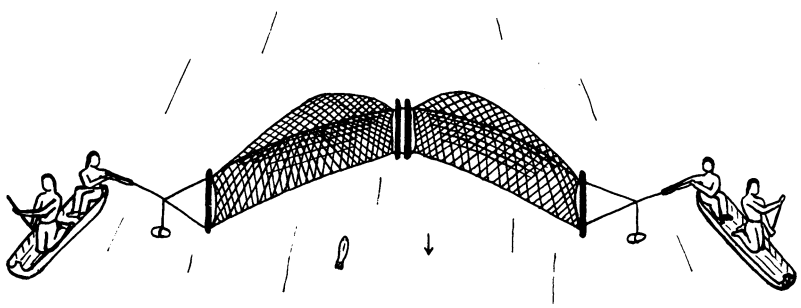

Fig. 21. Double drifting bag seine, for sturgeon.

When the net man in either canoe felt a sturgeon in his net he called out to the paddlers to bring the canoes together. Meantime he began to haul in the line and to close the mouth of his one of the pair of nets. As soon as the entrapped sturgeon was within reach both net tenders used their fish clubs to stun it. Or, upon occasion, one of the net men would actually grapple with the sturgeon while his partner wielded the fish club.

Yurok informants stated that a communal effort in taking sturgeon by means of the "drifting bag seine" was very efficacious. When the sturgeon run was due in the

Such a net was called icipkan. When used for taking the large winter salmon (pavût), it was called pavût icipkan.

Hewes also records this same type of net as present among the Wiyot.

The only other mention of it is that by Driver (1939, p. 312), whose entry 182 calls for a "sacklike net, dragged" which presumably refers to a similar type of net. However, he attributes it to one only of the divisions of the Sinkyone and to none of the other tribes of the Northwestern California region.

[36]Kroeber's field notes (1902) speak of seeing, at Ko'tep, just below Pekwon, a notched or ringed pole, about 4 ft. in length, attached to what was called a sturgeon dip net. From the description it seems quite possible that this may have been one of the distenders on a sturgeon drifting bag seine, rather than part of the frame of a sturgeon lifting net.

CYLINDRICAL OR HOOP NET

DRUCKER, 1937. Tolowa, p. 232; "conical net" with hoop set in diagonal weir.

HEWES, F. N., 1940. Tolowa; cylindrical net with hoop used in weir.

MAP 18

Much more rarely we find what may be termed a cylindrical net set by some of these tribes as a trap in the opening of a weir. The mouth of this long tube is held open by means of a wooden hoop and it is fitted with a signal cord which operates a rattle on shore. Also there is usually a cord which may be pulled to close the net and entrap the catch. Such a device, as reported by Hewes (F.N., 1940) for the Tolowa, is shown in our figure 9.

FLOATS, SINKERS, ANCHORS

BARNETT, 1937. Chetco, Tolowa, grooved sinkers; Chetco, square float; Tolowa, triangular float; p. 164.

BARRETT, 1910. Klamath Lake, pp. 250, 252, pl. 21, fig. 7; grooved sinkers, tule floats.

_____, 1952. Pomo, tule floats; pl. 15, fig. 2.

DRIVER, 1939. All Northwestern California tribes, pp. 312, 378.

DRUCKER, 1937. Tolowa, p. 233; triangular or oval wooden floats. Grooved or notched sinkers.

ESSENE, 1942. Yuki, p. 5; unworked stone sinkers.

GIFFORD and KROEBER, 1937. N and E Pomo, unworked stone net sinker; E Pomo, grooved net sinker; E and SE Pomo, net floats, pp. 133, 134.

KROEBER, 1925. Yurok, sinkers, fig. 7; Klamath Lake, p. 326, grooved net sinkers.

McKERN, 1922. Patwin, p. 248, mud ball sinkers wrapped in tule.

SPIER, 1930. Klamath Lake, p. 152; tule floats, grooved sinkers.

VOEGELIN, 1942. Modoc, Atsugewi, perforated stone sinkers. Klamath, Modoc, Atsugewi, Achomawi, Wintun, grooved stone sinkers. Achomawi, Atsugewi, wooden floats. Klamath, Modoc, Achomawi, Atsugewi, tule floats, p. 55.

MAPS 22-26

In manipulating nets of the flat type certain accessories were required: floats, sinkers, and anchors.

Floats in the nuclear area were usually thin ovals of light wood tied to the upper edge of the net so as to keep it buoyed up at or near the surface of the water. Such floats are shown in figures 18 and 20.

Hewes says these floats are 11 by 3-3/4 in. in dimensions. We may assume that such exact figures derive from actual measurements of floats seen in the field. The floats on our large net measure, as above mentioned, 16 by 27 cm. and have a thickness of 2 cm. Hewes does not give the size of the larger float [buoy] at either end of the net.

Some of the adjacent tribes varied the forms of these floats. Drucker (1937, p. 233) states that the Tolowa float was "triangular or ovoid." Driver (1939, p. 312, element 179) records simply "wooden floats" for the Tolowa, Karok, Yurok, Hupa, and Mattole. These were also used by the Chetko.

Others, the Klamath Lake Indians, for example, used plain sticks or tule for floats. The Pomo, of the Clear Lake region at least, used small bundles of tule as floats.

In the Northwest area sinkers were attached at frequent intervals along the lower edges of flat nets. These were of three general types: grooved sinkers, sinkers with natural perforations, and finely formed, perforated sinkers. Though sometimes purposely shaped, the grooved sinkers were most frequently flattish pebbles of natural forms with grooves pecked around their middles or on two of their edges to hold the cord by which they were lashed to the footline of the net. If such a pebble had any sort of depression sufficient to keep the cord from slipping, no pecking was required. If a pebble could be found which had a natural perforation, the hole was utilized to lash it to the net.

The finely formed perforated sinkers were usually quite carefully made by pecking and then smoothing. Four of these are shown in our plate 5, a, where they are lashed in place on a large gill net.

Our plate 6, a-l, shows a selected series of all three types of these sinkers, with considerable variation in form in the grooved and the perforated types. The dimensions and weights of these several sinkers are tabulated in the explanation accompanying this plate. Almost any kind of stone was utilized for sinkers, but the more finely shaped and smoothed ones were usually of serpentine.[37]

Kroeber (1925, p. 86, fig. 7) shows five of these sinkers. Driver (1939, p. 312) records grooved stone sinkers as used by the Tolowa, Chimariko, Karok, Yurok, Wiyot, Hupa, Sinkyone, and Coast Yuki. He records perforated sinkers as used by the Tolowa, Karok, Yurok, Wiyot, and Hupa.

With large nets, anchors were used at the ends, as shown in figures 18-20. A rock of suitable size and weight, generally more or less ovoid in form, was grooved so that it would hold a fairly heavy cord. Six of these are shown in plate 6, m-r. Their dimensions and weights are given in the explanation of this plate.

[37]Some of the sinkers in the collection have been identified as made of serpentine, others of talc.

As above mentioned, one of Hewes's (F.N., 1940) Karok informants said that his people had a drifting bag net which consisted of a short gill net held between two canoes and allowed to drift downstream with the current. The lower edge of this net was provided with stone sinkers and each of the lower corners of the net had one of the heavy anchors. These anchors were not allowed to hang down in the water but one was carried in each canoe. This would naturally cause the net to bag out upstream, and would produce an effective pouch.

That heavy stone anchors were quite widely used is indicated by the fact that Fr. Font (1931, p. 373) found them employed in the vicinity of Carquinez Strait in 1775-1776. With reference to balsas in these waters, he speaks of "raising the anchors, which were stones tied by a rope."

CHAPTER IV

NET MAKING AND NETTING IMPLEMENTS

NET MAKING

BARRETT, 1910. Klamath Lake, p. 250; milkweed and nettle fibers.

CURTIS, 1924a. Klamath, p. 173.

_____, 1924b. Wintun, p. 78.

DIXON, 1905. Maidu, pp. 143-145, and figs. 14, 15; details of netting, milkweed, wild hemp. Fibers rolled on thigh into 2-ply string. These combined to make stronger cord.

GIFFORD, 1939. Coast Yuki, pp. 342, 343; Iris macrosiphon fiber. String 2-ply. Rope 4-ply.

KROEBER, 1925. Yurok, Coast Yuki, pp. 85, 214; 2-ply iris-fiber cord. Coast Yuki, p. 214; wooden mesh measure.

ROSTLUND, 1952. P. 169; materials.

SCHENCK and GIFFORD, 1952. Pp. 381, 382, 386; uses of Iris macrosiphon. Grapevine and hazel used for coarser cordage.

SPIER, 1930. Klamath, pp. 152, 154; nettle, milkweed.

VOEGELIN, 1942. P. 80; 2-ply cord twisted on thigh by all tribes of Northeastern California.

MATERIALS

The people of this region generally employed only one material in making their finer cordage, though coarse ropes were twisted out of grapevine and strips of willow bark and hazel withes were used for tying and coarse weaving. In fact, mention was made of a temporary net woven of willow-bark fiber. Among the Karok, still another material (unidentified) was sometimes used, according to Gifford.

The Karok, according to Schenck and Gifford (1952, p. 386), used grapevine to moor a boat, and, they add, the smaller grapevines are twisted to make rope. Kroeber regularly observed the same among the Yurok.

The string regularly used for nets, bags, snares, and the like was made exclusively from the leaf of Iris macrosiphon. This is a small plant with a white flower. Each leaf yielded only two fine, white, silky fibers. These were extracted by the women with the aid of an artificial thumbnail of mussel shell, such as those shown in plate 19, m-r. The actual rolling and twisting of the strong cord, with right-hand twist, was the work of men, as was also the weaving and knotting of the nets.

Informants on the immediate coast usually said that the iris fibers were obtained "from the mountains." The Tolowa told Hewes that they got most of theirs from the Klamath River people. The range of the plant is recorded as from 100 to 3,000 feet (according to Jepson's Manual) in the Sonoran and Transitional humid zones. The restriction of range, the thinness of the fiber, and its high tensile strength account for the value placed on it.

Kroeber's field notes of 1901 (11-54) specify how the iris fibers for cordage were obtained.

The leaves of this iris (macrosiphon) are from one to two feet in length and not over a quarter of an inch in width, and are flat almost to the root. They are a red-purple at the base, white a little farther up, and finally green throughout the remainder of that part of their length which is above ground and in the light. With the leaves held in the left hand, each leaf is split by means of the artificial nail on the right thumb. Then each half-leaf is stripped of its green pulpy material by drawing this shell thumbnail from the middle of the half-leaf out, first toward one end, then toward the other, on one side, then the leaf is turned over. Thus with four such strippings one leaf is reduced to its two, full-length, silken, white fibers.

Kroeber collected six bundles of this iris fiber (specimen 1460) from the Yurok early in this century. These bundles range in length from 50 to 55 cm. Half-a-dozen individual fibers chosen at random range in length from 27 to 55 cm. The average length of the six was 42 cm.

Gifford (F.N., 1939-42) states that the Karok call Iris macrosiphon apkas. The fibers of the common large species, I. missouriensis (chir apkas), lack the tensile strength and are not used. His account of Karok preparation of macrosiphon follows.

The leaves are usually gathered by women, though men may assist. Each leaf is torn from the plant with the bare hands. As a handful of leaves accumulates, it is tied into a bundle with one of the leaves around it and dropped into a burden basket. On arrival at camp or home, these bundles are hung up overnight, but not where smoke will reach them. This procedure is necessary to permit the two contained fibers to be extracted without breaking as they are peeled out.

The next day the bundles are opened and each leaf is split with the thumbnail from its distal end, the index finger following through in the split after it is started. Each half-leaf is then scraped by being passed between the end of the middle finger and the musselshell scraper which is fitted over the thumb to form a false thumbnail.[38] If bundles dry before they can be scraped, they are dipped in water and laid in a basket until next day when they will be sufficiently damp and pliable to be split and scraped.

The scraper is often made from the end fragment of what has been a woman's musselshell spoon. Two holes are drilled into the fragment; a buckskin thong through the holes gives a loop.

[38] The edge of this implement is sharpened with the stem of the giant Equisetum.

Sometimes the leaves are scraped directly over the sharp edge of a musselshell spoon instead of by means of the thumb scraper.

The resultant product from each leaf is two white, silken fibers. These are twisted into string by the men, who roll them on the bare thigh. Depending on the size of the cord desired, a sufficient number of fibers is taken, and folded over at the beginning to make two rovings. These are then twisted, by rolling on the bare thigh, into the start of a 2-ply cord. As the worker nears the end of each roving, he adds more fibers and thus carries on each ply indefinitely. When a sufficient amount of string is finished, it is wound over the flexed elbow and hand, taken off, and wrapped around the middle to form a hank. It remains in this form until needed for net making, when it is wound onto the shuttle. Two-ply string is the predominant form, although informants said that 3-ply and 4-ply string was also made.

One informant told Gifford that among the upper Karok around Clear Creek iris fiber was not so important as that obtained from a plant called xansipmisip, which grows on river bars and which, though not the ordinary milkweed, does have a milky juice. It yields a long, stout fiber, which is mixed in with iris fiber, particularly to make deer snares.

Sinew is another material which was used by the Karok in making nets, particularly for catching deer. One informant mentioned that a strong sinew net was placed in the bottom of a pit in order to entangle an animal which had fallen in.

CORDAGE

The cords made from these iris fibers varied in size according to use, but the basic cord was usually 2-ply and quite thin. If a cord of considerable diameter was required, it was usually made by twisting together two (or sometimes three) of these thinner 2-ply cords. If a still heavier cord was required, two of these doubled cords were twisted together.

Our collection possesses six of these heavy cords, all skeined just as the Indians had them stored away. These were collected by Kroeber in 1907 and are recorded as having originally been deer snares, re-used for making sturgeon nets. All are apparently of iris fiber and in each the basic cord is of about the same gauge, about 0.5 mm. These basic elements are twisted in certain combinations as shown in the following tabulation.

Specimen No.			Diam. (mm.)
11848	2	2-ply cords twisted together	2.7
11844	2	2-ply cords twisted together	2.0
11845	2	3-ply cords twisted together	2.3
11847	2	3-ply cords twisted together	2.4
11849	3	3-ply cords twisted together	2.6
11846	2	3-ply cords twisted together and then three of these twisted together	4.4

This last is an especially heavy and intricate line. It starts with a definitely 3-ply cord. Two of these are twisted together to make the next larger unit. Then three of these are twisted together to make the final cord or rope, which is very compact and hard-twisted, 4.4 mm. in diameter. Thus we have in cross section 18 of the twisted strands with which we started. This cord is skeined up so as to make 67 loops, each approximately 30 cm. in length, the over-all length thus being around 20 meters.

While the basic cord of our region thus is the fine, 2-ply, right-hand-twist iris cord, this is combined to produce heavier line. Further, the snares used to take deer and the harpoon and tow lines used for sea lions were heavier than those tabulated above. Such lines are often specified as being as much as "half-an-inch thick"--three times the diameter of the heaviest line measured above.

NET WEAVING

As above mentioned, the making and repairing of nets was man's work, usually done at night or on rainy days in the sweathouse. Kroeber's notes (15-71) state that for salmon or sturgeon nets a hooked stick (pl. 25, a, c, e, specs. 1893, 1667, 1666) of fairly large size was stuck into the joint where the ridgepole of the building rests on the timber in the middle of the wall at one end of the sweathouse. Or, a wall timber was pierced and a withe passed through it. From either of these supports a net was suspended. As the weaving or the repairing progressed, the worker sat as near or as far away as the work required. He held the mesh stick in his left hand and tied the knots with his right. He held the netting shuttle in his mouth while the tie was being made over the mesh stick. The size of the mesh stick governed the size of the mesh and the number of meshes governed the size of the net, all according to the species for which the net was intended.[39]

No one might pass behind a weaver. Also no one might speak loudly, else the salmon would hear it and avoid the net.

Smaller nets for lampreys and other species were handled in the same way, but on smaller hooks.

As soon as a net was finished it was placed in the river to wet it. It was then considered good for five or six years of active service. So far, Kroeber's account of 1901.

The only knot used in making these nets is the sheet bend, also known to net makers by several other names: mesh knot, netting knot, weaver's knot, hawser bend, and becket bend. (See pl. 7, a.) This is true regardless of the kind or size of the net or of the size of the mesh.

In weaving any flat net the whole process is quite simple because it is only necessary to consider a direct progression on a plane surface without variation of mesh size or of mesh numbers. For example, in our large gill net above referred to (1083) the meshes are quite uniformly 80 mm. square, throughout its entire length and breadth.

However, in the conical nets (lifting, landing, and plunge nets), and in the scoop net, which is a conical bag with an apron of greater or smaller size woven onto it, we have constantly increasing mesh dimensions as we progress outward from the tip to the mouth of the cone or forward from the rear to the front of the apron. These increasing dimensions of the cone are achieved in the three following ways.

1. The number of meshes in each succeeding course of the spiral formed by these meshes automatically increases by four.

2. In some nets the size of the mesh in succeeding courses gradually increases as the work progresses.

[39]The large lifting net was held in place by means of the guide ring, which was frequently made from grapevine. These nets were very large and were used for taking salmon, lamprey eels, and sturgeon. The mesh size of the nets for taking lampreys was much smaller than that for taking salmon; that of the sturgeon net considerably larger. All the nets were provided with signal and trigger strings.

3. A still greater and more rapid flare of the cone is attained by inserting extra meshes (accrues, quarterings) at intervals as required. (Plate 9, b.)

The conical net shown in plate 9, b illustrates the process. Starting at the point of the cone with a single knot, we find three meshes originating from it. Two are rectangular and one is triangular. This combination starts the ever-expanding spiral of rectangular meshes, which increase by four as each round is completed. This produces a regular progressive growth in the diameter of the cone. This increase is usually further stepped up by gradually enlarging the size of the mesh in succeeding rounds of the spiral, apparently largely by what may be termed a free-hand method--loosening the cord as it passes around the mesh measure. However, as already mentioned, the mesh measures for some nets are so made that they provide two, or even three, gauges.

In the scoop net the apron is woven right on from the edge of the cone and usually covers half or two-thirds of the circumference of the mouth of the cone. For example, in one specimen (1228), which has an unusually long apron, the front or outer edge of the apron is 225 cm. wide, while its inner edge is only about 170 cm. in width. This increase in the width of the apron as it flares out toward the front of the triangular frame is accomplished chiefly by progressively increasing the size of the mesh.

Examples of several of these changes in mesh sizes, both in the cones and in the aprons, are given in the following table 1.

TABLE 1

Changes in Mesh Size
(All dimensions in mm.)

Spec. No.	Cone					Apron				
	Depth	Diam.	Mesh			Length	Width	Mesh		
			Tip	Middle	Mouth			Rear	Middle	Front
Scoop nets										
1181	1,000	1,500	9x9	11x11	12x12	1,700	900	10x10	12x12	24x24
10515[a]. . . .	800	900	18x18	21x21	22x22	800	650	10x10	15x15	22x22
1228	1,400	2,000	8x8	10x10	12x12	2,250	2,250	10x10	12x12	13x13
1684	800	700	13x13	15x15	15x15	1,000	600	15x15	20x20	24x24
1907	650	700	12x12	13x13	16x16	730	650	16x16	17x17	18x18
1565	1,300	1,500	27x27	30x30	45x45	900	700	45x45	50x50	60x60
1567	1,000	1,300	12x12	14x14	15x15	1,200	800	12x12	15x15	30x30
Lifting nets										
1566	1,500	1,750	28x28	32x32	35x35					
11724	5,400	2,300	42x42	50x50	70x70					
1680[b]. . . .	ca. 2,000	ca. 1,500	75x75		85x85					

[a]The mesh in the cone of this net is larger than that in the apron, a very unusual arrangement which seems to indicate that the apron was a later addition. This is a Nongatl net. All others mentioned in this tabulation are Yurok nets.

[b]This is a conical drag net, without trigger device or apron. It is mounted on two short sticks (ca. 530 mm. long). It is recorded as a "drag net for salmon" (see "Conical Drag Net"), and bears the original field number 264. It is the only one of this type in the collection.

When the edge of a net is finally reached, there is need to provide added strength where the net cone fastens to its A-frame or V-frame, or to other support in flat nets.

Strictly speaking the selvedge of a net refers only to the right- and left-hand edges (of a seine, for example) as distinguished from the top (head) and bottom (foot). The last row of loops on the right or left is a normal selvedge. By knotting into or binding onto each of these loops or half-meshes an additional cord, a straight selvedge is formed. This gives finish to the net as well as greatly added strength. In the lifting, landing, and scoop nets this extra cord on the sides may be carried on across the front edge of the net, and this edge may also be properly termed selvedge. In the A-frame or V-frame nets this is true for the bottom or forward edge as well as for the two slanting sides. The outer row of meshes at the front and at the two side edges of such a net, regardless of its size, is made with a double line of cord as a "selvedge" to give it this added strength. (See pls. 9, a and 10, b, both Yurok specimens). These two cords are not twisted together, as is sometimes done in making an extra strong tip of the pouch of such a net. These selvedged loops are then attached, either by knotting or by binding, to the loops of a strong stapling line, which loops, in turn, are knotted onto a still stronger headline or footline, depending on the position in the net. (See pl. 9, a.) The knot invariably used in making such attachments is the lark's-head knot.[40] Plate 8, b shows both obverse and reverse views. In one specimen, however, the meshes were attached to the stapling line by wrappings of fine cord (probably a method of repair).

The fourth side of the net's trapezoidal mouth is provided with a stout headline, but it lacks the stapling line found on the other three sides. Instead, the fourth corner of each mesh is fastened directly to the headline by means of a lark's-head knot in the mesh line itself. (See pl. 9, b.)

Examples of the selvedging may be of interest.

One of these is the large Yurok lifting net (11724), described in the discussion of that type.

Second, a Yurok scoop net (1684) previously mentioned is woven with the usual sheet bend or netting knot (pl. 7, a), and the last row of meshes is finished with the double cord selvedge. The middle of every third one of these meshes is attached to the stapling line by means of a lark's-head knot (see pl. 8, b) directly in the stapling line itself. These meshes are on a 50-mm. bar. The

[40]The rare instances of reeving of headline and stapling line may be considered a method of repair.

stapling line is attached by means of the usual lark's-head knot to the headline at intervals of 10 cm. The loops of the stapling line hang down about 13 cm.

A third example is the small Yurok lifting net, 1566, mentioned under that type. It still has its signal strings and the trigger button attached. It is about 170 cm. in length, and is woven of relatively heavy cord. It is specially strengthened at its conical tip, where the last 35 cm. of its length are woven of double cord throughout (plate 8, a). Here the net maker has simply taken two 2-ply cords and has twisted these together to make a single heavier 2-ply cord.

The edge of the mouth of this net follows the usual rule, being provided with a heavy headline to which, on three sides, is attached a stapling line at intervals of 14 cm., again with the lark's-head knot used for the purpose. This stapling line, which is as heavy as the headline, hangs down about 6 cm. (See pl. 9, a.)

The meshes of this net have a 35-mm. bar. The outermost side of each final mesh is made of two regular cords (not twisted together). These serve as a selvedge. The stapling line is not actually rove through these final meshes, as is usually done in the white man's net, but every other one of these meshes is seized to the stapling line by a firm binding of fine cord at the middle of the mesh. It is, as the net-makers would say, "set in by the half."

The fourth or upper edge of this net has, like the big lifting net, its meshes fastened, again by a lark's-head knot, directly to the headline. This edge is shown in plate 9, b. -- So far our analysis of the edges of lifting net 1566.

A somewhat different system prevails in the scoop nets with the long apron, used in the surf. This is, of necessity, a net with a very fine mesh; it must be, in order to hold small fish. As already explained in speaking of this type of net, it is used on a rather large V-frame, the apron being forward and the conical pouch hanging back at the arched crossbar. Our best example of this type of net (1228, Yurok) has an apron almost 2 m. long, with a spread at the forward edge of about the same, with a conical pouch nearly a meter deep, and with meshes on about a 1-cm. bar. (See fig. 17 for detailed measurements.)

Running around on three sides of this net is a heavy buckskin thong which serves as a headline on each of these sides. The method employed in attaching the net to this headline along the front edge is quite different from that used on the right and left sides. As shown in plate 11, a, along this front edge each of the meshes in the final row consists of two sides of normal length (1 cm.) and two sides of extreme length (10 cm.). These two long sides run from two opposite corners of this mesh up to the headline, to which they are attached by a single lark's-head knot. The other three corners of each mesh are made with the usual sheet bend. We thus have a whole final front row of these peculiarly shaped meshes (156 in number), in which the two long sides merely serve to suspend the net from the headline.

A slight variation is shown at one of the front corners of the apron. Here the long cords used for attachment to the headline are doubled in number. This doubling occurs in sixteen of the lark's-head knots, as shown in plate 11, b. There is no such strengthening at the opposite front corner of the apron. There is no stapling line along this front edge. All the other meshes in this entire net are of the regular square type, about 1 x 1 cm. in dimensions, or on a 1-cm. bar.

On the other hand, both the long sides of this apron are fastened to the headline by means of a stapling line which attaches to the headline by means of the usual lark's-head knot. This arrangement is shown in plate 10, b. These points of attachment (18 all told on each side) are about 13 cm. apart, and the length of each element of the stapling line is about 24 cm. Thus, the edge of the net hangs about 10 cm. from the headline. At the lowest point in each of these loops of the stapling line a mesh of the net is fastened securely to it with a sheet bend. This attachment occurs at every fifth to seventh mesh. There are along each side edge of the apron approximately 110 meshes.

The rear edge of this net (pl. 10, a), the edge at the arched crossbar, is only 56 cm. long. Instead of the buckskin headline, it is provided with a stout 3-ply cord as a headline. To this the final tie of each successive mesh is attached with a lark's-head knot. In this short space there are so many (108) of these knots that there is hardly any room between them. Outside of this headline there are loops of stout cord, presumably for attaching the net to the crossbar. Apparently these loops were originally attached to the headline by means of half-hitches. Later this line was broken and partly lost, and repair was made with a still heavier cord which was attached by half-hitches and by bindings. At one point a lark's-head knot was used. This ends description of meshes in net 1228.

The rare instance in which a headline is rove through the loops of the stapling line should be considered a repair device and not an original method of construction. A repair of this sort is found in specimen 1181, Yurok. In this old scoop net we have at the forward edge of the apron a heavy headline to which 79 meshes are directly attached with lark's-head knots. These meshes are on a 35-mm. bar, but as we progress toward the rear of the apron the meshes rapidly decrease in size. At 20 cm. from the front they are down to normal size, a 12-mm. bar, which is maintained for a meter and a half back to the pouch, where the size is still further reduced to about an 8-mm. bar. The pouch is about a meter in depth.

The other three sides of this net have a stapling line with loops, varying from 13 to 15 cm. long, to which the net is attached by binding at every sixth or seventh mesh. Through these loops a heavy headline has been rove. The whole has very distinctly the appearance of a repair job rather than of an original fabrication.

NETTING IMPLEMENTS

BARRETT, 1910. Klamath Lake, p. 250, pl. 22, figs. 7, 11; shuttle, mesh measure.

_____, 1952. Pomo, p. 278, and pl. 15; shuttle, mesh measure.

DIXON, 1905. Maidu, p. 143, and fig. 14; shuttle of wood. First two or three fingers of hand only mesh measure used.

DRIVER, 1939. All Northwestern California tribes, pp. 335, 396, 397.

DRUCKER, 1937. Tolowa, p. 396.

DU BOIS, 1935. Wintu, pp. 126, 127, and fig. 4; shuttle, mesh measure.

GIFFORD, 1939. Coast Yuki, pp. 343, 344, and fig. 13; very primitive composite shuttle. Simple wooden mesh measure.

KELLY, 1930. Northwestern California, p. 356; designs on mesh measures.

KROEBER, 1925. Yurok, p. 86; both shuttle and mesh measure made of elk antler. Pp. 126, 130; designs on mesh measures. Coast Yuki, p. 214; mesh measure of wood.

SCHENCK and GIFFORD, 1952. Karok, p. 388; shuttles made of manzanita.

SPIER, 1930. Klamath, p. 152; slender shuttle. Mesh measure of bone or wood.

SHUTTLES

The cord used in net making was always wound onto a long, more or less slender shuttle (Yurok, plestitł). Each eye of such a shuttle was slotted so as to permit the cord to be paid out as the weaving progressed. In former times shuttles "were made of elk antler only," the Yurok say (Kroeber, 1925, p. 86). It is probable that wood was used for this purpose chiefly after sharp-edged tools became available with the advent of the white man. Any wooden shuttle in precontact days was probably used by a poor man who could not afford better materials and whose whole equipment was substandard.

These elk-antler shuttles are very slender, trim implements, with small eyes, and are highly polished from long use. Plate 12, i-k, illustrates three of these implements. They measure respectively 311, 301, and 319 mm. The eyes range from 11 down to as little as 5 mm. in width.

Intermediate between these and the heavy wooden shuttle is the slender small-eyed wooden shuttle shown in l and m of this same plate, and catalogued as "shuttle for making eel net." One of these is 407 mm. long, with an eye 12 mm. in width. The other is 369 mm. long, and has an eye 11 mm. in width. It seems not unlikely that this may represent a transitional form between the slender elk-horn shuttle and the heavy wooden one.

The larger wooden shuttles are always made of a very fine-grained, heavy, reddish wood (probably manzanita), a wood which it would be difficult to work with primitive tools. The two specimens here illustrated in pl. 12, n and o are respectively 365 mm. and 397 mm. in length. Their eyes are from 22 to 25 mm. in width.

Schenck and Gifford (1952, p. 388) found that the Karok use the wood of the manzanita for making netting shuttles.

Hewes (F.N., 1940) shows a drawing of one of these shuttles with a perforation near one eye, which, he says, was used to hold the end of the string to prevent it from slipping as it was wound onto the shuttle. The string was knotted to keep it in place. This, however, seems a very unusual procedure and is not recorded elsewhere. Perhaps it is the idea of some individual worker.

Goddard (1903, pl. 14, fig. 2) and Mason (1889, pl. 29, fig. 82) show this large type of shuttle, but neither mentions just what wood is used.

A fourth type of shuttle, also of wood, is the short, slender shuttle shown in plate 12, g and h, designated in the records as "part of an unfinished head dress outfit." Such a slender shuttle would be especially suited to weaving the small meshes of these head nets. These particular shuttles are quite roughly hewn, and decidedly makeshift in appearance. They lack all the smoothness and polish of those used in weaving the larger nets. They are respectively 242 and 248 mm. in length. The eyes of g are 6 and 7 mm. respectively in width. Those of h are only 2 and 4 mm. respectively in width.

MESH MEASURES OR GAUGES

In net weaving the "bar,"[41] or mesh dimension, was governed by mesh measures (Yurok, tsepkó), of sizes and shapes suitable to each type of net. Principally these measures were of elk antler, though a few were of bone and a very few of wood. These last were either temporary implements or were used by lower-class or shiftless men and were usually referred to as a "poor man's mesh measure." These are, however, so few as to make them almost negligible in our collection.

In general, mesh measures are of three kinds: (1) the long, slender ones (pl. 13, a-o, and pl. 14, a-i), used in weaving sturgeon nets; (2) the shorter ones, with the more constricted middles (pls. 15, 16, 17, a-j, and 14, n-s), used in weaving salmon nets;[42] and (3) the ones of unusual forms, but designed to give two (possibly three) different gauges, used for weaving nets for smaller species of fish, such as lampreys, suckers, eulachon, and smelt. Some of this third kind are of most unusual forms, like those shown in plate 17, k, u, and w.

Some of the antler mesh measures are rather rough, but most of them are carefully fashioned, very smooth, and many show the high polish which comes from long use. In color, most specimens have the brown of age, or at least that rich "old ivory" color due to much handling which indicates that they have probably passed through more than one generation. One interesting feature which is almost always found, regardless of other surface qualities, is the presence of the striations made in the process of smoothing, evidently accomplished by rubbing on some sort of a sandstone surface.

The tabulations in the explanations of plates (pls. 13-17) give the various features of 99 of the specimens in the Museum's collection. Of these 68 are made of elk antler, 25 are of bone, and 6 are of wood. Of the bone specimens 11 are made of the heavy, bleached bones commonly found on ocean beaches.[43]

The mesh measures definitely called by informants "sturgeon net mesh measures," those shown in plate 14, a-i, and in plate 13, a-g, are proportionately longer and narrower than the "salmon net mesh measures" and are,

[41]Strictly speaking, the "bar" is the length of one side of a mesh.

[42]Kroeber's field notes (Book 44, 1902) say "length of all mesh sticks measured on hand by two lengths." This annotation refers to a group of eight mesh measures said to be for making "fall salmon set nets." Specimens 2079-2086 (orig. nos. 663-670).

[43]We are indebted to Professor Alden H. Miller, of the Department of Vertebrate Zoölogy, for carefully studying these specimens to determine the source of the material from which they are made. After careful comparisons with skeletal materials in the Museum of Vertebrate Zoölogy he concludes that it is most likely that they are from the ribs of large sea lions. These specimens which have been fashioned into implements, some with polished surfaces, have left so few characteristics of the materials of which they are made, that a positive determination of their source is impossible.

in fine specimens, usually made of what appears to be weathered, grayish bone such as is commonly found bleaching on the beach. Three others are of wood and only two are of antler. Almost all of these sturgeon net mesh measures are undecorated.

The mesh measures shown in the five plates, 13-17, were almost all secured from Indians by Kroeber, who, for most of them, obtained a declaration as to the sort of fish intended to be caught with the net made with each gauge. In half of these, the net was further described as for either "setting" or for "dragging." The term "set" may have included gill nets or the A-frame lifting nets, which are set stationary although meticulously attended. The individual figures are cited in the plate explanations; the summaries are given in the adjoined little table.

TABLE 2

Mesh Gauge Lengths
(in mm.)

Gauges	No. of specs.	Max.	Min.	Mean
Salmon net gauges				
Set	12	116	92	106
Drag	10	113	85	91
Unspecified	40	114[a]	52[b]	91
Sturgeon net guages				
Set	4	156	152	154
Drag	7	140	118[c]	129[c]
Unspecified	13	156	110	134

[a]Excluding one "155" mm. long.
[b]Not for salmon or for special purpose.
[c]Excluding one "96" mm.

It will be seen that measures named as being for "set nets" are definitely larger, whether intended for salmon or for sturgeon. In salmon nets, the gauge length came out the same in drag and in unspecified net measures. In sturgeon nets, the drag type came out 5 mm. shorter than the unspecified, but the sturgeon series are short, and there is much overlap.

Of the salmon-net measures, those said to be for set nets averaged 106 mm., with 7 of 12 pieces above 100. Nine drag nets for salmon were consistently between 85 and 92 mm., but the tenth, with 113 mm., brought their average up to 91. As expectable, the 40 unspecified gauges, though the average is the same, range more widely, seven in the 50's and 60's, three in the 70's, twelve from 100 to 114 mm. Five of the shortest measures are 65 mm. or less and may represent some special-purpose class.

The 24 sturgeon-net measures show, after deduction of one questionably assigned or perhaps mis-measured 96-mm. drag-net specimen, minima of 110, 114, 115 mm. There thus is just bare overlap between these measures and the 62 measures for salmon nets. The four gauges for sturgeon set nets (pl. 14, f-i) run remarkably uniform: 153, 154, 155, 156 mm. There is only one non-set gauge that overlaps with these four.

Converting into familiar terms, we may say that the standard sturgeon mesh was close to 6 in. in set nets, and 5 to 5-1/4 in. in drag and other sturgeon nets. For salmon, the mesh was around 4 in. for set nets, around 3-1/2 in. for drag and unspecified nets.

These figures may serve as a check on mesh sizes as estimated for various kinds of nets by Indian informants, as by one of Hewes's Tolowa informants who consistently exaggerated sizes.

Decoration of mesh measures.--In the Museum's collection of 128 mesh measures and similar objects[44] only 36 bear any kind of markings, many of which are of such a hit-or-miss nature and so lightly incised as to seem almost accidental. Many others are, however, clear-cut and have been patently made for ornamentation. Any use as property marks seems unlikely. The variety and the general nature of these marks may be seen in the accompanying drawings (figs. 22 and 23).

Here 39 drawings are shown, owing to the fact that three show incisions also on the reverse side of the specimen. In almost all specimens, however, only one side is decorated.

The 24 sturgeon-net mesh measures are very largely undecorated. The shorter salmon-net mesh measures, of which there are 92 in the collection, show more decoration than the sturgeon net gauges. These salmon-net gauges show considerable variation, from a few lines about the middle to fairly elaborate zigzags and triangles.

In general, all this decoration is very lightly incised. In only two specimens (pl. 16, c and e) are lines deeply cut as if for some useful purpose. The recently cut lines in the specimen shown in pl. 17, q, are not considered in this connection.

On the whole, the decoration on mesh measures must be considered a minor feature if we compare it with the ornate designs on the elkhorn purses and spoons. Nevertheless, there is enough of it to merit some consideration. Nowhere do we find anything very definite on the subject of the designs. Kelly (1930, p. 356) merely says that "minor articles. . . , and elk horn mesh sticks are occasionally incised (pl. 119). The designs are in keeping with those of the purses and consist of triangles, zigzags, and straight lines. The mesh sticks are usually decorated with plain lines, but this may be a mere coincidence." Kroeber (1905, p. 126) records a design of overlapping rectangles (found on only one basket) which bears the name "mesh stick." Also, in discussing the designs found on objects other than baskets (p. 130), he says: "Basket design names are the only names applied by the Yurok to the carved, engraved, or painted figures, predominantly of triangles, on wooden acorn-soup paddles, elkhorn spoons and purses, and network and skins." [It would have been more exact to say that the names for the designs and patterns worked on baskets are the same as those applied to decorations on other objects: the subject was first approached from basketry, but the design names have no specific reference to baskets.] While the designs found on mesh measures are not specifically mentioned in this passage, it seems probable that these might well have been included. At least there is no statement excluding them.

One notable feature in mesh-measure decoration is the presence in several specimens of very tiny notches on their long edges. Sometimes these are the sole decoration; in other instances the measure surfaces carry linear designs of one kind or another. One thing seems certain--such notches on these long edges could serve no useful purpose in net weaving.

[44]This number includes five "net handles" or "trigger buttons."

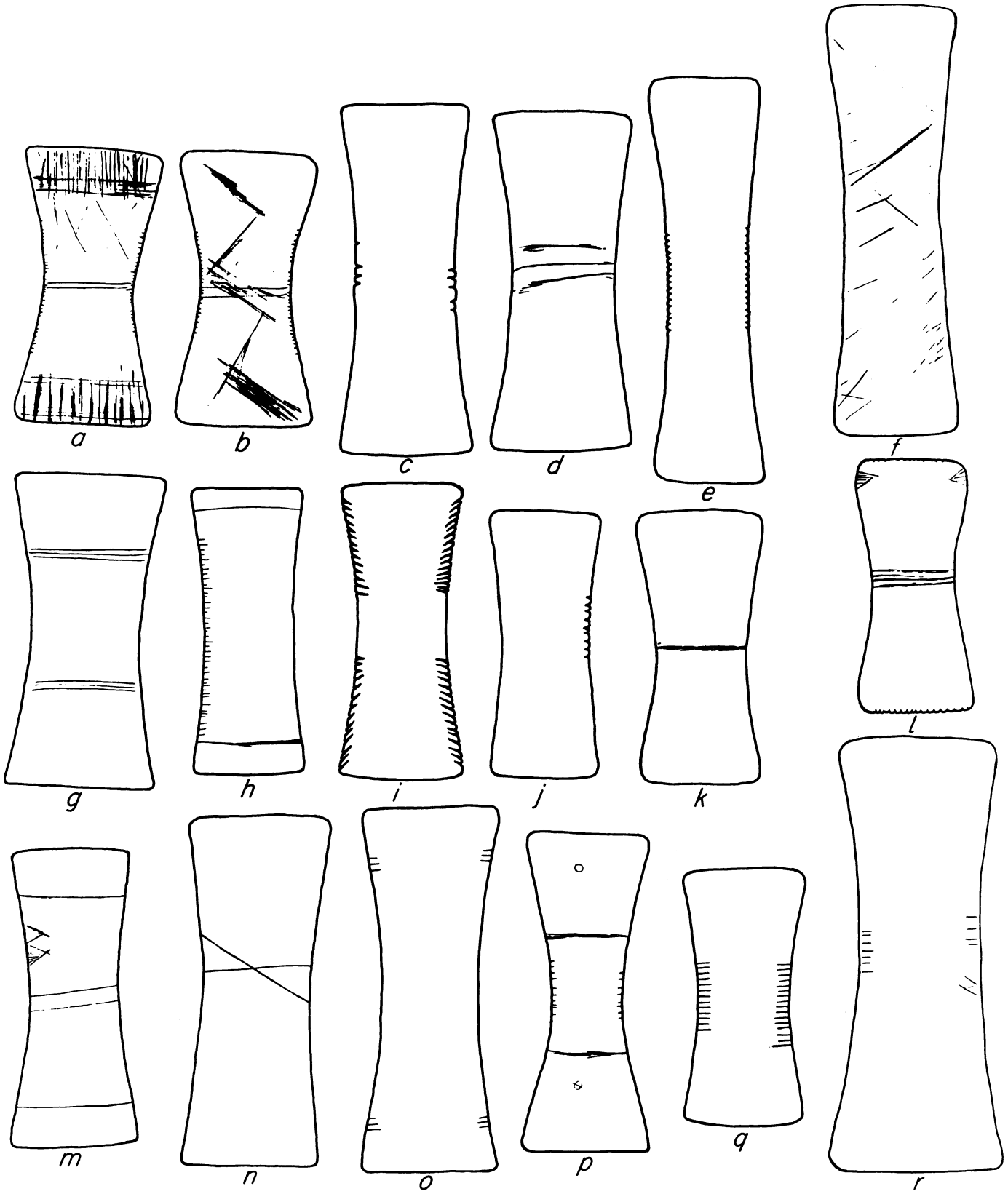

Fig. 22. Mesh measures, showing ornamentation.

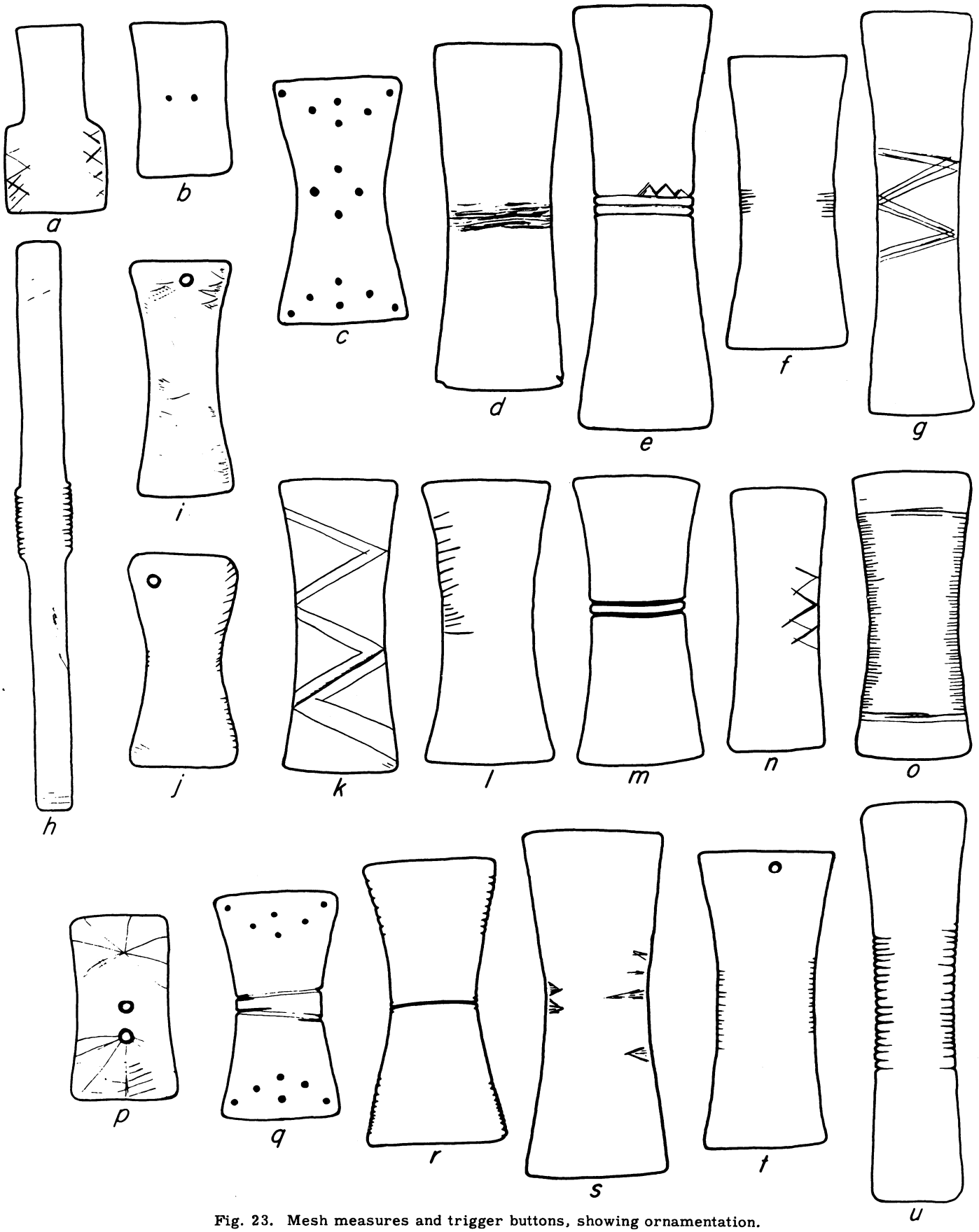

Fig. 23. Mesh measures and trigger buttons, showing ornamentation.
b and p are trigger buttons.

TRIGGER BUTTONS

These little hand-holds, called in Yurok we-tspiná ["its waiting for"], used on the signaling system which crosses the mouth of the lifting net, are made chiefly of bone, though elk antler and wood are also used. They are, as shown in the illustrations, smaller than the smallest of the mesh measures. The signal line is tied into a loop which usually passes through two close-set perforations as shown in plate 17, l-n. These three pieces are made of very thin bone. The specimen shown in plate 14, j, is a small piece of the scapula of some animal (probably deer) with a small piece of the ridge still left on it. This ridge is perforated to receive the line. Plate 17, l shows another bone piece with deeply notched sides to hold the string. A rather nicely incised specimen (fig. 23, p), this time of elk antler and with the usual double perforation, is shown among the drawings of mesh-measure decorations.

A small piece of wood may be used as a trigger button, in which case the line is held in place by means of a groove around its middle. Also we have one instance of such a trigger button of bone. It is shown in plate 14, l.

CHAPTER V
BASKETRY TRAPS

AGINSKY, 1943. Miwok, pp. 399, 452; cylindrical, invaginated, and plunge traps; scooping with basket.

BARNETT, 1937. Tolowa, Chetco, pp. 164, 195.

BARRETT, 1908b. Pomo, pp. 156, 157, 165, 167, and pl. 27.

_____, 1910. Klamath Lake, pl. 19, fig. 1; cylindrical fish trap.

_____, 1952. Pomo, pp. 151, 152.

CHARD, 1953. Wappo, p. 244; small fish scooped up in baskets; salmon caught in basketry traps or nets, set in weirs.

CURTIS, 1924a. Hupa, Wiyot, Achomawi, Shasta, pp. 8, 16, 75, 113, 137.

_____, 1924b. Pomo, Wintun, Maidu, pp. 63, 85, 109.

DIXON, 1905. Maidu, p. 197 and fig. 50; invaginated trap.

_____, 1907. Shasta, p. 428; "long willow fish-traps" used in openings in weirs.

DRIVER, 1936. Wappo, basketry traps: cylindrical, invaginated-mouth, plunge; p. 185. Salmon scooped up in basket; p. 184.

_____, 1939. Tolowa, Chimariko, Wiyot, Kato, Coast Yuki, Yurok, pp. 312, 313, 378, 379. All Northwestern California tribes use basketry scoops for fish.

DRIVER and MASSEY, 1957. Pp. 201, 203, map 26; general statement.

DRUCKER, 1937. Tolowa, trough-shaped or cylindrical trap; p. 232.

DU BOIS, 1935. Wintu, pp. 17, 128; trough trap placed in angle of weir.

ESSENE, 1942. Pomo, Kato, Yuki, p. 6; cylindrical. Pomo, Kato, Lassik, Yuki, scoop up with basket, p. 6.

FOSTER, 1944. Yuki, p. 164; woven trap (6 ft. long, 8-in. diam.) set in opening in brush weir. Coarse burden basket used to remove fish from pen at opening of weir.

GARTH, 1953. Atsugewi, pp. 136, 137; open twined traps used with V-shaped guide fence. Baskets suspended under natural falls caught fish falling back in attempt to jump falls. Invaginated traps. Fish dipped out with baskets.

GIFFORD, 1939. Coast Yuki, p. 321; several types of traps.

GIFFORD and KROEBER, 1937. Hill Patwin, Lake Miwok, Pomo (N, C, SW, S, E, SE, NE), Hill Wintun, p. 133. N Pomo, p. 172; baskets used with movable brush weir. C Pomo, p. 173; basket only used in surf fishing. Pomo, pp. 172, 173; invaginated, cylindrical, plunge.

GOLDSCHMIDT, 1951. Nomlaki, p. 407; two forms.

HEWES, Th., 1947. P. 88, and fig. 9.

KNIFFEN, 1939. Pomo, pp. 363, 364, 376, 386.

KROEBER, 1925. P. 816, general statement. Pomo, pl. 33. Achomawi, p. 309. Shasta, p. 294.

LOEB, 1926. Pomo, p. 168.

McKERN, 1922. Patwin, p. 248.

MEACHAM, 1875. Klamath Lake, p. 282; "canoe-shaped" basketry trap baited with fish eggs.

NOMLAND, 1935. Sinkyone, p. 154; made of hazel. Mouth set downstream.

_____, 1938. Mattole, p. 113.

SAPIR and SPIER, 1943. Yana, p. 258.

SPIER, 1930. Klamath, pp. 149, 152; sporadic use of traps. Canoe-shaped (quoting Meacham). Cylindrical. Minnows scooped up in baskets.

VOEGELIN, 1942. Klamath, Modoc, Shasta, Wintun, Achomawi, Atsugewi, pp. 55, 173.

MAPS 27-31, 56

While woven basketry traps were far less important than nets, there were several different forms which were much used, particularly by tribes outside our core area. These forms vary widely, viz.:

1. The long, slender cylindrical type (map 27)
2. The invaginated type, with an inverted cone in its mouth (map 29)
3. The boxlike type (map 56)
4. The long, open-trough type (map 28)
5. The openwork burden basket, and other scooping traps (map 30)
6. The half-cylinder and "half-tamale shaped"
7. The plunge type (map 31)

CYLINDRICAL TRAPS

Driver (1939, p. 378), after first citing the long, narrow basketry fish trap illustrated by Kroeber in the Handbook (1925, pl. 33, a), states that this type of trap was used by the Chimariko, Wiyot, Kato, and Coast Yuki. Such a trap was placed with its mouth upstream. It was so narrow that a fish could not turn around in it, and the current was so strong that the fish could not back up and was, therefore, most effectively caught. The diameter given, which is stated as "6 ft." for the mouth of the Chimariko trap, seems to be an error in printing or in recording.

As we have noted in speaking of weirs, Curtis (1924a, p. 75) describes what he terms "a slender, conical basket, which was placed by the Wiyot in a riffle at the angle of diverging wings extending upstream to both banks."

Hewes (F.N., 1940) states that the Wiyot built, in the smaller tributary creeks, but not in the main rivers, small weirs, of the same construction as those used in the rivers, for small species of fish, particularly trout. In such a small weir a slender basket about three feet in length was set with its mouth pointing upstream. The fish were carried into the trap by the force of the current. The basket was so narrow that the fish could not turn around. They were removed by simply lifting the whole basket out and emptying it. No invaginated mouth was used in this trap.

Hewes (Th., 1947, fig. 9) also shows a Tolowa double weir, in the angle of which is placed a slender basketry trap. Driver (1939, p. 378) describes this same weir with its "openwork basketry trap."

This cylindrical trap is illustrated for the Pomo by Kroeber (1925, pl. 33, a), and two variant forms are shown by Barrett (1908b, pl. 27, figs. 2 and 4). Hewes (Th., 1947, figs. 38, 39) shows two types of the long, cylindrical trap for the Pomo. One of these has an invaginated mouth and a special opening at the rear end. This one he attributes to the Southwestern Pomo.

Among the Tolowa, Driver (1939, pp. 312, 378) records a special type of "openwork basketry trap" placed near shore at either end of a double weir. This basket is placed with its rear end out of the water in such a manner that the fish are actually stranded here.

INVAGINATED TRAPS

Hewes (F.N., 1940) mentions for the Mattole a basketry fish trap of the invaginated type. It is described as being 3 to 4 ft. long, 2 to 3 ft. wide and as having an opening [in the invaginated cone] 2 to 3 in. in diameter. It was placed, facing downstream, in an opening in a brush weir and was especially efficacious in catching trout. Traps of this invaginated type are found more commonly farther south. Mention has already been made of the Southwestern Pomo cylindrical trap with invaginated mouth illustrated by Hewes (Th., 1947, fig. 38). He also shows a much shorter Pomo trap of this type in his figure 40. Kroeber (1925, pl. 33, b) illustrates this same type, as does also Barrett (1908b, pl. 27, fig. 6).

Inasmuch as the invaginated eel pot of the Northwestern tribes was learned from Caucasians and there are no indubitable Northwestern occurrences of other invaginated basketry openings, the interesting question arises whether the use of invaginated basketry traps by the Pomo and neighboring tribes was aboriginal or was possibly learned from Spanish sources a half-century or so before the Americans reached the nuclear Northwestern tribes in 1850.

BOXLIKE TRAPS

Hewes (F.N., 1940) describes and illustrates, for the Hupa, a special type of dam or weir, called nolket, built at the foot of some rapids. It was a simple fence made by driving posts in a V-shaped line out to about the center of the stream. On these posts horizontal poles formed a fence, the base of which was made tight by the use of rocks and brush. Where the water was relatively shallow, fairly near the bank, a woven trap, rectangular in form and about 4 ft. wide by 8 to 9 ft. long was constructed. (See fig. 24.) The fishermen remained on shore beside their little fire for comfort. When they heard the splashing of water out in the stream, they knew that fish were approaching. They waded out and closed the trap, sometimes capturing as many as half-a-dozen salmon at one time.

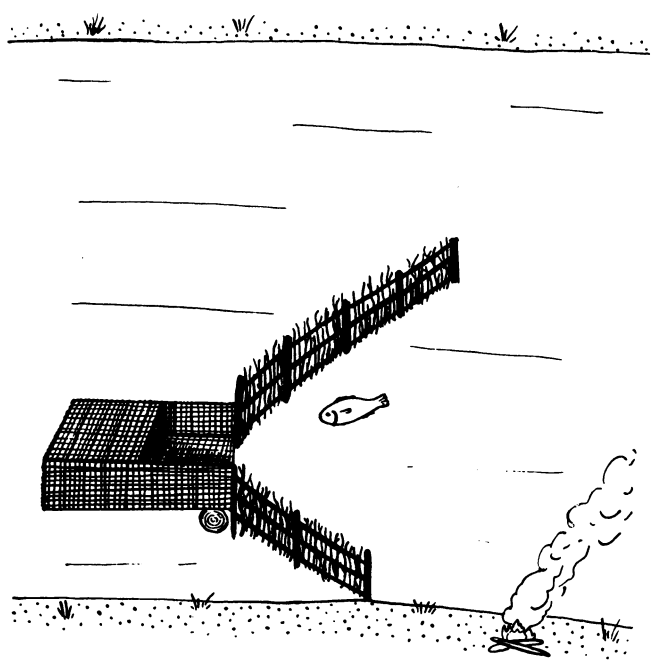

Fig. 24. Boxlike trap. Hupa. After Hewes (Th., 1947, fig. 43).

Hewes, in his field notes, shows this weir and trap as located on the west side of the river and opposite the mouth of Hostler Creek. A short distance up the river he shows one of the main Hupa weirs, the one at Takimiłding.

Again we hear of a similar type of boxlike trap where Hewes (F.N., 1940) states that, although the Karok used

no pens or other traps in connection with weirs, they had a kind of woven hazel trough trap, called pichimvaru or pisimvaru, which was about seven feet long and squarish in cross section. Its open end was staked firmly under some relatively small falls or in a riffle in a creek or river. It was most effective when the water was low, late in the season. The closed end of the trap, which extended downstream, was supported on a horizontal beam or on a rock and was actually out of water. At the open upper end a guide wing of brush and stones was built diagonally out toward each bank.

TROUGH-SHAPED TRAPS

According to Hewes (F.N., 1940), the Karok made a coarsely woven trough-shaped basketry trap for use in the creeks when the water was high in the winter.

This type of trap was made of split spruce poles each six or seven feet long and set several inches apart. The weaving was done with hazel withes. (Cf. fig. 25.) The wide end of this basketry trap was securely fastened. The small, pointed end was left out of the water and was not secured.

The wide spacing allowed smaller species, like trout and suckers, to pass through, but held all larger fish, such as salmon. It was left in the creek continuously during the run and was visited once a day for the removal of the catch. The name of this device, pisimvaru, refers to its bent-up sides. A similar device but with much closer spacing of its elements, was sometimes used for taking the smaller fish.

In speaking of Coast Yurok traps Hewes (F.N., 1940) says that, in making this trough-shaped type, they simply wove a rectangle of poles about six feet long by three and one-half to four feet wide, doubled over one end, and fastened it to make a tight joint. This arrangement naturally made a scoop of the opposite end. The trap was placed in the angle of a small weir on a riffle in a creek, with the open end upstream and higher than the closed end. A fish got up over the open end and found himself caught in the wedge of the closed lower end where he could not turn around. (See fig. 26.) Otters were also sometimes caught in this type of trap. For otter it was fitted with a cover to keep them from climbing out.

What Driver (1939, p. 379) calls a "pole trough," which he says was used by the Tolowa, Karok, and Sinkyone, was so placed, with its apex pointing downstream, that the fish were swept into it by the force of the current and there stranded. It was usually made of hazel shoots and is said to have been of openwork twining. It was truly trough-shaped and had no top, but its sides were high enough to prevent the fish from escaping as they flopped about. (See figs. 25 and 27.)

Curtis, evidently referring to a trap of this kind, (1924a, p. 16) in speaking of the Hupa states:

> Only one form of fish trap was used. This was a receptacle of poles and withes, about ten feet long and four feet wide, which was placed in a riffle below the weir, with the floor of the middle section raised slightly above the surface of the water.

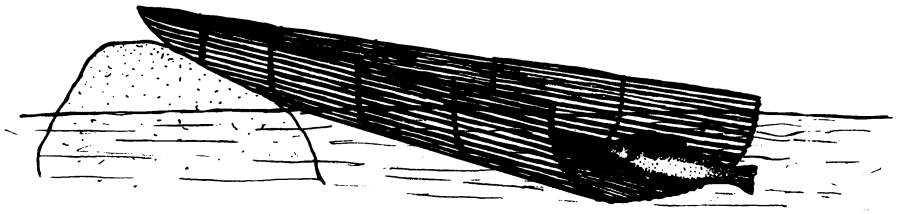

Fig. 25. Trough trap. Karok. After Hewes (F.N., 1940).

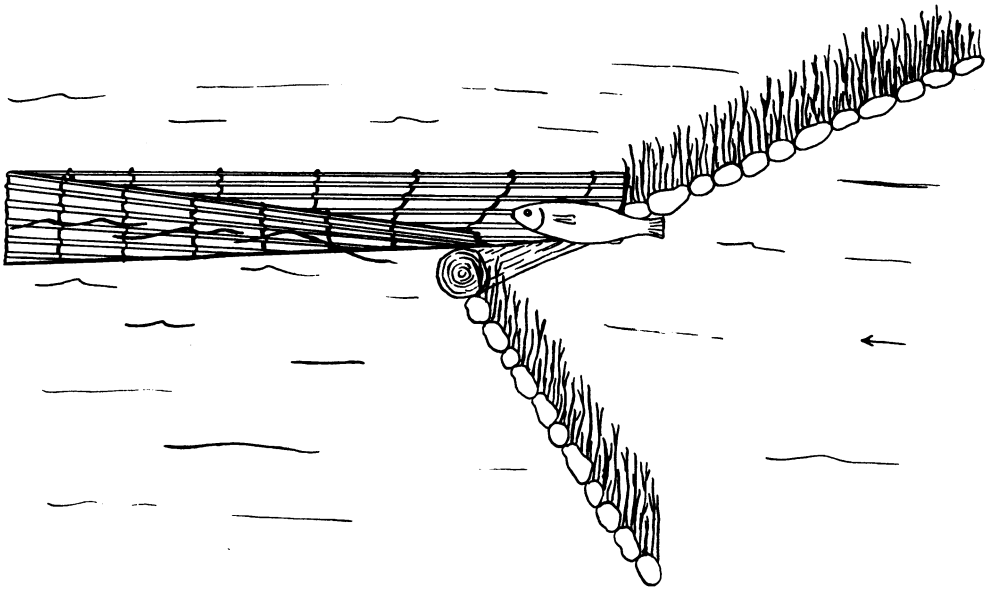

Fig. 26. Trough trap, with upstream end raised. Coastal Yurok. After Hewes (F.N., 1940).

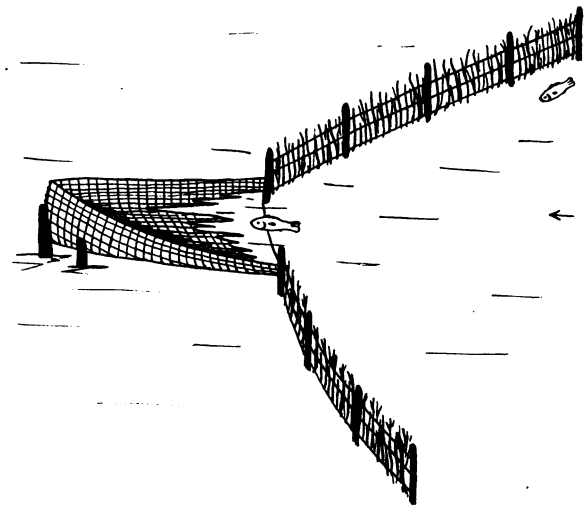

Fig. 27. Trough trap in weir. After Hewes (F.N., 1940).

> Salmon on striking the weir would turn back, and those that entered the trap quickly found themselves carried by the current and their own momentum into the lower end of the trap, whence they were unable to escape. This device was placed also at the downstream angle of the two converging lines of fence, one of which extended quite to the bank, while the other left a channel around the upper end. Salmon swimming through this passage were driven back into the triangular area between the two wings, and so down into the trap.

In the latter part of this statement Curtis seems to be referring rather to a double weir similar to the one which we have illustrated in our figure 8, which Hewes gives as a typically Tolowa device. Fish swimming downstream might be carried by the current, aided by the lateral wings, into it. The force of the water and the momentum of the fish tended to carry the victim up into the closed end of the basket where it was effectually stranded. Salmon, steelhead, trout, and other species were caught in this device.

When this trap was set up, a signal device was installed to show from a distance when a fish had been caught. This device might be a fish club or any ordinary stick which was so set that the flopping of the fish would jar it. Thus the observer could see conditions from a distance without going near the trap and running the risk of frightening fish from the vicinity.

This trap is shown in figure 28. The shade provided by the branches over the rear end of the trap serves to guard the fish from exposure to the sunlight before the fisherman has time to remove them. It is very similar to the Wiyot trap described by Curtis as being of conical form and as being covered with brush in a similar manner for the protection of the catch from the sun.

BASKETS FOR SCOOPING FISH

From Driver (1939, p. 379) we learn that, among the Yurok, an ordinary carrying basket was sometimes employed in catching crayfish. If the basket was raised suddenly, it was not unusual to catch one or more fish in it as well.

Hewes (F.N., 1940) states that among the Karok an openwork burden basket, commonly used for wood gathering, was sometimes used for catching smaller fish, like suckers. It was used in the winter season when the coolness of the weather made it possible. Suckers die too quickly in the heat of the summer season. He states, also, that among the Wiyot an ordinary openwork burden basket was sometimes employed in fishing. A man held it in the water under an overhanging bank and drove the fish into it by kicking his foot around under the overhang. In this way suckers, bullheads, and other species were caught. Even waterdogs (salamanders) were sometimes taken, but these were never eaten. The Tolowa, he says, used this burden basket to scoop up smelt in the breakers; also for catching trout in narrow streams at low water.

The Mattole dip such a basket at random in smaller streams when the water is low. This procedure is especially successful when used on a very dark night when the fish cannot see the basket. A dip may bring up trout or any of the other small species. The Nongatl, in addition to using the openwork burden basket as a dipping basket, placed it in the angle of the converging wings of a barrier of stones. A man was stationed at the basket

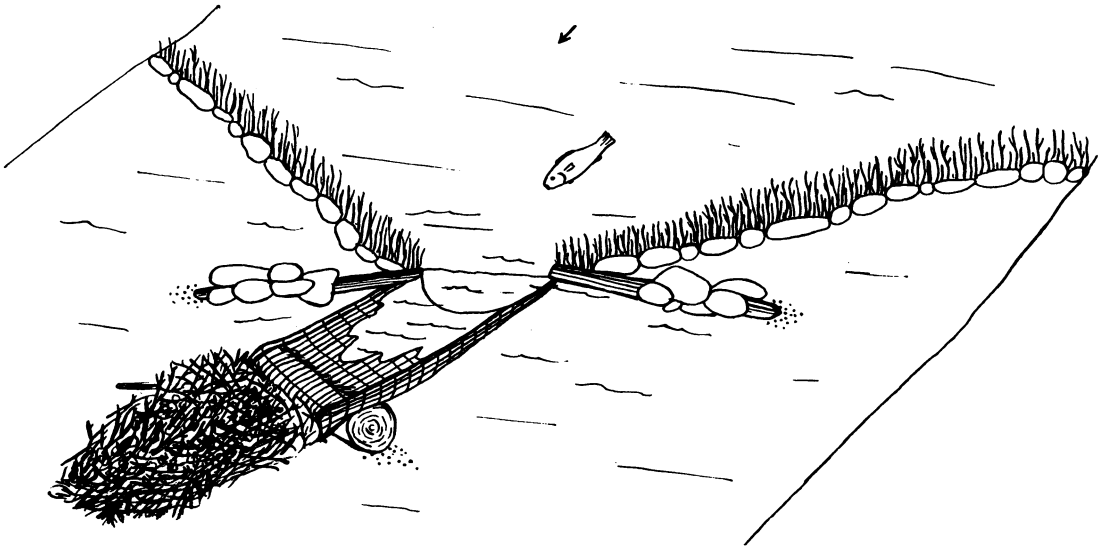

Fig. 28. Trough trap. Brush-covered. Hupa. After Curtis.

while others drove the fish toward it. Whenever fish entered the basket, he raised it and threw the catch out on the bank.

HALF-CYLINDER AND HALF-TAMALE-SHAPED TRAPS

Driver (1939, pp. 313, 379) lists a half-cylinder type of trap as found among the Yurok, Karok, Hupa, Chilula, and Nongatl. Hewes (F.N., 1940) mentions this type of trap as used by several of the tribes of this region. Driver (1939, p. 379) mentions Karok use of a trap which is "pointed at both ends, half-tamale shape."

EEL POTS AND ROCK PILES

BANCROFT, 1883. Yurok, p. 339.

BARNETT, 1937. Tolowa, Chetco, p. 164.

DRIVER, 1939. Yurok, Wiyot, Van Duzen, Mattole, Sinkyone, pp. 313, 378.

DRUCKER, 1937. Tolowa, p. 233.

GIBBS, 1860. Sinkyone, p. 125.

HEWES, Th., 1947. Bear River, Nongatl, p. 78; lampreys pierced with bone awl.

KROEBER, 1925. Yurok, p. 85; used on lower part of river.

MAPS 32, 33

The lamprey was greatly esteemed as a food in Northwestern California, particularly because of its fatness. As elsewhere stated, lampreys were usually taken by truly aboriginal methods: by small-meshed nets and by gaffs, or in rock piles. Also they were plucked off the faces of falls to which they had attached themselves by their suctorial mouths when they were ascending streams.

In more modern times, however, eel pots have been used. These basketry traps are woven of undressed withes of hazel or willow, always in plain-twined technique, and are fairly large, as shown by the accompanying tabulation which gives dimensions of four of them. The last specimen listed is in the State Indian Museum at Sacramento. In the tabulation all measurements are in centimeters; the mesh of weaving is about 1 by 4 cm.

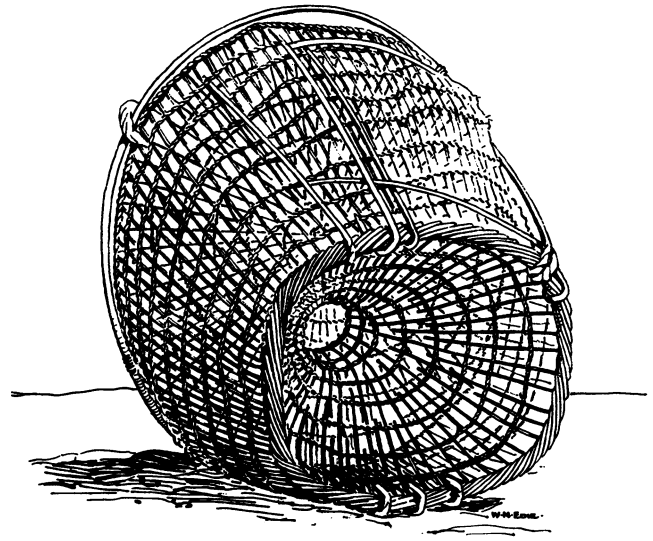

Fig. 29. Eel pot. Drawn from specimen 11865.

Spec. No.	Height	Depth	Depth of funnel	Diam. of funnel mouth
40043	54	48	43	6
11865	45	45	32	5
86093	58	51	43	11
hcr-10-9-SP	41	43	30	10

Figure 29 shows a typical specimen of one of these openwork basketry "pots" or traps. Such a trap is provided on one side with several reinforcing sticks which rest on the gravelly river bottom and protect the trap from wear. In setting this type of trap, the fisherman baits it, places it on its side with the funnel downstream, and weights it down with several stones. Then a grapevine anchor line (sometimes two) is run several feet upstream to a stake or to a cross-tree (see fig. 30) to keep the trap securely in place. The fisherman always chooses a shallow spot in the river where the current is strong, but not too swift, and where the bottom is gravelly, the sort of place favored by the lampreys for spawning. The lamprey builds a kind of nest by carrying pebbles with its suctorial mouth and dropping them where its eggs have been deposited until it has built up a small gravel mound. The lamprey, particularly the male, tends to travel chiefly at night and to spend its days attached to or concealed among rocks on the river bottom. The eel pot is, therefore, an ideal place for the lamprey to seek shelter.

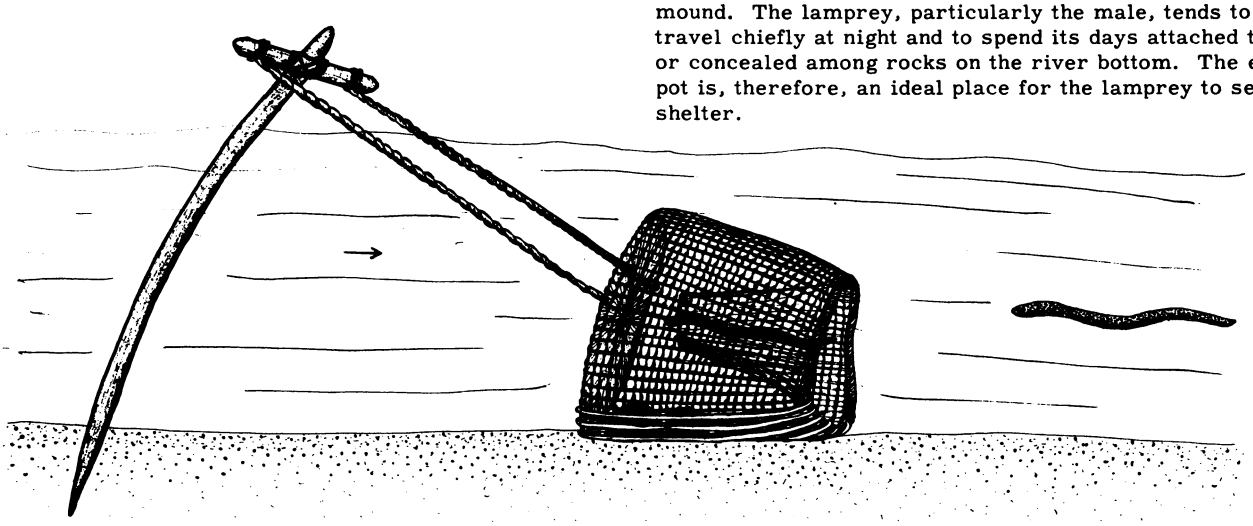

Fig. 30. Eel pot anchored in stream.

It is this tendency of the lamprey to hide among rocks that makes it an easy prey to the fisherman's gaff. In fact, in some places in the estuaries along the coast, stones were stacked in small piles[45] purposely to provide hiding places for the lampreys. Into the crevices in these rock piles lampreys crawl to hide during the bright hours of the day, resuming their journey with the coming of night. In such places lampreys are very easily taken with a gaff or with a sharp-pointed awl. In fact, a special type of gaff was made, provided with a piercing device as well as a hook. Figure 31 shows both types of these gaffs. Hewes (Th., 1947, p. 78) specifically notes these rock piles among the Nongatl on Van Duzen Creek, and also on Bear River. One of Hewes's Nongatl informants mentioned another method of taking lampreys with artificially arranged rock work. Instead of higher rock piles, they made a windrow of stones about a foot high which extended almost the entire width of the stream. Here the lampreys attached themselves by their suctorial mouths and were easily picked off by hand in the early morning hours. The informant stated that this was much easier than it was to gaff them during the night by torchlight.

Driver (1939, p. 378), in his notes on the eel pot, cites Kroeber's Handbook (1925, pl. 33, b) in such a way that it may be assumed that the Handbook plate illustrates this device, despite the fact that the plate is titled "Pomo Fish Traps," and that this figure, b, is titled "funnel pot, for small fish." Actually this trap was used by the Pomo for very small species of fish only and was never employed for lamprey eels, which the Pomo do not use for any purpose ordinarily. The true eel pot is of quite a different shape and construction (see fig. 29). It is definitely known to be a device adopted by the few tribes which used it only after contact with the whites. Driver makes this fact very clear for the Hupa and the Wiyot, but it is equally true also for the other tribes of this region. A Yurok told Kroeber that the making and use of lamprey pots were learned from the whites. Another Yurok told Hewes the following story concerning the origin of the eel pot among his people.

> When the first whites came to Humboldt Bay they had trouble with the Wiyot. Finally they moved them up to Smith River and guarded them there. The Tolowa felt sorry for these Wiyot and told them to go up to Big Flat and sent a guide with them. Their food became exhausted and some went over to Hupa, others to Weitspus, where they settled. The women wove eel pots and the men put them in the river. That is the way the Yurok learned about eel pots. They took the Wiyot name for them also, lúmûn.

Gifford (F.N., 1939-42) states that among the Karok lampreys were taken in several ways. A small-meshed dip net, the same kind used for taking smaller species of fish when the water is high, is set in an advantageous spot. With this net is used, apparently as a charm, a plant, called kuswexas (kuswe, "poison oak;" xas, "rotten"), which grows high up in the mountains. The statement was made that some of this plant "was put on the bottom of the net," but that this was done without reciting any formula.

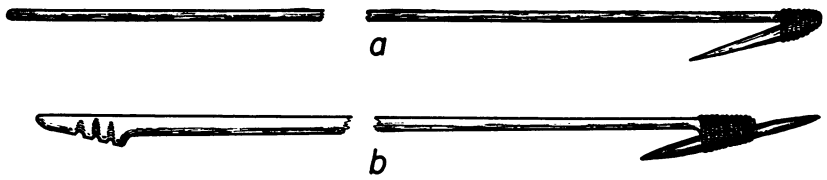

Fig. 31. Gaffs. a. Gaff of ordinary type.
b. Gaff with hook and piercing point.

As above mentioned, lampreys have a tendency to fasten themselves, by means of their suctorial mouths, onto rocks in the stream. At Ike's Fall, for example, many of them will fasten themselves in this way and hang down the faces of the rocks. A net was placed below them and they were then frightened so that they dropped off into the net. Again, a net was set in a narrow place between rocks. Then someone went upstream and put his hand into the water so as to cause the lampreys to release their hold on the rocks. The swift current immediately carried them down into the net.

Many lampreys are even now caught by hand, the fisherman either wearing a glove or carrying in his hand a rag or something else to prevent the lamprey from slipping through his grasp. Sometimes the bare hands alone are used. The fisherman usually has with him a net bag into which the lampreys are thrust at once.

Lampreys were also taken by the Karok with a gaff, anciently an acute-angled point of bone or antler attached to a wooden handle three feet or more in length. The modern gaff is usually a white man's fishhook fastened to a handle.

Gifford's informants stated positively that eel pots were not used by the Karok, though they were employed by the Hupa and even more extensively by the Yurok. Though it is quite well established that the eel pot is a modern device, actually unknown in precontact days, we find among the Karok a tale accounting for the fact that it is not used by them because its use was tabooed by three ixkareya girls (myth-period immortals) whose fish dam was spoiled by Coyote. Two of these girls are now two white rocks on the mountain above Ashanamkarak. The third sits bent over at the north edge of the Klamath lagoon entrance at Requa. The use of the eel pot by the Karok would cause famine: "It would make everything [growing become] scarce."

Informants stated that among the Karok there was no "eel medicine ceremony," but that among the Hupa the first eels caught in the season were ceremonially cooked at a certain spot across the Trinity from Takimilding. After this ceremony and feast, people were free to catch and eat lampreys at will. Goddard (1903, p. 79) says that among the Hupa there was a "medicine for the first eel" and that "the observances are nearly the same as for

[45]This same device for taking fish is found elsewhere; for example, rock piles are made by the Samoans, according to Buck (1930, pp. 418, 419), for the special purpose of providing sanctuary for fish in the lagoons. As a shoal of fish comes in from the sea it is driven by the fishermen in their canoes toward these rock piles. Then, by simply groping or by the careful removal of the stones as is done here in Northwestern California for lampreys, the fish are captured either in basketry traps, in nets, or by spearing.

salmon." In fact, Goddard (1904, pp. 252-264) gives in full the text and translation for this eel medicine. Kroeber and Gifford (1949, p. 61) also discuss the ceremony.

One Bear River informant gave Hewes some detailed information concerning the rock piles used for catching lampreys. Lampreys began running in the early spring and continued up into July. April and May were the best months for them. Neither torchlight nor gaff was here used in taking lampreys, though they were used on Eel River.

Bear River was a swift stream, though rarely more than knee deep. At the upper end of a riffle one or more rock piles were constructed. Such a rock pile might be as much as five feet in diameter and thirty inches in height, and usually came to within a couple of inches of the surface of the water. In building such a rock pile the builder always sang special good luck songs; and when the lamprey run was finished the rock piles were pulled apart. The lampreys would crawl into the crevices of such a rock pile during the night. The following morning the rocks were carefully removed so as not to alarm the lampreys. Not a word was spoken: all communication was by gestures. Rocks were all moved under water and great care was taken to see that no rock slipped out of the hands. As a lamprey's tail came into view it was pierced with a sharp bone awl four or five inches in length, and the lamprey was pulled out of the crevice. As many as eight or ten lampreys might be taken from a single pile.

Lampreys were always eaten fresh by the Bear River people, never dried. If too great a supply was at hand, the surplus was given away. The reason assigned for not drying lampreys was that to do so would cause them to cease coming. It seems doubtful whether so greasy a meat as the lamprey's would dry satisfactorily without smoking. As a matter of fact the Coast Yurok, Chilula, and Tolowa dried lampreys by first exposing them to the sun, then hanging them over a fire, as told below under "Preservation" in chapter VIII.

The eel pot was not used on Bear River, though it was on the Mattole, a larger stream.

The people of Bear River carefully distinguish between the "day eels" and the "night eels," the latter being the males which start their daily upriver journeys just after sundown and crawl into the rock piles during the daytime. They are fat and tasty. The "day eels," on the other hand, are the females which burrow and build their nests and are rank and unpalatable. This female lamprey is called tonáibetcawho ("eel's grandmother").

A Nongatl from the Van Duzen River told the following about lampreys. Foot-high piles of rock were made in a line across the river. The lampreys attached themselves by their mouths to these rocks and could be pulled off with the "gloved" hand of the fisherman, not pinned down by piercing the tail with an awl as on Bear River. In old times the hand was "gloved" by grasping a piece of buckskin in the hand.

A large natural rock two miles downstream from Bridgeville was used similarly. Here, where the shallow water ran over the rock, the lampreys would attach themselves. If a net was placed below the rock, they could be readily eased off the rock and washed down into the net. Sometimes the net was mounted in the regular way on an A-frame and sometimes it was held open by some makeshift sticks. This rock belonged to the people who lived near there and permission must be asked by anyone else who desired to use it.

CHAPTER VI

FISH HARPOONS, SPEARS, AND OTHER DEVICES AND METHODS

HARPOONS AND SPEARS

AGINSKY, 1943. N, Pl. Miwok, p. 399; toggle harpoon, single-pointed spear.

BANCROFT, 1883. Yurok, Vol. 1, p. 338.

BARNETT, 1937. Tolowa, Chetco, pp. 164, 195; single-toggle and double-toggle, also spear with single fixed point.

BARRETT, 1910. Klamath, p. 251, and pl. 22, fig. 4; barbless, toggle harpoon. Multipointed spear. Double-barbed fixed-pointed spear. Single-pointed retriever.

_____, 1952. Pomo, p. 153, and pl. 15. Pp. 187, 188; seal harpoon.

BENNYHOFF, 1950. Classification of California fish spears and harpoons.

BERREMAN, 1944. P. 25 and pl. V.

CHARD, 1953. Wappo, pp. 244, 245.

CURTIS, 1924a. Wiyot, p. 75. Shasta, p. 113. Klamath, p. 169; double-pointed toggle harpoon. Multipointed spear.

_____, 1924b. Wailaki, Pomo, Wintun, Patwin, Maidu, pp. 22, 63, 85-88, 109.

DIXON, 1905. Maidu, p. 196, and fig. 49.

DRIVER, 1936. Wappo, salmon, etc., harpooned, but no details of harpoon given; p. 184.

_____, 1939. Tolowa, Chimariko, Karok, Yurok, Wiyot, Hupa, Van Duzen, Mattole, Sinkyone, Kato, Coast Yuki, pp. 313, 379; harpoon with toggle points. Wiyot, p. 313; multipointed spear. Also spear with single fixed point used by Wiyot and Mattole.

DRIVER and MASSEY, 1957. Pp. 201, 203, 208, maps 27, 28; general statement.

DRUCKER, 1937. Tolowa, pp. 233, 237, and fig. 1; harpooned salmon at night from canoe, with torches projecting on sticks out over bow.

DU BOIS, 1935. Wintu, pp. 16, 123; harpooning platform; salmon house fully described; salmon harpoon illustrated, p. 128.

ESSENE, 1942. N Pomo, Kato, Lassik, Yuki, p. 6; with detachable toggle points. N Pomo, Kato, Lassik, spearing booth.

FOSTER, 1944. Yuki, pp. 163, 171; double-pointed toggle harpoon used from platform by day, or by night with fire for light.

GARTH, 1953. Atsugewi, p. 136; double-pointed toggle harpoon. Spearing from canoe by torch light.

GIFFORD, 1939. Coast Yuki, pp. 321, 322; double-pointed toggle harpoon.

GIFFORD and KROEBER, 1937, Pomo (N, C, SW, S, E, SE, NE), Hill Patwin, Lake Miwok, pp. 133, 134, 173; single-pointed toggle harpoon. Pomo (E); double-pointed, toggle harpoon. Hill Patwin, NE Pomo, Hill Wintun; fixed-pointed spear. Pomo, p. 172; scaffold; white stones. Pomo, Lake Miwok, Hill Patwin, Hill Wintun, pp. 133, 172.

GODDARD, 1903. Hupa, pl. 13, fig. 3.

_____, 1914. Chilula, p. 270; salmon taken with harpoon.

GOLDSCHMIDT, 1951. Nomlaki, p. 407; bone-pointed spear (not harpoon). Harpoon also used by river people.

HEWES, 1942. Double-pointed harpoon illustrated; fig. 34, a, p. 106.

_____, Th., 1947. Coast Yuki, Yuki, p. 75; both single- and double-pointed harpoons. Yana, Wintun, Wailaki; double-pointed harpoons. Sinkyone, Mattole, Bear River, p. 77; single-pointed toggle harpoon used by skillful fishermen. Double-pronged harpoon used only by old men and boys. Wiyot, p. 80; multipointed spear for flounders on Humboldt Bay and in Eel River estuary. Tolowa, p. 88.

KROEBER, 1925. Pp. 815, 816; general statement concerning harpoons in California. Yurok, Coast Yuki, pp. 85, 86, 213; double-pronged. Achomawi, p. 309. Klamath, Modoc, pp. 324, 326; barbless, double-pointed, toggle harpoon. Modoc; multipointed spear, with barbed lance used as retriever. Wintun, p. 359; double-pronged toggle harpoon, from scaffold over river. Maidu, p. 410.

_____, 1929. Nisenan, pp. 261, 287. Toggle harpoon.

_____, 1932. River Patwin, pp. 278, 295; pike (but not salmon) taken with harpoon. Hill Patwin use harpoon.

KNIFFEN, 1939. Pomo; p. 386.

LOEB, 1926. Pomo, pp. 168, 185.

LOUD, 1918. P. 381; describes and illustrates harpoon heads of antler from archaeological sites on Humboldt Bay.

MASON, 1902. Pp. 222-224; general statements concerning harpoons of California.

NOMLAND, 1935. Sinkyone, pp. 153, 154; salmon harpooned from canoes or from shore. Double-toggle (?) with antler barbs. Line attached to wrist. Women and children could fish.

ROSTLUND, 1952. Pp. 105-112, 177, and map 35.

SAPIR and SPIER, 1943. Yana, p. 252.

SCHENCK and GIFFORD, 1952. Karok, p. 385; foreshafts of serviceberry wood.

SPIER, 1930. Klamath, pp. 149, 153; double-toggle harpoon. Also single-barbed fixed-pointed spear, and multipronged spear used with retriever. Ice fishing with harpoon.

VOEGELIN, 1942. Klamath, Shasta, Wintun, Maidu, pp. 56, 174; toggle harpoons, both single- and double-pointed. Multipointed spear used by Klamath, Modoc, Achomawi, Atsugewi.

WATERMAN, 1918. Yana, pls. 5-9; pictures of Ishi making and using double-pointed toggle harpoon.

For harpoons and spears used in taking sea lions, etc., see "Sea Mammals."

MAPS 34-38

The invention of the harpoon, consisting of a detachable head tethered to the shaft by a stout line, was a great step forward from the presumably earliest simple thrusting spears, but one which came, historically, very early. Barbed harpoon heads occur among Upper Palaeolithic remains in Europe.

For use on land the spear was in most regions preferred to the harpoon, probably because retention of game by a line was difficult or impracticable on land, whereas the harpoon thrust or thrown from shore or boat into fish, seal, or cetacean, rarely fouls its line in water and enables the hunter to retrieve his prey.

In our own area, Northwest California, the true spear is so little used in fishing that it becomes quite secondary to the harpoon. In fact, about the only spears employed are the sharpened pole used for the flat fishes on tidewater flats and the multipronged spear used for certain small species, also usually in the same waters. The harpoon, with its toggle head or heads, was used for larger fishes.

We treat separately the harpoons used for salmon and sturgeon in fresh water from the heavier ones used for sea lions in salt water, the latter being dealt with in chapter XI on "Sea Mammals."

