The Indian Dip Net Fishery

AT CELILO FALLS ON THE COLUMBIA RIVER

R. W. SCHONING, T. R. MERRELL, JR. and D. R. JOHNSON

OREGON FISH COMMISSION
Portland, Oregon

Contribution No. 17

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Frontispiece: Indian fishermen "roping" fish in channel between Chief and Standing Islands. This is only area at Celilo where fish are actually seen by fishermen before being caught. Main falls is in background, Washington shore in distance.

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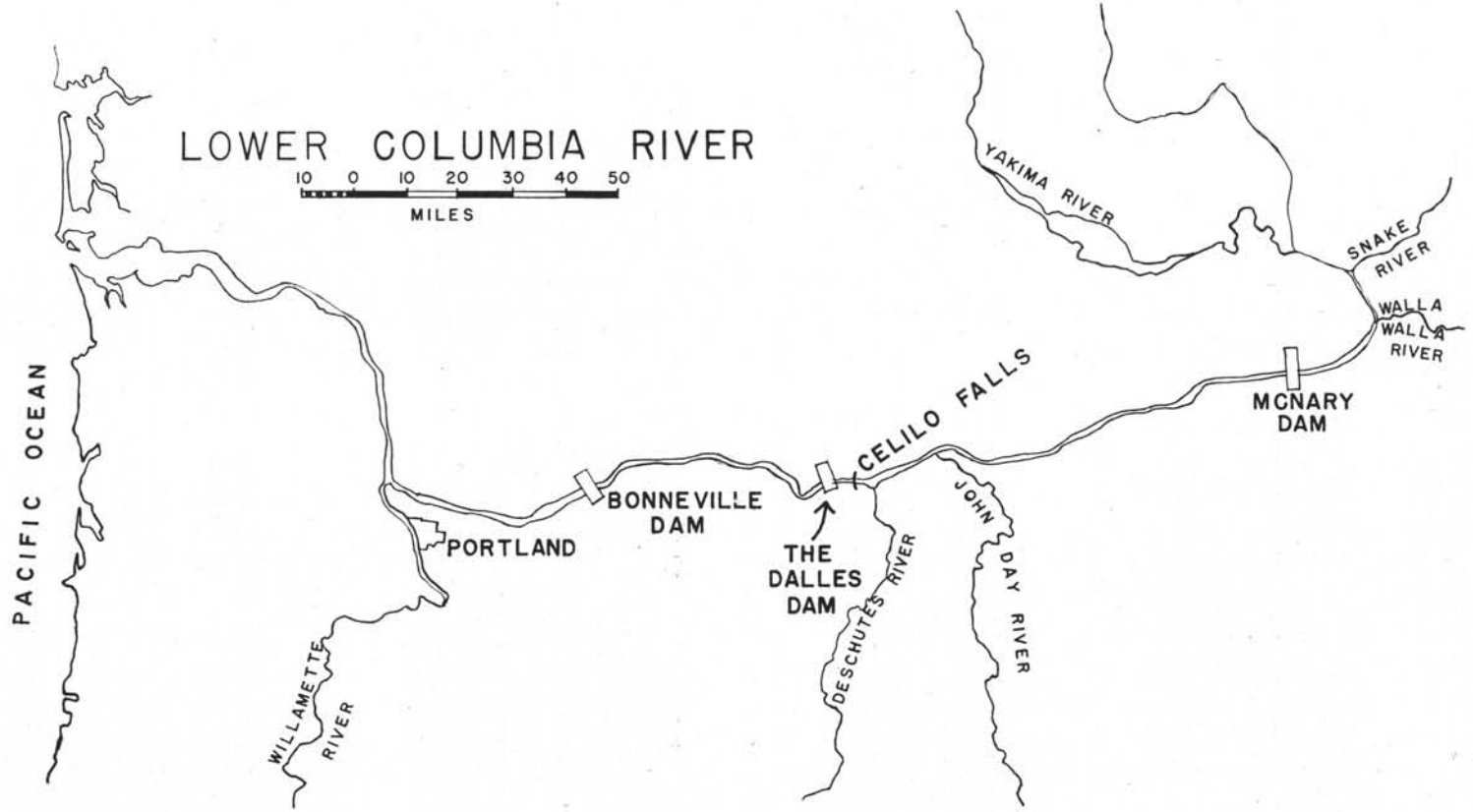

Figure 1. Lower Columbia River.

The Indian Dip Net Fishery at Celilo Falls on the Columbia River[1]

R. W. Schoning,[2] T. R. Merrell, Jr. and D. R. Johnson[3]

INTRODUCTION

Untold centuries ago some wandering Indian—or his aboriginal predecessor—discovered that he could catch salmon at the falls in the Columbia River a few miles below the mouth of the Deschutes River (Fig. 1). Virtually nothing is known about the beginnings of the fishery that developed. Shrouded by the ages that have passed, a flourishing fishery evolved. An extensive commerce with neighboring tribes developed, and this fishery was noted by the early explorers, who visited that portion of the Columbia River.

Craig and Hacker (1940) have summarized some of the early observations and mention the explorations of Lewis and Clark, David Thompson, Suckley and Cooper, and Charles Wilkes. Indians were found fishing in many parts of the Columbia River watershed, but they were particularly numerous at Celilo Falls. Craig and Hacker estimate that the annual take of salmon throughout the Columbia River watershed by Indians in the early 1800's was about 18,000,000 pounds. While this take was not restricted to the Celilo Falls area and the estimate is not precise, its enormous size indicates the magnitude of the Indian fishery.

Some of the observations of the explorers are of considerable interest. When Lewis and Clark journeyed down the Columbia Captain Clark wrote, concerning his Celilo observations of October 22, 1805, ". . . the waters is divided into several narrow channels which pass through a hard black rock forming Islands of rocks at this Stage of water, on those Islands of rock as well as at and about their Lodges I observe great numbers of Stacks of pounded salmon neetly preserved . . . thus preserved those fish may be kept Sound and Sweet several years, as those people inform me, Great quantities as They inform us are sold to the whites people who visit the mouth of this river as well as to the nativs below."[4]

Several distinct tribes speaking different languages inhabited the Celilo area and caught large quantities of salmon for their own consumption and for trading. In addition to resident Indians, many others traveled to the Celilo area to fish during the summer and fall.

When the treaties of peace with the Indians were negotiated in 1855, their rights to fish in the usual fishing places were included, and by interpretation their fishing has been virtually unrestricted. The only restriction placed upon the Indians has been the stipulation that they cannot sell fish caught during seasons closed to commercial fishing, though they can catch fish for their own use. Article III of the treaty[5] stated:

"The exclusive right of taking fish in all the streams, where running

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[1] This is the first of a series of reports of cooperative studies by the Washington Department of Fisheries and the Oregon Fish Commission.

[2] This paper was completed while the senior author, R. W. Schoning, was in the armed services.

[3] D. R. Johnson was employed by the Oregon Fish Commission during the course of this study; he is now Fisheries Research Supervisor, Washington State Department of Fisheries.

[4] p. 148, Vol. 3, "Original Journals of the Lewis and Clark Expedition", Dodd, Mead and Company, 1905, New York.

[5] From an opinion of the Supreme Court of the United States, No. 318, October Term, 1941. Decision of Court in Case of Sampson Tulee, Appellant, vs. State of Washington, March 30, 1942.

through or bordering said reservation, is further secured to said confederated tribes and bands of Indians, as also the right of taking fish at all usual and accustomed places; in common with citizens of the Territory, and of erecting temporary buildings for curing them; together with the privilege of hunting gathering roots and berries, and pasturing their horses and cattle upon open unclaimed land."