The essential features of the fish harpoons in this whole region are so similar that we may simplify our treatment of the subject by first outlining these features, and then calling attention to variations in construction and use from tribe to tribe.

Fish harpoons, as the name indicates, are all fitted with detachable points or heads secured by toggle lines. They differ one from another only in the number and placement of the foreshafts on which these toggle heads are socketed. They fall into the following classes, as given below. The illustrations in figures 32-35 are after Hewes (F.N. 1940).

I. Single-pointed harpoons.
   A. Point socketed directly onto the end of the main shaft. (See fig. 32.) Used by the Karok, Tolowa, Chetco, Wiyot, Mattole, Sinkyone, Bear River, Nongatl, Coast Yuki, Yuki.
   B. Point socketed onto the end of a foreshaft of harder wood bound and pitched onto the end of the main shaft in such a manner as to align with it. A very rare type.
   C. Point socketed onto the end of a foreshaft which sets at a definite angle to the main shaft. This angle is made by properly beveling the rear end of the foreshaft and binding it securely to the main shaft. (See fig. 33.) Used by Coast Yurok, Karok, Chilula, Bear River.

II. Double-pronged harpoons.
   A. One prong formed by the end of the main shaft; the other by binding the end of a beveled foreshaft onto the main shaft at the proper angle (maintained by a wooden block bound into the angle).
      1. Prongs of equal length. (See fig. 34.) Used by Yurok, Hupa, Chilula.
      2. Prongs of unequal length. Used by Karok, Chilula.

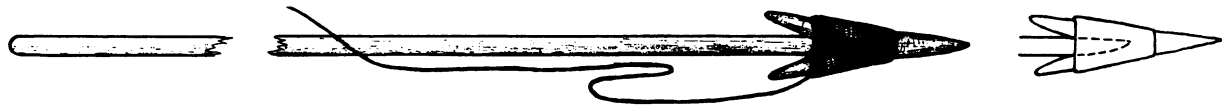

Fig. 32. Single-toggle harpoon on end of shaft. Class I A.

Fig. 33. Single-toggle harpoon, angled foreshaft. Class I C.

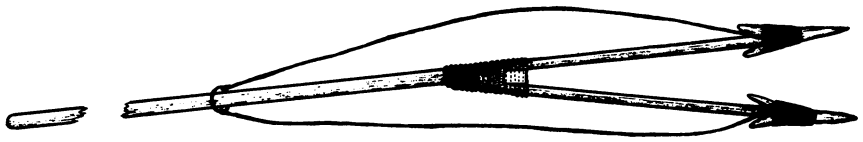

Fig. 34. Double-pointed toggle harpoon. One point on shaft. The other on angled foreshaft. Class II A 1.

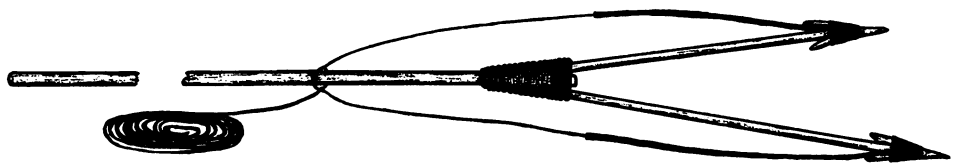

Fig. 35. Double-pointed toggle harpoon. Both foreshafts angled; one longer than the other. Rawhide leaders, cord toggle line. Blackened shaft. Class II B 2.

B. Both prongs made by binding beveled foreshafts at proper angles at the double-beveled end of the main shaft.
   1. Prongs of equal length. Used by Yurok, Karok, Wiyot, Mattole, Coast Yuki, Yuki, Shasta, Wintun, Wailaki, Yana, Klamath Lake.
   2. Prongs of unequal length. (See fig. 35.) Used by Yurok, Coast Yurok, Sinkyone, Shasta.

The following general observations may be made. The length of the main shaft is variously given by different informants and observers as from six to twenty feet, and we may safely conclude that these considerable variations were due to local conditions and perhaps somewhat to the whim of the maker, not to mention to faulty memories or to a native informant's vagueness in estimating in American units of measurement.

While statements on blackening vary, it seems certain that some of the forward end of the harpoon was usually scorched in order to render it less visible to the fish. Some informants stated that blackening extended throughout the entire length.

The lengths of the foreshafts are variously given, from a foot or so to as much as three feet. Here again such variations are expectable.

Since harpoons were intended for use in the water, all wrappings of the harpoon heads and of the joinings of foreshafts with shafts were thoroughly pitched, the pitch being rubbed smooth with a heated pebble.

The toggle line which held the fish after it was speared was sometimes only a heavy cord of iris fiber, but frequently there was a "leader" of buckskin, of tanned elkskin, or of rawhide. Some informants mentioned the hide of the seal as especially good. This leader was said to be used because the teeth of the salmon were less likely to cut it than iris cord.

CORE AREA

Among the Yurok, the double-pointed harpoon was much the more common. The single-pointed was perhaps preferred in small streams or low water. However, a single-pointed one was noted by Kroeber in 1902 at the Klamath mouth: its main shaft measured twenty and a half feet in length. The detachable socketed head is called peskó and was said to have been aboriginally made of a point of deer-leg bone and barbs of deer antler, the assembly, including the line, being thoroughly pitched.

Our plate 12, a-f, shows several of these points, all double-barbed. All except those shown in e and f are so modern that the point of each is made of iron. These two have truly aboriginal points of bone and their barbs are of wood (see pl. 19, a, b). In every other specimen shown on plate 12 the barbs or "ears" are made of bone (see pl. 19, c, d). Each barb is separate and, when a point is assembled, its two barbs are securely bound with stout fine cord to the base of the point. At the same time one end of the toggle line is bound to the rear of the side of this assembly, at a point immediately in front of the barbs. This toggle line, in all specimens but two, consists of two parts, a stout "leader" (usually of rawhide) and the remainder of heavy cord. (See pl. 12, c, d, f; also Goddard, 1903, pl. 13, figs. 2, 4.) The opposite end of the toggle line is secured to the shaft of the harpoon. The cord wrapping of the point and the attached end of the leader are heavily pitched to unify and waterproof all these parts.

When this harpoon, whether double- or single-pointed, is thrust into a fish, the struggles of the fish immediately pull the toggle points off the wood foreshaft prongs of the harpoon. As these points come off they are turned somewhat sidewise by the pull of the toggle line. Furthermore, the toggle lines provide "play" for the fish and guard against sudden jerks which might tear the points out of the flesh. The toggle lines may apparently be of any length but those shown in our plate 12, a-e, range from 62 to 106 cm. All are full length lines. In these harpoon heads each toggle line is separate and was apparently fastened to the pole separately.

One informant, however, described a different method of tying on the toggles. He said that the leader might be of either buckskin or of seal-hide and that it was usually about twenty inches in length. These two toggles were attached to a single toggle line of iris fiber about six feet in length, thus giving the speared fish ample play. These conditions make it practically impossible for the fish to free itself. It soon becomes exhausted and is easily landed and dispatched.

Goddard (1903, pl. 13, fig. 3) shows the forward end of a double-pointed toggle harpoon pole.

In a myth collected by Kroeber in 1902 among the Karok (Kroeber, G3a), we learn that Chukchuk, Fish Hawk (Osprey), made the salmon harpoon for people who owned no "fishing places." This reflects the fact that owned fishing places operate with large nets on frames held from scaffolds erected where there is a favorable

eddy or counter current in water deep enough so the fish are not seen but are felt in the net. This method is the most productive known to the Indians of our area for salmon--which fact is precisely why such favorable spots were jealously claimed and owned. But spearing can ordinarily be effective only where fish are visible, and the harpoon is therefore used in shallow water, especially at riffles. Such spots are numerous and open and they often change with the stage of water in the stream. They therefore lend themselves less readily to private claim, besides, of course, being less desirable on account of their less concentrated productivity. So the harpoon came to be associated with public and open or unrestricted salmon fishing.

Data collected by Kroeber in 1902 show that the Yurok salmon harpoon, used at the mouth of the Klamath, usually had two toggle points, though the single-toggle harpoon was also used.

The double-pointed harpoon took two major forms. In one of these, type II A, one foreshaft (ni´me-w), was bound onto the shaft, which itself served in lieu of a second foreshaft and also carried a toggle point. (See fig. 34.)

The second double-pointed form, type II B, beveled both sides of the shaft end and one side of the rear end of each foreshaft. (See fig. 35.)

Some of Hewes's informants pointed out that with double points the fisherman was more likely to pierce the salmon with at least one: the single-pointed weapon required greater skill.

One Yurok said that the best harpoon in the Klamath was double-pronged, with one foreshaft more nearly in line with the main shaft and about two inches longer than the other. The longer prong was held uppermost; this was done so as to insure that it would pierce the fish before the other struck bottom.

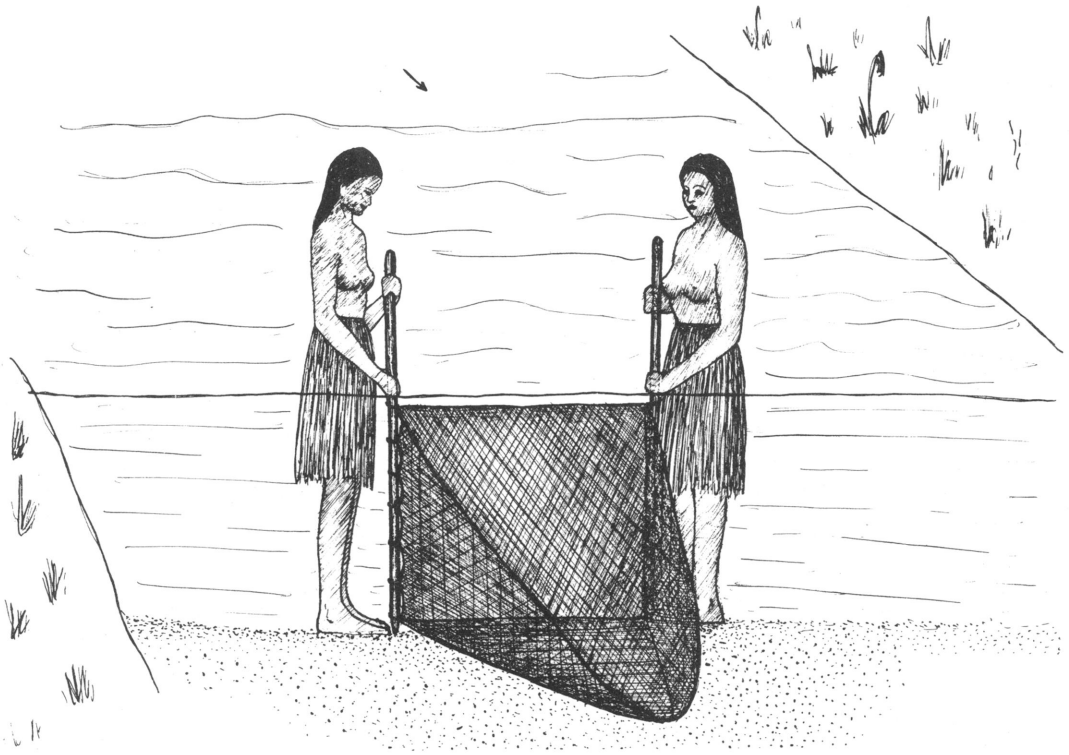

Fig. 36. Bag net temporarily mounted on two sticks. After Hewes (F.N., 1940).

Hewes (F.N., 1940) states that the Yurok employed both single- and double-pointed harpoons, but that the double-pointed harpoon prevailed. However, one informant said summarily that at Trinidad the single-pointed harpoon "only" was employed; which statement can probably be amended to "prevailed."

The simplest type of single-pointed toggle harpoon is the one in which the point is socketed directly onto the end of the main shaft, type I A, above, as in figure 32.

This type, Hewes says, was used by the Bear River, Nongatl, Karok, Tolowa, and Chetco; in conformity with which is the fact that Kroeber does not recall having seen it among the Yurok.

The end of the shaft of the single-pointed harpoon was, however, sometimes beveled along with the foreshaft so that the latter stood off at a desired angle, as in type I C, above. (See fig. 33.)

Hewes reports a Yurok combination method: taking a net along with the harpoon. A plunge net (tregépa) was untied from its frame and set in a small stream with a couple of women or men to tend it. Such a net is called kergerpr. (See fig. 36.)

The spearmen poked in under banks, among rocks and roots, to scare out silverside salmon (tcegun) or steelhead (tskwoł), which usually ran downstream, the spearman calling "pudlaiya!" ("going downstream!") to the net watchers, who quickly lifted the net. Sometimes more fish were caught in the net than by the spearmen.

Yurok Robert Spott told Hewes that his grandfather had said that in holes[46] too deep to scare fish out of by stones or poles, a diver would go down and fasten a loop

[46]The informant spoke specifically of a deep hole in Hunter's Creek, at a point about 2-1/2 mi. above Weber's ranch.

to the tail of a salmon whose head was among rocks or tree roots, or would fasten separate lines to two or three fish. People on shore hauled them out. The resisting fish would frighten others downstream into the net. This method was used in conjunction with harpooning.

Yurok toggle harpoon heads, collected by Kroeber and now in the Museum of Anthropology, are shown in plate 12, a-f. Table 3 gives catalogue data on these, as well as on two Hupa points (994A and 994B) collected by Philip Mills Jones. All these specimens were collected between 1901 and 1906.

TABLE 3

Toggle Harpoon Heads

(Measurements in mm.)

Spec. No.	Toggle Line				Heads				Total Length (head and line)
	Leader		Cord		Head Points		Barbs		
	Material	Length	Material	Length	Material	Length	Material	Length	
1988	...	...	Iris	990	Iron	55	Bone	46	1,006
1947	Rawhide	370	Iris	590	Iron	55	Bone	50	1,005
1641A	Elk	440	Iris	600	Iron	60	Bone	55	1,013
1946	Rawhide	200	Iris	700	Iron	56	Bone	50	965
9302	...	...	Iris	540	Bone	40	Wood	68	620
9357a, b	Rawhide	400	...	...	Bone	76	Wood	78	ca. 500
994A	Rawhide	280	Iris	600	Bone	40	Bone	56	950
994B	Rawhide	330	Iris	540	Bone	40	Bone	50	930

Coastal Yurok told Hewes (F.N., 1940) that, at low tide, fish caught in pools or shallow water, or even stranded in the mud, were easily speared. They added that the double-pointed harpoon was used in tidewater where the spearing was difficult; upstream the single-pointed prevailed. [Kroeber doubts this as a rule. He remembers both seeing and hearing of the harpoon as standardly two-pronged among the Yurok.]

It will be seen from table 3 that the four toggle harpoon heads with bone points and wooden or bone barbs have barbs longer than the points; the four with iron points and bone barbs have points longer than the barbs.

Of the eight lines two have no leader and one has no cord. The lines may be grouped as follows: six lines run from 870 to 1,040 mm., averaging 940 mm.; one has only an iris line 540 mm. long. This last gives us an extremely short ensemble and toggle-line length 400 mm. shorter than the average of the other six, which can properly be considered as normal for this region. Specimen 9357a, b is a pair of incomplete harpoon heads which have leaders 400 mm. long, but no lines.

A Coastal Yurok Rekwoi informant told Hewes that sturgeon were harpooned from canoes in shallow places in the lower Klamath, the harpoon shaft (maa´) being of fir and about fifteen feet long. The two toggle heads were on long lines ("twelve feet") or iris-fiber string, or of string with a buckskin leader. Hewes's illustration (fig. 35) shows two leaders joining perhaps three feet up on the pole. Here a slip knot fastens the single cord to the pole and on beyond is the remainder of the line. As soon as the sturgeon was harpooned the fisherman laid the pole down in the boat and played the fish on the line until it was close enough to be stunned with a club. The sturgeon were "speared in the side, below the bone" (below the horny dorsal plates).

Hewes (F.N., 1940) records for the Coastal Yurok that flounders (łpergerp) were caught in the gill net, speared with the regular toggle harpoon, and even impaled on a sharp pointed "ironwood" pole. This latter instrument was used on these flat fish as they congregated on the sand or mud of lagoons and estuaries where the water was brackish.

Other tribes along the immediate coast used similar methods.

According to Gifford (F.N., 1939-1942) the Karok harpoon was usually of the double-pointed, toggle variety, although the single-pointed harpoon was, on rare occasions, used in smaller creeks, especially for steelhead. Neither a single, fixed-point spear nor a multipointed spear was employed by the Karok.

The shaft of the double-pointed harpoon was made of fir, and the two foreshafts, usually of even length, of western Service Berry (Amelanchier alnifolia), afishiip (Schenck and Gifford, 1952, p. 385, no. 123). This close-grained wood was considered especially good for holding the points of deer bone. The barbs were fastened to the points by a wrapping of iris string pitched with fir gum[47] smoothed down with a hot stone. This type of harpoon was formerly used for salmon of any kind when the water was low in the streams. Later it was particularly used for Chinook or "black" salmon.

Hewes's (F.N., 1940) Karok told him that they used both double-pointed and single-pointed harpoons. The single-pointed harpoon had no foreshaft, its barbed head being socketed directly onto the shaft. (See fig. 32.) The double-pointed harpoon foreshaft forked because of the beveling where the points were bound on.

Toggle heads might be thrust completely through the salmon, in which case the line was usually untied from the shaft and pulled out through the body of the fish.

The Karok analyzed their double-pointed harpoon thus:

1. The main shaft (itakánowo or otokánwoáa'up), "ten to twelve feet" long, with foreshafts scorched to make them less visible, and the scorching sometimes carried part or all the way up the length of the shaft.

2. The two socketed heads (sakan), the point being of bone, the barbs or "ears" of woáa'up hardwood or bone or antler.

3. The leader (aan) of iris fiber string--not of buckskin.

Informants affirmed that formerly harpoons were not often used for taking salmon. With fish weirs across the river, salmon could be taken with the dip net much more

[47]Schenck and Gifford (1952, p. 385, no. 132) state that this wood is also used as the foreshaft for the arrow, but the sinew binding is then smeared with the gum of Prunus demissa.

easily. The harpoon was used for taking steelheads as they ascended the creeks in the spring to spawn. This run covered a short period, perhaps not more than a month, often less.

The Wiyot told Hewes (F.N., 1940) that in the early days salmon ran in such numbers in the streams that a spear thrust anywhere would bring up a fish. Both kinds of harpoon were employed, though apparently the double-pointed was more common. The single-pointed type was more suitable for the smaller streams. The harpoon shaft was seven or eight feet long. It was scorched black in order to render it as little visible as possible. Its lower end was beveled so as to seat the foreshafts, which were firmly bound to the shaft with iris-fiber string. Onto the two foreshafts were socketed the detachable heads, which were fashioned from deer leg bone and held by toggle lines. Pitch was applied to the iris-string wrappings "to make them waterproof," i.e., to keep them from slipping off when wet and soft.

Curtis (1924a, p. 75), in speaking of the Wiyot, says that salmon were speared in the riffles on moonlight nights or in the autumn by a crew of three men, one using the harpoon, another holding a pitchy torch, the third managing the canoe.

Curtis (1924a, p. 74) also mentions "spears with single, detachable bone points" as used by the Wiyot, though he does not specify that they were used for any one species. Hewes (Th., 1947, p. 77) states that the single-pointed harpoon was used by the Sinkyone, Mattole, and Bear River.

Among the Wiyot, according to Driver (1939, pp. 313, 379) a spear with a single fixed point was also employed, and Hewes (F.N., 1940) states that the Wiyot used a multi-pronged spear, especially in the tidewater region. It was seven or eight feet long and had three or four (sometimes even more) sharp prongs. It was used for taking small fish. They were simply impaled on the prongs and brought to the surface. Informants stated that it was not necessary to pinion them to the bottom and hold them there, as was done in some other regions. This spear was used to a limited extent in serious fishing and also as a means of sport by boys. In his thesis (1947, p. 80) Hewes mentions this Wiyot multipronged spear as used for "flounders on the shallow bottom" of Humboldt Bay and in Eel River estuary. With it was used a simple fixed-point retrieving spear.

Driver (1939, pp. 313, 379) also records for the Wiyot this multipointed spear, in which the points are arranged in a circle on the shaft. With it they pinned the fish to the bottom, where it was "held till worn out or dead, then retrieved."

One Wiyot told Hewes (F.N., 1940) that his people used a multipointed arrow as well as spear. It was about the same as an ordinary arrow and was shot from the ordinary bow. Like the spear, it had three or more sharp wooden points arranged in a circle and was chiefly used by boys for sport. It was serviceable only in deep water and was always shot from a canoe. This is the only mention we have found of this type of arrow.

We have no record of a multipronged harpoon.

Among the Tolowa the single-pointed harpoon was, according to Driver (1939, p. 379), used for trout, while the double-pointed harpoon was used for salmon. Hewes (F.N., 1940) says that this Tolowa harpoon (meł'ki) was usually, if not always, single-pointed. One informant maintained that the double-pronged harpoon was tabooed. The pole, usually ten to twenty feet in length, was of [Douglas ?] fir. The single point was socketed directly onto the end of the pole, the point being of bone or elk-horn, the barbs of deer antler. One informant stated that sometimes the point was made of flint, a claim which the present authors doubt.

The point was attached to the pole by means of a toggle line, four or five feet in length, of buckskin, of sealskin, or of cord, attached by a slip granny knot which automatically tightened as the fish pulled. Informants said that the thrust of the harpoon usually carried the point completely through the salmon. To remove the point from the fish it was either turned back on itself and forced back through the flesh or the line was freed from the pole and drawn on through the fish.

The fisherman usually carried a spare point in case the point he was using was broken or damaged.

Informants spoke of a very simplified form of this single-pointed harpoon, what might be properly termed a lance. This was simply a sharp-ended pole used, as above mentioned, by the Tolowa on Smith River to take flounders. They went out at night in a canoe, armed only with this sharpened pole. In shallow water they could easily see (presumably with the aid of a torch) the flounder resting on the bottom. The fish was simply pierced and lifted into the canoe. It must be lifted in toward the stern--never toward the prow.

PERIPHERAL AREA

The people residing on the lower courses of the larger rivers did relatively little spearing of fish for the reason that it was easier to take them in set nets. (For the same reason--plus the greater depth and breadth of the stream--weirs were not often built.) They [evidently the Wiyot] in fact, did not consider themselves very good spearmen and had great respect for the skill of the Nongatl and others upstream where spearing was much more the order of the day. In fact they said that the upstream fishermen were so expert that they would feel about in the muddy water with the upper end of the harpoon shaft till they found a fish, then quickly reverse ends of the shaft and harpoon the prey before it had time to escape. [Fish can move so quickly that the agility attributed to these spearmen seems questionable.]

According to Hewes (F.N., 1940) the Shasta practically always used a double-pointed harpoon, with one prong usually a fraction of an inch (perhaps 3/4 in.) longer than the other. When this harpoon was poised for use, the two prongs were held in a vertical plane, not side by side. The upper prong was aimed slightly below the salmon on the theory that the buoyancy of the water would tend to carry the harpoon a little higher and that thus one or the other of the points would pierce the fish. Either the longer or the shorter prong might be held above.

The string used as a leader in attaching the head to the shaft was about thirty inches in length and was, according to one informant, made of fibers from the bark of a certain weed [probably Apocynum]. He insisted that iris-fiber string was not used for this purpose. Usually two strings were used to form such a leader, the upper ends being looped around the shaft in a notch cut at the proper distance back to give some slack to the leader.

Shasta informants gave the following terms for parts of the harpoon: toggle, arawátcû; barb, ikwuhâsi; pitch, iratcu--this is smoothed on with a hot stone. The point used for summer [King] salmon in the river was somewhat larger than that on a harpoon for use in a creek. The Shasta did night fishing, using a pitch torch for light. A rainy night was especially good for harpooning salmon.

The making of harpoons, nets, and other gear was particularly a men's occupation in the sweathouses during the long inclement winter days. Women were never allowed to go where the men were working on such fishing and hunting gear. Women were allowed to use the harpoon upon occasion, but they were not permitted to step over a harpoon shaft.

Hewes (F.N., 1940) says that the Nongatl used the single-pointed harpoon. It had a ten-inch foreshaft only, set at the effective angle. Its toggle line was of either heavy iris-fiber string or rawhide. The barbs of this Nongatl harpoon, much shorter than those of the Hupa and other tribes, were made of bone or antler (either deer or elk). The fisherman exercised great caution in carrying his harpoon point in an "up" position for fear that he might strike in on a rock and damage it.

The harpoon was used after the first rains of the season caused the Eel or Van Duzen to rise, despite the fact that the rains also made the water so murky that it was practically impossible to see the fish. The salmon could be followed by their wakes as they swam upstream, and the harpoon could be given a calculated thrust. The alleged unusual dexterity of the Nongatl has already been noted.

Informants stated that harpooning was done at night as well as in the daytime. Night harpooning usually required two men, one wielding the harpoon, the other carrying a flaming brand as a torch to give proper illumination. The two simply waded out into the shallow water of a riffle for their fishing.

Daytime fishing was often done in deeper water and sometimes with the aid of a fishing booth. This was a simple shelter of boughs in the shadow of which the fisherman stood. The fact that he was not silhouetted against the sky, or otherwise easily visible, made his spearing easy.

A Sinkyone informant, however, stated that their harpoon for salmon had a single toggle point of bone. Nomland's (1935, p. 154) statement that the Sinkyone ran the toggle line directly from the harpoon head to the wrist of the fisherman seems such an unusual procedure that we may safely assume that there must have been some confusion in recording.

Hewes (F.N., 1940) says that one very old Sinkyone informant stated that they had both the double-pointed toggle harpoon and a spear with a fixed single point. The latter required more accurate aim and was more suitable for fishing in the daytime. It was used chiefly by young men. The double-toggle harpoon was used by older men, and was preferred in night fishing with a torch. He gave bełke as the name for harpoon, and tce as the name for pitch.

The double-pointed harpoon was so constructed that one of the points was somewhat longer than the other. This arrangement is said to insure that the shorter point will get the fish if it is missed by the longer one. The same observations are made above by the Shasta. In former times the point was of bone, the barbs of elk antler.

Of the Nongatl harpoon, Hewes (F.N., 1940) says that the main shaft (10 to 12 ft. long) was scorched to "keep the wood from rotting," according to his informant, and not to render it less visible to the fish. Formerly only a single-pointed harpoon was used; and the toggle line must be about six inches longer than the distance to the end of the foreshaft "in order to account for the width of the salmon" [sic]. The Nongatl term for harpoon is beenak; the toggle head, tûs. It was customary to carry an extra point or two, even extra parts (elkhorn barbs and bone points), so that if a harpoon point broke, it could be quickly replaced or repaired.

Hewes (F.N., 1940) states that, for salmon fishing, the Mattole had both a single- and a double-pointed harpoon. The leader for the toggles was always made of string, and in the double-pointed harpoon the junction of the foreshafts with the main shaft was always tightly wrapped with string to keep the foreshafts from spreading. No mention was made of a spreader block. Upriver, where there were more rocks, the single-pointed harpoon was preferred because if it hit a rock only one point was spoiled. Downriver, the double-pointed harpoon was preferred. Here, especially at the river mouth, the sandy bottom could do no damage to the points.

The sturgeon, though a much larger fish, was occasionally found among salmon. It was harpooned just like a salmon. One man could drag out a sturgeon by pulling it downstream. The bones of the sturgeon are "very small" and its meat is excellent. Its eggs were also much prized.

Informants stated that sometimes the Mattole fished in the daytime. To make the fisherman as nearly invisible as possible, a small booth or shelter of brush was constructed in which the fisherman, usually an older man, stood in shadow. Such a shelter would overhang a deep pool, but no platform was built out over the water. This booth for spearing had the handicap that salmon do not like shady spots. The younger men were more successful, for they preferred to take the salmon out on the riffles.

Hewes (F.N., 1940), says that the Chilula used both single- and double-pointed harpoons. In fact they sometimes removed the second foreshaft to make an effective single-pointed harpoon.

In the double-pointed harpoon the shaft and both foreshafts were flattened to make good joints. One foreshaft was at quite an angle; the other was straight, in line with the shaft. The joining was wrapped, but not pitched [sic]. The toggle line was made up of two parts. To the socketed head was fastened a leader of about ten inches of buckskin, and then iris-fiber line of any desired length, finally ending in a secure half-hitch tie to the shaft itself. The shaft was peeled, but not darkened. The informant insisted that the harpoon is the more certain method of taking salmon in clear water for the reason that the fish might see the net and shy away from it.

The harpoon was held so that the straighter of the two prongs was more or less parallel to the surface of the water. The second point, which was placed at quite an angle to the shaft, pointed down into the water. This is said to make more sure a strike of one or the other of the prongs. Occasionally both points took effect.

Here, again, we find in use the spear with the single fixed point among the Sinkyone and the Mattole, according to Hewes (F.N., 1940). Driver (1939, pp. 313, 379) mentions this spear with the single fixed point as employed by the Mattole; while the Kato had a double-pointed type, in which one point was fixed, the other detachable.

AREA OF NEIGHBORING TRIBES

Hewes further states (Th., 1947, p. 75) that both the Coast Yuki and the Yuki used both single- and double-pronged harpoons. For the Yana, Wintun, and Wailaki he mentions only the double-pointed harpoon.

As a variant of the double-pointed harpoon we may mention that the people of Klamath Lake used a double-toggle harpoon, the points of which had no barbs or

"ears." The toggle head was thrust completely through the fish so that the detachable points slipped off and turned at right angles owing to the fact that the toggle line is attached at the middle of the head. Barrett (1910, p. 251 and pl. 22, fig. 4) gives the details of this device.

Waterman (1918, pls. 5-9) has given us a most graphic record of the double-pointed harpoon among the Yana. In these pictures Ishi is shown making and using one of these implements. In Waterman's plate 9 we see that the harpoon heads are barbless, as are those of the Klamath Lake and Modoc.

OTHER DEVICES AND METHODS

SPEARING SCAFFOLDS

BARNETT, 1937. Tolowa, Chetco, pp. 163, 195.

DRIVER, 1939. Tolowa, Chimariko, Karok, Yurok, Hupa, Nongatl, Mattole, Sinkyone, Kato, Coast Yuki, pp. 312, 378.

GIFFORD and KROEBER, 1937. Pomo (N, C, S, E, SE), p. 133; S Pomo speared through openwork floor; had brush screen on front of scaffold.

KROEBER, 1925. Wintun, p. 359.

MAP 39

Over much of the area under consideration we find that some kind of simple scaffold was erected on the bank or on a weir for harpooning fish. This scaffold was usually a simple platform upon which the fisherman could stand to wield his harpoon. Our map 39 shows the distribution of this type of scaffold, which was quite different from the platform used for the large A-frame lifting net.

SHADED BOOTHS

BARNETT, 1937. Chetco, pp. 164, 195.

CURTIS, 1924b. Wintun, p. 87.

DRIVER, 1939. Tolowa, Wiyot, Mattole, Sinkyone, Kato, Coast Yuki, pp. 312, 378.

DU BOIS, 1935. Wintun, pp. 16, 123; white stones on river bottom. Very detailed description of "Salmon house." Torch used at night.

ESSENE, 1942. N Pomo, Kato, Lassik, p. 7.

GIFFORD and KROEBER, 1937. Pomo (N, E, SE, NE), p. 133. N Pomo of Russian River; booth built over hole in stream. SE Pomo; booth used in cold weather. Dip net (not harpoon) used. NE Pomo; booth for spearing salmon used on shore.

GOLDSCHMIDT, 1951. Nomlaki, p. 407.

HEWES, F. N., 1940. Mattole, Nongatl; a shade (without platform) on the bank. Harpooner stood in this shade.

_____, Th., 1947. Yana, pp. 66, 91; shaded booth negatively correlated with high development of salmon fishing.

MERRIAM, 1955. Wintun, p. 21; conical spearing hut.

POWERS, 1877. Yurok, pp. 48, 49; brush-covered booth used for both netting and spearing.

ROSTLUND, 1952. "Distribution of Aboriginal Fishing with Decoy, Dark Hut, and Leister" in North America; map 36.

Mention has already been made of the use of a shaded booth (without scaffold) by the Mattole and the Nongatl in spearing. For spearing in bright, sunny weather a booth of boughs was built. In the shade of this booth the fisherman could stand almost without detection by the fish in the water below. His body cast no shadow on the water and he was not silhouetted. We may safely assume that the spearing booth, either with or without shade, was more widely distributed than appears in the literature. Such a detail might easily have escaped notice, especially in more recent times.

Although scaffolds (without weirs) were quite universally recorded by Driver (1939, p. 312) and Barnett (1937, p. 164), we find that the covered scaffold for harpooning is recorded by them for only the Chetco, Tolowa, Wiyot, Mattole, Sinkyone, Kato, and Coast Yuki.

While Powers (1877, pp. 48, 49) says that the Yurok used the brush-covered fishing booth for both netting and spearing salmon, he seems to be alone in this statement. Kroeber never saw or heard of a Yurok booth, though he saw dozens of scaffolds.

The fishing booth is also found in various other parts of the state. Hewes (Th., 1947, p. 66), for instance, mentions it as in use by the Yana: "The Yana harpooned salmon from a small darkened booth set on a scaffolding; the harpoon was of the double-foreshaft toggle type." Essene (1942, p. 7) records a "fish-spearing booth, not on weir" for the Pomo, Kato, and Lassik. Merriam (1955, p. 21) states that the Wintun "erected conical huts for spearing salmon."

Presumably the booth would be most practical and useful on small and medium-sized streams with vegetation coming down to the river's edge or overhanging its pools.

WHITE STONE FLOORING

AGINSKY, 1943. N, Pl. Miwok, p. 399.

DU BOIS, 1935. Wintu, p. 123; used with salmon house.

ESSENE, 1942. Wailaki, Yuki; used white stones in bottom of pool to increase visibility; p. 54.

FOSTER, 1944. Yuki, p. 164; white stones in weir opening.

GIFFORD and KROEBER, 1937. Pomo (N, E), p. 133; placed on bottom of pool to increase visibility in spearing fish.

VOEGELIN, 1942. Klamath, Atsugewi, Wintu, pp. 55, 173; used in connection with scaffold.

MAP 40

Even more rarely noted is the white stone flooring used under spearing booths to increase visibility. The fisherman laid white stones immediately below his booth or on the bottom of a pool without booth. Fish passing over the area were more easily seen. (See fig. 11.)

Du Bois (1935, p. 123) describes an elaborate "salmon house" used by the Wintu for spearing salmon. The river bottom was covered with white stones, and at night a torch was used.

GAFFS

AGINSKY, 1943. N, Pl. Miwok, p. 452.

BARNETT, 1937. Tolowa, Chetco, pp. 164, 195.

CURTIS, 1924b. Wailaki, p. 22.

DRIVER, 1939. Tolowa, Karok, Yurok, Wiyot, Van Duzen, Mattole, Sinkyone, pp. 313, 379.

DRUCKER, 1937. Tolowa, p. 233.

ESSENE, 1942. N Pomo, Kato, Lassik, Yuki, p. 6; lamprey gaff.

HEWES, 1942. Nongatl; fig. 34, i, p. 106.

_____, Th., 1947. Lassik, Wailaki, Mattole, Tolowa, pp. 76, 78, 88, 104-106.

KROEBER, 1925. Coast Yuki, p. 213; eels caught at night by raking water at random with bone gaff.

NOMLAND, 1938. Mattole, p. 113.

MAP 41

Gaffs were used to a limited extent in our area for taking lampreys and to a slight extent for taking trout and salmon. Though the sluggishness of the sturgeon is generally remarked, no mention is made of the gaff in taking this species, presumably on account of its size, weight, and armor.

Hewes (F.N., 1940) speaks of two forms of the eel gaff among the Yurok. The shaft of such a gaff was about three-quarters of an inch in diameter and its length was equal to the height of a man's armpit. One of these gaff shafts (1615), collected by Kroeber in 1901 from the Yurok, measures 137.5 cm. The shaft was usually decorated near its forward or hook end by several narrow bands of bear-grass (Xerophyllum tenax) wrappings placed at about inch-and-a-half intervals.

Our figure 31, a shows the simpler form of this gaff, in which a backward-directed sharp bone or antler point is bound to the shaft. Figure 31, b shows the other type in which this bone also has a forward-projecting point, used, like an awl, for piercing the heads of lampreys in order to string them for carrying, or to pierce their tails in capturing them in the rock piles.

The angle which such a point bears to the shaft is quite carefully regulated by using the thumb as a measure, since the thumb has approximately the same thickness as a lamprey. The angle must be such that the gaff will not sever the notochord of the lamprey. Extraction of the severed notochord in preparation for drying is more difficult.

For the Yurok, Hewes (F.N., 1940) says that the gaff, lem·ôló'tł, was used only at the mouth of the Klamath. As the lampreys came in on the breakers, the fisherman gaffed one, swung it two or three times around his head and sent it sailing through the air to a point back on shore where it was picked up by a boy or someone else stationed there. Its head was pierced and it was strung for carrying. If no assistant was on hand, the lamprey was also whirled to keep it from wriggling off; when secured it was dropped into the fisherman's netted bag (pl. 23, c), which he usually carried along. Upstream of the river mouth, lampreys were taken with a special A-frame lifting net with small mesh.

There was another gaff, somewhat larger in size, which the Yurok used for salmon. They also mentioned a gaff for sea-lion hunting, but without details.

Hewes again records the lamprey gaff for the Wiyot, where the shaft was only three feet or less long. The sharp point of bone was securely bound to the shaft, but for some reason the wrapping was not pitched. A fisherman could use this gaff from a canoe or while wading in the stream, the latter being the better method. The fisherman carried in one hand a torch, for most lamprey fishing was done at night. The torch was bound to a short staff which could, if necessary, be stuck into the river bottom to free both hands. Here again informants spoke of the necessity of keeping the gaff constantly in motion ("twisting," as they called it) to prevent the escape of the lamprey, which eventually landed in the fisherman's netted bag.

One Wiyot specified that the lamprey gaff was held so that the sharp bone point was on the under side. Then the fisherman pulled the gaff toward himself with a downward raking motion; the lamprey was hooked on the point and between it and the shaft and then swung with the gaff two or three times around the fisherman's head before being dropped into his netted bag or flung ashore.

Driver (1939, pp. 313, 379) records the lamprey gaff among most of the groups covered by his survey; the trout gaff as used by the Yurok, Wiyot, and Mattole; and the salmon gaff by the Wiyot only. He notes that the Karok type of lamprey gaff is made "with single barb of bone bound to wood shaft," but gives no details of construction. Concerning the trout gaff he notes that among the Yurok this implement is "made of fork of elkhorn bound to wooden shaft."

The Tolowa mentioned to Hewes a lamprey gaff which was said to have a barb on the outer surface of its point. No others mentioned such a barb. One informant told of a lamprey gaff with a point of mussel or clam shell. He said it was used both for lampreys and for "ocean eels" (tsóēs, apparently some type of blenny), which were much like codfish.

One Tolowa informant told Hewes that a gaff for fish, especially salmon, was regularly used from the canoe. The point was either of bone or of mussel shell, though the latter was more fragile and would break after fifteen or twenty fish had been taken with it.

According to Hewes (F.N., 1940), the Nongatl gaff for lampreys was made of a sharp bone point two inches long, bound at an acute angle to the end of a short stick. The angle was measured by the width of the thumb. The base of the point was beveled so that the iris-string lashing held it in place without the use of a wedge.

As elsewhere, the fisherman had to swing the gaff about his head to keep the eel from wriggling off before he could land it. With it he wore [on his free hand ?] a hand-covering woven of iris-fiber string, much like a thumbless glove or mitten, to grasp his slippery prey.

Hewes also records the lamprey gaff among the Sinkyone, and (Th., 1947, p. 78 and fig. 121) among the Mattole, Lassik, and Wailaki.

Curtis (1924a, p. 98), in speaking of a Tolowa weir, says that the steelhead trout are removed "with gaffs made by lashing a pointed piece of elk-horn to a shaft."

A Coast Yuki informant told Kroeber in 1902 that there lampreys were caught with a gaff which had a "hook of bone." This gaff was about three feet in length and was used at night, and he emphasized that this is "so we don't have to step into water." He said that he still used this gaff at that time though he was then living inland at Cahto. He added that the Coast Yuki did not use eel pots or lamprey nets.

We have already referred to the tendency of lampreys to crawl into any available pile of rocks. There they may be gaffed or pierced with an awl after daybreak.

American gaffs are large curved hooks used to lift or help lift out of the water fish held by a line and brought to the side of the boat or shore. They are landing implements for large, hooked fish. The Northwest California

lamprey gaff was a wholly distinct type of implement. The lamprey is an eel-shaped animal, rather light but exceedingly slippery, and does not take bait. The gaff is primarily a hooking device: a sort of one-tined rake which is swept through the water and out in one motion--a rapid swipe-swing-whirl in which centrifugal force keeps the catch on the implement until it is hurled away from the water. The aim probably is to pierce the lamprey, but as there is no barb, it would certainly at once wriggle off again except for the swing and whirl. By mere rapidity of motion a skillful gaffer quite likely could snake on to shore most of the lampreys that he engaged in the acute angle between point and shaft without actually piercing them. On the contrary it would seem impossible to take large fish this way, and we have no idea how the alleged Tolowa salmon gaff could have been used from a canoe.

SHOOTING FISH WITH BOW AND ARROW

AGINSKY, 1943. N, Pl. Miwok, p. 399.

BARNETT, 1937. Tolowa, Chetco, p. 164; use of this method tabooed.

DRIVER, 1939. Chimariko, Karok, Yurok, Mattole, pp. 313, 379.

DRIVER and MASSEY, 1957. Pp. 201, 206, 208; general statement.

ESSENE, 1942. Lassik, p. 76.

GIFFORD and KROEBER, 1937. Patwin, Pomo (N, SW, S), pp. 134, 173.

HEWES, Th., 1947. P. 87; prohibited on lower Klamath and Trinity.

NOMLAND, 1938. Bear River, p. 112.

POPE, 1918. Yahi, p. 130; fish not shot with bow and arrow.

ROSTLUND, 1952. Pp. 134, 192, and map 40.

VOEGELIN, 1942. Shasta, Wintun, pp. 56, 174; infrequently used.

MAP 42

Shooting fish with the bow and arrow, though much in vogue among some native tribes elsewhere, seems to have been rarely encountered in our region and then mostly as a matter of sport.

Hewes (F.N., 1940) reports that the shooting of fish was strictly prohibited among the Yurok for the reason that then "they would not come up river in future." This is evidently an instance of Yurok inclination to forbid as wrong or dangerous anything unusual or exceptional.

Among the Hupa fish shooting was never done seriously. Shot fish must not be eaten, lest the eater himself be shot soon. The psychology was like that of the Yurok.

Hewes's informants also state definitely that the Tolowa and Sinkyone did not shoot fish. On the other hand, peripheral tribes did shoot fish, though probably never as a major practice.

Among the Shasta, mountain trout were shot in the quieter reaches of mountain streams; in swifter parts, the practice was impossible. The long arrow was fitted with a short point or one made of two crossed pieces of bone or hardwood (preferably mountain mahogany). The arrow with the cross-member head (akir kaahuxástairuk) was feathered. It was used in water up to eighteen inches deep, the point of the arrow being below the surface of the water when it was aimed at the head of the fish. (See fig. 37.)

A shorter arrow with similarly crossed members as a head, but with shaft of ordinary length, was used by the Shasta for hunting the smaller land mammals.

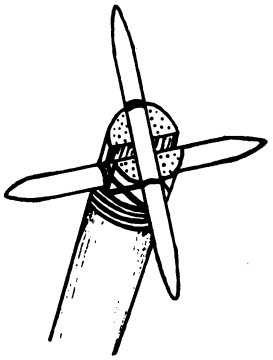

Fig. 37. Blunt-headed arrow. Used in shooting fish and also the smaller land mammals.

The Nongatl shot flounders with the bow and arrow but, like the Yurok, they believed that if salmon were shot, they would stop entering the river.

The Mattole told Hewes that a very long fish arrow was used in deep holes for shooting fish. Such an arrow might be as much as eight [sic] feet in length. It had no feathering and only a sharpened wooden point. It was blackened in the fire for less visibility. They said that shooting in the water was tricky both on account of the buoyancy of the water and its refraction. The arrow was inserted into the water for about half [sic] its length and the fisherman aimed at a point below the fish, for "the arrow shoots up." The arrow might go completely through the fish, but the fish, if only wounded, rose to the surface and "jumped around." No poison was used on these arrows, and they were shot from an ordinary bow. The only species mentioned as taken with these arrows were flounders, trout, and bullheads. The bow and arrow was, of course, never employed in taking sea fishes.

Driver (1939, pp. 313, 379) notes that fish shooting is found among the Chimariko, Karok, Yurok, and Mattole, though always as an incidental method or for sport. He adds the Chilula to Hewes's list of tribes tabooing the shooting of salmon.

Hewes (Th., 1947, p. 87), in fact, says that the "shooting of fish with the bow and arrow seems to be prohibited with almost the strength of a taboo on the lower Klamath River and lower Trinity River, although it was practiced without compunction by the Shasta."

Nomland (1938, p. 112) says that the Bear River regularly shot salmon with the bow and arrow.

A multipronged arrow of about the same length as the ordinary arrow was used among the Wiyot for shooting fish. This missile, like the multipointed spear, was largely used by boys, chiefly in sport rather than as a serious method of fishing.

FISHHOOKS

BARNETT, 1937. Tolowa, Chetco, pp. 164, 199; acute-angled hooks.

BARRETT, 1910. Klamath, pp. 250, 251, and pl. 22, figs. 3, 6; gorge hook and double, acute-angled hook.

_____, 1952. Pomo, pp. 147, 155, and pl. 14; gorge hook used on Clear Lake for fish. Chiefly used to catch certain species of water birds.

BERREMAN, 1944. P. 25, fig. 7 and pl. V.

CHARD, 1953. Wappo, p. 246; no fishhooks. Patwin, p. 246; gorge hook, inch long, double-pointed.

CURTIS, 1924a. Wiyot, p. 76; hook and line from rocks. Also trolling. Hupa, p. 8.

_____, 1924b. Pomo, p. 63; used no hooks. Maidu, p. 109; gorge hook.

DIXON, 1905. Maidu, p. 198.

DRIVER, 1936. Wappo, p. 185; no fishhooks used.

_____, 1939. Tolowa, Karok, Wiyot, Hupa, Chilula, Nongatl, pp. 313, 378; composite, acute-angled hook. Gorge hook used by Tolowa, Chilula, Nongatl, Mattole, Sinkyone, Kato, Coast Yuki. Hook on a short line and float used by Wiyot only. Trot line used by Tolowa and Hupa.

DRIVER and MASSEY, 1957. Pp. 201, 206, map 29; general statement.

DRUCKER, 1937. Lower Rogue River, p. 271; "single-pointed, sharp-angled fishhooks of bone or horn were used for off-shore fishing, or, tied to tule floats, were drifted downstream for sturgeon." Tolowa; did sea angling with double-pointed gorge hook.

DU BOIS, 1935. Wintu, p. 16; hook made of two thorns or of deer nasal bone.

ESSENE, 1942. Kato, p. 6; bipointed gorge of wood or bone.

FOSTER, 1944. Yuki, p. 163; no fishhooks of any kind used.

GARTH, 1953. Atsugewi, p. 136; hook and line fishing.

GIFFORD, 1939. Coast Yuki, p. 322; deer bone gorge, baited with mussel worm, used on pole and line to catch certain species of ocean fish.

GIFFORD and KROEBER, 1937. Patwin, Pomo (N, SW, S, SE), pp. 134, 203, 204, 207; gorge. N Pomo; sharp-angled hook. Pomo (N, C); kelp line.

GODDARD, 1903. Hupa, pl. 13, fig. 1.

HEIZER, 1949. Pp. 92, 93; Humboldt Bay, archaeological remains of curved fishhooks of bone.

HEWES, 1942. Pp. 104-106. Also fig. 34, j.

_____, Th., 1947. Sinkyone, Mattole, Bear River, p. 77; acute-angled hook: wood shank, bone point, pitched. Gorge hook used for rock-dwelling sea fish. Karok, p. 86; acute-angled hook of wood. Tolowa, p. 87; hook of mussel shell.

KNIFFEN, 1939. Pomo, p. 386.

KROEBER, 1925. P. 815; general statement on fishhooks in California. Modoc, pp. 324, 326; double-barbed bone hook. Bone gorge hook. Maidu, p. 410; acute-angle hook.

_____, 1932. River Patwin, pp. 278, 295; gorge hook. Hill Patwin; no fishhooks.

LOEB, 1926. Pomo, pp. 167, 168.

NOMLAND, 1935. Sinkyone, p. 154; acute-angled hook of antler and hazel wood (large for salmon, small for surf fishing) with iris line. Human hair fly used for trout. Lampreys caught with gorge hook [sic]; also larger sea fish.

_____, 1938. Mattole, p. 113; surf fishing.

ROSTLUND, 1952. Pp. 113-126, 185, and map 38.

SPIER, 1930. Klamath, pp. 149, 154; several forms. Tail bone of sucker (illustrated) forms natural hook. Gangs of poles, each with hook and line, set for trout.

STEWART, 1943. Pomo, pp. 61, 62; giant kelp used as fish line from rocks on coast.

VOEGELIN, 1942. Klamath, Modoc, Shasta, Wintun, Maidu, pp. 56, 173; acute-angled (unilateral- or bilateral-barbed) hooks, gorge hook, trotline.

MAPS 43, 44

Driver (1939, pp. 313, 379) records for this area as a whole a considerable variety of fishhooks,[48] largely used by the peripheral tribes, who in general live on the smaller and more rapid streams. These are the single-barbed acute-angled hook (fig. 38), the split-stick acute-angled hook, the gorge hook (fig. 39), the bird-claw hook, the human-hair or vegetable-fiber ball for snagging (so-called sniggling), the hair "fly," the trotline, and the hook on a short line and float (fig. 40). The first two types are attributed to the Karok and the Hupa, the sniggle to one division of the Hupa, and the vegetable-fiber snagging device to one Yurok division. Otherwise practically all "hooking" devices are confined to the peripheral groups.

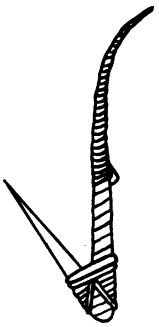

Fig. 38. Single-barbed, acute-angled fishhook. Hupa.

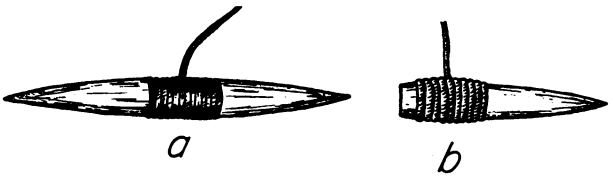

Fig. 39. Gorge hook. a. Double-pointed. b. Single-pointed. After Hewes (F.N., 1940).

[48] A most interesting find, from not too far from our area, is in Humboldt Cave, Nevada. Here were found large acute-angled hooks made with points of bone bound onto wooden shanks (See Heizer and Krieger, 1956, pl. 11, c, d, e). Each of these bone points has two barbules cut into it. In one type these are on the outer face of the angle; in another type on the inner face; and in a third type one on the outer and one on the inner face. Each of these hooks has a wooden shank 9-10 cm. long and each has a bone barb 7-1/2 cm. long firmly bound to the shank with fine cord. This cord passes up to the top of the shank where it is closely wrapped around the top section (about 3 cm.) of the shank, whence it passes on to form a leader. Two of these leaders are single heavy 2-ply cords. The other two leaders are formed of very light double cords. The leaders are from 125 to 145 cm. in length. Such large hooks were undoubtedly intended for catching the larger species of fish.

No hooks with barbules were reported even in the archaeological remains of Northwestern California. In fact, the only hook with a barbule (this time on the outer surface of the barb) from the northern California region is the one (19448) made by Ishi, a Yahi, and illustrated by Gifford (1940, fig. 24, p. 237).

A plain, acute-angled hook is shown on this same plate, pl. 11, a (Heizer and Krieger, 1956). Loud and Harrington (1929, pl. 51) show two similar specimens from Lovelock Cave.

Also found in Humboldt Cave were obtuse-angled hooks of smaller size, consisting of bone points bound to wooden shanks. This type was apparently used as a form of gorge, and, in one instance at least, a large number of these hooks were mounted on a long trotline. (See Heizer and Krieger, 1956, pl. 11, b.) Here again we find in Lovelock Cave similar obtuse-angled hooks on a trotline. (See Loud and Harrington, 1929, pl. 51.)

The groups living on the larger, heavy-flowing streams had in weirs and nets far more efficient methods for mass catches. It was therefore ordinarily unnecessary for them to waste time, for the effort expended, with devices which would yield only individual and small fishes.

Hewes (F.N., 1940) records for the Yurok that the fishhook was made of an inch-long thorn from one of the briers. It was securely bound to a wooden shank. This hook was tied to the end of a line about six feet long and was used on a pole. The bait was a grasshopper or hellgrammite, or occasionally some dried salmon. This type of hook was used for trout from early spring on into the fall. In late winter this type of hook, with angleworm bait, was used for steelheads. Hewes also mentions a hook of bone, chiefly used by boys for catching trout. The men were usually much more interested in taking larger species: salmon, sturgeon (on the Klamath R.), or ocean fish, as well as sea lions.

Hewes (F.N., 1940) records for the Hupa that a stout setline or trotline was anchored ashore, the opposite end, supported by a wooden block, being allowed to float freely downstream. To this line were attached, with short leaders, hooks, baited with fish eggs or gill "rakes." These hooks were called taldetł, and it is said that any number up to thirty or forty might be used. This device was used in the fall, when the water was low, primarily for trout. The hook, as described, was of the composite, acute-angled type, its two parts being secured by wrapping with cord which was sometimes pitched. (See fig. 38.) One informant said that the points of such hooks were made of the bones of suckers.[49]

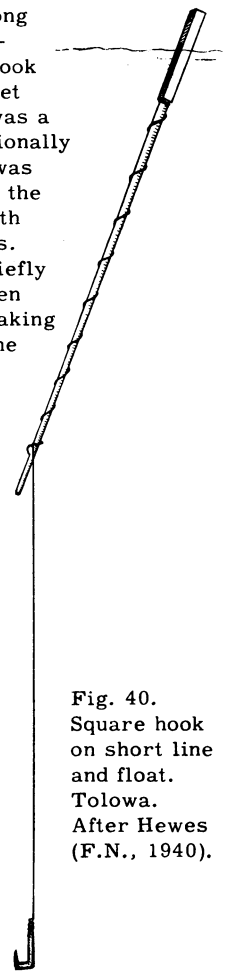

Fig. 40. Square hook on short line and float. Tolowa. After Hewes (F.N., 1940).

Curtis (1924a, p. 8), in speaking of Hupa fishhooks, says: "The hook was a sharp bone attached by wrapping to a small wooden shaft, which in turn was made fast to the iris-fibre line. It was used for trout, and generally on a multiple-hook set-line." Goddard (1903, pl. 13, fig. 1) shows a group of the small, composite, acute-angled hooks (bone point set in a wood shank) which, he says, were used by the Hupa for trout, and Hewes (Th., 1947, p. 86) states that the Karok had an "acute-angled hook of wood."

Hewes (F.N., 1940) says that among the Wiyot an acute-angled hook made of deer bone ("deer leg pin") was baited and fastened by a short line (about 3 ft.) to a wooden float. This apparatus was cast adrift in the bay or in the river estuary. No sinker was required. The bobbing and movement of the float gave notice that a fish had taken the hook. A surf fish made about the best bait. Several of these little buoyed lines were used at one time by a single fisherman. They were especially good for taking steelheads.

For the Wiyot, Driver also mentions a short line with float and hook, several of which were set in a "lagoon." The bobbing of the float indicated that a fish was on that particular hook. This rig was probably quite similar to the device mentioned below for the Tolowa.

Hewes (F.N., 1940) states that among the Tolowa a barbless hook was used to jerk fish out of the water, but informants disclaimed knowledge of a bird's-claw hook.

Hewes's Tolowa informants described a set-hook (see fig. 40) made of mussel shell. It was about four inches [sic] long and squarish in form owing to the shape of the shell from which it was made. The upper part of its shank carried three or four notches by which the fish line was securely fastened to it. The opposite end of the line was fastened to a special type of dry, wooden float about three feet in length by one and a half to two inches in diameter. The upper six inches of this float were squared. Just below the squaring, a fish line four feet or so long was tied and wound spirally down to the point of the float, finally being secured with what informants termed a "slip hitch" at a knob near this lower end of the float.

When the fish took the bait and struggled, two things happened: (1) the float bobbed about; (2) the "slip hitch" was loosened and the squared upper end of the float began to revolve as the line unwound. Either of these motions of the float gave notice to the fisherman that he had a catch on this particular hook. This method of fishing was much used in the tidewater estuaries. Several canoes would put their hooks in a given area, each canoe tending about a dozen floats. The result might be a fairly large catch when the salmon were running well.

[We doubt whether the weight of a musselshell hook could pull the end of a 3-ft. float stick under water as far as shown in fig. 40, but the device would work just as well if the angle of the float were considerably nearer the horizontal. We shall encounter in chap. XI, in Drucker's description of the sea-lion harpoon, another Tolowa square-ended, several-feet-long stick from which a line unwinds.]

Another type of hook and float, among the Wiyot, was somewhat simpler, according to Hewes (F.N., 1940). A deer leg-bone angle-hook (the gorge hook not being used here) was fastened to a line two and a half or three feet long, the other end of the line being tied about the middle of a wooden float of almost any shape. Several of these devices were set adrift from a canoe either in Humboldt Bay or in the estuary of Eel River. The hook might be left bare or it could be baited with a surf fish. It caught salmon, steelheads, perch, or bullheads.

Reverting once more to hooks among the Tolowa, we find Hewes (Th., 1947, p. 87) saying that fishhooks of mussel shell were reported as once used by the Tolowa, but he also notes that this marks the first appearance of shell hooks north of the Chumash, and then suggests that they may have been copies from Caucasian hooks.

We would be inclined to agree with Hewes's suggestion, were it not that Heizer (1949, pp. 92, 93) calls attention to the presence in two archaeological sites, on Humboldt Bay and Patrick Point, of C-shaped single-piece fishhooks of bone. These are not too unlike the Tolowa fishhook of shell to suggest a possible relationship, particularly in view of the proximity of the two areas.

According to Nomland (1935, p. 154), the Sinkyone hook for "salmon" was about 6 in. long, of deer bone, and with a barb of hazel wood, all well pitched. [Salmon do not ordinarily take bait as far up Eel River as the Sinkyone habitat. Steelhead do, but are so much smaller that we would be inclined to reduce the size of the hook from 6 in., unless the white deer bone served primarily as a lure and the wooden barb was much smaller.] Sinkyone hooks for small fish were minor replicas of the "salmon"

[49]Spier (1930, p. 154) describes and illustrates a fishhook which is actually the tail bone of a sucker. This is used on Klamath Lake.

hook. The Sinkyone had also a double-pointed gorge hook on iris-fiber line (see fig. 39, a), for catching ocean fish from the rocks and, it is said, for lampreys. We do not know how a gorge would work on the jawless, circular mouth of a suctorial lamprey.

Hewes (F.N., 1940) says that the Mattole used a small gorge hook especially for sea perch, sea trout, and bullheads. It was of bone, about an inch and a half in length, pointed at either end; to the middle a 2-ft. sinew leader was attached. "Mussel worms" served as bait, which are found among mussels almost anywhere. No sinker was required, the hook and bait being allowed to float upon the surface.

For other species of sea fishes the same hook-and-line outfit was used but a stone was tied into the middle of the line as a sinker. One hook only was used on each line and a fisherman used only one line at a time, on the reef outside the bar at the Mattole mouth and from rocks along the coast.

This type of gorge hook was not used in the Mattole River itself, though a bone gorge 3 in. long was used upriver for steelheads, chiefly on the riffles, though sometimes also in deeper pools. A gorge was also used, with almost any kind of bait, in the upriver pools for suckers.

Informants specified that no gorge hook was used on Eel River or on Humboldt Bay.

Hewes's Chilula informants described a very small gorge hook (not more than 1/2 to 3/4 in. long), used with grasshopper bait and no sinker, on a pole with a line up to 10 or even 15 ft. in length.

In a general statement Hewes (Th., 1947, p. 77) says that among the Sinkyone, Mattole, and Bear River "bone gorge hooks on lines were employed for rock-dwelling species. Salmon were taken on angle hooks with wooden shanks, bone points [wood and bone reversed from Nomland], and lashings smeared with pitch." He also mentions for the Patwin a gorge hook, for the Yana an angle hook, and for the Northern Wintun both a thorn gorge hook and a deer-bone angle hook.

A double-barbed fishhook and also the double-ended gorge hook are found among the Klamath Lake people. These forms are described and illustrated by Barrett (1910, pp. 250, 251, and pl. 22, figs. 6 and 3).

The gorge hook, single-pointed (see fig. 39, b), on a throw line used from rocks along shore is confirmed for the Yurok by Hewes.

In passing we may call attention to the wide distribution of the gorge hook both in space and time. It is found in many parts of the world, and Gruvel (1928, pp. 29-31, 41) discusses European prehistoric fishhooks of the gorge type made of flint, wood, and ivory.

A fishhook was made by the Mattole by fastening the sharp claw of a "chicken" hawk to a line and baiting it with meat. This hook was used chiefly on the riffles upstream.

According to Hewes (F.N., 1940), one informant (probably Nongatl), stated that for trout in the Van Duzen (during the summer only) a "sharp grass thorn" was used which grows curved and is "about the size of the bent index finger of a child." This needlelike hook had a notch cut in its base, was attached to a line ten feet long, and was baited with a grasshopper. It could be used by anyone and was said to be very effective for trout, though much too small for salmon. The "grass" from which the hook was obtained was said to produce a rose-colored flower.

On Mad River they used another type of thorn hook for catching black salmon, but details are unknown.

FISH POISONS (NARCOTICS)

AGINSKY, 1943. N, Pl. Miwok, p. 399.

BARNETT, 1937. Tolowa, Chilula, p. 164; poisons denied.

BARRETT, 1952. Pomo, p. 149 and pl. 19.

BEALS, 1933. Nisenan, p. 347.

CHARD, 1953. Wappo, p. 244; soaproot, doveweed, okali used. No angelica or buckeye used.

CURTIS, 1924b. Yuki, Wailaki, pp. 22, 41.

DIXON, 1905. Maidu, p. 198; soaproot.

DRIVER, 1936. Wappo, p. 185; soaproot and dove weed used as fish poisons. Buckeye and angelica not used.

_____, 1939. Chilula, Nongatl, Mattole, Sinkyone, Kato, pp. 313, 379.

DRIVER and MASSEY, 1957. Pp. 201, 206, 208, map 21; general statement.

DU BOIS, 1935. Wintu, p. 17; soaproot, "ginseng." Buckeye not used.

ESSENE, 1942. N Pomo, Kato, Lassik, Yuki, pp. 6, 55; soaproot, dove weed, manroot.

FOSTER, 1944. Yuki, pp. 163, 164; four vegetal poisons used (singly or together) to stupefy fish.

GARTH, 1953. Atsugewi, p. 137; wild parsley.

GIFFORD, 1939. Sinkyone, p. 322; wormwood.

GIFFORD and KROEBER, 1937. Patwin, Lake Miwok, Pomo (all), Wintun, pp. 134, 174; various plants used.

GOLDSCHMIDT, 1941. Nomlaki, p. 406; fish poisoning by women, using turkey mullein and soaproot. Mullein fuzz gets into gills and stifles fish.

HEIZER, 1941. Pp. 43, 44; discussion of plants used for fish poisoning in California.

_____, 1953a. Piscicides fully treated, pp. 225-283, with a special chapter on California, pp. 250-252.

HEWES, Th., 1947. Miwok, p. 62; soaproot, buckeye, turkey mullein, pepperwood. Maidu, p. 63; soaproot, etc. Yana, p. 66; soaproot. Wintun, p. 67; turkey mullein, etc. Wappo, p. 71; soaproot, turkey mullein. Pomo, p. 72; manroot, soaproot, buckeye. Yuki, p. 75; soaproot. Kato, p. 76; soaproot, manroot. Lassik, Wailaki, p. 77; soaproot, turkey mullein, manroot. Nongatl, Whilkut, Chilula, p. 79; soaproot. P. 89; reasons for disappearance of poisoning in the nuclear salmon area.

KNIFFEN, 1939. Pomo, p. 376.

KROEBER, 1907-1910. Article on poisons. Pt. 2, p. 273.

_____, 1925. Fish poisons, general statement, p. 817.

_____, 1929. Nisenan, p. 287.

_____, 1932. Patwin, p. 278; poison not used.

LOEB, 1926. Pomo, pp. 168, 169; soaproot, manroot used for octopus.

McCLELLAN, 1953. Wappo, p. 241; soaproot and mullein.

NOMLAND, 1935. Sinkyone, p. 154; soaproot and one other (unidentified).

POPE, 1918. Yana, p. 130; beaten fruit of manroot or wild cucumber [squirting cucumber] used.

ROSTLUND, 1952. Pp. 127-133, 189, 190, and map 39.

SPIER, 1930. Klamath Lake, p. 149. No poisons.

STEWART, 1943. Pomo, pp. 61, 62; octopus, ocean eels, fish taken by poisoning small pools in rocks along coast.

VOEGELIN, 1942. Shasta, Wintun, Maidu, pp. 56, 174; plants used.

MAP 46

Conditions on the large, swift-flowing streams in Northwestern California are not favorable for fish poisons, but these were used by almost all of the peripheral and neighboring tribes.

Driver (1939, p. 313) records fish poisoning with soaproot among the Chilula, Mattole, Sinkyone, and Kato, but gives a negative record for all the other tribes of Northwestern California. By the very nature of this poisoning we know that it cannot be used where there is too large a volume of water or in a stream in which the water rushes down too rapidly. Driver cited four tribes which lived on small streams or headwaters and where the natural conditions--series of still pools with little flow between them--were favorable.

Nomland (1935, p. 154), for the Sinkyone, states: "poison, or mashed soaproot, stupefied fish. Sūltsa´n said to be the strongest poison." One informant stated that this plant "grew in one tall stalk with a cluster of blue flowers at the end of the spike and a root as big as a hat [which suggests manroot--see Hewes below]. The root was pounded and put into water. It turned the water blue and made eels (lampreys) come out of the rocks and trout turn right over."

Hewes (Th., 1947) notes the species used among several additional tribes: soaproot (p. 79) was used by the Nongatl and Whilkut, as well as Chilula, in the dry season for suckers and trout; the Lassik and Wailaki (p. 77) took the same two species in the smaller streams with soaproot, turkey mullein, and manroot; the Kato (p. 76) used soaproot and manroot; the Yuki (p. 75), mainly soaproot; the Yana (p. 66) took "small fish in quiet pools" with soaproot; and the Wintun (p. 67) used turkey mullein and a plant identified as ginseng.

Further details from Hewes (F.N., 1940) are:

Wiyot: poison employed in pools and quiet spots.

Sinkyone: soaproot and manroot [wild cucumber] (either together or separately) pounded up and put in deep holes in creeks at low water; efficacious in taking trout and suckers, at times even steelheads.

Mattole: poisons much more frequently used upriver than toward the mouth of the Mattole, where the pools are bigger. Only soaproot used, though some other tribes were known to use other poisons. With soaproot in a deep hole the fish soon come floating on the surface. This poison believed to take effect in the viscera, so the fish must not be allowed to float about but should be quickly brought ashore and eviscerated.

Bear River: an effective poison was made by pounding and mixing together soaproot, wild onions, and manroot (?). Placed in a pool at the upstream end, this quickly colored the pool purplish. In a few minutes the fish began to float on top of the water. All species were affected: trout, suckers, lamprey eels, etc.

Nongatl: a large quantity of a root from higher altitudes was pounded and deposited in a still pool, giving the water a characteristic color. In an hour or two the stupefied fish rose to the surface and were taken out with dip nets as they floated downstream. This poison was not mixed with soaproot; the root produced edible shoots, though it was itself poisonous to human beings. One informant said that it was used chiefly for trout, though on Redwood Creek lampreys were also taken. It did not impart any flavor to the fish.

Chilula: soaproot was pounded up with just enough water to make suds, which were dropped in creek holes for trout. The fish soon rose to the surface and floundered around drunkenly; they were either picked off by hand or scooped up with a small dip net. So far Hewes.

Fish poisoning among more distant (our "Neighboring") tribes was quite generally practiced, as is shown by the long list of references at the head of this section, and a considerable variety of plants was used: soaproot, turkey mullein, dove weed, manroot, and others.

Pope (1918, p. 130) states that he was told by Ishi that the Yana used the beaten fruit of the "squirting cucumber" [manroot] as a fish poison.

FIRE AT NIGHT

AGINSKY, 1943. N, Pl. Miwok, p. 399.

BANCROFT, 1883. Yurok, pp. 338, 339; torches (also fire on bank) used in spearing. Presumably for illumination.

CURTIS, 1924a. Tolowa, pp. 75, 88; pitch torch for illumination.

_____, 1924b. Wintun, p. 98.

DRIVER, 1939. Tolowa, Mattole, Sinkyone, Kato, pp. 313, 378, 379; fire used at night.

DRIVER and MASSEY, 1957. P. 203; general statement.

DU BOIS, 1935. Wintu, pp. 15, 16; torches used with seine in communal salmon drive. Also used as lure in harpooning salmon.

ESSENE, 1942. Pomo, Kato, Lassik, Yuki, p. 6.

FOSTER, 1944. Yuki, p. 163; fire for illumination.

GARTH, 1953. Atsugewi, p. 136; torch described.

GIFFORD and KROEBER, 1937. NE Pomo, pp. 133, 172; two fires on banks to spear salmon at weir. Patwin, Pomo (N, C, S, E, SE), p. 174; fire for illumination, warmth.

GOLDSCHMIDT, 1951. Nomlaki, p. 407; fire on platform on weir.

HEWES, Th., 1947. Wiyot, p. 80; torch light used in canoe on Humboldt Bay.

KROEBER, 1932. Patwin, p. 278; firelight used at night to see fish in weir.

NOMLAND, 1935. Sinkyone, pp. 153, 154; torch in canoe or on bank; made of finely split redwood.

ROSTLUND, 1952. P. 182 and map 37.

VOEGELIN, 1942. Klamath, Modoc, Shasta, Wintun, Maidu, pp. 56, 174; fires on shore and pitch torches.

MAP 47

The use of fire at night appears to have been limited, and then was more for illumination or for warmth than a lure. We know that a torch was used in the canoe at night, presumably for lampreys, which were taken by the dip net or the gaff.

A pitchwood torch, according to Hewes (F.N., 1940), was used by the Tolowa for illumination in taking lampreys. The fishing was done with gaffs on the bar as the tide turned into flood, bringing the lampreys in for their upstream journey. This same gaff-and-torch method was also employed farther upstream at certain falls. Here the lampreys work their way by suction up the faces of the rocks and are easily gaffed. Another use for the torch and gaff was at the Tolowa lamprey chute shown in figure 11. Salmon were also harpooned in Smith River by the aid of such a pitchwood torch, and it was employed for catching crabs in low-tide pools at night.

Curtis (1924a, p. 98) says that the Tolowa speared salmon at night on the riffles in the river by the light of a pitchwood torch. Among the Wiyot he says (p. 75) that spearing of salmon on riffles on moonlight nights was facilitated "by one of a crew of three men using the

spear, another holding a pitchy torch, the third managing the canoe"; and again (p. 74): "on an earthen hearth in the canoe was a small fire, at which they warmed their hands." These statements definitely establish that fire by no means always served as a lure for the fish.

As previously noted under "gaffs," Hewes describes lampreys being gaffed by the Wiyot with the aid of a torch lashed to a pole stuck into the river bottom to free both hands.

Driver (1939, p. 378) records for the Sinkyone that a fire was built out on the platform of the weir, though he says that there is some question whether the blaze was used as a lure or merely for warmth and illumination. He states that the Coast Yuki used fire similarly. According to Nomland (1935, p. 154), the Sinkyone used a torch "for spearing salmon from canoes or banks at night."

That fire was not more used for fishing may be because the people of this region were able to take fish in great numbers with their weirs and dip nets, and by other means, much more efficaciously than by fire lures.

DIVING FOR FISH

AGINSKY, 1943. N, Pl. Miwok, pp. 399, 452, 453; dive with bag net.

CURTIS, 1924a. Klamath, p. 170.

_____, 1924b. Wailaki, Wintun, pp. 22, 85.

DIXON, 1905. Maidu, p. 198.

DRIVER, 1936. Wappo, pp. 184, 185; dive and catch fish with bare hands.

_____, 1939. Tolowa, Chimariko, Karok, Yurok, Hupa, Chilula, Van Duzen, Mattole, Sinkyone, Kato, Coast Yuki, pp. 313, 379; divers catch fish with bare hands.

DRIVER and MASSEY, 1957. P. 206; general statement.

ESSENE, 1942. Yuki, p. 55. Pomo, Kato, Lassik, Yuki, p. 6.

FOSTER, 1944. Yuki, p. 164; dive for salmon in large pools. Catch with bare hands. Also lampreys.

GARTH, 1953. Atsugewi, p. 135.

GIFFORD and KROEBER, 1937. N, C, S Pomo, pp. 134, 173.

GOLDSCHMIDT, 1941. Nomlaki, p. 406; dive and catch with hands. Big fish: break neck with hands or by biting. Also catch with small hand nets.

HEWES, Th., 1947. Yurok, p. 84; wrestling with sturgeon.

KROEBER, 1925. Yuki, p. 174; dive for salmon.

_____, 1932. River Patwin, pp. 278, 295; diver with spring-pole bag net caught salmon in pen of weir, also noosed salmon. Hill Patwin dived for fish.

VOEGELIN, 1942. Klamath, Modoc, Shasta, Wintun, Maidu, pp. 56, 174; fish caught with bare hands.

MAPS 48, 49

The sturgeon is a sluggish as well as large fish and informants described how it is sometimes caught by hand where it lies on the bottom or in the quiet waters of a lagoon. The swimmer simply dives and grasps it by the neck from above and lies on the fish's back. Then, by pulling its head up, he makes it swim toward the surface, and can guide it toward the shore as it swims to free itself.

Hewes (Th., 1947, p. 84) mentions this method among the Yurok. "Other important fishing methods near the mouth of the river include . . . wrestling with large sturgeon, which tumbled rather helplessly down-stream after spawning."

The following statements seem to refer to salmon.

Essene (1942, p. 55; Hewes, Th., 1947, p. 84) emphasizes the Yuki diving to catch fish bare-handed in deep pools. Hewes adds that "this seems to have been practiced rather widely in California as a sport." We concur.

However, Hewes (F.N., 1940) gives additional details. At Hupa, if a fish was seen to disappear under an overhanging bank or rock, a man might dive in and catch it with his bare hands. Among the Shasta, women often caught fish with their hands when the water was shallow in summer. On the Mattole, a large fish, partly hidden in a deep hole, might be grasped by the gills and brought to the surface; or it might be dispatched by stabbing with a special barbless bone dagger, called tsemâ, made for the purpose. One Mattole stated that a fish resting quietly under a bank could be grasped quickly by the tail and this slashed off with a knife, thus rendering the fish entirely helpless.

Farther afield we find that diving for fish was in some use among many of the neighboring tribes, but always rather incidentally.

SNARING FISH

DIXON, 1905. Maidu, p. 198; sinew noose (on a short stick) slipped over head of large fish by diver.

DRIVER, 1939. Tolowa, Yurok, Wiyot, Van Duzen, Mattole, Sinkyone, Coast Yuki, pp. 313, 379.

DRIVER and MASSEY, 1957. Pp. 201, 206; general statement.

ESSENE, 1942. Yuki, p. 6.

GIFFORD, 1939. Coast Yuki, pp. 321, 322.

HEWES, Th., 1947. Maidu, Patwin, pp. 63, 65.

KROEBER, 1925. Yuki, p. 174; noose slipped over tail by a diver.

_____, 1932. River Patwin, p. 278; diver caught sturgeon by noose on tail. Also dived with hand net.

ROSTLUND, 1952. P. 194 and map 42.

MAP 50

Snaring fish, usually by a diver rather than from above water level, is noted for several tribes.

Hewes (Th., 1947, pp. 63, 65) mentions fish snaring by the Maidu and the Patwin. Driver (1939, pp. 313, 379) under his element 249, "Noose slipped over tail of large fish," records this method as used by the Tolowa, Yurok, Wiyot, Van Duzen, Mattole, Sinkyone, and Coast Yurok. His notes on this element add that, among the Tolowa, the noose was slipped over the tail after the fish, driven back and forth till tired, had sought refuge in a hole under the bank or a rock; among the Yurok, when the fish was "resting with tail protruding from hole under roots or rocks, or when struggling in narrow and shallow rapids."

Dixon (1905, p. 198) mentions that the Maidu in the Sacramento Valley "caught fish by diving with a stick to which a sinew noose was attached, which could be pulled tight. By cautiously swimming toward a large fish, this noose was said to be slipped over the fish's head, and pulled taut, the diver then coming to the surface with his prize."

According to the Yurok (Hewes, F.N., 1940), the sturgeon in the Klamath and Trinity range up to 8 or 9 ft. and 400 lbs. They start going upstream to spawn in late February or early March. When they come in from the

ocean they are very fat and have orange-colored sides. After spawning they roll downstream like logs.

The Yurok sometimes attempted to land a resting sturgeon by grasping it with the bare hands alone. There were fishermen bearing scars on their chests where the horny plates of the sturgeon's skin had cut deeply into their flesh as they fought with their catch.

The Hupa told Hewes (F.N., 1940) that sturgeon sometimes floated downstream to the weir at Takimilding. A man might wade quietly out to such a fish with a stout line in each end of which was knotted a small but stout billet. He would cautiously loop a noose about the tail of the sturgeon and as gently as possible begin to tow it ashore: any quick motion might cause the fish to make a dash for liberty. When near the river bank the man tried to yank the fish ashore quickly, by himself or with help from others.

The Karok told Hewes that sturgeon sometimes lie with tail pointing more or less upward. A fisherman wades in and slips a noose of twisted grapevine over the fish's tail. This line is tied to a tree on shore. The fish is so strong that two or three men cannot hold it, but the hitch to the tree is secure, and the fish can be gradually eased ashore.

Hewes (Th., 1947, p. 65) says that among the Patwin, sturgeon were caught in a noose wielded by a diver. "For salmon, the diver used an elliptical bag-net, the mouth of which could be snapped shut by releasing the two poles which held it open." He also refers to a special type of net used by the Pomo and described by Gifford and Kroeber (1937, p. 215): "Scoop net with two straight sticks on either side of opening. Man dived with this and bagged salmon caught in enclosure."

In Kroeber's (1932, p. 278) account of the Patwin fish dam, already discussed, there is mention of taking salmon from pens with a special net provided with a clamping device at its mouth; noosing sturgeon by the tail is also mentioned.

Noosing or snaring is a method employed in many parts of the world in catching fish; for example, Findeisen (MS, 1929, fig. 21, p. 29) shows an elaborate type of Siberian snare for fish which consists of a loop at the end of a rod so rigged that it can be pulled taut through a couple of rings.

SNAGGING, SNIGGLING, OR JERKING FISH

BARNETT, 1937. Chetco, p. 164; hair ball.

CHARD, 1953. Wappo, p. 244; hair sniggle and bait for trout.

DRIVER, 1936. Wappo, p. 184; trout caught with grasshopper tied on end of hair line. Trout swallowed bait, hair caught in its "teeth."

_____, 1939. Yurok, Hupa, Mattole, Sinkyone, Coast Yuki, pp. 313, 379; trout jerked with hair string or ball. Yurok; same but with a vegetable fiber ball. Wiyot, Sinkyone; hair fly attached to hook.

ESSENE, 1942. Lassik, pp. 5, 6; hair string or ball for jerking trout.

GIFFORD, 1939. Coast Yuki, p. 321; human-hair loop (baited) on pole and line. Cast for jerking trout.

HEWES, Th., 1947. Wappo, Lassik, Wailaki, pp. 71, 76, 77; hair sniggle.

MAP 45

What may be termed a snagging method of catching certain species of fish was sometimes employed. The device used was referred to as a sniggle. It has been briefly noted above under "Fishhooks."

Perhaps the simplest snagging device is that mentioned by Hewes (F.N., 1940) for the Coast Yurok. A piece of salmon flesh tied into the end of a line on a pole was dropped into the water. When a bullhead or a trout took a firm hold on the piece of salmon, it could be lifted out of the water quite easily. This method was used chiefly in the summertime.

For the Wiyot, Hewes records that trout and bullheads were taken with a "bunch of hair" or a "ball of hair" on a line. For bullheads it was weighted to carry it to the bottom. For trout the line was attached to a light pole and simply cast out on top of the water. It could be used without bait but was more effective if baited, usually with a grasshopper.

Hewes also records for the Sinkyone that trout were taken on a human hair lure. What the informant termed the "end hair" of this device was baited. The bait generally employed was a grasshopper, but in the spring angleworms were preferred. This human hair "hook" was even used to some extent in taking steelheads. Usually these sniggles were operated from a canoe.

For the Sinkyone, Nomland (1935, p. 154) mentions the use of human hair in this way. "Trout 'hooks' of loop of human hair wound around finger; tied in middle with iris string, used like fly on top of water; trout's teeth get tangled in hair; fish easily raised out of water."

Driver (1939, pp. 313, 379) records for the Hupa, Mattole, Sinkyone, and Coast Yuki what he terms a "hair string or ball for jerking trout." He says that this is baited, and that, when the strike is felt, the angler jerks the string, the hair catches in the trout's mouth and it is hurled onto the bank. For the Yurok he records a "vegetable fiber ball for jerking trout" which works on the same principle.

Another very simple device is that recorded by Gifford (F.N., 1939-42) for the Karok for taking trout. By attaching a grasshopper, hellgrammite, or other insect to a line and lowering this into the water, we have a proper lure. When the fish swallows this bait, it can be easily jerked out of the water. No fishhooks were needed, and some informants maintained that the Karok did not use them, although they were familiar with the fact that the neighboring Hupa did have fishhooks.

Hewes's (F.N., 1940) Mattole informants went into detail concerning this device, as follows: Trout were taken by snagging or jerking with a hair ball. Some long hairs from a woman's head were made into a small ball, called silos. This was tied to the end of a six-foot line; and a worm for bait was affixed. With a willow pole it was thrown onto the surface of the stream time after time, much as we do fly casting. When a trout struck at the worm its teeth became entangled in the hair ball and it could be easily jerked out of the water. This device was used from early summer until the first salmon appeared in fall. From then on trout were considered too small to bother with.

Hewes (Th., 1947, p. 77) also records for the Lassik and the Wailaki that suckers and trout were jerked out of the smaller streams "with a hair sniggle at the end of a short line." No details are given other than that the implement was intended for use below the surface of the water. Hewes refers on these same pages to the use by the Wiyot and Sinkyone of a "hair 'fly' attached to a hook," and he says that this was "human hair wrapped around the hook to disguise it." He mentions bait (Th., 1947, p. 71) only for the Wappo and says "trout were sometimes sniggled with a hair line with grasshopper for bait" [apparently without hook]. Essene (1942, p. 5) records a similar device for the Lassik.

DRIVING FISH

AGINSKY, 1943. N, Pl. Miwok, pp. 398, 399, 452.

BANCROFT, 1883. Pp. 338, 339; fish driven to dam. Then another dam built upstream to impound them. Speared.

CHARD, 1953. Wappo, p. 244; small fish driven into nets.

DIXON, 1907. Shasta, pp. 428, 430; fish driven by women.

DRIVER, 1936. Wappo, pp. 184, 185; bullheads, suckers, driven into nets (5-ft. opening) held by two men.

_____, 1939. Tolowa, Yurok, Wiyot, Hupa, Chilula, Chimariko, Van Duzen, Mattole, Sinkyone, Kato, pp. 313, 379.

DRIVER and MASSEY, 1957. P. 206; general statement.

DRUCKER, 1937. Tolowa, p. 232; drive fish downstream into net at apex of weir.

DU BOIS, 1935. Wintu, pp. 15, 17; large communal drives for salmon. Seines and torches used. Also for suckers.

ESSENE, 1942. Kato, Lassik, Yuki, p. 6.

FOSTER, 1944. Yuki, p. 164; fish driven into seine.

GARTH, 1953. Atsugewi, pp. 136, 137.

GOLDSCHMIDT, 1951. Nomlaki, p. 406; salmon driven into shallow water. Clubbed or stoned. No spears or seines used.

HOLT, 1946. Shasta, p. 309.

KNIFFEN, 1939. Pomo, p. 364; driving fish with balsa.

LOEB, 1926. Pomo, p. 182; driving with rafts.

SPIER, 1930. Klamath, pp. 150, 151; chub driven into "rectangular pouch net" in river. On lake several canoes drive fish to large triangular nets, set sometimes several abreast.

MAP 51

In connection with certain types of nets and traps and, to some extent, with weirs, fish were driven by throwing stones from the bank or from canoes, by wading and thrashing about in the stream, or by hauling a seine or a movable weir toward the trap. Among some tribes several dip nets were held by as many men in a line across a stream while others drove the fish toward them. One Tolowa device was a double weir, in one of which was a tubular basketry trap into which the fish were driven. Obviously such methods were used only in the smaller streams. In the large, swifter streams of our nuclear area it was largely unnecessary to resort to driving. Reference to driving has already been made in the discussion of drift nets.

The wide distribution of driving is shown on our map 51, and it is safe to say that driving would be found in the remaining areas if fuller information were available.

SEA FISHING

The tribes living on the immediate coast had developed certain special devices for taking the ocean species.

The Coastal Yurok of Trinidad Bay, and possibly others, are reported by Hewes to have trolled with their canoes, using a long line and surf fish for bait.

Trolling in our area is mentioned by Curtis (1924a, p. 76), who says of the Wiyot that "the hook and line were used for rock cod and in trolling for salmon."

It is true that Waterman (1920a, p. 185), says that the "only ocean fish" taken by the Yurok with hook and line were "surf fish or smelt, which they caught from the beach with throw-lines." This is a unique report and seems unlikely for the reason that smelt are a small species, easily taken in quantities by the scoop net. It is much more probable that other authors are correct in reporting the Indians as taking larger species of fish on lines, using smelt for bait. Waterman evidently confused smelt as bait with smelt as catch.

We are told by Hewes, for example, that the throw line was used by the Coast Yurok. Fishing off the rocks with a line forty or fifty feet long and with a gorge hook of bone baited usually with mussel or clam meat, they caught ocean perch, snappers, rock cod, rock eels, occasional halibut, and other species. Sometimes no actual bone gorge was used. The bait was simply attached to the line and itself served in place of a gorge hook. When the fish had thoroughly swallowed this bait with the line attached, it could be hauled out of the water. The line was coiled into a basket to keep it from snarling.

Hewes (F.N., 1940) says that the Wiyot actually ventured out two or three miles beyond the line of breakers. Here, with a heavy line and a fairly heavy sinker, they fished for the pelagic species.

The same is true of the Tolowa, who did their deep sea fishing with either a hand line, or with a pole about twelve feet long and with a line two or three fathoms in length, at the end of which was a hook made of deer antler and bone, or, other informants said, of mussel shell. When a fisherman started out, he had a mussel or two for bait, but when he had caught his first fish, perhaps a perch, he cut this up and used it for bait. It was much better bait than the mussel meat. Tolowa informants listed as species caught in this way salmon, codfish, snappers, red fish, halibut, ocean eels, etc.

We have previously discussed in some detail the taking of surf fish (smelt, eulachon, and others) with nets on the beaches, where the special V-frame scoop net was so much used.

The small species of fish would often remain offshore, waiting for favorable conditions for them to run in through the breakers to spawn. The fishermen could always keep track of the spots where the fish were thus congregating by noting where the gulls, cormorants, pelicans, and other birds were hovering as they fed on these fish.

Yurok informants spoke of a very small species (rímertr), about the size of anchovies and so small that they frequently slipped through the small mesh of the scoop net. They were, however, caught in great numbers with the scoop net and were dried like other surf fish.

In addition to the netting on these beaches, there was much activity about the tidal pools in the rocky parts of the coast. Here the older men, as well as the women, sought out codfish and other species which might have been stranded when the tide receded. Crabs were also often found in such pools. The women carried their wood baskets on their backs and often returned well laden from a low-tide excursion.

Some very venturesome fishermen might, as above mentioned, go in their canoes for short distances outside the line of breakers, but this was rather rarely done for fish, such journeys to offshore rocks being usually made for mussels and sea lions.

SHARKS

All informants agreed that sharks were not used as food. In fact, only one use for the shark was mentioned, and that by the Mattole only. If a shark washed ashore, its liver was taken out and rendered in a large shell, by adding hot rocks. The resulting oil was used as a cure for running sores.

The Wiyot state that they did not use sharks for any purpose. The Yurok say that they do not use sharks or skates.

CHAPTER VII

ACCESSORY IMPLEMENTS

FISH CLUBS

AGINSKY, 1943. Miwok; p. 399.

BARNETT, 1937. Tolowa, Chetco, pp. 164, 195.

BARRETT, 1952. Pomo, pp. 153, 357.

DRIVER, 1939. Tolowa, Chimariko, Karok, Yurok, Wiyot, Hupa, Chilula, Van Duzen, Mattole, Sinkyone, Kato, pp. 313, 379.

DRIVER and MASSEY, 1957. P. 206; general statement.

DU BOIS, 1935. Wintu, p. 15.

ESSENE, 1942. Lassik, p. 7; club. N Pomo, Lassik, Yuki, p. 7; stick.

GIFFORD and KROEBER, 1937. Lake Miwok, Patwin, Pomo (N, C, S, SE), pp. 134, 173.

GODDARD, 1903. Hupa, p. 24 and fig. 2.

GOLDSCHMIDT, 1951. Nomlaki, p. 406.

ROSTLUND, 1952. Pp. 135, 193, and map 41.

VOEGELIN, 1942. Klamath, Modoc, Shasta, Wintun, Maidu, p. 56; stick, stone, shaped club.

MAP 52

Clubs used to dispatch the larger species of fish before removing them from nets are usually in size and shape somewhat like our bowling pins. Such a club is always kept ready at hand on the fisherman's platform from which the large lifting net is handled, or elsewhere wherever the fisherman operates. In taking large species, like salmon or sturgeon, such a club is indispensable. The sturgeon club is somewhat larger than the one used for salmon. Both types in our collection are made of redwood and are therefore very light, but both are quite capable of dealing a stunning blow to the head of even a large fish. In former times harder woods were sometimes employed. Examples of the salmon club are shown in plate 18, a and b. A good example of the somewhat larger club used for sturgeon is shown in c of this same plate. Measurements of these clubs are given in the explanation of the plate. Goddard (1903, p. 24, fig. 2) illustrates one of these fish clubs. Driver (1939, p. 313) records the fish club as used by all the tribes of the nuclear and peripheral areas.

Hewes's (F.N., 1940) Yurok informants said that the sturgeon club, called perker,[50] was usually made of oak, while the salmon club was made of redwood or some other light wood.

The Hupa told Hewes that before edged tools were available, fish clubs were made very simply, of alder, fir, willow, or almost any available wood. Green wood was chosen so that such a club would not be too brittle. A new club was, for this reason, made each year.

A fish club was hung at each fishing platform, right where it would be handy and within easy reach. They were sometimes lost by falling into the water, or because a dam was washed away. A club was so simple that no special effort was made to retrieve it, whereas if a net came loose, it was so valuable that the fisherman would always dive in and try to recover it.

When a fish club was made, the following charm formula was recited by the Hupa: "Fish grease and fish oil and blood will run all over you." This makes the club hungry for fish blood and oil.

The Karok also said that clubs were simple, not carved into fancy form, because too easily lost in the river. Any convenient billet, a foot or so long, had a notch cut around one end. By a loop of string tied here the club was hung from a pole of the platform or crotch of the weir. (See pl. 31, b, c.)

The Tolowa said that they used as a fish club any convenient billet of alder or other heavy wood, regardless of form; while the Sinkyone and the Nongatl utilized any suitable stick or stone.

MASHERS

Since most of the fish were taken in the spawning season it was natural that fish eggs should be much used as food. The eggs of the sturgeon were especially prized. These were mashed in preparing them for curing, and a special, heavy wooden masher had been developed for this purpose. Two typical "sturgeon egg mashers" are shown in plate 18, d and f. Both are of a relatively heavy, dense wood, and each has a broad-faced, flat, mashing end. Each tapers more or less uniformly to the conical knob at the hand end. Their dimensions and weights are given in the explanation of the plate. There is in the collection a third specimen, designated as a sturgeon egg masher, which so closely resembles a white man's "potato masher" that it may well have been copied after that implement. Still another specimen, also designated as a sturgeon egg masher, is shown in g of the same plate. It is a twisted club, evidently used just as it was picked up off the beach, without reshaping.

While these implements are referred to as sturgeon egg mashers, they were used for mashing salmon eggs also. Hewes (F.N., 1940) states that the Karok mashed the eggs of salmon as well as sturgeon with one of these wooden tools or with a stone pestle. The eggs were then wrapped in maple leaves and baked in the underground oven. Those that were not immediately consumed were dried and stored for later use. Fish eggs were never cooked whole.

Sturgeon eggs were called crigera-atai by the Karok. As usual, they were preferred to salmon eggs, but among salmon roes those of the Chinook salmon were largest and considered best.

What is designated as a berry masher (pl. 18, e) is quite like the sturgeon egg mashers first mentioned except that it is much smaller.

ALARM RATTLES

BARNETT, 1937. Tolowa, Chetco, pp. 164, 195.

CURTIS, 1924a. Wiyot, p. 74.

DRIVER, 1939. Tolowa, Yurok, Wiyot, Mattole, pp. 312, 378.

[50]This same term was given as the name of whiskey bottle, because of its form.

DRUCKER, 1937. Tolowa, p. 232.

HEWES, Th., 1947. Tolowa, Chetco, p. 88.

POWERS, 1877. P. 49.

WATERMAN, 1908. P. 276; illustration of crab-claw rattle.

MAP 53

To a slight extent our tribes used an alarm rattle with some of their nets and traps to give notice of fish in the net. Such a rattle, of crab claws, is shown in plate 19, i. According to Driver (1939, pp. 312, 378) the crab-claw rattle was used by the Yurok, Tolowa, Wiyot, and Mattole. He notes that the rattle was used on the river but, as expectable, not in the surf, and that by the Wiyot it was used on the set gill net. Driver also notes the use of a shell rattle by the Mattole.

Hewes (Th., 1947, p. 88) says: "Shell or claw rattles as alarms to signify the entrance of a fish were used, at least by the Chetco and Tolowa." He also mentions the use of the device on certain of the traps as well as the set nets. The rattle was affixed either to the guy line (or to a special cord running from the net to the shore) or was tied to the top of a very flexible wand planted for the purpose on shore near the watcher's fire. A light line running from the net or trap to this wand caused it to vibrate. Examples are shown in text figures 18 and 19.

Curtis (1924a, p. 74), in speaking of Wiyot fishing, says that the two fishermen, after setting a gill net completely across a stream and placing on one of its net poles "the dry carapace of a crab," would go ashore. "When a school of fish struck the net, the pole was shaken and the rattling carapace gave warning. The fishermen then launched their craft and removed the catch." This rattle must actually have been composed of several dry carapaces, or of one with one or more claws.

SALMON JAW BREAKERS

The teeth and powerful jaws of a salmon could inflict a wicked wound as the fish struggled after being netted or harpooned. To guard against such an injury the fisherman often used a "jaw breaker," a paddle-shaped, wooden implement (pl. 19, u), which he inserted in the mouth of the fish to help control it. This, combined with the fish club, soon subdued the most dangerous fish.

FISH KNIVES
(MAP 58)

A special type of knife for descaling salmon, and for splitting and cutting up salmon and presumably sturgeon, is made of a nicely chipped flint blade, hafted in a wooden handle, wrapped and pitched for firmness. Six of these knives from the Yurok are shown in plate 20, p-u. These blades are usually of a greenish stone, which the Yurok call hekwsa "whale [color]." The core of the handle is a piece of wood into which the base of the blade is quite carefully fitted. It is held firmly by a cord wrapping which may extend anywhere from two centimenters to the full length of the wooden handle. On this wrapping as a base is applied a composition which dries and hardens down to a very effective handle. This coating is basically pitch, but it has, from its appearance, an admixture of some granular substance like fine sand. One specimen seems to have some fibers mixed into the composition. On all of these handles there are some fish scales, on the surface at least.

The chipped blades have a length ranging from 43 to 87 mm., beyond the handle. In width they vary from 28 to 53 mm., in thickness from 7 to 11 mm. The composition handles are large enough to give a good grasping surface. The dimensions of the largest handle are: length, 120 mm.; width, 42 mm.; thickness, 30 mm.

One of these knives is shown by Kroeber (1925, pl. 16), who states (p. 85): "Both salmon and lampreys were split for drying, the former with a wooden-handled knife (Pl. 16) of 'whale-colored' flint, as the Yurok called it; the latter with a bone awl."

We learn from a Karok myth collected by Kroeber in 1902 that Osprey (Chukchuk) assisted the mountain A'u'ich when A'u'ich created salmon and invented various nets and other devices; also the splitting of cobbles with which to cut up salmon and suckers.

EEL SLITTERS
(MAP 57)

Perhaps the simplest implement used by the Indians of Northwestern California is the eel splitter, or slitter (pl. 20, a-o). Any fragment of bone which happened to break in such a manner as to produce a sharp point was utilized. Good examples of this sort are shown in plate 20, i and b, both of which are definitely catalogued as "eel slitters." The first is a mere bone fragment, the naturally sharp point of which has been ground and rounded to some extent. The second is a similarly pointed end of a deer tibia.

While the eel slitter was often used in the raw, some specimens were provided with a definite handle in the form of a rounded mass of the same plastic substance used in making the fish-knife handles. An excellent example is the handle molded onto the rough end of the slitter shown in plate 20, k.

One other specimen, n of this same plate, is definitely catalogued as an eel slitter. This object is the cannon bone of a deer which appears to have had no grinding at all. All of the remaining specimens in the collection are merely listed as awls. If we may judge from similarities, however, we are entirely safe in assuming that all these specimens were "eel slitters" regardless of whatever other uses, if any, they may have had. This tool might, perhaps, better be called an "awl-shaped implement," for the tribes of this region appear to have had little if any use for a true awl, except in the sewing of skins, and that no doubt went out when needles became available in 1851 or 1852.

Goddard (1903, p. 26) states that "eels" were "drawn and slit many times to the skin with a sharp bone."

It is interesting to note that Driver (1939, pp. 315, 381) records the "bone awl" as used for lamprey slitting in practically every tribe in Northwestern California, but that he also records the use of the flint "knife" for this purpose among the Tolowa, Chimariko, Yurok, Wiyot, Hupa, Van Duzen, Mattole, and Sinkyone. [Spott in chap. VIII of this paper, under "Lamprey Curing" makes the "knife" into a very short flake of flint held between thumb and finger--which agrees with Gifford on the Karok, below.] A wooden awl was used by the Sinkyone and Kato. In his notes on the Hupa, Driver specifies that lampreys, when destined for cooking fresh, were cut and drawn with the flint knife, but when they were to be dried they were slit with the bone awl. Perhaps further inquiry might discover a similar distinction in the other tribes.

Gifford (F.N., 1939-42) says that the Karok used a small, very thin quartz flake as an eel slitter. An informant demonstrated by holding a lump of quartz in the palm of the hand and striking it several times with another stone, until a satisfactorily thin, sharp-edged flake was produced. Such a flake, held tightly between the thumb and index finger, enabled the worker to slit the thin but slippery skin of the lamprey easily and to slit the adhering flesh preparatory to drying.

CHAPTER VIII

TRANSPORT, PRESERVATION, STORAGE, AND COOKING

TRANSPORT

AGINSKY, 1943. N, Pl. Miwok, pp. 399, 405; balsa, log raft, ferryage in baskets.

BARNETT, 1937. Tolowa, Chetco; transportation methods on land, p. 171; canoes, p. 170.

BARRETT, 1910. Klamath Lake, pp. 247, 249, pl. 10; shovel-nosed dugout canoe.

_____, 1952. Pomo; transportation methods on land and water, pp. 163-172. Tule balsa, pp. 164-166, pl. 28. Netted bags, p. 280 and pl. 20, figs. 2-4.

COSGROVE, 1947. Figs. 26, a, b, 80, b, and 81, f. Here called plain coiled netting and full-turn coiled netting.

DAVIDSON, 1933. Knotless netting, pp. 259-262.

_____, 1935. Knotless netting, pp. 119-123.

D'HARCOURT, 1934. Knotless netting, pl. LIX.

DIXON, 1905. Maidu, p. 198; dugout canoe, log raft, and balsa all used slightly.

DRIVER, 1939. Tolowa, Chimariko, Karok, Yurok, Wiyot, Hupa, Mattole, Sinkyone, p. 315; dugout canoe. All Northwestern California tribes; navigation and land transportation, pp. 322, 323, 386, 387.

DU BOIS, 1935. Wintu, p. 15; salmon strung on grapevine. P. 125; no canoe or balsa. Raft of logs or bundles of poles. Also basket rafts. No paddles.

ENGEL, 1956. Fig. 7, a, knotless netting, apparently hourglass technique.

ESSENE, 1942. N Pomo, Kato, Lassik, Yuki; land transportation, pp. 12, 13; navigation, p. 12.

FONT, 1931. P. 370. In the region of Carquinez Strait Fr. Font saw, in 1775-1776, "launches very well made of tule, with their prows or points somewhat elevated." He also saw tule balsas on San Francisco Bay.

FOSTER, 1944. Yuki, p. 174; no boats or rafts. Basket ferryage.

GARTH, 1953. Atsugewi, pp. 154, 155; dugout canoes, and rafts of logs or tule. Tule balsa unknown.

GIFFORD and KROEBER, 1937. Pomo, pp. 144, 145, 174; several methods.

GODDARD, 1903. Hupa, p. 19 and pl. 6.

GOLDSCHMIDT, 1951. Nomlaki, p. 407; method of carrying salmon.

HARRINGTON, 1932. Karok, pl. 11, b; woven bag also used for gathering tobacco.

HEIZER, 1940. Yurok, pp. 80-82; "Yurok type" canoe discussed.

HEIZER and MASSEY, 1953. Pp. 296, 297; origin, distribution, and use of "Yurok type" canoe.

HOLT, 1946. Shasta, p. 312.

KENT, 1953. See Wendorf, pp. 150-153.

KIDDER and GUERNSEY, 1919. P. 117 and fig. 45.

KNIFFEN, 1939. Pomo, pp. 362-364; balsa.

KROEBER, 1925. Yurok, p. 27; boat (values of). Pp. 82, 83, and pls. 13, 15; canoe building and care. P. 94; net sack. Wiyot, p. 117; made canoes. Tolowa, pp. 126, 127; canoe. Sinkyone, p. 147; used canoe. Mattole, p. 147; had no canoe. Yuki, p. 174; rafting with baskets. Coast Yuki, p. 214; had no canoe. Pomo, p. 243, tule balsas, log rafts, no dugouts. P. 247; burden baskets and nets. Shasta, p. 291, dugout canoes. Achomawi, Atsugewi, N Maidu, p. 310; crude dugout. Modoc and Klamath, p. 329; dugout canoe, tule balsa. Wintun, p. 359; tule balsa on San Francisco Bay and in marshes of lower Sacramento. Maidu, p. 416; dugout canoe, balsa, raft. Valley Nisenan, p. 416; tule balsa, log raft, dugout canoe.

_____, 1929. Valley Nisenan, p. 260. Tule balsa and log raft.

LANGSDORFF, 1914. Balsa, pl. facing p. 36.

LOEB, 1926. Pomo, pp. 169, 182. Raft on coast, balsa on Clear Lake and Santa Rosa lagoon.

MASON, 1904. Pima, p. 248; Hopewell, p. 380.

NOMLAND, 1935. Sinkyone, p. 156; canoes. Paddles have carved, painted bird and mammal designs.

_____, 1938. Mattole, p. 114; canoes, rafts, paddles.

ROTH, 1901. Knotless netting, Queensland, various illus.

SIEWERTZ VAN REESEMA, 1926. P. 65.

SPIER, 1930. Klamath Lake, pp. 169, 170; dugout canoe, paddle, punt pole, tule raft.

While the actual catching of fish, by whatever means, was definitely the work of the men, the handling of the fish from that point on was almost exclusively women's work. The transportation, "butchering," drying, storing, and cooking of fish, as well as all other foods, was done by the women. Men did, upon occasion, carry some of the fish home but under ordinary circumstances even this task was done by the women.

By one means or another, a burden of fish or lampreys was usually carried by the fisherman to some convenient spot on the adjacent river bank or ocean beach, where it was left. Someone else carried it on to the house or elsewhere for butchering and curing. A large salmon might be tied head to tail and the cord might then serve as a tumpline. In fact three or four fish bound in this way might be carried at once, according to Hewes's Yurok informants. No attention was paid to the slime of the fish which came off on the carrier's back. It was readily washed off at the end of the journey.

Women almost always carried burdens in the openwork burden basket, usually referred to as the "wood [gathering] basket." It was especially serviceable in transporting the large numbers of small species of fish taken in surf fishing. This burden basket had a tumpline attached, which passed across the woman's forehead. If the basket was carried by a man, the tumpline usually passed across his chest, according to Hewes's Tolowa informants.

A Mattole stated that if a man had as many as three large salmon, or an equivalent weight of smaller fish, he would make a brush mat, roll the fish in it, and tie it so that it could be conveniently packed with a tumpline. Then he rigged a leafy pad to help ease this weight on his back, and at the same time keep at least part of the slime off his back. Such a burden could be carried several miles with relative ease. A variant of this method was mentioned by a Nongatl informant, who said that a cord or twisted withe was passed through the gills. One end of a tumpline was tied to this loop, the opposite end being used to tie the fishes' tails together. Thus the fish were carried in a more or less horizontal position. They rested on a pad of leaves on the carrier's back.

One or two salmon were sometimes carried by passing the toggle line of a harpoon through the gills of the fish and using this as a tumpline. Also they could be strung on a hazel withe, twisted to make it pliable. When there were only a small number of some small species, like trout, the fish were simply strung on a short stick which had the stub of a branch left so the fish could not slip off.

KNOTLESS NET BAGS

A man almost always had a net bag (pl. 23, c) into which lampreys could be dropped as they were gaffed and in which smallish fish or anything else might be carried.

Hewes's (F.N., 1940) Karok informants described the "eel sack" (tátcura) as a woven sack, made of iris-fiber string. It was as much as two to three feet in length and its mouth was a much as a foot and a half across. In late winter or early spring the lampreys attach themselves to the rocks and can be picked off by hand when a "glove"[51] or piece of buckskin is used to prevent them from slipping out of one's grasp. They are placed in this bag to carry them ashore. There they are dumped into a fuel basket for transportation to camp. This sack was used for only two or three weeks, at most a month, during the lamprey run. This may or may not have been the same receptacle as the one shown in plate 23, c and the bag referred to in the next paragraph.

The importance of this net bag is emphasized in a Karok myth (G1b) collected by Kroeber in 1902: A'u'ich, after creating salmon, and making nets and devising scaffold staging, makes the salmon club and the net sack (uhuriv--cf. Hewes's tátcura above) for carrying salmon. Its chief use is for carrying freshly caught fish up to the house or elsewhere for splitting and drying, though this woven bag finds a multitude of other uses as well.

These bags are woven in what is called knotless netting and show four different techniques in the body of the bag, in addition to the plaiting usually found at the edge of the mouth of the bag.

The only exception we have encountered to the plaited mouth in these bags occurs in two specimens in the State Indian Museum at Sacramento. In one of these the mouth is formed by a heavy rawhide thong 15 mm. in width; in the other by a thong of modern tanned leather 12 mm. in width. In each of these the initial course of loops forming the body of the bag is suspended from a series of perforations in the thong forming its mouth. (Harrington, 1932, pl. 11, b illustrates another of these bags.) When the plaited mouth is used, it forms the initial step in the construction of the bag. It can be either a common simple "chain stitch" (pl. 24, a, b) or the intricate double "chain stitch" (pl. 24, c, d). This chain-stitch section is made as a straight piece, a little over twice the length of the mouth of the bag. It is then doubled back and the ends are woven and securely tied together. Then, back several inches (1-3 in.) from each end of this doubled chain-stitch bag mouth, a short, heavy cord is tied across between the two chain-stitch elements.

The body of the bag is then woven, loop and single twist (fig. 42), from left to right in such a manner that its initial loops are suspended from the elements of the chain stitching until one of these cross cords is reached. Then the next loops are suspended from this cross cord which carries the weaving over, in 4 to 8 meshes, to the opposite side of the mouth of the bag. It then progresses

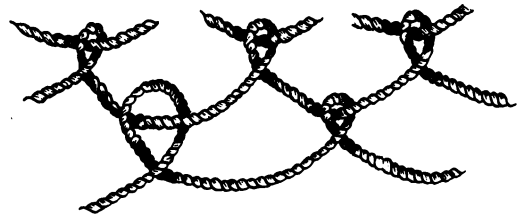

Fig. 41. Simple-loop technique.

[51]The term "glove" was explained by a Nongatl informant as referring to a kind of thumbless mitten woven of iris-fiber string. It was woven like a very fine-meshed net and its rough surface enabled the fisherman to hold firmly the slippery lampreys.

from left to right along this opposite side until the starting point of this course has been reached. It then steps down to the first of the loops formed in the first course of weaving and proceeds as before, but now, instead of being attached to the chain-stitch mouth element, it attaches to each successive loop, so that the second course of loops is suspended from the first course. So the weaving proceeds until the bottom of the bag is finally reached.

The final course of weaving is attached to the preceding course by merely looping it into the preceding course without any twisting of the cord.

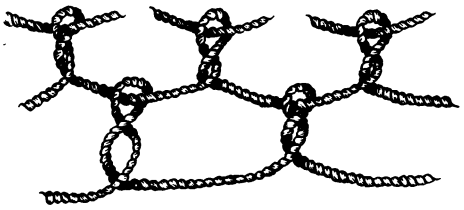

Fig. 42. Loop and single twist.

Finally, when the last corner is reached, the cord is firmly knotted to make the weaving secure against raveling. (Figs. 41-43 are drawn from specimens in the Museum of Anthropology.)

There are two variations from the description above.

1. The initial course of weaving may be suspended from the chain-stitch mouth of the bag by means of the same loop and single twist ordinarily used throughout the body of the bag (fig. 42), or it may have a double twist (fig. 43). In fact in one instance a triple twist was used on the second crossing cord, apparently to gain enough length to drop down to the next course of weaving. This was in a bag using the double-twist suspension for the rest of this first course and a single-twist body. It should be observed in passing that in all three (single, double, and triple twist) the ascending element passes in front of the cord forming the loop from which it is suspended.

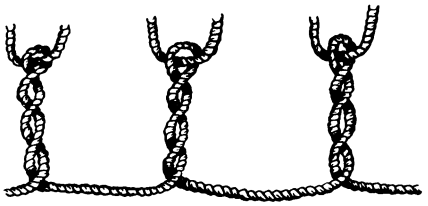

Fig. 43. Loop and double twist.

2. The second variation concerns the expansion of the bag toward the bottom. This is a relatively simple process, accomplished by the insertion of accrues or extra meshes. In other words, at any needed point an

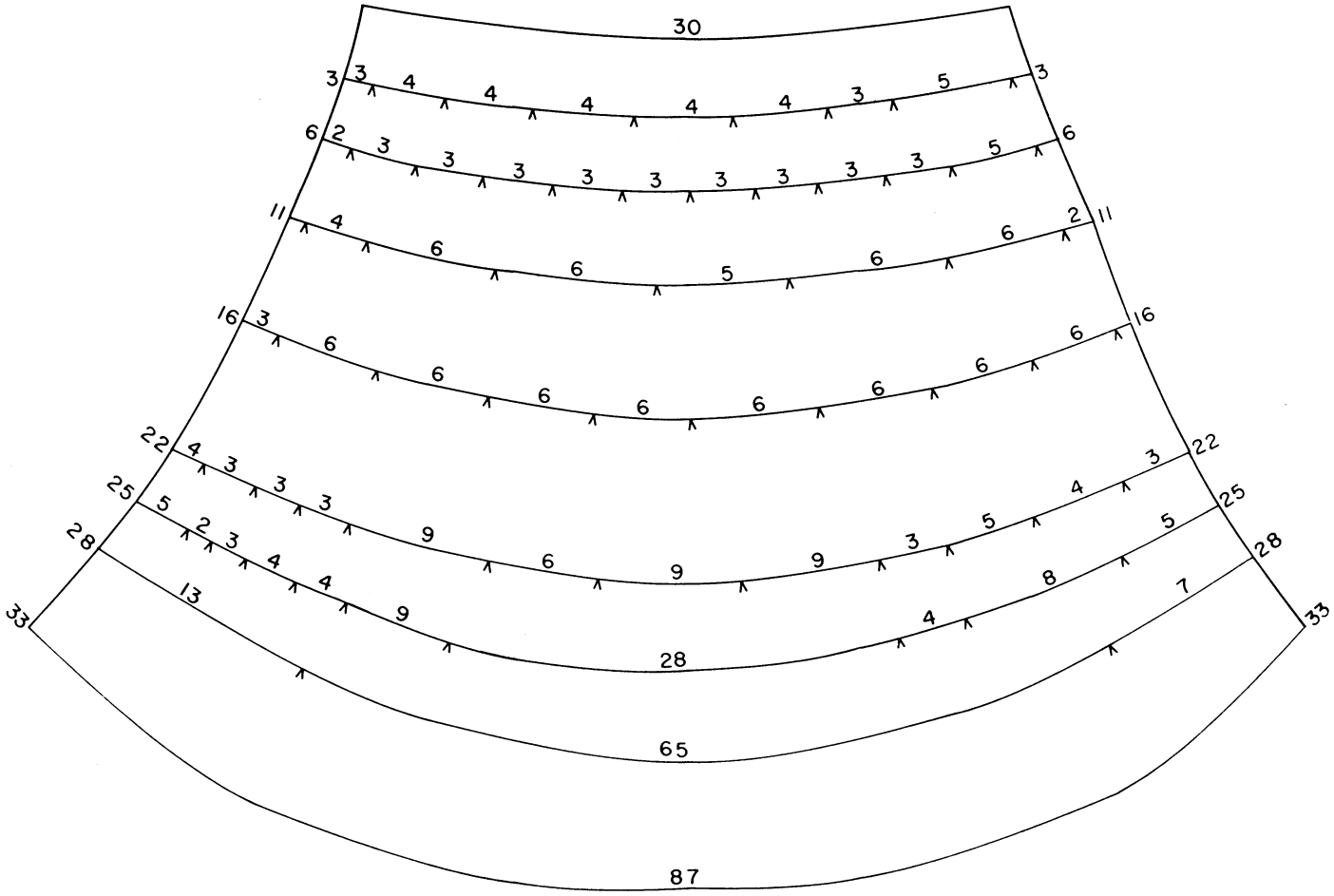

Fig. 44. Schematic plan of weaving of knotless netting bag (2022), showing the courses and the mesh intervals at which accrues are set in, as indicated by caret.

extra cord is passed through the suspending loop and given its single twist. This lays the foundation for an extra mesh at this point as the next course comes around. By this means we find that in specimen 2022 we start at the mouth of the bag with 30 meshes on each side and arrive at the bottom with a total of 87 meshes, after going down a total of 33 courses. This expansion is accomplished by adding meshes in the rather irregular order shown in figure 44.

There are, all told, a considerable number of types of knotless netting techniques known. (See Davidson, 1933 and 1935, and Siewertsz Van Reesema, 1926). Only four of these occur in the bags made in Northwestern California.

The simplest is that shown in figure 41. This is called by Davidson (1933, pp. 259-262) the "simple loop" technique and described by him as "a continuous series of half-hitches taken at definite intervals on a basal string for a first row, the subsequent rows being added in the same fashion by a half-hitch in each pendant loop of the preceding row." This results in a series of simple half-hitches or what Siewertsz Van Reesema (1926, p. 65) calls "quarter knots." Kidder and Guernsey (1919, fig. 45, p. 117) refer to this technique as "coiled work without foundation" (see our specimen 1973).

In Davidson's illustration (1933, fig. 2) the half-hitches are so made that the cord as it ascends passes in front of the preceding loop. It then descends behind this loop, passing around itself to produce the half-hitch. In our Northwestern California specimen the direction is reversed, as shown in figure 41, provided the bag is viewed from the front or outside. From the inside, to be sure, the course of the cord is the same as that given by Davidson for his Australian specimens.

In our region the only other techniques regularly used in the body of this knotless netting are what Davidson calls the "loop and single twist" (fig. 42), "loop and double twist" (fig. 43), and the loop and triple twist. The first two of these techniques are here shown in models (see pl. 7, b). Here again Davidson's illustrations show the cord running in the reverse relations to those taken by ours, as shown in figures 42 and 43.

It will thus be observed that in the "simple loop" the ascending cord passes behind the cord of the previous loop, while in the "loop and single twist" it passes in front of the cord of the previous loop.

In both the simple-loop and the loop-and-single-twist techniques the descending element passes only once around the ascending one. In reality the manipulations involved are the same, but the results of the two techniques differ: a half-hitch loop is produced in the first instance and a loop and single twist in the second. In one the ascending cord passes behind the cord of the previous loop, in the other before it.

The appearance of the finished product is therefore quite different. The "simple loop" can be drawn very much tighter than the "loop and twist." This fact is well illustrated in plate 23, b, which is made almost entirely in the "simple loop" technique. The other two specimens in this plate are, so far as their body techniques are concerned, wholly in the "loop and single twist" technique which produces an openwork of more or less hexagonal forms.

In the loop-and-double-twist and in the loop-and-triple-twist techniques above referred to the ascending element also passes in front of the cord forming the suspending loop, the only differences being in the number of times the descending cord passes around the ascending element.

The geographical distribution of these knotless netting techniques covers a very wide range from Australia[52] and the South Seas, through many parts of both North and South America and also the old world; and the techniques have also a great time range, from ancient Peru (D'Harcourt, 1934, pl. LIX), our own archaeological Southwest and middle United States (Kidder and Guernsey, 1919, and Mason, 1904), down to recent sites in both North and South America.

Mason (1904) illustrates two of these techniques. His figure 42 (p. 248), shows a Pima carrying basket or net in the simple loop technique, while plate 129 shows a Dog Rib specimen of rawhide in which the chief technique is the simple loop or, as Mason calls it, a series of half-hitches or a buttonhole stitch. This is relieved by a single course of loop-and-single-twist technique, as Mason explains (p. 379). On his page 380, figures 115 and 116 show impressions of the loop-and-single-twist techniques obtained from pottery specimens from the Hopewell mounds of Ohio.

A fragment of charred cloth described and figured by Kate Peck Kent (Wendorf, 1953, pp. 150-153) from the Twin Butte site in the Petrified Forest of Arizona shows the simple-loop technique.

Amsden (1934, fig. 1, p. 4) shows four forms of looping, a phase of "finger weaving" still used by the Navaho. Also knotless netting is still used in Mexico, Panama, Guatemala,[53] Colombia, Ecuador, Peru, and probably elsewhere in the western hemisphere, as we know from our own Museum specimens.

[52] Roth (1901, pls. 8, 9, 13, 15, 18, 19) illustrates several of these knotless netting techniques found among the aborigines of Queensland.

[53] O'Neale (1945) gives some details of bag making from maguey fiber as found in Guatemala. She describes (p. 20) the method of making the 2-ply cord, and later (p. 35) she briefly mentions two types of looms used by men: one a "small upright loom," the other a "stick loom," neither of which is apparently used in knotless netting. She states that "finger-looping techniques employed vary" and she discusses a bag "made entirely of half-hitches, the coil without foundation (cf. fig. 80, g)," noting that this technique is more rarely used than the "hourglass."

She then calls attention to a variant of this hourglass technique, illustrated in her fig. 58, b, where, in the upper course only, we have an hourglass variant in which the upper loop of the hourglass includes two adjacent loops instead of one.

In fig. 58, c the author shows what she considers a "change from looping technique made in maguey over mesh needles to looping without gauge and a variation of single element weaving". In other words, she considers this the product of a combination of weaving on a simple knitting-needle device and freehand finger weaving. Lothrop (1929, pp. 123, 124 and figs. 30, 31) illustrates this same knitting-needle type of weaving bags in Guatemala, and states that this method is more frequently employed than the freehand finger process.

While we have quite detailed analyses of the finished products and a classification of the variations of knotless netting, we have almost no detailed information from any region concerning the actual procedures and manipulations involved. We feel sure, however, that in most places it was aboriginally a purely finger process. Dr. John H. Rowe recalls seeing such bags made in Colombia by a purely finger-weaving technique, and suggests that this use of the three knitting-needle-like sticks as spacers and framework upon which some of these bags from Guatemala are made may represent a postcontact development actually based upon the white man's knitting (and indeed the resultant product closely resembles white man's knitting). Dr. A. H. Gayton, whose specialty is textiles, corroborates this opinion and has produced from the collections of the Decorative Art Department a half-finished bag (collected some years ago by Dr. O'Neale in Guatemala) with its 3 needles of wood still in place.

PRESERVATION AND STORAGE

BANCROFT, 1883. Wiyot, Yurok, p. 339; sun-dried, smoked.

BARNETT, 1937. Tolowa, Chetco, p. 166; sea foods dried. River clams and mussels dried. Babracot, earth oven.

BARRETT, 1952. Pomo, pp. 104, 417; fish-drying rack.

CURTIS, 1924a. Shasta, p. 114.

_____, 1924b. Wailaki, Maidu, pp. 22, 107; Maidu made "fish flour."

DRIVER, 1936. Wappo, p. 185; dried fish stored in baskets. Dried fish in sun or smoke-dried in house (stuck between poles in roof or hung by tail).

_____, 1939. Yurok, Wiyot, Tolowa, Mattole, p. 314; sea-lion bladder or paunch grease-container. Tolowa, Sinkyone; kelp grease-container. Tolowa, Karok, Yurok, Wiyot, Hupa, Chilula, Nongatl, Sinkyone, Kato, p. 315; fish flour.

DRUCKER, 1937. Tolowa, p. 234; salmon split, skewered, sun-dried and smoked. Stored in baskets, pack frames, or suspended. Eggs dried, stored in seal-paunch lining. Smelt sun-dried. Lampreys split, sun- and smoke-dried.

DU BOIS, 1935. Wintu, pp. 15, 16; salmon split, skewered, sun-dried and stored. Heads, guts, bones, tails also dried, pounded into a fine flour and stored for winter. Another salmon flour made from fish baked in underground oven. Dried roe and pine nuts mixed with salmon flour to make a kind of pemmican.

FOSTER, 1944. Yuki, p. 164; salmon fillets sun-dried. Fire used to keep flies away. Dried salmon stored. Trout not stored.

GARTH, 1953. Atsugewi, p. 136.

GIFFORD, 1939. Coast Yuki, pp. 324, 325; pit storage of smoked surf fish. Two methods of smoking.

GODDARD, 1929. Bear River, p. 294. Kelp bottles and seal paunch used for oil storage.

HARRINGTON, 1932. Karok, pp. 142-145; three kinds of salmon beetles and three of salmon worms.

HEWES, Th., 1947. P. 66; fish flour probably related to fish pemmican.

HOLT, 1946. Shasta, p. 309; salmon, mussels.

KNIFFEN, 1928. Achomawi, p. 305; fish flour.

_____, 1939. Pomo, p. 363.

KROEBER, 1925. Yurok, p. 85; salmon and lampreys smoked and dried. Surf fish sun-dried. Stored in baskets, as strips or slabs. Never pulverized. Shasta, pp. 292, 294; salmon smoked and dried. Kept in slabs or pulverized. Stored in baskets or tule bags. Crushed salmon bones and crushed deer bones stored for making soup later. Yurok, pl. 9; salmon hanging from drying frame of dwelling. Achomawi, p. 309; salmon kept in slabs or pulverized.

_____, 1929. Nisenan, pp. 261, 262; salmon dried. Salmon flour.

_____, 1932. River Patwin, p. 278; salmon strips sun-dried on grapevine line. Some later ground to salmon flour. Stored in granaries. Flour eaten dry. Strips baked in underground oven. Sturgeon flour also made.

LOEB, 1926. Pomo, p. 172; special racks, also fish-drying house.

MERRIAM, 1955. Wintun, p. 22; salmon flour.

NOMLAND, 1935. Sinkyone, p. 154; lampreys, abalones smoked. Clams, mussels, abalones pounded and sun-dried.

POWERS, 1877. P. 51; describes curing of surf fish: smoking on a babracot, followed by sun-drying.

ROSTLUND, 1952. Pp. 137-144, 197, 198; fish dried and smoked. Pulverized.

SAPIR and SPIER, 1943. Yana, pp. 250, 252; cooking and preservation of salmon. Pulverizing.

SCHENCK and GIFFORD, 1952. Karok, pp. 381, 382, 385; birch used in smoke-drying salmon, lampreys, etc. Poison oak branches used as salmon spreaders and skewers. Maple leaves used to store dried salmon.

SPIER, 1930. Klamath, p. 155; all fish sun-dried. Never smoked. Quotes Coville on fish drying. Storage. Dried fish pulverized.

SPOTT and KROEBER, 1942. Yurok, p. 189; bladder for storage of grease.

STEWART, 1943. Pomo, pp. 61, 62; sea foods.

VOEGELIN, 1942. Pp. 60, 62; fish chiefly sun-dried on outdoor rack by all tribes of Northeastern California. Salmon meal stored indoors--Klamath, Modoc, Shasta, Wintun, Maidu.

MAPS 59-62, 67-70

Most kinds of fish were cured and stored for "winter" use, but salmon were the most important. They were cured as quickly as possible. Informants said that they should be immediately split and have their eyes removed. Then the slabs of flesh were first placed on heated rocks or on scaffolds about a foot high above a small fire to be "cooked" (i.e., to be dried and smoked). This smoking and curing was often done at the camp where the salmon were caught, as for instance the famous Yurok fishing spot called Erliiken or "Lamb's Riffle" (Waterman, 1920a, map 10, nos. 11-17), where a bend in the Klamath, the riffle, and some projecting rocks make excellent fishing. If the fish could be easily transported home, they were cured in the small lean-to smoke houses usually found at every permanent village, or they might be cured on the large rack hung over the fire in the living or family house. In either event, when the salmon slabs were well started on the road to drying, they were finished by being taken into the living house and hung on the regular drying rack there. This made it unnecessary for someone to tend a separate fire in the smoke house.

Schenck and Gifford (1952, pp. 382, 385) state that the Karok use the wood of the white alder for "smoking salmon, eels, and deer meat." An informant's claim that "only" alder wood was used presumably means that it gave the best taste--as hickory for barbecuing among ourselves.

The Karok used green twigs of poison oak or of willow on which to spit salmon steaks or slabs when they were being smoked.

It was during the final stage of the drying that the rich oil tried out and dripped almost in a trickling stream into the steatite dishes kept for the purpose of catching and preserving this oil. Plate 21, a shows such a Yurok indoor rack hung full of drying salmon slabs,[54] and plate 22, a-i some of the steatite dishes used in catching the oil.

When thoroughly dried, these slabs of salmon were put away for winter in the same kind of large storage baskets used to store acorns and other foods. Informants indicate that openwork storage baskets were often used for the storage of fish, but plate 21, b, showing the ledge of the interior of one of these houses, happens to show only baskets of the tightly woven and decorated sort. There seems to have been no rule. Well-to-do, particular people were likely to have mostly close-woven storage vessels, though they took much more time and trouble to make.

The Karok, again according to Schenck and Gifford (1952, p. 385), used maple-leaf mats to separate the layers of dried salmon in the openwork storage basket, finally topping the filled basket with a layer of madroño leaves.

These tribes dried, in addition to salmon, almost every other species as well, from the huge sturgeon to the very small smelt and eulachon.

The small species were usually sun-dried, perhaps with the aid of small fires smouldering under open, low racks when fog blotted out the sun. One such fish camp on the bar on Redwood Lagoon is shown in plate 4, a, with quantities of surf fish spread out.

Gifford (F.N., 1939-42) describes the modern Karok drying of salmon, and also other fish, as follows: The tail of the salmon is first cut off in order to drain out the blood, the fish being laid on a layer of brackens during this time. After removal of the head, the fish is cut up the belly--split its full length--and has its backbone removed. This produces two slabs of half a fish each. Each is spitted on a willow rod and placed horizontally on a rack of poles, either in an outdoor brush shelter or on the rack of poles permanently hung over the fire in the dwelling house. As soon as the preliminary drying is finished, these slabs are turned and hung vertically so that their oil will drip in a continuous trickle from the end of the slab into the steatite dishes set to catch it.

Gifford's informants said that the old method was somewhat different, the salmon being split along the back and the backbone removed. This left the fish in one whole wide slab. The flesh of each side was next split so as to widen the slab further, for these new sections were left attached. Thus there was a very wide slab consisting of four thinnish sections. These slabs were then draped over horizontal poles where they remained for the first day. They were then turned over for the second day of preliminary drying. Each slab was then flattened out and held so by means of two or three cross sticks of proper length [evidently pinned through the salmon flesh]. One informant specified that these should be unpeeled poison oak.[55] This early drying was described as more of a grilling process over a relatively hot fire made by burning non-pitchy wood. One informant mentioned "dead maple wood" as best because it produced heat without black smoke.

The grill over which these slabs must be cured was usually made by setting up two rows of stones and between them poles on which the fish were laid. The curing fish must at all times be shielded from the direct sun. If the curing was done outdoors, a special shade of boughs (usually pepperwood) was built. It was not necessary to keep the fire actively burning all the time. A fire was always kindled in the morning, but as the sun's heat became stronger later in the day, that was sufficient to carry on the curing, even though the sun's rays did not strike the slabs of fish directly.

After about three days of this preliminary drying and curing, the slabs were hung vertically from the drying rack in the dwelling house where the process was completed. After a total of eight or ten days the slabs were ready for storing.

On the house rack the slabs were so hung that a space of about two inches separated each two slabs for ample air circulation.

In splitting salmon and in cutting them into slabs for curing, a handled knife of flint was invariably used; if it became dulled, it was sharpened by retouching with a flaker. This predilection accounts for Kroeber being able to secure a half-dozen such stone-age pieces, still caked from use, fifty-two years after steel knives were brought to the Yurok.

Informants pointed out that formerly the Karok smoked not only salmon, sturgeon, lampreys, trout, and other fish, but venison and other meats, and even acorns. Only rotten wood of various sorts (alder, madrone, oak, and certain others) was used in the curing process. It was sometimes dipped in water in order to make it burn more slowly and produce more smoke. In general they liked best to gather, whether for smoking or for fuel, dead, dry limbs which could be easily broken by simply

[54]One of Kroeber's Yurok informants (Field Notes, pp. 67-81) stated that while the fiber of the larger iris (Missouriensis) was unsuitable for string making, it was used for tying these slabs of salmon to the drying rack.

[55]Kroeber has seen these spreader sticks on slabs of salmon in the the field. He remembers some of them as bent-over withes, but is not clear in his recollection whether withes were bent over so as to enclose or bind the slab or whether perhaps one or both ends of the withe were skewered through.

hitting them on the ground. [This preference is intelligible because they had no axes.]

Gifford further says that in native times the Karok stored dried salmon in two ways. The better method was pit storage, where it kept its flavor better and was less likely to be attacked by insects. It did not mold in the pit but kept nicely all winter. Such a pit was dug inside the house at the back. It was lined with pine needles (aksui), sometimes mixed with maple leaves, and was covered with more pine needles.

If baskets were used, they were the same large conico-spheroid storage baskets as were used for acorns and miscellaneous property. However, salmon did not keep as well here as in pits, especially in warmer weather, when it tended to become rancid (domsivit). It was also more subject to the ravages of insects. Informants maintained that there were two kinds of insect pests, one having wings, the other a worm (evidently the adult and the larval stages of the same insect). This is a different enemy from that which attacks acorns.

According to some Karok informants dried salmon was not pulverized into "salmon flour" as was done particularly by the tribes of northeastern California, but others said that they, too, made salmon flour.

Dried salmon was usually eaten just as broken off the slab, though it was sometimes stone-boiled in a basket.

METHODS OF CUTTING AND CURING SALMON

As might be expected in the case of such a major food as the salmon, its "butchering" and preparation for curing or cooking were quite specifically detailed by informants. While the procedure was generically uniform, there were certain variations from tribe to tribe. A comparison of the methods of several tribes, particularly the Hupa, the Karok, and the Shasta, is of interest.

Hupa method.--One of Hewes's Hupa informants gave the following specifications for preparing a salmon for drying: Place the salmon on a wooden slab with the head away from the worker.

1. Cut off the tail.
2. Cut the head halfway off and allow it to hang, still attached to one side.
3. Slit the fish down the back.
4. Remove [strip off, or slice off?] the skin on the left side, beginning along the back and cutting down to the belly.
5. Slice the meat itself down from the back to the ends of the ribs.
6. Cut "into" [down as far as?] the viscera under the ribs. This produces two thinner slices on this side.
7. Then reverse the length of the fish so that its tail is now away from the worker.
8. Repeat the above skinning and slicing operation on the other side of the fish.
9. Next, "slice" so as to remove the backbone. Take this out with the viscera hanging to it.
10. Now reverse the position of the fish, so that the head is once more away from the worker.
11. Separate the skin, with some flesh still attached, from the remainder down as far as the tail, and put this aside. [As each side of the salmon has already been split--cf. step 6--we infer that "skin" here means that layer of the side of which the skin is part as contrasted with the layer adjoining the viscera.]
12. Remove the viscera and clotted blood from the backbone.
13. Remove the [adhering?] meat from the [back] bone on both sides, and put the backbone aside.
14. At the tail, make a cut from the dorsal side so as to lay open one side. Turn the fish over and make a similar cut on the opposite side. Thus the two slabs of flesh [two layers of one side of the fish's flesh] are left attached to both the skin and the "backbone" [= inner] sides here at the tail.
15. In case the tail has not yet been cut off, this may be done at this juncture in the operations.
16. In the male fish the milt is sometimes cooked, though it is not considered by some to be a tasty food. The roe, however, is much esteemed. These sacks of roe are removed from the viscera and are either cooked and eaten at once or are dried for later use.
17. The jaw sides or, as they are usually called, "cheeks"' are always used. The gristle on the inside of the head and nose of the salmon is esteemed. This gristle is called kininjkitce. A particularly tasty morsel is the bone and flesh located on the under side of the throat.

Curtis (1924a, p. 16) states, for the Hupa: "Salmon, sturgeon, and lampreys are dried on racks, formerly in the underground [sic] dwellings, and stored in baskets."

Karok method.--Hewes's Karok informants stated that the preparation of a salmon was governed by the use to be made of it. If it was to be dried, the procedure was as follows: Spread out a layer of ferns on the ground and lay the fish on these.

1. Cut off the tail at the small rear dorsal fin (tail = ipun).
2. The head is sometimes left on for a time. If the fish is to be used for drying, break the jaw and pull the head back.
3. Cut down the full length of the back and then turn the fish completely end for end.
4. Remove the backbone, but not the ribs. [We suspect that "backbone" means the vertebral column with adhering "true" ribs, and that "ribs" means the parallel line of more ventral bones on each side. This interpretation is confirmed by step 6: the viscera could not well be taken out via a dorsal cut if the ribs, which are attached to the vertebra, had been left in; also by step 7: the "inside slice"--next to the visceral cavity--"includes the ribs."]
5. When the head is removed, the gills are also taken as part of this unit.
6. After the backbone is out, remove all the viscera, and discard all but the eggs. These are always saved for food. If food is extremely scarce, certain other internal parts also may be utilized.

This results in a very large, thick slab of salmon, which must now be sliced into two slabs or slices each half an inch or perhaps more in thickness, and up to two feet in length. Such a salmon, cut up for drying, is called weraípun.

7. The inside slice includes the ribs and is called iic. The outside slice with the skin on is called maan. The backbone is called ó·t.
8. A scaffold perhaps three feet or so above the ground is constructed and here, over a small fire, the backbones, the heads, and the tails are cooked and thoroughly dried.
9. The two slabs of flesh require no actual cooking. They are dried in the shade. First they are folded over poles, where they remain for two or three days for a preliminary curing. Then each slab is flattened out and small cross sticks are so placed as to keep each slab fully distended and flat. A hole is made through each slab near its head end. Through this hole a pole passes so as

to keep such a slab hanging vertically. The slabs dry for as many days as necessary to complete the curing. Finally the slabs are packed away in storage baskets, provided with basketry covers.

When a slab of this dried salmon is to be prepared for eating, if it is a skin-covered, outside slab (maan), the skin side is scored lightly with a knife before heating. This makes it break more easily into smaller pieces. If it is one of the inner slabs (iic), no scoring is needed, for it naturally breaks up easily. These slabs of salmon may be eaten without any heating and freshening if desired. Upon occasion dried salmon might be boiled. Informants say that various other foods may properly be eaten with dried salmon, but acorn soup is best.

Some informants stated that the salmon backbone was not pounded or pulverized. It was broken and used directly, that is, without any further cooking. Others stated that this backbone was pulverized.

The Karok name for dried salmon is amve-vaxara; for dried steelhead sapi-vaxara.

The steelhead (saap) is handled by the Karok in a different way than the salmon, according to Hewes (F.N., 1940). If it is to be eaten fresh it is slit down the belly. The head and tail are left on. If it is to be dried, it is cut down the back, and is not sliced like the salmon. Also the backbone remains in. The viscera are, of course, removed. The whole fish, except for the viscera, is laid out flat and is stretched in this way by means of three skewers. It is hung vertically on a pole which passes through a hole made in the slab.

Steelhead is fatter and molds more easily than dried salmon. Since dried steelhead did not keep as well, it was used first and the supply was usually exhausted early, while the dried salmon lasted throughout the winter and there was usually supposed to be enough on hand for a safe margin of supply when the next season's salmon run began.

The hookbill (tcwon) was handled the same as other salmon except that the slabs cut were three instead of two: one maan (outside slice with skin), and two inner slices, now called picpâ'n instead of iic. [We construe this to mean that the inner right and inner left side were sliced off after the main cut down the back, but the skin of the belly was not cut through.]

If salmon was to be used as fresh fish the procedure was as follows.

The fish was cut down the belly from head to tail. It was eviscerated and the interior wiped out with ferns--never cleansed with water. [However, Weitchpec Ned, a Yurok, told Hewes that in pre-white days all salmon, whether to be dried or eaten fresh, were cut down the back.]

The tail was cut off to bleed the fish. Then the head was removed.

The flesh was then cooked on one or more sticks set so as to hold it near the fire. [In the open, Kroeber has seen the skewer sticks planted in the sand at 45°. See below under "Cooking."] The flesh was not laid directly on the coals. A salmon cooked whole in this way is called topsírukit in Karok.

If the fish was cut into smaller pieces and roasted fresh at the fire it was called wûtúpic.

Usually the gills were thrown away at the outset, though some people saved and utilized these.

The eggs were always saved, and were almost invariably sun-dried by being hung outside on sticks. They could be eaten in this form or they might be pulverized. There is such an abundance of fish during the regular fishing season that no one cares to eat fish eggs fresh.

Shasta method.--Hewes states that the salmon has a line naturally along its side. After cutting off first the tail (łhiwa) and then the head (tcaro), one split the side of the fish, along this natural line, down to the ribs, first on one side, then on the other. This leaves the whole salmon belly intact as a single piece, called áxti. The back of the fish is then removed also as a single flat piece (back = tuxu). From this the viscera were removed and discarded, then the backbone with the ribs was "cut" [stripped, drawn ?] out.

The back of the fish is so thick that it can be split into two slabs, one with the skin on it, the other without. The slabs are now thin enough so that they can be wiped off with weeds or grass leaves and laid out in the sun to dry. They do not need to be cooked in order to preserve them.

This is not the case with the salmon belly. This is not split, and is so oily that it must be somewhat cooked before it will properly dry.

The backbones, together with such flesh as may adhere to them, are laid on a scaffold about eighteen inches high over a fire to cook thoroughly and dry. They are then pulverized by rubbing them together or against the inner surface of a storage basket. The resultant powder, or what is sometimes called salmon flour, is called itáptci. Only the salmon bones with attachment were pulverized. The salmon flesh when dried was put away in slabs for future use.

Curtis says (1924a, p. 114) that among the Shasta salmon were dried in the sun without salt or smoke and were stored in large baglike receptacles of tule with pine-root twining.

Tolowa method.--Hewes says that among the Tolowa the slabs of salmon had stretchers inserted ["skewers"?] to keep them from folding. These slabs are "cooked" on a rack over a fire. They may then be sun-dried for a couple of days or they may be smoked and dried on the rack hanging over the fire in the living house. Care must be taken not to use cedar or any pitchy wood in the fire. Green alder is best for drying fish. Salmon may be sun-dried, without cooking, but it is then too strong to be palatable.

The Tolowa dried and ate both the eggs and the milt of the salmon.

The Tolowa names of the edible parts of the salmon (tłuk) are: slice with skin, tłuk- nû'ste; inside slice, tłuk-mésū; tail, tci·la; roe, xom'; milt, tcelûsûm; gill, tcaû'cre; head, tłuk-tcéta; part under throat ("very good meat"), tca pełt'; lower jaw, tłuk-jig'ele.

Wiyot, Mattole, Nongatl, Sinkyone methods.--Hewes's Wiyot split the salmon into three layers or slabs. The preliminary drying was on a rack of green willow poles in the sun and over a small fire. This not only smoked the meat but also kept the flies from it.

They warned that the fire must be sufficient to "cook thoroughly" the flesh of the fish as well as to dry it. [They alone of our tribes lived along a low, sandy, and particularly foggy coast.] The Wiyot also said that the same general methods as those used for salmon were followed in curing sturgeon, steelhead, perch, and lampreys.

The smaller species (herring, smelt, and suckers) were rarely dried at all but were eaten fresh. [The reason for this is not clear, unless it is the greater fogginess of the Wiyot coast.]

The Mattole mentioned the use of dried salmon backbone for making soup and in other ways; but specified that the ribs were burned, giving as the reason that these were needle-sharp and dangerous to bare feet!

Among the Nongatl, still according to Hewes, the same

general procedures were followed, but, in speaking of the stone knife, informants made no mention of a hafting but simply said it was "grabbed" in buckskin. They also said that dried backbone was sometimes pulverized together with dried meat, or that this powder might be mixed with dried roe.

Among the Sinkyone, according to Nomland (1935, p. 154), salmon were "slit open; laid skin-side down on smoke rack over slow fire of green willow brush two days, nights; then sun-dried on leaves two or three days; packed in baskets between layers of leaves." Salmon eggs were smoked with the fish, but separately, and packed for winter in special baskets. Whether eaten raw or stone-boiled, they were considered a great delicacy.

Various informants among the nuclear tribes mentioned that the pulverizing of the dried fish to preserve it (the making of salmon flour) was not a general practice, but that it was usual among marginal groups. It is probably related to the making of salmon pemmican in the Plateau region, as suggested by Hewes (Th., 1947, p. 66).

Summary.--Salmon eaten fresh were cut up the belly and eviscerated, at least in the historic period, but salmon to be dried underwent special treatment, designed to produce slices of meat thin enough to dry effectively.

Usually the first cut for drying was down the back. This practice is specified for Karok and Hupa, is inferable for the Tolowa, and probably held for the Yurok, from whom there are few particulars.

After removal of backbone and viscera, each side of the fish was then split into two layers. The Tolowa names for these are nuste for the inner layer, mesu for the layer adhering to the skin; the Karok, respectively iish and maan; the Yurok, uwosetso and uwerskun: no doubt there were corresponding Hupa terms.

Whether the Hupa really skinned their salmon before slicing and drying, as stated, or whether this is an error of explanation or understanding remains uncertain. The account of scoring the dried skin before reheating confirms the Karok statement that the skin was left on; and Kroeber's Yurok recollections include hanging slabs with skin still attached.

There may have been minor variations as to the stage of handling at which the tail was cut off, the backbone, ribs, and viscera removed, as to what informants meant by "ribs," etc.

The Shasta method was different from the foregoing, two main longitudinal cuts being made, one along each side, so there was a dorsal and a ventral half of the body. The dorsal half, being thicker, was then split into two layers, one interior, the other, exterior, retaining the skin. This procedure thus yielded three slabs of meat for drying. The Wiyot may have followed the same method: we have no details, but they ended up with the salmon in three slabs.

Data on the curing of steelhead are fewer, probably because steelhead kept less well and were eaten either fresh or as soon as possible. The one specific account, from the Karok, has the first main cut made down the back, the backbone left in; the whole fish, except for the viscera, then constituted one slab held flat by skewers. This procedure was rendered possible by the smaller size of the steelhead but it may also have contributed to its not keeping so well.

LAMPREY CURING

The Tolowa told Hewes that lampreys must be sun-dried for the first day because the meat is so soft that the "smoke of the fire sticks to it," makes it black, and ruins the flavor. It is next dried for two or three days over the fire inside the house. It is at this time that the oil tries out and is caught in the steatite dishes.

If lampreys were to be dried by the Chilula, Hewes says, they were slit and cleaned. Then the flesh was split so as to lay the lamprey wide open. Then, with the same awl-shaped bone implement the flesh was scored and cut [evidently on the inside] so that the heat and smoke could easily reach it. [Compare the following Spott account.]

To begin the drying, the whole lamprey, prepared as above and flattened out, was bent double over a stick and hung over a small fire at the fireplace in the house. Here, in the course of twenty-four hours it was about "half dried." Then a hole was pierced in the tail of the lamprey and it was suspended over a small smoky fire for the final drying. The oil was caught in a steatite dish.

Yurok lamprey preparation (told by Robert Spott).--After the heads have been cut off, the bodies of the lampreys (ke'win) are slit with small quartz flakes (rekoyois), held between the fingers so as to project only 1/4 to 1/3 in., to keep the gall from being cut. For fresh consumption, the slit was carried only to the "navel" (wer'wers, probably the anus) and the guts removed. For drying, the flake was carried around the vent and continued to the tail end.

With 60 or 70 lampreys loosely strung together, a woman now worked over them one by one on a piece of board (called o-sl-eg-oił-ku, from sloił, dried lamprey) held on her knees. She worked with a bone awl or slitter (kwer'). Putting her left hand into ashes to give her a grip on the slippery body, she doubled up and held the tail, inserted the awl point under the notochord (miks-rāg or u-mik-we-rāg) and worked it loose for a couple of inches or so till there was room for her right thumbnail, then ran the thumb to the head end, laying one side of the lamprey open. Then she reversed hands and laid the other side flat. The notochord was then loosened at the head end with the awl, stripped out, and saved for dog food or as a reserve against famine; or it might be left in. The inner side or lining was scraped with a flint knife or mussel shell, then slit lengthwise repeatedly with the bone awl held so short between thumb and finger as not to cut the skin. The flesh was then in ribbons, but still adhering to the skin.

These opened lamprey bodies were then draped, skin side underneath, over the round poles of the scaffold suspended in the house, more or less above the hearth fire, and left for two or three days, to prevent the body walls curling together again. When they stayed flat, they were again strung together through the holes in their tails, and hung in the house for final drying. They were then sloił, and were usually eaten raw.

SMELT DRYING

The smaller species, collectively designated as smelt or surf fish and consisting, according to Greengo (1952), mainly of Spirinchus starksi and Allosmorus attenuatus,

which run in onto the beaches to spawn, were largely sun-dried. Our plate 4, a shows a modern fish camp near the mouth of Redwood Creek with quantities of surf fish drying in the sun. In addition, fire was also used in this process (as is shown in pl. 4, b).

The eyewitness account of drying by Powers (1877, p. 51) says:

> Smelt being small the squaws dry them whole by laying them awhile on low wooden kilns, with interstices to allow the smoke to rise up freely, and then finishing the process in the sun. They eat them uncooked, with sauce of raw salal-berries.

BY-PRODUCTS

The by-products of fishing in this region are oil and adhesives. Sea-mammal hunting also yields oils, both sea-lion oil and whale oil. Of these by-products, the oils are much the most important.

OIL

A by-product, but an important one, of salmon drying is the oil which tries out, especially toward the last of the curing. Here, at the permanent drying rack over the fire in the house, the slabs of salmon hang, as shown in plate 21, a. Toward the last, the oil or grease actually trickles down almost in a stream. This, according to Hewes's Yurok informants, is especially true of what they term the "summer salmon" (nepew, King). The "fall salmon" (tcegwun) is much drier and has little grease except in the head. Informants stated that this fall salmon is so dry that it could be eaten by sick people.

Salmon grease was caught in a shallow steatite dish. A larger, somewhat deeper steatite dish, holding up to a gallon or so, was used for storing the oil. Both of these dishes are called pemoiyekw by the Yurok ["greasy," referring either to the oil or to the steatite of which they were made].

The storage bowls are said to have been placed in holes eight or nine inches deep, dug in the floor at the edge of the house. They were protected with basketry covers.

Hewes's (F.N., 1940) Karok informants stated that these steatite dishes (imniciram) were "dug out" of stone blocks by older people unable to engage in more active pursuits; for instance, by an old woman who could no longer make baskets. The name of this receptacle derives from the term mnic, meaning to cook.

There are two other types of grease-storage receptacles, the kelp bottle and the sea-lion bladder or stomach with a basketry cover (see fig. 45), but this last is reserved for the storage of sea-lion, seal, and whale oils.[56] Salmon oil is never stored in it. The oils are not mixed. This container also was dug into the house floor for safe-keeping.

Hewes's Tolowa informants mentioned that oils were rendered in stone dishes or in the shell of the horse clam, and were stored in containers made of the bladder of the sea lion. It was dried and its opening was closed with a tight-fitting stopper.

According to Hewes, the Mattole used the carapaces both of land tortoises and sea turtles to catch oil.

Driver (1939, p. 314) lists the sea-lion bladder or paunch grease-container for whale oil, as used by the Tolowa, Yurok, Wiyot, and Mattole. Also he lists the kelp grease-container as used for whale oil by the Tolowa and the Sinkyone. However, he fails to record grease storage for fish oil or sea-lion oil.

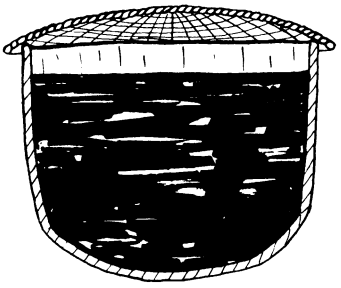

Fig. 45. Sea-lion paunch oil storage container with basketry cover. For sea-lion and whale oils. Fish oils are stored in steatite bowls. After Hewes (F.N., 1940).

ADHESIVES

AGINSKY, 1943. Miwok, p. 410.

BARRETT, 1952. Pomo, pp. 184, 185.

DRIVER, 1939. Tolowa, Chimariko, Karok, Yurok, Wiyot, Hupa, Chilula, Nongatl, Mattole, Sinkyone, Kato, Coast Yuki, p. 325. All Northwestern California tribes, pp. 325, 389.

ESSENE, 1942. N Pomo, Kato, Lassik, Yuki, p. 14.

GOLDSCHMIDT, 1951. Nomlaki, p. 407; glue a by-product of the salmon.

KROEBER, 1925. Maidu, p. 417; salmon-skin glue.

NOMLAND, 1938. Mattole, p. 114.

SCHENCK and GIFFORD, 1952. Karok, pp. 378, 384.

VOEGELIN, 1942. Klamath, Shasta, Atsugewi, Achomawi, Wintu, Maidu, p. 81.

MAPS 73, 74

Glue was important in this region, particularly in making the fine yew bows used both in war and in hunting. Tribes to the south (Pomo, etc.) used just such finely made yew bows, which they said were obtained from the north. It is not unlikely that some of these came from our region.

Gifford (F.N., 1939-42) learned from the Karok of an effective glue. Descaled, dried salmon skin was scraped fine, and was then chewed for a long time. The resultant mixture was deposited in a small "cup" made of a single leaf of the madroño. Next a glandular substance from the throat of the sturgeon was chewed and added. The "cup" was then placed in among the young leaves of a madroño branch, and this set in the warm ashes (not coals) of the fire, where it cured into a viscous glue. Care must be taken to see that no ashes contaminated

[56] Spott says that among the downriver Yurok sea-lion oil was stored in a sea-lion bladder which was hung up in the shade, while among the upriver Yurok this oil was stored in a stone dish with wooden cover which was buried in the ground.

the glue or it would not stick. It was used for building up, layer upon layer, the sinew backing of the bow, and wherever else a strong adhesive was required.

One informant maintained that only the skin of the Chinook salmon was used in making glue; another that sturgeon skin might be employed. [If so it must have been the inner side of the skin because of the enormous plates outside.]

For use, glue was usually prepared as needed in a small stone dish (see pl. 22, d-f). Any left over remained in the dish till needed, then was softened with a little water.

When certain pigments were added to this glue, paints for decorating bows, arrows, and certain other objects were produced.

Another adhesive was found in the gum of the chokecherry. Informants said that, in backing a bow with sinew, the wood was first dressed with chokecherry gum before the salmonskin glue and the first layer of sinew were applied.

In a Karok myth (G3e) recorded by Kroeber in 1902 glue was first made by Osprey (Chukchuk). In trying to put the sinew backing on the bow he was creating, he needed something to make it stick, so he chewed salmon skin, spat it on maple leaves, cooked it into glue, and put it onto the bow with a little stick. He then tied the sinew layer onto the bow with string and let it dry.

A statement to Kroeber (40-78) by one Yurok informant to the effect that glue was made from either the "bladder" of a sturgeon or the skin of the salmon seems unusual so far as the sturgeon bladder is concerned. Possibly "bladder" refers to the sturgeon's throat gland of six paragraphs back.

Harrington (1932, p. 156) says that the Karok glue is made from the skin of the sturgeon or the salmon, mixed with the gums of the fir and the "wild plum" [chokecherry presumably]. Goldschmidt (1951, p. 407) says that the glue of the Nomlaki is a "salmon by-product." And Powers (1877, p. 108) remarked most favorably upon the power of the glue made by the Mattole.

Other tribes also had their own adhesives. The Pomo, for example, used a mixture of pulverized fish skin and soaproot juice in making their sinew-backed bows (see Barrett, 1952, pp. 283, 284).

COOKING

BANCROFT, 1883. Yurok, p. 339; broiled, boiled.

BARRETT, 1952. Pomo, pp. 61, 103; broiling on coals and hot rocks. Baking in underground oven.

CURTIS, 1924a. Hupa, Shasta, pp. 16, 114.

DRIVER, 1936. Wappo, p. 185; fresh fish broiled, baked in underground oven. Two underground ovens: indoors for family's use; outdoors for communal use. "Roasted" fish also used in gruel form.

DRUCKER, 1937. Tolowa, p. 235; broiling, stone boiling, pit-oven roasting. Gives list of meats handled by each of above methods.

DU BOIS, 1935. Wintu, pp. 15, 17; salmon baked in underground oven. Extra meat made into salmon flour. Small fish broiled on hot rocks. Extra small fish dried and stored. Boiled when finally eaten. Salmon refuse ground, mixed with roe and pine nuts to make pemmican.

FOSTER, 1944. Yuki, p. 164; fresh fish broiled on coals. Dried salmon roasted or crumbled and boiled.

GARTH, 1953. Atsugewi, p. 136.

GIFFORD, 1939. Coast Yuki, pp. 322, 324, 325; methods of cooking surf fish and others.

GODDARD, 1929. Bear River, p. 294; cooking clams.

GREENGO, 1952. Tolowa, Wiyot, Coast Yuki, etc., pp. 76-82; methods of cooking and preserving sea foods.

HOLT, 1946. Shasta, pp. 309, 310.

KNIFFEN, 1939. Pomo, pp. 363, 376.

KROEBER, 1932. Patwin, p. 278; dried salmon cooked in underground oven.

LOEB, 1926. Pomo, p. 168.

NOMLAND, 1935. Sinkyone, p. 154; fresh salmon cooked directly on coals.

SAPIR and SPIER, 1943. Yana, p. 252.

STEWART, 1934. Pomo, pp. 61, 62; preparation of sea foods.

MAPS 63-66

According to Gifford (F.N., 1939-42), the Karok cooked freshly caught salmon after splitting them lengthwise, removing the backbone, and giving each slab two transverse cuts, making six pieces all told. Each piece was then skewered in the middle of an eighteen-inch willow rod, and each rod stood in the ground facing a blazing fire, either indoors or outdoors. From time to time each rod was turned end for end and reset, exposing the various parts to an even broil, and imparting good flavor. [Kroeber has seen the same method used by the Yurok.--Compare the account above under "Cutting" by Hewes for the Karok.]

In cooking fresh salmon the Karok usually left the tail on one of the pieces. Freshly caught salmon did not drip grease, but when dried or partially dried salmon was cooked on a skewer (usually held in the hand), it yielded

much grease. The skewer was held so that the drip fell into a steatite dish, where it quickly congealed. It was eaten with a spoon, along with acorn soup. Also, freshly caught salmon was sometimes cooked by raking away the coals of a fire so as to expose the hot rocks beneath and laying the pieces of fish directly on the stones.

Salmon heads were cooked and eaten. A single head might be cooked in water in a steatite dish, being turned frequently. If several heads were to be cooked, they were usually broiled on a rack of sticks rigged over coals. Such a rack or babracot or barbecue was made of four "posts," with crossbars about three feet above the fire. Here the heads cooked from four to five hours. Such slow cooking on a babracot is called tanikixwa. Informants said that "the soft portions [brains ?] in the top of the head" were eaten; and that some people even ate the eyes.[57] We have seen that the meat on the mandible was eaten.

Among the Karok the backbones removed from drying salmon were saved and dried for winter use. Boiling made the vertebra (usually crushed previously) soft and a good food, even for human consumption, at the same time that they could produce a good soup. The vertebra were also much used as a dog food.

Hewes (F.N., 1940) gives, for the Karok, the details of cooking the head of a sturgeon in the underground oven as follows: Heat the pit, heat rocks, line the pit with the hot rocks. Place on them a layer of green leaves, then the sturgeon head and another layer of green leaves, followed by a layer of sand, and finally by a layer of live coals and hot rocks. The head is allowed to bake here from morning till evening. The leaves used are preferably those of the cottonwood.

However, maple leaves were used as wrappings for sturgeon eggs when these were roasted in the underground oven. [Kroeber recalls that the Yurok used maple leaves in cooking.] These sturgeon eggs were first mashed with an acorn pestle of stone or with a special wooden egg masher (see pl. 18, d, f)--they were not roasted whole.

Hewes (F.N., 1940) says that the Karok cut fresh salmon into smallish pieces which were put on "maple sticks" [probably skewered] and placed near the fire to cook. Salmon heads, he says, were split from the under side and laid out flat on a babracot to roast, sometimes outdoors, sometimes indoors if there was a strong wind.

A photograph recently acquired from Grover Sanderson clearly shows the Karok method of cooking slabs of salmon on skewers stuck into the ground around the fire. (See pl. 31, d.) He says that from time to time each skewer carrying such a slab of salmon was rotated in order to secure an even cooking of both sides of the fish. It will be noted also that each of these skewers is so placed that its top is inclined toward the fire. This naturally makes for a more even distribution of the heat vertically and an even cooking on whichever surface is toward the flame. This particular picture was taken at a fire out-of-doors, but the same method is employed at a fire in the house.

The Tolowa, according to Hewes, prepared flounders by making a cut "under the throat" and removing the viscera. Then a skewer was passed through the mouth, along the backbone, and out at the tail. The fish was then set by the fire, tail uppermost, being turned and handled by the skewer. Other fish were cooked the same way.

The Sinkyone, according to Nomland (1935, p. 154), cooked fresh salmon by laying [pieces of ?] them directly on the hot rocks in an earth oven or by placing them in a cleft stick over coals.

Hewes (F.N., 1940) has the Chilula cooking freshly caught lampreys by slitting them down the belly, removing the entrails, and plucking out the notochord, then roasting them on live coals without scoring or further preparation.

Hewes (F.N., 1940) says that one of the few foods not dried by the Bear River was trout, perhaps because these fish were not secured in sufficient numbers. They were merely broiled and eaten as caught. If good luck produced an extra number, these were given away. Trout were cooked by broiling on the hot coals without cleaning or other preparation. Bullheads were also broiled and eaten fresh.

The dried salmon backbones (sometimes ground) were used in making soup. Soup was also made from a mixture of salmon gills and salmon eggs.

Curtis (1924a, p. 114) says that, among the Shasta, both fresh and dried salmon were roasted on skewers, the dry fish being softened by sprinkling on a little water.

The Yurok told Hewes about lampreys: that they were slit down the belly from head to tail with an awl of bone, with which also the notochord was extracted, from the tail upward to the head. This notochord is, according to an ancient tale, all that the eel has left of the bony structure which he once had. He and Sucker played a many-stick guessing game, wagering their bones, and Eel lost. Hence Sucker now is "all bones and no meat" while Eel has only a "white string" (notochord) left, which is his shell money.

Fresh lampreys are prepared as above, then laid (about four at a time) and broiled on a bed of coals spread out far enough away from the flames so that they will not burn. They are rolled over from time to time so as to cook evenly. When done they are cut into short sections--a turn of a string is wrapped around the lamprey and pulled, which cuts the soft, buttery flesh easily.

For drying and preservation, lampreys are slit, the notochord is removed, and then the flesh is scored lengthwise with the same awl. This lets the heat and smoke into the scored channels and cures the meat more quickly and evenly. The oil which tries out is caught in steatite dishes and preserved. (Another Yurok account, given by Spott, has been cited earlier.)

[57] Gifford's Karok informants, in speaking of deer hunting, stated that the animal's eyes were removed entirely, or at least were slit open. The "eye jelly" [vitreous humor] was often eaten raw by the hunter to give him good luck. It might not be eaten by women or children, though they were permitted to eat the cooked eyes from a boiled deer head. No such procedure, they said, was followed with the eyes of the salmon.

CHAPTER IX

BELIEFS, RESTRICTIONS, AND CEREMONIES

BELIEFS AND RESTRICTIONS CONCERNING FISHING

Various beliefs concerning fishing, luck charms, taboos, and restrictions have arisen.

YUROK

Reported by Hewes.--1. The longer and more valuable dentalium shells are usually covered completely, or at least ornamented, with the skin of a tiny red snake. To see many of these snakes is an omen of good luck for money. The tip of the tail of such a snake is tied onto an eel net to insure a good catch of lampreys.

2. When a large lifting net is set in an eddy in the river, it is carefully watched. If driftwood is carried into the net, it is a sure sign that this is a poor fishing place.

3. When a lifting net is attached to its large A-frame, the attaching must be done in exact progression, according to informants; then the net must be let down into the water in accordance with a certain specified formula and with certain motions.

4. When sturgeon leap straight up and back down at about the same spot, it is because the water is cold and this indicates that they will not move far. However, if they leap at an angle (forward), they are going to run and the prospects are good for netting many soon.

5. Merlus was the name of a small species of fish in the rivers, which resembled the frog fish or sea-robin. In cooking, this fish is said to "jump" at the fire. However, if someone says, "A pregnant woman will eat you," it becomes quiet.

6. Women must not fish. A man should not fish during his wife's menstrual period. A Coast Yurok, however, said that there was no law to prevent women from fishing, but they were too busy with housework. They could help paddle a canoe but must not use a spear.

7. It was forbidden to eat anything on the bar or sand spit at the river mouth. [Kroeber learned the same.]

This restriction applied for certain distances along the beach and upstream, such as mâgá, the shore ("bank of the ocean") north of Turkey Rock (oregos). Toward the south the restriction extended to etskwak'oo. Inside the mouth the restriction applied on the south side up to pkentcopegemo [Waterman, 1920a, map 5, No. 49, on north side]; to atcâ´ł on the north bank. [Pkentcopegemo corresponds to Pkets-o-pegemu of Waterman, 1920a, map 5, no. 49, but on north side and at mouth. The other places named have not been identified either in Waterman or in Spott and Kroeber, 1942, p. 182, where boundaries are given for rights to beached whales and to sea-lion flippers.]

8. These same boundaries applied to the abstention from fresh salmon at the time of the first-salmon ceremony.

9. A person might not smoke within these same limits. If, for some reason, it was necessary to take food or to smoke within these limits, this must be done in the canoe, not on land [the inverse of the general rule]. Yet, if it became necessary to build a fire and cook at the river mouth, this might be done, provided someone was actually in contact with the soil, like some old man leaning on the bank.

10. At Rekwoi the people must be on the point of starvation before they would eat seals or bears. Seals were not eaten because they are the slaves and companions of a great sea monster, Ka·mus. If a seal sees Indians (or children) in a canoe, he goes back to Ka·mus, who then may capsize the canoe. There are many kinds of Ka·mus. The informant's father saw one on an evening in winter. It was as big as a dam stretched across the mouth of the lagoon. The water was very high. It flowed over him, and made a noise like the surf. At other times the Ka·mus takes the form of a trout [sic] wriggling back into the surf after being cast up onto the beach. It would be fatal to follow such a fish. A person would be enticed into deep water and drowned.

One Yurok added that the Tolowa did not refrain from eating seals.

Reported by Kroeber.--11. Yurok boatmen may not consume food while on the ocean, and "even on the river, travelers might not eat a meal; but if in haste, they might carry fire on a layer of earth in the canoe, heat stones, and then, disembarking, quickly cook" (Kroeber, 1925, p. 69). Compare Hewes's last preceding sentences.

Certain restrictions pertained to salmon.

12. Salmon caught in "April or May" [presumably before the first-salmon rite at the river mouth] might be dried, and they could be eaten fresh by the aged. Younger people could not eat these as fresh fish until after the salmon medicine had been made. [The Karok have a similar rule as regards their first-salmon ceremony at Amaikiara.] The old may take the risk because they have not long to live anyway.

13. It was prohibited to talk or make a noise while in a canoe on the ocean. One must not point out people on shore. On a river no such restrictions applied. There one could talk, even yell, while traveling in a canoe. Also, a person on the bank could point out people in a canoe on the stream.

14. There were definite restrictions on foods which might or might not be eaten together: Deer meat, bear meat, grouse eggs, or acorns blackened by prolonged soaking, must never be eaten at the same meal with any kind of fish or with sea-lion meat. Acorn products may be eaten at the same meal with any other food, and different kinds of fish could be eaten at the same time.

15. "It is believed that deer cannot abide the whale; the flesh of the two is not eaten together, and whale meat is called 'rotton wood' before a [deer] hunter in order not to spoil his luck'" (Kroeber, 1925, p. 69).

Also, carrying whale meat upriver may cause rain.

One old Yurok said that the eating of whale meat spoils a fisherman's luck for salmon. In fact, care must be used in handling fish generally; to throw away the head of a salmon carelessly may ruin the luck of the one who has caught the fish.

KAROK

Reported by Gifford.--16. Before the first-salmon ceremony at Amaikiaram, any person who had not observed continence and ate salmon or steelhead, was in risk of being drowned on the following day or killed by a rock rolling down the mountainside. Even after a dream about intercourse, salmon must not be eaten.[58] [This restriction seems a reinforcement: salmon were forbidden before the ceremony anyway, but doubly so after intercourse.] Later in the year no such taboo was observed. One of Hewes's informants specified this prohibition as at the mouth of Clear Creek and on steelheads only, from the time that the "rocks are piled until the World Renewal ceremony there in August"--which evidently comes to the same thing. This strict taboo against the use of steelhead (or even touching them) must be observed or "the world will fall apart," Hewes's informant goes on. It is bad luck even to touch a steelhead accidentally during this period.

17. A menstruating woman may not eat either [fresh] salmon or venison.

18. At Katimin steelhead are not eaten for a period of a month preceding the World Renewal ceremony (pikiawish) in September. However, spring salmon may be eaten.

19. Fresh salmon must never be eaten along with venison. This will spoil the fisherman's luck. However, dried salmon may be eaten at the same meal with venison without ill effect.

20. While larger game animals and birds must be brought into the house by way of the "back door" [removal of a plank], this restriction does not apply to fish.

Reported by Hewes.--21. The front pectoral fins (a´rup) of the sturgeon were reserved for people of wealth and rank. No one else might eat these morsels. If a poor man caught a sturgeon, he must give these fins to someone of rank. He could not eat or dry them himself. [This parallels the sea-lion flipper rights inherited in a certain house at Rekwoi (Spott and Kroeber, 1942, pp. 182, 183, 191).]

SHASTA

Reported by Hewes.--22. Lightning (or Thunder) and Dove gamble, Lightning betting summer salmon, Dove betting "grass" seeds. When Dove loses, you hear Dove calling in spring earlier than thunder sounds; there will be plenty of seeds that season. When Thunder loses, thunder is heard before the call of the dove in the spring; there will be a few (sic) summer salmon that season. In winter both Lightning and Dove are away.

23. While there were no fishing songs and no formal fishing ritual was made, the Shasta did not eat salmon until the formal ceremonies held by the Karok downriver had been concluded. The Shasta caught and dried salmon at any time, but fresh salmon must not be eaten until after the Karok pikiawish or world renewals had been concluded in early fall. [The nearest pikiawish, at Clear Creek, came about August-September; those at Katimin and Orleans, a month later; but it is doubtful if the Shasta would have had much news of these more remote festivals.]

24. Many Shasta journeyed downriver to witness the pikiawish [presumably the Clear Creek one] and knew of the dire evil that befell if anyone but the ritualist looked at the crucial fire he lit. They looked upon this rite as the special province of the downriver and fishing Karok, just as hunting was their own specialty.

Reported by Holt.--25. Tobacco was used (together with another herb) as an offering to fishing pools. It was used with a short prayer for luck (Holt, 1946, p. 310).

MATTOLE

Reported by Hewes.--26. In the fall, if you feel the east wind blowing cold, you know that "the fish want to come in." The formulist has songs for fish. Even some ordinary men have songs for salmon, eels, and other species.

27. Among the Mattole, conduct toward waves is prescribed: The water watches you and has a definite attitude, favorable or otherwise, toward you. Do not speak just before a wave breaks. Do not speak in passing rough water in a stream. Do not look at water very long at any one time, unless you have been to this same spot ten times or more. Then the water there is used to you and does not mind if you're looking at it. Older men can talk in the presence of the water because they have been about so much that the water knows them. Until the water at any spot does know you, however, it becomes very rough if you talk in its presence or look at it too long.

28. The ordinary period of abstinence from meat, by a menstruating woman, was five days, sometimes ten. She might then eat dried salmon, though she was prohibited from eating fresh fish for two days. [Among the Yurok, Kroeber was told by Spott, dried salmon was her principal non-vegetal food during her periods, but even a small piece of this, taken from her hut of retirement into any supernatural or ritual context was contaminating.]

NONGATL

Reported by Hewes.--29. Among certain other tribes bad luck resulted from walking behind a fisherman, but this was not Nongatl belief.

WIYOT

Reported by Hewes.--30. Continence must be observed, otherwise an accident might befall a hunter or fisherman, or at least he would have bad luck.

31. A woman might not fish, handle, or step over a net, or take hold of fish lines.

TOLOWA

Reported by Hewes.--32. If a woman fishes alone--without a boy along--she will likely die before the year is out.

33. While there was apparently no rule against eating venison with fish, there was a definite prohibition against eating bear meat with mussels. It was said that to do so would cause the mussels to disappear from the rocks: "the bear would scratch the mussels off the rocks."

[58] Kroeber's Karok information from Little Ike states (Kroeber and Gifford, 1949, p. 40), "A man dreaming of a woman, or sleeping with a woman, eats no fresh salmon before New Year's, for fear of slipping on a rock and being hurt, being bitten by a rattlesnake, or otherwise losing life or limb." Another Karok informant stated (p. 42), in speaking of the Jumping Dance, that "the priest must be continent for a year after his retreat if he wanted to have good luck."

34. Women were not allowed around a fish weir. They were not allowed to fish with a surf net, except that, if there was no man present big enough to fish, then a woman could use the net, provided she had a boy to help--no matter how small the boy was (2 to 3 years), he could hold the "sack end" of the net. Apparently his male presence was all that was required.

NORTHERN POMO AND KLAMATH

Going farther afield we find that every tribe probably had certain rules and restrictions. For example:

Gifford and Kroeber (1937, p. 172) mention that among the Northern Pomo of Russian River, wood damaged by woodrats or birds must not be used in building a weir or bad luck in fishing will result.

Spier (1930, p. 148) shows that the Klamath have certain mourners' restrictions upon fishing and eating fish. Fish gall must be thrown back into the water. Most other restrictions, however, are absent. He also mentions the absence of any salmon-heart magic.

CEREMONIES

AGINSKY, 1943. N, Pl. Miwok, p. 398. First Salmon rite.

BARNETT, 1937. Tolowa, Chetco, p. 193; First Salmon rite, First Acorn rite, etc.

BEALS, 1933. Nisenan, p. 354. First Salmon ceremony in north, not in south.

DIXON, 1905. Maidu, p. 198; simple "First Salmon" ceremony; first salmon must be caught by shaman.

_____, 1907. Shasta, p. 430; regulations concerning "First Salmon" and "Salmon Medicine."

DRIVER, 1939. Tolowa, Karok, Yurok, Hupa, Mattole, Kato, pp. 314, 380.

DRIVER and MASSEY, 1957. General statement concerning First Salmon Ceremony, p. 256, map 64.

DU BOIS, 1935. Wintu, p. 15; no first salmon ceremony.

GODDARD, 1903. Hupa, pp. 78, 79.

GOLDSCHMIDT, 1951. Nomlaki, p. 408; "First Salmon" rite denied.

GUNTHER, 1928. Pp. 129-173; general discussion of "First Salmon" and "First Fruits" ceremonies, including California tribes.

HARRINGTON, 1932. Karok, pp. 7, 241-252; "Spring Salmon" ceremony; "World Renewal" ceremony with special reference to the importance of tobacco.

HEWES, Th., 1947. Kato, p. 76; modified form of "First Salmon" ceremony. Yurok, p. 84; Kepel dam. Yurok, Hupa, Karok, p. 86; celebrate "First Salmon" ceremony jointly; relationship to "First Fruits" ceremony.

HOLT, 1946. Shasta, p. 310.

KROEBER, 1925. Yurok, pp. 53, 60; first salmon speared by shaman, eaten by his assistant. Kepel dam, p. 58. Yurok, Karok, Hupa, Yuki, pp. 53, 102, 134, 183; world renewal. Yurok, Karok, Shasta, Maidu, pp. 103, 294, 437; "First Salmon" rite. Achomawi, p. 313; a mild form of "First Salmon" ceremony. Hupa, p. 134; lamprey ceremony.

_____, 1929. Nisenan, p. 273; first salmon caught in any new net had to be consumed completely.

_____, 1932. Yuki, p. 371; no first salmon ceremony.

KROEBER and GIFFORD, 1949. Karok, Hupa, Yurok, pp. 35-56, 59, 61, 99, 105, 116, 120, 124, 128; "First Salmon" ceremonies and myths of origin.

LOEB, 1926. Pomo, p. 169.

_____, 1932. Lake Miwok, pp. 123, 124.

McCLELLAN, 1953. Wappo, p. 239; First Fruits Ceremony.

NOMLAND, 1935. Sinkyone, pp. 153, 154; southernmost extension of First Salmon rite here meets the California acorn rite.

POWERS, 1874. Shasta, Achomawi, p. 413; salmon ceremony.

_____, 1877. Tolowa, Yurok, pp. 56, 57, 67; salmon ceremony.

ROBERTS, 1932. Karok, pp. 426-440.

SCHENCK and GIFFORD, 1952. Karok, p. 388; madroño wood used to cook first salmon.

SPIER, 1930. Klamath, p. 148; no "First Salmon" ceremony. First sucker ceremonially roasted at one certain spot.

SPOTT and KROEBER, 1942. Yurok, pp. 171, 172, 175, 178, 179, 203; "First Salmon" rite.

THOMPSON, 1916. Pp. 44-54, 135-137; building of the fish dam at Kepel. "Laws of the Fish Dam."