The number of Indians fishing has increased steadily in recent years, some of them coming from as far away as Montana and California. This influx of Indians who had not originally fished on the grounds results in some friction between the newcomers and the original tribes.

Since white men first established colonies on the North American continent some 350 years ago, enormous changes have taken place. Animal life has changed, forests have been removed, soils have washed away—even the rivers have changed. The once flourishing Atlantic salmon runs have largely disappeared, the carrier pigeon is gone, and buffalo have disappeared from the plains. On the Pacific Coast the Indians are absent from many of their former haunts, even in Canada and Alaska. It is both surprising and interesting, then, that an enormous Indian fishery still exists at Celilo Falls. There are other large Indian fisheries in Washington, British Columbia and Alaska, but perhaps nowhere on the North American continent is there a native fishery as concentrated and as large within a limited area as the one at Celilo Falls on the Columbia River.

Salmon are scarce at Celilo during the winter, and there is very little fishing at that time. Beginning in March and April the first run of salmon—the highly prized spring chinook—begins to arrive. In late April or May this run migrates through the Celilo area in greatest numbers, just before the annual spring freshet on the Columbia River reaches its peak. As the Columbia begins to drop the blueback salmon run appears in numbers and this run peaks in early July. Chinook salmon continue to be present during the entire summer and become very abundant in early September at which time they are called fall-run or fall chinook. Other important species are present in the late summer and fall. As the blueback run passes, upriver steelhead trout mount in abundance and are present in significant numbers from July to October. A relatively small run of silver salmon passes Celilo Falls in early September on its way to up-river spawning grounds. To summarize, from November to April few migratory fish are present; spring chinook are abundant in late April and May; spring chinook and blueback salmon in June; chinook, blueback and steelhead in July; chinook and steelhead in August; chinook, steelhead, and silver salmon in September; and a few chinook and steelhead in October.

The Celilo Falls Indian fishery justly deserves considerable study. Its unique character—a vast assemblage of Indians from various tribes fishing with gear much like that used in ancient times—and its accessibility to commercial interests and tourists alike make it a situation of financial importance. Furthermore, the very size of the present-day take of salmon at Celilo—as will be shown in this article—makes the unrestricted Indian fishery, in this day of drastic restriction for conservation purposes, a controversial subject. Finally The Dalles Dam has recently been authorized by Congress. Since this proposed dam for which monies have been appropriated, will be only a few miles below Celilo Falls, it will completely inundate the Falls and obliterate the Indian fishing sites. For these several

reasons attention has been focused on the Celilo fishery recently, and the need for gathering and assembling all possible information has become evident.

Investigation of the Celilo Indian fishery has involved two phases. Firstly, since fishing customs in general and the subsistence take during certain closed commercial seasons was almost entirely unknown, a field study of the fishery was inaugurated beginning in August, 1947. Secondly, a gross analysis of the commercial landings, including the percentage of the Columbia River catch taken in the Celilo area was undertaken. Along with the latter study, consideration of the relative importance of the Indian take compared with the entire commercial catch above Bonneville Dam is included.

Every year a large influx of Indians arrives at Celilo from the various Indian reservations to fish the big fall run. A closed commercial fishing season, beginning noon August 26 and ending noon September 10, has protected the fall migration of chinook salmon since 1890. However, the Indians are allowed to fish during the entire year. Figure 2 shows the daily landings of fall chinook by the Indians for 1947, 1948 and 1949 for the period August 20 to October 7. It includes both commercial and closed season landings. It can be seen that the catch begins to peak in early September during the closed period and reaches its height a few days after the season opens. Since commercial fishermen below Celilo cannot fish during the two week period when the peak of the fall chinook run is migrating upriver, a significant percentage of the fall run is allowed to pass upriver unmolested until it reaches Celilo Falls.

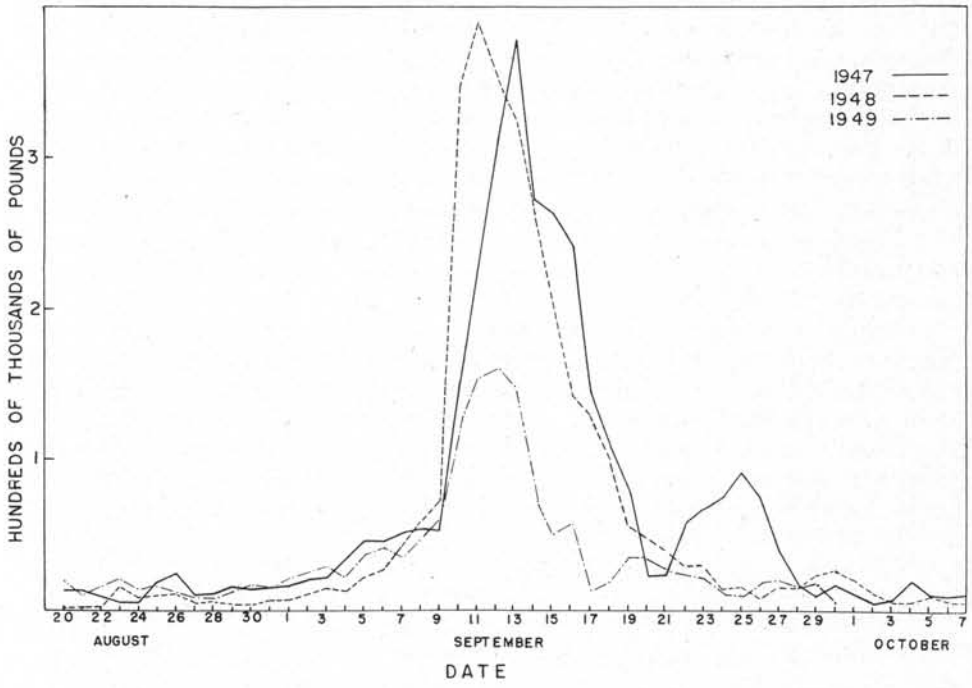

Figure 2. Daily Columbia River Indian Fall Chinook Landings 1947–1949.

Since 1943 there has also been a spring closed season designed to protect the valuable but declining spring chinook runs and blueback runs. The Indian subsistence fishery has been the only river fishery operating on the runs during these periods.

Catches during these closed seasons have never appeared in any official catch records, and the impact of this catch upon the chinook runs has been virtually unknown. It was primarily to ascertain the magnitude of the closed season catch that the present study was undertaken. Fall chinook during the fall closed season are caught in far greater numbers and by far greater numbers of fishermen at Celilo Falls than are spring chinook during the spring closed period. The reason for this is that only a limited number of fishing locations are available at the Falls in the spring, and the spring run is smaller than that occurring in the fall.

Customs of Fishery

The ruling body for the fishery is an Indian group composed of three representatives from each reservation contributing fishermen. Disputes concerning fishing rights and other fishery rulings are settled by this group. Minor intra-tribal differences are referred to the tribal fish committees.

Problems often arise over ownership of certain locations and blood right to fishing privileges, one-quarter Indian blood being required to fish on the Indian grounds.

Fishing locations are a family inheritance and are passed down from father to son. During the closed season, one man commonly comes to the grounds and catches all he wants for his own use before another begins fishing. Each fisherman usually catches only what his family can clean and prepare that night. On other occasions, a family drives over from the reservation, gets its year's requirement, and leaves the next day. As many as ten or twelve different persons may fish at one location throughout a day. If the owner or some member of his family is not fishing, however, another person may fish with the owner's permission.

It is an old custom of the Celilo Indians to refrain from fishing at night in order to allow any fish that move during the hours of darkness to escape to the spawning grounds. Increasing numbers of Indians from the various reservations have been journeying to Celilo Falls to fish in recent years, and the policy is no longer strictly observed. During the commercial season, many of them fish all night; however, little night fishing is done during the closed period because personal fish requirements can be met by merely fishing in the daytime. A few of the fishermen who sell their fish during the closed season do fish at night, however. As a general rule, fish migrations are at a minimum during darkness, so only a few are caught at that time. Catches generally improve when fish begin to move at three or four o'clock in the morning.

It is compulsory for all fishermen to be roped to the platform while fishing. One end of the rope is tied to the platform, and the other has a slip knot which is worn around the waist. Occasionally an Indian is jerked off his scaffold, but the rope saves him from a swim and possible drowning. Indians occasionally lose their nets when two or three large chinook enter the net simultaneously.

Geography of the Grounds

The Indians fish during both the spring and fall salmon runs. The river is too high to fish at Celilo Falls proper during the spring run, so the bulk of the spring fishing is done from platforms on the rocks near Tenino at the lower end of the Dalles-Celilo Canal in Oregon and on the opposite side of the river in the vicinity of Spearfish, Washington. The locations from which the Indians fish in the fall are under several feet of water during the spring, but later in the season as the water level lowers and the fall run appears in the river the fishermen move upriver to the main Celilo Falls fishing grounds. The best fishing sites extend for approximately a mile down the river, beginning near the upper end of the canal and extending downstream to the railroad bridge. There are only a few good fishing locations near Tenino because of the rock formations and resulting action of the river. As the water lowers throughout the summer, the fishing locations at the main grounds become progressively better for the dip net fishery. Consequently the total catch of the fall fish by the increased number of fishermen is much greater than the landings of spring fish.

At the principal fall fishing area at Celilo Falls proper, fishing is done from wooden scaffolds situated on four small islands, three large ones, and a section of the shore (Fig. 3). Scaffolds of various sizes and shapes are constructed along the water's edge on the islands as well as the shore. Some fishing is done from the rocks themselves, although it is usually not as satisfactory as when using a platform. The scaffolds enable the fisher-

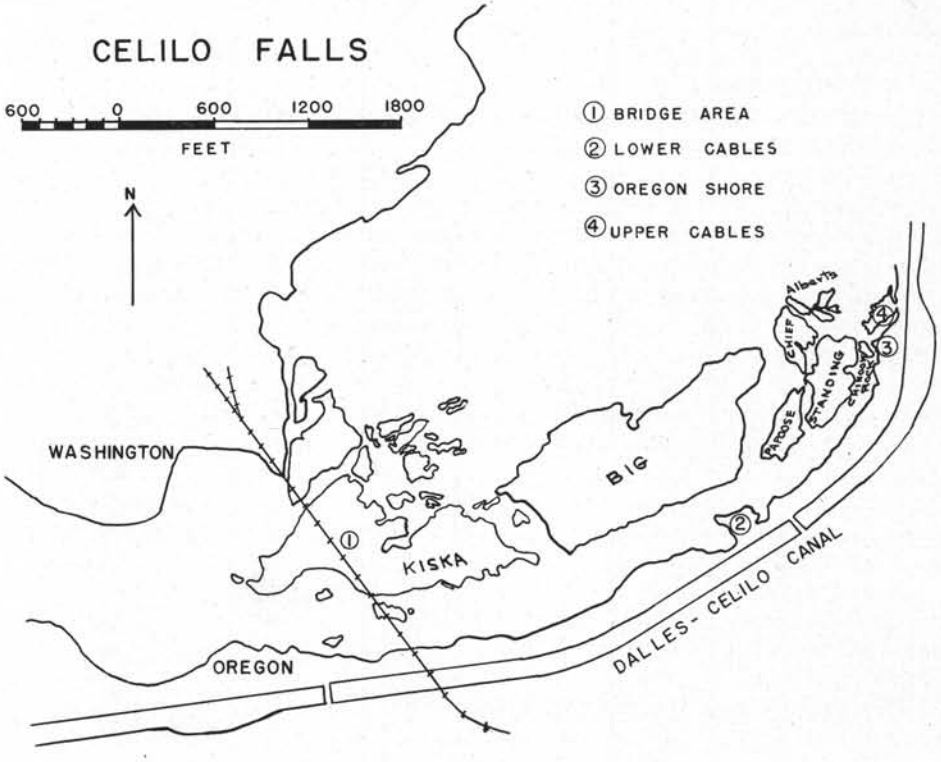

Figure 3. Celilo Falls.

men to dip their nets in the deeper sections of the channels where more fish are found.

The majority of the fishing effort is concentrated near the upper end of the Dalles-Celilo Canal, principally on the islands. Platforms are also located at intervals along the shore down to the railroad bridge; the bulk of the shore nets are put in only after the reopening of the commercial season on September 10.

Near the railroad bridge there is one large channel up the Oregon side of the river, and a considerable number of smaller ones up the Washington side. Fishing under the bridge is done only on the smaller channels. Above the bridge, but just below the main fishing grounds, the large channel forks. The south channel leads to a cul-de-sac formed by an impassable falls with a very small passable artificial channel which was built for the operation of a fishwheel. The north channel leads to a large, rolling, turbulent falls which is passable in places to the fish and is not an abrupt drop like the one on the south channel.

Fishing is very heavy on the south channel in the cul-de-sac below the falls and in the small channel leading from it and, likewise, on half of the north channel. Many of the smaller channels under the bridge are not fished at all due to their inaccessibility and as a result, many salmon presumably escape to the spawning grounds by ascending them. Apparently very few escape the dip nets below the impassable falls, as the only route by which fish can move upstream is through the small artificial channel which has a heavy concentration of nets. Thousands ascend the large rolling falls.

Fishing Equipment

Small cable cars link the shore to the various islands and between some of the islands to permit rapid and easy travel to and from the fishing grounds (Fig. 4). The number of cable cars in operation varies from year to year; in 1947 during the fall closed season there were five to the mainland and in 1950 there were eight. Most of these cable cars are erected by fish buyers who operate them for the convenience of the fishermen. During the open season, the buyers have scales and fish boxes ready at the terminus of the cable, hoping that the fishermen whom they transport will sell fish to them. However, anyone is free to ride the cables and fishermen are under no compulsion to sell fish to anyone. During the closed season, fish buyers continue to operate the cable cars even though they cannot buy fish.

Some of the cable cars are motor driven and some are hand propelled. The motor driven ones are most popular because they involve no work on the part of passengers, but they only operate during the daytime. The hand pulled cars can be operated from either terminus of the cable or by the passengers riding in the car.

One of the understood rules of the fishing grounds requires that a fisherman waiting to ride a hand cable car must help pull across anyone en route, and a person who is pulled across must in turn pull the cable car on its return trip.