WATERMAN, 1920. Yurok, pp. 248, 249; town of Kepel and the ends of the fish dam located.

WATERMAN and KROEBER, 1938. Yurok, pp. 49-80; the Kepel fish dam.

MAP 54

The first-salmon, first-lamprey, first-acorn, and general "first-fruits" rituals of the core tribes have been described in Kroeber and Gifford's World Renewal (1949). Some such rite forms a feature in perhaps all the greater ceremonies of the core tribes, and in some rituals like the Karok one at Amaikiaram, it is perhaps central. Others, like the first-lamprey rite of the Hupa, seem to stand outside the specific complexes covered by the term "World Renewal."

Among the marginal and more distant tribes which have not elaborated formal world renewals, a first-salmon rite is most widespread and important. This rite, as well as the first-salmon aspects within world renewals, are covered by the bibliography at the head of this section.

CHAPTER X
SHELLFISH

We use the term "shellfish" rather than "mollusks" for this chapter heading because our discussion includes some minor food use of species of two or three other phyla: crustaceans, echinoderms, and perhaps coelenterates.

By far the greatest quantity of shellfish food was taken in salt water. Fresh water provided only crayfish and river "mussels" or "clams" (Unionidae). Inland tribes like the Hupa and Karok probably consumed many more mussels and other ocean foods, including surf fish and seaweed, than crayfish and river shellfish from their own territory, the ocean food being obtained by trade and by visits to the coast.

Edible seaweed--Porphyra perforata--was gathered and dried wherever the coast was rocky. It was eaten like a food, but also as a condiment, displacing salt among the coastal tribes. It could not be dissolved or seasoned into food, but flakes of the dried "leaves" were broken off and eaten between or with bites of acorn gruel. Surf fish served a similar purpose: one or two of them on a small openwork tray were laid across the top of the individual basket of acorn gruel served in well-to-do provident households.

There are some gaps in recorded data concerning the use of Porphyra seaweed--either in fact or in the records (mostly Culture Element Survey listings)--which Kroeber has discussed in his 1941 paper on "Salt, Dogs, Tobacco."

MOLLUSKS

BARRETT, 1952. Pomo, pp. 105, 106.

DIXON, 1905. Maidu, p. 198; river mussels dived for.

DRIVER, 1936. Wappo, pp. 184, 185; abalones, clams, mussels.

_____, 1939. Tolowa, Yurok, Wiyot, Chilula, Mattole, Sinkyone, Coast Yuki, p. 310; shellfish poisoning. Mussels, clams eaten. Tolowa, Mattole, Coast Yuki ate octopus.

DU BOIS, 1935. Wintu, p. 18; mussels and clams obtained from river bottom by diving. Roasted or boiled. Extras dried and stored.

ESSENE, 1942. Pomo, Kato, Yuki, p. 4; mussel poisoning.

GIFFORD, 1939. Coast Yuki, pp. 307-371, 326-328; various species of shellfish and other sea foods utilized. Pp. 337, 338; abalones and mussels pried off rocks with a special "abalone spatula."

GIFFORD and KROEBER, 1937. Pomo, pp. 138, 178; shellfish poisoning.

GOLDSCHMIDT, 1951. Nomlaki, p. 407; dive for clams in river.

GREENGO, 1952. All northern California coastal tribes, pp. 63-114; review of sea foods. Pp. 85-90; shellfish poisoning discussed.

HARRINGTON, 1942. Coastal tribes south of San Francisco, p. 8; mussel poison denied.

HOLT, 1946. Shasta, p. 309; river mussels.

KNIFFEN, 1939. Pomo, pp. 365, 378, 386; cascara chisel for abalones.

KROEBER, 1932. River Patwin, p. 278; river mussels taken by diving.

LOEB, 1926. Pomo, pp. 164, 165, 169, 182; mussels, barnacles, and other sea foods.

LOUD, 1918. Pp. 275 ff.; goes into details concerning the kinds of shells encountered at the various mounds and archaeological sites about Humboldt Bay and vicinity.

NOMLAND, 1935. Sinkyone, p. 154.

_____, 1938. Mattole, p. 113.

SOMMER et al., 1937. P. 553; shellfish poisoning.

STEWART, 1943. Pomo, pp. 60, 61; sea foods.

For mollusks, Hewes's somewhat scattering data are supplemented by Gifford's (1939) excellent information on a group at the edge of our area, the Coast Yuki, and especially by Greengo's 1952 monograph on Shellfish Foods of the California Indians, which gives data on the northwestern tribes. Greengo, in a second paper, treats the archaeological aspects of the subject (MS, 1951).

All these tribes used the various shellfish available. Those living along the immediate coast line had an abundant supply at all times and they dried them, not only for use in winter, but also as an article of barter with the people living farther back in the mountains. Frequent mention is made of this barter. The interior people also made trips to the coast where they were permitted to

collect shellfish and other sea foods for themselves on the beaches and rocks of their friendly neighbors.

Much the most important species in the northwest is the large ocean mussel, Mytilus californianus, which grows to nine inches long. It lives on rocks exposed to the tide, and the largest specimens are likely to be on offshore sea stacks. This large mussel was important in the northwest also especially for its shell, pieces of its butt serving as the principal material of the cutting blades bound on to the stone handles of adzes.

Mytilus edulis, a world-wide species in the northern hemisphere and important on the Atlantic coast, grows in California to only half its eastern size, or to about two inches, and does not thrive in the open surf but needs sheltered bay water. Its most abundant occurrence is on San Francisco and Humboldt bays, the latter bay held wholly by the Wiyot.

Two species of Haliotis or abalone furnished solid meat, and the opalescent shell was in demand for ornaments. Abalones were quantitatively important for food especially from Monterey Bay south, but were still abundant on the Pomo and Yuki coast. North of Shelter Cove they thin out, and beyond Trinidad and Patrick Point they occur only sporadically, if at all. The Yurok and Tolowa are well aware that dentalium shell comes to them from the north, abalone from the south.

Clams live in sand, mud, or fine gravel and are therefore in most characteristic use in our area among the Wiyot, whose entire ocean frontage is low and sandy, whereas other northwestern groups have beaches only in coves, bars, and other short stretches. The principal species of clams are the razor (Siliqua patula), bent-nosed (Macoma nasuta), rock, hard-shell, or Tomales Bay clam (Protothasa staminea), horse-neck (Schizothaerus nutallii), basket or heart-cockle (Clinocardium, formerly Cardium corbis), and the Washington clam (Saxidomus nuttallii), this last the source of the shell-disk money of Coast Miwok and Pomo type, which penetrated to the northwest only very rarely, and then for ornamentation, dentalia replacing it as currency.

The large hard-shell Pismo clam, Tivela stultorum, does not reach Northwest California, its limit being below San Francisco.

The small, native, west coast oyster (Ostrea lurida), formerly of consequence in San Francisco Bay, should have occurred also in Humboldt Bay, but does not seem to have attained primary importance there.

A paralyzing poison, occurring especially in mussels, is due to a dinoflagellate form of plankton, Gonyaulax catenella. When this species becomes disproportionately numerous, as indicated by redness or rustiness of the ocean water and luminescence at night in summer, the mussels, storing the poison in their livers, are not themselves harmed but can become lethal to warm-blooded animals eating them. The northwest coastal Indians were well aware of this poisoning. Many of them believe, as do some whites, that deep-water mussels are safe, since the poison is the result of mussel exposure to the sun at low tide. The fisheries laboratory investigators deny this flatly. It is therefore to be presumed that Indians maintaining that in their habitat mussels did not become poisonous if taken below low-water line, were favored by local formations of the coast less favorable to strong accumulation of the dangerous Gonyaulax. This interesting point is gone into in detail below, from the native point of view.

The California mussel is the chief source of danger, clams appearing to be somewhat protected by living buried (though the razor and Pismo clam show some infection), and bay and estuary species by the fact that Gonyaulax does not flourish in these waters. The abalone, though on open-sea rocks, seems immune.

Greengo (1952) gives a convenient recent summary of this whole topic, with references.

Driver in his 1939 element survey found every coastal group from Tolowa to Coast Yuki aware of mussel poisoning. Occasional Pomo informants denied knowledge of poisoning to Gifford and Kroeber in 1937, and of those who knew, several maintained that mussels taken in deep water were safe.

We list the recorded instances of this deep-water safety proviso being mentioned by Indians:

Tolowa (Hewes, F.N., 1940)
Coast Yurok, and again Trinidad (same)
Wiyot (Greengo, 1952, p. 87)
Mattole (Hewes, F.N., 1940), at the Mattole R.; (reiterated by Greengo, 1952, p. 88)
Coast Yuki (Gifford, 1939, p. 315)
N. Pomo (Stewart, 1943, p. 60)
C. Pomo (Gifford and Kroeber, 1937, p. 178)

Greengo points out that the reddening of the water in the daytime and its luminescence at night were well known to at least some of the Coast Indians, and were utilized as a safety factor. He says, in fact (MS, 1951, p. 48), quoting Meyer:

> From time immemorial it has been the custom among coast tribes of Indians, particularly the Pomo, to place sentries on watch for Kal ko-o (mussel poison). Luminescence of the waves, which appeared rarely and then only during very hot weather, caused shellfishing to be forbidden for two days; those eating shellfish caught at such times suffered sickness and death (personal communication from Dr. John W. Hudson, Ukiah).

SPECIFIC TRIBAL DATA

Yurok.--According to Hewes (F.N., 1940) mussels were good at Trinidad all the year round [sic]. None [of the largest size?] were to be found on the inshore rocks, but at a very low-lying group of rocks, called Pilot Rock [a long half-mile due south of Trinidad Head: Waterman, 1920a, map 33, no. 18, Yułpets] or Mussel Rock, they were especially abundant. They were taken there whenever the tide was low enough. [Possibly the Gonyaulax plankton was less abundant so far out at sea.]

In gathering both clams and mussels silence was imposed.

Almost all the rocks near the mouth of the Klamath River had mussels. Such rocks were specially named, such as Kimtku, a rock four miles north, and Micikomâ, a rock a mile south. Both these rocks had good mussels, but they were found at such depths that they had to be gathered from canoes. [Neither rock can be identified from Waterman, 1920a, Rectangle A, B, nor can Segwok mentioned in the next paragraph.]

Another rock, Segwok, two miles north of the river mouth, had mussels which must not be eaten. Informants said that "it was against the rule," but perhaps the locality was liable to summer poison.

Hewes's informants stated that near Trinidad a few abalones (Haliotis sp.) were gathered at Patrick Point, but only at the very lowest tide of the year in August.

George Mahats told Kroeber that along the ocean

shore mussels are small. The farther out one can get them, the bigger and better they are. "I twice went out from Orekw to Redding Rock for mussels."

The "only" kind of shells dug out of the sand with sticks are the small clams called sêkwusa. These do not occur on the coast in the vicinity of Big Lagoon, but are found only north of Omen.

Spott on Yurok (and Tolowa) use of shells for wear.--No meat of shells worn as beads or on the body, or having trade value, was eaten by the Yurok. This holds for dentalia, small and large olivellas, small clams, mostly for abalone, and for the clams which were ground into perforated disks or buttons. On the other hand mussels, clams of edible size, and tritons were not used for ornament.

Dentalium shells used as money came from the far north. Occasionally pieces of dentalium would be found on the beach and were called a-srāruł. They consisted only of upper or open ends. The diameter was that of a large shell, but they were mere fragments, an inch or less long [and therefore valueless as money; and they were too few to amount to anything as necklace beads]. Only Spott's father, Captain Spott, once found a whole one at Smetskéu weroi, the creek at the north end of Enderts beach, 3/4 mile south of Nek'eł, Nickel or Cushion Creek [in Tolowa territory]. He found that this shell brought him good luck for gambling, but not for more wealth or money.

Small olivella univalves, turrk, were washed up alive at Trinidad and at Tolowa Crescent City. They were not found on the coast near the mouth of the Klamath. They were killed in heated sand. One end was rubbed off on a stone, they were strung, and used chiefly as necklaces. They were low-value. A bunch of strings of them about 1-1/2 inches in diameter [this would be around 10 strings, presumably], each string reaching from the nape of the neck to the navel [and back up again?], was traded for a capful of shelled acorns (wenípł) full to the rim. [This seems an incredibly low price for the shells; it suggests that Crescent City was acorn-hungry.] However, the upriver Karok would pay a good price for olivellas.

Similar univalves, an inch or longer, were called "olivella's grandmother," túrrk-u-kútsos.

Small clam shells used for decorating women's dresses were called sekwsé', in distinction from the large clams, sekwsó', which were eaten (fresh, not dried). They occurred only at certain places on Tolowa beaches, and reportedly on Wiyot and farther shores, around Eel River or beyond. Among the Tolowa they were found on both flanks of a gentle sand spit called Omíg south of Crescent City; at Pebble Beach, Sohtsai, northwest of Crescent City; and most abundantly at Knāāwi, Point St. George. Mostly they were got in the seventh month, tsewerhsik, seventh after the winter solstice, viz. (July-) August], when the very low tides come. The shells of the dead clams [about the size of a dime or nickel] were washed up singly, never in attached pairs. A few came with a round hole below the hinge; the rest were given a similar hole by holding the point of a finger inside and rubbing the hinge through against a rough stone. Women gathered them by going down to the beach in the morning, following the tide out, and stirring the sand a few inches down with a stick. In a good place they might get 3 or 4, or 6, or even up to 10, in a morning; if the luck or location was not so good, they might find only 1 or 2.

However, these little clams were valuable. For the larger ones, $20 was given for a string a cubit long, the shells nested spoon-fashion. For the smaller size, the string reached 2 or 3 inches above the elbow. They came in, or were graded into, two sizes: the larger ones were sewn onto the waist or belt of the dress, the smaller ones on its "apron" or skirt. They were dyed in alder bark steeped in warm water in a basket. This procedure brought out their sheen, which showed reddish against the brown of the buckskin dress. Women's mussel shell spoons were dyed in the same solution to bring out their opalescence in the sun and to redden them.

Abalone (Haliotis) were called yerernér. These were cut (sawed) with an edge of rough rock, often more or less three-cornered like a steel file, into pendants on women's dresses. The very large ones were called pegérk wer-yer, "man's his abalone," and a pair of the shells might be laid on top of a man's grave, where a woman would have baskets. Abalone was valuable and came from the south. None grew north of Patrick Point; a few were found there; [the Wiyot sandy coast would not have this rock-creeping form]; and most of them came from south of Eel River.

[These statements, plus the Spott generalization that mollusks which were worn were not eaten, further confirm the doubt which we have expressed as to the statement recorded by Hewes that the Karok received enough dried abalone meat to be eager customers for it. We suspect the informant confused shell and meat. Most of the abalones reaching the Karok would have come from as far as the Bear and Mattole River coasts, at least, and would have been passed on through Nongatl (or Wiyot), Whilkut, and Hupa hands. Valuable shells would have been much more likely to make this several-step traverse than packets of rather tough dried meat.]

Plegépił were buttons or perforated disks of clam shell of Pomo-Coast Miwok type, a few of which reached the Yurok from the south [apparently always as finished manufactures, never the raw material]. They had two uses: girls wore them strung on the neck; and they were strung on the buckskin fringe strands of dresses above the abalone or other pendants.

Women's dresses, muntséł, were of three types of ornamentation:

1. sek-sún, with sekwsé' clam shells sewn on the body. These normally had pendants on the fringes also, most often of abalone.

2. plegépił-sun, with clam disk beads on the fringe. These were more valuable.

3. Most valuable were soktóp (upper river Yurok) or serktérip (lower river) ne-mún, dresses with obsidian prisms a few inches long. These prisms had bits of notches pressure-flaked near the upper end, for attachment to the fringe. The prisms came from the Karok; abalone was likely to be traded for them. [The abalone is more resplendent, but the glass-on-glass clank of the valuable stone fascinated the Indians. One of these obsidian-fringed dresses was obtained among the Karok in 1902 by Kroeber for the American Museum of Natural History.] The tinkling of the pendants, whether of obsidian, shell, or American coins and thimbles, is called wilółkwits in Yurok; plegépił meł-elāu wilółkwits means "disk shell beads among the rattling fringes."

Karok.--Hewes says that sea foods were not much used. Dried surf fish, abalones, and mussels were brought up from the coast on occasion. Of these, mussels (tsugilc) were the most esteemed. Abalones were very hard to cut and were little used. [We suspect that the Karok were more interested in abalone shell than meat, except as an occasional curiosity.]

Greengo (1952, p. 80) discusses Karok use of river mussels.

Tolowa.--According to Hewes (F.N., 1940) mussels

were pried off the rocks with a sharp stick, and were eaten fresh or were dried either in the sun or over a fire. When eaten fresh, they were simply roasted in their shells by laying them on the hot coals. If, however, a large company was to be provided for, two or three baskets of the freshly collected mussels were spread, still in their shells, on a rack of green sticks built over a fire and there roasted.

Dried mussels were first soaked over night and then cooked by stone boiling in baskets.

Clams were found in the sandy beaches, and also in pockets of sand in crevices in the small rocks along the mouth of Smith River. They could be eaten the year round but could be gathered only at low tide. The two prevailing kinds were horse and razor clams [probably Schizothaerus and Siliqua]. Clams were roasted in the coals and eaten fresh. If there was an oversupply they were dried for winter use. Along the immediate shore they could be sun-dried without fear of flies. Otherwise they were dried on the rack over the fire in the dwelling, where the smoke protected them.

The Tolowa said that abalones did not occur on their coast. There were, however, found here two types of edible snail. One was a white snail found abundantly on the beach, especially in the spring. Snails were boiled whole. In native times the shells were broken to get at the meat. Nowadays they are pulled out of the shell with a sharp instrument.

Mattole.--Hewes (F.N., 1940) was told that mussels were good at the Mattole at any time of year, although sometimes unsafe at other points, because there was neither "red water" nor luminescence at the mouth of the Mattole.

There was no taboo against talking while gathering mussels.

Mussels were cooked, then sun-dried and strung on strings and simply hung up in the house for storage. People from the interior came for sea foods, among which dried mussels were important.

Clams were similarly handled, as were also abalones. Clams were not too plentiful in ancient times. They were dug at low tide along the bar at the mouth of the river. They were almost always roasted in the coals; only one informant mentioned that they were sometimes eaten raw.

Abalones were pried off the rocks with a chisel-shaped stick of hard wood about as long as one's forearm. The chisel end of this pry was further hardened in the fire. It was called yáltcwi. The abalones were roasted in the ashes or were buried in a shallow underground oven on top of which a fire was built in order to cook them. Here they remained till the abalone meat was thoroughly cooked and "as soft and tender as a biscuit," and this without any pounding. These were then taken out and the sand removed. For winter use they were dried in large quantities.

Limpets [probably Acmaea] were eaten, either raw or cooked.

What the informant called "water snails" [cf. Tolowa] were never eaten raw. They were cooked by boiling or by roasting in the ashes. They were cooked in the shells, which were cracked only as they were eaten.

Sinkyone.--According to Nomland (1935, p. 154), abalones were taken by prying them off the rocks with a "cascara stick sharpened at one end." They might be smoked in the drying process. They were sometimes pounded and sun-dried, as were also clams and mussels.

Coast Yuki, Pomo.--Gifford (1939, pp. 307, 311) gives a long list of mollusks and other sea species utilized by the Coast Yuki.

Stewart (1943, pp. 60, 61) goes into much detail on the sea foods of the Pomo.

CRUSTACEANS

BARRETT, 1952. Pomo, p. 107.

DRIVER, 1936. Wappo, p. 184; crabs.

DU BOIS, 1935. Wintu, p. 18; mussels and clams obtained from rivers by diving. Roasted or broiled. Dried for winter use.

GIFFORD, 1939. Coast Yuki, pp. 310, 325, 326.

LOEB, 1926. Pomo, pp. 164, 165; lobsters netted at low tide. Snails.

NOMLAND, 1935. Sinkyone, p. 154; crabs, river crayfish caught by hand.

_____, 1938. Mattole, p. 113; crabs caught with baited net.

SPIER, 1930. Klamath, p. 154; crayfish boiled.

STEWART, 1943. Pomo, pp. 60, 61; sea foods.

In fresh water, river and creek crayfish were the only crustacea available.

In salt water, two species of Cancer--antennarius and productus--were chiefly taken, according to Greengo (1952, p. 67), from pools among the rocks at low tide. The present-day market crab, Cancer magister, is rare in the intertidal zone, but it "may have been taken occasionally." This coincides with Kroeber's general recollection. The two accounts of crab taking are from the Tolowa, in tidal pools, and from the sandy-shored and estuarine Wiyot, who used a lifting basket of the sort that the Karok and Shasta had for crayfish.

Barnacles, both Balanus and Mitella, are sessile saltwater crustaceans, and are mentioned by Greengo (1952, p. 66) as considerably used in California. He cites accounts from Loeb (1926) and Stewart (1943) of gathering and hot-ash cooking of barnacles by the Pomo, and of building fires on top of beds of them exposed on flat rocks by low tide--a method known also to the Kwakiutl. The only Northwest California reference to the use of barnacles is by Greengo (1952, p. 81), who says that the Yurok cooked pig's foot barnacles (Mitella polymerus) in hot sand.

SALT-WATER CRABS: TRIBAL DATA

Hewes attributes to the Wiyot a trap for crabs similar to that of the Karok for crayfish. A shallow plate-form basket has strings fastened to its edges so that it will remain level. It is weighted with a stone or two, is baited with meat or fish, and is lowered into salt water. If raised carefully, the crabs on the basket are not frightened "and may be easily picked off by hand" [sic]. It is interesting that this one report of a trap for salt-water crabs comes from the still-water Wiyot. The other ocean-fronting tribes seem to have got their crabs chiefly from tidal pools among the rocks.

The Tolowa told Hewes that they caught crabs in pools at low tide. A torch was used if they were hunted at night. Large crabs use their pincers for defense, but if held belly up they are helpless. They are usually thrown into a burden basket as caught. They are cooked in the hot ashes and sand of the fire.

FRESHWATER CRAYFISH: TRIBAL DATA

Hewes's (F.N., 1940) informants stated that the Yurok sometimes caught crayfish (kerłker) by fastening a piece of salmon into the end of a string which was tied to a pole. Other Yurok mentioned a similar device, but used, instead of a piece of salmon, a ball of what they called "Bald Hills grass." The crayfish "held tightly" onto the fibers of this ball [could not disengage their claws or legs fast enough] and were easily pulled out of the water. They said that crayfish were frequently caught by hand at the water's edge.

The Karok used a pole and string baited with salmon gills. Also a bunch of salmon gills were tied above or in a basket set beside or under a rock, and the feeding crayfish lifted with the basket [as also per Gifford's fuller account in the next paragraph]. They were also caught by hand. When roasted in the ashes, they became deep red.

According to Gifford, the Karok called the crayfish xānson. It was caught and eaten chiefly by children and old people: a large openwork plate-form basket, called imvarum, had a four-foot stick rigged to its center so that the basket would remain horizontal when lowered into a still place in the river; on the basket were salmon gills as bait. After crayfish had been lured aboard, the basket was lifted quickly. They were cooked in hot coals, the small amount of meat eaten, and the shells strung and used as playthings by children.

Among the Tolowa, according to Hewes, crayfish (nile·métaka'acûs) were caught by hand under rocks in streams, usually while people were swimming. They were cooked either in the ashes or in the underground oven.

The Mattole said that crayfish were abundant upriver, but were not found in the brackish water at the mouth of their river.

Crayfish were trapped by the Shasta, according to Hewes, on a plate-form basket used as Gifford describes for the Karok, except that several strings were attached to its edges instead of a stick to the center, and a stone was laid on it with bait, in about four feet of water in the evening. After ten or fifteen minutes it was pulled gently to the surface. The crayfish were boiled in a basket.

ECHINODERMS AND COELENTERATES

The eggs or gonads of the sea urchin Strongylocentrotus purpuratus were eaten raw by the Tolowa, Wiyot, and Pomo, according to Greengo (1952, p. 76), confirmed for the Pomo by Omer Stewart (1943, p. 60). Nomland (1938, p. 113) adds the Bear River. Kroeber seems to have no record for the Yurok, but this is presumably an accident of non-mention.

Somewhat similar is the use of a sea anemone, Cribrina xanthogrammica, according to Greengo (1952, p. 81), which however seems always to have been cooked. The first references are from Pomo and Coast Yuki, and it may have been a more frequent food there than farther north. The citations are: Pomo, Loeb, 1926, p. 164; and Omer Stewart, 1943, p. 60 (dried, soaked, warmed); Coast Yuki, Gifford, 1939, p. 328 (in hot ashes); Wiyot, Greengo, 1952, p. 82 (sliced and fried, doubtful whether pre-Caucasian [certainly frying was not]); Tolowa, Greengo, 1952, p. 82 (on live coals); mentioned also by Drucker (1937, p. 231). Again the Yurok are lacking--whether because of greater choosiness or from an accidental gap in the record is not clear.

CHAPTER XI

SEA MAMMALS

PROPERTY RIGHTS IN SEA MAMMALS

Sea mammals, especially sea lions, were regularly hunted by the groups on the coast, and sometimes by people living farther back, when they made summer journeys to the coast for surf fish, sea birds, seaweed, and especially sea mammals. The sea lions were found particularly in their regular rookeries on the outlying rocks. So important were these that many rocks or groups of rocks were particularly owned, and the claims passed on by inheritance or payment, like salmon eddies along the rivers.

There is however no known case of sea-lion rookeries being owned exclusively by a single family. While it was a matter of prestige to have a claim to sealing rights on the great Redding Rock (as per Waterman, 1920a, map 3), many families held the same claim with equal legitimacy. For all we know, everyone born and living in sight of Redding Rock had some rights to its mussels and sea lions. Quite probably this was taken for granted; it was when an inlander like Waterman's Ko'tep informant happened, through some ancestors from the coast or perhaps by settlement for an injury, to share in the right that it became a matter of boast and prestige.

The same holds even more clearly for rights to beached whales. Everyone in a specified stretch of coast (except for the few slaves and bastards) had a right to some cut of a whale. Residents of other shore stretches and inlanders did not have such a right, unless by traceable descent or remembered legal transaction. All that the "big man" had was a right to the dorsal fin or to the first cut or to priority of a cut of a certain size. Pride in this inherited privilege no doubt might lead him to say that he "owned" the whale; but this must not be exaggerated into a right to grant or withhold a share arbitrarily. Every household in the stretch shared.

Waterman (1920a, p. 221) speaks of certain tumplines kept as evidence of right to cuts of whales stranded in specified stretches of shore, and adds that "sea lion clubs, étsqwo-ū-pr´qr-m, also, were looked upon as a sort of outward and visible sign of partnership in sealing-rocks. Certain of these clubs were handed down as heirlooms." The emphasis must be put on "partnership" as well as on heirlooms.

Driver (1939, p. 314) aptly sums up the situation when for his traits 291-293 he says that among Tolowa, Yurok, Wiyot, and Mattole each beach was owned by the local group, that a stranded whale was communal property, but that certain parts of the animal were owned by individuals.

PINNIPEDS

BARNETT, 1937. Tolowa, Chetco, p. 164; club and harpoon used.

BARRETT, 1952. Pomo, p. 187; seal spear.

BENNYHOFF, 1950. Pp. 300, 301; classified forms. Quotes several authors concerning use for sea mammals.

CURTIS, 1924a. Coast Yurok, Wiyot, Tolowa, pp. 39, 73, 99.

DRIVER, 1937. Tolowa, Yurok, Wiyot, Mattole, p. 314; harpoon with 2-3 unilateral barbs. Tolowa, Yurok, Wiyot, Mattole, Sinkyone, Kato, Coast Yuki, p. 314; sea-lion club. Coast Yurok, Mattole, p. 314; sea-lion gaff. Tolowa, Wiyot, Mattole, Coast Yuki, pp. 314, 380; pursue sea lion in canoe. Yurok, p. 380; harpoon with redwood float for sea mammals.

DRUCKER, 1937. Tolowa, p. 237; despatching dart used with harpoon; fig. 2, sea-lion club.

GIFFORD, 1939. Coast Yuki, pp. 318, 319; sea lions, common seals, fur seals: all taken on rocks with harpoon, club, or bow and arrow. Also while asleep on the water. Club made of tan oak or yew. Pp. 335, 336, and figs. 6, 7; bilaterally barbed sea-mammal harpoon obtained from the north.

HEWES, 1942. Coast Yurok, fig. 34, b, p. 106; sea-lion harpoon.

_____, Th., 1947. Wiyot, Yurok, Tolowa, pp. 80, 83, 87, and fig. 104.

KROEBER, 1925. P. 816; general statement concerning harpoons for sea mammals. Yurok, p. 86; hunter uses disguise. Harpoon with unilaterally barbed, toggle head. Wounded animal followed in canoe.

LOEB, 1926. Pomo, pp. 169, 182.

NOMLAND, 1935. Sinkyone, p. 153; sea lions and seals speared from canoes. Cascara wood club. Oil stored in kelp bottles. Used as food and medicine.

_____, 1938. Mattole, p. 111.

OLSON, 1936. Quinault, pp. 44-49; whales, sea lions, seals, sea otter.

SPOTT and KROEBER, 1942. Yurok, pp. 182, 183; sea-lion flipper rights for one house defined. Details of transmission of flipper rights.

WATERMAN, 1920a. Yurok, pp. 220, 221; hunting and rights.

MAPS 71, 72

SPECIES

While no whales, large or small, seem to have been pursued, all the pinnipeds available were taken by the Northwest California coast Indians. Though this activity might properly be classed as hunting, it is here treated along with fishing since it concerns the sea, boats, and harpooning instead of bow and arrow or snare.

So far as food is concerned, the sea lion was much the most important of the pinnipeds. Both the California and the larger Steller sea lion occur on this coast, and were distinguished by the Indians. The Yurok call the California species etskwo', the rarer Steller form numi-'ets. It is the latter, seemingly, or the male fur seal, whose canine tusks were worked into the hooks worn around the forehead by two performers in the Deerskin Dance (Goddard, 1903, pl. 30; Kroeber and Gifford, 1949, pl. 2, c).

In fact, the Yurok tell of a still larger sea lion, but he came from the dentalium ocean in the north, swam to the sea of pitch in the south, ascended the Klamath as far as Salmon River, and is obviously a creature of fantasy and myth.

They further tell of a third sort of sea lion, a real animal which they used to hunt, called kwer'erł. It was brown (whereas the numi-'ets was whitish, that is, light-colored). This animal was the fur seal, which used to visit the coast between breeding seasons at the Pribiloffs.

The common or harbor seal, which belongs to a different suborder of pinnipeds from the sea lions, fur seals, eared seals, and walruses, and whose Yurok name tskwegés, may be etymologically related to the etskwo' of the sea lion, was disliked by the Yurok for its stealing of salmon out of nets and was misprized. Accounts differ whether all the Yurok or only those near the mouth of the Klamath refused to eat seals; the Tolowa and the Wiyot to the north and south of the Yurok did eat them.

The sea otter, Yurok wohpuniká', "across the ocean blanket," is strictly a member of the carnivores rather than of the pinnipeds, though it comes to land less than sea lions. Its fur was highly prized, but the Russians must have made it very scarce along the northern coast of California even before the Americans came in 1850. In fact, Heizer and Mills (1952, p. 193) give Tikhmeneff as authority for the statement that by 1817 the sea otter had been exterminated from Trinidad to the vicinity of San Francisco Bay. Ogden (1941), however, states that these furs were taken in small numbers at various points along the California coast even as late as 1848.

The Tolowa seem to have taken most sea otters, and the Wiyot, with their sandy coast, fewer than the Yurok. Along the Bear and Mattole rivers' coast, the numbers apparently picked up once more. (See also our statement below on the Mattole methods of taking sea otters.)

The Tolowa told Hewes that the fur seal was formerly found in considerable numbers. They were usually shot with the bow and arrow, or were clubbed when found ashore. They were used, like other species of seals, for food.

Of the sea otter, Hewes's Mattole informants said that this long, beautifully pelaged animal was formerly abundant. They were most easily taken while asleep on the rocks which jut up out of the water offshore, or as they dozed and floated on the surface of the ocean. A good hunter would swim out to a rock with his bow and arrow. If the wounded animal succeeded in reaching the water, it would sink, but its location could be discovered by the blood rising to the surface. If it could be retrieved or if it did not sink, it was towed ashore.

A sea otter, floating asleep on the surface, might easily be mistaken for a sea lion, it was so long. Its fur was the finest possible and was not used by common people. The meat was not eaten because [sic] this "rich fur" belonged to people of rank and wealth.

The attitudes toward these sea mammals are reflected in the Yurok narratives of Spott and Kroeber (1942, pp. 152, 182, 189, 191, 240, 241, 242).

SEA-LION HUNTING

YUROK

Account by George Mahats of Big Lagoon.--

Our people ate sea lions, êtskuk, but not seals, tskweges. Sea lions were hunted on the rocks, about six men going out in a boat. Three or four of these might bring deerskin blankets, or sometimes a bearskin because some sea lions are black. These men landed on the rock to act like sea lions and attract them; the others stayed in the boat, off to one side, out of sight. Sometimes they made a fire on the rock to keep warm. When those left there saw sea lions coming, they began to sway and crawl and shout like them, to persuade the sea lions to come up close. Meanwhile they got their harpoons ready; and when a sea lion was near enough, all the men cast their harpoons at the same time. Sometimes only one would strike, but the harpoons which missed mostly fell into the ocean and floated. The sea lion would drag off whatever harpoon he was struck by. Then the boat came close to the stack and took off the hunters, and they looked about for the sea lion to emerge. Sometimes he stayed under a long time; or only the harpoon shaft rose to the top. Then they paddled to that, caught it, and pulled on the line. Two of the men in the boat stood ready with more spears [more harpoons or different dispatching spears?]. Sometimes the animal had to be struck five times before it was killed. Besides the two spearmen, another man had to be ready to hand them a new spear. As it was dangerous to hand it to them with the point forward, it was held crosswise of the boat.

Usually they did not attempt to harpoon large sea lions when the sun was getting low, because the big ones took a long time to kill, and sometimes dragged

the boat far out into the ocean, hiwôpik, and then the sun would go down on them. Morning was the right time to spear big ones, because it might take up to half a day to kill them. A good-sized sea lion cannot be taken into the boat; holes were punched through its lips and flippers, and then it was towed back to land.

Sea lions were not skinned, but the hide was cut up and distributed with the meat. The hair was singed off and then the skin part of the cut was generally put away as a reserve against emergencies, because it kept indefinitely without spoiling. In time of famine it would be got out and eaten.

The sea-lion harpoon shaft is called we-tserher. The harpoon line is wound around it. The harpoon head is known as wer-'umerh and is made of elk horn. There are two barbs, one behind the other, along the same edge. The point is of flint or obsidian. The dispatching spear is called u-wôptsits. It is like an arrow, but larger; no attempt was made to pull it out.

There is "another kind of sea lion" called kwererł. These are hunted like the êtskuk sea lions, but are hard to find and to get. [This is not a mythical animal but the fur seal: the informant said he had killed them.] It is from the kwererł that the large canine teeth were taken which were worn on headbands in the Deerskin Dance. The females are said to have been killed after they had given birth. [This must refer to the Steller sea lion, since fur seals give birth only on the Pribiloffs.] The skin was used in the same way as that of the êtskuk sea lions. The oil was tried out and kept in the opāraw [stomach]. The kwererł meat has not much oil when it is fresh, but just before it spoils it is full of oil. This was boiled [?] out. [There may have been confusion for this kwererł between the fur seal and the Steller sea lion.]

Hewes data.--Hunters on shore watched, particularly at low tide. When sea lions "dived backwards" [that is, somersaulted or leaped out of the water, belly up], it was said, they did not see you. Then a hunter who was especially skillful with the harpoon ran quickly down to the shore and harpooned the animal. Several men were required to man the 30- to 60-ft. line to hold the animal and bring it in to shore.

Hewes (F.N., 1940) describes the Yurok sea-lion harpoon as quite short, only about four or five feet long. (See fig. 46.) The harpoon head was socketed into the forward end of this shaft. The point or head was of bone or elk antler and usually carried two barbs placed unilaterally. If the harpoon head was of the detachable type, the line was fastened to it either by a hole in the head or was held by means of a unilateral line guard. To it was securely fastened some seventy or eighty feet of stout line. This line was wound for a few turns around the harpoon shaft, the balance of the line, in sea hunting, being coiled in the canoe.

When the sea lion was harpooned, the harpoon head, if socketed, came off the shaft and the men held the line and let the animal tow the canoe. If the harpoon had a fixed head, the shaft was much longer, about ten feet, and the line was fastened to the shaft about midway of its length. Following was made easier by a fin or vane at the butt of the shaft, which had a tendency to stand out of water and serve as a kind of buoy. This fin was usually about an inch in thickness, as much as four or five inches in width and up to a foot in length. (See fig. 47.)

The canoe was always manned by at least two and sometimes as many as four or five hunters. The prow was occupied by the harpooner. Not only was he experienced, but he was frequently the leader and had undergone about ten days of special preparation: singing special songs, abstaining from water, and eating only dried salmon and acorn products. Upon his faithful adherence to these regulations depended the success of the hunt. None of the other participants were required to join in the preparations.

Sea lions (and seals) were sometimes harpooned in the water but more frequently on one or another of the rocks where they came out to sun themselves. Such spots were Redding Rock (sekwóna) (about 6 mi. offshore near Orick), Red Rock (about 4 mi. offshore near Trinidad), and certain flat rocks off Patrick Point (óolem). One of these is a sea stack, called numi'ahăg, about three miles off Patrick Point. The people of Rekwoi went to what is now known as Four-mile Rock (kim'tko) about four miles north of the mouth of Klamath River. [None of these except Redding Rock is identifiable in Waterman's maps.]

On these rocks the animals had to be approached with great stealth. No noise was made and the approach was always upwind. The harpooner had to be prepared to make an accurate cast at a range sometimes as great as thirty feet. The aim was always for some point in the thorax. When struck, the animal immediately took to the water. One or more of the men in the canoe held the harpoon line. The steersman kept the boat on an even keel. And the animal towed the boat at will, usually out toward the open sea and sometimes "even out of sight of land." [This perhaps refers to fog blotting out the shore.] Only when the animal became exhausted and rested on the surface did the paddlers head back toward land, towing the wounded animal [?] or its carcass.

The journey back to shore sometimes required, it is said, as much as four or five days [! sic; perhaps hours are meant] and was, of course, fraught with considerable danger. Tradition states that some cases of drowning are known. [See Spott and Kroeber, 1942, narrative no. 5.] The only means of steering a course back to land

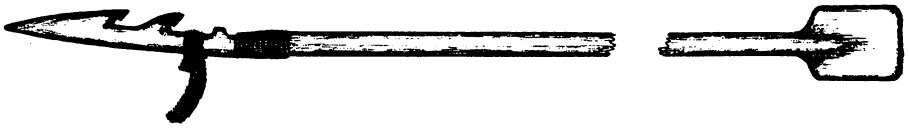

Fig. 46. Sea-lion harpoon with detachable head. Yurok. After Hewes (F.N., 1940 and Th., 1947, figs. 105-107).

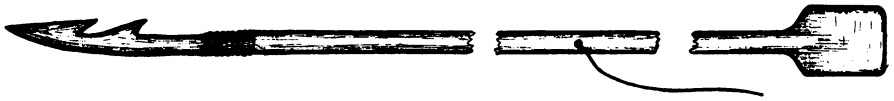

Fig. 47. Sea-lion harpoon with fixed head. Yurok. After Hewes (F.N., 1940).

was through reckoning direction by the sun, except that the people on shore kept a beacon fire burning as an assist for night travel if the canoe was within sight of land.

[We regard these statements as exaggerated as to distance and duration. Kroeber was told by the Yurok that they tried to harpoon in the morning so that even if towed out to sea they might return before the afternoon wind blew up, and a return after dark was surely regarded as dangerous.]

Hewes's informants said that it was impossible to club a harpooned sea lion: it could not be brought close enough. Shooting it with bow and arrow was difficult because of the thick and tough skin. [For "impossible" we would read "unwise." A Yurok told Kroeber that sometimes large sea lions attacked the boat, in which case they might have to be clubbed off.]

Another method of hunting sea lions on these rocks was for the spearman to go onto a rock, disguised with a mask. His body was covered with a coat of yellow paint and on his head he wore the head of a sea lion as a mask. He lay down at the edge of the rock and imitated the motions and sounds of the sea lion till one of the animals swam in close enough to the rock to be harpooned. [Note there is no mention here of creeping close to the sea lions on their rocks, only of harpooning them as they swam by.]

Seals did not congregate in large numbers in rookeries as did sea lions, but they did come out on certain rocks and perhaps cove beaches to doze and sun themselves.

The Coast Yurok said that they rarely harpooned sea lions on the rocks; the animals' clumsiness made it easier for the hunter to overtake and knock them out with a heavy club six or seven feet long, according to one statement. Such a club was wielded with both hands, and even then two or three blows might be necessary to dispatch an animal. According to Hewes, this implement must be distinguished from the one-handed short club, like a fishing club, used from canoes when an exhausted animal was brought alongside.

However, when sea lions, and seals too, pursued fish into the estuaries and up into the Klamath, especially at night, harpooning was the only recourse and would be resorted to in protection of nets as well as for the sea-lion meat. Sea lions would run upriver in pursuit of fish at night as far as Terwer or, according to another informant, to Turip, about seven miles. They could be heard roaring, but always returned to the ocean before day.

One informant described a small dispatching dart used after the harpoon. This dart (see fig. 48) was similar to the harpoon, but much shorter, though it had the fin or vane at the butt to make it go straight. The long

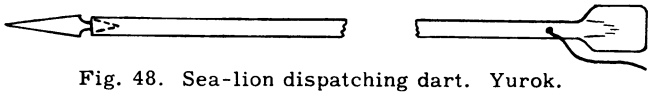

Fig. 48. Sea-lion dispatching dart. Yurok. After Hewes (F.N., 1940).

slender head (okneget) was socketed into the end of the dart. The dart was provided, just above the butt, with a line 25 to 30 feet in length. When such a dart was placed in the animal (whether by thrusting or by throwing was not stated), the line was jerked and the shaft retrieved. A new head was inserted and the dart used again. The hunter carried a number of extra heads, and he might have with him an extra dart shaft or two, in case of breakage.

Finally, when the animal was sufficiently spent so that it could be brought up near the canoe, the death blow was given by the short club, perker, of the sort mentioned by Waterman.

Archaeological evidence.--Heizer (1951) found at archaeological site Hum-118 at Patrick Point "a large number" and on Cone or Sea Gull rock (Hum-174, a half-mile south of Patrick Point and a quarter-mile offshore) an estimated 1,000 sea-lion skulls, usually with one or two perforations into the brain case. No jaws, vertebrae, or long bones of sea lions were found with the skulls, an absence which evidently represents magico-ritual deposits, such as occur farther north on the Pacific Coast. No ethnographer seems to have reported the practice.

Summary.--Sea lions could be clubbed to death if surprised in certain spots on sea stacks. They were also harpooned: in a few localities, from rocks close to deep water in the ocean or at the mouth of the Klamath; and on a number of sea stacks. In hunting at the river mouth the harpoon line was held by several men on shore. From rocks in the ocean or from sea stacks the line led to a boat waiting below and had merely to be kept from fouling; or the harpoon shaft was thrown into the ocean, or dragged into it by the wounded animal, and was recovered by the boat. In either case, the boat was towed by the sea lion--by a large male perhaps for some hours--before the animal could be dispatched with additional harpoons or by spears. Both methods are specified and probably existed side by side. Thus there were two lengths of harpoon, and the line ran from the head either to the shaft or past it to the hunter. The shaft had a vane or fin at the butt. The harpoon head was wholly different from that of the salmon harpoon: larger, one-piece (except perhaps sometimes for an added flint point), of elk antler, with the barbs in line instead of spreading and with the line attached behind the barbs so that the head did not much "toggle" or turn crosswise; and with the head set into a socket in the end of the main shaft. There was none of the elegance of refined function of the Eskimo harpoon head, but the California heads seem to have served their function, for we do not hear of speared sea lions breaking away--except in myth when one was a change-shaped doctor.

TOLOWA

Hewes account.--The Tolowa, most of whom lived on the immediate seacoast, relied perhaps more than any other California people on sea mammals for food. Again, the harpoon was used chiefly from the canoe, whereas at rookeries the main reliance was on the long club.

When a sea-lion hunt was decided on, word was sent to other settlements. If they wished to participate, they were welcomed. Otherwise they were offered some of the meat after the hunt. Each canoe was in command of a leader who might, himself, serve in any capacity in the crew, but who made the decisions as to what was to be done.

Usually all the people of the village came down to the beach to await the return of the canoes from the hunt. If canoes were caught out in a gale, and especially in a heavy fog, the hunters were guided ashore by the direction of the swells, also by the direction of the drift of the fog. If a canoe did not make shore before dark, those on shore built a good fire as a beacon.

When the canoes came ashore a feast was held. Plenty of acorns and other foods were provided to go along with

the fresh sea-lion meat. [The account even specifies fish, which would seem superfluous, and venison, which may have been permitted by the Tolowa but was forbidden among the Yurok to be eaten at the same meal with sea lion. Possibly an informant got garrulous with enthusiasm over the feast.]

Should sea-lion meat be left over after the feast, it was thrown into the ocean off the sea-lion rocks so that it would not pollute the atmosphere and offend the sea lions; otherwise they would not return to the rocks. [This account seems to contain both exaggeration and misunderstanding. Like deer, sea lions had their meat treated with respect, to ensure their future favor to the hunter. Scraps and offal would presumably be thrown into the ocean rather than be left around to rot, and the sea lions would be thought to appreciate this. It would probably be erroneous to infer that the Tolowa had a rule that all of a sea lion not consumed at the first meal had to be returned to the ocean.]

There were two fires on the shore for such a feast: one about which the men congregated for warmth, the other used by the women for cooking. It was at this latter fire that the women ate also. [This account describes the usual practice at all feasts and gatherings.]

At the mouth of the Klamath, the Tolowa said, the Yurok tied the harpoon line ashore, then speared a sea lion as it came in through the breakers after lampreys or salmon. The animal would fight the line for an hour or so and finally, when exhausted, it could be brought in close to shore by two or three men. When pulled in close enough, it would be clubbed with the large heavy club which the Tolowa called mûtcú·łagáł.

Sea lions were hunted from canoes only in the calm season from early spring through summer.

There are sea-lion rocks offshore from Tolowa territory. One such place is "toward the southwest," at a spot called yā´sō'hwut; another toward the northwest at tásō´'hwut.

The former [which is the Crescent City lighthouse rock, called pekts'u in Yurok--Spott and Kroeber, 1942, p. 240] was the larger in area and was unique in that it had a pool which was kept filled by the wash of the waves. The greater area of the rock facilitated the work of the hunters, and the pool enabled them to round up the younger animals where they could be more easily clubbed.

The other rock, to the northwest [which may have been off Point St. George], was longer, narrower, and steeper. Here hunting was much more difficult. The animals were harder to approach, and when one was stunned with the club, it was more likely to roll off into the water and be lost. This steep-sided rock did have one advantage: it furnished a very excellent vantage point for harpooning almost straight down when an animal was swimming in the water below.

Hunting at such seal rocks was done in the daytime for it was then that the animals congregated to rest. By two or three in the morning the rocks were completely depopulated, for it was then that the sea lions were out in the breakers in pursuit of the fish and lampreys.

Three Tolowa towns were mentioned where sea-lion hunting was especially important. These were xawunhwut, etculet, and mesłtełtun, located respectively at the mouth of Smith River, on Lake Earl, and at Pebble Beach at the north end of Crescent Bay. (See Drucker, 1937, pp. 226-229.) Informants said that only at such ocean-side villages did the people have "sea-going canoes" suitable for journeys to offshore rocks for sea-lion hunting and mussel gathering. At militcuntun and other villages farther back from the immediate coast line only "river canoes" were to be found. No one gave specific details as to the differences between seagoing and river canoes, but one informant did say that very special care was given to these seagoing canoes. When not in use they were hauled up beyond the driftwood line, and in winter they were drawn farther back--even being taken over the spit and into the lagoon on Lake Earl. Or they were turned upside down and the bottoms heavily pitched to prevent cracking.

Each Tolowa canoe was manned by five men, who, when they started out, sang the sea-lion hunting song, repeating it four or five times: "You must go back up onto the rock, you young sea lions." (This song was designed to entice the young animals up onto the rocks where they could be clubbed more easily than if chased with the canoe.)

Two or three of the hunters, armed with long, stout clubs, went up onto the rocks. Here they clubbed the sea lions. This feat required considerable care to avoid being bitten. If a sea lion is "doubled up" [with his hind legs under him] he can "flip over" [lunge] and inflict a bad wound with his teeth. If he is stretched out and flat, he is much less dangerous. In clubbing these animals there are two vulnerable spots--just back of the nose and on the rear of the head. A heavy blow at either point may prove fatal, and almost always at least stuns the animal. However, if it is merely stunned, it may roll off the rock into the sea. Then the men in the canoe give chase and attempt to harpoon the animal. It is necessary to get within twenty or thirty feet in order to make a good strike with the harpoon. If the canoe could be brought close enough, the animal might again be clubbed.

The animal might be butchered alongside the canoe. The skin and blubber were taken, also most of the meat. If too great weight was involved, the extra was simply thrown into the sea--such parts as the head, viscera, etc. If a small animal was secured it might be hauled into the canoe without being cut up. This skinning and butchering was done with a flint-bladed knife with a handle of wood or bone.

If no full disguise, in the form of a sea-lion skin or even of a sea-lion head as a mask, was worn by the hunters, they blackened their faces with charcoal to render themselves at least partly invisible to their prey. The disguise was, however, very frequently employed. A single hunter, with a sea-lion skin covering him from the waist up, would go onto one of the rocks and roar and act like a sea lion in order to attract the animals to the rock and within range of his deadly club. Or several hunters went onto a large rock and, by surrounding the animals, succeeded in corralling the younger ones and clubbing them. The older animals were pretty tough eating and if they did escape and swim away, it was not considered much of a loss. The younger animals were very tender, and it was sometimes possible to secure a considerable number, in fact, "a canoe load" at one time.

Sometimes a hunter wearing a disguise, as above mentioned, but this time armed with a harpoon, would go ashore and spear one of the sea lions. No attempt was made to hold onto the line, to the rear end of which the shaft of the harpoon was left attached. It served as a float and by it the course of the animal could be easily followed. The flat fin or vane of the shaft, especially, was easily visible. When the sea lion became weary, the men in the canoe would seize the pole and play the animal to tire him out as quickly as possible.

The sea-lion harpoon is called in Tolowa tcāántí-mûłótket-tûtłki'rc. Informants stated that no darts were used in connection with this harpoon.

Incidentally, it may be noted that these Tolowa informants stated that the oils of the seal and the sea lion were stored in the paunches of these animals or in kelp bottles. The bottles were no doubt common on this immediate coast line, and their use by the Tolowa is quite expectable. The informants did not mention bladders used as receptacles.

Drucker account.--[This account condensed from Drucker, 1937, p. 234.] Sleeping sea otters, seals, and sea lions were clubbed on the beach. On a sea-lion hunt, one or more canoes (each with a crew of five, and after proper ritualistic procedure) paddled out to the sea-lion rocks. One or two men went ashore with clubs after the sleeping animals. If pursuit in the water was necessary, the harpooner stationed himself in the prow. The others paddled. If the harpoon was planted, the harpooner held the line until the animal was exhausted, then killed it with a dart. [See Drucker, 1937, fig. 2, p. 237, for sea-lion harpoon. It should be noted that this drawing is evidently not sketched from a preserved specimen but was drawn from statements made by informants. Comparative material suggests that the head was not perforated, that the shaft was longer and thinner than drawn, and that the square end into which the head is socketed represents a misunderstanding or a poor description of the fin or vane at the butt of the shaft, if not a confusion with the set-hook float described for the Tolowa by Hewes in our chap. VI under "Fishhooks."] (Fig. 40.)

WIYOT, BEAR RIVER, MATTOLE, SINKYONE

Our information on the Wiyot, Bear River, and Mattole is again from Hewes.

Wiyot.--With a very quiet approach to a sea-lion rock in a canoe it was possible to get so close that, as the animals finally took alarm and dived into the water, one might be harpooned. They are strong swimmers, but eventually they become exhausted and may be stunned with the seal club.

Hewes illustrates (Th., 1947, fig. 104) a toggle harpoon with a single point, three-barbed head with flint tip, described to him by the Wiyot for hunting sea mammals. [See fig. 49. The barbs recurve more than in preserved specimens, and number one more.]

Hewes states specifically that the harpooners went out in dugouts from the mouth of Eel River.

The animal once dispatched, its nose was pierced and a line passed through it, by which the carcass was towed ashore.

Both sea-lion and seal meats were highly esteemed by the Wiyot for their fatness and their fine flavor [whereas the Yurok mostly did not eat seal]. The oil was carefully saved, being stored in the sea-lion paunch or bladder. Both were carefully cleaned and made good storage receptacles. The bladder was blown up, it is said, until it had a capacity of as much as four or five gallons. [These statements explain the discrepancy of the Yurok speaking sometimes of the paunch and sometimes of the bladder as used for storage; it might be either.] The oil was eaten "like butter," as the informants expressed it.

Bear River.--Boats were used to reach sea-lion rocks, though everyone swam out for merely gathering mussels. It required a strong line to hold a sea lion -- always of iris fiber and about half an inch in thickness. It would take several years to gather the materials, so it was customary to assemble the deer snares of several families and tie these together to make a rope of sufficient length. Once secured, the sea lion was hauled ashore by this line.

One of Hewes's Bear River informants recounted briefly that a very long time ago a sea-lion hunting party was towed far out to sea. The people ashore built a signal fire of dry fern fronds at a point near Oil Creek in order to help guide this canoe back to shore.

Mattole.--The harpoon used for sea lions was fitted with a "blue flint point, with elk horn barbs," and this head was attached to a stout line of iris fiber about thirty feet long. The shaft was made of young fir. What they probably mean by the "blue flint point" is that the barbed elkhorn head was slotted at the end and fitted with a flint tip. The Yurok "whale-color" flint is blueish or greenish. Iris-fiber rope was, they say, the strongest possible, would never break, and would withstand water without rotting.

The harpoon was here considered the surest method. The hunter swam out to the rocks (boats were not used) with his harpoon, and stealthily approached the animal. When he succeeded in planting the harpoon, the animal took to the water with the line. A spear with a fixed point was not used because the sea lion is so powerful that it would soon snap off the shaft. Further, it was believed that the "blue flint from the beach" was poisonous. A sea lion or a seal, or a human being, speared with such a point would die.

Another method of harpooning was to steal up silently in a canoe [sic: boats not used to reach rocks-- ante] upon a sea lion sleeping on the surface of the ocean. If the harpoon head was well planted, the animal would tow the canoe for some distance, often a mile or so. It eventually became exhausted and could be dispatched.

Sea lions, and seals as well, might be taken with a special "iron-wood" club made for the purpose. If a sea lion came up near enough to a canoe, it might be dispatched if hit on the nose. A blow on the top of the head was of no avail, for the skull is too thick and hard. Hunting on the rocks was done by four or five men armed with these clubs. With luck, someone got in an effective blow on the animal's nose, which stunned it so that it could be finished off. These clubs were even more effective on harbor seals, because they are much smaller--a blow almost anywhere on the head was lethal.

A hunting party would, with luck, succeed in taking a number of seals, even ten to twenty, in a day. If they got a great many, a man swam out to the rocks with a long rope-- "as much as a quarter of a mile long" [sic]. The cheek of each clubbed animal was slit and the rope passed through it. Such a string of animals was not unlike a string of fish. They were then floated in onto the adjacent beach, where they were butchered and cut up into slabs of meat and blubber of suitable size for handling. The viscera and other offal were food for the sea gulls. The bones were left on the beach.

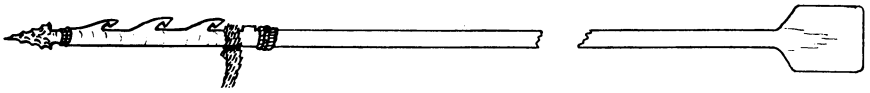

Fig. 49. Sea-lion harpoon with three-barbed head and flint point. After Hewes (F.N., 1940). [The size of the stone tip may be somewhat exaggerated.]

The seal meat was divided in accordance with the ownership of the rocks upon which the animals had been killed. Each of these "seal rocks" was owned by one or more persons, sometimes by as many as seven to nine men. As informants put it, "They have owned this rock from the time the world was made. When one owner dies, his share is given to someone else. Sea-lion rocks are not public [common] property. For instance, the Bear River [Athabascan] people own Steamboat Rock. The Eel River [Wiyot] people own False Cape Rock for sea lions." [Note that the evidence cited for private ownership is that certain rocks are owned tribally, not intertribally!]

When the meat was cut up and properly apportioned, it was carried home "like slabs of bacon." Everybody in the community shared in accordance with the wishes of the "owners" of the rocks.

As the oil tried out and dripped, it was caught in large abalone shells. When a shell was full, it was emptied into a kelp bottle for storage. The bulbous end of the giant or "whip" kelp, when partially dried, is very tough and serves admirably as a container.

The sea-lion meat was dried for winter and this "jerky" was considered very good eating.

Sinkyone.--Nomland (1935, p. 153) states that the Sinkyone speared seals and sea lions from their large redwood canoes and killed them with a cascara-wood club. The flesh was dried and the oil was stored in kelp bottles and used for both food and medicine. The skin was not utilized.

COMPARATIVE SUMMARY

In summary, sea-lion hunting was conditioned by local environment. It would appear that harpooning of sea lions from the land could be practiced at only a few spots, especially at the mouth of the Klamath. There is almost certainly no other Yurok stream where it would be feasible. Tolowa Smith River and Wiyot Eel River perhaps were large enough, seasonally, for sea lions to enter, but the tidal sloughs there may have had no rocks at their edges.

Except at the mouth of the Klamath sea lions were ordinarily got by going out on sea stacks, where the animals could be surprised or attracted, and either clubbed or harpooned, according to opportunity, with a boat standing by to pick up the line and wear the animal down. Occasionally, a hunter might cast a harpoon from a sea stack into a sea lion swimming close by.

It is doubtful whether any of our tribes set out to hunt by cruising in a canoe, trying to get a cast at an unwounded sea lion in the water. There is no unambiguous mention of such procedure or intent. Now and then the possibility may have occurred, but sea lions are alert in the water, as compared with whales, and they probably do practically all their sleeping on rocks or beaches. The sea otter is said to sleep or doze on the water, especially in kelp beds.

There was no intentional netting of sea lions or even of harbor seals. The Yurok along the lower Klamath were in fact much concerned at both animals ruining their fish nets as they followed salmon runs in.

SEA-LION HARPOON HEADS: BENNYHOFF DATA

J. A. Bennyhoff has reviewed California Fish Spears and Harpoons (1950)--that is, their bone or horn points or heads, which alone usually are preserved in the archaeological record.

On pages 299-300 he classifies Northwest California "simple" harpoon heads (one-piece, for sea mammals; the salmon and sturgeon toggle heads are mostly three-piece and therefore "composite").

I. Large, for sea mammals.
   A. Line held by bilateral "shoulder."
   B. Line held by bilateral "guard."
   C. Line held by unilateral "guard."
   D. Line passes through hole in head.
II. Small, for fish and small game.

Class II may have been used for seals and sea otters or for fish other than river salmon, but scarcely appears in ethnographic accounts and accordingly we do not discuss it further here. Class I was intended primarily for sea lions, but, as will appear, would hardly answer for whales with their relatively tender skin.

Of the subdivisions of I, D, "holed," is not represented by even one specimen figured by Bennyhoff. Its only illustration is Bennyhoff's figure 7, b', which is a copy of Drucker's (1937) figure of the Tolowa sea-lion harpoon as drawn by him from verbal descriptions, which has already been discussed. We assume that the hole through the head rests on a misunderstanding or misconception.

This leaves types A and B having the line held by a bilateral shoulder or guard, C by a unilateral one. The nomenclature implies that all harpoon heads were relatively flat--in contrast with, say, Eskimo and European sealing and whaling harpoon heads, which were more three-dimensional, either rounded or spreading. "Flat," in short, means that there were two "sides" and two "edges" to the piece of horn or bone. The shoulders or guards extended out from one edge ("unilateral"--the same edge as the barbs were on) or from both edges (bilateral).

The difference between "shoulder" and "guard" is not explicitly defined, but the illustrations suggest that a "shoulder" expands or slopes out obliquely from the body of the harpoon head, whereas the "guard" expands at more or less of a right angle. A "guard" may also definitely swell out across the thickness of the head, whereas a shoulder expands only in the dimension of its breadth. At any rate, shoulders come out from both edges (bilaterally), whereas guards may project from one or both edges of the harpoon head.

Bennyhoff next subdivides into: 1, "simple tip," that is, the penetrating point is of the same bone or horn as the whole head; 2, "slotted tip"; and 3, "grooved tip with inset." The distinction between a slot and a groove is not clear; it may possibly refer to whether the inserted tip was of flint or of post-European steel.

A final subdivision is into (a) simple, and (b) hooked barb, the latter denoting barbs whose inner edge recurves toward the body of the harpoon head or which, instead of coming to a point, are cut off to an oblique edge.

Bennyhoff's typological classification appears sound, so we have extricated it from his text, figures, and explanation and transposed it into the subjoined tabulation and summary. These show:

1. Northwest California harpoon heads meant for taking sea mammals fall into two classes, intended respectively for sea lions and for smaller game.
2. Both classes are basically one-piece, but class I heads, for sea lions, are larger and about two times out of three had a stone tip inserted; the smaller, class II heads are always without inserted tips, and their barbs are never hooked.

3. Both classes are flattish elliptical in cross section. Barbs, shoulders or guards for holding the line, and inserted tip if there is any, are all in the plane of the longer axis of the cross section.

4. Line guards or shoulders occur more often on both edges than on one, especially in the smaller class II.

5. Blunt "guards" are more frequent than sloping shoulders for holding the line, in both classes, but there is no strict demarcation. A rectanguloid projecting guard is the most characteristic shape for holding the line to the head.

6. All harpoon heads are held in position on the shaft from quite near their butt.

7. The head is always "male," its base fitting into a socket in the shaft. This is in distinction from the composite salmon harpoon head, which is always "female."

One-Piece Harpoon Heads for Sea Mammals
(Plate references are to Bennyhoff's monograph)

I. Large heads, presumably for sea lions
  A Shoulders on both edges
    1 Self - simple barb: pl. 4, j, k, l
    2 Tipped - simple barb: pl. 4, m, p, q, r
  B Guards on both edges
    1a Self - simple barb: pl. 5, a
    2a Tipped - simple barb: pl. 5, c, d, f
    2b Tipped - "hooked" barb: pl. 5, g
  C Guard on one edge only
    1a Self - simple barb: pl. 5, h, i
    2b Tipped - "hooked" barb: pl. 6, a, b, c, e
    3b "Grooved" - "hooked" barb: pl. 7, d'
II. Smaller heads--no grooving or inserted tip, no "hooked" barbs
  Ala - shoulders on both edges: pl. 4, s, t, u, v, w
  Bla - guards on both edges: pl. 5, j, k, l, m, n, o, p
  Cla - guards on one edge only: pl. 6, g, h, i

Quantitative Summary of Sea-Lion Harpoon Heads

	Class I Large	Class II Small
Projection for line on both edges		
Shoulder	7	5
Guard	5	7
Total	12	12
Projection for line on one edge only		
Guard	7	3
Total Shoulder	7	5
Total Guard	12	10
Self point	6	15
Inserted point	13	0
Simple barb	13	15
Recurved or blunt barb	6	0

WHALES

BANCROFT, 1883. P. 376; whale meat roasted in underground oven by Indians of central California.

BARNETT, 1937. Tolowa, Chetco, pp. 164, 195; beach owned by local groups or individuals. Sing to bring floating whale carcass in at desired point. Certain parts of carcass owned by certain individuals.

CURTIS, 1913. Quinault, Quilliute, pp. 10, 53, 146.

_____, 1916. Nootka, pp. 16-40; highly developed whaling fully described.

DRIVER, 1939. Tolowa, Wiyot, Mattole, Sinkyone, Coast Yurok, Coast Yuki, pp. 314, 380; ownership of beaches and of certain parts of whale carcass. Sea-lion bladder and paunch, also kelp, grease-containers.

DRUCKER, 1937. Tolowa, p. 235; whale cut in "narrow strips." Sea-lion-paunch grease receptacles.

_____, 1951. Nootka, details of whaling among the Nootka; pp. 48-56.

GIFFORD, 1939. Coast Yuki, p. 318.

GODDARD, 1929. Bear River, p. 294; uses of whale blubber and meat.

HEIZER, 1940. Yurok, pp. 80-82; "Yurok type" canoe discussed.

_____, 1943. Pp. 420, 441; whaling extended as far south as mouth of Columbia River.

HEIZER and MASSEY, 1953. Pp. 296, 297; origin, distribution and use of the "Yurok type" canoe.

HEWES, Th., 1947. Clayoquot, Makah, pp. 133, 136; aboriginal whaling off Cape Flattery.

JEWITT, 1815. Nootka, canoes of sizes up to "forty-two feet six inches at the bottom, and forty-six feet from stem to stern," p. 84. Description of Nootka whaling, pp. 132-136.

_____, 1931. Nootka, whale harpooned. Towed to shore by forty canoes. Methods of cutting up whale. Pp. 35, 36.

KROEBER, 1925. Yurok, pp. 14, 27, 84; apportionment rules for whale. Importance of whale. Value of meat.

NOMLAND, 1935. Sinkyone, p. 153; whale belongs to group. "Whale bones used for fire which dried meat." Oil stored in kelp bottles, used as food.

OLSON, 1936. Quinault, detailed account of whale hunting. Pp. 44-48.

POWERS, 1877. Tolowa, p. 67; whale feast and whale dance.

RUSSELL, 1856. Sept. 5. Whaling among the Indians of the northern California coast.

SPOTT and KROEBER, 1942. Yurok, pp. 182, 183; whale rights for one house defined.

TAYLOR, 1860-62. (Apr. 5, 1861.) Whaling on the northern California coast.

WATERMAN, 1920a. Yurok, Wiyot, pp. 220-222; regulations and measurements for cutting up whale.

We have previously noted the fact that the meat of the whale is highly esteemed, that none of the historic tribes actually put to sea to hunt this huge mammal, but that when the carcass of one did wash ashore it was seized upon most avidly, but under rules and regulations quite different from the rules governing other foods and commodities. Quite naturally only those communities and individuals having lands and rights fronting on the sea were directly concerned with these matters.

YUROK INFORMATION

Hewes secured excellent data on whales. According to these, not infrequently a whale was killed in an offshore attack by a killer whale. It would eventually wash ashore, though no attempt was ever made to tow it in or bring it ashore at any particular point. The carcass was then the property of the community controlling the particular beach or other spot where it landed. The dorsal fin (considered the choicest part of the animal) belonged hereditarily to one family, regardless of where the whale might land or of the position in which it might come to rest on the shore. When Hewes collected his data, in 1940, this right was vested in the family of Mrs. Susie Brooks [of the house layekw at Rekwoi]. The discoverer of a stranded whale must at once notify the Brooks family, and no meat could be cut until they had taken the dorsal fin or had given consent for someone else to do so. Another informant said that the flukes and the flippers also went to certain houses, but this statement seems uncorroborated.

With a flint knife a cut was made around the base of the dorsal fin, an iris-fiber tumpline was fastened to it, and it was "pulled off," i.e., as the cutting of the flesh progressed.

The remainder of the whale, or at least as much of it as was needed, was then cut into slices. Each family cut its own. One informant stated definitely that these slices were "four fingers wide," were cut longitudinally [read: "transversely"?], and cut completely through to the bone. Later each such huge slice was cut crosswise to make pieces small enough to be carried away. As a cut was started the women passed up tumplines, which were tied into holes along the edge of the slice. While the men did the cutting with their flint knives, the woman assisted by pulling on the tumplines. If, however, men were not available, the women might wield the knives.

People from distant points cooked and dried their meat on the beach, using driftwood fires. Those from near-by villages usually took their meat home and cured it [tried it out] there. While whale oil was not considered so tasty as that of the sea lion, it was caught in the usual steatite dishes, and was stored in the sea-lion paunch containers. Whale meat was used both freshly cooked and cured [? cf. below] and stored for winter use. It was eaten with many other foods. No special restrictions were mentioned.

Whale oil was eaten with seaweed or with the poor-tasting meat of the hookbill salmon and with other foods, these being dipped in it for added flavor. The flavor of sea-lion oil, used in the same way, was considered much better. The relative desirability of the two oils is pointed up in a myth which recounts that Whale boasted that its baby would not starve [but live off its own oil], but it did die. Sea lion's baby, on the other hand, did not starve. The oils of the whale and the sea lion are not mixed or used together.

Waterman (1920a, pp. 221, 222) adds some picturesque details. One provides for the hypothetical case of a whale coming ashore across the mouth of Little River, which formed the boundary between the "beach rights" of the Trinidad Yurok and the Wiyot. The solution was expectable: each group got the parts lying in its territory. The "cuts" of a whale were measured off with the tumpline or pack strap, which had a definite and recognized length, and divided into sections by knots. Waterman says:

> The length of a strap was, to use the Yurok expression, "one double stretch," qohtsemoi wenūpek, that is, twice as long as the owner's "reach" from finger tip to finger tip across his chest. The length of the cut of whale was the full length of the strap. The strap was then doubled two times to determine the width of the strip of meat. Some rich families were entitled to ten cuts [sic]. When a man had cut off his strip of meat, the carrying strap was fastened under the whale hide by means of slashes and the meat dragged home on the ground. If, in cutting up a whale, a man cut beyond the end of his strap, violent disputes arose.

Waterman adds also that people from outlying places might look on but must not touch the whale. Later, if invited, they might cut off small pieces for themselves.

Kroeber discussed whale use at some length with Robert Spott and other Yurok. There are at least three distinct terms for cetaceans. The larger whales are called hekwsa; a gray whale, somewhat smaller than the largest, is hekwsa kāmuks, "bastard whale." The inland female whale in Fish Lake (Spott and Kroeber, 1942, narrative no. 24) was a bastard; but she may have been visualized as of this species.

There are two words for smaller cetaceans, kegór and pe'wis. Waterman and Kroeber have both translated kegór as porpoise, but it would seem to be the killer whale or orca. If so, pe'wis would denote porpoises and dolphins. The older Yurok used English terms somewhat indiscriminately to designate these several cetaceans, sea lions, sharks, and mythical underwater monsters (kāmes, generic; knewolek, a gigantic horned serpent). The kegór are said to have lived with the immortals at Kenek, tried to kill visitors, later went to Patrick Point (Sumíg), had a fight there, took the place over, and are associated with it: it is a tract of danger and evil. The rocky peninsula of Patrick Point, with its outlying rocks and sea-lion rookeries, is the sort of shore locale likely to be frequented by killers. All this agrees with kegór being killer whales.

Robert Spott remembered in 1940 that kegór had said he would kill whales for human beings. His daughter

carried a whole whale flipper in her pack basket. Therefore, women teach their girls, when a load is heavy, to speak to kegór's daughter before lifting it: then they begin to rock the basket with their elbows, and repeat the prayer; then the load becomes light. All this reēnforces the interpretation of kegór as killer.

However, Orick Bob, about 1924, confirmed the earlier identifications of kegór as porpoise by saying that both kegór and pe'wis leaped, but pe'wis was the larger; which would make it the killer. Bob may have inverted the sizes, or Spott may have remembered the life habits but have got mixed and applied the porpoise's name to the killer. Hewes does not help out because he gives the Tolowa name for the killer who attacks large whales, but no Yurok term. The identification will have to be left open until some Yurok sure of the English names of the cetacean species is interviewed.

Kroeber's account resumes with Spott: Blubber was got off stranded whales by cutting down through it to the meat, passing a line under the skin, and two or three women pulling. The blubber came off with the skin, was washed in the breakers, and dragged up on the beach. It was tried out there, being hung on four stakes, sloping down at one end, from which the oil dripped into a dish; the fire underneath had to be kept small, so as not to spread to the oil or blubber. The steatite dishes used by wealthy families were large and about five inches deep ("from base of thumb to point of index"); the very biggest were so valuable they "would buy a wife"--not literally, probably, but the phrase is customary for denoting extreme value.

The whale oil was lifted out of the dish with a keyém basket-dipper and poured into a "bladder," presumably sea-lion's, though Kroeber's notes say whale's. As a receptacle, this bladder was called pamar; in the animal, wahseł oł, "urine house." This name at least establishes that bladders as well as paunches were used.

Pieces of whale skin with tried-out blubber adhering seem to have been preserved--perhaps to chew on when other foods ran low. [Goddard secured a piece of such whale meat from the Tolowa in the early years of the century, which we have kept in the University's Museum of Anthropology as specimen 2512. It measures 54 by 18 cm. and is about one cm. thick. This particular specimen is apparently a cross section of a small whale fin which had been dried for later use. It was found by Goddard in one of the large baskets used for the storage of such foods.]

The whale muscle [which is lean and has a fiber much like that of beef] was taken off in blocks, much like the blubber, but the women had to pull harder and continue to pull as the man was cutting. Kroeber's notes contain the Yurok phrase terernitu, "four fingers broad," which Waterman and Hewes mention as the customary "width" (thickness) of slices.

Whale meat will not jerk or dry, Spott said. This would explain why when a whale came ashore the California Indians stayed with the carcass until it was more than high. However, it seems doubtful whether there is any quality in the muscle flesh to prevent its dessication. It seems rather a matter of the immense volume, which, especially with only flint knives, would have taken forever to slice thin enough to sun-dry.

Whale meat might be eaten by menstruating women. Robert himself was surprised at this fact, because sea lion, deer, and even fresh salmon are absolutely taboo. He explained this was because whales are bastards.

Baleen ("branched whiskers in the mouth") was known but not used. Bones and viscera were left in the surf. Barnacles on whales were very large but were not eaten.

Whale ribs, after they had become clean in the surf or on the beach, were used as material for awls and needles. Three sizes of these implements were specified. Kwer', or meł tigohpek, the awl for stitching moccasins, was usually of deer or elk leg, but on the coast might be made of whale rib. Kwegéno, 10-12 in. long, cylindrical but with an eye, for sewing women's dresses, or double buckskin blankets, was (or might be) of whale rib. Longer (about 15 in.) and flat, but also eyed, was another whale-rib implement: wełkop kwegéno, for sewing cattail rush stalks into floor mats.

Whoever saw a whale stranded or drifting ashore--even a child, or a widow in mourning, or a man by himself--shouted as loudly as he could: hekwsáaa, kitshekwsáaa, and repeated it as he approached any settlement. Even if there was a recent death there, the mourners could not claim compensation for having their grief broken in upon by this news of communal concern.

Spott said that whale cuts were measured with a man's bow--a full length, then turned over its end and onto its middle. [This would be toward 5 ft.] A woman measured from finger tip to sternum, then from her armpit to finger tip [a little short of a woman's reach, or again around 5 ft.] What is meant by cut sizes is discussed below.

About Waterman's map 3 (1920a, p. 225) Spott told Kroeber that the name of the tract owner Ko'tep Charley was Ki'-morets, not Amits, who was from Kepél-Sa'. While the whale-stranding claim in which he shared ran from Stone Lagoon north to Amonek or Emonekw rock (Waterman, 1920a, map 9, no. 20) two miles north of Osegen, the whale beach claim of the Rekwoi house layekw is however cited as extending from beyond Omen at Wilson Creek southward to Otłeu (Spott and Kroeber, 1942, p. 182; Waterman, 1920a, map 29, no. 2), which is two miles south of Osegen. [There is thus an overlap of 4 mi. between the two claims, unless an error has crept into the place names.]

There were no whales stranded [or at least none cut up by the Yurok] from 1900 to 1940, but Robert remembered two that came ashore and were butchered when he was a boy.

TOLOWA, WIYOT, MATTOLE, AND SINKYONE INFORMATION

The Tolowa and the Wiyot handling of a whale was substantially the same as that of the Yurok, according to Hewes. Tolowa informants added that large horse-clam shells, as well as steatite bowls, were used to collect the whale oil. The sea-lion paunch container was made by tying the lower opening, and by plugging the upper opening with a seaweed stopper. They said that this oil kept for about a year, and then went rancid.

Hewes's Mattole informants told of a "whale doctor" who could predict the washing in of a carcass. This is of interest because Barnett mentions (1937, p. 166) that the Chetco, Coos, and Siuslaw of Oregon sang and beat on a log to bring in a floating whale carcass.

The carcass "was considered the property of the headman" of the village owning the beach. He assembled the people and made the first cut with a large obsidian knife. After that "anyone was privileged to cut for himself." [Again we have prestige priority, but after that equal rights.]

The slabs were taken home and cured. The blubber was tried out, the oil being caught in the carapaces of

turtles. This oil was eaten with dried fish or mussels, and with vegetal foods. The carapaces of land and river and also sea turtles were used; but also as cooking vessels for stone-boiling. The meat of land and river turtles was eaten, but that of the sea turtle was considered too strong to serve as food.

Another Mattole statement to Hewes was that the "large bones" of the whale were cracked to get at the rich and well flavored marrow. [There is a misunderstanding here, since the only long or marrow bones of whales are the much reduced ones of the flipper. The oil-rich bones of the jaw of some species are however boiled or steamed out by commercial whalers, and the Mattole may have discovered this source.]

According to Nomland (1935, p. 153) whales washed ashore at Needle Rock belonged to the tribe and everyone camped there during the butchering. The discoverer of the whale was awarded the choicest piece; the balance was equally divided. There was apparently no hereditary right vested in some person or family to some choice part of the animal as there was farther north on this coast. The flesh was dried for winter. The whale oil was preserved and eaten with berries and other foods. Also, the statement is made that the whale's bones were used for the fire which dried the meat; a statement which seems rather unusual.

WHALE RIGHTS AND CUSTOMS

The extant accounts of hereditary family privileges and communal sharing of whales stranded within defined districts are more picturesque than consistently intelligible. We here point out the zone of doubts, but also try to delimit it.

Apparently everyone born on a certain stretch of coast had a claim in every whale stranded in that stretch. If an ancestor had married or moved inland, his descendants, at least for a few generations, claimed participation by descent.

There was one house or family in each district which had the prestige-laden right to a certain token part of the whale, such as the dorsal fin, plus possibly other parts; or the right to claim and make the first cut; or possibly both privileges.

"Tumplines" were preserved both as evidence of such inherited privilege, and as a measure of the size of cut. These lines were evidently those passed under the whale skin to drag off sections of blubber as it was cut loose, and later, slices of meat, and then to drag these up the beach or to one's camp or house. This was much as sea-lion dispatching clubs served as tokens of one's sharing in the right to hunt particular rookeries.

The length of these tumplines or straps was two fathoms, according to Waterman. The "length" of the cut was stated to be these twelve feet; the width was the line doubled twice, or three feet. When Waterman says that "some rich families were entitled to ten cuts," he gives them all of the whale, or more. Even a single twelve-by-three-foot cut through a whale might well be more than one household could handle. Possibly the big man gave much of his share away to clients and friends. Spott speaks of the measure of a cut being one and a half bow lengths, or about five feet, and about the same for women, though they measured on their arms. Hewes's second informant allots fin, flippers, and tail flukes to privileged houses, but no large cuts to any one; and after these special portions, everyone cut into the body for himself, in slabs "four fingers thick"--which last is confirmed by Spott.

It is not clear which way the cuts or slabs ran. One statement says "longitudinally," but adds "cut through to the bone," which would mean that they were transverse.

Except for Spott, no distinction is made between blubber and meat. If cuts ran lengthwise, there would first be one or more enormous sheets of blubber, and after that many of pure muscle.

With the normal slab being four fingers thick and running transversely, but the full height of the whale carcass, there would first be a series of three-inch blocks of blubber pulled off, each adhering to a piece of skin, and after that, similar blocks of striped-muscle meat. These could be handled in butchering, dragging, trying out, or curing, and in a whale six or eight feet in diameter would give a household about as much oil and meat as they could dispose of or store.

This arrangement would make the most sense, and it leaves the fewest residual problems; but the statements also leave some doubt whether it was the plan actually followed.

It is clear that the Yurok and their neighbors were more interested in prestige privileges than in an orderly accounting for the disposition of the carcass, and that they highlighted the special claims.

Not a word is said about how anyone got at the offshore or oceanward side of the whale, where the surf might be beating hard; nor whether cuts ran clear across the body or only to ribs and vertebrae. Low tide would have helped on the offshore side. But since a whale's carcass floats almost wholly submerged, a large whale would have been in the wash of the surf on the ocean side even at low tide. The mean rise of tide above "the plane of reference" is not far from six feet in our region.

It is clear that there was some trying out of blubber into oil. But it seems doubtful whether the small fires, which were all they dared build under slabs of blubber loosely stuck up on sticks, would get all the oil out. The connective tissue left on the skin might dry out enough to keep; perhaps this is what is spoken of as "cured" whale "meat."

Spott flatly says that whale flesh will not jerk or sundry. This statement sounds more than probable for three-inch-thick slabs, and while the slabs might conceivably have been slit into thin slivers that would dry hard, there may also have been practical difficulties. The one preserved specimen, probably a section of dorsal fin, is seven inches wide where broadest, three-eighths inch thick and surrounded by hide.

All of which makes it doubtful what Kroeber's old statement (1925, p. 27) refers to: "the meat from a small section--perhaps half a fathom--of a whale was worth a string of small dentalia"--does it mean fresh or dry; inland or on the spot; meat or blubber?

ALLEGED WHALE HUNTING

Hewes picked up in the most extreme northwestern corner of California, among the Tolowa, a story reminiscent of the Northwest Coast. One informant stated that some of the old Tolowa had spoken of a time when their people went out to sea in their canoes and harpooned the whale. To the harpoon line were attached one or two sea-lion paunches as floats. These floats were just sufficient to prevent, or at least to discourage, the whale from sounding. The animal finally wore itself out in trying to submerge. Though it seems unlikely, it could be that this is a legendary account dating back to a time

when these people did, like those of the Washington and Vancouver Island coast, actually put out to sea in large, ocean-going canoes and hunt whales. [This is quite apart from the use of "sea-going canoes" mentioned above in connection with sea-lion hunting.] And there are reports that immediately after the coming of the whites a few large, seagoing canoes were in use on the Northwest California coast.

Alexander Taylor (1961, Apr. 5) in an article subtitled "North California Fisheries," quotes verbatim an article by Russell titled "California Fisheries" which appeared in the September 3, 1856 issue of the San Francisco Bulletin.

This is one of a series of six articles in the Bulletin on this subject, in which, after stating that he had been "on the Coast" for seven years, Russell outlines the Indian methods of whaling and of utilizing the meat and oil of this great sea mammal. He then argues for the establishment of a great whaling industry to be based at San Francisco.

Taylor's version of Russell's description leaves a first impression of being an eyewitness account of methods employed by northern California Indians. But the original Bulletin articles leave little doubt that Russell is actually describing what he saw farther north on the Washington or British Columbia coast. Taylor was a great miscellanist, and in a later article (1862, Aug. 1), quoting from another article in the Bulletin (Oct. 22, 1860) by an unnamed "special correspondent," and under the title of "The Mackahs of the Washington Coast" states:

> According to the statement of several reliable chiefs, these Indians have taken during the past year thirteen whales, seven of which they killed, and six were found dead on the beach. They yielded about 10,000 gallons of oil.

There can be little doubt that an earlier statement by Taylor (1860, Oct. 26) more nearly portrays the true picture for California:

> The stranding of a whale on this coast was, in former times, a season of universal rejoicing and festivity among the Diggers. Whale blubber was esteemed a great luxury. The flesh of the whale was cooked in holes in the ground lined with stones, like wells. Fires were kindled in these, and, after cleaning out the coals and ashes, they were filled with whale-flesh, and covered with grass, sticks, and earth. After the Diggers had gorged sufficiently, the remainder of the flesh was hung upon trees, out of the reach of bears and wolves, and eaten afterwards, as occasion required.

According to Hewes's notes, Tolowa sea-lion hunting was systematized enough so "special, sea-going canoes" were required. These were quite a bit larger than the canoes used on the rivers and lagoons [as illustrated in our pl. 5, b]. His informants told him that only the people living on the immediate coast had such seagoing canoes.

Powers (1877, p. 69) saw on Humboldt Bay one of these "sea-going canoes" which he says was made on Smith River and which measured 42 ft. in length and had a beam of 8 ft. 4 in. It was "capable of carrying twenty-four men or five tons of freight."

Drucker (1937, p. 271) says that Lower Rogue River informants believed that "large ocean-going canoes" were used for hunting seals and sea lions, but knew no details.

We believe it most likely that the Tolowa had in recent times heard of whale hunting by northern tribes. Spanish, Russian, British, and American ships all sailed along this coast for decades before Americans settled it in 1850. Recollections in 1940 would have to be quite specific before meriting credence.

Also, two specific factors block belief. First, the Tolowa-Yurok sea-lion harpoon head is neither of size nor shape to hold a whale, whose skin is soft, whose blubber is softer, but whose mass runs into tens of tons. If whales were formerly hunted on the California coast, suitable harpoon heads should have been found among the Indians or in archaeological sites. Second, the Northwest California canoe is admirable for river use, but about as ill-adapted for navigating the ocean as could be designed. Both ends are cut off square--across the grain--and it has no keel. Ocean swells have to be taken quartering. The Tolowa and Yurok, though expert canoers, are timorous on the ocean because they know the unseaworthiness of their craft. Without a stem-piece and a shaped prow, these canoes would be little if any more seaworthy even if made much larger.

Kroeber long ago inquired of the Yurok about Powers' giant canoe, and was told that one oversize boat had been adzed out by the Tolowa on the order of an American who hoped to use it to reship miner's pipe from Crescent City harbor to the mouth of the Klamath.

All canoes in the region seem to have been almost identical in cut and in length -- about 18 ft., and not over 20 -- but to have differed in beam and in draft according to the service intended and the labor cost involved. For river ferriage, a narrow, shallow boat was sufficient and cheaper, and was easily handled. On the ocean, such a canoe was likely to founder in the first whitecaps. As the rounding of the hull essentially followed the curve of the tree, higher freeboard was a function of increased draft and beam. Canoes used on the ocean would be full-sized, just as they would be stout and new, for reasons of obvious safety. Kroeber has never heard that they were built oversize, as compared with the standard specimens used on the river. They no doubt averaged larger, because undersized or even cracked canoes were still of some utility on many river reaches. We believe these statements will be substantiated when we can publish material on the boats of the region.

It is true that Drucker (1937, p. 237) says of the Tolowa: "Five-men boats ('sea-lion boats'), for use on ocean, said to have been 4 to 4-1/2 fathoms long, 3 feet deep, 1 fathom beam; boats for river use nearly as long, but not so wide nor deep." But a boat 24-27 ft. long and 6 ft. broad far surpasses any canoe ever seen in the region by Kroeber, who believes that, if the Tolowa had occasionally made them the Yurok would have been so impressed and envious as to mention them. It also seems doubtful whether with native wedges and adzes the Indians could have cut off, halved, or even handled a 24-ft. length of a 6-ft. log -- 7 ft. with the bark and cambium. As against these considerations, it is a matter of accepting the quantitative statement of one informant who may or may not have misremembered or exaggerated.

APPENDIX

SUPPLEMENTARY PLATES OF KAROK STAGINGS AND NETS

After the bulk of this monograph had been written and typed, we received from Professor Bert A. Gerow of the Anthropology Department of Stanford, where he is also Curator of the Anthropological Collections, three photographs of Karok fishing at Katimin Rapids and Amaikiara (Ashanamkarak or Ike's) Fall, just above and below the mouth of the Salmon where it empties into the Klamath. With permission, we here reproduce these as plates 26-28.