The design of these cable cars is simple. Essentially they consist of a wooden box about 3′ x 5′ x 1′ which is suspended from a taut cable on two pulley wheels. An endless rope or cable is attached to each end of the

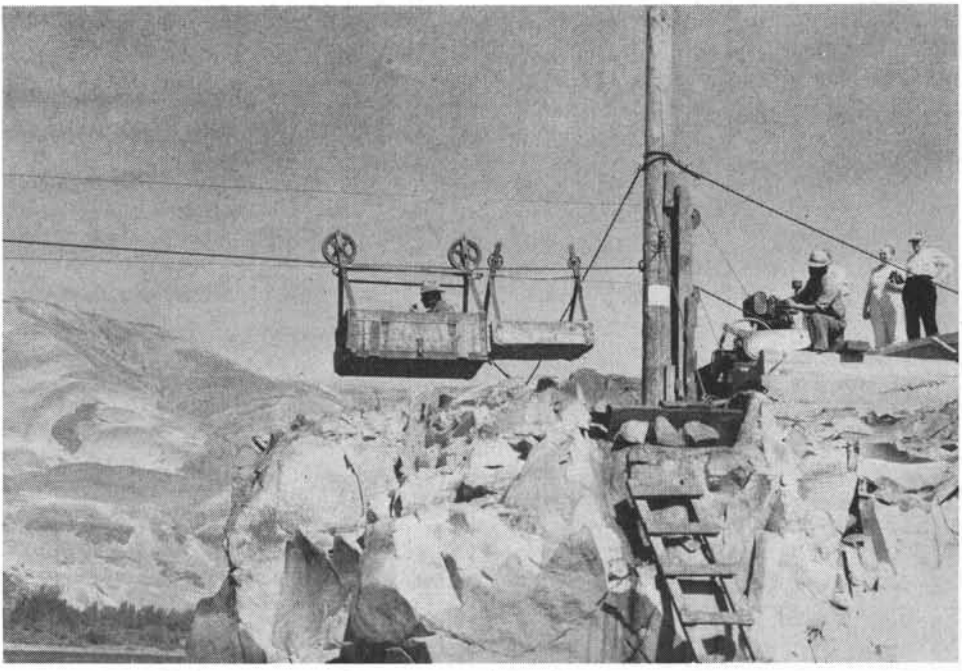

Figure 4. Indian cable car used to link the mainland with various islands where fishing is conducted.

box, and runs over a pulley at each shore terminus. The car is moved either by pulling the rope attached to the car by hand or by a gasoline motor. The cars hold four fishermen or the equivalent amount of fish and men. Occasionally an overloaded car will cause the cable to sag to such an extent that it is inundated part way across the river.

The universal method of transporting fish from the fishing grounds is in burlap sacks. These sacks will hold about as much as a man can carry, and are the easiest method of carrying fish over the rocks and on the cable cars.

The nets used by the Indians are of two general types. Although they are both dip nets, one is held stationary while the other is moved through the water. The motionless one is referred to as a set dip net in this report, while the other is called a movable dip net, or simply a dip net.

The latter type is attached to a pole about two inches in diameter varying in length from 15 to 25 feet, depending on where it is used. It is fished only in a fast current where the water is aerated to such a degree that the visibility of the fish is very limited. The steel hoop is an oval about 30 inches long and 18 inches wide. The mesh varies from two and one-half to five inches, stretch mesh, according to the desires of the fisherman. It is attached to the hoop by small brass rings and secured by a leather thong which is held in place by slipping it under a taut twine at the base of the pole (Fig. 5). The net is dipped into the water and the current aids the fisherman in forcing it downstream through the roily water. Other factors being equal, the size of the catch is directly proportional to the speed with which the net passes through the water. The more rapidly the net moves, the less chance the fish has of escaping.

While most of the movable dip nets are fished blind, i.e., the fisherman cannot actually see the fish he is trying to catch, there is one area at Celilo where "roping" is practiced (Fig. 6). During certain water levels, the river flows over slanting smooth rocks at a depth of about one to two feet. When fish swim up over these rocks, they can be seen from the platforms con-

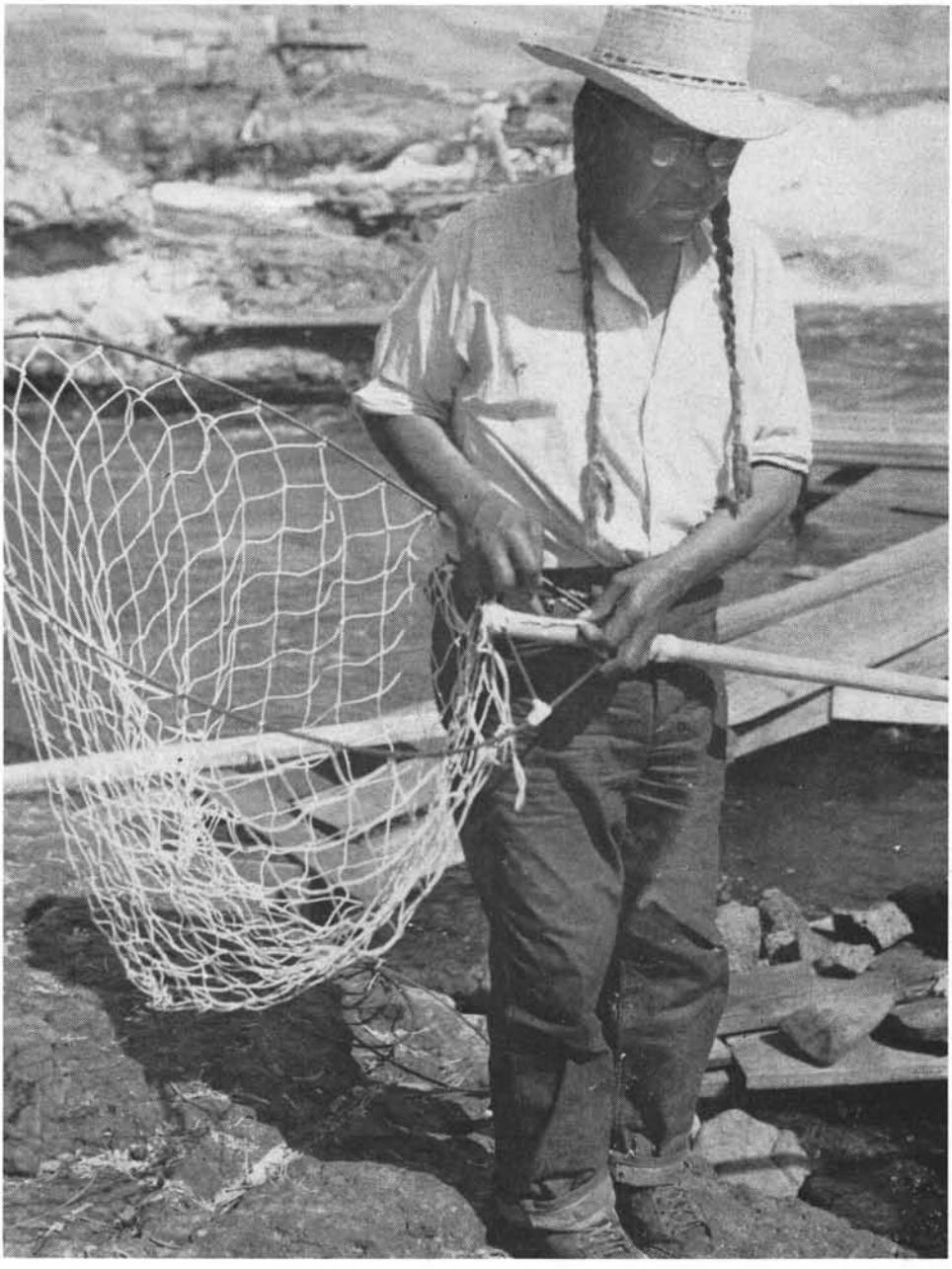

Figure 5. Indian fisherman, Henry Thompson, placing thong in place at base of movable dip net pole.

structed over them. Dippers on their platforms wait tensely for a fish to appear, their nets held in readiness. When one is seen swimming up, the net is dipped through the water, intercepting the fish. Since only a limited area is suitable for this type of fishing, and it is dependent on exact water flows, the method is used to only a minor extent.

Small wire basket traps constructed of chicken wire are also used in some locations, but only occasionally. These are set in white water with the opening upstream at a location where fish tend to fall back, and are pulled up when a fish enters.

Many of the fishermen who use a movable dip net have a pie tin or similar object fastened to the pole near the lower end. When the net is in the water, the force of the water against the tin plate causes the net to move through the water more rapidly (Fig. 7). Occasionally an Indian will construct a more elaborate device to increase the speed of the net through the water. One such device consists of a galvanized rectangular bucket about 2′ x 1′ x 1′ deep which is attached to the net hoop by two ropes about ten feet

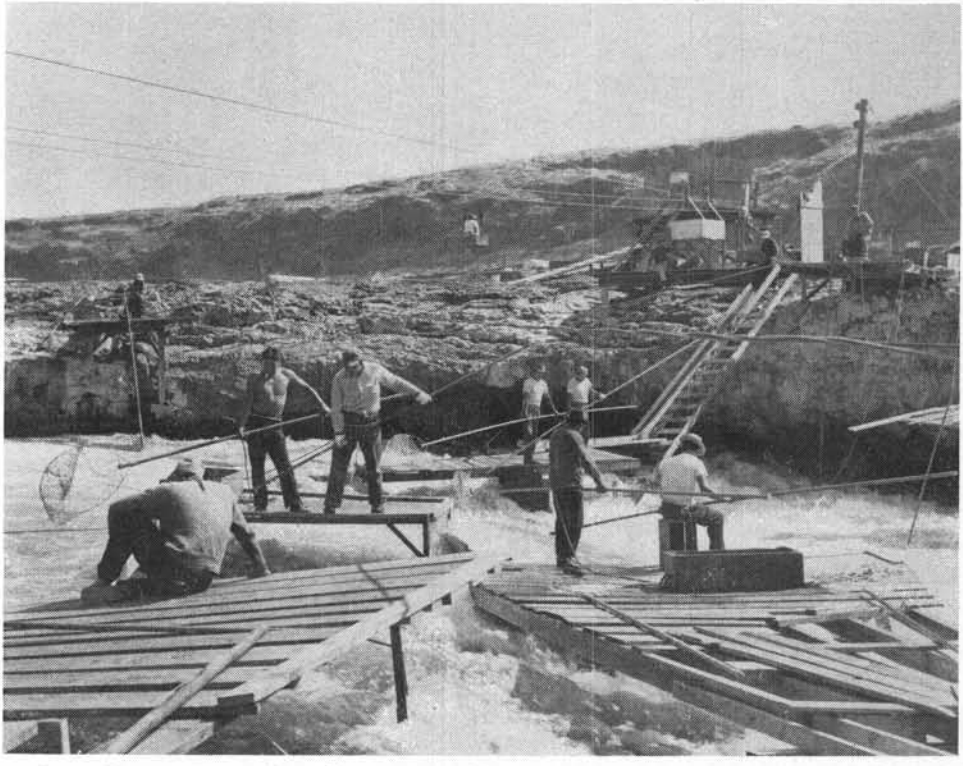

Figure 6. "Ropers" tensely waiting for fish to swim up into view (see frontispiece).

long. The bucket is suspended from overhead rocks by a system of ropes and pulleys controlled by a second man, so that the bucket enters the water at the same time as the net and pulls the net through the water with great speed.

With the movable type of dip net, fish moving upstream are usually captured by entering the net head first. When a fish strikes the net, the

thong pulls free and the net purses around the fish preventing its escape. The pole is pulled in hand over hand and lifted to the platform on which the fisherman is standing, which is usually three or four feet above the surface of the water. A helper often aids the fisherman in pulling up his dip net and in dispatching the fish. The fish is struck on the head with a wooden club while still in the net, quickly removed, and put into a box on the platform. During the height of the run, two or three fish are sometimes caught in one dip. In one instance in 1946, eight fish were caught in one dip. In another instance 212 pounds of fish were landed from one dip. Such occurrences are rare, however. Large chinook sometimes escape by breaking through the net, even though the twine is as much as 18 thread heavy twine. Fourteen and 16 thread twine is more commonly used for the nets.

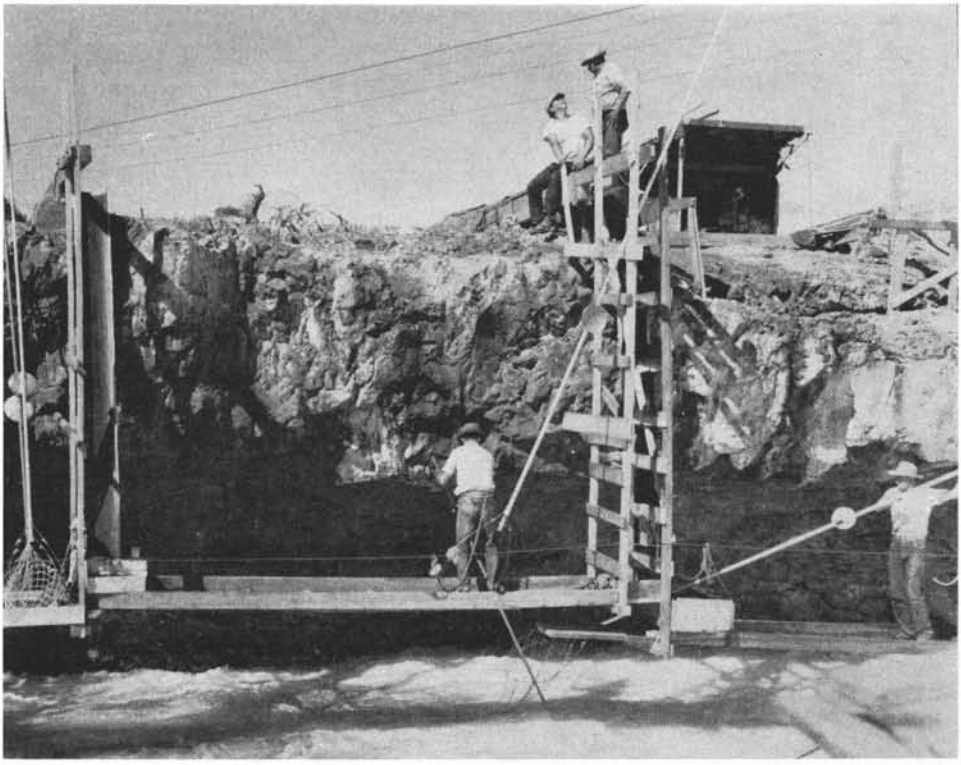

Figure 7. Dip netting from scaffolds suspended from overhanging rocks. Note pie tins attached to dip net handles, used to increase speed of net through water.

Before manufactured net twine became available in the 19th century, the nets were made of grass which was obtained through trading. The net bags are all made by the Indians, the time for constructing them varying between three and four hours, depending on the speed of the net maker.