Dr. Gerow found the 4-by-5 in. photographic prints in the Stanford Museum, uncatalogued. With or on them were notations giving the native names of the three spots and of two of the four human figures showing in them. The pictures were undated and without record of who took them or who gave them to the Stanford Museum. Kroeber estimates that they must have been taken not many years before or after his own Karok photographs of 1902 in the same district (Handbook, 1925, pls. 6, 7, 12; also our pl. 2, a-c).

The legend with plate 26 reads: "Klamath River, Siskiyou County. Cah-tee-main Falls. Old Ichirie packing salmon on his back in net. Indian with dip net." This is the fall or rapid near the village of Katimin, which indeed was named after it: "upper dam." It will be seen how great the rush of the current is. The Klamath is a large river, but its width here is only a matter of yards. Ichirie or Hichiri was an old Karok at Katimin whom Kroeber heard of and probably met in 1902. He is shown carrying one or more salmon in a large net sack (cf. section on "Knotless Net Bags" in chap. VIII). The mesh of the bag is visible and is much closer than that of a salmon net. It is not clear whether the strap of the bag passes over Ichirie's left shoulder or across his forehead. He holds his left hand, and perhaps his right also, on his head, possibly over a basketry cap: the hand and forearm and their shadow block wholly certain interpretation. The hand or hands on his head suggest that the strap of the bag served as a tumpline passing over the forehead. This accords also with his leaning forward against the weight of the salmon. (Part of the lean, perhaps 10°, is however due to the camera not having been held level.)

The younger man wearing the American hat holds a long-poled plunge net. It will be seen that he stands within its frame. The crossbar is at the far right. Most conspicuous is the considerable upturn of the round end of the frame where the net itself is attached. This upturn reapperas in plate 27, but is less marked there.

Across the river a fishing scaffold is visible, against and partly under the face of a rock. Two upright poles emerge from the water to have their upper ends against the rock. Farther out by a foot or two, two shorter poles meet at their tops in a 30° V at the level of the platform, which projects out over the water for perhaps three or four feet more. It is impossible to see the number of horizontal timbers used but there is at least one pole, besides a plank. A small cylindrical stool has been left near the outer end of the platform.

On the near side of the river are two long slender, straight poles lashed crosswise. They may be handholds on the wet, slippery rocks; or, possibly, guy anchorage for a platform on the hidden or torrent side of the medium-sized rock that shows between the two men. At any rate, a foot or more of the upper end of a vertical pole projects above this rock, just "behind" the younger man's back.

For plate 27 the memorandum reads: "Indian dipping for fish in an eddy, Ma-kee-arrah Falls, Humboldt near the border of Siskiyou County." The Indian is Little Ike--Kroeber immediately recognized his face. He is the same man as shown in Handbook plates 6a, 7a, 7b (our pl. 2, a, b), and he could not have been much younger than as shown there from Kroeber's 1902 exposures. Quite likely he was wearing the same cap and using the same net as then.

Ma-kee-arrah of course is Amaikiara, the large village and religious center (First Salmon Rite) a few hundred yards downstream from the fall, of which Ashanamkarak, nearer the fall on the opposite side, was really only a suburb.

The fall itself, now named after Ike, does not show in plate 27, as it does in Handbook plate 6, a. The fall must be beyond the two large rocks in front of which Ike is standing on his platform. However, the trees against the skyline, and even the bushy growth down the sloping opposite bank at the left, conform so closely that Ike's positions in the two photographs could not have been more than a few yards apart. He seems to be facing more or less downriver in the present picture, crosswise in the Handbook one.

In both pictures he stands outside the frame, with his left hand farther down the net frame; and, at least in plate 27, with the frame held so as to curve downward, instead of upward as in 26. He stands on a staging with only one upright over the face of a boulder, but at least four and perhaps six or seven horizontals, laid partly on rocks and partly over spaces between them. Presumably the horizontals included at least one plank or slab to give more secure footing; but none such is discernible with assurance. Beyond the staging, parts of three poles are visible, lashed together--possibly a rail, or a footing by which to descend to the fishing platform itself. (In the Handbook picture there is no platform, and Ike stands on a rock above where two channels of torrent converge. That view was taken in May, when the river was still being fed by melting snows; the season of pl. 27 is not known.)

In July, 1957, after this text had been submitted for publication, Barrett had an opportunity to observe and to make a motion picture of a Karok fisherman operating a plunge net at Ishipishi Falls. In these rushing waters the fisherman threw the net out from the rocks upon which he stood and drew it in toward himself, standing always at the side of the net frame and breaking its descent into the river by allowing it to strike on the cap on his head. Rarely did it first hit on the head bar. This operation is described in the account of the plunge net (p. 42).

Plate 28 came with the legend: "Ma-a-kee-arrah Falls; Rea Neck fishing with net." The staging shown in the middle of this was a few tens of yards downstream from that centering in plate 27: in fact, the latter is faintly visible (one upright, several horizontals) at the far right of the present plate; and to the left of this is the large rock which fills the left foreground of 27. Across the river, the same slope, bushes, and trees on the crest show as in 27, very slightly farther off and a bit altered in angle. Again, the river is flowing from the right to the left of the picture (although a first glance might erroneously suggest the opposite).

Rea Neck may be a white man's version of the Indian name of Little Ike. In 1902 his was the only house close to the fall. He is seated on his platform, his right hand seemingly holding the longer of the two A-frame rods above their junction; his left hand is below the junction, holding either the other rod or perhaps the button of the drawstring. He sits at the end of his plank, facing across the river, with the plane of his A-frame extending more or less up-and-downstream, as if the bag of the net were carried by the eddy beneath himself both toward the shore and to the right upstream. This is in contrast to Handbook plate 7, b (our pl. 2,b), in which the platform also extends out crosswise to the river, but the A-frame plane is crosswise and the fisherman there faces upstream instead of toward the opposite bank as here. Kroeber's recollection is that plate 28 was upriver from Ike's house; but Handbook, plate 7, a downriver.

The staging here has three main uprights projecting several feet above the platform; also a smaller upright projecting but little above the plank; and a fifth pole, waterworn and white, serving as a diagonal strut to the middle one of the main uprights. There are two heavy and long horizontals reaching well on to the bedrock of the shore; besides at least two shorter ones; in edgewise view, the plank is difficult to distinguish from poles. It is obvious that in a staging like this one--or for that matter the one in Handbook 7, a--the weight of a man, especially when lifting the frame, net, and fish, exerts considerable leverage, and a firm holding down of the platform at its landward end, whether by lashing or counterweighting, is indispensable. And even a good swimmer might be in danger if he fell into the rock-studded torrent here.

GLOSSARY

In approaching this whole subject from its technological aspects we find ourselves faced with a good many problems in terminology. There seems to be little uniformity in the names given to different types of nets, for example; and considerable variations are found in the terms used for weaving processes and implements. The same is true for other fishing gear, such as spears.

An example or two will suffice to illustrate this point: we read (Smith, 1940, pp. 261-262) that the Puyallup-Nisqually made a "large tripod fish trap." What is a "tripod fish trap?"--a woven basketry device standing upon three legs? The author's description soon shows that her "tripod fish trap" is a large weir supported by several tripods of heavy posts or piles.

Again, we learn from Stern (1934, p. 49) that the Lummi use a "river trap" which again turns out to be a weir supported upon tripods of heavy timbers. It is, furthermore, provided with a "large pocket," which he says is a basket, but which is variously called by others a pen, corral, etc.

We are told by various field observers that this or that tribe uses "dip nets," a term which is good as far as it goes, but we would like to know which of the many kinds of dip nets they employed. The term dip net is applied by different authors to any one of several forms.

Jochelson (1908, p. 531), for the Koryak, describes and illustrates what he terms a "scoop net." This is, in reality, a conical dip net with its mouth made fast to a circular hoop and mounted on a handle.

Teit (1900, pp. 249-251) describes and illustrates what he terms a "bag net." This is a conical net mounted upon an elongated hoop by means of "horn rings." The mouth of the net is held open by means of a string held by the fisherman. The release of this string allows the rings to slip and the mouth of the net to close, thus securing the catch. When the net is landed ashore, another pull on this cord again opens the net mouth. This net could also, by virtue of the closing feature, be very properly called a purse net as well as a dip net.

What Jochelson (1908, pp. 530-531) calls a "hand net" is a bagged net with a rectangular mouth mounted on a scythe-shaped wooden frame. It is another type of dip net.

What Smith (1940, pp. 266, 267) calls a "salmon spear" is in reality a double-toggle harpoon, and what she calls a "harpoon" is, she says, "exactly like the salmon spear except that it was about four times as big." It was used for taking large fish, seals, and porpoises.

The "flounder spear" (Smith, 1940, pp. 267, 268) had three fixed points and was what we are here terming a "multipointed spear." It was, incidentally, used for taking other species than flounders, so why imply this restriction in the name?

Faced with this lack of uniformity in terminology and with such a multiplicity of terms (often several for the same thing) it has seemed best to attempt some standardization of terms which will enable us to be relatively certain that we are always speaking of the same thing when any term is used two or more times.

Obviously this list of terms will be confined to the subject immediately at hand and will not include terms which, though closely related to our subject, do not have any direct bearing. For example, since the Indians with whom we are dealing never made a net remotely similar to the Trammel net, this term will be omitted.

At the same time we must use certain terms which relate to other phases of this subject than fishing implements, devices, and their manufacture. These for convenience will be included in this same glossary.

For ease of reference it seems expedient to arrange these terms alphabetically rather than by subject.

TERMS RELATING TO FISHING

Accrues: See Meshes, false.

A-Frame: See Net frame.

Anadromous: "Ascending rivers from the sea, at certain seasons, for breeding."

Babracot; babricot: "A wooden grill supported by three or four posts for smoking and drying foods, especially meat." The above definition in the glossary, Handbook of South American Indians, 1948, Vol. 3, pp. 901, 902.

Bar: 1. The dimensions of a mesh. Strictly speaking the term bar, in this sense, refers to the length of one side of a mesh. Thus, a net made on a 10-cm. bar is one whose meshes are each 10 cm. square.

2. The sand and/or gravel obstruction which forms at the mouth of a stream, particularly at a period of low water, backing up the water and also obstructing the passage upstream of anadromous species at spawning time. It is sometimes necessary to cut a channel through such a bar artificially in order to start the flow of water. The water coursing through this artificial cut soon widens and deepens the channel so that the fish can start their run upstream.

3. There is a third local use: for a sand or gravel deposit along the edge of the stream. Usually these have been placered, but even then the bigger stones remain. The original names were Sawyer's Bar, Somes Bar, Orleans Bar, Redcap Bar, and a dozen or two others. They are of course between high water and low water of river.

Barrage: A bar or obstruction of any kind which is so placed as to hinder the passage or so as to deflect the normal movements of fish, etc.

Barrier: Any obstacle: a line of stones, brush, or other material, or a net, placed across or in a stream so as to hinder the passage or so as to deflect the normal movements of fish, etc.

Complete barriers are so designed as to prevent the movements of the fish from an area which they have voluntarily entered.

Guiding barriers are so designed as to direct the voluntary movements of fish into a desired area such as a basketry trap or a corral.

Beat: See Breed.

Bend: 1. To fasten, as one rope to another.
2. A fastening or knot: as a beckett bend, a sheet bend, etc.

Bight: 1. The double part of a rope or line when bent.
2. A loop.

Braid: See Breed.

Bread: See Breed.

Breathe: See Breed.

Breed, Bread, Breathe, Braid, Beat: To make a net.

Bobbing: See Clotting.

Buoy: See Float.

Bush net: A roll or bundle of brush, or a screen of intertwined limbs which is dragged through the water to frighten fish toward a weir or trap. It is in reality a form of movable weir. When such a "bush net" is being dragged through the water, boys or others are usually throwing stones into the stream to assist in frightening the fish and moving them in the desired direction. For a discussion of the origin and distribution of the bush net see Rostlund, 1952, pp. 93, 94.

Chute: A sluice, channel, or canal through which, by means of barrages or guide fences, fish, lampreys and/or other species are made to pass so that they may be more easily taken. See fig. 11.

Clotting: Fishing with a "baited line," probably first used without a hook. Used even now in England for catching eels by "tying a bunch of worms at the end of a line, and when it has been taken by the eel, drawing it swiftly to hand before the eel has had time to disengage its teeth."

Conical net: Any net of conical form, usually mounted on a wooden frame of some kind. The simplest is a wooden hoop. One of the most elaborate is the large A-frame used for the lifting net. See fig. 13.

Cylindrical net: Any net of cylindrical form. See fig. 9.

Dead netting: See Flat netting.

Dip net: A generic term, applied to any form of net which is dipped into the water to catch fish, etc. These range very widely in form as well as in size, from the small hoop or arc net up to the immense A-frame lifting net. See figs. 13, 16, and 17.

Double selvage: See Selvedge.

Drag: A term sometimes applied to the "bush net" which may take various forms from a roll or bundle of branches to a screen of intertwined branches, or a grapevine to which leafy branches are attached (called "grapevine drag"). Such a drag is always drawn through the water as a movable weir.

Drag net, Draft net, Draught net, Driggle: Any net which is dragged, hauled, or drawn through the water. These drag nets may be of various sizes and forms. They are usually drawn by boats of some sort. That this is a very loosely used term is shown by the following observation by Bathhurst (1838, p. 115), "so many different nets are called by this name that it is . . . difficult to know which is meant." See fig. 14.

Draft net: See Drag net.

Draught Net: See Drag net.

Drift net: A net, attached to a floating buoy or to some type of vessel, which moves with the buoy or the vessel under the influence of the wind, the tide, or the current. It differs essentially from the trawl or the seine in that it is not purposely approached toward the fish. It merely drifts naturally under the influence of the elements. It may, as here in Northwestern California, be held between two canoes which are so maneuvered as to keep the net fully stretched in just the desired position. See fig. 15.

Driggle: See Drag net.

Eye: See Shuttle.

False loops: See Meshes, false.

Filter nets and Filter basket: A Filter net is any net so devised and set as to filter out from the water as it flows through the net such small species as are carried by the current without their own volition (certain small fishes, also crustacea) or which filters out the free-swimming species of fish.

Closely related to this net is what we are here calling the Double Drifting Bag net, the Drag seine and the Drifting Bag seine. In each of these types the net is drifted or hauled through the water to a greater or less extent, and as it is hauled the fish are filtered out of the water.

Basketry traps set in running water act as filters in the same way as do the filter nets.

Fishgig: See Gig.

Fishhook: Any device used on any pliable cord or line for catching fish. Hooks are of many forms and of various sizes, from the simple gorge hook to the composite angular hook, with or without barbules. Usually used with bait of some kind.

Fish trap: This term is very loosely used, in some instances erroneously referring to a large and elaborated weir or to a net so set as to entrap the fish. Most frequently, however, it signifies some kind of a device woven of rigid material (some form of basketry) used for entrapping fish. This last use seems a more correct one. Such fish traps may be long and cylindrical or cones with or without invaginated mouths. Others are half-cylinders or what have been called half-tamale-shaped, still others box-shaped.

Fixing a net: See Setting in of a net.

Fizgig: See Gig.

Flat netting, Dead netting: A piece of netting made without any widenings or contractions. See figs. 18-20.

Float, Floater, Buoy, Pellet, Swimmer: An object made of buoyant material (light wood, tule, etc.) attached to the head of a net to keep it at the desired level. Floats are attached by strops, the length of which regulate the depth of the net in the water.

Floater: See Float.

Foot: The lower margin of a flat net.

Footline, Foot rope, Ground rope, Bottom line, etc.: The heavy cord rove, bent, or seized to the foot of a net. It is to this footline that the sinkers are fastened.

Fork: See Shuttle.

Fyke: A tubular net held open with hoops and provided with a funnel at its entrance. A true fyke is not found in this region, though we do find a tubular net with a hoop holding its mouth open. See fig. 9.

Gaff: A hook or barb on a handle, used in securing fish.

Gig, Fishgig, Fizgig: 1. Strictly speaking, a kind of spear with barbed prongs for taking fish.
2. Sometimes loosely applied to the harpoon.
3. Also applied to a device made of hooks which is drawn through the water, where fish do not readily bite, in the hope of snagging them. No record of this last device is present in our area.

Gill net: A large flat net, fixed in the water, in which the fish are caught by the gills as they attempt to get through it. It is almost always provided with floats and sinkers, and it may extend from shore to shore or may be anchored in one way or another. Such a net is often called a set net. See figs. 18-20.

Gore: A tapering triangular section of a net. Also called a pix.

Gorge, Gorge hook, Gorget: A very primitive type of fishhook, consisting of a straight piece of wood, bone, antler, or stone pointed at one or both ends. The line is attached about its middle. See fig. 39, a and b.

Gorget: See Gorge.

Grapevine drag: See Drag.

Groping: A term used in some regions for diving and groping with the hands for fish among the rocks, etc.

Guide fence: Any type of diversionary structure so placed as to cause fish, lampreys, and/or other species to pass some desired spot where they may be more easily taken. A guide fence may be constructed of any material: brush, logs, slats, wattling, even stone.

Hand net: Any net which is manipulated by hand. A loosely used term, most often applied to a small dip net of one form or another.

Harpoon: A barbed spear or javelin with detachable head on a toggle line used to take larger species of fish and sea mammals. In our area the fish harpoon is usually of the single-toggle or double-toggle type. A heavier harpoon is used for seals and sea lions.

The toggle harpoon consists of a shaft, one (or two) foreshafts on which are fitted the barbed head, attached by a leader and toggle line to the shaft. This implement is sometimes referred to as a gig, though this term should be reserved for the spear with fixed point. See figs. 32-35, and pl. 12, a-f.

Head: The upper margin of a flat net.

Headline, Head rope, Top rope, Cork line, etc.: A heavy cord or rope rove, bent, or seized to the head of a net. It is to this headline that the floats are attached, usually by strops.

Head of a harpoon: The detachable barbed point.

Heading: Strengthening the upper and lower edges of a flat net by doubling the cords of the edge meshes or by using a stronger cord. Similar to selvaging the side edges.

Head-masting: See Selvedge.

Hitch: A knot or noose, especially one intended as a temporary fastening, and capable of being readily undone; as a diamond hitch, a half hitch, etc.

Hook: See Fishhook.

Hose, tail: The slender, usually more or less cylindrical, end section of a conical or cylindrical net; as in a trawl. None of the nets in our area are purposely woven with such a hose, though in actual use the V-frame scoop net often takes on such a form when partially filled. See pl. 3, c.

Knot: See sheet bend, lark's-head knot. Of the many knots only these two are found in this area.

Lance: A type of spear, often with sharpened, unbarbed point. The only implement of this kind in our area is the sharpened pole used for taking certain species of flat fishes in the tidewaters.

Lacustrine: Pertaining to lakes or inhabiting lakes.

Landing net: A conical net, usually of medium or relatively small size, used in dipping fish out of corrals or directly out of a stream. It may be mounted on any kind of a frame, but for clarity we are here restricting the use of the term to the net mounted on an A-frame, and without the signaling and trigger device.

Lark's-head knot: See pl. 8, b.

Leister: A special type of spear with three points. The two outer points are more or less flexible and have recurved, infacing barbs which grasp or hook into the prey.

Teit (1900, p. 252) describes and illustrates for the Thompson Indians of British Columbia a leister, which he merely refers to as a three-pronged fish spear.

The leister is much used in the regions farther north but does not occur in the California region.

Length of a net: Usually expressed by the whites in fathoms. Indians also use the term fathom, or very frequently the term "reach," signifying the distance from fingertips to fingertips with the arms fully stretched. This measure actually gives a close approximation to our fathom.

Lever: The first row of meshes of a net.

Lift net, Lifting net: A term which could be properly applied to any net which is lifted out of the water when a catch is secured. Some lift nets are horizontally placed (Olson, 1936, p. 28). Others are vertically placed. The lift net is used vertically in our Northwestern California region, where it is the most elaborate and important fishing device used. The term here is restricted to this large conical net mounted upon a vertically placed A-frame, and provided with a signal and trigger device. See fig. 13.

Long line: See Trotline.

Lozenge: See Quincunx.

Marline: A small, loosely twisted, 2-ply cord used especially for seizing.

Meshes: The squares composing a net, made by netting row upon row. These meshes may appear as rectangles or diamonds of various proportions depending upon the manner in which the meshes are "set in." (See Setting in of a net.) In weaving, however, practically all meshes are square.

The term is not to be applied to the half-squares, or half-meshes, formed by a single row of netting, which are called quincunx (which see).

False meshes, false loops, accrues, quarterings: Loops or quincunxes inserted or "set in" in any given row of weaving, by which the number of loops in the work is increased. Used in conical or circular nets. This process is known as "creasing," an abbreviation of increasing; also as "letting out," "rising," "hitching," "widening," etc.

Stole meshes or stolen meshes: Meshes or loops taken out so as to reduce the number of loops in the work. This procedure reduces the diameter of the net. Used in conical or circular nets. This process is known as "bating," "taking in," "stealing," "shrinking," or "narrowing."

Mesh gauge: See Mesh measure.

Mesh measure, Mesh gauge, Mesh stick, Mesh pin, Spool: All these terms are applied to the implement (regardless of size, shape, or material of which it is made) which is used to govern the size of the mesh of the net. Various other terms for these measures are used: pin, shale, moot, cowl, keevil, kibble, and mesh.

Mesh pin: See Mesh measure.

Mesh stick: See Mesh measure.

Mounting a net: See Setting in of a net.

Multident: A spear with several fixed points, usually arranged in a circle. Also called multipointed spear. The multipointed harpoon does not occur in our area.

Multipointed spear: See Multident.

Narcotizing of fish: See Poisoning.

Needle: See Shuttle.

Net: Device woven of cord or other pliable material, used for catching fish, birds, or mammals. Nets are of a myriad forms and sizes and are used in a great variety of ways. Their names are derived from their forms, methods of use, and often from the kind of fish or game taken.

In the region here under consideration the following types of nets are found: arc net, bag net, bow dip net, bush net, conical net, cylindrical net, dip net, drag net, drift net, gill net, hauled net, hoop net, landing net, lifting net, movable weir, plunge net, purse net, seine, set net, thrusting net, towed net.

There are very many other types of nets which are not found in our area. To mention only a few; casting, pound, trammel, trawl, hood, etc.

Historically nets are very ancient: remains of nets have been found in prehistoric Swiss lake dwellings. Upon the walls of Egyptian tombs of the early dynastic period appear paintings showing nets used by these ancient inhabitants of the Nile Valley. In North America numbers of net fragments have been recovered from caves in Nevada and elsewhere. In fact, from the most ancient times man has used nets on land and in the water in almost every corner of the globe. As for the origin of nets, it is only possible to speculate, but the theory that these light, easily portable barriers naturally arose as substitutes for rigid barriers of various kinds which were thrown across tidal channels in order to impound fish at the ebbing of the tide, or across streams to congregate fish going up or down, seems a most likely explanation. A flat net used in this way was, in reality, a convenient form of weir, and from such a net could have very easily developed the various other forms of net we now find.

Net frame: The wooden frames upon which different kinds of nets are mounted vary greatly, from the small circular or oval hoops used for small hand dip nets, to the very large A-shaped or V-shaped frames of the lifting and the scoop nets. Furthermore there is a looseness in the use of these last two terms which causes confusion.

For our purposes therefore, it seems well to define these two.

The A-frame is, as the name implies, one with a crossbar, and one which is used in the A position. This applies to the "lifting net" (fig. 13) and to the "landing net."

The V-frame (fig. 17), on the other hand, is one which is usually held with its points up, being lowered partially as a wave rolls in on the beach, or wholly as in the case of the immense V-frame dip net used on Klamath Lake. See our pl. 3, a-c; also Barrett, 1910, pl. 10.

Norselling, Osselling: A method of suspending a net from its headline by cords of any desired length. These cords are called "norsells" or "ossells." Usually a light line is first rove through all the meshes before the norsells are attached. This method of attachment is not used in any of the nets of our region.

Osselling: See Norselling.

Over: See Width of a net.

Pelagic fish: Fish which "swim in the upper layers of the water" of the ocean.

Pellet: See Float.

Pix: A gore, or tapering triangular section, in a net.

Plunge net: A type of dip net mounted upon a narrow frame and especially useful in foamy water like that at the foot of falls. This net is plunged into the water at random and the fish are taken even though the fisherman cannot see into the water at all. In the lower reaches of the rivers, especially down on tidewater, or in murky waters, this net is plunged vertically, or swept sidewise, with good effect. See fig. 16.

Ply: Literally a turn or twist; applied to each element of a cord (as 2-ply, 3-ply, etc.).

Poisoning: Poisoning or narcotizing of fish was accomplished by placing in pools or in slow-flowing streams certain kinds of mashed vegetal products: soaproot, manroot, dove weed, mullein.

Quarterings: See Meshes, false.

Quincunx: One loop or half-mesh. This term signifies literally "five twelfths" or "five ounce" in Latin, and arises from the similarity in form between the Roman V and the loop or half-mesh. The whole, or completed mesh, is called a Quincuncial Lozenge.

Reach: See Length of a net.

Reeve: To thread or pass a rope or line through any opening, as to pass a headline through the meshes forming the upper edge or head of a net.

Rove, Roving: A roll or sliver of fiber drawn out and slightly twisted, ready for spinning into the final cord.

School: See Shoal.

Scoop net: This term could be applied to any of the dip nets which are handled with a scooping motion. However, for the sake of clarity it seems best to restrict its use here to that relatively large conical net, mounted on a V-frame, which is used on the immediate coastline for the purpose of catching smelt and other small species of fish as these roll in in the breakers. It is often called a surf net. See fig. 17 and pl. 3, a-c.

Seine: A flat net which is hauled by hand or with canoes, usually in such a manner that it encircles or impounds the fish. Or a seine may be hauled down a stream so as to drive fish toward a weir or trap. In that event it is practically a movable weir. A seine may be used either with or without floats and sinkers, depending upon circumstances.

Seized: Fastened together or lashed with cord of smaller size, especially marline.

Selvedge, Selvage, Head-masting: The self edge of any woven fabric. In flat nets, specifically, the right and the left edges, as distinct from the top (head) and bottom (foot) of the net. These edges are reinforced by tying a continuous string into each successive mesh, thus forming a straight, firm edge to take the strain. It is this additional cord which is referred to by the term Selvedge or Selvage, or more correctly Double Selvage.

It is quite customary to strengthen the upper and lower edges of a net by using double cords or a cord of heavier material. This is called Heading. In conical nets, those mounted upon A-frames and V-frames, a similar reinforcing cord may be run along the front edge of the net. The same term, selvedge, may properly be applied to it also. See pls. 9, a, and 10, b.

Sennit: A braided cord or a fabric of plaited cords.

Setline: See Trotline.

Set net: Any net which is fixed in its position, such as a gill net. See figs. 18-20.

Set in: The insertion of one or more extra quincunxes (also called accrues, quarterings, or false meshes) in a mesh in order to provide for a greater number of meshes in the next round and thus for a widening of the net at this point. Not to be confused with the Setting in of a net, which see.

Setting in of a net: This term refers to the system followed in mounting or fixing a net upon its headline, which in turn governs the shape of the diamond of each mesh. The closer the meshes are spaced on the headline, the narrower and deeper the meshes will be.

If a perfect square is to be produced, three meshes are spaced on the headline so as to take up the length of four bars or two full stretches of a mesh. This is called "setting in by the third."

If four meshes occupy the space of three, this is "setting in by the fourth."

If five meshes occupy the space of four, this is "setting in by the fifth," and so on.

Sheet bend, Mesh knot, Netting knot, Weaver's knot, Hawser bend, Becket bend, Trawler's knot: The knot used in weaving the meshes of nets in this region. For the details of this knot see pl. 7, a.

Shoal: A multitude of fish. Also called a school of fish.

Shuttle, Needle: The implement upon which is wound the thread, string, or twine used in netting. Primitive types of shuttles are usually provided with an eye or fork at each end and they may be made of any material (wood, antler, bone). Modern net makers often use a shuttle provided at one end with an eye carrying a tongue, its opposite extremity having a simple notch. See pl. 12, g-o.

Sluice: A narrow channel made by placing barrages and guide fences so as to divert the water and, with it, the fish, lampreys, and/or other species so that they may be more easily taken. See fig. 11.

Snagging: See Sniggle.

Sniggle: A hair or vegetable-fiber ball attached to the end of a line and used for snagging or sniggling small species of fish, particularly trout. The sniggle is

sometimes baited, but is often used without any bait whatever. As the trout nibbles, its teeth become entangled in the fibers of the sniggle, and it can be easily lifted out of the water, or snagged.

Spear: A general term made to include, rather loosely, various types of pointed weapons with long shafts. It may most properly be restricted to the shaft with a fixed head, as distinguished from the harpoon with its detachable head.

A development of this implement is the bident, with its two fixed points, the trident with three, and the multident with several.

The term gig is sometimes applied to this type of implement.

Spool: See Mesh measure.

Stapling: To fasten by staples. It is done in the following manner. Fasten a lighter line to the headline of a net. Then reeve this light line through any desired number of meshes and then hitch or seize it to the headline, allowing enough slack in this light line to form a staple or bight, so that this section of the net hangs down the desired distance. Repeat this reeving and hitching till the entire net edge is on the stapling line. See plates 9, a, and 10, b.

Strop: The line by which a float is attached to the head of a net.

Surf net: See Scoop net.

Sweep: A movable weir, particularly one made of leafy branches attached to a grapevine or other flexible holder and drawn through the water to cause the fish to move toward a weir or trap.

Swimmer: See Float.

Tail: See Hose.

Taut (tight): A term used to signify the pulling tight of the loop around the mesh measure. In aboriginal netting variations in this tightening of successive rounds of loops are apparently sometimes used to expand a net's diameter.

Trawl: 1. This term is sometimes applied to the very long fishing-line which is anchored firmly with many hooks attached to it by means of short lines or leaders. Another and better term for this is "trotline."

2. The term Trawl is chiefly applied to the large bag net which is dragged along the sea bottom or in very deep water (beam trawl, otter trawl). Our Indians do have two types of bag nets which are hauled through the water, but in no sense could either be called a true Trawl.

Troll: To fish with a trolling line provided with a hook which is drawn through the water. That trolling was done aboriginally in this region may be doubted, though some informants stated that it was done down on tidewater in more recent times.

Trotline: An extended line to which are attached any desired number of hooks each by means of its short line or leader. It is fixed by being anchored.

V-Frame: See Net frame.

Waterspread: The water which backs up and spreads out over the land at time of flood or of high tide.

Weir: Any dam or obstruction used for catching fish. Weirs range from a log, a simple line of rocks or of brush, to a very elaborate structure with impounding corrals and platforms. Also there are double weirs and movable weirs of various kinds. See figs. 1-8, 10, 12.

Width of a net: Usually expressed by the term "over." (A net is said to be three fathoms long and one over, or wide.)

Wing: A net device for conducting the fish into the main body, bag, or purse of the net.

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ABBREVIATIONS

AA	American Anthropologist
A Ant	American Antiquity
AMNH	American Museum of Natural History
-AP	Anthropological Papers
-B	Bulletins
-M	Memoirs
BAE-B	Bureau of American Ethnology, Bulletins
MAIHF-INM	Museum of the American Indian, Heye Foundation, Indian Notes and Monographs
PMH-P	Peabody Museum of American Archaeology and Ethnology, Harvard University, Papers
SI	Smithsonian Institution
-AR	Annual Reports
-CK	Contributions to Knowledge
-CNAE	Contributions to North American Ethnology
UC	University of California Publications
-AR	Anthropological Records
-PAAE	American Archaeology and Ethnology
UCAS-R	University of California Archaeological Survey, Reports
USNM-R	United States National Museum, Reports

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MAPS

EXPLANATION OF MAPS

Map 1. Weirs in Northwestern California and delineation of Littoral and Coastal Yurok Areas.

Weirs

A short bar across a stream indicates an established site for a weir.

A crossed circle on the lower course of a stream or elsewhere indicates that one or more weirs were erected upstream, but that their precise locations are unknown. The crossed circle at Forks of Salmon marks an alleged Karok weir, in Konomihu, not Karok, territory. The crossed circle, and "S", at Happy Camp on the Klamath indicates an alleged Shasta weir in Karok territory.

T1, T2	Tolowa weirs at Munsontun and Milichuntun
YM1, YM2	Yurok mythical weirs: YM1 at Roach Creek, Falcon's Rest; YM2, at Turip, original of Kepel
Y1, Y2	Yurok historic weirs at Kepel and at Saint's Rest (Lo'lego)
H1, H2, H3	Hupa weirs at Medilding, Takimilding, and in 1906 near Mill Creek
K1-K6	Karok weirs at Stanshaw-Irving Creek, on Salmon River above mouth, on Salmon above Somes Bar, on Klamath near Orleans, near mouth of Ullathorn Creek, near mouth of Redcap Creek
S1, S2, S3	Shasta weirs at Scott Creek, Horse Creek, Shasta River
"S"	Alleged Shasta weir at Happy Camp, in Karok country

Littoral and Coastal Yurok Areas

Solid black line marks the outer limits of the Littoral Zone.

Heavy dotted line marks the exterior boundaries of the total Yurok Area.

Where the two lines coincide, the solid black line supersedes the dotted line.

The Coastal Yurok Area comprises two parts, a very small area lying north of the mouth of the Klamath, and a larger one beginning a short distance south of the mouth of the Klamath and extending down to Little River.

The Littoral peoples are the Tolowa, the Coastal Yurok (those not of the riverine area), and the Wiyot.

See also comments on map 2.

Map 2. Culture Areas in Northern California and the Area of Culture Blendings in Northwestern California.

This map, which presents an ethnographic classification of the groups dealt with by us, differs in certain respects from previous maps. This is because of a somewhat different weighting or preoccupation flowing from our particular subject matter. On the other hand, we have followed the delimitation of "tribal" (really linguistic) groups of our outline base map as it has been conventionally current for more than thirty years (going back to the large multicolor map in the Handbook), even where we now know the lines on this to be somewhat incorrect, because we cannot, in the present context of fishing practices, stop to dissect and compare the highly detailed evidence on group boundaries. The C. Hart Merriam primary data on many "tribal" territories were not available when the basic all-California Handbook may was compiled. They are now available through the co-operation of the Smithsonian Institution and of the heirs of the Merriam trust estate. As a result, we are aware that many of the group territory boundaries will be changed in detail, and some radically. But the corrections will take some years to establish. And until they are definitely established, the only practical course appears to be to continue to operate with the conventionally accepted lines.

Specifically, the Athabascan boundaries, internal and external, are due for a drastic overhaul. The old lines were based mainly on detailed data of Goddard's for certain patchy areas, reconciled as best possible by Kroeber with spotty information secured by himself, Goddard, Barrett, and Powers. There are now available not only primary data, including settlement sites, long ago gathered by Merriam on most of the Athabascan groups, but others independently got by Goddard, laid aside by him, but rediscovered under the stimulus of the Merriam information just now worked over by Martin A. Baumhoff. As a result, the Mattole area 1f will lose its southern half to the Sinkyone 1i; the Sinkyone will be split into two halves; the Chilula and Whilkut, 1d and 1e, will be drastically altered. But we are not remaking, in the present monograph, a better map of California: we are using what is available at the moment.

So much as to the particular dialectic or "tribal" areas.

We return now to the ethnographic classification presented by the shading in our map 2.

Mainly this follows the old segregation of native Californian cultures into Northwestern, Central, and Southern, subsequently carried further by Kroeber (1939, pp. 30, 55) by recognition of a transitional zone between Northwestern and Central culture. This transition area we have retained: it appears in our map 2; in the text it is often called Marginal in distinction from the Core area of Northwest California culture. This Core comprises the Tolowa, Yurok, Karok, Hupa, and Wiyot, together probably with Chilula-Whilkut between the two last.

However, in a monograph like the present one dealing with aspects of subsistence and technology, ecological adaptations necessarily loom larger than they do in classifications of total culture, many parts of which, such as religious and social structure, reflect environmental influences only indirectly and partially. We have accordingly found it desirable to distinguish a littoral aspect or facies of Northwestern California culture from a land-oriented, or better, riverine one.

The Riverine Core peoples are the Yurok so far as they live on the Klamath, the Karok, the Hupa, and the Chilula-Whilkut.

The Littoral Core peoples are the Tolowa, the off-Klamath Coastal Yurok, and the Wiyot.

The term "Coastal Yurok" has been coined for the subsistence culture situations treated in the present work. It does not abrogate the term "Coast Yurok" as it has been regularly employed to designate only the people of Stone and Big lagoons and Trinidad, on the basis of dialectic variation. This quite minute linguistic area is

numbered 2b on our base map. However, so narrow a division does not seem justified from the standpoint of subsistence culture. The people in area 2b are one with the other littoral Yurok of the immediate coastal belt (Redwood Creek, Gold Bluff, Wilson Creek), except that at the mouth of the Klamath we find riverine influences crowding clear down to the coast itself. Thus we have a short gap in this littoral belt at the river mouth, after which it resumes--for one village more, namely Omen--up to the northern limit of Yurok territory on the coast. This is shown in more detail on our map 1. It is this narrow, broken littoral stretch which we designate for our present purposes as the "Coastal Yurok" area, including thereby all the Yurok actually resident on the coast, in contradistinction to the smaller dialectic unit, the Coast Yurok of map 2.

Neither does "Coastal Yurok" imply that all segments of Yurok culture divide on this coast-river distinction. For instance, the World Renewal rituals are closely similar at Big Lagoon, which is both Coastal Yurok and Coast Yurok (2b); at mouth of Redwood Creek, which was essentially main Yurok (2a) in speech; at Rekwoi at the mouth of the Klamath; and at Pekwan 20 miles up the Klamath. And similarly as regards other rituals, beliefs, law, and society.

There are a few minor points to be noted about the Littoral zone.

Most of the Tolowa settlements were on the coast, or lay on near-by lagoons (cf. Lake Earl) with their backs to the beach. There were two or three settlements on Smith River, but these were smaller than most of the coastal ones. The largest village was at the mouth of Smith River, corresponding to Rekwoi at the mouth of the Klamath, but on a much shorter river. Strictly speaking, there is a split among the Tolowa as there is among the Yurok, but it is the other way: the coast predominates. And the Riverine minority is so minute that we have for convenience subsumed it in the Littoral majority.

With the Bear and Mattole River Athabascans of the Transitional zone, we have sea-frontage but land orientation. Smelt, abalone, seaweed, sea lions, and seals were taken, but most of the settlements stood inland, and most of the year-round food came from the land and river. We have accordingly felt justified in excluding the Bear and Mattole River area from the Littoral zone. This exclusion is in accord with the generic condition south of Cape Mendocino; the coast frontage is steep, and among Athabascan Sinkyone, Yuki, and Pomo alike the littoral population is only a small fraction of that living inland along streams.

North of Cape Mendocino, the coast changes so as to invite littoral residence. The Wiyot coast is a sand beach stretch, with a large stillwater bay halfway along. The Yurok coast is rocky, but punctuated by sheltered coves like Trinidad and Wilson Creek and four prevalently land-locked and freshwater bodies from Big to Redwood lagoons. The Tolowa stretch has the advantage of numerous outlying sea stacks, a fairly broad level terrace immediately back of the surf, some good coves around Crescent City, and the freshwater lagoon of Lake Earl.

NORTHWESTERN CALIFORNIA AND ADJACENT ETHNIC GROUPS

NUCLEAR GROUPS

Riverine Groups

Yurok (on Klamath R.)	2a
Karok	8
Hupa	1c
Chilula	1d
Whilkut	1e

Littoral Groups

Tolowa (and Winchuck)	1b
Coastal Yurok	2b and part of 2a
Wiyot	3

MARGINAL OR PERIPHERAL GROUPS

Shasta	6a
New River Shasta	6b
Konomihu	6c
Chimarico	9
Mattole and Bear R.	1f
Nongatl and Van Duzen R.	1g
Sinkyone	1i
Lassik	1h
Wailaki	1j
Wintu (in Trinity, Mad, and Eel R. drainages)	16a

NEIGHBORING GROUPS

Modoc and Klamath	5
Okwanuchu	6d
Achomawi	6e
Atsugewi	6f
Yana (all)	7
Wintu (of Sacramento drainage)	16a
Wintun (Nomlaki)	16b
Yuki	4a
Huchnom	4b
Kato	1k
Coast Yuki	4c
Pomo (all)	10
Wappo	4d
Patwin (River and Hill)	16c, d
Maidu (all)	17a, b, c
Miwok (Coast, Lake, Plains, N. Hill, Central)	18a-e

Map 3. Converging Fixed Weir. The V-shaped, or converging, fixed weir was confined to the northern part of the area, but its presence was denied by some informants. It was rather generally denied farther toward the south.

Map 4. Straight Fixed Weir. This weir is the type most widely distributed and appears throughout almost all of the Northwestern and Central California areas. Its presence was denied by only a few informants, and these denials may be due to misunderstandings. The straight weir was the simplest to build and could be expected if any weir at all was present in the area.

Map 5. Double Fixed Weir. This weir was apparently found only among the Tolowa, being specifically denied almost everywhere else in the western part of our area and not even mentioned in the Sacramento Valley and Sierra Nevada regions.

Map 6. Movable Weir. This weir might be any portable device, from a brush drag to a woven fence of split stakes. It was used by many tribes, wherever conditions were right; particularly on small streams and in backwaters on tidal flats.

Map 7. Weirs with Pens on Upstream Sides. A few tribes used impounding bays or pens as accessories to their weirs. Some placed these pens on the upstream sides, others on the downstream sides (map 8). However, many tribes in our area denied their use.

Map 8. Weirs with Pens on Downstream Sides.

Map 9. Weirs with Platforms. Some tribes built platforms on their weirs. These were chiefly for dip-netting, though they were occasionally used for harpooning. There was also a special type of scaffold for harpooning which had an even wider distribution, as shown on map 39; also the lamprey chute of the Tolowa (map 55).

Map 10. Weirs with Traps or Nets Set in Openings. Closely akin to the impounding pens were the traps or nets placed in openings left for this purpose in the weirs.

Map 11. A-frame Lifting Net. Since the lifting net required a swift-flowing stream with eddies, its use is naturally restricted. We find it in our nuclear area and in some of the adjacent territory. Its presence is denied elsewhere, except in two of the Maidu areas where it is somewhat doubtful. This specialized type of net is certainly one of the most characteristic features of our nuclear area, reaching its highest development among the Yurok and Karok on the Klamath River.

Map 12. A-frame Landing Net. This net is very largely confined to the nuclear area and the areas immediately adjacent. Here we find on most of the weirs platforms from which landing nets could be operated, though sometimes the nets were handled from a canoe or from the river bank. In addition to netting platforms built onto the weirs there were other platforms or scaffolds built at other points of vantage. The distribution of both types of these platforms is shown on map 15.

Map 13. V-frame Scoop Net. This net is suitable for use only at certain places. It is especially adapted to surf fishing and we find it universally used along the immediate coast line from the Southwestern Pomo region northward. No doubt, if information were available for the Coast Miwok region we would find it there also. It is reported for the Nisenan (?) and finds its maximum size in Klamath Lake, where it is used from a dugout canoe.

Map 14. Plunge Net. The plunge net has a rather wide distribution throughout Northern California but seems to have been more important in the northwestern part of the region.

Map 15. Scaffold for Netting. This map shows the distribution of both types of scaffolds or platforms. See comments on map 12.

Map 16. Arc Net. The arc net is essentially a Central California device quite universally used throughout that region. It comes into our Northwestern California area only along the very southeastern edge of the peripheral region. Its use is definitely denied for the nuclear area and for almost all of the peripheral area.

Map 17. Hoop Dip Net. This simple, often makeshift, type of net is recorded as in use over a considerable area, though it is one of those items which was probably little noticed and was doubtless used in other areas not noted on our map.

Map 18. Cylindrical or Hoop Net. The only locations reported for this cylindrical or hoop net are in the Tolowa and Karok areas. Its existence elsewhere along the coast is consistently denied and it is not even mentioned in the whole of the Sacramento Valley and Sierra regions.

Map 19. Seine. The seine is recorded as in use over much of northern California but as missing from some areas where the gill net (map 20) was used. The use of both types was so general that neither can be definitely pegged as characteristic of either the Northwestern or Central California area.

Map 20. Gill Net.

Map 21. Double Drifting Bag Net. The drifting bag net is reported chiefly from the Northwestern California area. Its appearance in the Maidu region seems a bit out of order when we consider the environment there. Perhaps this is another instance of misunderstanding on the part of the informants. It may, however, have been used on the Sacramento River but, if so, we would naturally expect it to be found among other tribes on this stream.

Map 22. Anchors. Anchors are reported exclusively from our nuclear area, where the larger streams and deeper waters made them necessary.

Map 23. Grooved Sinkers. Grooved sinkers are widely distributed throughout this whole region, though their use is denied for some groups.

Map 24. Perforated Sinkers. Perforated sinkers are recorded only from the northern tribes, especially those of our nuclear area.

Map 25. Wooden Floats. Wooden floats are reported from all the tribes of the nuclear area except the Wiyot; also from the Mattole, Modoc, Achomawi, Atsugewi, Pomo.

Map 26. Tule Floats. These are reported from the Clear Lake Pomo groups and from the Klamath Lake area. These large bodies of water, with their rush-bordered shores, naturally produce this material and the use of tule apparently spread to the Yuki, on the one hand, and to the Achomawi and the Atsugewi, on the other. The use of tule floats by the Shasta is not so easily explained.

Map 27. Cylindrical Basketry Traps. These traps, set in weir openings or at other advantageous places, were used in the smaller streams and at almost any spot where the flow of the water was not too forceful. They were common in the Pomo region and adjacent areas and in the northeastern part of California. Their use is denied in most of our nuclear area.

Map 28. Trough-shaped Basketry Traps. These traps were very commonly used in northern California, especially in the nuclear area.

Map 29. Invaginated Basketry Traps. These are not even mentioned for the nuclear area. They are found among the Pomo and Patwin and in the Sierra region.

Map 30. Scooping Basketry Traps. These traps, of various shapes, were widely used throughout the region but appear to be absent in much of the lower Sacramento drainage.

Map 31. Plunge Basketry Traps. The plunge trap, used in shallow, still water, appears in the Pomo, Wappo, Miwok, and Achomawi-Atsugewi areas, but is lacking in all other regions; in fact, it is denied in several areas.

Map 32. Eel Pots. Eel pots were used only among the people of the nuclear area and by some of the

immediately adjacent tribes. Their restriction to this small area is explained by the fact that the eel pot was introduced by the first whites who came to Humboldt Bay. Our map shows the eel pot as also present among one group of the Yana in Sacramento Valley. It seems very probable that the statement of its presence here may be an error due to some misunderstanding by the informant.

Map 33. Rock Piles for Lamprey. The use of rock piles, a really primitive method for taking eels, is reported for the Mattole, Sinkyone, and Nongatl only. We suspect that further inquiry would show that this method was more widely used.

Map 34. Multipointed Spears. The multipointed or multipronged fish spear is reported from the Wiyot, Klamath Lake, Achomawi, and Atsugewi. Its use was quite consistently denied practically everywhere else in our area.

Map 35. Spear, with One Fixed Point. Fish spears with fixed points were rarely used. Those with single fixed points, however, were found in a number of tribes.

Map 36. Spear, with Two Fixed Points. These were reported from the Eastern Pomo, Klamath Lake, Wintun, and Atsugewi.

Map 37. Single-toggle Harpoon. Toggle harpoons were used much more than spears. The single-toggle harpoon was used in the western half of northern California but its use was specifically denied for most of the eastern half of the area.

Map 38. Double-toggle Harpoon. The double-toggle harpoon was reported from almost every tribe in northern California and we strongly suspect that any blank spaces on the map are due to lack of information. The double-toggle form should be considered the characteristic type of harpoon for this area as a whole.

Map 39. Spearing Scaffold. The scaffold or platform erected specially for spearing fish was found over a large part of the western half of the region under consideration but was not reported from the eastern half except in the Klamath Lake region.

Map 40. White Stone Flooring. Closely associated with the spearing platform and booth was the white stone flooring which was placed on the stream bottom in order to make the fish more easily visible as they swam over it. In many areas, particularly in the northwestern part of California, the spearing booth was used without the white stone flooring.

Map 41. Gaffs (lamprey or fish). Gaffs of various kinds are reported from Northwestern California, including most of the peripheral area. Their use is, however, specifically denied by the Hupa and the Chilula. Except among the northern Wintun, Atsugewi, and Miwok, they are not reported from the Central California area. In several other areas their use is specifically denied.

Map 42. Shooting Fish with Bow and Arrow. In spite of the relative rarity of fishing by shooting, we find the practice fairly widespread over northern California, though informants from many areas denied its use.

Map 43. Acute-angled, Single-pointed Fishhook. The acute-angled fishhook, with single point or barb, has been recorded for most of the tribes in northern California. A double-barbed hook was used by the Klamath Lake and Modoc.

Map 44. Bipointed Gorge Fishhook. The gorge hook was much more commonly used than the acute-angled hook and had a rather wide total range of distribution.

Map 45. Sniggle, Hair Fly, or Ball. The sniggle was used in most of the nuclear area and to a limited extent by some of the near-by tribes. It is also recorded for the Wappo. Elsewhere we have only negative evidence from two small Yana areas; otherwise no statements have been found concerning this practice.

Map 46. Fish Poisons (Narcotics). Since fish poisons, to be effective, required relatively quiet waters, they were not used in our nuclear area except by the Wiyot and Chilula. Otherwise, poisons were used quite generally throughout the rest of northern California. Their use is definitely denied, however, for such tribes as the Klamath Lake, Modoc, and River Patwin, who lived on large lakes or rivers.

Map 47. Fire at Night. Fire at night, as a lure, for illumination, or for heat, was used in most of the region under consideration. Its use is definitely denied for the Nisenan. For the Coast Yuki and the Mattole both positive and negative statements were obtained. It seems probable that in those areas from which we have no data further information would show that fire was used.

Map 48. Diving for Fish. The areas where diving for fish is a usual practice are shown on this map. This method, however, was used only incidentally.

Map 49. Catching Fish or Lampreys with Hands. The practice of catching fish and lampreys by reaching into the water is closely related to diving for them. The areas where catching fish by hand is used are shown on this map.

Map 50. Snaring Fish. Snaring fish either from above water level or beneath by diving was practiced by all the tribes in our nuclear area and by most tribes in the peripheral area. Farther away we find the practice among the Yuki, River Patwin, and Maidu. Information from all other tribes of the region is lacking.

Map 51. Driving Fish. Fish drives were quite generally made throughout most of northern California and we suspect that, if further investigation in the field were possible, most, if not all, of the blank spaces on the map would be filled.

Map 52. Fish Clubs. Fish clubs of one kind or another were used by almost all tribes in this region. Uncontested denial of their use is recorded for the Achomawi and the Atsugewi only. There are only a few tribes for which we have no information at all.

Map 53. Alarm Rattles. Except among the Nisenan, the use of the alarm rattle was confined to the people on the immediate coast in the extreme northwestern part of our area, coming south only far enough to include the Mattole. The alarm rattle may be considered, therefore, rather strictly a Northwestern California device.

Map 54. First-Salmon Ceremony. Although the First-Salmon Ceremony was more important in the nuclear

area than in adjacent regions, some form of this rite was found among most of the tribes in northern California. Its absence in the southwestern part of this territory seems remarkable. Perhaps this is due to the great emphasis among the southwestern tribes on the first-fruits ceremony, in which the acorn is such a dominant feature.

Map 55. Lamprey Chute. The lamprey chute of the Tolowa is closely related to weirs. See maps 1, 3 to 10.

Map 56. Boxlike Trap. A special boxlike trap is reported only from the Hupa and Karok, but is not even mentioned elsewhere.

Map 57. Eel Slitter. As might be expected, the use of the eel slitter appears to be confined to the extreme northwestern part of California. It extended only as far east as the Shasta and as far south as the Kato. This is what we should expect, for in the rest of the region lampreys were either not present or formed a negligible part of the food supply.

Map 58. Fish Knives. The fish knife is a characteristically Northwestern California implement. Its use is confined to the tribes of our nuclear area and to a few peripheral tribes. There is no evidence of its use elsewhere on our map.

Map 59. Babracot. The maps from 59 to 62 and also from 67 to 70 cover various phases of fish preservation and storage. The babracot was used all along the coast and as far inland as Klamath Lake and the Achomawi area. Its use is denied in a very few places, but we suspect that even these tribes had some sort of drying rack. The babracot was used both for drying and cooking fish.

Map 60. Smoke-drying of Fish. The smoking of fish was practiced quite generally, as shown by this map. Here again further detailed information would probably enable us to fill in the present blank spaces.

Map 61. Fish-drying House. A special house for fish drying is a characteristic feature of our Northwestern California area; it reappears in the Clear Lake Pomo area.

Map 62. Smoke-drying inside Dwelling. Smoke-drying inside the dwelling is characteristic of the northwestern coastal area, extending south as far as the Northern Pomo area.

Map 63. Roasting at Fire. Roasting at the open fire occurs in the western part of the region covered by the map. This is such a general practice that further field investigation would probably enable us to shade all other areas on the map.

Map 64. Broiling on Live Coals or Hot Stone. Broiling is another universal method of cooking and this map shows broiling as occuring in almost all parts of the area covered.

Map 65. Stone Boiling. Stone or basket boiling is generally practiced for cooking many kinds of foods. For the cooking of fish, however, we have positive information on this method only for the coastal tribes and those near by, and also for the Central Wintun and Miwok.

Map 66. Underground Oven. As our map shows, the underground oven was almost universally employed in roasting fish.

Map 67. Fish Flour. Fish flour was made throughout the Northwestern California, Sacramento Valley, and Sierra regions with the exception of a few areas. The fish were prepared for pulverizing by various methods of cooking.

Map 68. Oil Storage in Kelp Bottle. The kelp bottle for the storage of oils of the salmon, sea lion, or whale is recorded only for the Tolowa, Mattole, and Sinkyone.

Map 69. Oil Storage in Sea-Lion Paunch or Bladder. The sea-lion paunch or bladder as a storage receptacle for oil is recorded for the coast tribes southward as far as the Mattole.

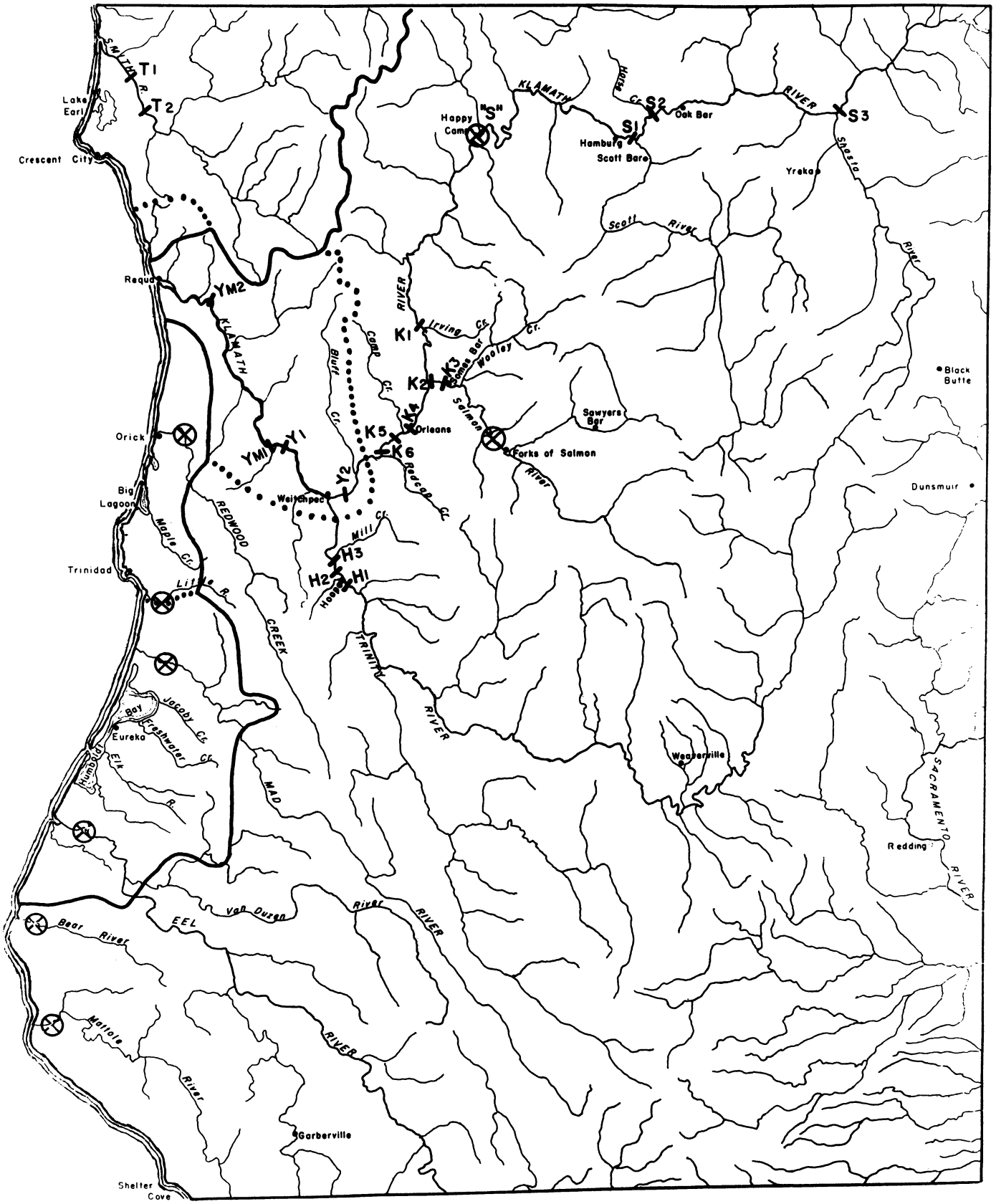
Map 70. Oil Storage in Steatite Dish. The steatite dish for oil storage is recorded only for the Yurok and Coast Yurok.

Map 71. Club for Sea Lions. Since sea lions were found only along the immediate coast line, we naturally expect weapons concerned with their capture only among tribes fronting on the ocean. The fact that the club is found much farther south than the harpoon (map 72) is undoubtedly due to the much more highly developed and regularized pursuit of the sea lion by the northern coastal tribes than by the southern groups. Sea-lion hunting was one of the major occupations in the north.

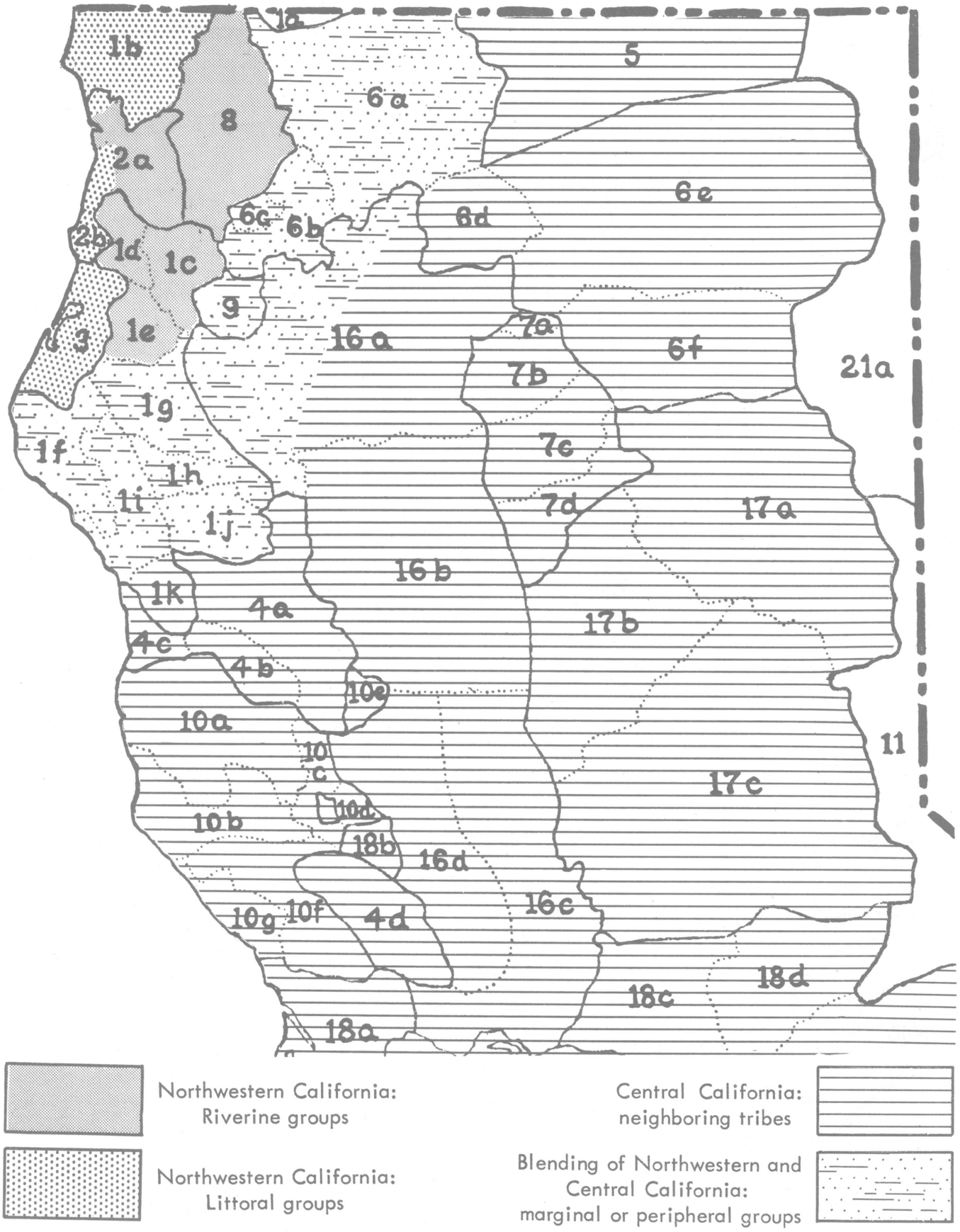
Map 72. Harpoon for Sea Lions. The harpoon for sea-lion hunting was used chiefly by the northern tribes of our area.

Map 73. Adhesives Made from Fish Products. The distribution of adhesives made from fish products was quite general throughout northern California. Compare map 74.

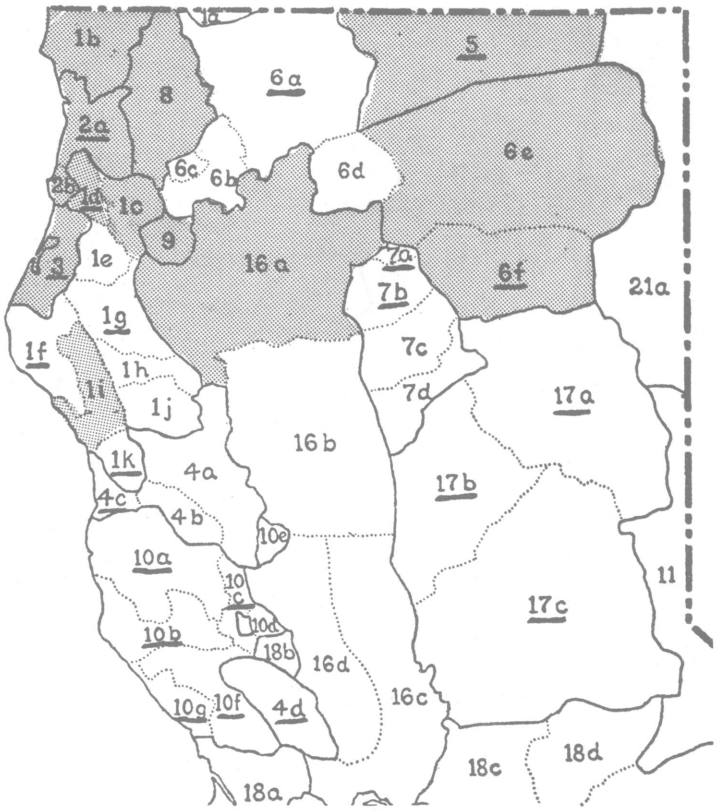
Map 74. Adhesives Made from Vegetal Products. Vegetal adhesives were also generally distributed throughout northern California. A comparison of maps 73 and 74 shows that in most areas both kinds of adhesives, those made from fish products and those from vegetal products, were used but that in the Yuki and Southern Maidu areas only vegetal adhesives were employed.



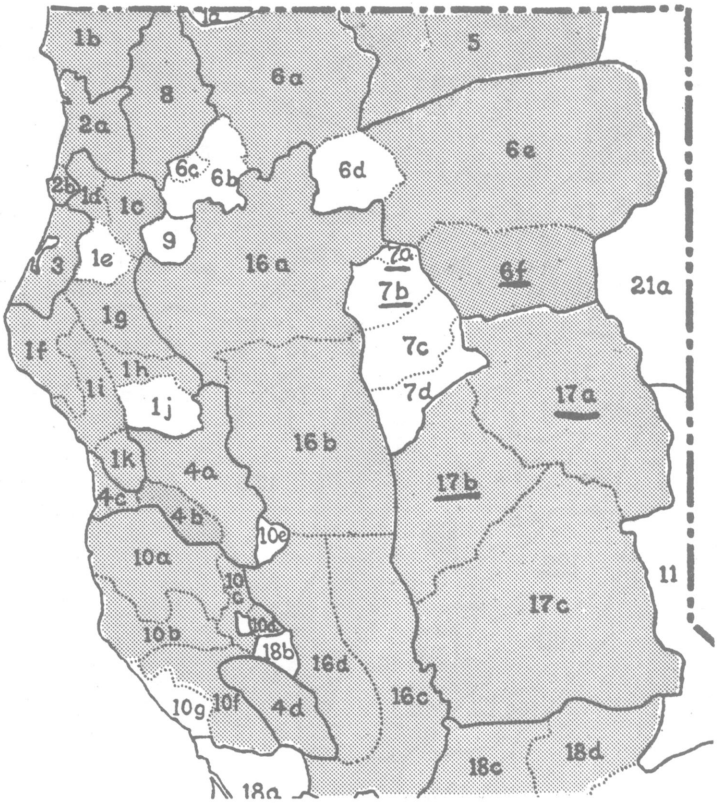
Map 1. Weirs in Northwestern California



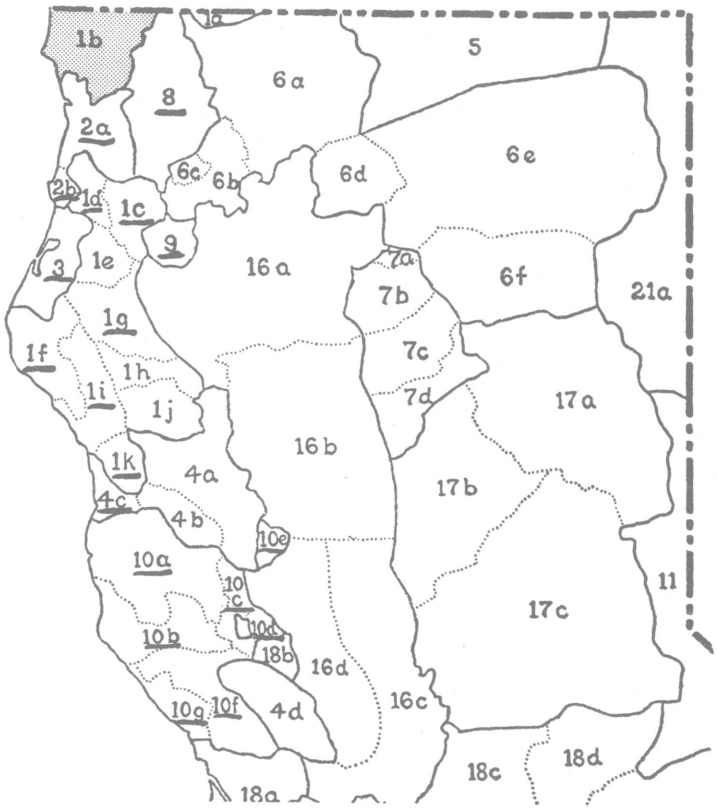
Map 2. Culture Areas in Northern California and the area of culture blendings in Northwestern California



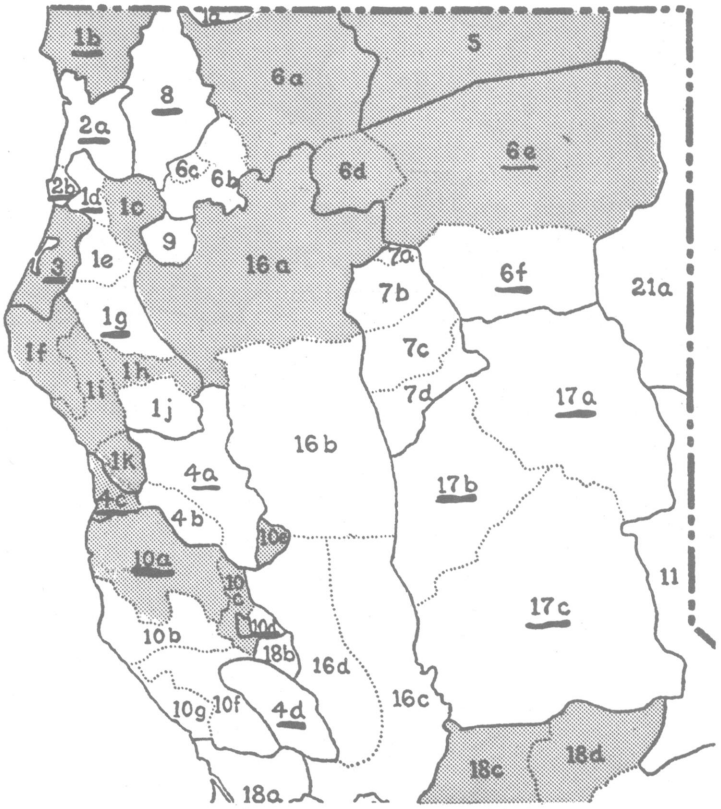
Map 3. Converging fixed weir



Map 4. Straight fixed weir

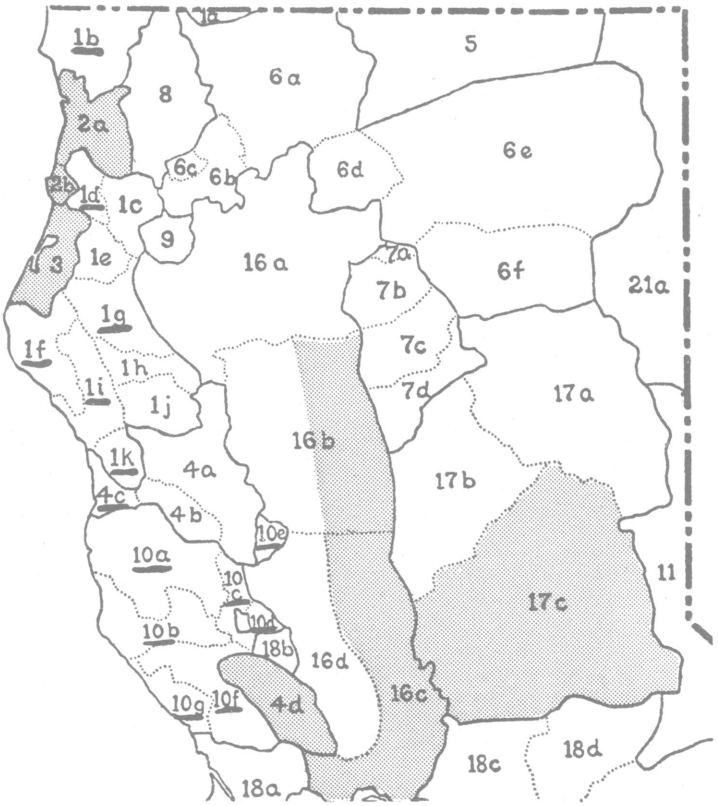


Map 5. Double fixed weir

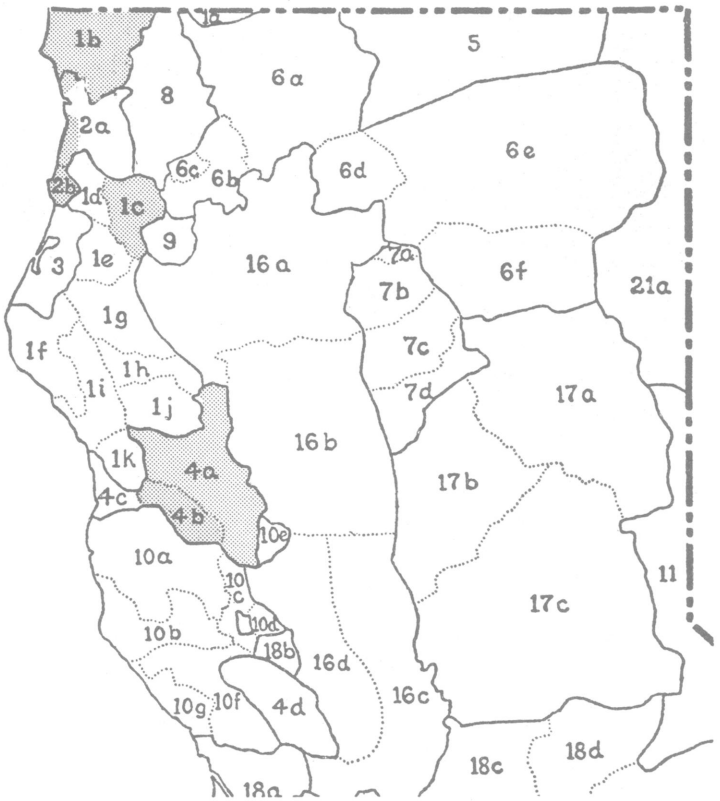


Map 6. Movable weir

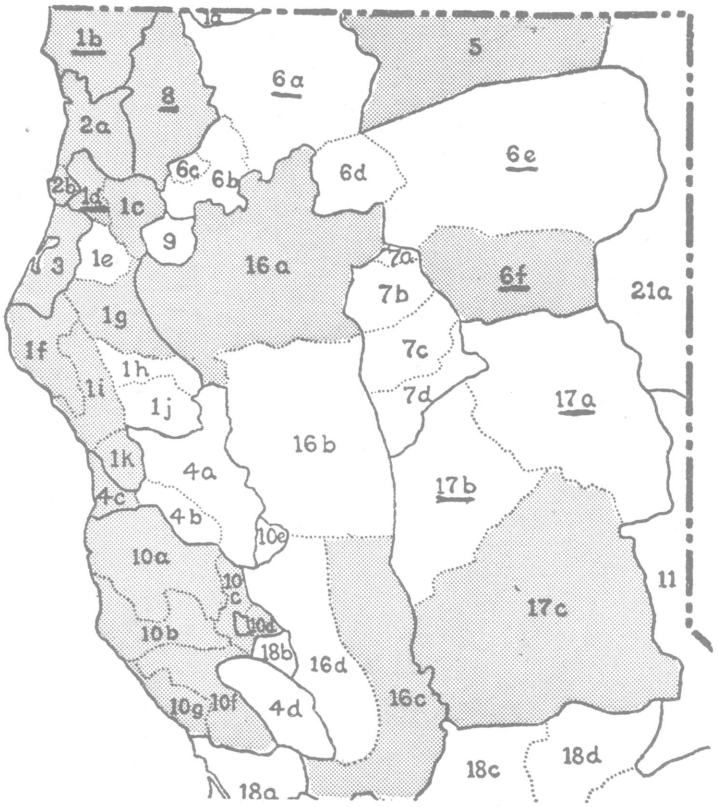
WEIR TYPES



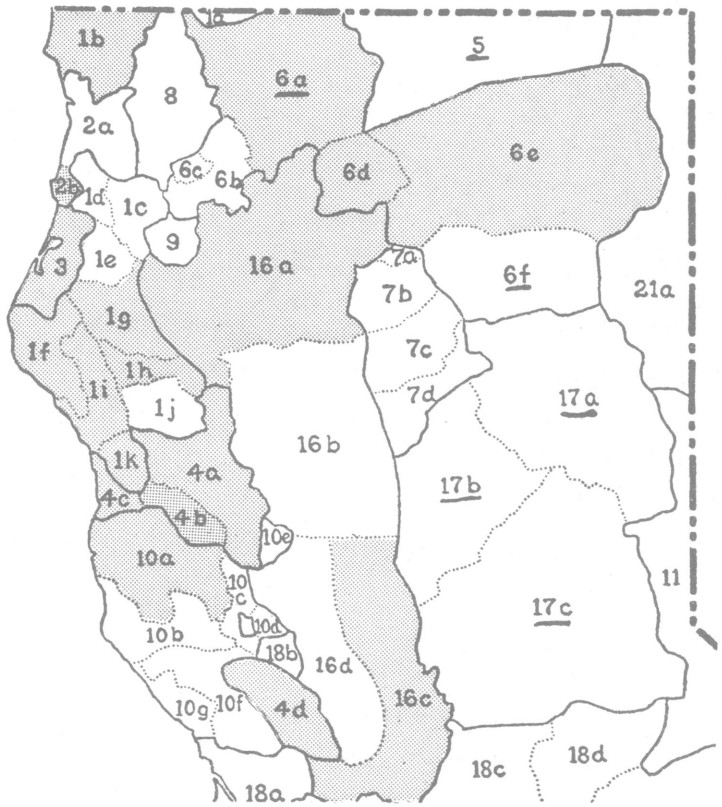
Map 7. Weirs with pens on upstream side



Map 8. Weirs with pens on downstream side

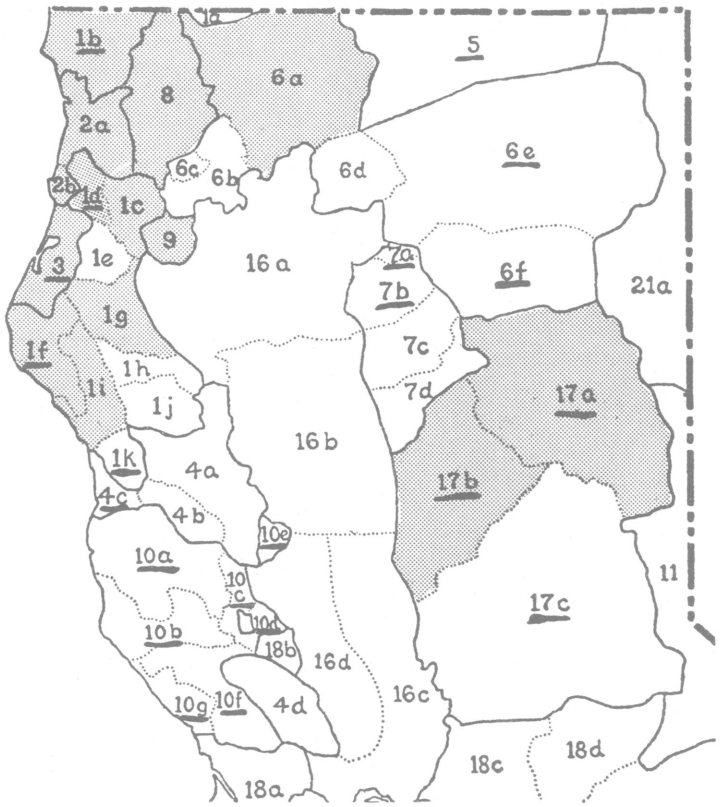


Map 9. Weirs with platforms

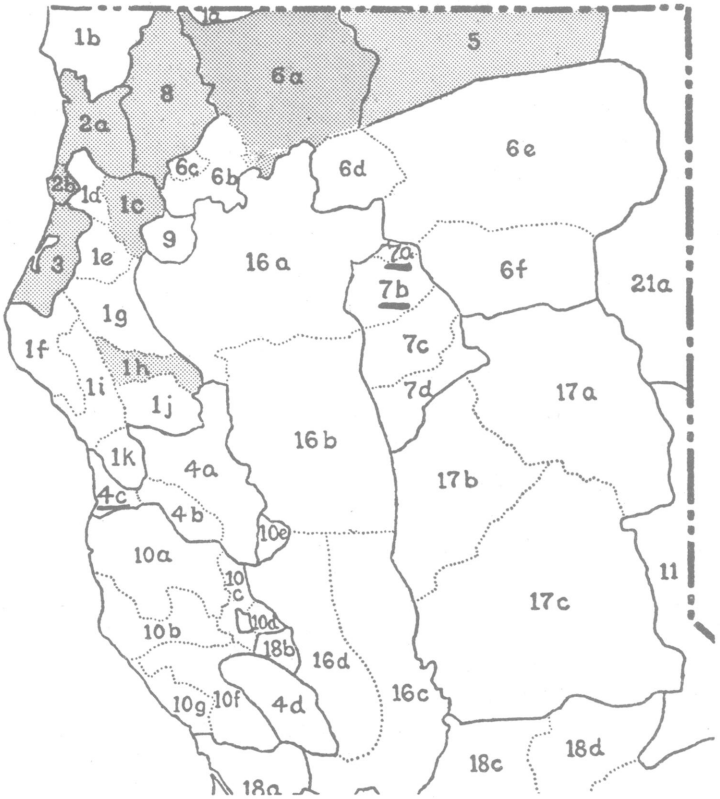


Map 10. Weirs with traps or nets set in openings

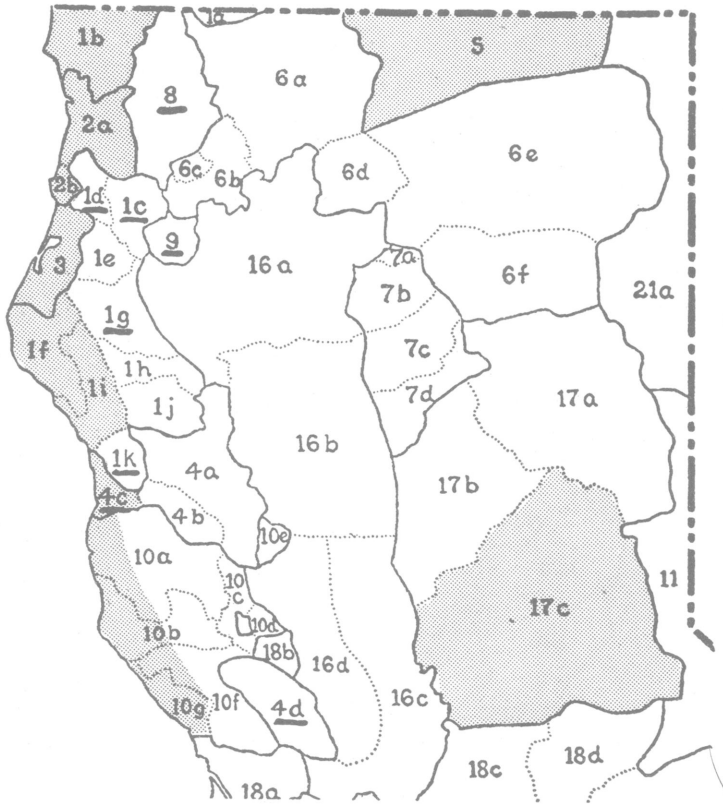
WEIR FEATURES



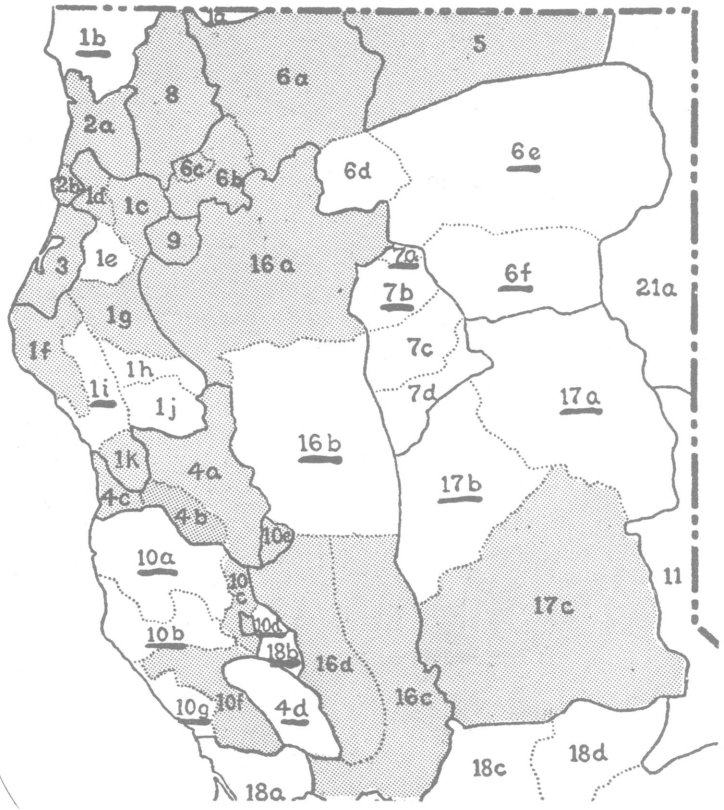
Map 11. A-frame lifting net



Map 12. A-frame landing net

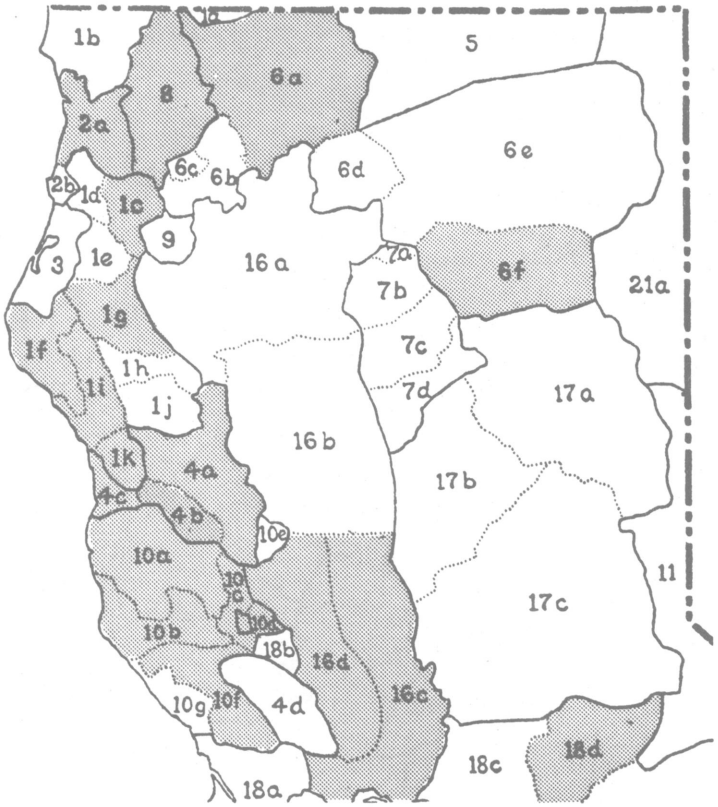


Map 13. V-frame scoop net

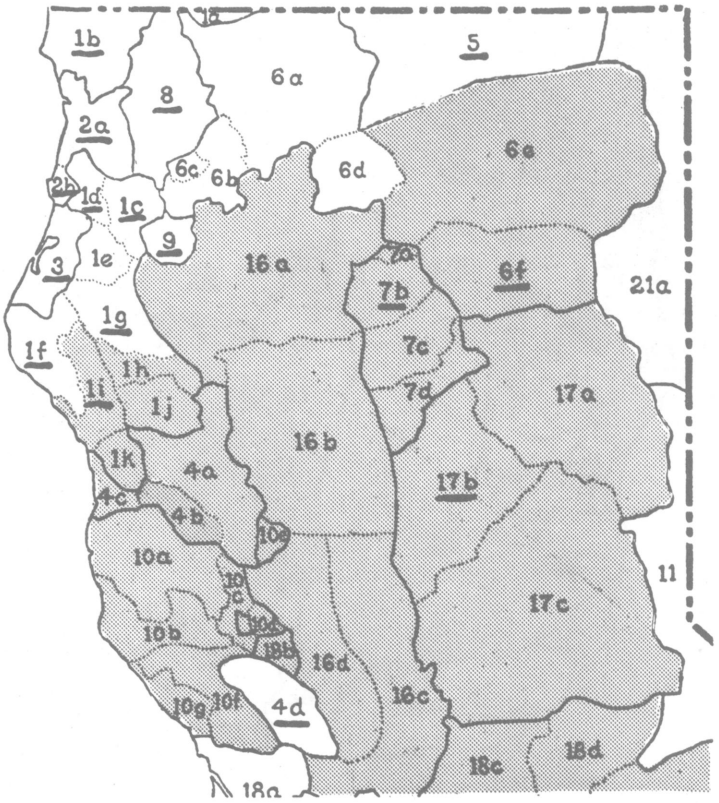


Map 14. Plunge net

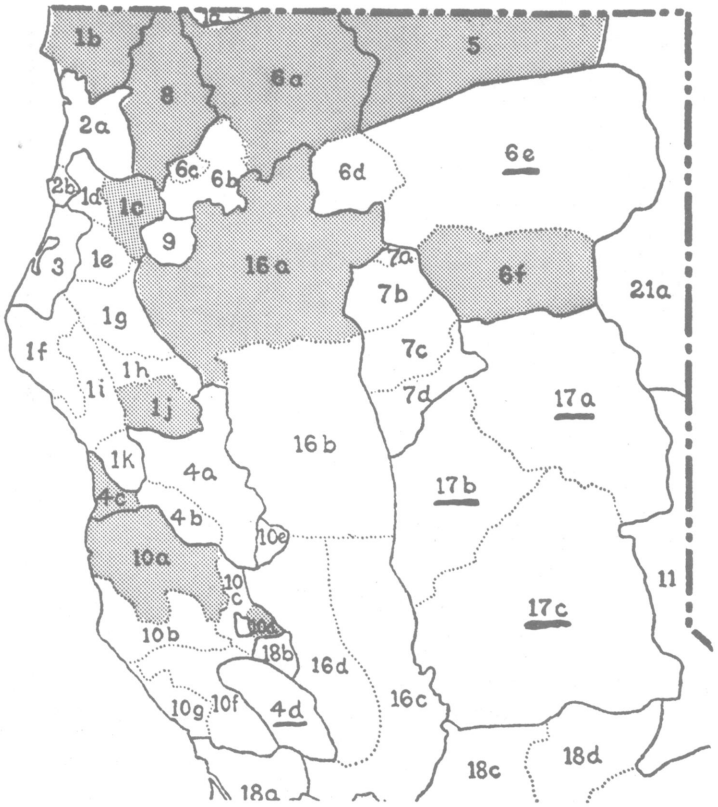
NET TYPES



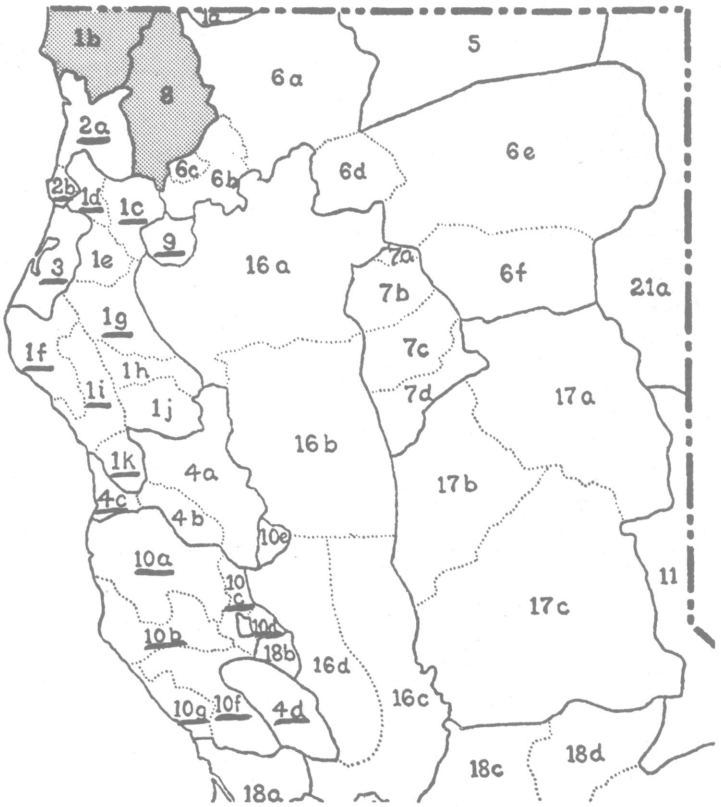
Map 15. Scaffold for netting



Map 16. Arc net

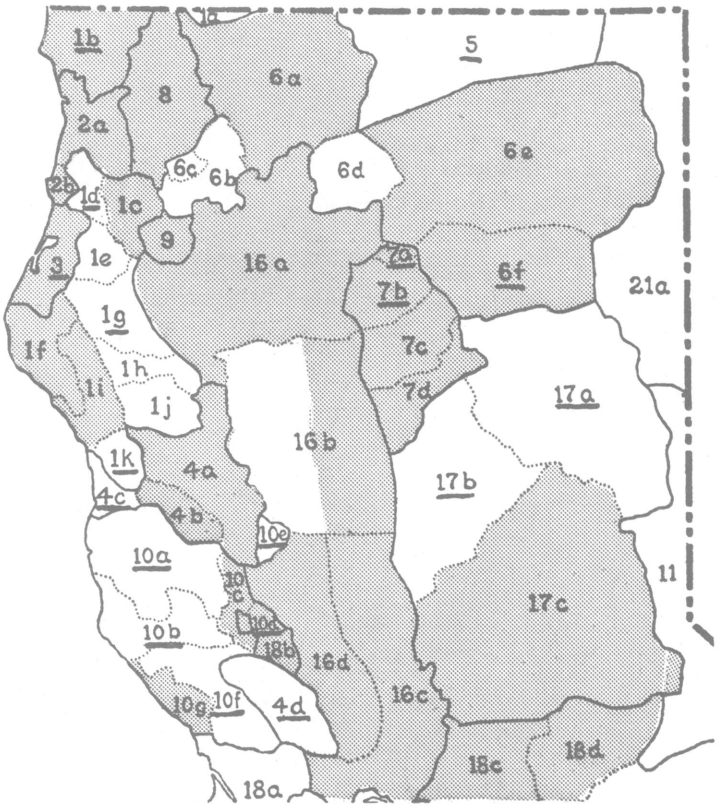


Map 17. Hoop dip net

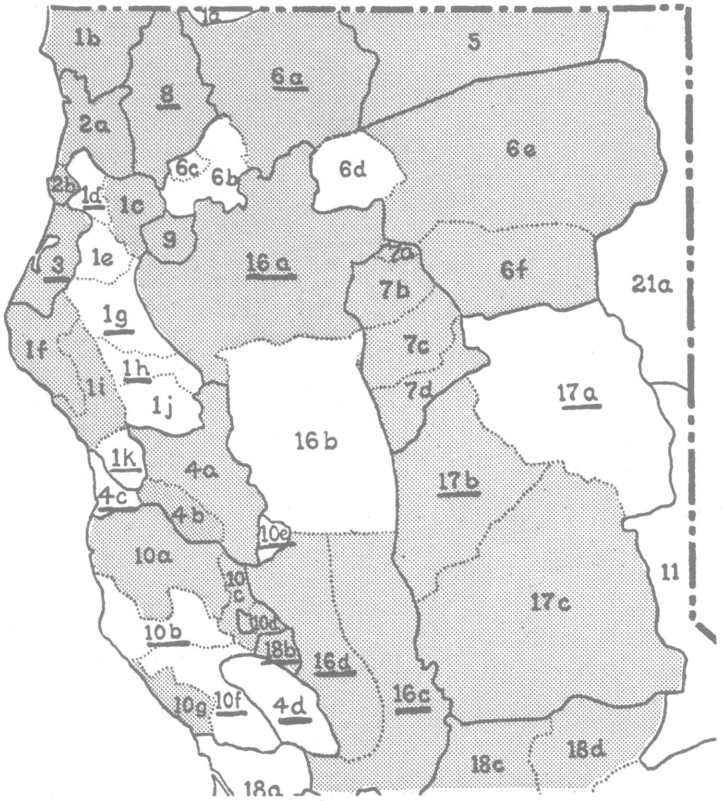


Map 18. Hoop net (cylindrical)