The set dip net is attached to a more sturdy pole, usually three or four inches in diameter and varying in length from 10 to 20 feet depending on the fishing location. The steel hoop varies from two to five feet in diameter (Fig. 8). The mesh is fastened to the hoop by small metal rings, but there

is no thong for purse action as with the movable dip nets. The net itself is much deeper than the movable dip type; it may be as much as five feet deep while the movable dip net has a bag of only about three feet. The frame of the net is supported in the water by wires connected to the shore or to the platform. Fish are usually caught in this type of net when they are falling back from a falls or a strong current. Occasionally a set net is fished in an eddy to catch fish which are resting there. A trigger string is attached to the extremity of the bag. When a fish strikes the net, the vibration is telegraphed by the string to the fisherman holding the end of the string, and he quickly pulls up the net.

While no systematic counts of nets in operation were made in the four year study, an indication of their numbers can be had from counts on two days.

On September 17, 1947, near the peak of fall run, there were 119 movable and 93 set dip nets in operation with an average of three or four Indians per net per day. On September 23, 1948, there were 93 movable and 79 set dip nets in operation, excluding those in the vicinity of the railroad bridge. If these were included, the 1948 count would approximate that of 1947. In both cases these counts do not necessarily indicate the peak number of nets fishing at Celilo.

Figure 8. Indian fisherman repairing set dip net. Note large size of net compared to movable dip net (Fig. 5).

ANALYSIS OF CLOSED SEASON CATCH

Closed Season Landings

The estimation of the magnitude of the Indian closed season catches of fish has been the most important and difficult objective in the Celilo field studies. With each succeeding year since 1947, slight changes in methods of gathering data and methods of analysis have been made. The greatest and most consistent effort has been applied to the fall closed season.

Spring Closed Season

Only a limited number of fishing locations are available at the time of the spring closed season, and a relatively small number of Indians fish. Because of the small numbers of fish involved, only a limited effort has been applied to estimation of the spring closed season catches. In 1947 and 1948, very few observations were made, so that no estimates of the closed season catches were made for these years.

In 1949 and 1950 a combination of periodic actual counts of fish, estimates, and interviews with fishermen were used to determine the closed season catch. The time and length of the spring closed season varies considerably from year to year. In 1949 it was closed from June 23 to July 14, while in 1950, it was closed from June 7 to July 6.

The magnitude of the spring closed season catch is greatly dependent on the water stage of the Columbia River. Fishing is carried on in three general locations: Spearfish, along a two mile stretch of the Washington shore; Tenino, opposite Spearfish on the Oregon shore; and at Celilo Falls proper, eight miles up the river from the Spearfish-Tenino grounds.

Landings in the Celilo area are usually slight at the beginning of the closed season and become progressively larger as the river drops and more locations suitable for construction of scaffolds become available. Conversely, fishing is best in the Spearfish-Tenino area at the beginning of the closed season and becomes worse as the river recedes leaving suitable scaffold locations high and dry. An indication of the rapidity with which conditions change can be seen from counts of scaffolds, non-operative and operative, made during the 1948 spring closed season. At Tenino on June 28, 1948, there were a total of 59 scaffolds, 28 of which could be operated; on July 8, only 12 scaffolds were in operation. At Spearfish on June 27, 1949, 69 scaffolds were counted, 31 of which were operative. On July 12, only 12 scaffolds out of a total of 60 were operative. At Celilo, on June 28, 1949, seven scaffolds were counted, two of which were in operation. On July 12, with the river steadily dropping, 18 out of 22 scaffolds were in operation.

During almost the entire 1950 spring closed period fishing conditions were poor, due to an abnormally prolonged freshet on the Columbia River. Consequently, catches were much less than in 1949 and at times almost no fishing was in progress. Celilo Falls proper was under water during the entire spring closure, so all fishing was done at Spearfish and Tenino.

Blueback salmon and chinook salmon are caught in greatest numbers during the spring closed season, though smaller amounts of steelhead and sturgeon are also caught. Table 1 summarizes the total catch during the spring season in 1949 and 1950.

Fishing during the spring closed season is largely done with small meshed movable dip nets, designed to take blueback which are usually most abund-

Table 1.—Spring Closed Season Indian Catch by Area
June 23—July 14, 1949

Area	Total Days of Observations	Fish Actually Counted CH①	BB	SH	Stg.	Total Estimated Catch CH	BB	SH	Stg.	Percent Estimated CH	BB	SH	Stg.
Spearfish	4	8	63	3	29	53	475	18	147	84.9	86.7	83.3	80.3
Tenino	9	13	474	17	32	149	1368	63	111	91.3	65.4	73.0	71.2
Celilo	8	61	602	26	0	164	1033	94	0	62.8	41.7	72.3	0.0
Total (Rounded)						400	2900	180	260				

Spring Closed Season Indian Catch by Area
June 7—July 6, 1950

Area	Total Days of Observations	Fish Actually Counted CH	BB	SH	Stg.	Total Estimated Catch CH	BB	SH	Stg.	Percent Estimated CH	BB	SH	Stg.
Spearfish	4	39	23	0	0	290	60	0	13	86.5	61.7	0.0	100.0
Tenino	4	57	91	0	3	96	101	0	13	40.6	9.9	0.0	76.9
Celilo	4	0	0	0	0	0	0	0	0	0.0	0.0	0.0	0.0
Total (Rounded)						400	160	0	30				

① CH, chinook; BB, blueback; SH, steelhead; Stg, sturgeon.

ant at this time. A few large meshed, heavy twined set dip nets are also used, primarily for catching sturgeon.

Most fish caught during the spring closed season are consumed fresh by the Indians or canned or frozen, in contrast to the fall when most of the closed season catch is dried. Each Indian attempts to catch 15 or 20 fish a day in the spring, which is sufficient to keep a woman busy during the day. Most of the spring closed season fishermen are residents in the vicinity, since the more distant reservation Indians largely depend upon the fall run to supply their yearly needs.

Fall Closed Season

In 1947 and 1948 one man, occasionally augmented with one or two helpers, was stationed at the Falls throughout the fall closed season. In 1949 and 1950 two or three men were present. Augmented by reliable local help this small crew was able to check the fishery with considerable care, and the catch estimates and other data obtained proved highly useful. (Tables 10–14).

For the purpose of assessing the catch, the Celilo Falls region was divided into four main areas which were treated separately due to differences in geography and catch composition. These areas were the Railroad Bridge Area; the Lower Cables at Tumwater; the Upper Cables (including Albert's Island, Standing Island, Papoose Island, Chief Island, and Chinook Rock); and Oregon Shore (Fig. 3). In most cases fish were counted only as they were carried away from the fishing grounds.

The sacks of fish being transported from the fishing grounds were individually opened and their contents examined. However, there were instances when it was impossible to open a few sacks. In these cases the appearance of the sack, the origin of the catch in the fishing area, and the general abundance of various species at that time was known and it was possible to estimate the contents with considerable accuracy. Such estimates were checked periodically and found to be reliable.

Each day was broken down into half-hour intervals, the landings in each area being tabulated by this time period. These landings by half-hour periods do not necessarily represent the catch for the respective preceding interval (except in the case of Oregon Shore 1950). It is common practice for a fisherman to fish during the early morning and to bring his morning's catch ashore at noon when he goes home for lunch. The afternoon's catch is often left until 5:00 P. M. or later before taking it home. Other Indians after fishing for two or three hours will take their catch home immediately to keep their wives busy preparing fish throughout the day. Very few if any landings are made before noon on September 10, all of the fish caught during the night and until noon on the tenth being saved until it is legal to sell the fish.