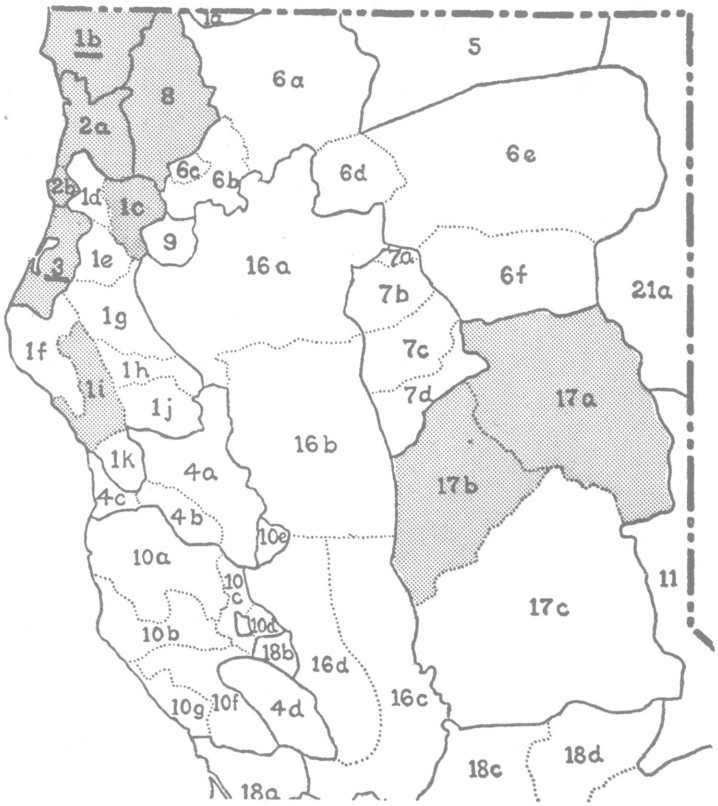
PLATFORM AND NET TYPES



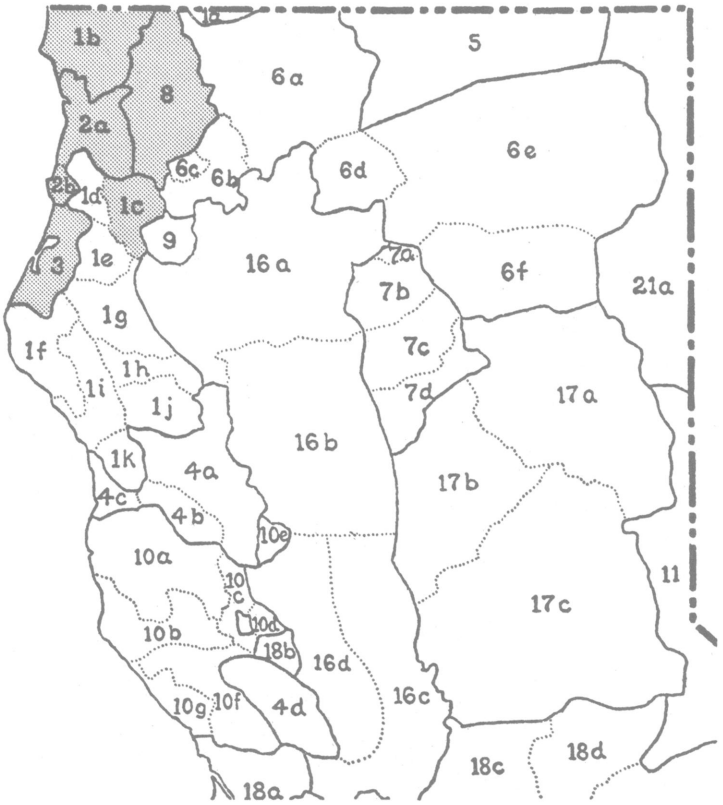
Map 19. Seine



Map 20. Gill net

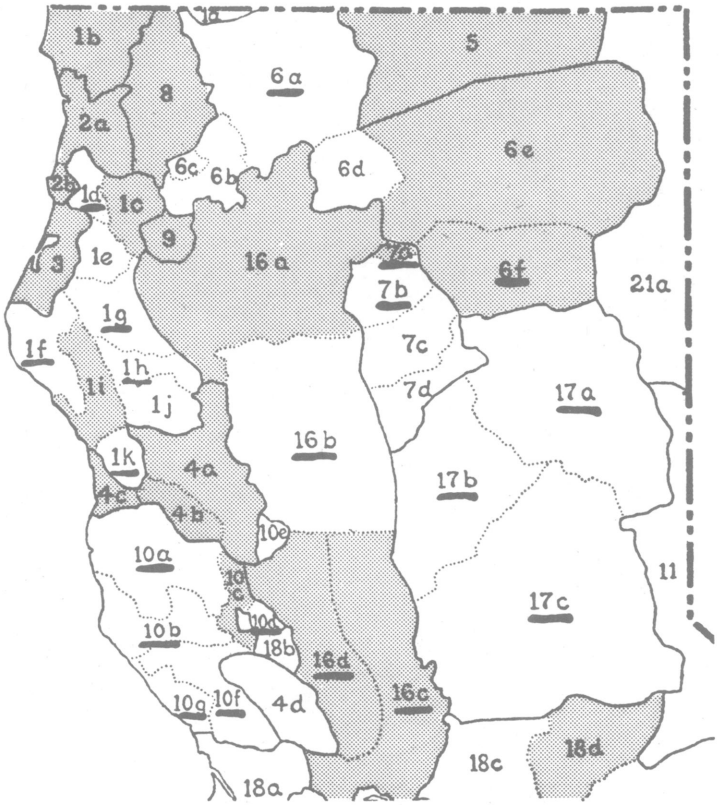


Map 21. Double drifting bag net

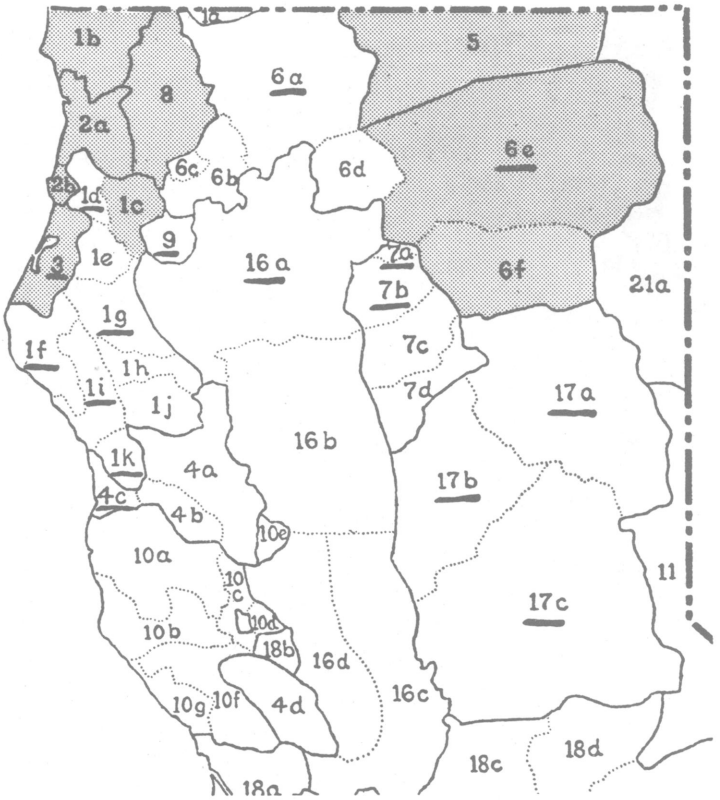


Map 22. Anchors

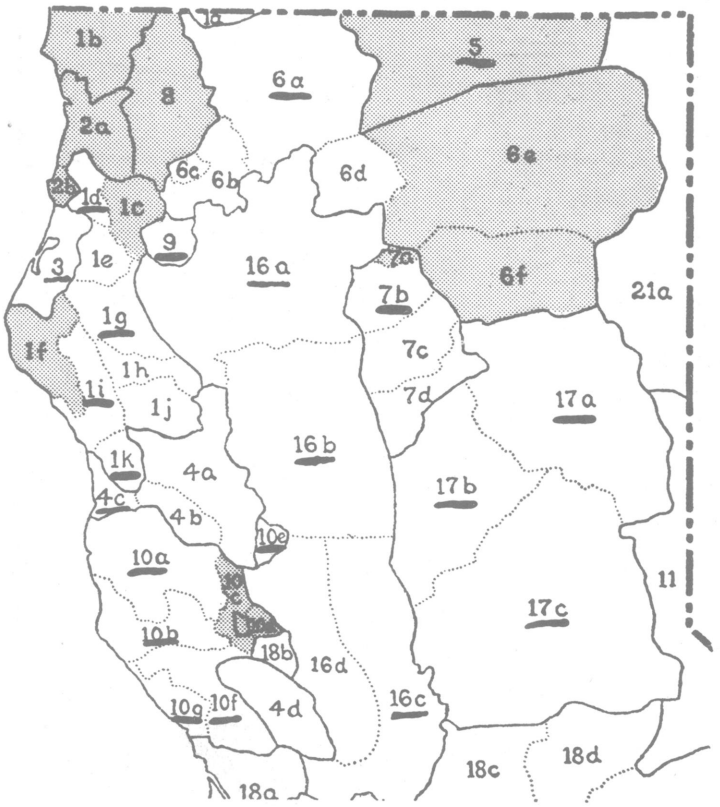
NET TYPES; ANCHORS



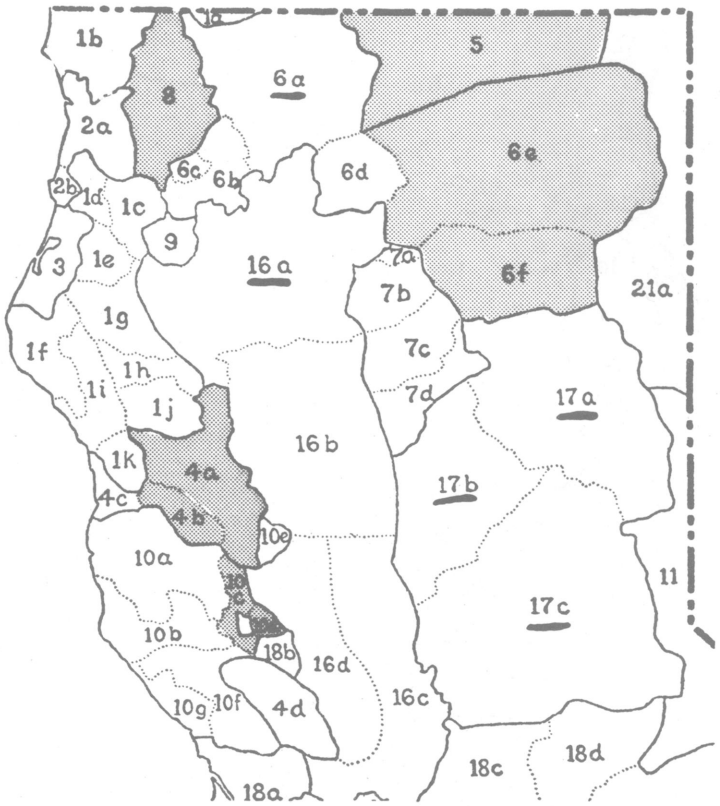
Map 23. Grooved sinkers



Map 24. Perforated sinkers

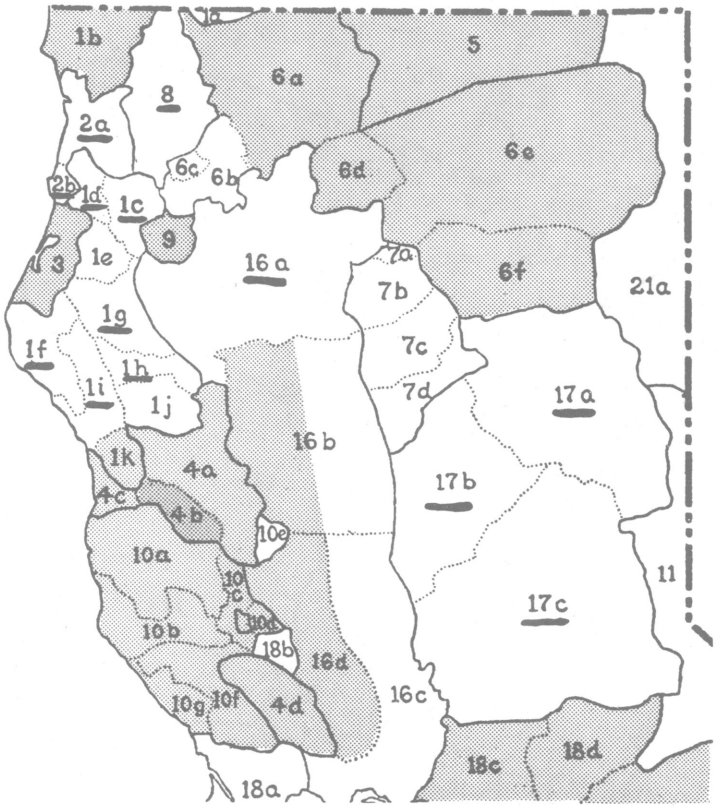


Map 25. Wooden floats

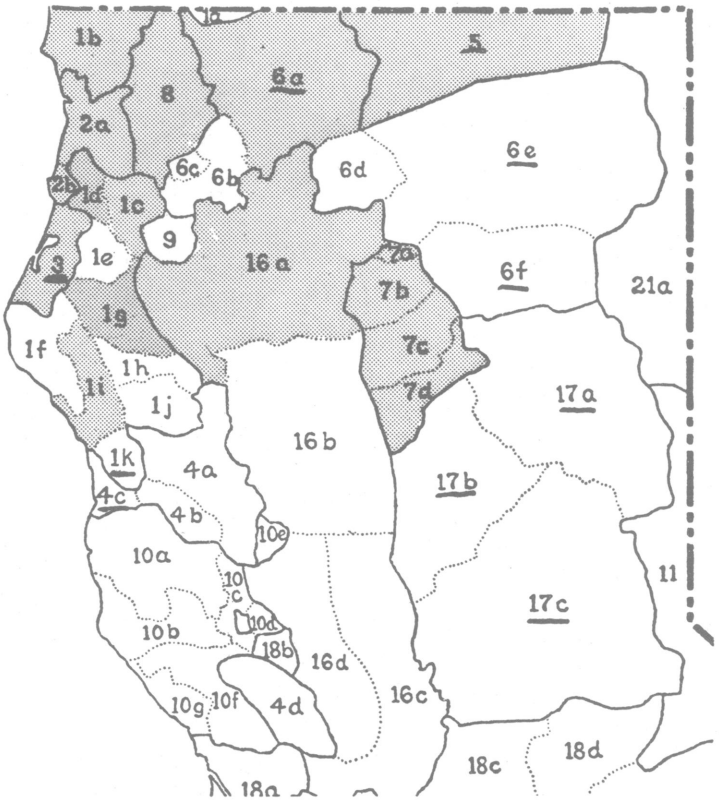


Map 26. Tule floats

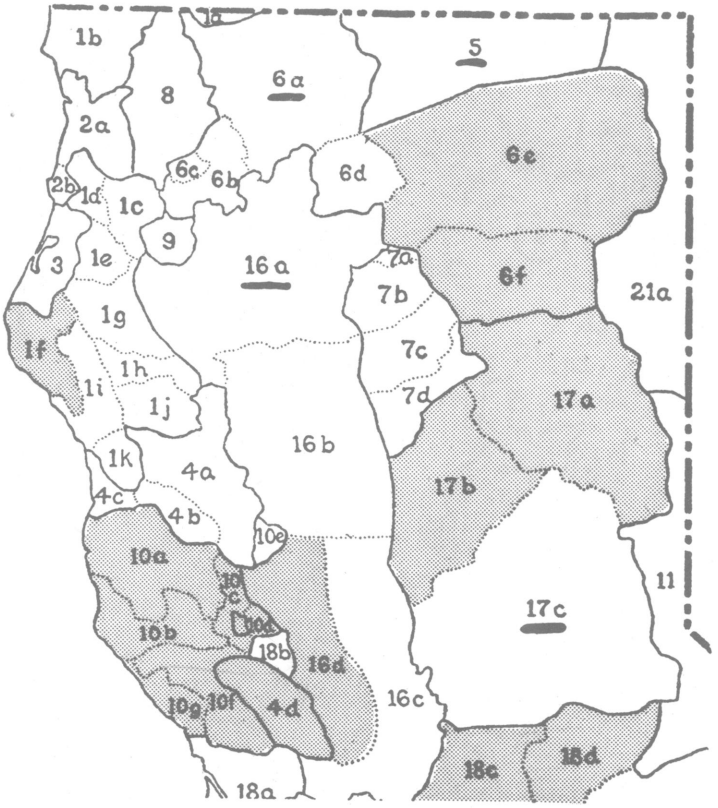
SINKERS AND FLOATS



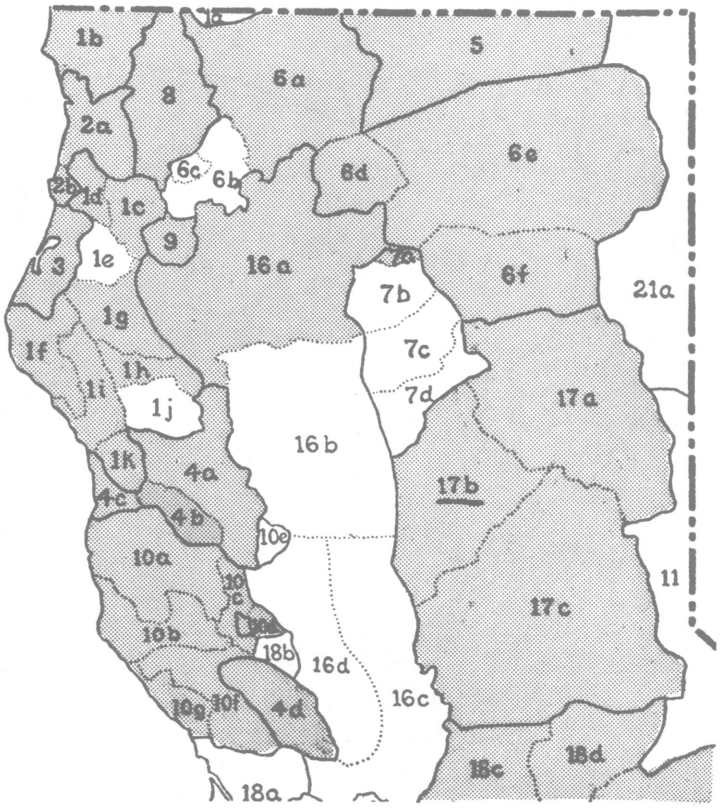
Map 27. Cylindrical basketry traps



Map 28. Trough-shaped basketry traps

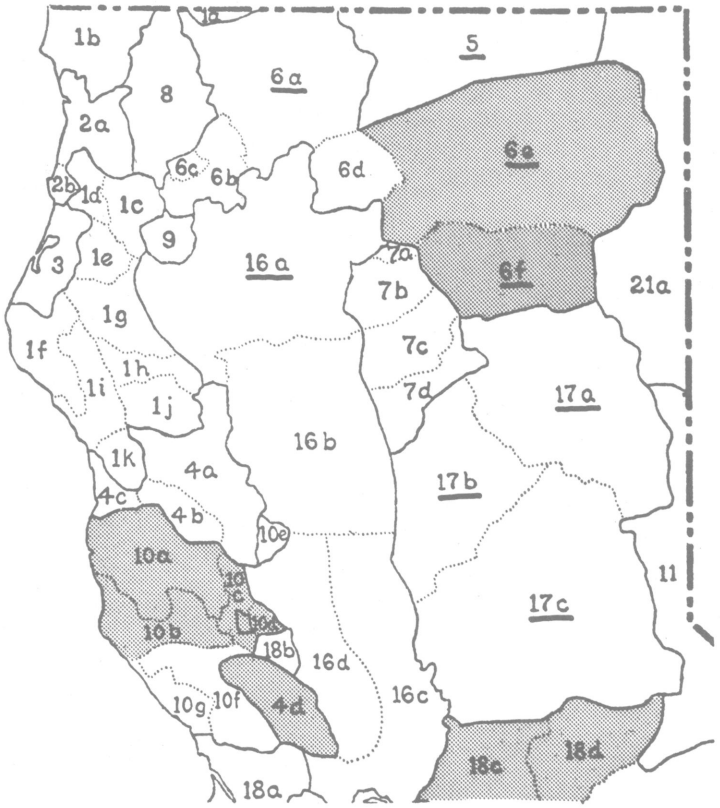


Map 29. Invaginated basketry traps

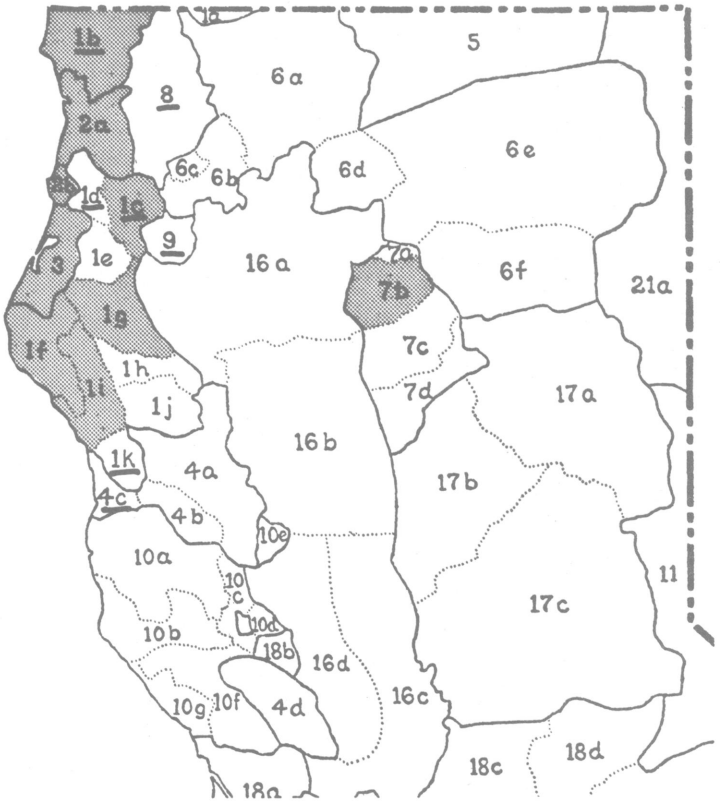


Map 30. Scooping basketry traps

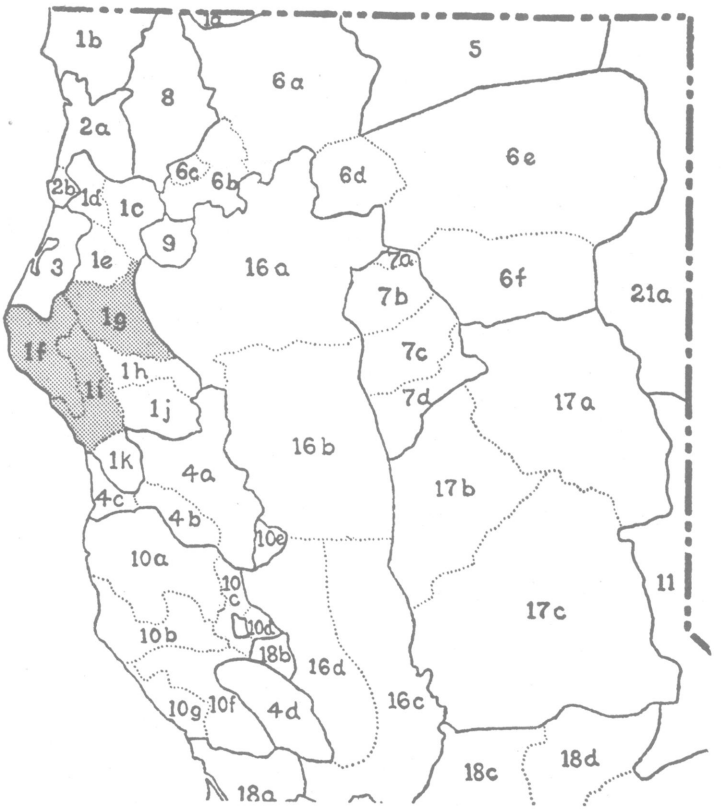
BASKETRY TRAPS



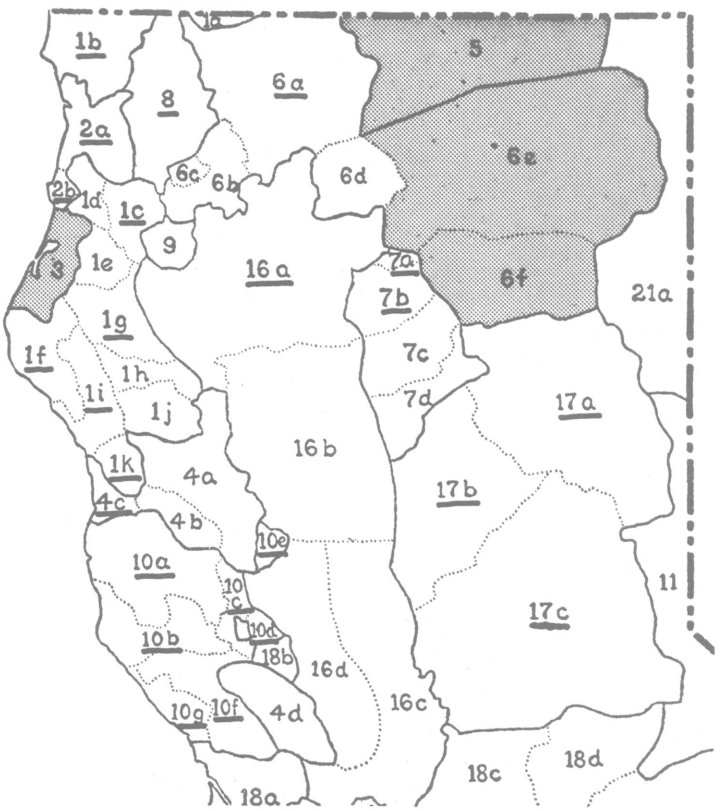
Map 31. Plunge basketry traps



Map 32. Eel pots

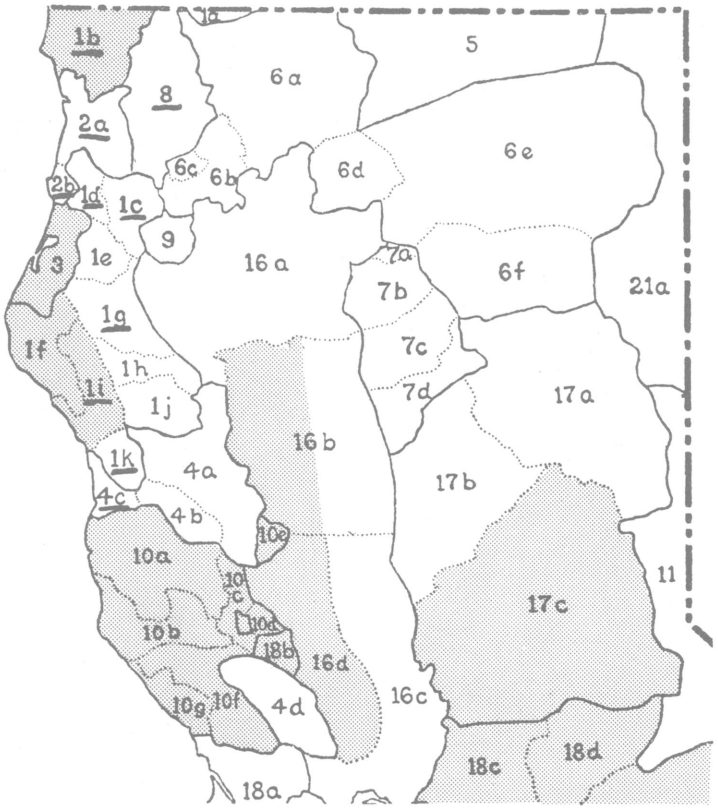


Map 33. Rock piles for lampreys

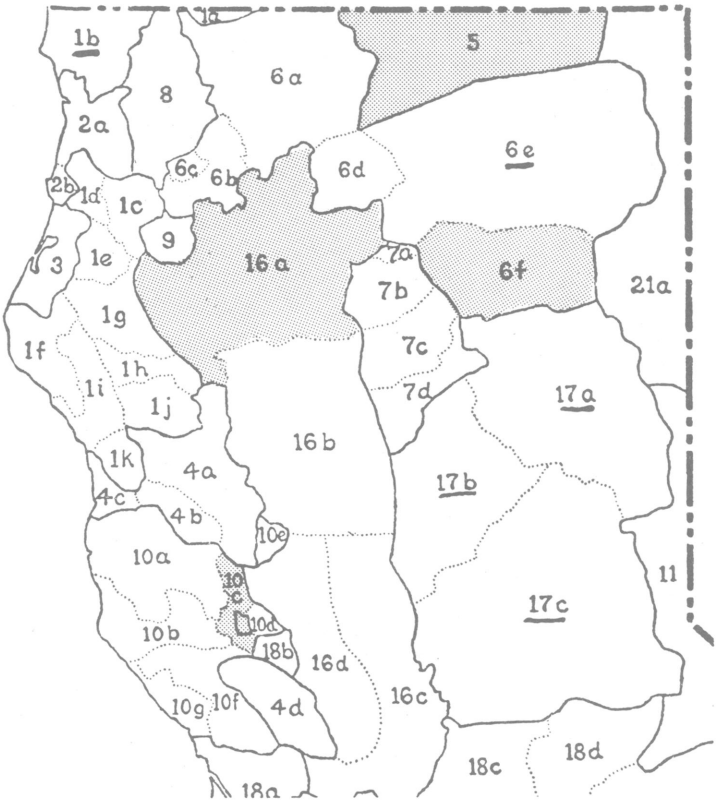


Map 34. Multipointed spears

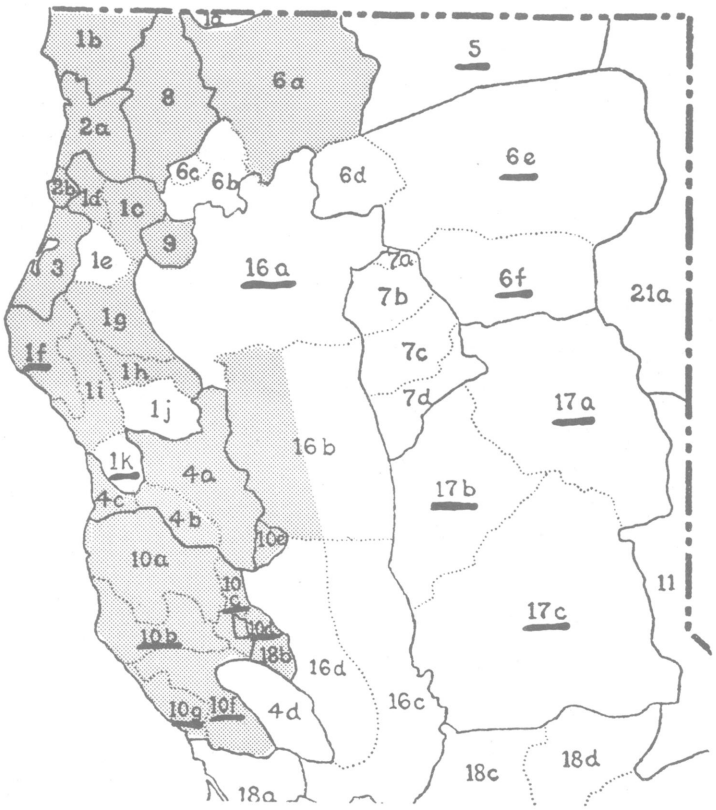
BASKETRY TRAPS; EEL POTS; ROCK PILES; SPEARS



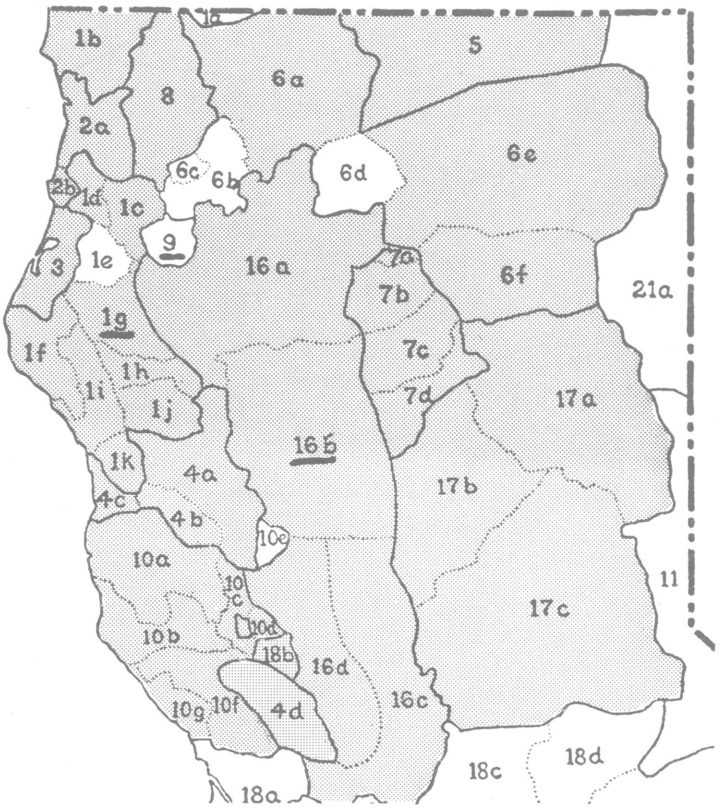
Map 35. Spear, with one fixed point



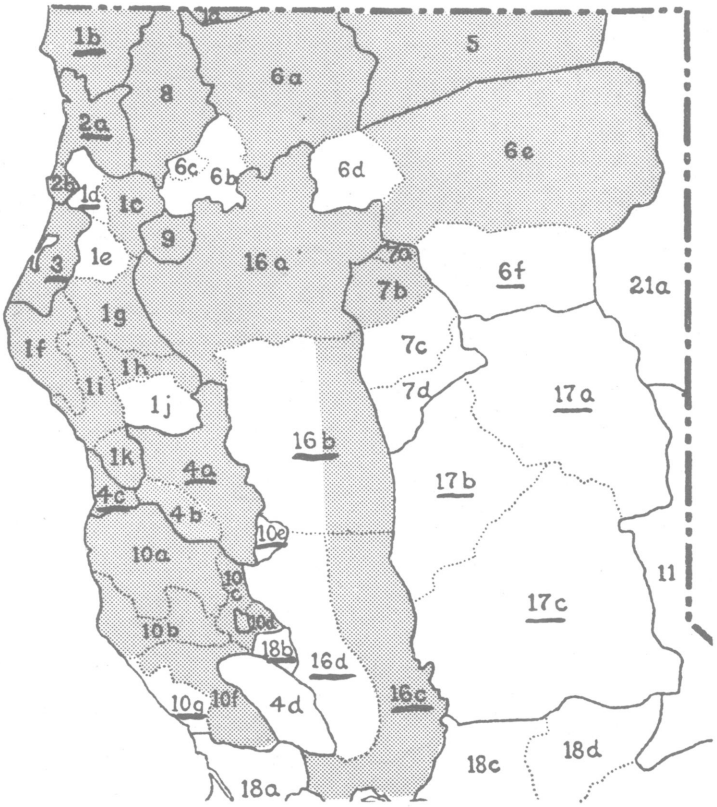
Map 36. Spear, with two fixed points



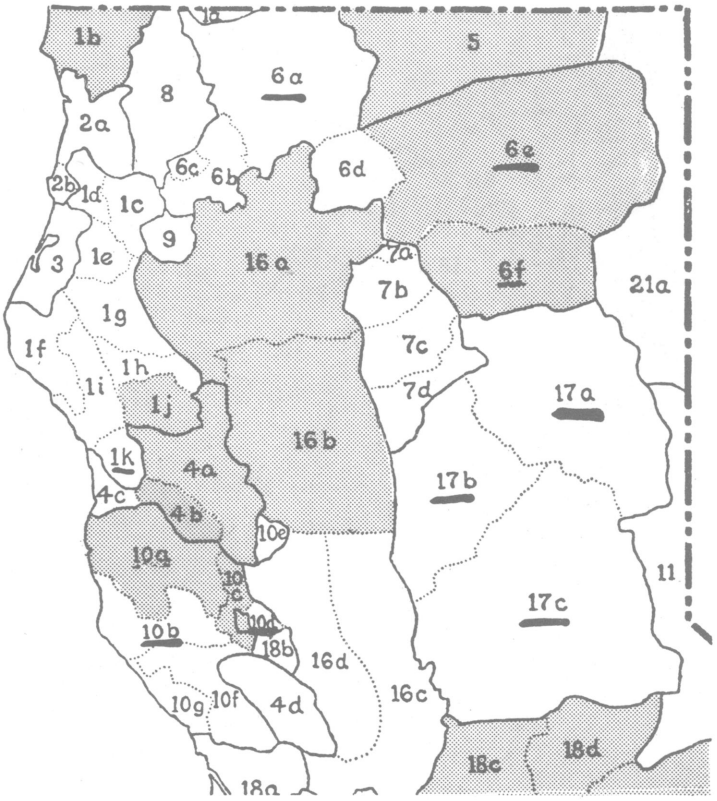
Map 37. Single-toggle harpoon



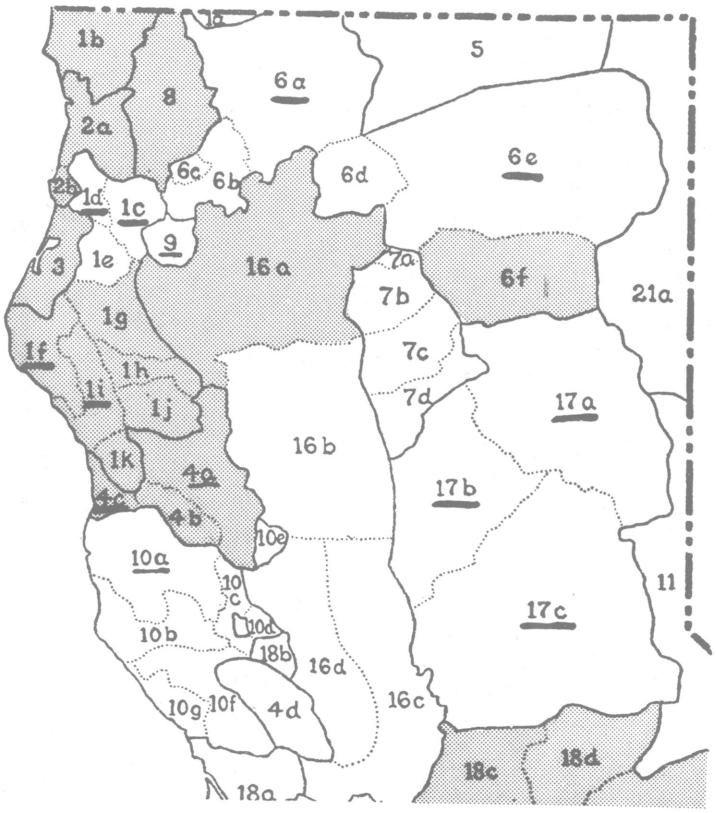
Map 38. Double-toggle harpoon



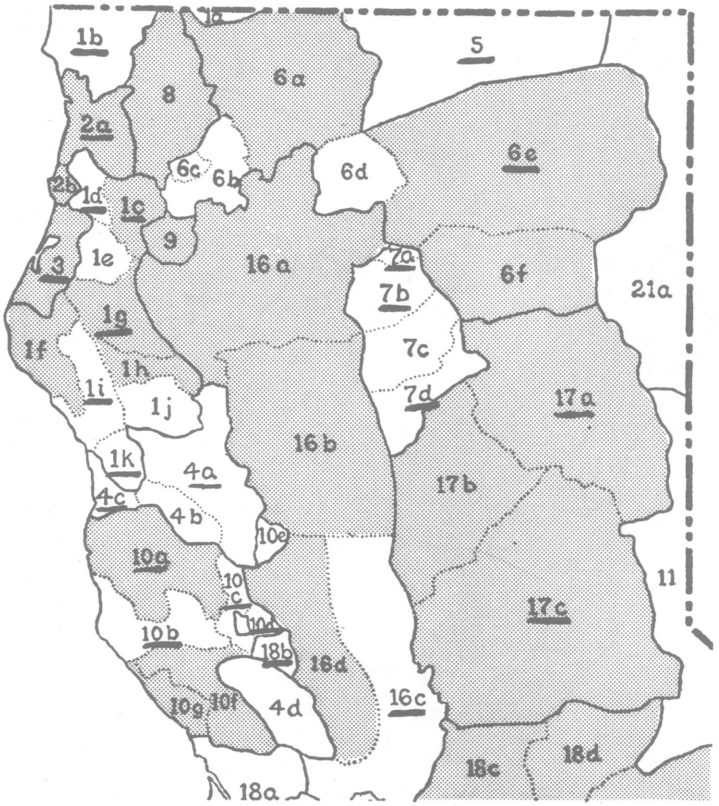
Map 39. Spearing scaffold



Map 40. White stone flooring

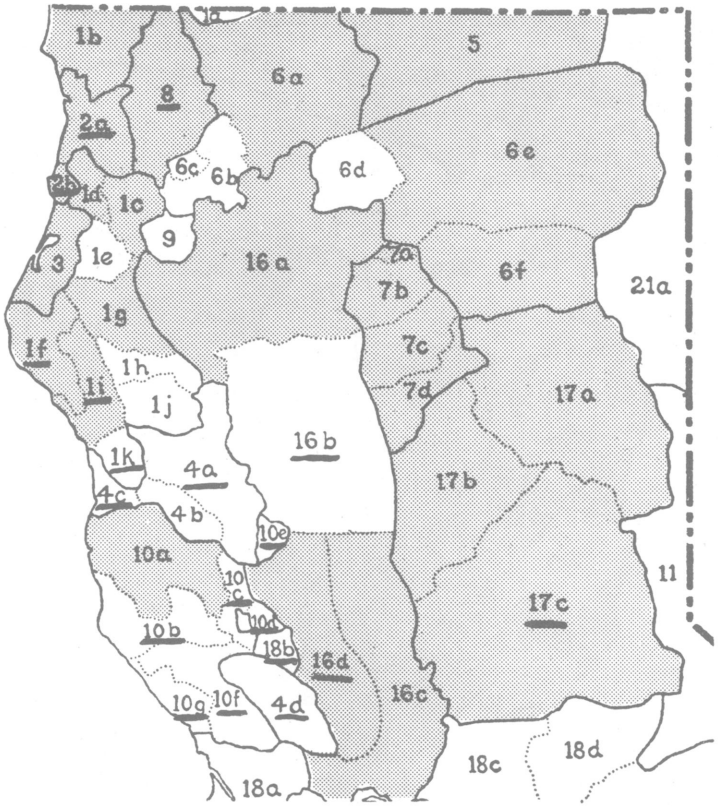


Map 41. Gaffs (lamprey or fish)

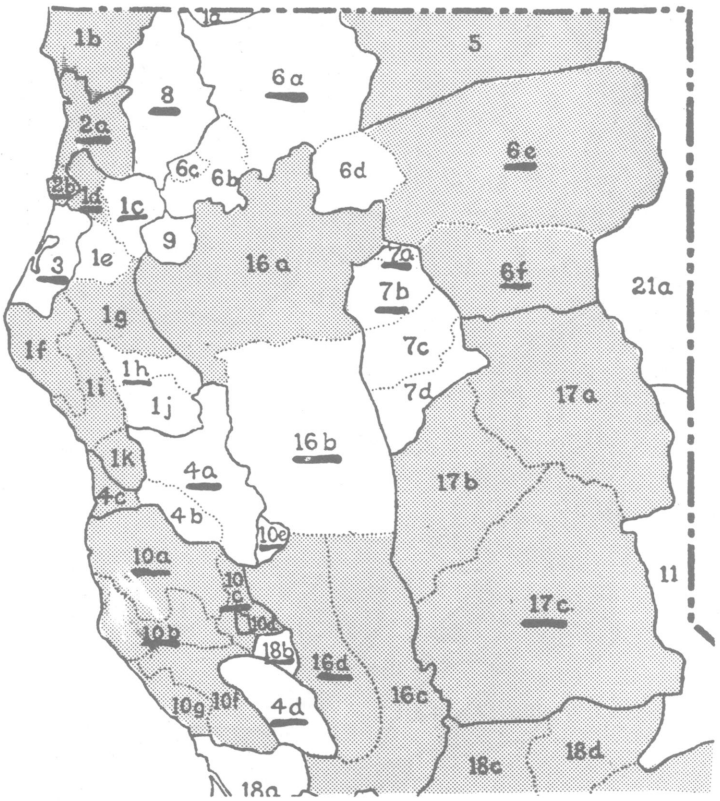


Map 42. Shooting fish with bow and arrow

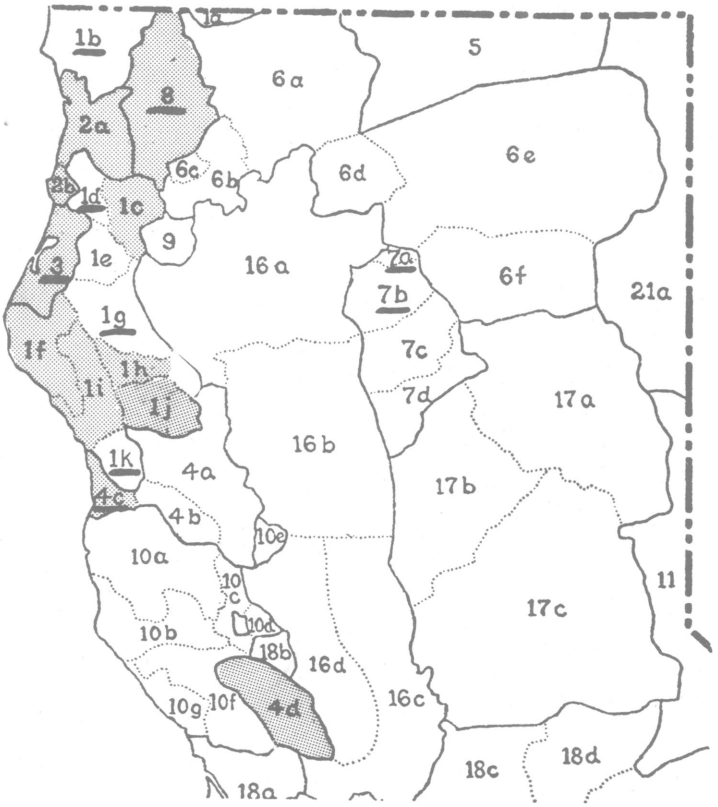
SCAFFOLDS; WHITE ROCK FLOORING; GAFFS; SHOOTING FISH



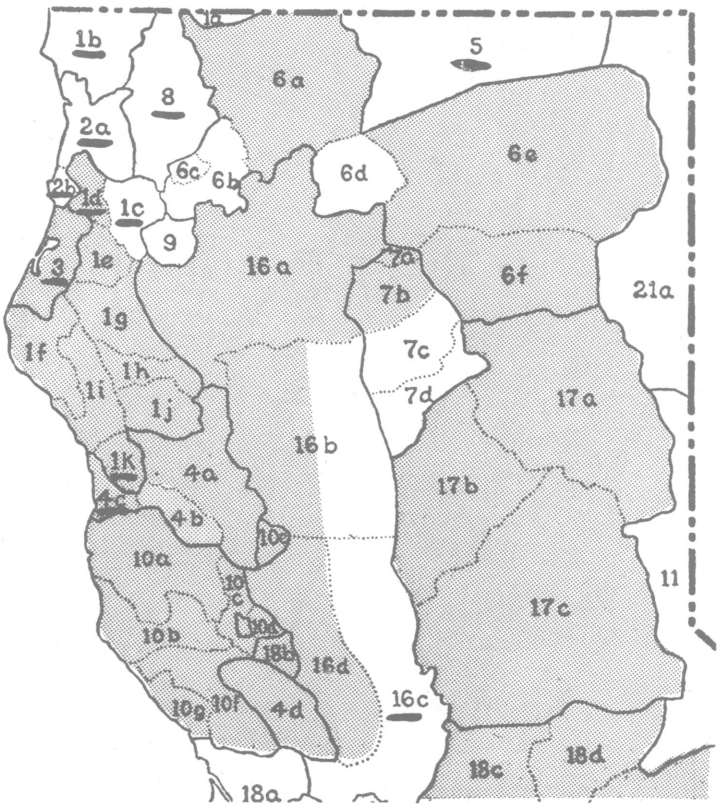
Map 43. Acute-angled, single-pointed fishhook



Map 44. Bipointed gorge fishhook

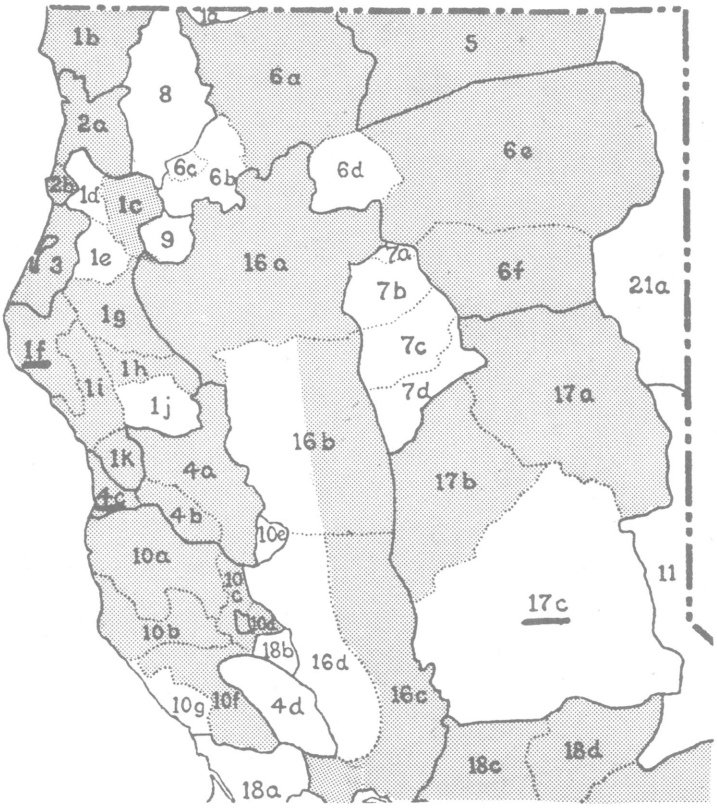


Map 45. Sniggle, hair fly or ball

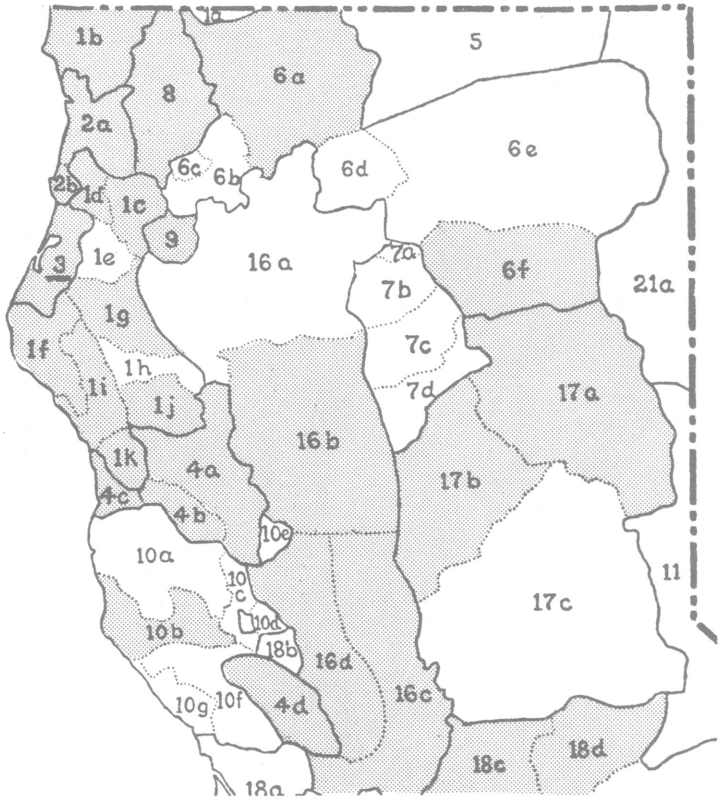


Map. 46. Fish Poisons (narcotics)