Landings are least during the early part of the closed season in the fall and increase gradually, reaching a maximum at the end of the season (Figs. 9 and 10). There are two reasons for this steady increase: the fall chinook run is approaching its peak, and fishing intensity increases as a result. Steelhead do not show as great an increase as chinooks because there are not as many fish available, although fishing intensity on both species remains the same.

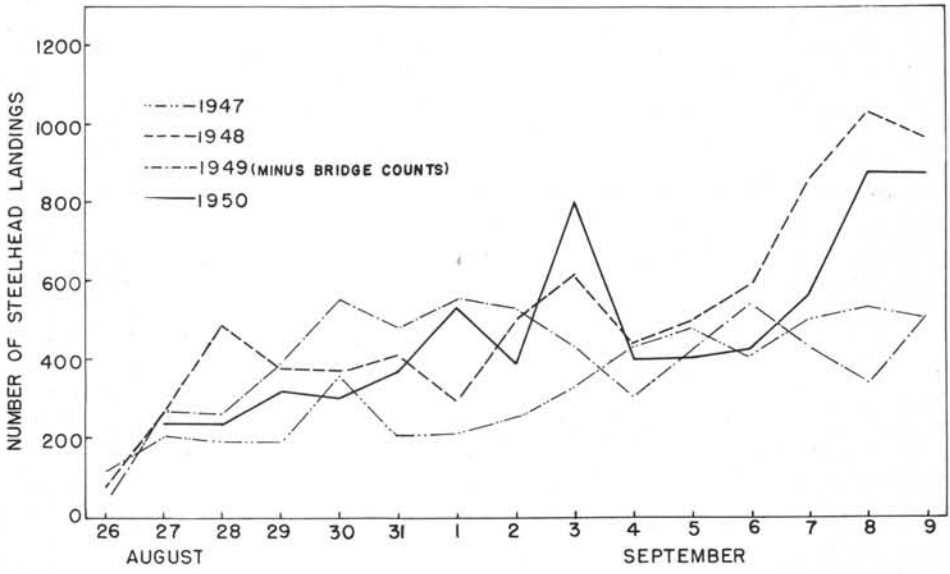

Figure 9. Total Number of Steelhead Landed Daily by Indians at Celilo Falls, August 26–September 9, 1947 to 1950.

Upper Cables

For various reasons the catch landed in each area during certain half-hour intervals was not obtained. Landings made during times when a counter was absent were estimated on the basis of the known percentage landings for like time periods of other day's observations.

Lower Cables

Counts of fish landed at Lower Cables (Tumwater) were obtained by two methods. In 1947, Mr. Chris Kito, an employee of the Seufert Brothers'

Cannery and operator of the cable car at Tumwater, estimated the number of pounds of fish of each species brought across at that location. Mr. Kito's information is reliable, and his observations are as accurate as any which could be made.

In order to convert his 1947 estimates to numbers of fish it was necessary to have an average weight per fish and a percentage composition by species of the catch. The former was obtained by weighing 308 chinook and 180 steelhead selected at random over a period of several days from different parts of the main fishing area. The chinook averaged 20.1 pounds and the steelhead 9.0 pounds. While it is unfortunate that a larger sample was not weighed, the weights agree closely with others obtained under slightly different circumstances (Table 5).

In the succeeding three years, Mr. Kito counted all of the fish brought across at Lower Cables by day, so these figures were used directly.

Oregon Shore

Fish caught in the Oregon Shore Area were counted as they were taken from the fishing area in 1947, 1948, and 1949. This is the only area accessible to tourists, and individual fish are constantly being sold and transported from the grounds, making it difficult to tally the catch.

In 1950 with additional manpower available it was simpler to count the fish as they were caught. All of the fishing platforms were in a limited area and were visible to the checker at one time. While identification of the several species had to be done at a distance, several checks of the accuracy of the observers demonstrated that they were accurately recognizing chinooks, silvers, and steelhead.

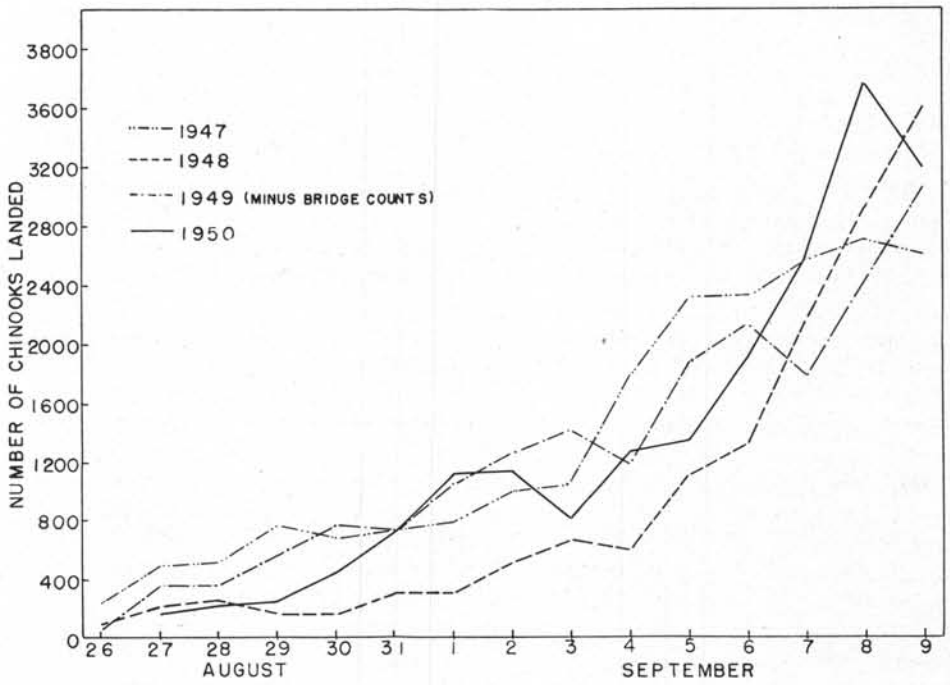

Figure 10. Total Number of Chinooks Landed Daily by Indians at Celilo Falls, August 26–September 9, 1947 to 1950 (not including jacks).

Bridge Area

The railroad bridge forms the lower limit of dip net fishing at Celilo Falls. The magnitude of the catch in this area is relatively small compared to that at Upper Cables, and methods of estimating this catch varied from year to year.

In 1947 and 1948, interviews with fishermen in the area and spot checks were relied upon to determine the catch in the bridge area. Inasmuch as only a comparatively small number of Indians fish near the bridge, they have a good idea about the total number of fish landed in that area.

In 1949, more frequent visits by a checker were made to the Bridge Area, generally at least one being made each day. Fish which had been caught were counted each time and the Indians were also questioned concerning their catches.

In 1950 the most complete Bridge Area counts were made, and most of the catch was actually seen by observers.

The percentage of total Celilo fall closed season landings which was actually counted during the four years ranged from 84.8 percent to 95.7 percent (Table 2). The proportion estimated varied considerably between the various areas. In general, however, an effort was made to actually count as many fish as possible in the areas of greatest landings. Thus, smaller percentages were estimated at the places of greatest landings such as Upper Cables, and greater proportions had to be estimated where relatively few fish were landed, such as in the Bridge Area.