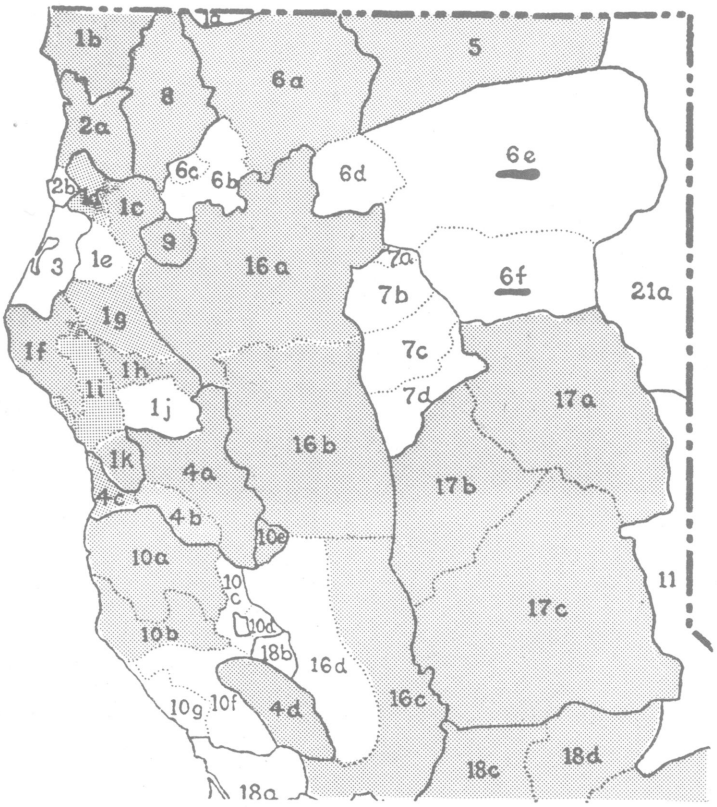
FISHHOOKS; SNIGGLES; FISH POISON



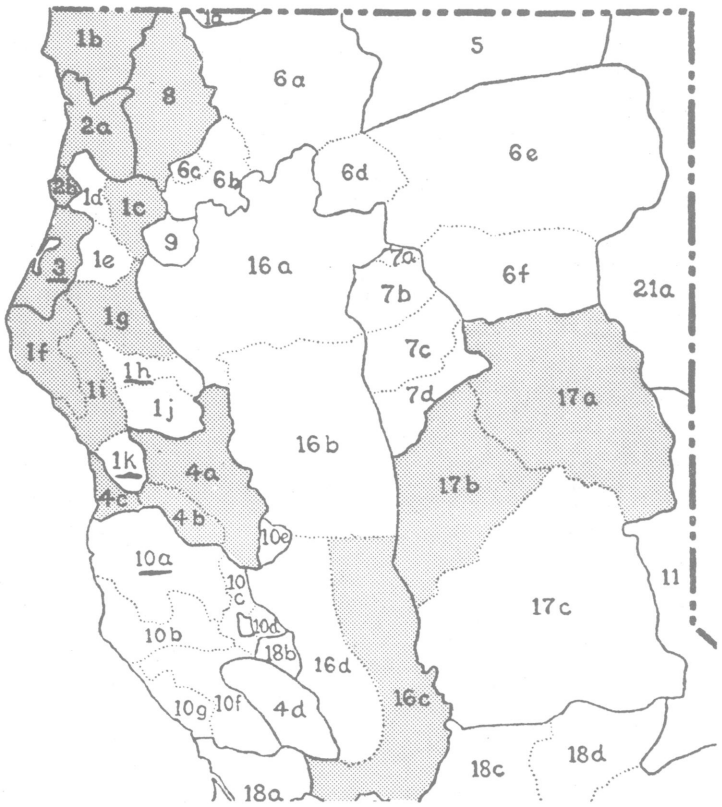
Map 47. Fire at night



Map 48. Diving for fish

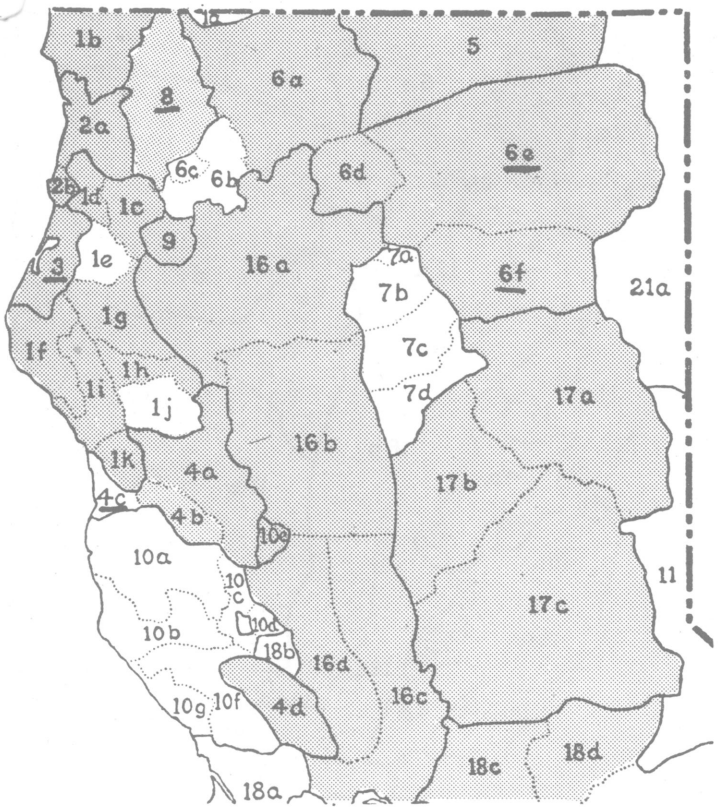


Map 49. Catching fish or lampreys with hands

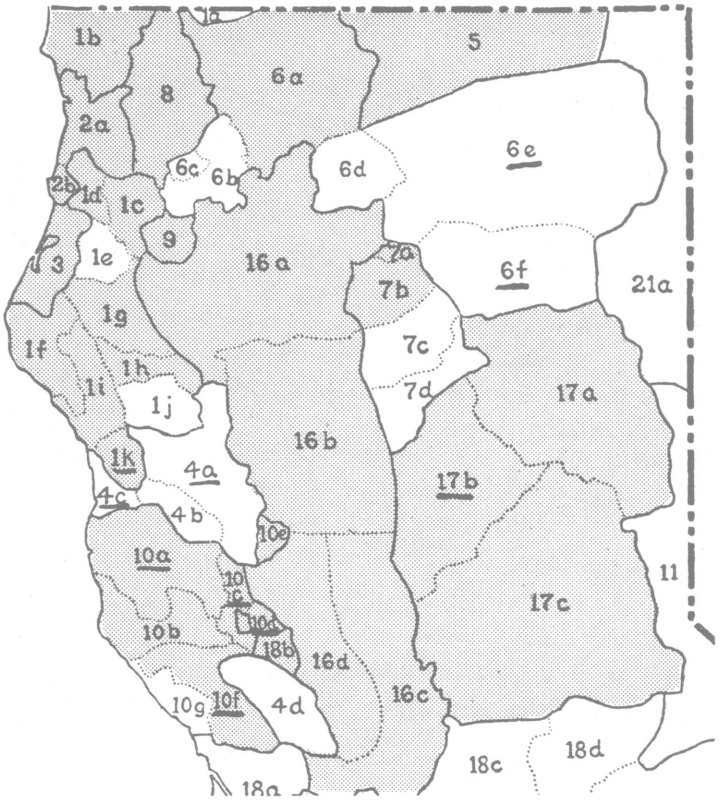


Map 50. Snaring fish

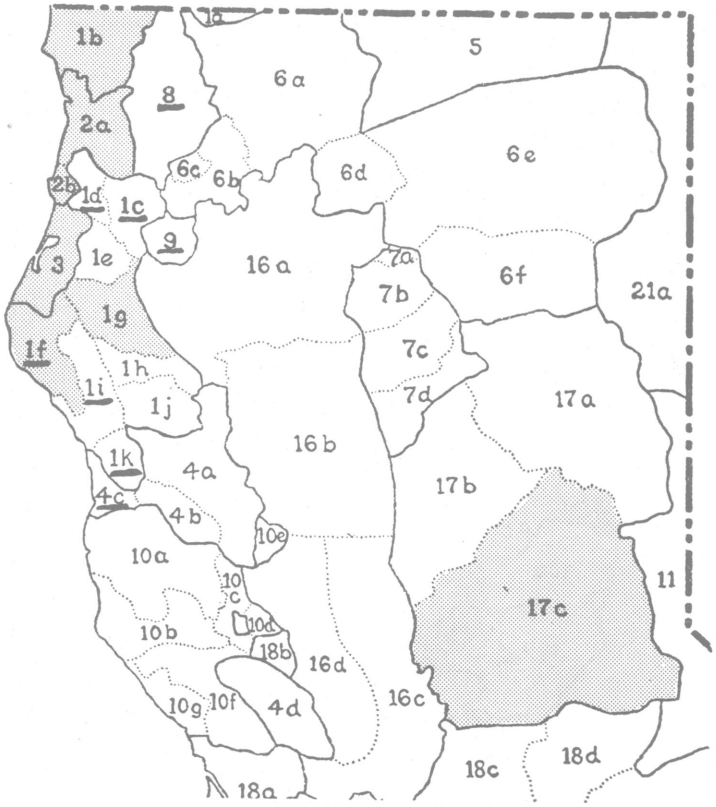
VARIOUS FISHING METHODS



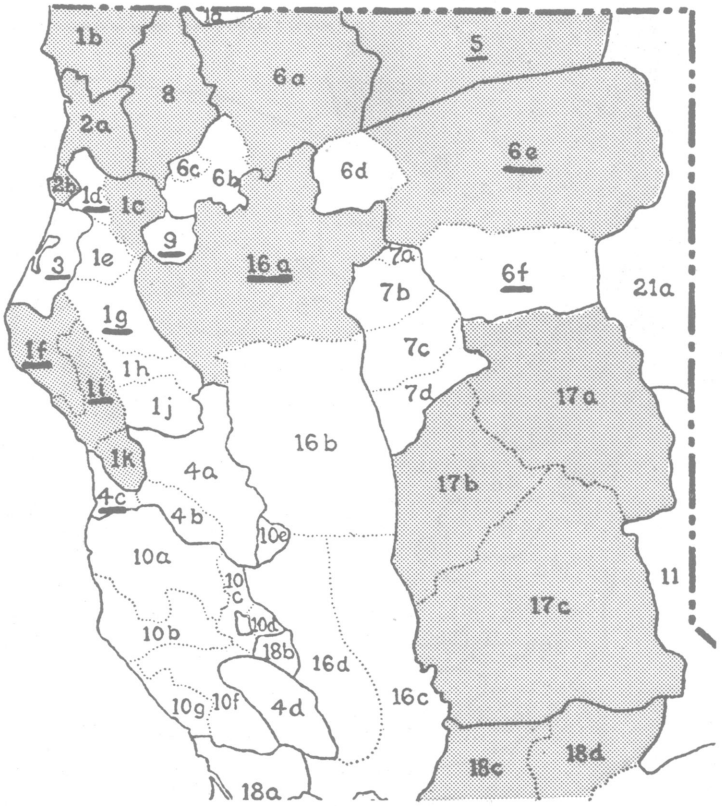
Map 51. Driving fish



Map 52. Fish clubs

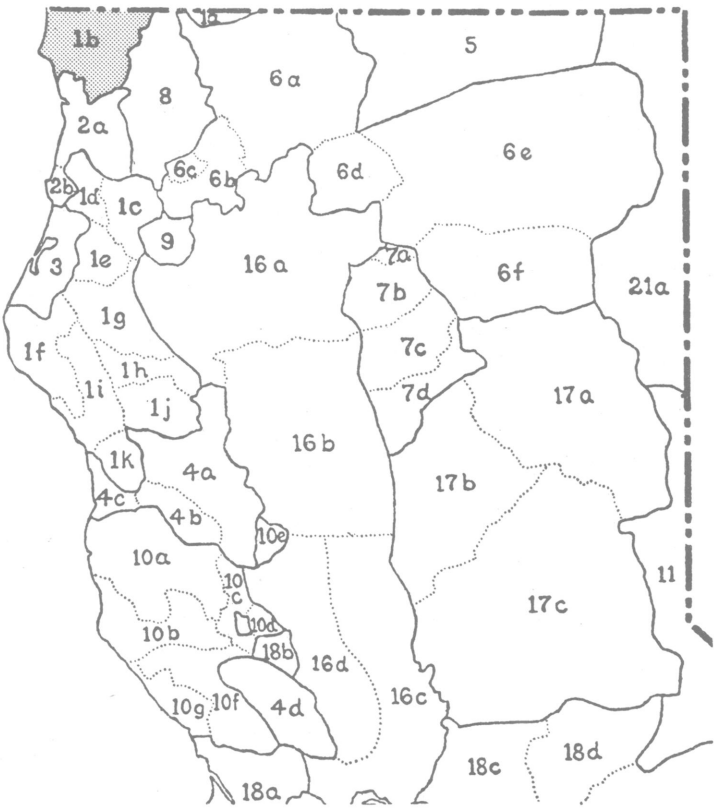


Map 53. Alarm rattles

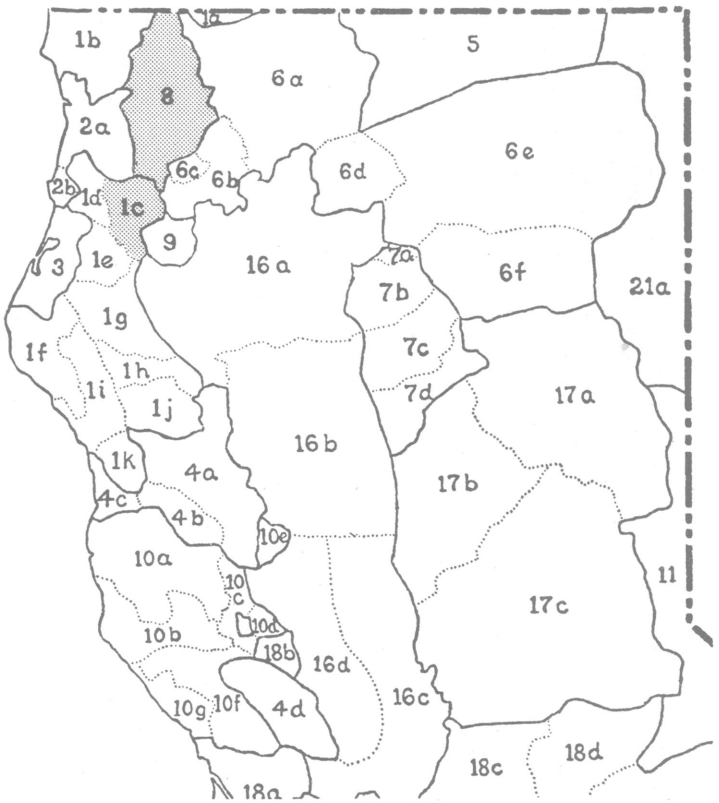


Map 54. First-salmon ceremony

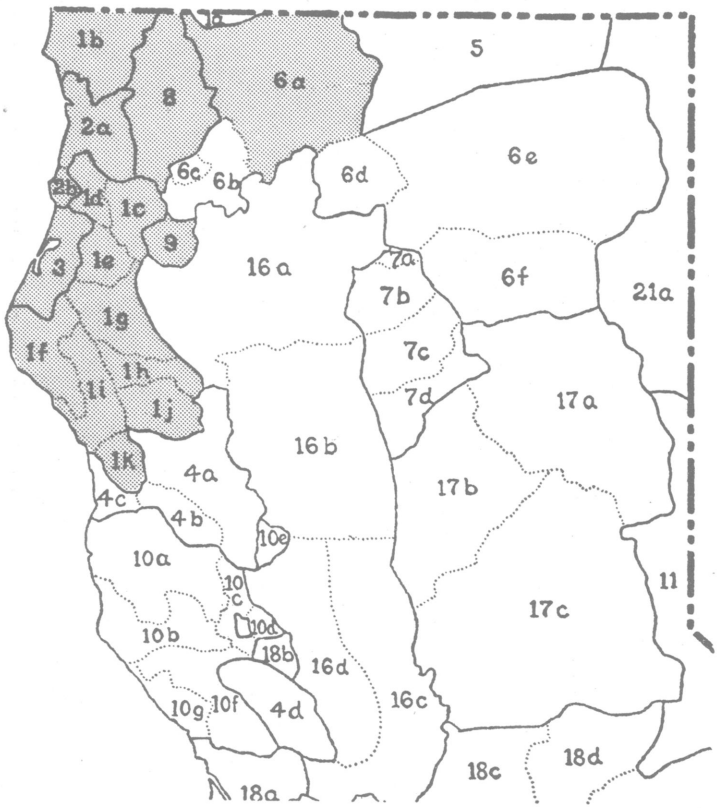
FISHING METHODS; IMPLEMENTS; CEREMONY



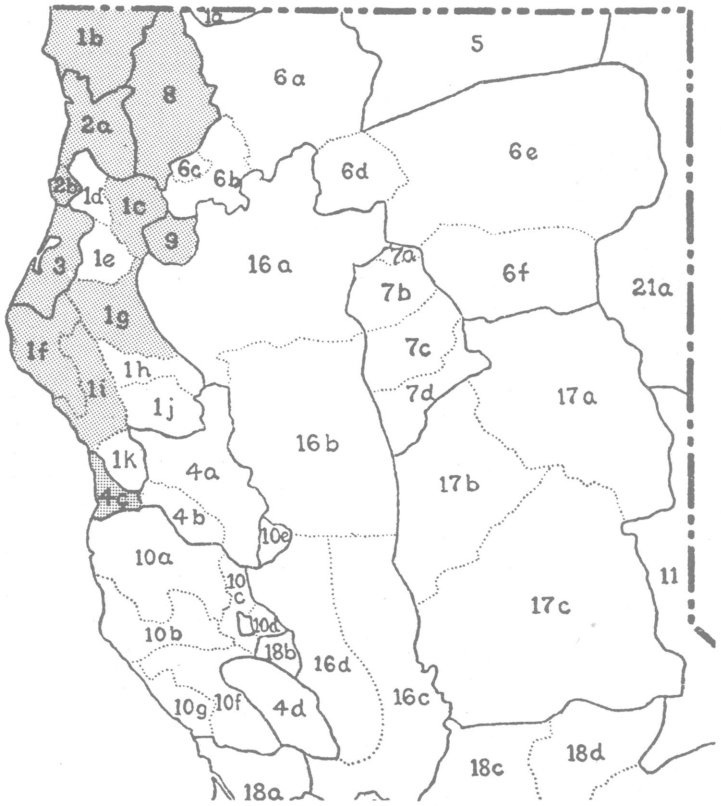
Map 55. Lamprey chute



Map 56. Boxlike trap

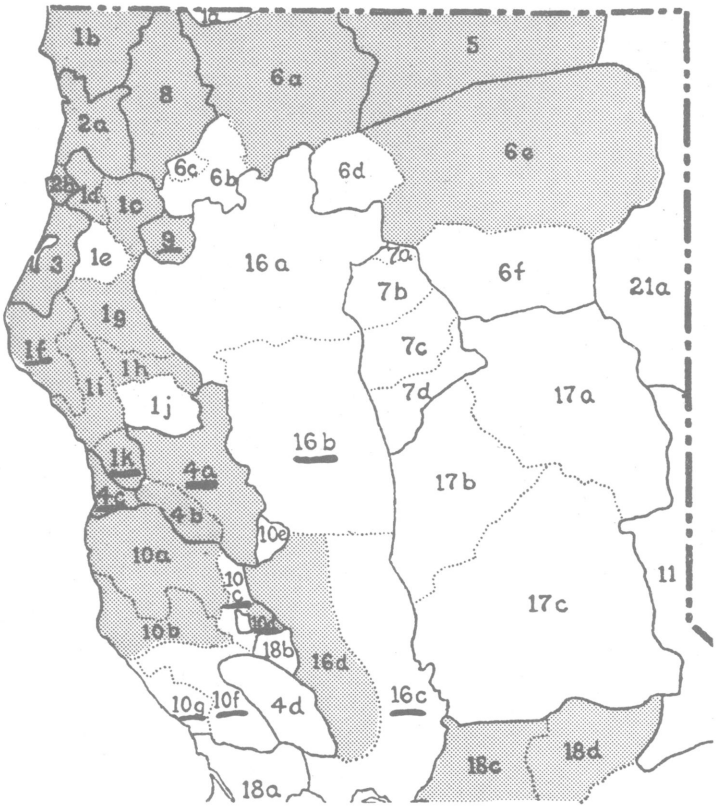


Map 57. Eel slitter

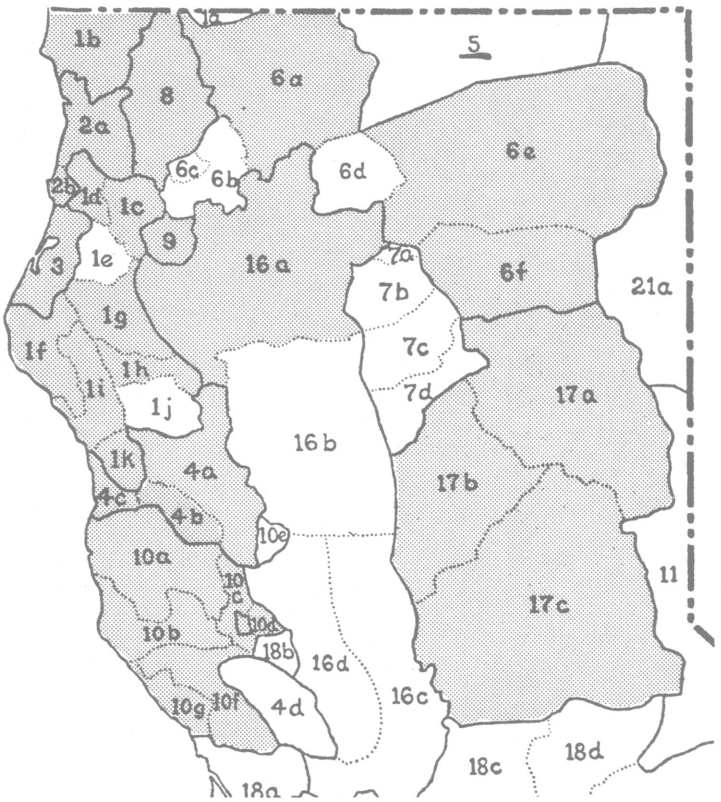


Map 58. Fish knives

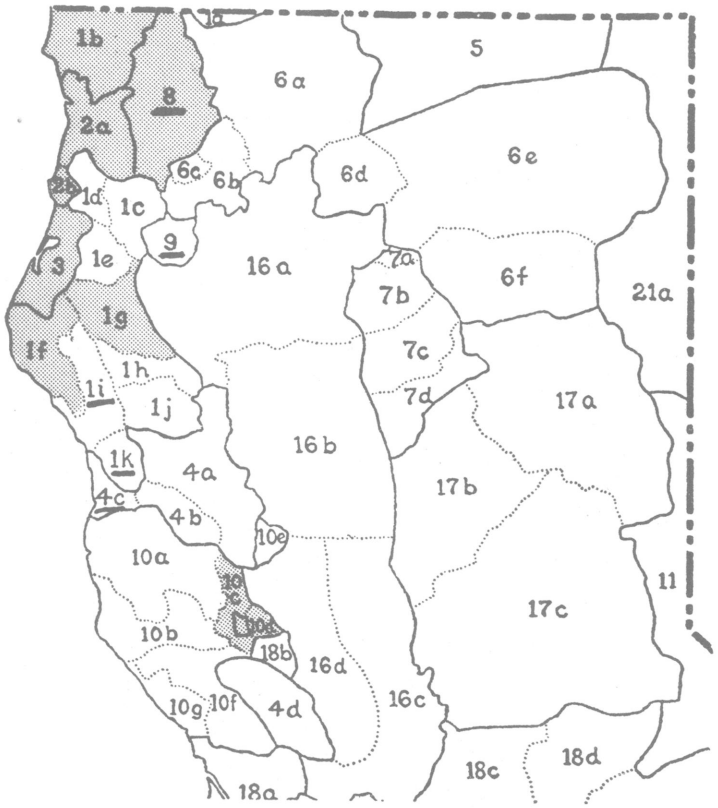
FISHING DEVICES AND IMPLEMENTS



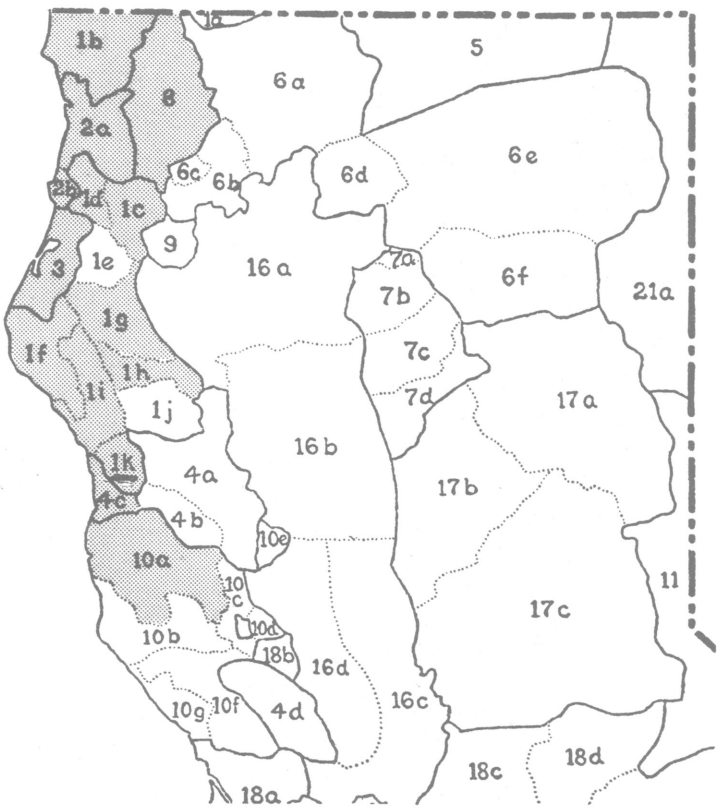
Map 59. Babracot



Map 60. Smoke-drying of fish

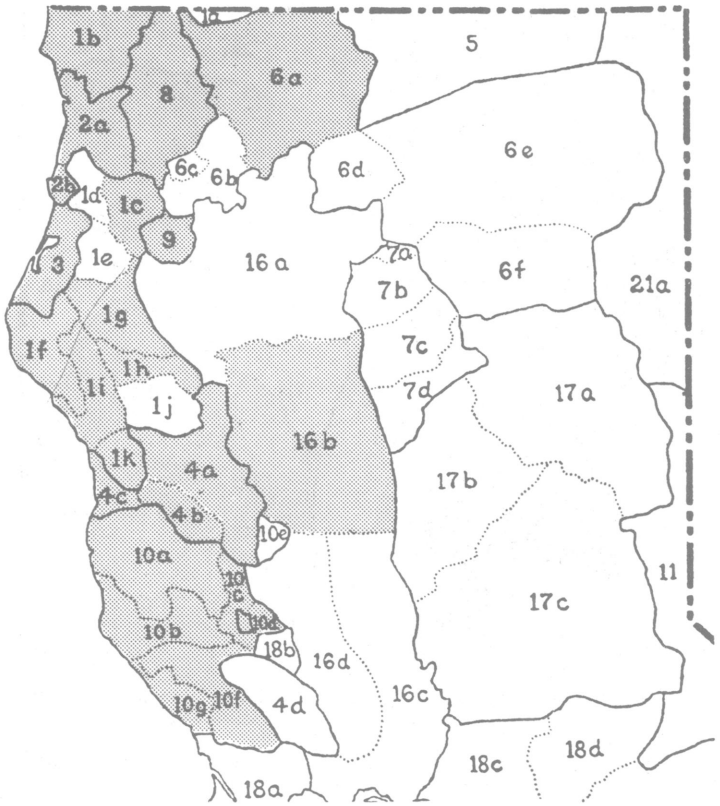


Map 61. Fish-drying house

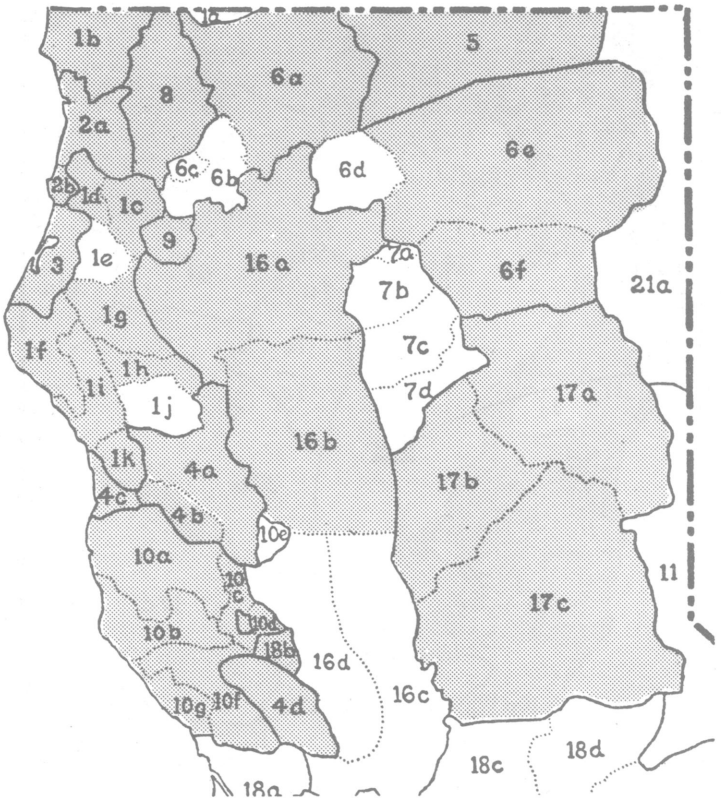


Map 62. Smoke-drying inside dwelling

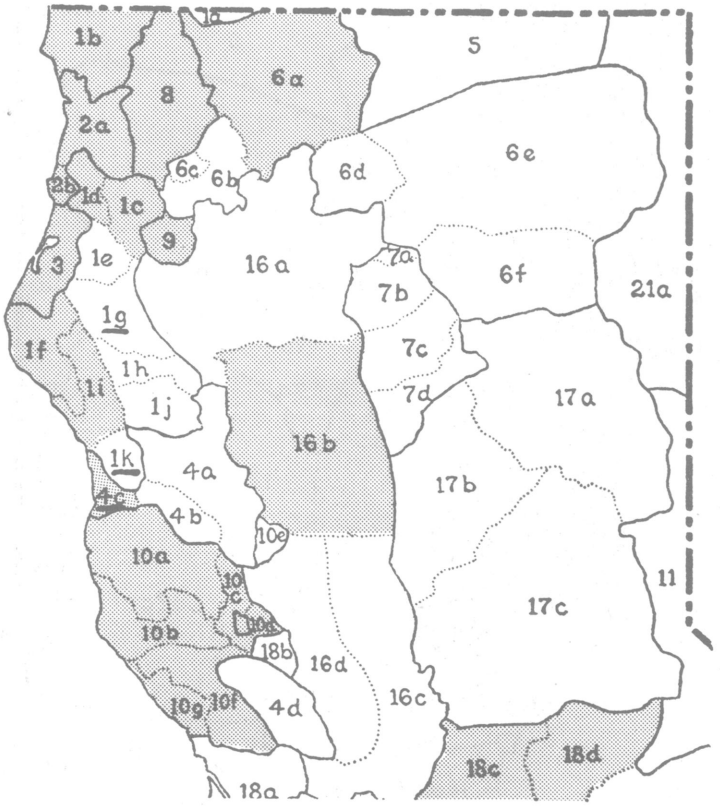
PRESERVATION OF FISH



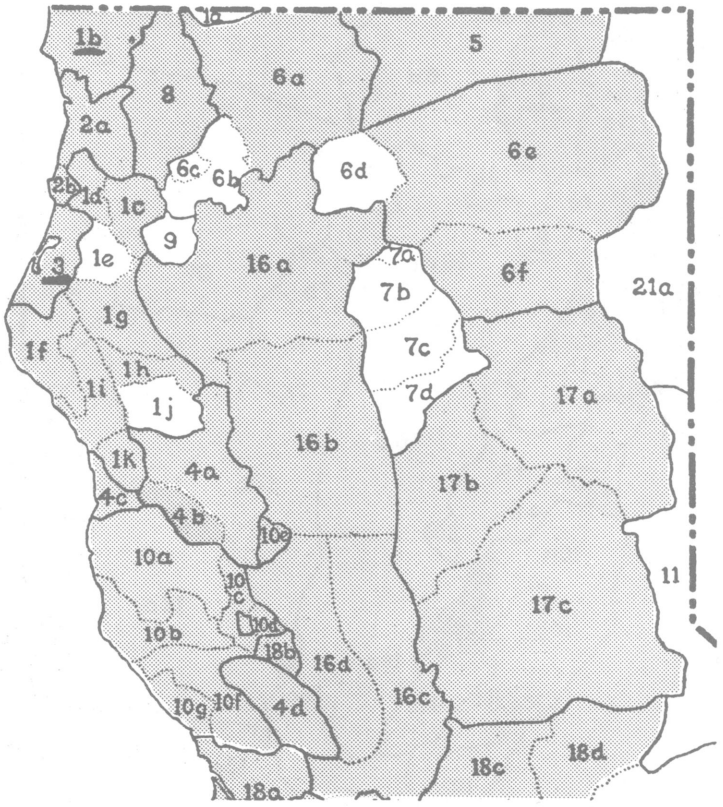
Map 63. Roasting at fire



Map 64. Broiling on live coals or hot stone

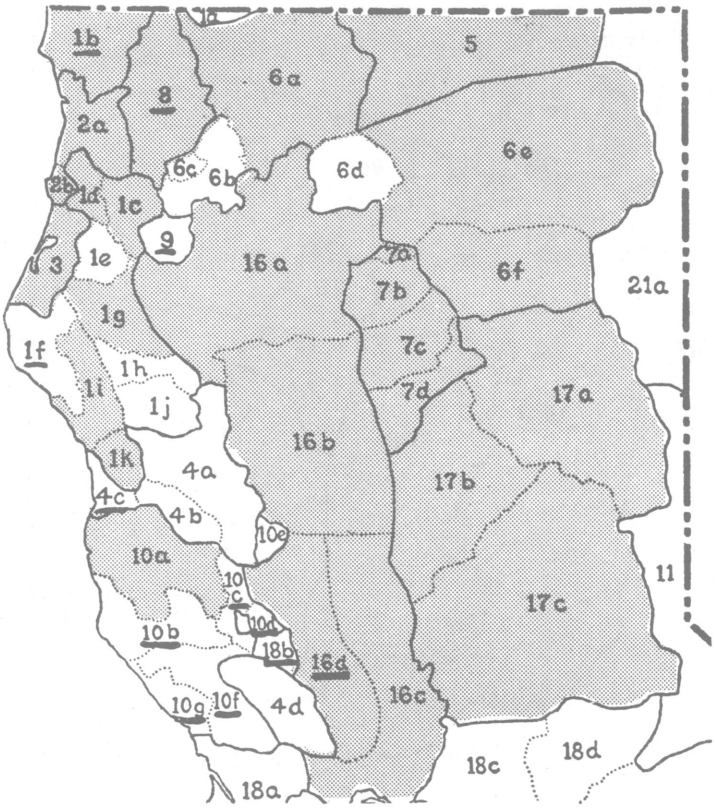


Map 65. Stone boiling

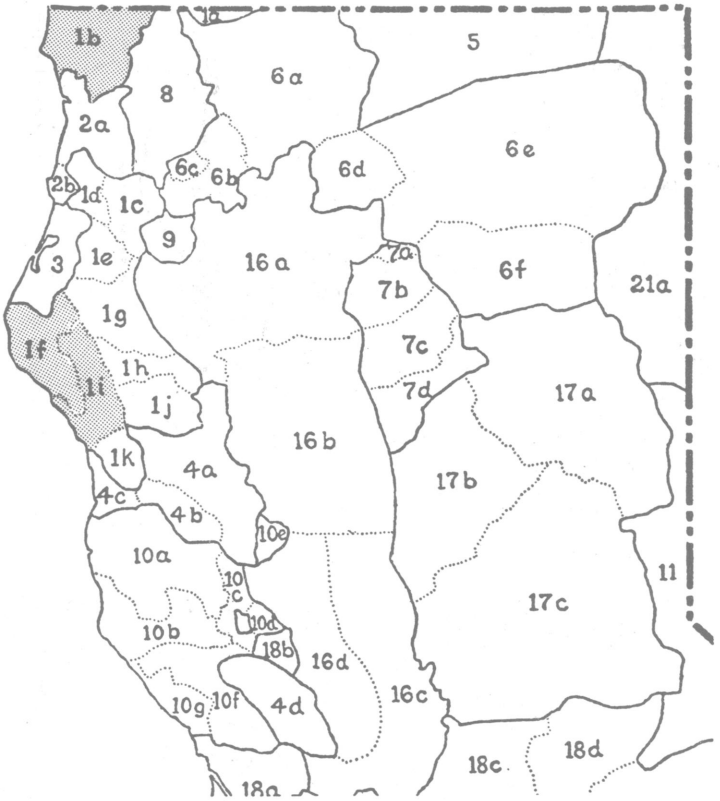


Map 66. Underground oven

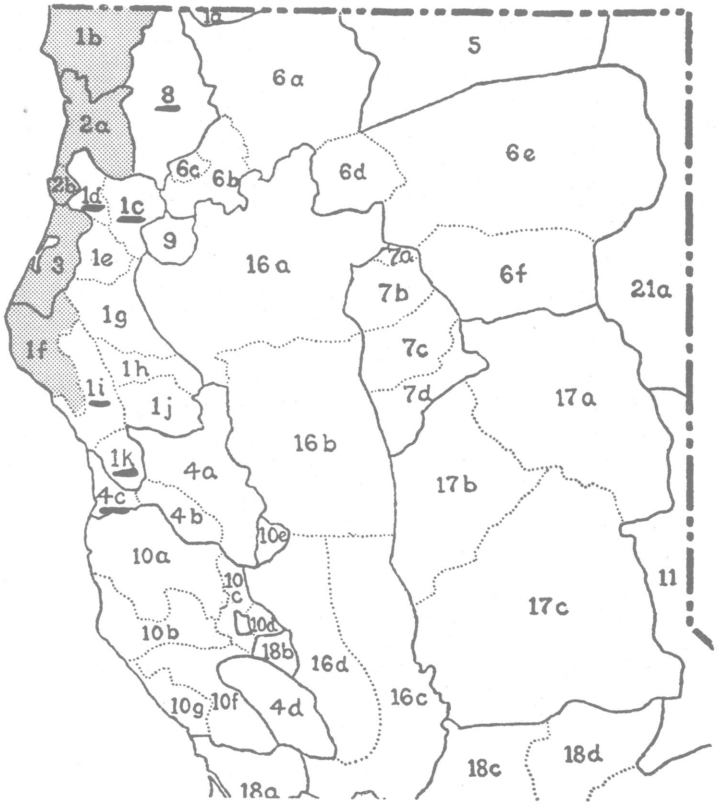
COOKING OF FISH



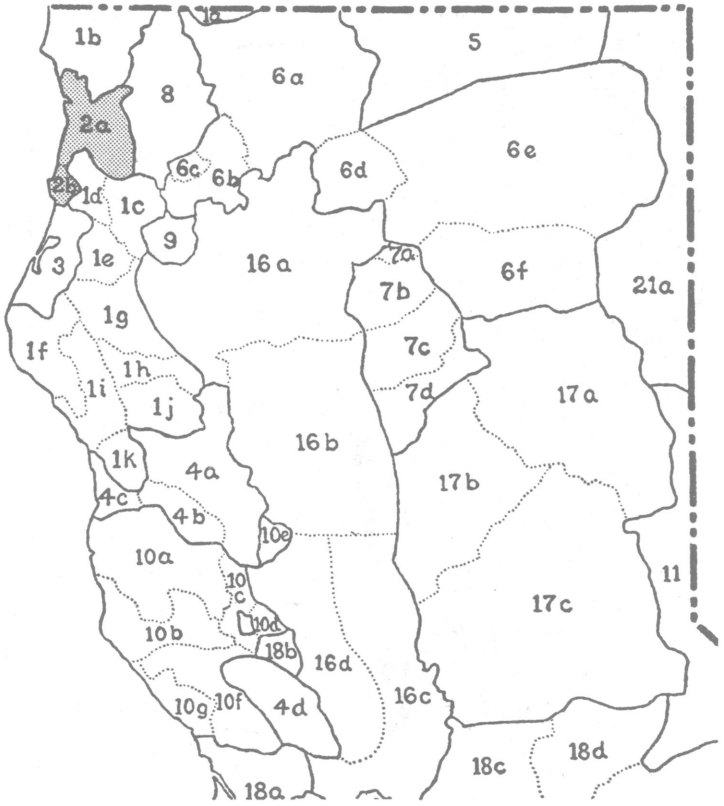
Map 67. Fish flour



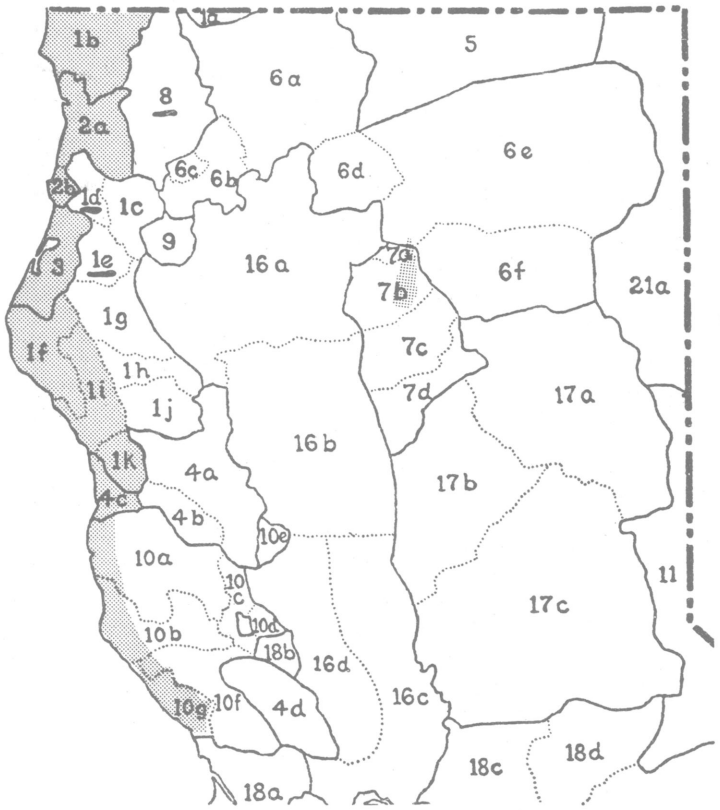
Map 68. Oil storage in kelp bottle



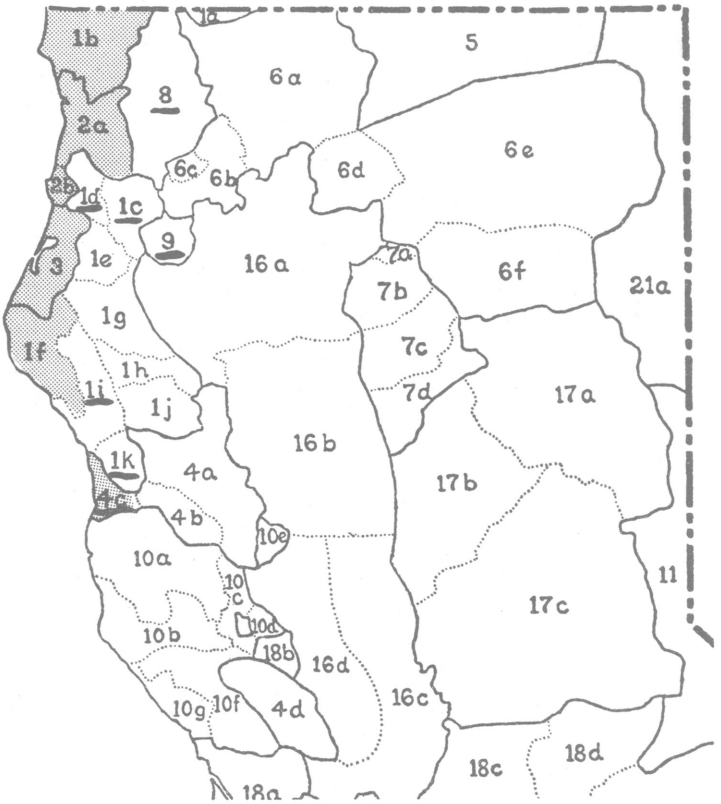
Map 69. Oil storage in sea-lion paunch or bladder



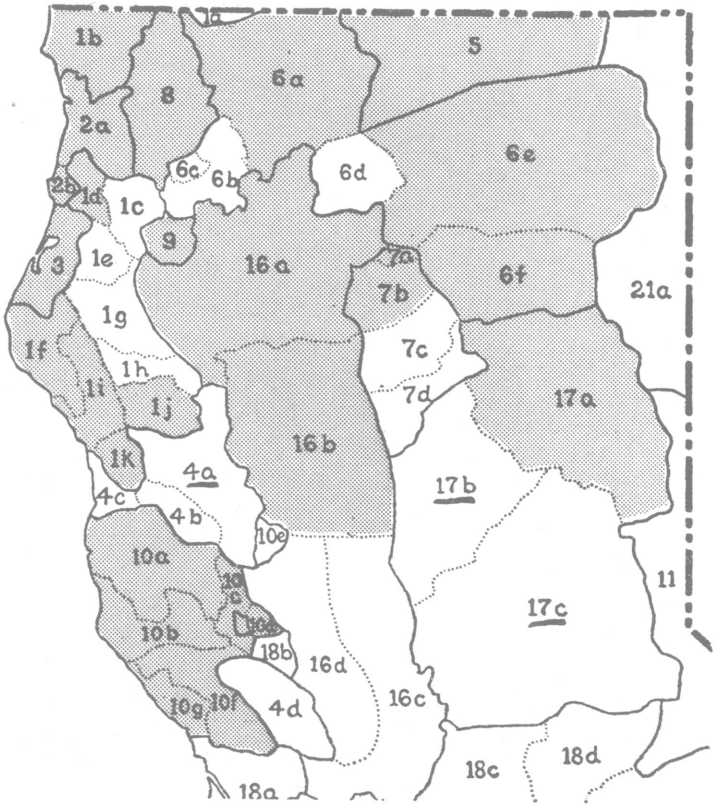
Map 70. Oil storage in steatite dish



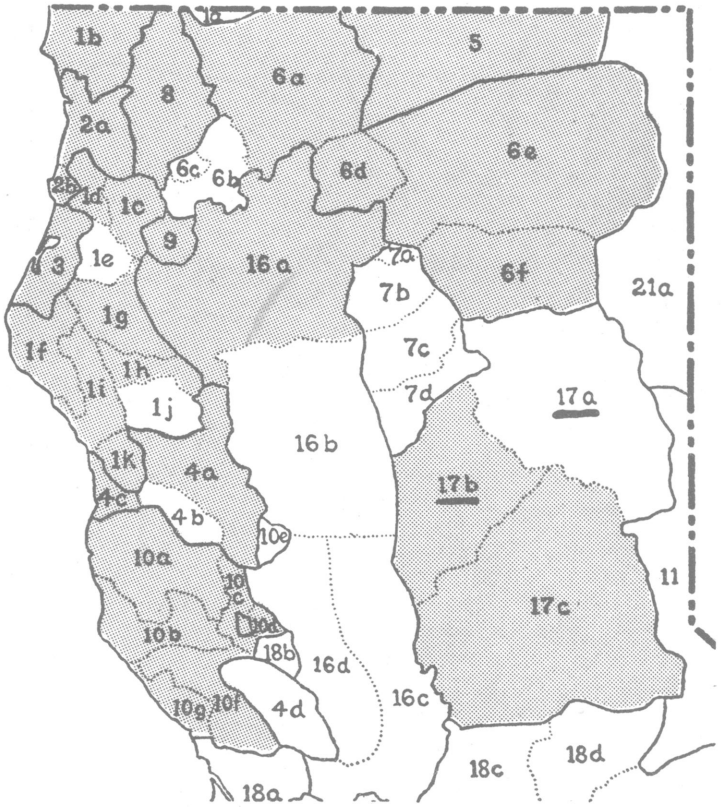
Map 71. Club for sea lions



Map 72. Harpoon for sea lions



Map 73. Adhesives, fish products



Map 74. Adhesives, vegetal products

WEAPONS FOR HUNTING SEA LIONS; ADHESIVES

PLATES

EXPLANATION OF PLATES

PLATE 1

Fish Weirs. a, b. Hupa; negs. 1289, 1291; Jones, 1901. c. Hupa; neg. 3301, Goddard, 1906. d, e. Chilula; negs. 3041, 2926, Goddard, 1902, 1903. f, g. Pomo; negs. 2677, 2676; Barrett, 1906.

PLATE 2

Scaffolds for A-frame Lifting Nets. a-c. Karok; negs. 1383-1385. d. Yurok, neg. 2730. All photographs by Kroeber, 1901-1907.

PLATE 3

Surf Fishing with Scoop Net. Mouth of the Klamath River. a. Fishermen ready to lower scoop nets into oncoming breakers carrying surf fish; neg. 11469. b. Scoop net set to receive incoming wave; neg. 11468. c. Scoop net raised to show small catch of surf fish secured as wave rolled in onto beach; neg. 11467. All photographs by T. T. Waterman, 1928.

PLATE 4

Drying Surf Fish. a. Sun-drying surf fish at the mouth of Redwood Creek; neg. 11470. b. Drying surf fish with the aid of fire at the mouth of Redwood Creek; neg. 11473. Photographs by T. T. Waterman, 1928.

PLATE 5

Sinkers on Net; Large Dugout Canoe. a. Edge of net with sinkers attached, showing method of lashing. Yurok; 1083; neg. 756; photograph by P. M. Jones, about 1901. b. Large dugout canoe with ornamental peak at prow and with paddles. Yurok; 1703; neg. 4439; photograph by A. L. Kroeber, about 1901.

PLATE 6

Net Sinkers and Anchors; negs. 17069, 17068.

	Spec.	Max. Dim. (mm.)	Weight		Spec.	Max. Dim. (mm.)	Weight
a	11777	83	408 gm.	j	11717	113	350 gm.
b	11787	80	403 gm.	k	11720	75	173 gm.
c	11786	76	240 gm.	l	11741	87	370 gm.
d	11735	85	300 gm.	m	9438	130	2.55 kg.
e	11806	91	380 gm.	n	L13316	155	4.53 kg.
f	1688R	83	267 gm.	o	9289	170	3.46 kg.
g	11723	87	335 gm.	p	L26329	140	3.29 kg.
h	11736	98	332 gm.	q	2006	150	3.23 kg.
i	1908	83	243 gm.	r	9275	167	3.46 kg.

PLATE 7

Netting Techniques. a. Model of sheet bend or netting knot used in weaving all nets except the netted bags. The upper model shows this knot open and spread so as to show the relations of its elements. The lower model shows the knot closed and tightly drawn as it is in actual use. Neg. 17106. b. Model of the knotless netting used in bags. This knotless netting has many combinations of loops and twists, but here in the Northwestern California area there are but four of these: the simple loop, the loop and single twist, the loop and double twist, and occasionally the loop and triple twist. In this model are shown the loop and single twist and the loop and double twist. Neg. 17147.

PLATE 8

Reinforced Tip of Lifting Net, and Models of Lark's-Head Knot. a. Tip of cone of Yurok lifting net (1566); neg. 17101. Thirty-five centimeters of tip of this conical net

have been woven of double cords, made by twisting together two 2-ply cords. b. Model of lark's-head knot, showing obverse and reverse views; neg. 17107.

PLATE 9

Techniques of Yurok Lifting Net (1566). a. Side of small lifting net, showing double line as selvage, stapling line bound to each alternate mesh and attached to headline by means of lark's-head knots; neg. 17098. b. Upper edge of small lifting net, showing final meshes attached by lark's-head knots to headline. Also the setting in of extra meshes to increase the flare of the cone of the net. In the third row of meshes from the edge an additional mesh is set in at regular lateral intervals of every seventh mesh. Neg. 17100.

PLATE 10

Techniques of Yurok Scoop Net (1228). a. Rear edge of pouch of large scoop net, showing closely set lark's-head knots. Also a reinforcing line secured by half-hitches and with a second reinforcing line bound to this one and the headline so as to include both. Neg. 17102. b. Side of apron of large scoop net, with stapling line attached at every fifth to seventh mesh by means of sheet bends, and to the elkskin headline by means of lark's-head knots. Neg. 17103.

PLATE 11

Techniques of Yurok Scoop Net (1228). a. Front edge of apron of large scoop net, showing each mesh with its 11-mm. sides attached to the elkskin headline by means of lark's-head knots; neg. 17104. b. One corner of the front edge of the apron of large scoop net, showing the doubling of the long sides of the last dozen meshes; neg. 17105.

PLATE 12

Toggle Harpoon Heads and Netting Shuttles; negs. 17013, 17014. a-f. Harpoon heads. 1988, 1947, 1641A, 1946, 9302, 9357a,b. Collected by Kroeber between 1901 and 1906; neg. 17013. For measurements and description see table 3 in text (p. 77). g-o. Netting shuttles; neg. 17014. Measurements in mm. below.

Netting Shuttles

	Spec.	Length	Material		Spec.	Length	Material
g	1582C	248	Wood	l	813	369	Wood
h	1582B	242	Wood	m	9492	407	Wood
i	1929	311	Antler	n	798	365	Manzanita
j	960	301	Antler	o	9495	397	Manzanita
k	9444	319	Antler				

PLATE 13

Sturgeon Drag Net Mesh Measures. a-g. Neg. 17001. h-o. Sturgeon net type mesh measures; neg. 17003. Measurements in mm.

	Spec.	Material	Length	Width: Ends		Middle	Thickness	Color
a	2101	Bone	117.8	43.4	41.0	35.4	8.5	Brown
b	2078	Bone	127.9	39.4	38.5	26.2	7.25	Ivory
c	2077	Bone	131.5	34.2	33.3	26.0	6.9	Dk. Ivory
d	2102	Antler	119.0	49.8	45.0	32.2	5.7	Dk. Brown
e	2099	Bone	138.0	44.0	42.4	31.6	7.5	Dk. Brown
f	2100	Antler	139.6	41.0	40.6	31.2	7.0	Dk. Ivory
g	2098	Antler	96.0	40.0	37.4	27.7	7.0	Tan
h	2120	Antler	110.0	44.0	39.0	28.5	8.8	Brownish
i	2117	Antler	114.6	49.0	48.5	32.3	12.8	Lt. Brown
j	1131	Antler	125.2	33.2	33.0	22.0	5.5	O. Ivory
k	2122	Antler	126.0	32.8	28.4	25.0	5.5	O. Ivory
l	1124	Bone	149.6	34.5	32.7	20.0	11.3	Gray
m	2132	Antler	141.0	36.8	36.0	31.8	7.3	Gray
n	1452	Bone	156.0	45.5	45.5	39.0	8.0	Gray
o	2124	Antler	145.5	35.0	34.5	29.2	7.4	Ivory

PLATE 14

Mesh Measures and Trigger Buttons. a-e. Sturgeon net mesh measures; neg. 17002. f-i. Sturgeon set net mesh measures; neg. 17002. j, l. Trigger buttons; neg. 17008. k, m-s. Mesh measures, various types; neg. 17008. Measurements in mm.

	Spec.	Material	Length	Width: Ends		Middle	Thickness	Color
a	2108	Wood	114.4	35.0	34.5	28.3	9.2	Dk. Brown
b	2071	Wood	117.9	39.5	39.5	27.3	8.5	Brown
c	2070	Wood	149.8	37.4	36.2	25.9	9.4	Brown
d	2009	Bone	133.5	38.2	37.5	29.6	8.3	Brown
e	1959	Antler	149.0	38.5	38.5	21.4	7.7	Brown
f	2073	Bone	155.5	31.5	31.0	24.0	8.0	Grayish
g	2074	Bone	152.5	31.0	30.7	24.7	6.5	Brown
h	2076	Bone	153.5	30.0	29.0	22.0	6.5	Grayish
i	2075	Bone	155.0	36.0	35.0	26.5	8.0	Brown
j	9353	Bone	59.0	18.3	19.8	21.5	2.1	White
k	2262	Antler	65.4	28.7	30.2	29.5	4.4	O. Ivory
l	1453	Bone	68.5	22.4	23.8	12.0	3.6	White
m	1014	Wood	82.0	20.0	24.0	20.0	4.0	Tan
n	2260	Antler	100.2	37.4	39.0	31.0	6.4	Blackish
o	2072	Wood	64.7	29.0	29.3	21.4	6.4	Tan
p	9481	Antler	96.7	39.1	40.8	33.0	4.5	O. Ivory
q	2147	Wood	106.5	39.4	41.8	29.4	10.0	Brown
r	2211	Antler	107.0	31.8	32.8	27.9	4.3	Brown
s	1135	Antler	114.0	30.0	30.5	24.0	7.0	O. Ivory

PLATE 15

Salmon Net Mesh Measures. a-j. Drag net mesh measures; neg. 17004. Set net mesh measures; neg. 17005. Measurements in mm.

	Spec.	Material	Length	Width: Ends		Middle	Thickness	Color
a	2093	Bone	85.0	41.0	37.7	26.4	4.0	O. Ivory
b	2106	Antler	91.2	31.4	30.0	19.6	5.4	Brown
c	2095	Antler	86.4	39.1	38.5	27.8	6.0	O. Ivory
d	2092	Antler	87.8	31.1	30.5	26.2	5.1	O. Ivory
e	2091	Antler	85.3	41.2	40.4	32.3	9.0	Brownish
f	2094	Antler	85.0	34.0	32.3	26.0	5.5	O. Ivory
g	2104	Antler	92.2	40.0	38.8	27.0	6.9	Dk. Brown
h	2090	Bone	89.0	34.3	33.7	23.8	6.0	Gray
i	2103	Antler	113.0	45.8	39.9	34.4	7.3	Brown
j	1130	Antler	92.0	40.4	40.0	28.7	5.5	O. Ivory
k	2083	Antler	112.5	40.0	39.4	32.9	5.0	Brown
l	2025	Bone	92.5	34.9	31.2	26.3	5.3	Ivory
m	2089	Antler	96.0	40.0	37.4	27.7	7.0	Tan
n	2088	Antler	92.3	41.3	38.8	29.8	6.6	Gray
o	2081	Antler	116.0	39.3	38.6	30.2	9.8	Gray
p	2087	Antler	99.2	35.9	34.6	29.2	7.2	Gray
q	2079	Antler	109.3	39.5	38.6	29.8	7.8	O. Ivory
r	2084	Antler	116.3	34.0	33.8	28.0	8.0	Gray
s	2080	Antler	110.2	37.0	35.0	31.0	10.4	Gray
t	2086	Antler	106.6	38.2	37.4	25.8	6.6	Dk. Brown
u	2085	Antler	110.8	44.0	43.7	32.6	5.8	Brown
v	2082	Antler	115.3	40.7	40.6	28.7	9.0	Gray

PLATE 16

Salmon Net Type Mesh Measures; negs. 17006, 17007. Measurements in mm.

	Spec.	Material	Length	Width: Ends		Middle	Thickness	Color
a	2138	Antler	83.7	40.2	39.8	26.5	4.4	O. Ivory
b	2139	Antler	93.8	36.4	35.5	27.8	4.0	Brown
c	1958	Antler	91.0	41.8	41.2	26.7	6.0	Brown
d	1077	Antler	77.5	34.4	32.2	25.1	3.8	O. Ivory
e	11747	Antler	94.3	39.7	38.9	29.6	9.3	Brown
f	2261	Antler	91.0	37.0	34.8	25.9	4.2	O. Ivory
g	2123	Antler	104.5	41.9	41.0	31.2	6.4	O. Ivory
h	1138	Antler	84.3	37.3	35.6	27.3	6.8	Brown
i	1454	Antler	107.0	43.3	42.0	33.3	7.9	Gray
j	11851	Antler	94.9	45.9	43.8	32.5	8.4	Brown
k	2210	Antler	87.0	32.8	32.4	26.3	4.3	O. Ivory
l	2137	Antler	90.3	36.9	36.0	27.0	6.5	O. Ivory
m	2144	Antler	93.4	37.5	37.4	29.0	6.7	O. Ivory
n	1078	Antler	97.0	38.3	36.4	20.7	5.5	O. Ivory
o	2201	Antler	95.4	44.0	38.5	31.6	7.6	O. Ivory
p	1949	Antler	81.9	33.7	32.2	27.0	4.6	Brown
q	1136	Antler	94.5	38.5	37.7	30.0	6.2	Ivory
r	1428	Antler	78.2	35.9	34.9	27.6	4.2	O. Ivory
s	1127	Antler	109.3	40.0	39.6	30.8	9.2	Yellowish
t	1125	Antler	111.0	40.9	40.6	29.1	5.3	O. Ivory

PLATE 17

Mesh Measures and Trigger Buttons. a-j. Salmon net type mesh measures; neg. 17009. k, o-w. Various types of net mesh measures; neg. 17010. k. Described as: "Length is for steelhead set net. Two widths for one eel net." u. Catalogue entry: "For sucker net." v. Catalogue entry: "Mesh measure of elk scapula." w. Catalogue entry: "Horn mesh stick, two widths for top and bottom of smelt net." l-n. Trigger buttons; neg. 17010. All measurements in mm.

	Spec.	Material	Length	Width: Ends		Middle	Thickness	Color
a	11873	Antler	69.8	34.0	34.9	30.0	3.7	O. Ivory
b	1140	Antler	61.5	44.0	44.2	36.0	6.3	Gray
c	2209	Antler	82.8	27.4	29.1	27.0	3.9	Brown
d	2024	Antler	68.4	33.0	34.0	27.4	4.0	Brown
e	11814	Bone	96.9	39.8	42.2	30.0	7.0	Brown
f	1990	Antler	51.5	36.5	36.8	37.0	4.0	Brown
g	2075	Antler	103.7	35.0	36.0	26.5	8.0	Brown
h	1128	Antler	103.5	37.6	38.0	35.9	7.0	Brown
i	2121	Bone	100.6	35.3	35.6	32.4	15.0	O. Ivory
j	11850	Bone	107.8	45.3	46.7	32.8	11.3	O. Ivory
k	2097	Bone	60.4	21.0	30.8	--	2.3	Whitish
l	1066	Bone	67.9	24.7	25.0	18.8	2.6	Whitish
m	2146	Bone	81.4	36.2	37.8	28.0	3.0	O. Ivory
n	1957	Bone	73.7	29.8	29.9	24.6	3.0	O. Ivory
o	1323	Antler	49.1	29.0	29.8	27.7	3.7	O. Ivory
p	2199	Antler	85.0	29.3	30.8	25.5	4.4	O. Ivory
q	1324	Antler	72.6	36.7	37.9	27.1	4.8	Brown
r	2145	Antler	68.5	33.6	34.2	23.2	5.2	Brown
s	1325	Antler	79.0	40.4	41.3	22.2	4.3	Brown
t	2200	Antler	74.9	28.8	31.0	21.3	3.8	O. Ivory
u	2096	Bone	98.9	35.8	40.0	--	2.0	O. Ivory
v	1067	Bone	87.8	42.0	45.7	46.8	4.0	Brown
w	2107	Antler	182.0	11.3	13.7	17.0	2.9	O. Ivory

PLATE 18

Fish Clubs and Mashers for Berries and Fish Eggs. a-d. Neg. 17015. e-g. Neg. 17016.

	Spec.	Length	Diam.	Material	Use	Weight (gm.)
a	1966	315	77	Soft wood	Salmon club	450
b	1431	283	83	Soft wood	Salmon club	480
c	1193	335	81.5	Soft wood	Sturgeon club	550
d	1194	350	94	Hard wood	Sturgeon egg masher	980
e	1612	210	65	Hard wood	Berry masher	195
f	1967	315	97	Hard wood	Sturgeon egg masher	730
g	1980	350	100	Irreg. nat. wood	Sturgeon egg masher	280

PLATE 19

Miscellaneous Implements; Objects of Mussel Shell; Salmon Jaw Breaker. a-l. Neg. 17047. m-t. Neg. 14057. u. Neg. 17042. Measurements in mm.

	Spec.	Material	Length	Width	Use
a	1825B	Wood	70.0	14.9	Barb for toggle harpoon
b	1825A	Wood	69.0	14.6	Barb for toggle harpoon
c	1655	Bone	62.8	11.9	Barb for toggle harpoon
d	1654	Bone	62.0	12.0	Barb for toggle harpoon
e	1143	Bone	146.5	12.5	Double-barbed foreshaft
f	1142	Bone	144.5	14.9	Double-barbed foreshaft
g	1144	Bone	129.0	12.8	Double-barbed foreshaft
h	1141	Bone	142.5	16.0	Double-barbed foreshsft
i	2014	Crab claw	135.0	85.0	Rattle on set net
j	1175	Wood	110.0	14.5	Handle for sturgeon line
k	1665	Wood	75.5	13.2	Prevents sinkers from slipping
l	2008	Wood	107.0	15.7	Prevents sinkers from slipping
m	2109	Mussel sh.	63.5	40.0	Art. thumbnail. Strip iris
n	2418	Mussel sh.	45.0	33.0	Art. thumbnail. Strip iris
o	9356	Mussel sh.	59.5	42.0	Art. thumbnail. Strip iris
p	850	Mussel sh.	88.0	38.5	Art. thumbnail. Strip iris
q	1023	Mussel sh.	89.0	35.5	Art. thumbnail. Strip iris
r	1458	Mussel sh.	77.0	31.0	Art. thumbnail. Strip iris
s	1834	Mussel sh.	130.0	65.0	Paint mixing dish
t	1836	Mussel sh.	170.0	60.0	Paint mixing dish
u	1620	Wood	450.0	75.0	Salmon jaw breaker

PLATE 20

Eel Slitters and Fish Knives. a-o. Eel slitters; neg. 17011. p-u. Fish knives; neg. 17012. Measurements in mm.

Eel Slitters

	Spec.	Length		Spec.	Length
a	9315	111.9	i	1015	91.2
b	1613	103.5	j	1823	79.1
c	9317	77.7	k	1846	117.2
d	1976	121.5	l	1862	126.2
e	9316	102.9	m	1852	135.8
f	9313	149.0	n	1166	133.8
g	1848	103.2	o	9347	147.3
h	9314	137.0			

Fish Knives

	Spec.	Length	Length	Blade Width	Thickness
p	1326	163.0	43.0	28.0	7.0
q	1541	163.0	64.0	42.5	7.0
r	1538	174.0	87.0	43.0	10.0
s	1540	170.0	68.0	44.0	9.0
t	1539	185.0	69.0	52.5	11.5
u	978	178.0	72.0	50.0	7.5

PLATE 21

Salmon Drying and Storage. a. Slabs of salmon drying above house pit and fireplace in a Yurok living house. The salmon hangs from a crisscross of poles resting on heavier poles like that showing (upper left). An adult must stoop to keep his head out of the salmon. Neg. 1338. Photographed by A. L. Kroeber, c. 1901. b. Corner of plank-walled pit of Yurok living house at Wa'soi and part of two sides of surrounding ledge, with storage baskets holding dried salmon, acorns, and other foods, with conical carrying baskets as covers. Note also the poles across top of pit forming a sort of rack for temporary storage, and part of a rack above the pit. Neg. 3815. Photographed by A. L. Kroeber, 1907.

PLATE 22

Steatite Dishes; negs. 17146, 17145, 17144. Measurements in mm.

	Spec.	Length	Width	Height	Depth	Thickness	Use
a	1637	272	126	65	43	15	Catch fish grease
b	9538	265	210	45	38	22	Catch fish grease
c	880	290	240	53	29	25	Catch fish grease
d	1189	138	88	53	35	13	Sturgeon glue dish
e	881	140	104	48	29	16	Catch fish grease
f	1177	98	65	36	24	22	Paint cup
g	9391	425	260	125	110	23	Catch fish grease; ornamented
h	1626	305	295	70	31	30	Catch fish grease
i	9390	655	315	115	90	31	Catch fish grease

PLATE 23

Bags of Knotless Netting; neg. 17066. Measurements in mm.

	Spec.	Length	Height	Use
a	2110	220	86	As purse and for small objects
b	1973	179	70	As purse and for small objects
c	1179	640	420	For eels and fish chiefly

PLATE 24

Borders of Knotless Netting Bags, Showing Upper and Under Sides. a. Simple "chain stitch" border. Upper side. 11852. b. Simple "chain stitch" border. Under side. 11852. c. Double "chain stitch" border. Upper side. 2022. d. Double "chain stitch" border. Under side. 2022. b and d both show the way in which the loops of the first course are attached to the border. Negs. 17151, 17152, 17155, 17150.

PLATE 25

Yurok Wooden Hooks; neg. 17191.

	Spec.	Length (mm.)	Use
a	1893	737	Hook for hanging net in sweathouse
b	1171	278	Hook for hanging spoon basket
c	1667	792	Hook for hanging net in sweathouse
d	1663	394	Hook for lifting pots from fire. Modern
e	1666	1,245	Hook for hanging net in sweathouse

PLATE 26

Karok Fishing Platform at Katimin. Showing one man wielding a plunge net and another carrying salmon in a knotless net bag. Neg. 17261. See Appendix.

PLATE 27

Karok Fishing Platform at Amaikiara. Little Ike wielding plunge net. Neg. 17262. See Appendix.

PLATE 28

Karok Fishing Platform at Amaikiara. This one is just downstream from the platform shown in plate 27. Neg. 17263. See Appendix.

PLATE 29

Trail and Fishing Platform on Klamath River. a, b. Trail along the face of the cliff in Sahwarum canyon, near a fishing place about three miles downstream from Orleans. c, d. Karok fisherman, Antone Sanderson, building a fishing platform at Sahwarum yum. Photographed by Grover C. Sanderson, 1932.

PLATE 30

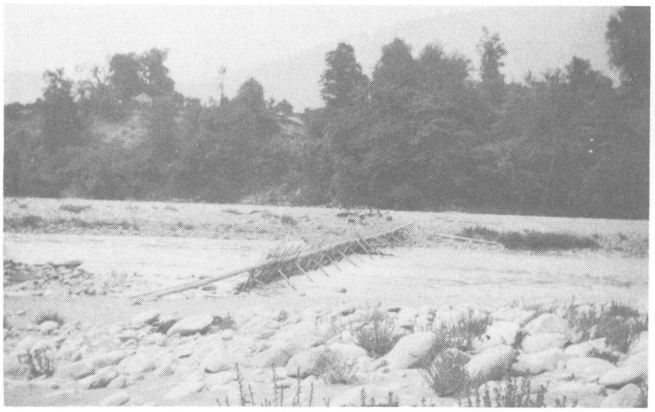
Karok Fisherman Using Lifting Net from Platform. a. Fisherman lowering lifting net from fishing platform. b. Fisherman tending lifting net. c. Fisherman holding trigger button of signal string of lifting net. d. Fisherman raising lifting net. Photographed by Grover C. Sanderson, 1932.

PLATE 31

Salmon Fishing and Cooking at Fire. a. Lifting net with salmon being raised onto platform. b. Fisherman pinching neck of salmon to render it helpless before removing it from lifting net. c. Fisherman removing salmon from lifting net. d. Slabs of salmon, spitted, and cooking at the fire. Photographed by Grover C. Sanderson, 1932.

PLATE 32

Yurok A-frame Lifting Nets and Scaffolds. a. Neg. 3808. b. Neg. 3806. c. Neg. 1345. d. Neg. 2729. e. Neg. 3856. f. Neg. 3857. All photographs by Kroeber, 1901-1907. For detailed descriptions see page 33.



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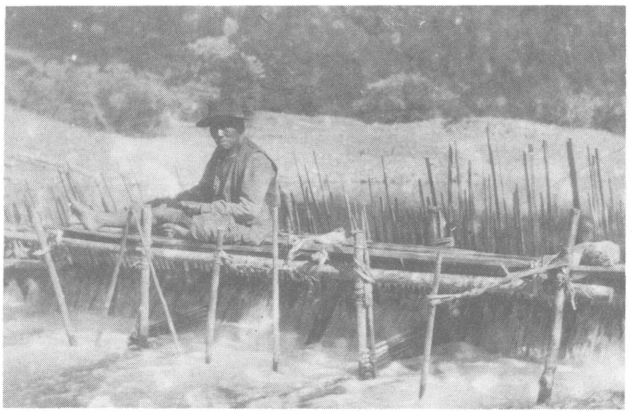

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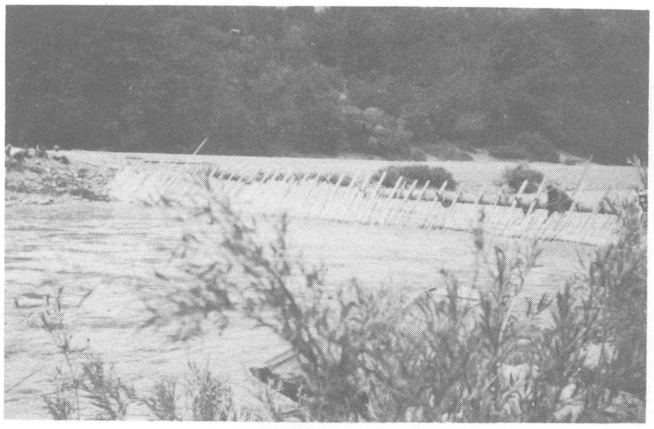

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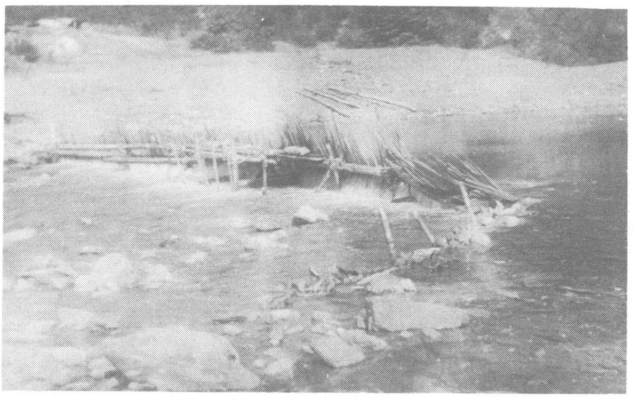

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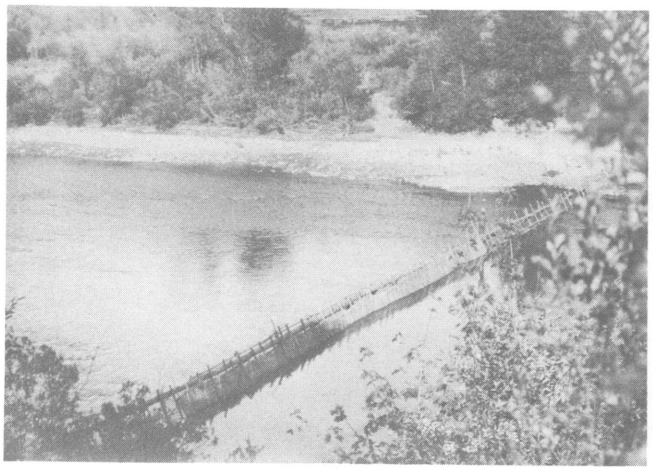

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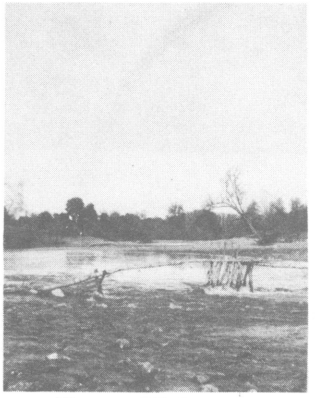

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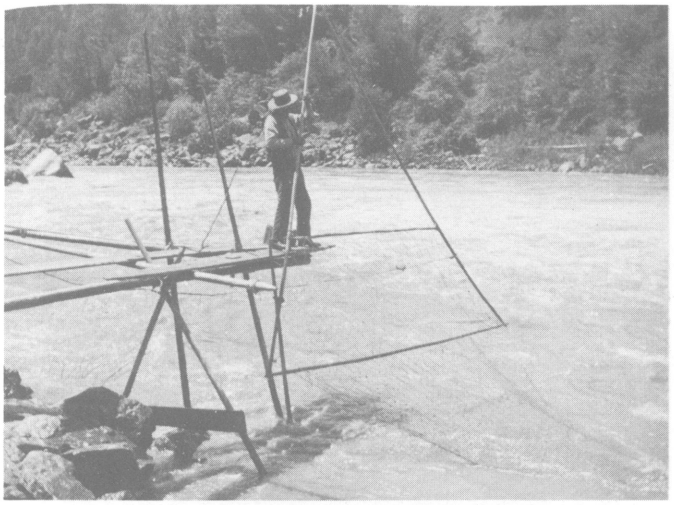
Plate 1. Fish weirs.



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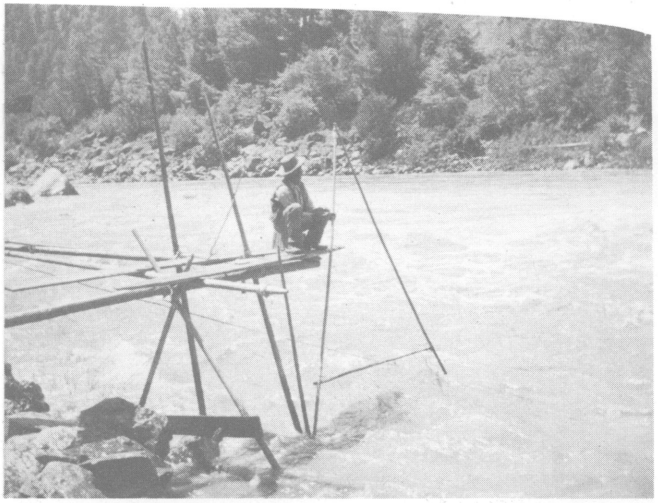

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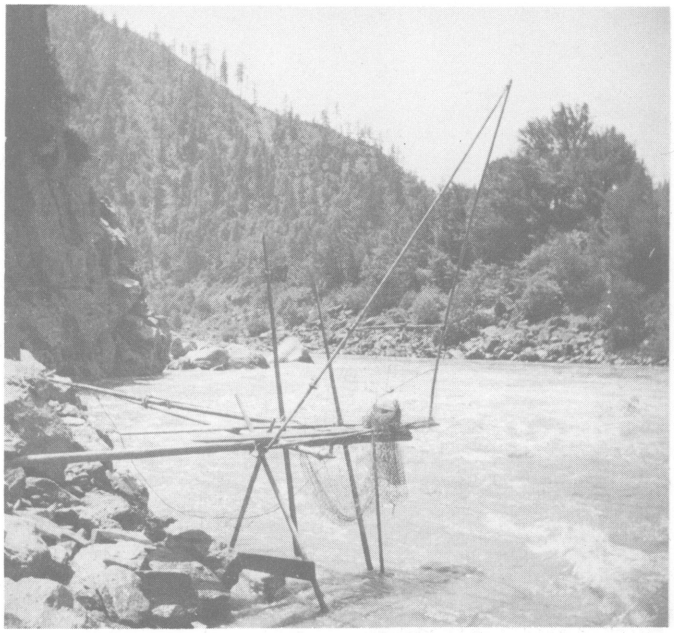


c

d

Plate 2. Scaffolds for A-frame lifting nets.

a

b

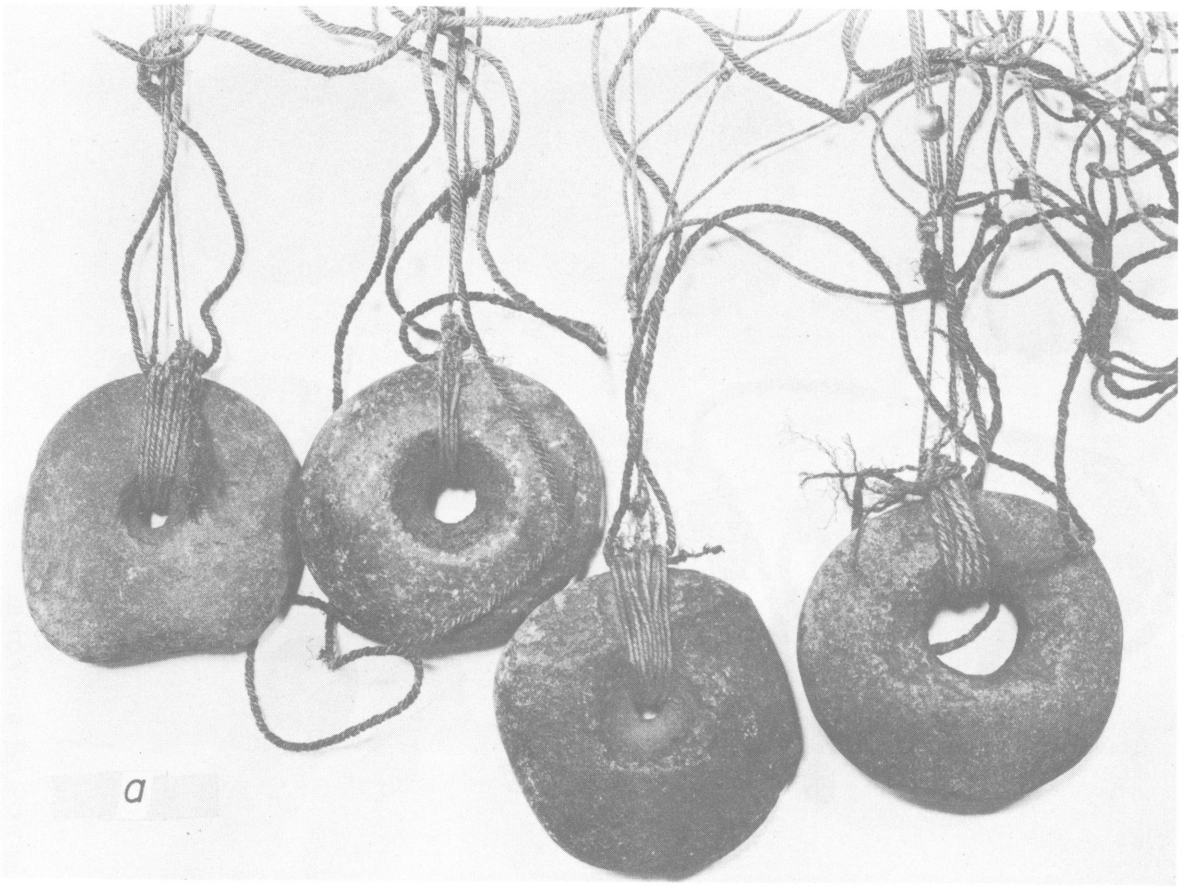
c

Plate 3. Surf fishing with scoop net, mouth of the Klamath River.

a

b

Plate 4. Drying surf fish.



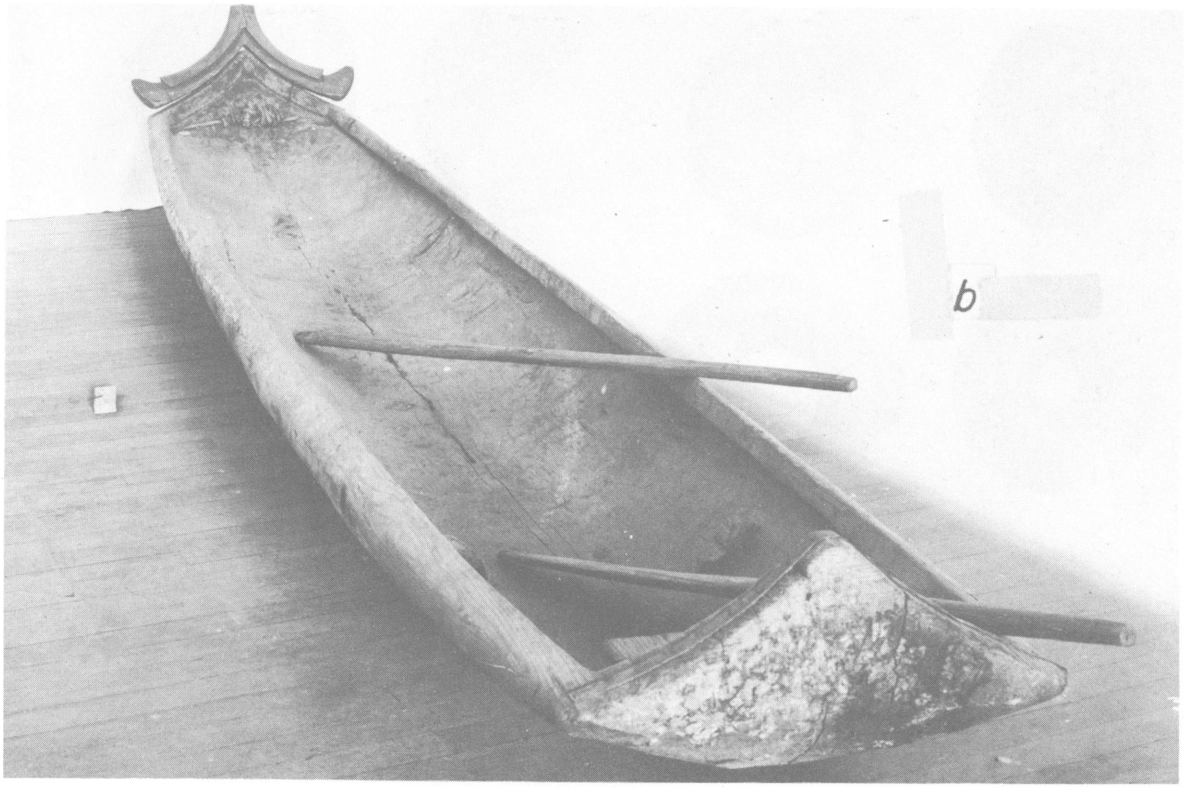
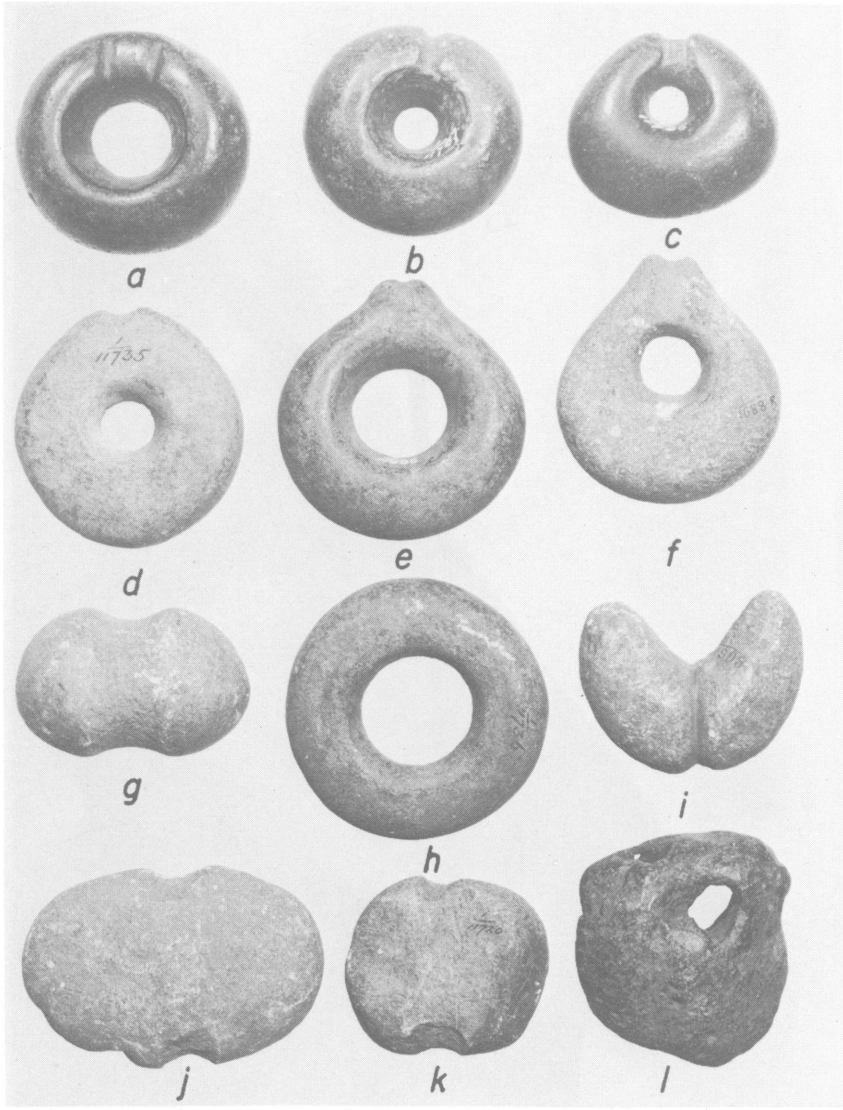


Plate 5. Sinkers on net; large dugout canoe.



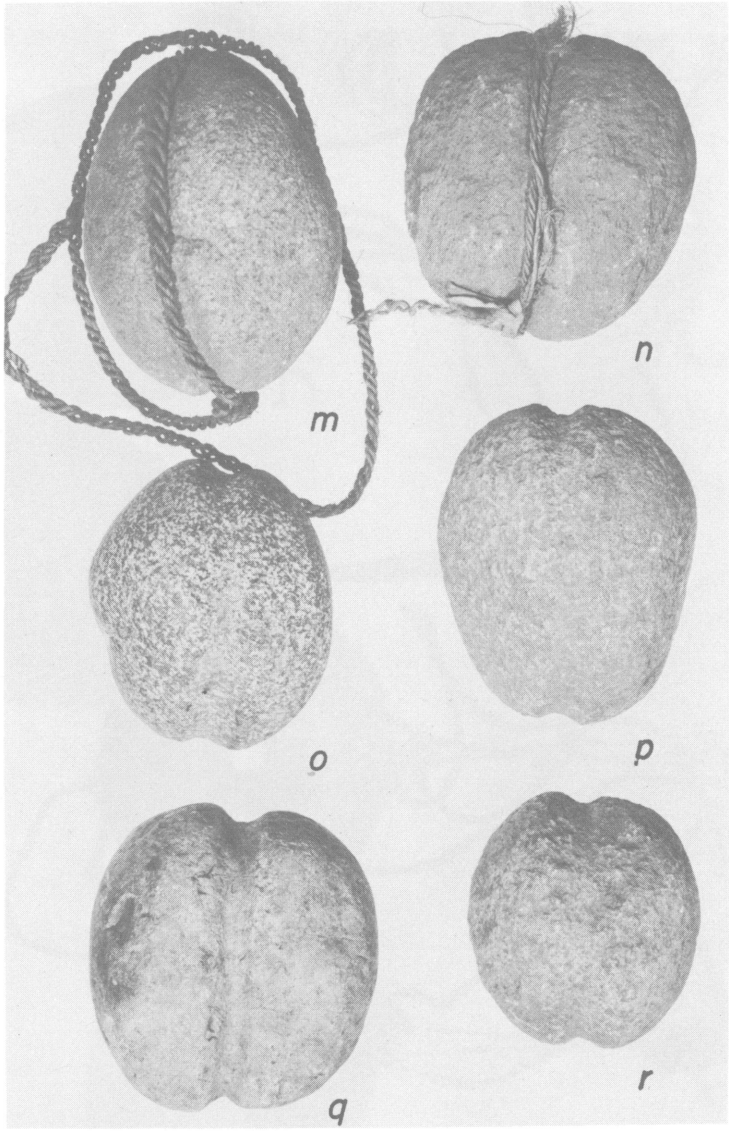
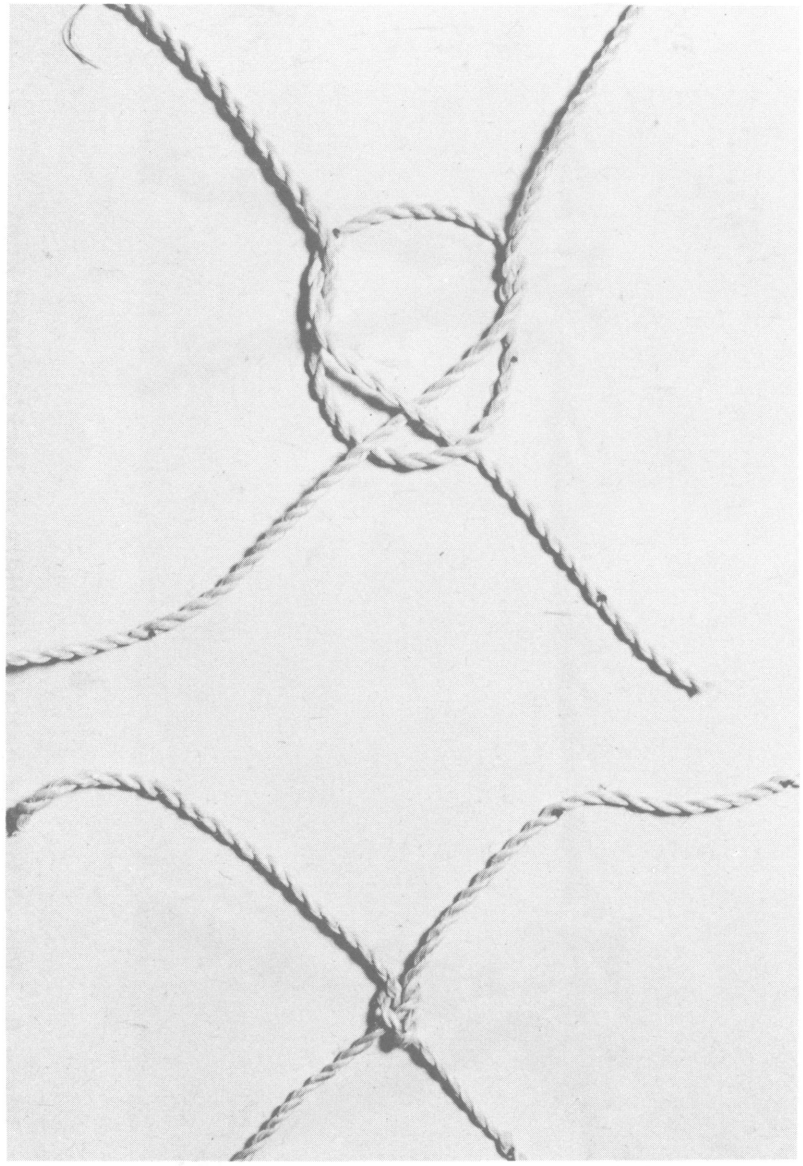


Plate 6. Net sinkers and anchors.



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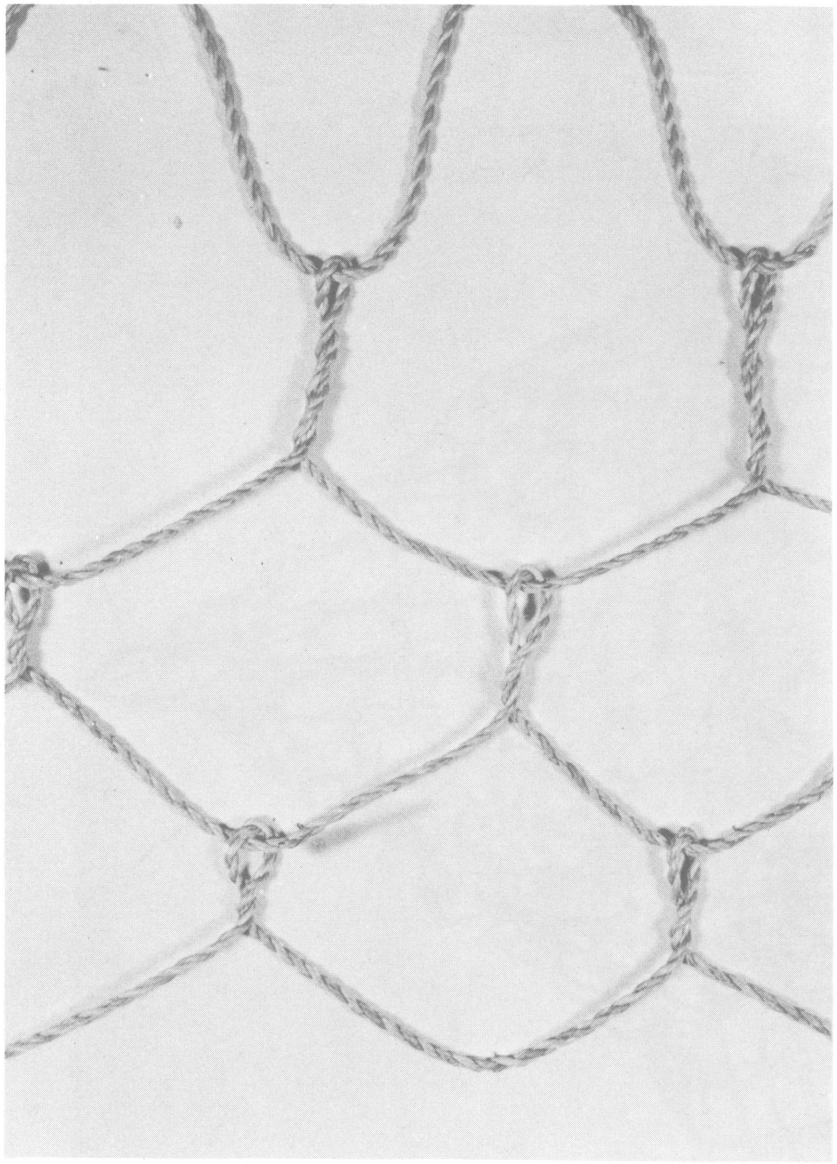

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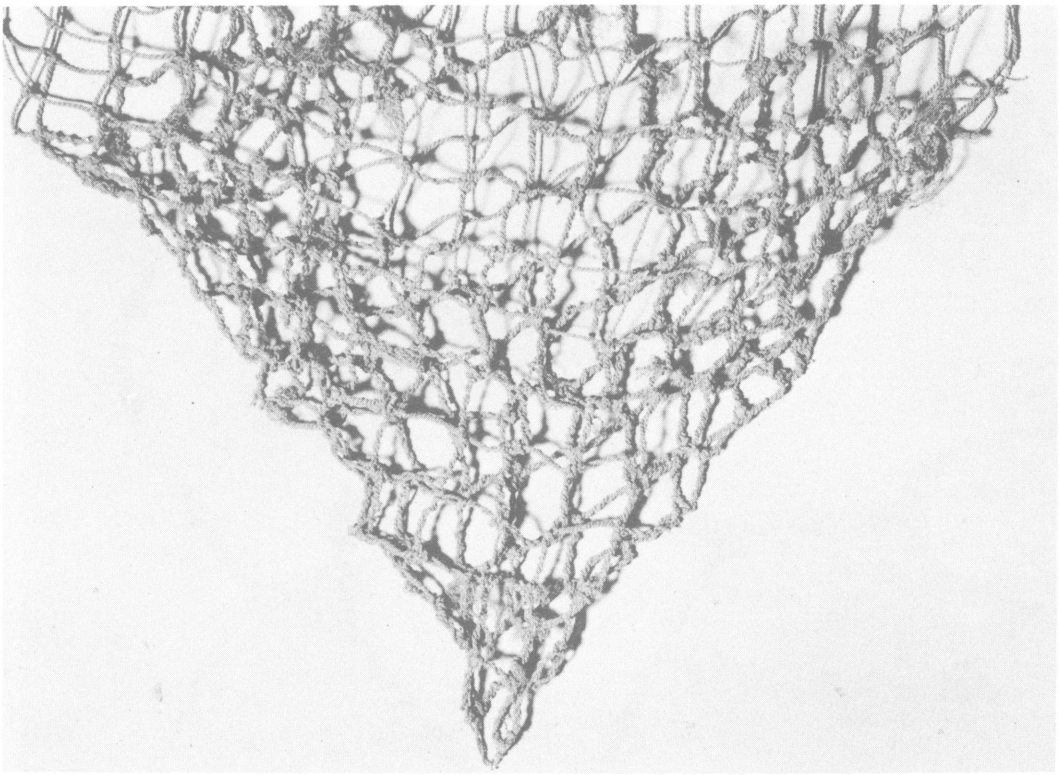
Plate 7. Netting techniques; sheet bend and knotless netting.



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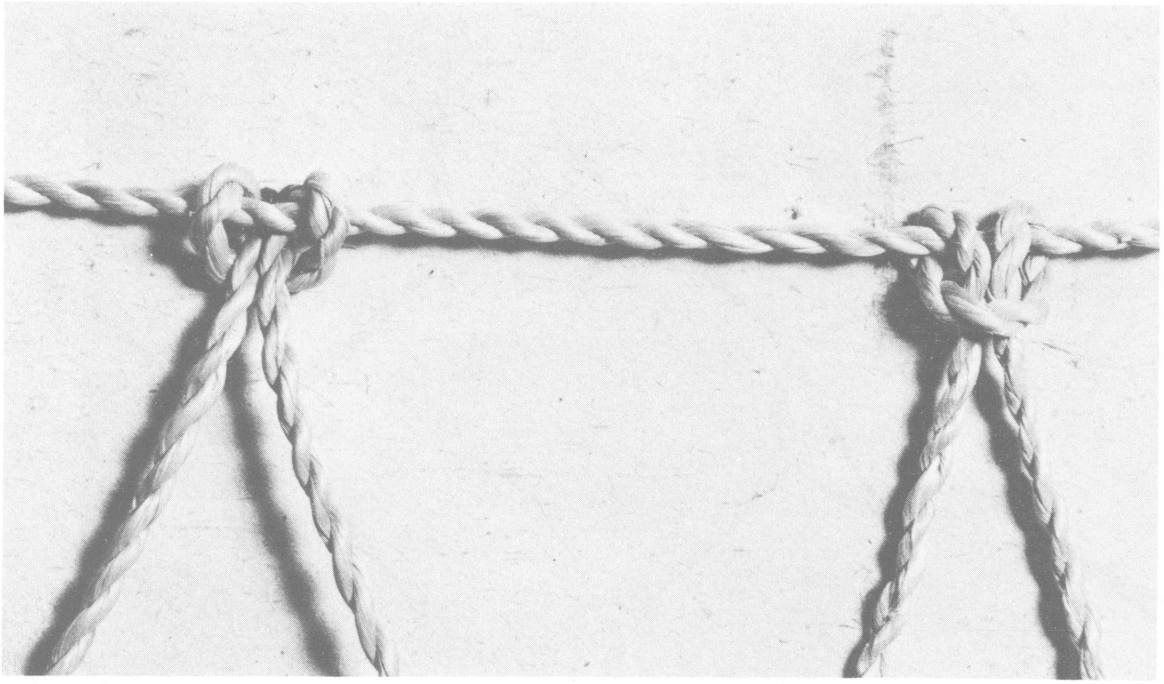

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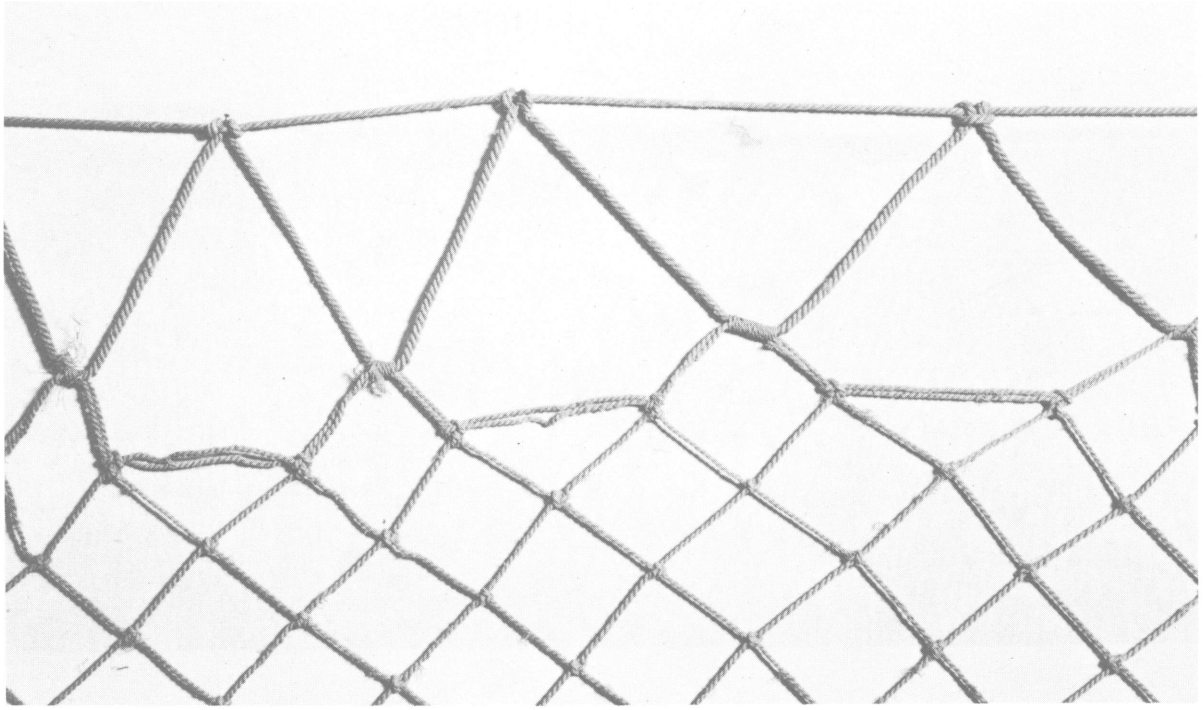
Plate 8. Tip of lifting net and models of lark's-head knot.



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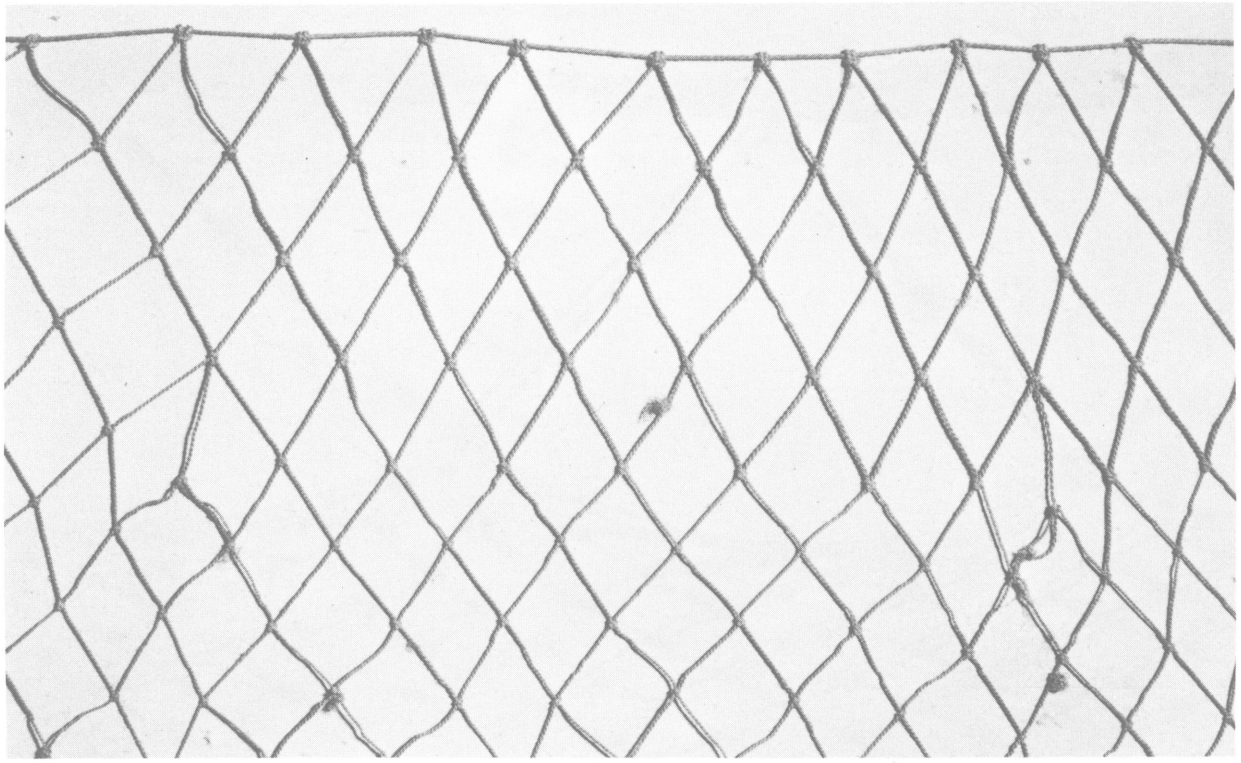

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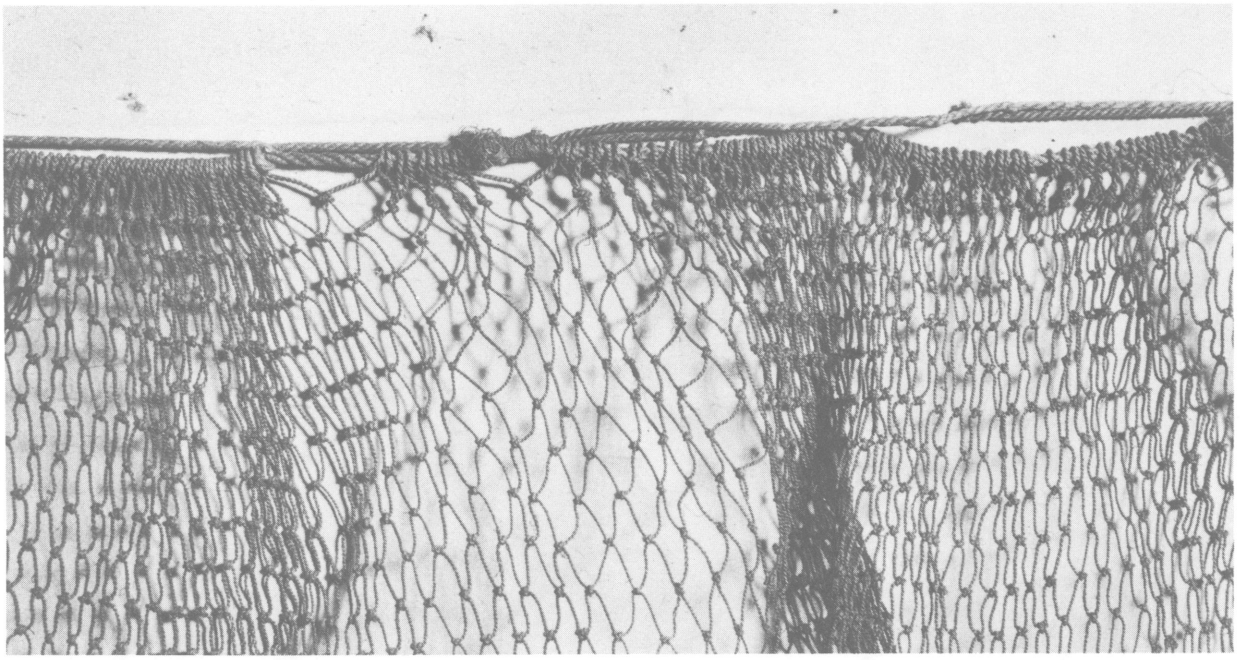
Plate 9. Techniques of Yurok lifting net.



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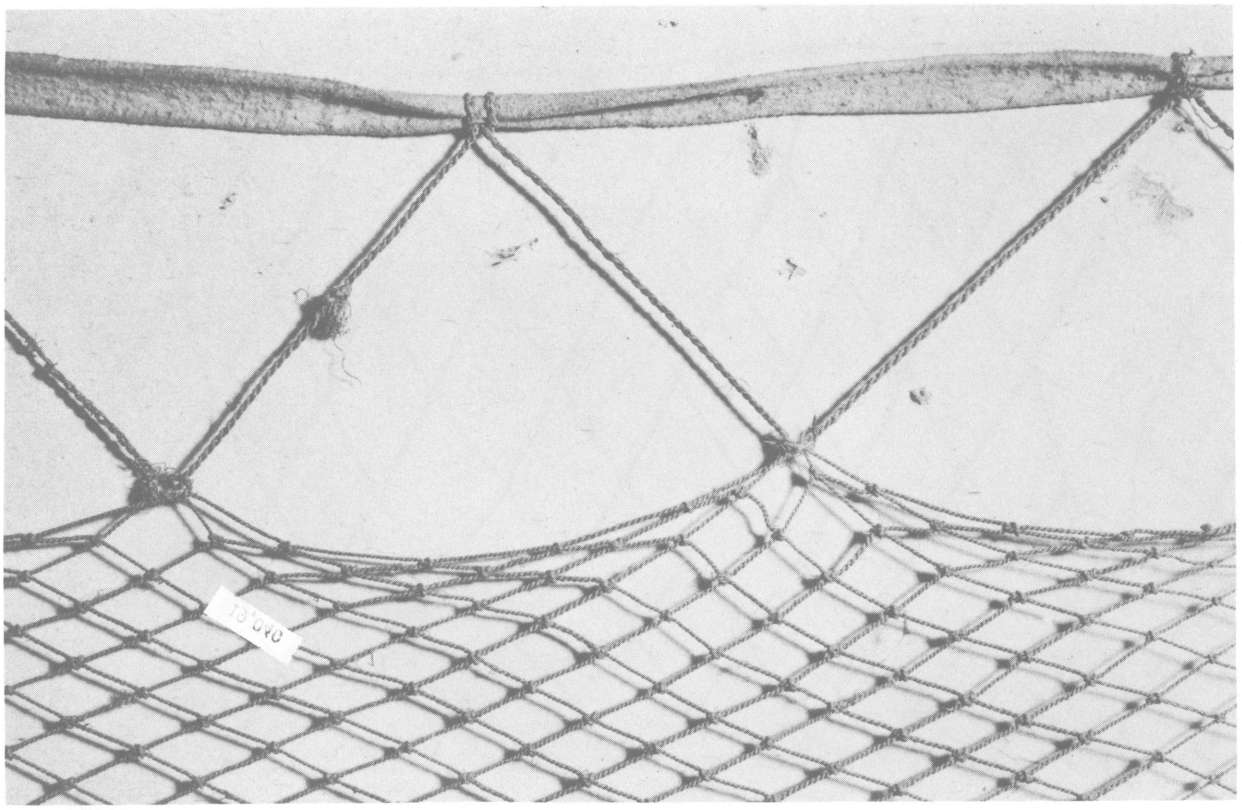

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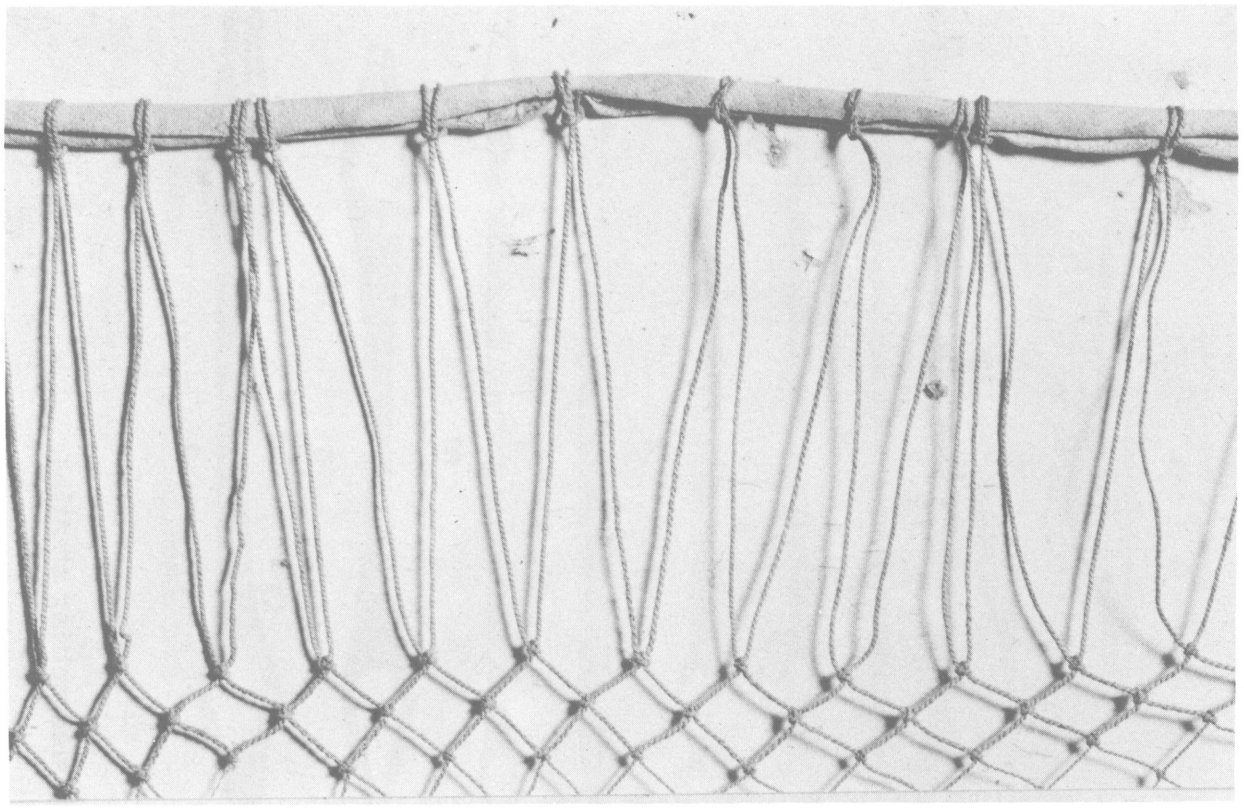
Plate 10. Techniques of Yurok scoop net.



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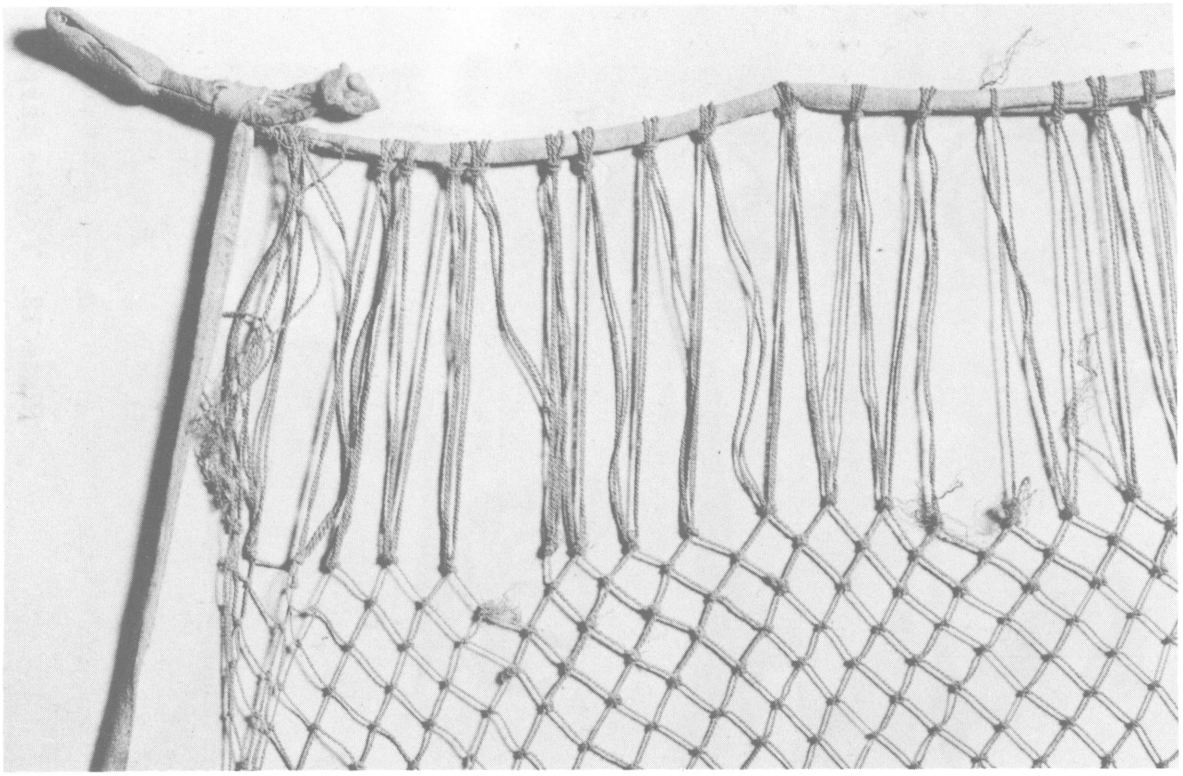

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Plate 11. Techniques of Yurok scoop net.

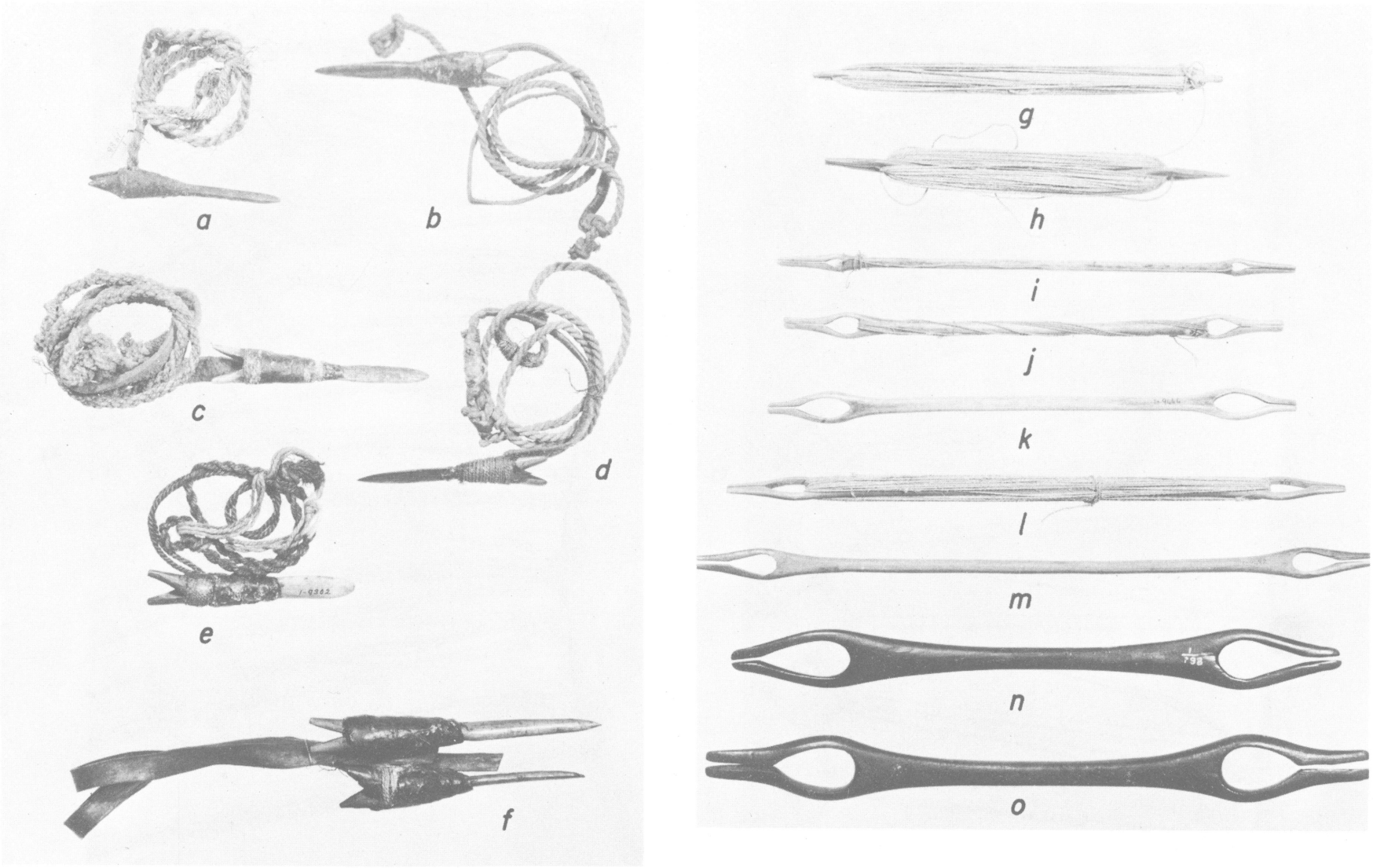


Plate 12. Toggle harpoon heads and netting shuttles.

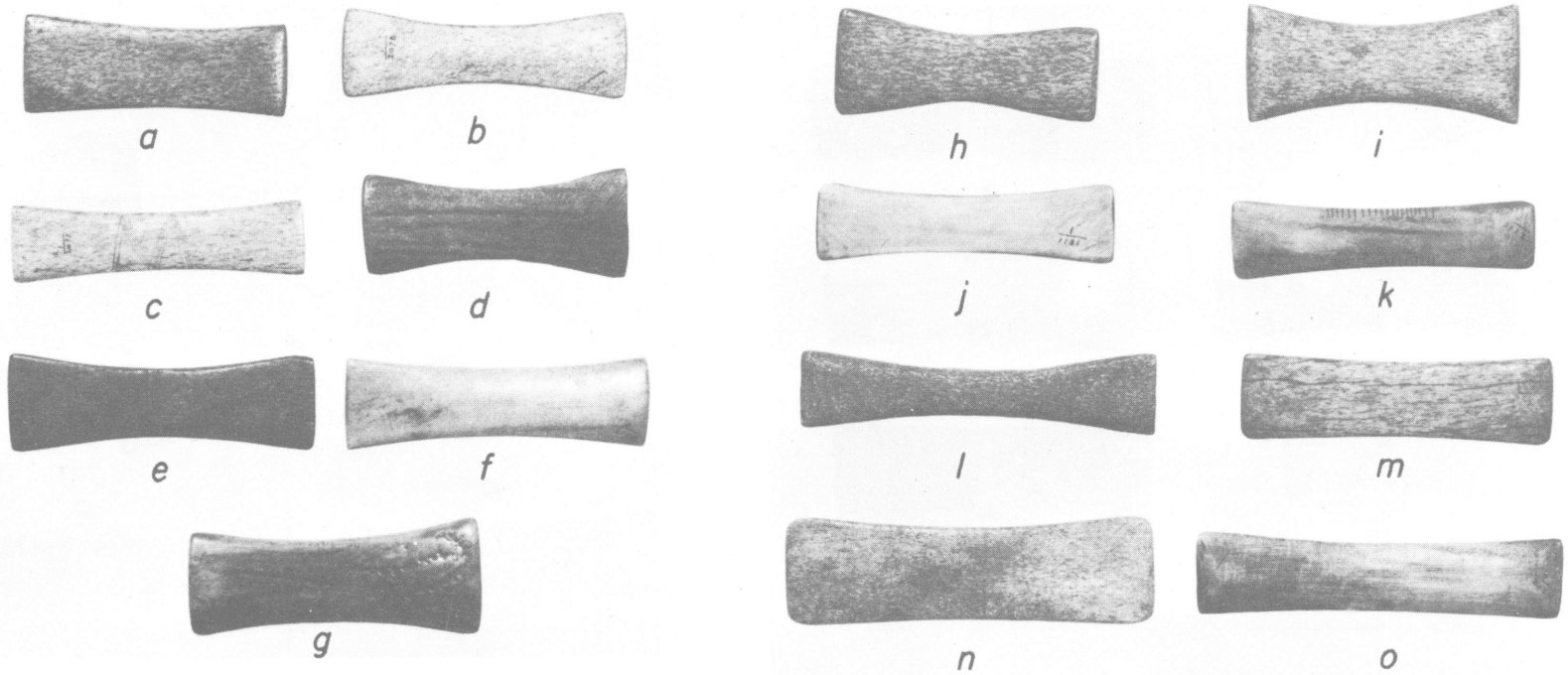


Plate 13. Sturgeon net mesh measures.

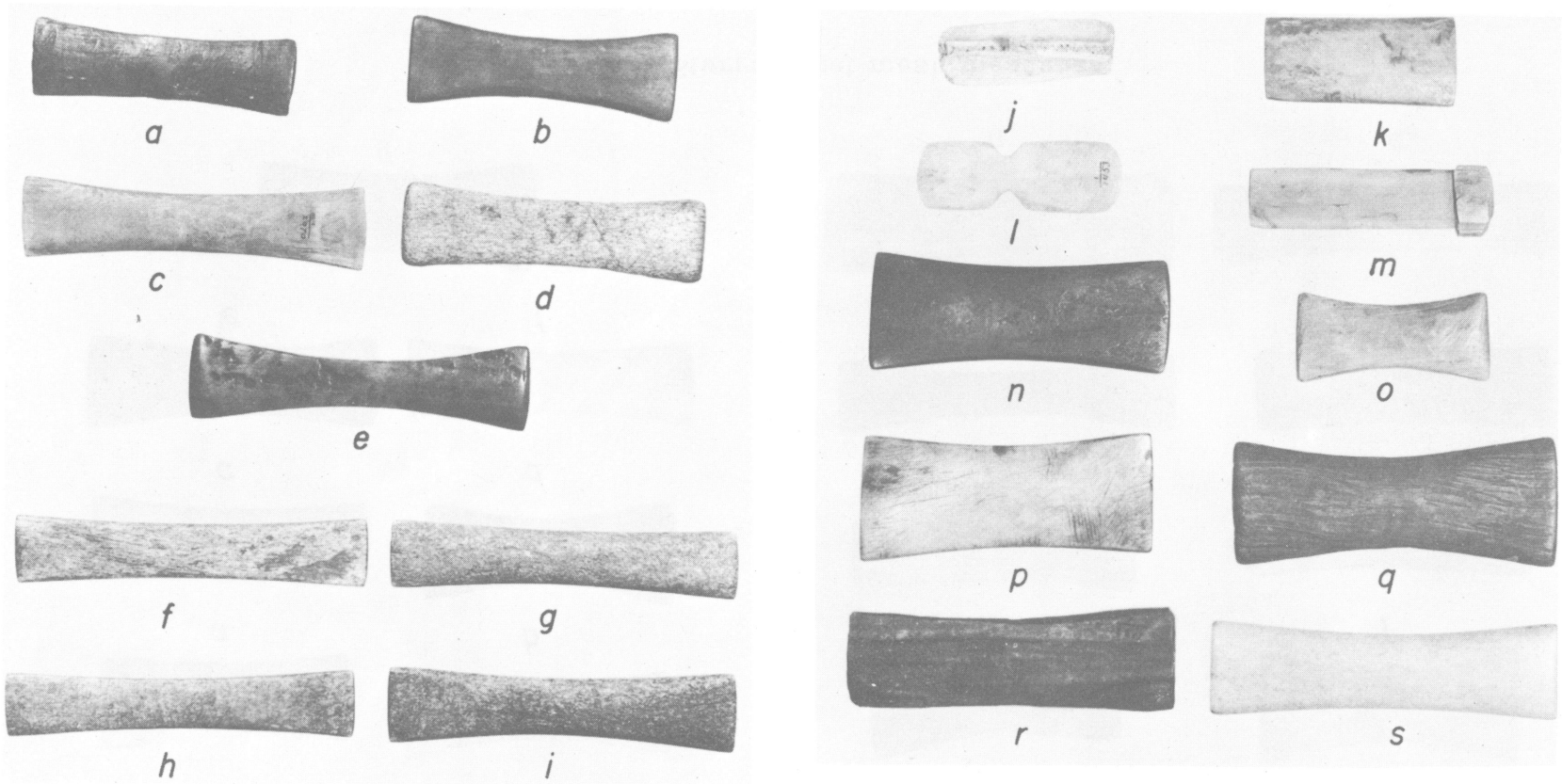


Plate 14. Mesh measures and trigger buttons.

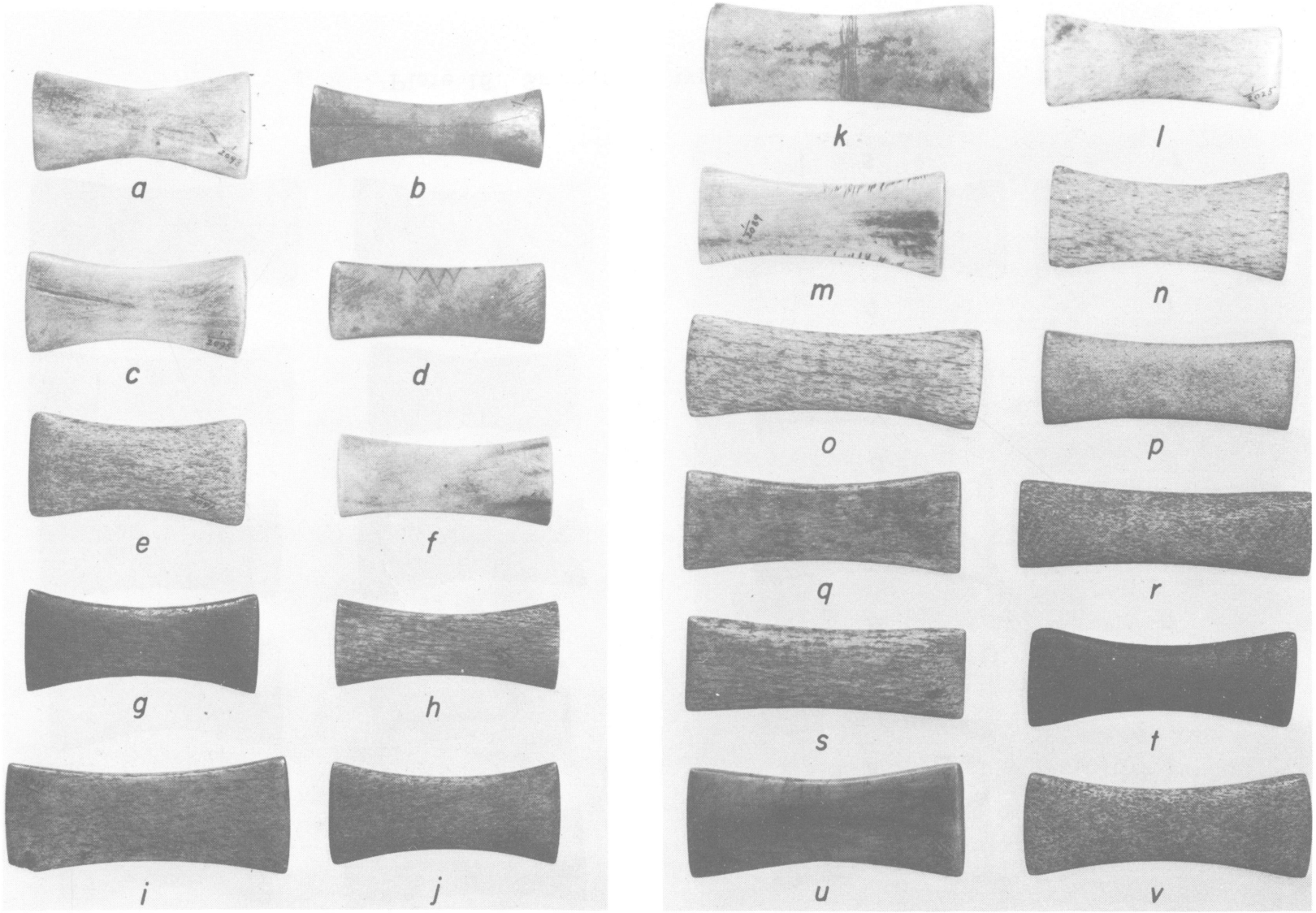


Plate 15. Salmon net mesh measures.

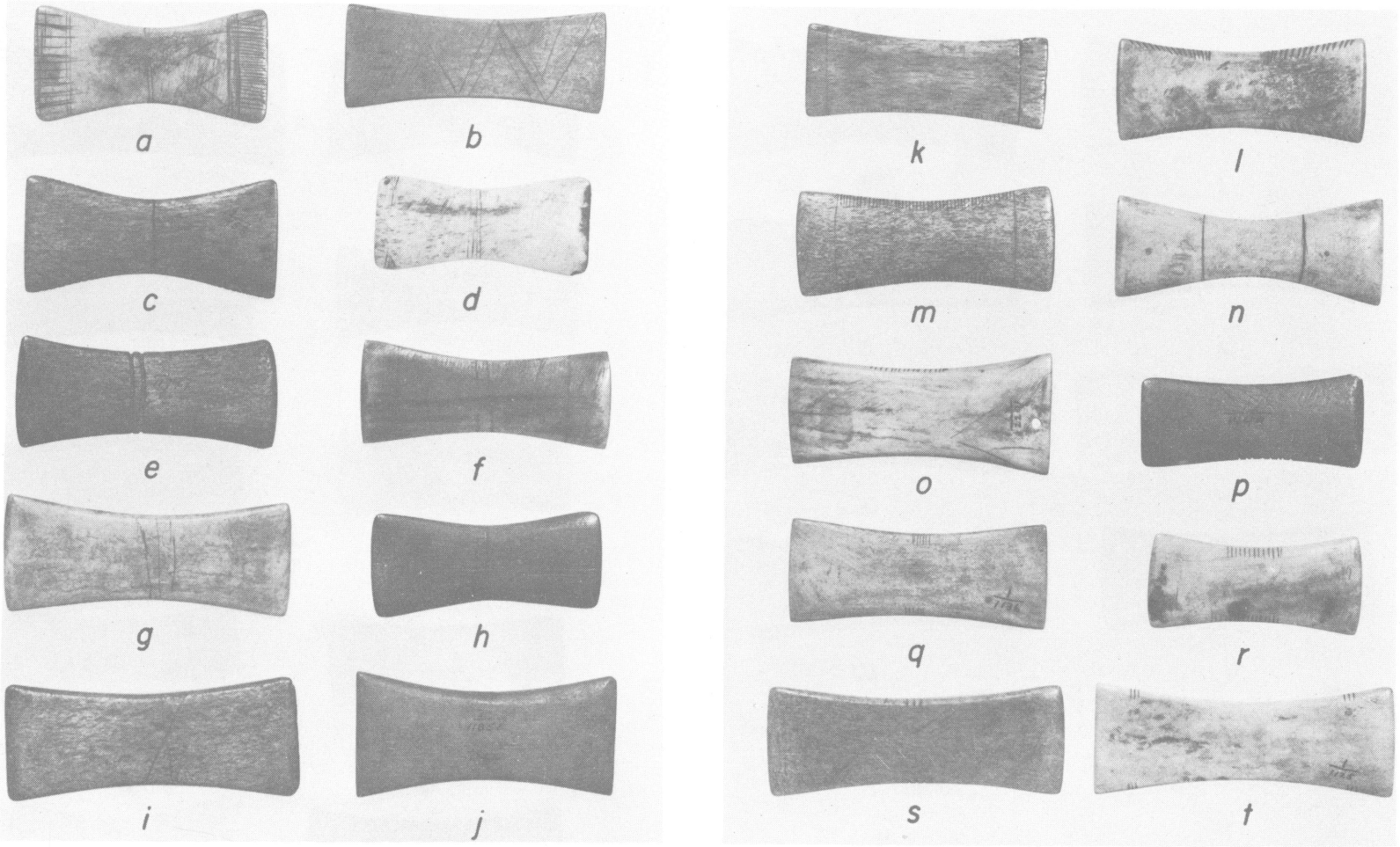
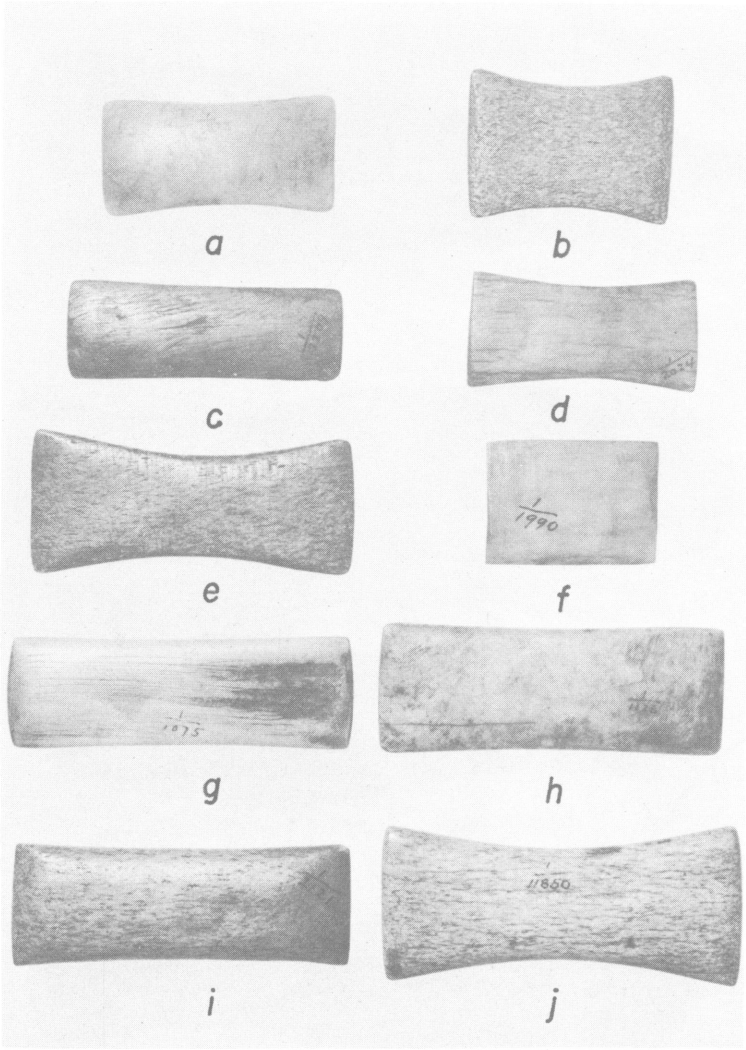


Plate 16. Salmon net type mesh measures.



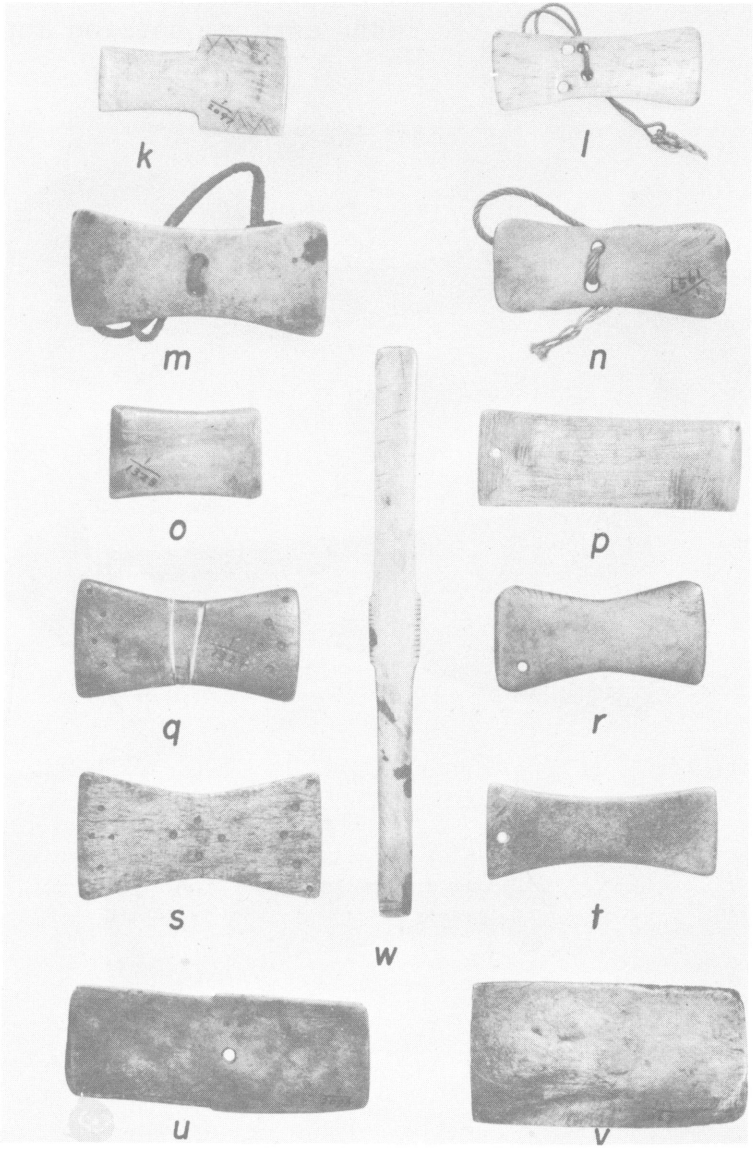


Plate 17. Mesh measures and trigger buttons.

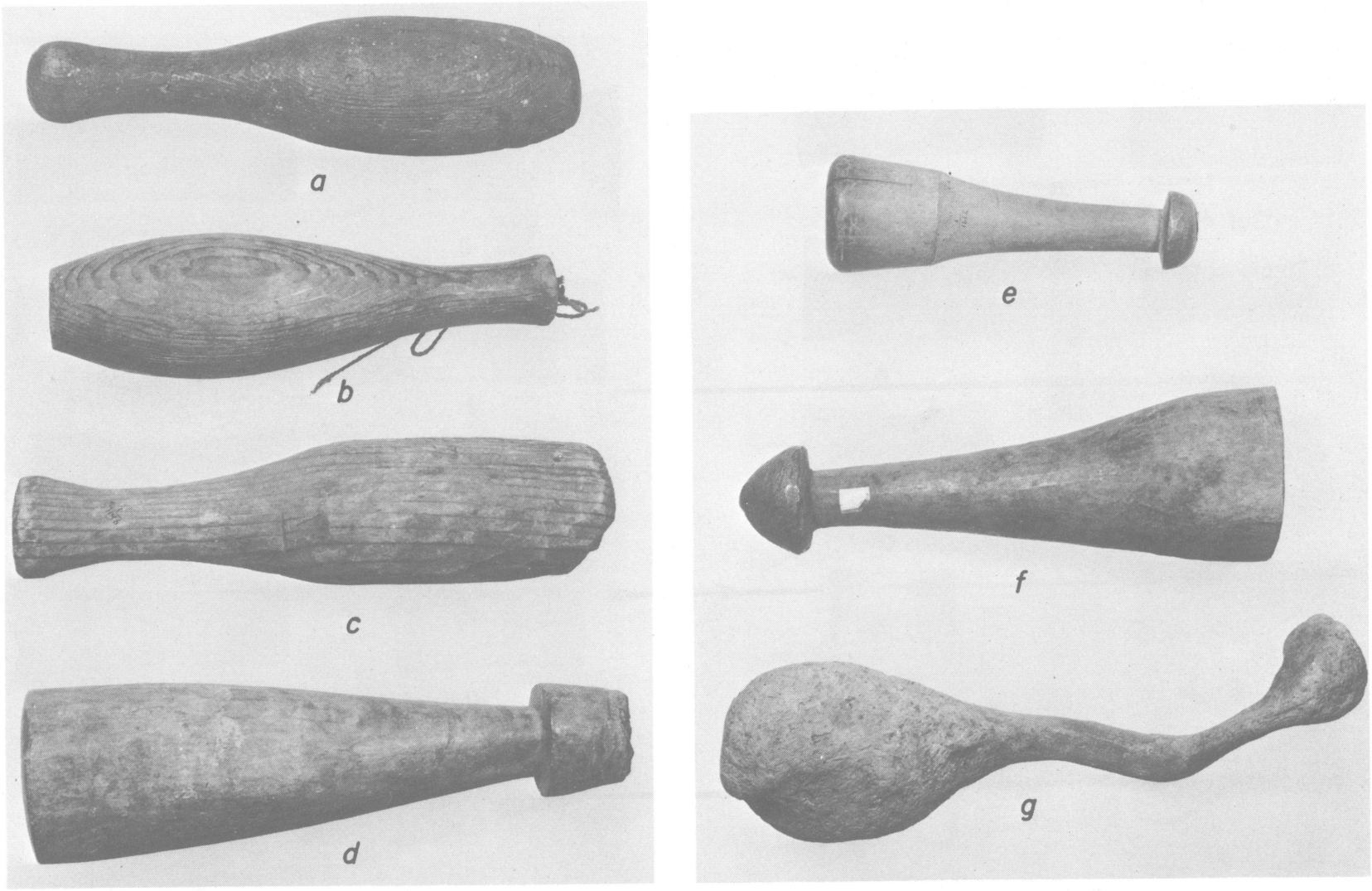


Plate 18. Fish clubs and mashers for berries and fish eggs.

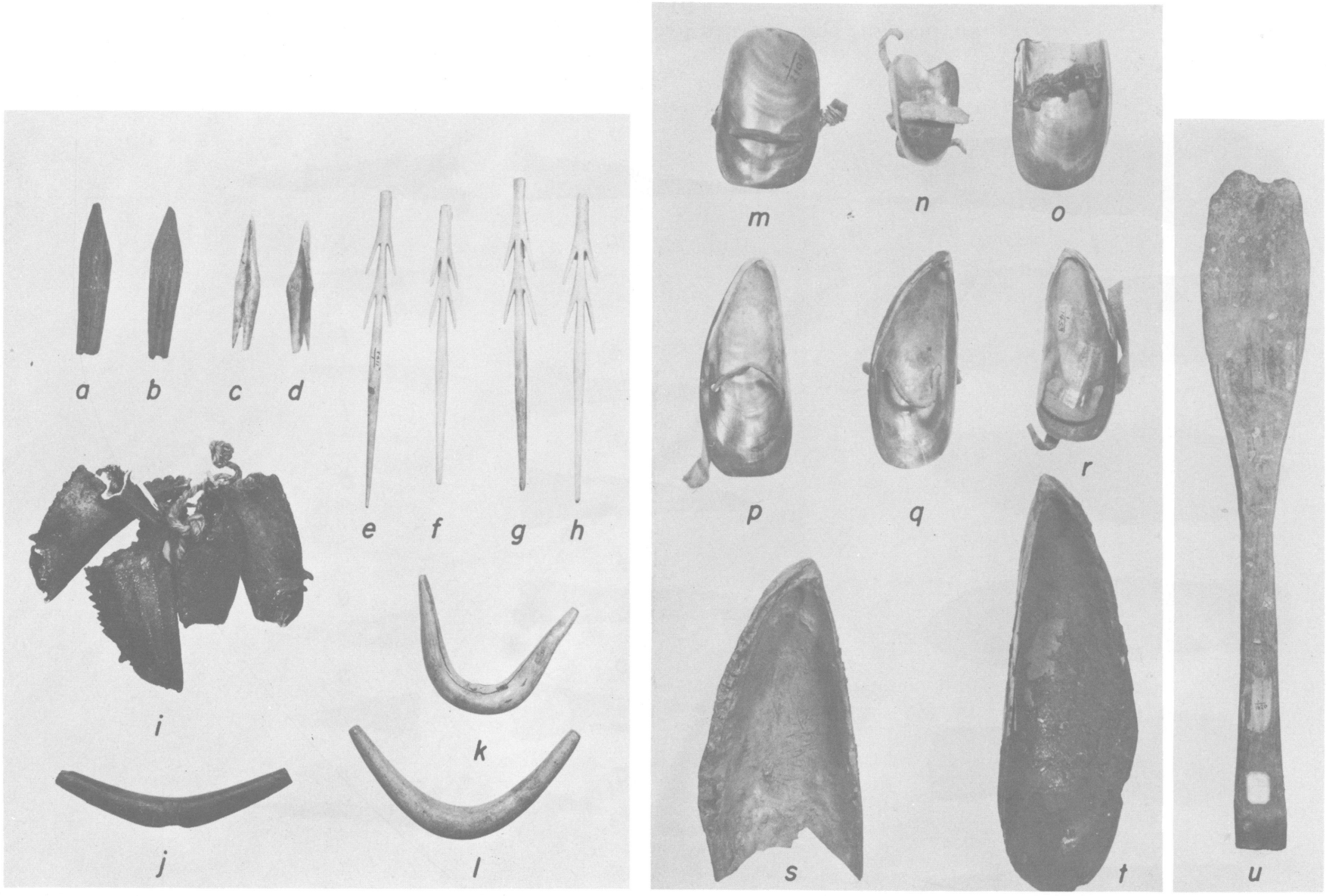


Plate 19. Miscellaneous implements; objects of mussel shell; salmon jaw breaker.

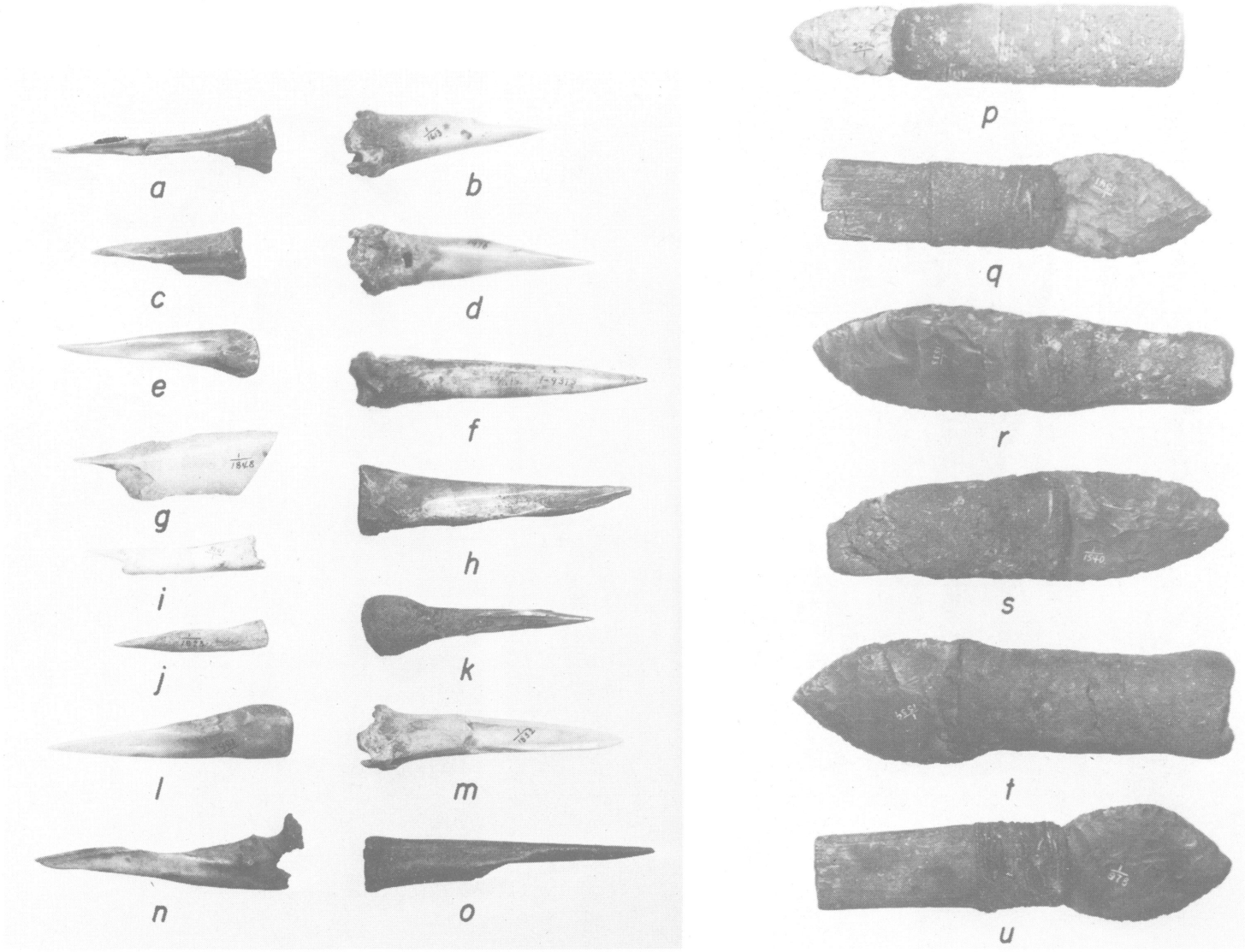
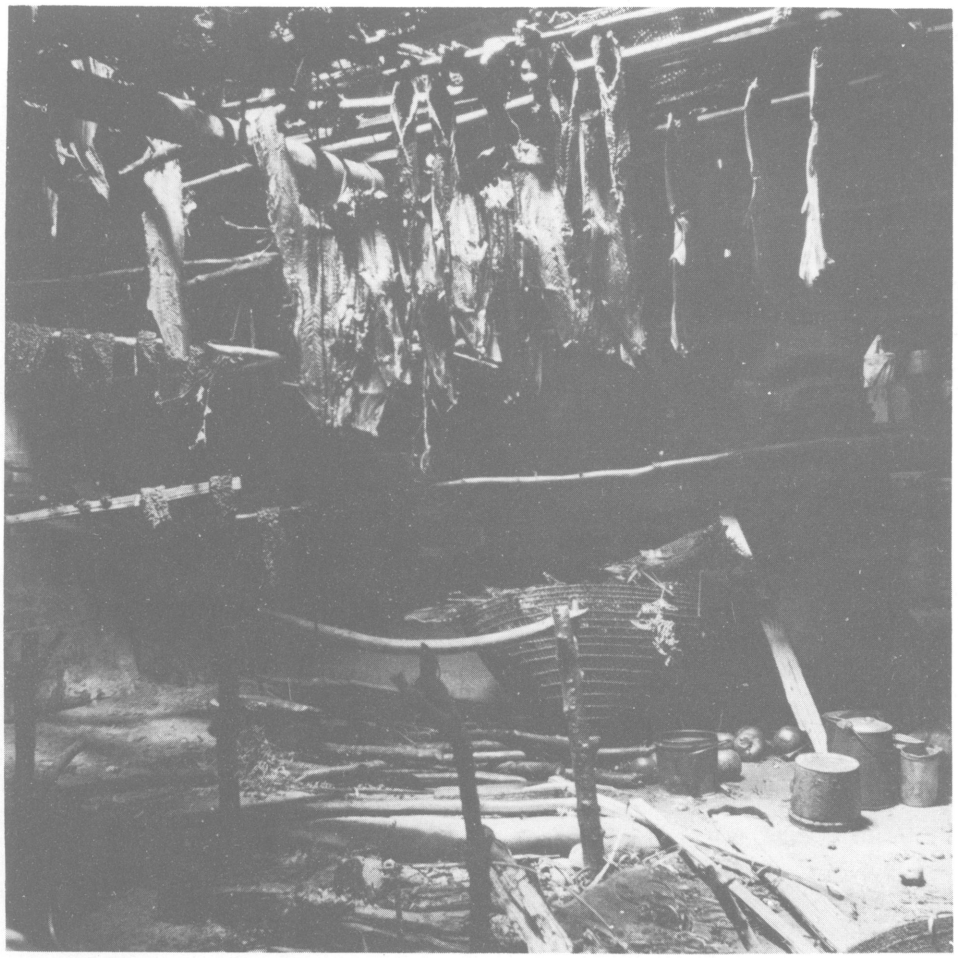


Plate 20. Eel slitters and fish knives.



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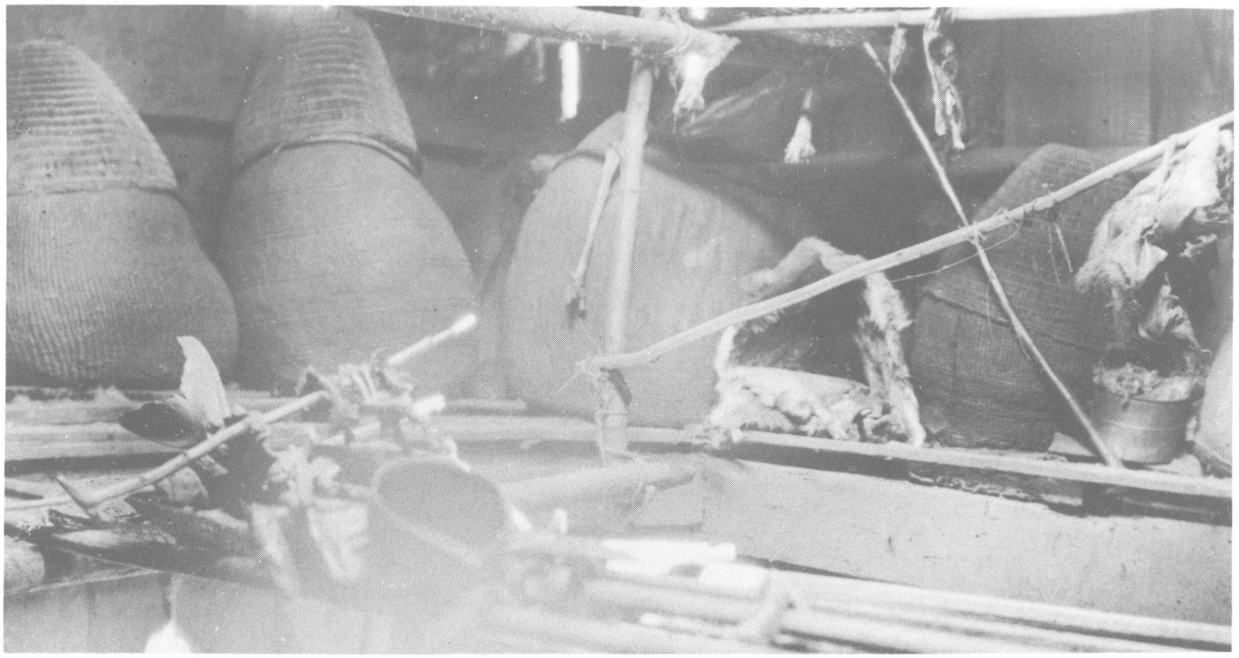

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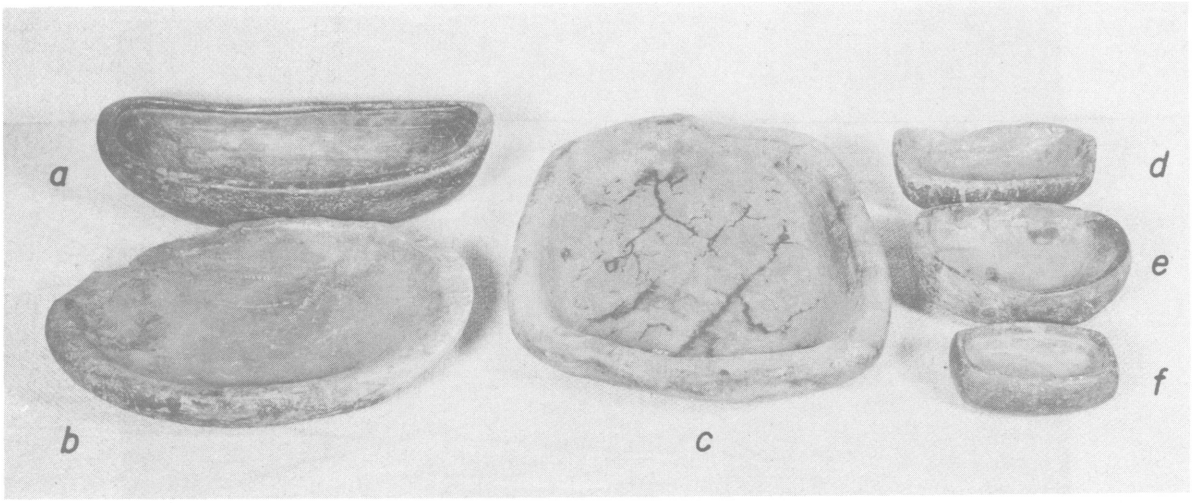
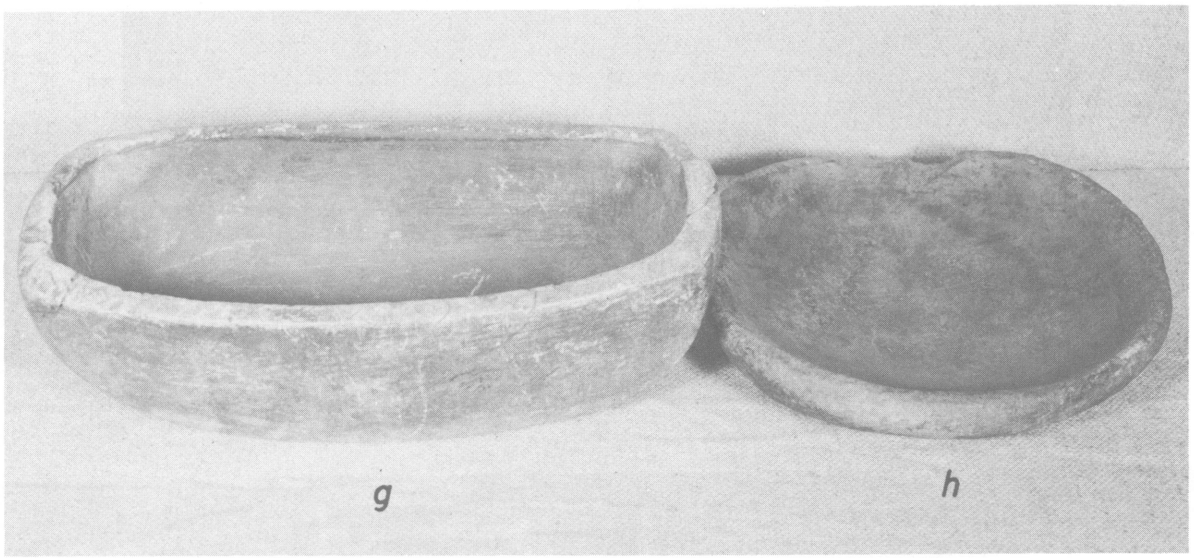
Plate 21. Salmon drying and storage.





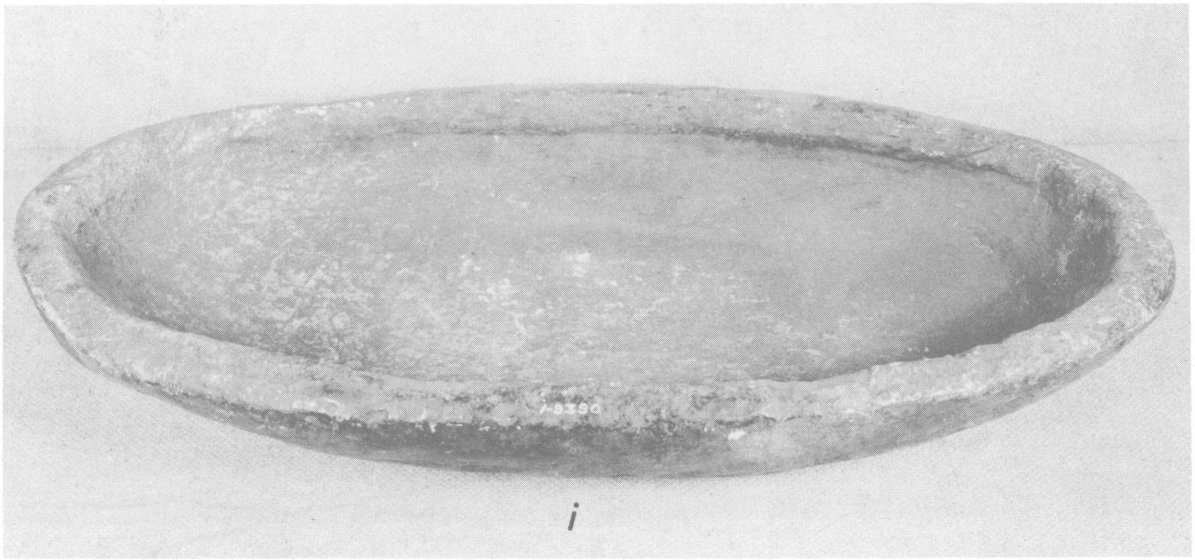


Plate 22. Steatite dishes.

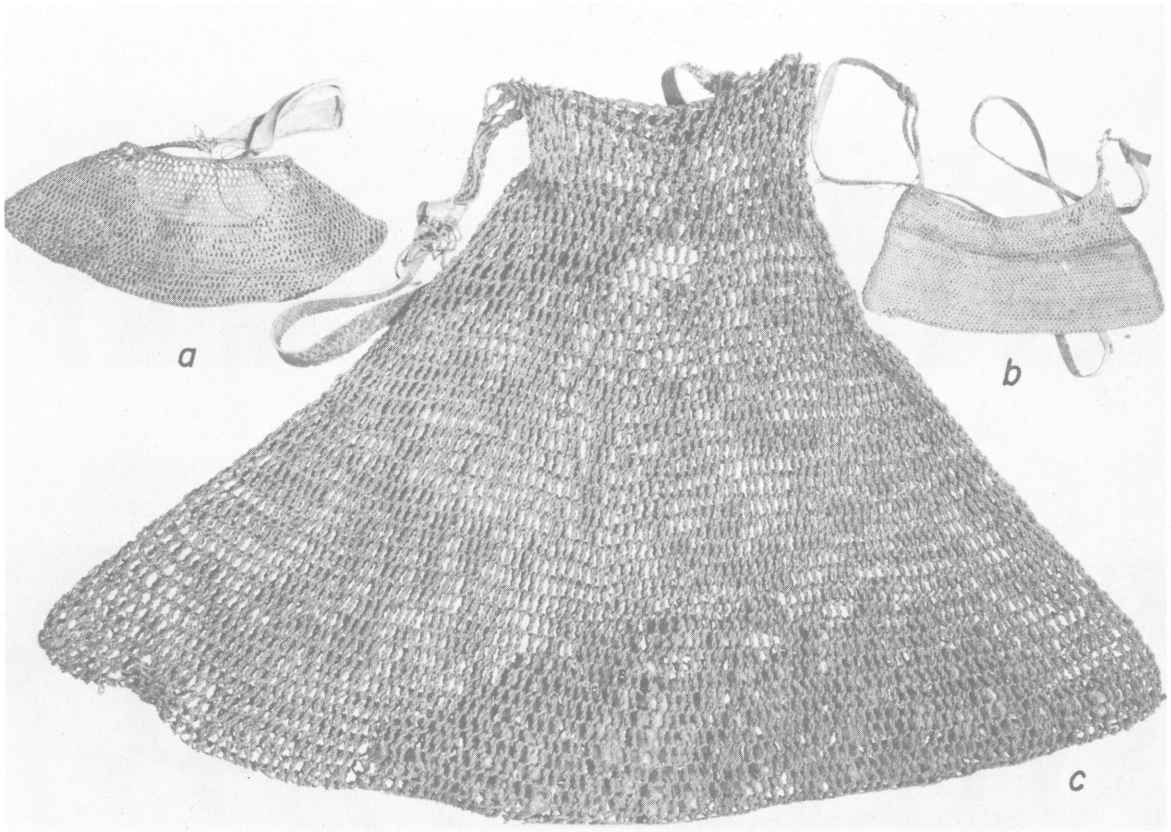
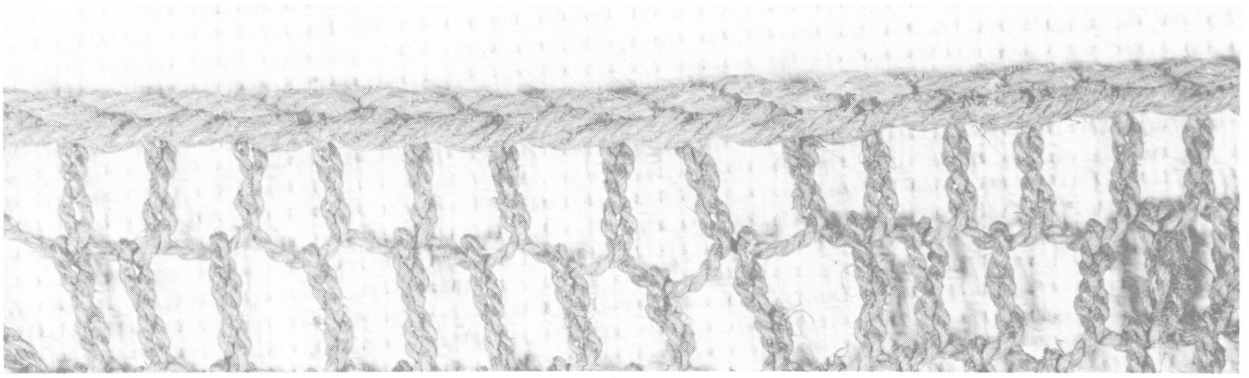


Plate 23. Bags of knotless netting.



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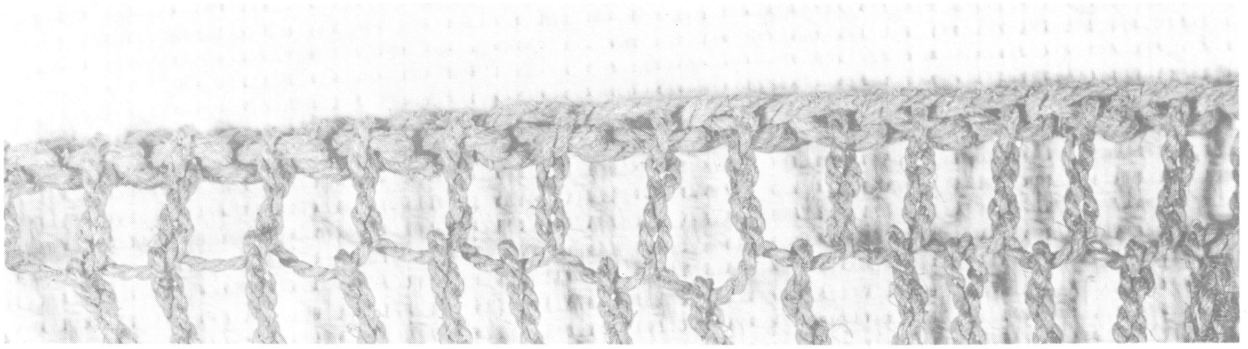

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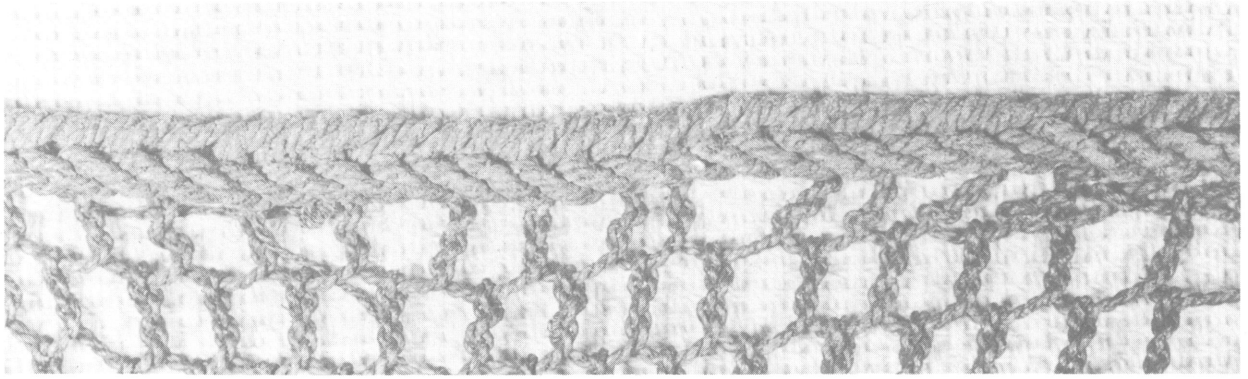

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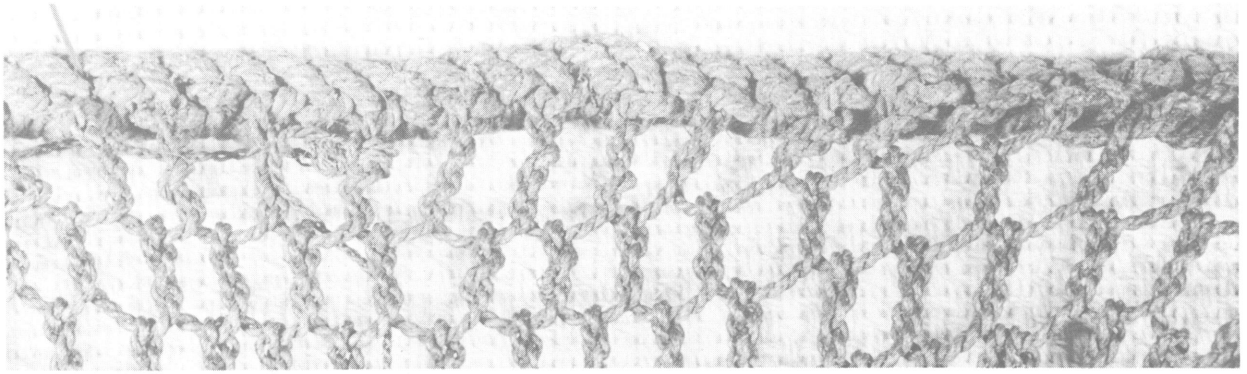

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Plate 24. Borders of knotless netting bags.

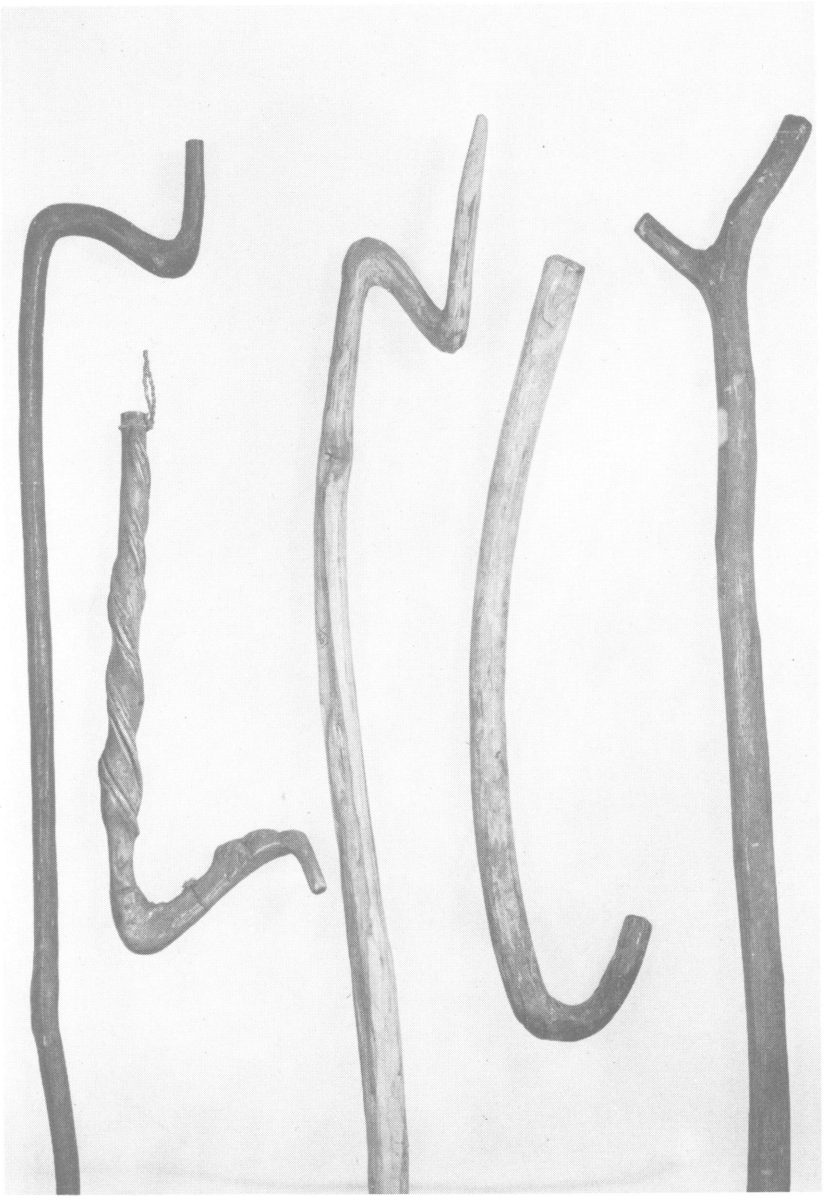

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Plate 25. Yurok wooden hooks.

Plate 26. Karok fishing platform at Katimin. Also fisherman with plunge net and man carrying fish in net sack.

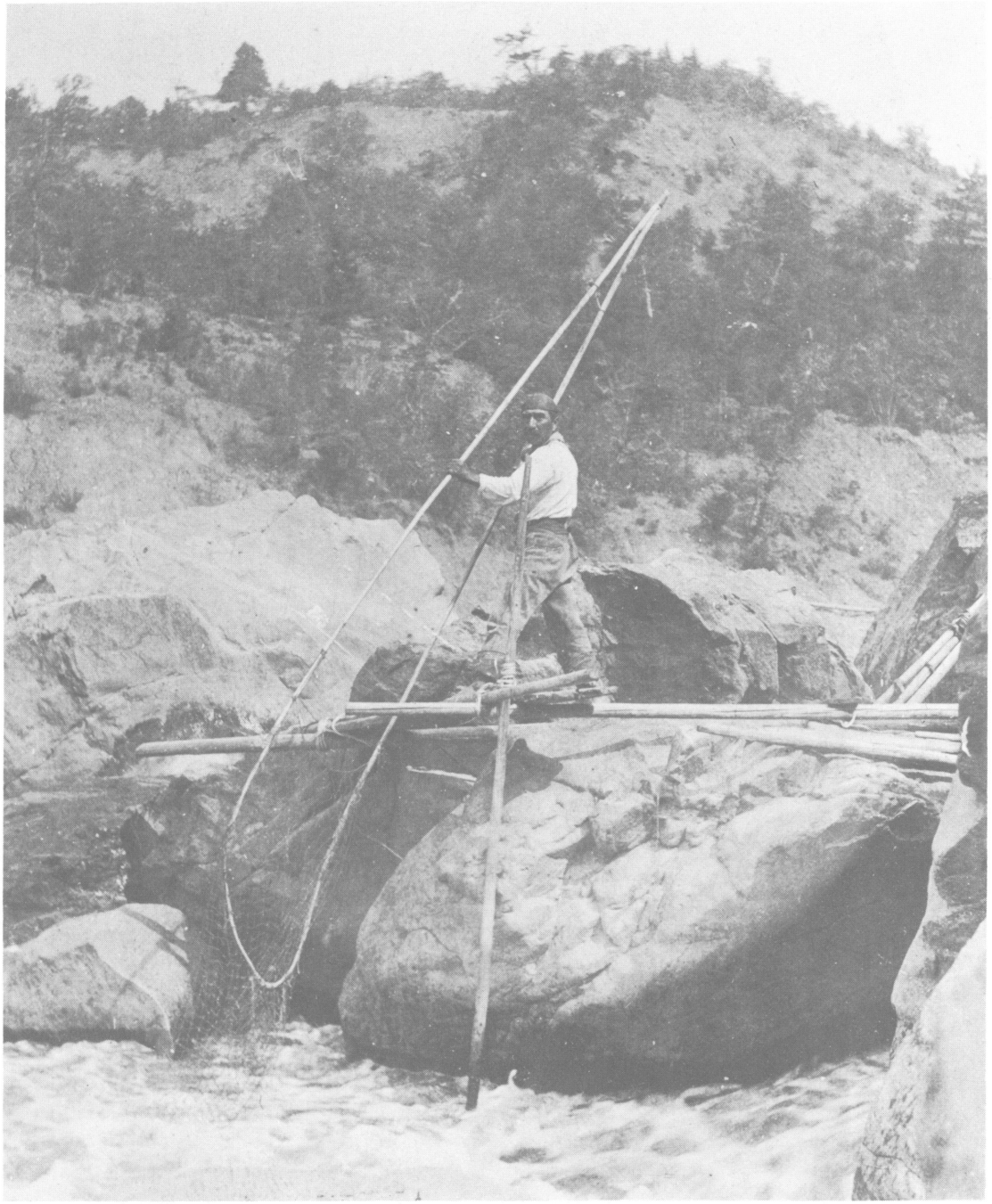
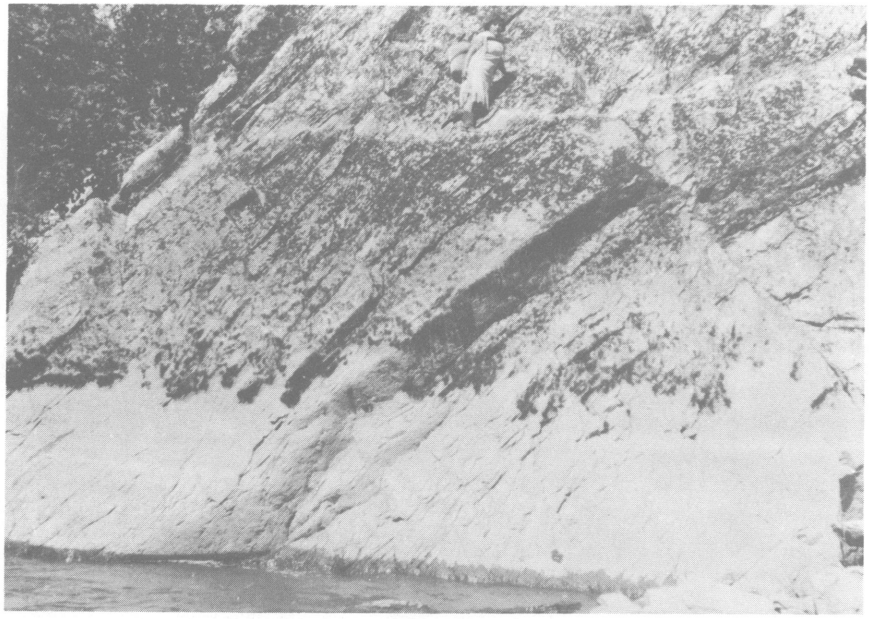


Plate 27. Karok fishing platform at Amaikiara.

Plate 28. Karok fishing platform at Amaikiara.



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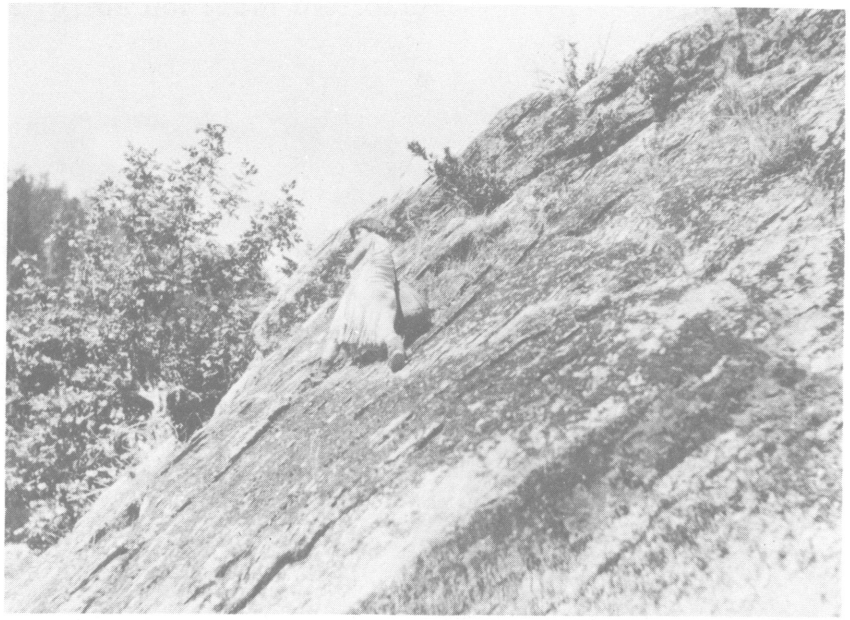

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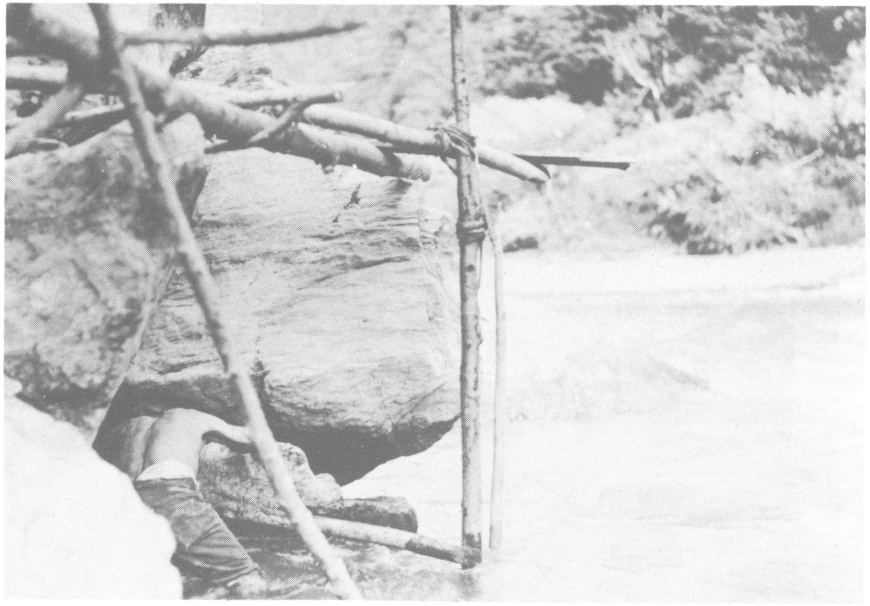

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Plate 29. Trail in Sahwarum canyon; Karok fisherman building fishing platform.

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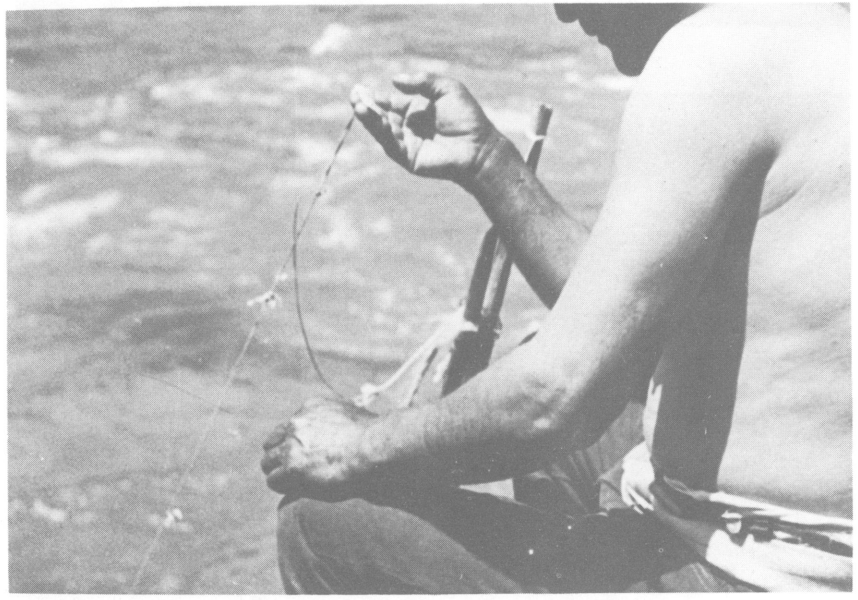

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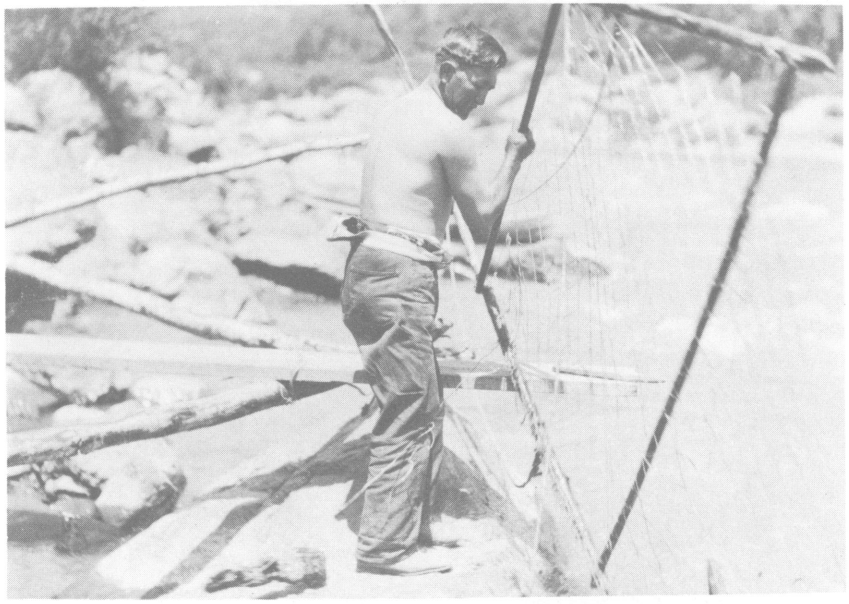

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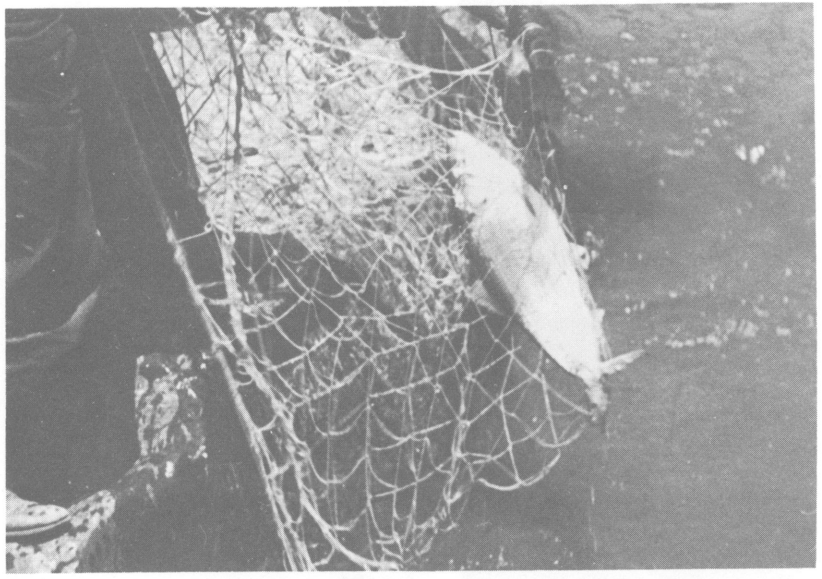
Plate 30. Karok fisherman using lifting net from platform.



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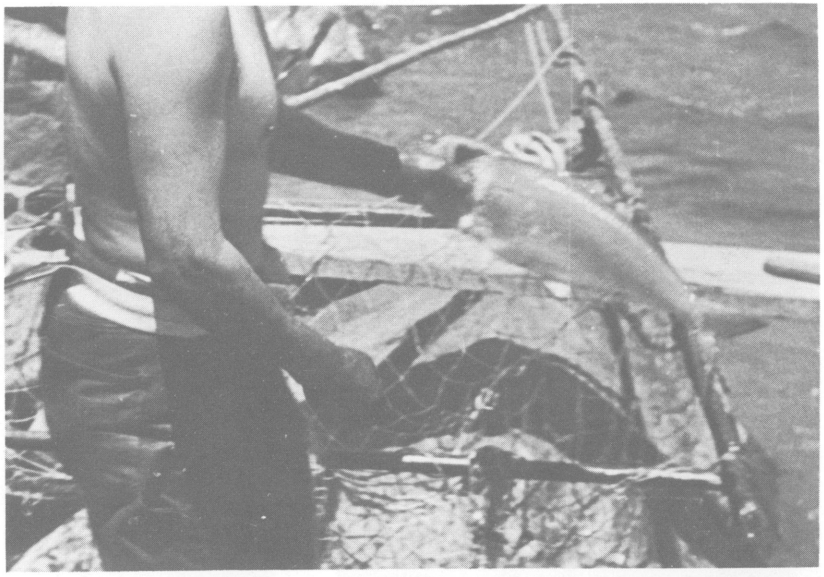

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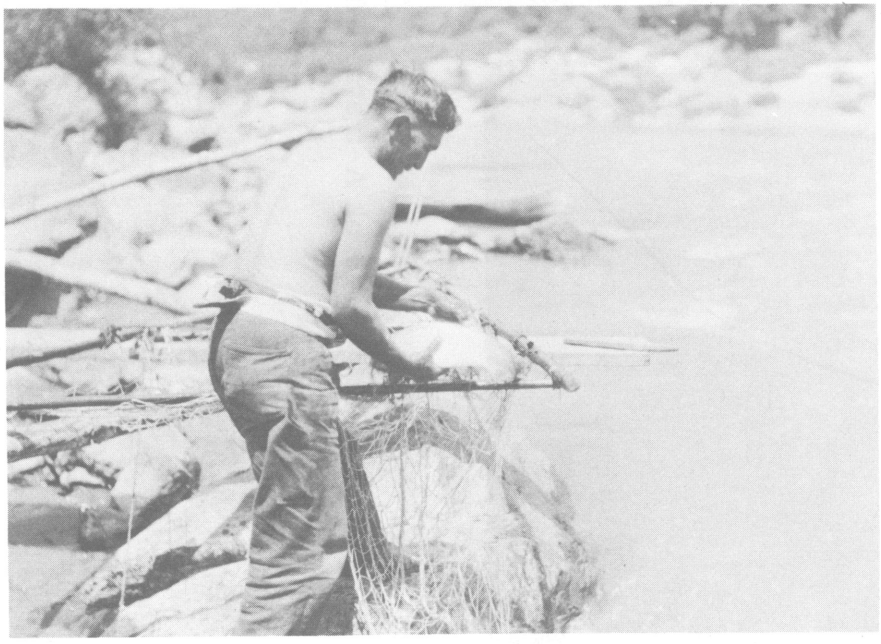

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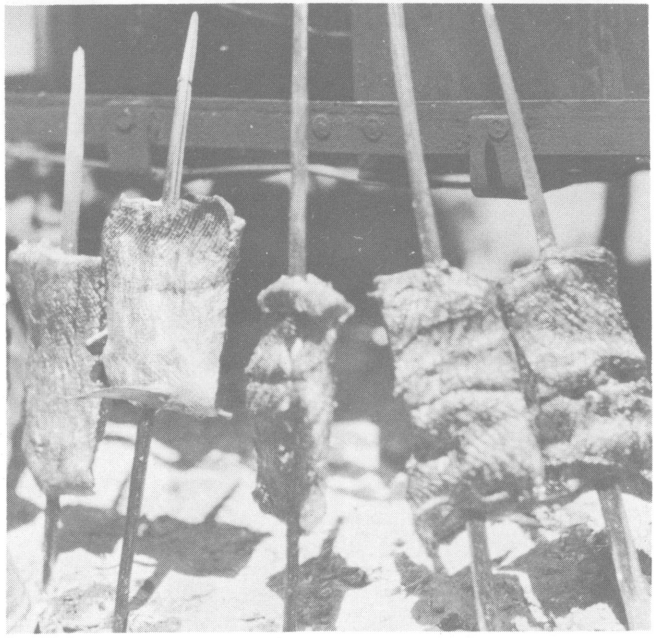

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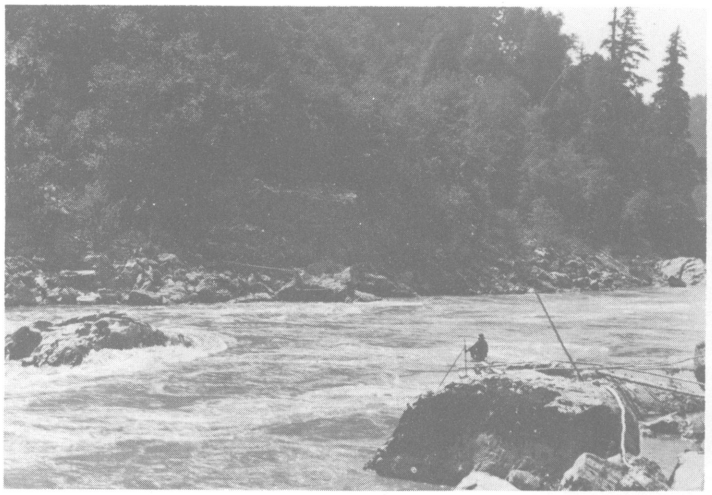
Plate 31. Salmon fishing with lifting net; cooking salmon.



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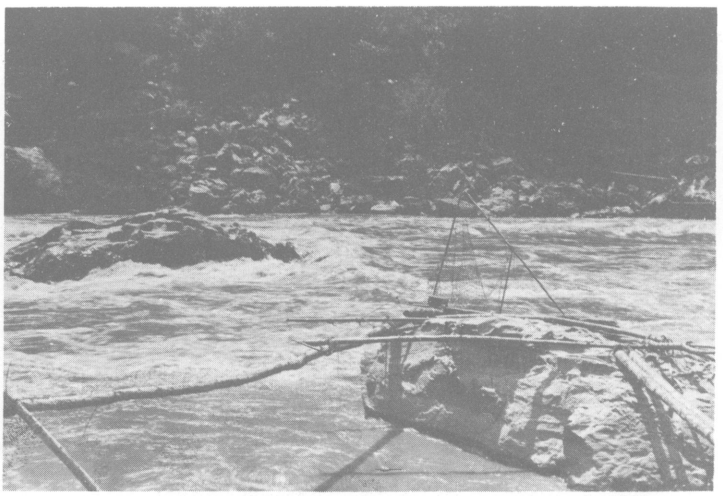

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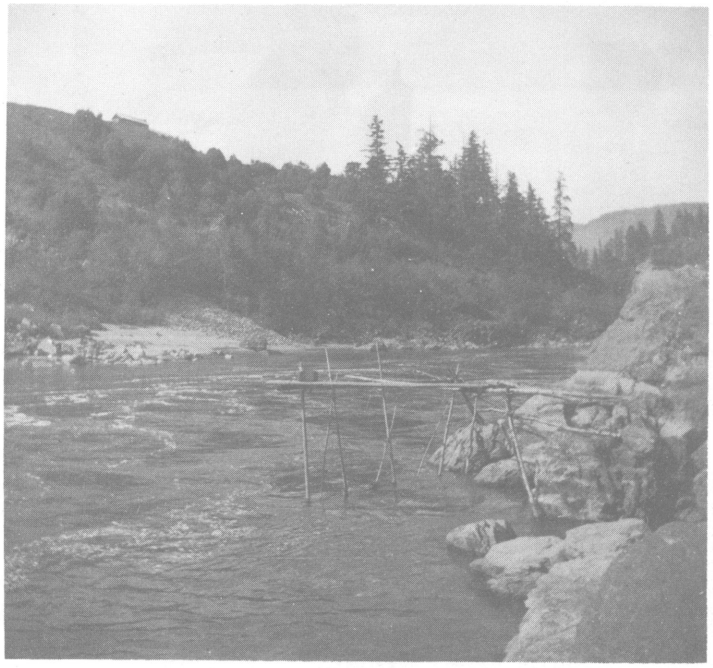

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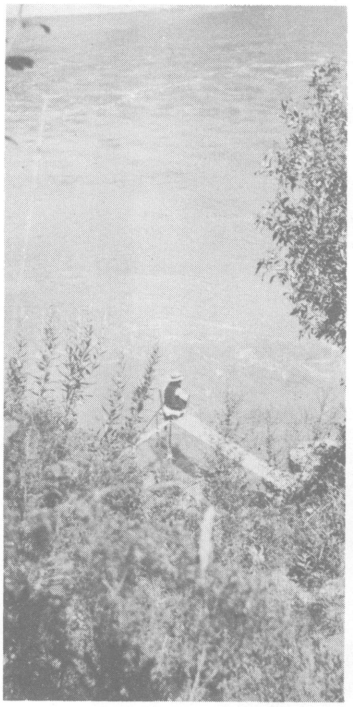

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Plate 32. Yurok A-frame lifting nets and scaffolds.

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