Table 2.—Summary of Fish Counted and Estimated During Fall Closed Season, 1947–1950

Year	Total Fish Counted	Total Fish Estimated	Total Combined	Percentage of Total Fish Estimated
1947	23,494	4,207	27,701	15.2
1948	22,466	2,575	25,041	10.3
1949	28,602	1,271	29,873	4.3
1950	28,957	2,759	31,716	8.7

The total estimated Indian fall closed season catch by species during the four year study is shown in Table 3. Silver salmon fluctuated more widely than any of the other species. The big 1947 cycle reappeared in 1950, and was reflected in substantial landings in these two years. The landings of silvers in 1948 and 1949 were insignificant, however.

The "jacks" (precociously developed small salmon) which were counted in 1947, 1948, and 1949 were added to the chinook total, as they were identified as chinook jacks. The silver jacks were simply counted as silvers at the time of observation. In 1950, however, when the largest number of silvers was counted, jacks, chinook or silver, were not differentiated. To assign the jacks to the total chinooks and silvers counted, the ratio between

Table 3.—Total Indian Fall Closed Season Landings by Species at Celilo Falls in Numbers of Fish, 1947–1950.

(Figures rounded to nearest hundred)

Year	Chinook	Steelhead	Silvers
1947	21,600	5,000	1,200
1948	17,100	7,900	100
1949	23,300	6,500	100
1950	21,000	6,900	3,800

the large chinooks and large silvers counted was used. The 1950 jacks were computed as being 84.9 percent chinooks and 15.1 percent silvers.

Tourist Sales

Management of the Columbia River fishery by the states of Oregon and Washington requires, among other things, that the catch be adequately assessed. Normal commercial sales are routinely recorded, and problems arise only when significant takes are unrecorded. It has already been pointed out that the Indian subsistence take during closed seasons, particularly that during the big fall run, was checked primarily for this reason. There are additional fish taken during open seasons that are retained by the Indians for their own use, and a number are sold illegally direct to tourists each year. No data were gathered relative to the fish kept by Indians for their own consumption during open seasons, but it was possible to obtain some idea of the magnitude of tourist sales.

The magnitude of sales of Indian dip net caught fish sold to tourists is, however, very difficult to determine. Availability of fish for direct sales has become common knowledge, and in many cases a person representing a number of his neighbors drives a truck to the fishing grounds and buys enough fish for all of them.

About 25 fishing platforms are accessible to tourists in the Oregon Shore Area and on Chinook Rock. Fishermen at these locations have small hand scales on which they weigh fish as they are sold to customers (Fig. 11).

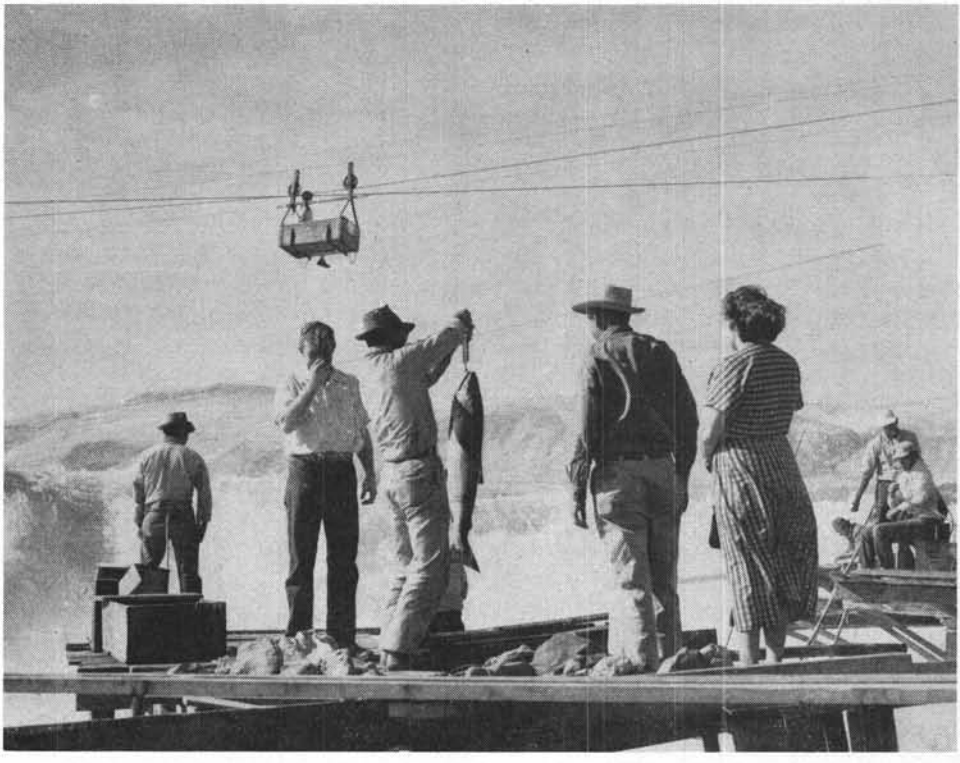

Figure 11. Indian weighing fish about to be purchased by tourists. Note cable car overhead and fisherman at right removing safety rope so that another Indian can take his turn with the net.

The end of the Pendleton Roundup sometimes coincides with the peak of the fall run, resulting in a land-office business for the Indians as the Roundup spectators return to their homes in western Oregon via Celilo. Some visitors stop at the fishing grounds daily but are in greatest numbers on week ends and holidays. During the commercial season, almost the entire catch by fishermen of the Oregon Shore Area is purchased by tourists at 25 to 35 cents per pound. In 1947 counts of these sales were made frequently during the season. On the peak day over 400 fish were sold including silvers, steelhead, and chinooks, the latter being in the majority. The estimates and actual counts of tourist sales in 1947 during the open season combine to form a total of approximately 3,000 chinooks, 1,000 steelhead, 100 chinook jacks, and 100 silvers. Converting to pounds of fish shows 60,000 pounds of chinook, 9,000 pounds of steelhead, and 800 pounds of silvers.

It can be seen that the total amount of illegal tourist sales during the open season although large is relatively insignificant when compared to the amount sold through regular commercial channels. Since the tourist sales were roughly determined in 1947 and since their magnitude was sufficiently small as to have but little effect on the overall management of the fishery, it was deemed inadvisable to make a detailed survey of these sales in 1948, 1949 and 1950, though rough estimates were made for the latter three years. Total estimates of tourist sales are shown in Table 4.

Table 4.—Estimates of Fish Sold to Tourists, in Numbers of Fish, 1947–1950.

Year	*Chinook*	*Steelhead*	*Silvers*
1947	3,000	1,000	100
1948	3,100	600	0
1949	1,000	600	0
1950	2,000	700	50

ANALYSIS OF COMMERCIAL CATCH

Indian Commercial Catch

The Indian fishing is entirely for commercial purposes during the open season, and the fish are bought on the grounds by buyers who erect cable cars to central areas on the islands. Some of these additional cables are operated only for the commercial season and are removed when it is over. Allegiance to the different buyers by fishermen depends to a degree on comparative prices. A fisherman usually sells all of his fish throughout the season to the same buyer unless the buyer fails to raise his price when competitors raise theirs. In some cases the buyer maintains his business from year to year by loans to fishermen in time of need or during the off season. Occasionally a wildcat buyer comes in, usually a small private buyer or butcher, and pays three or four cents a pound more than the regular buyers. Many of the Indians sell to him because the profit realized on several hundred pounds of fish is considerable. In general the price is lowest at the beginning of the season and gradually increases.

The catch by nets at different locations varies considerably. During the peak of the run some fishermen make as much as $1,000 in a single day. Many make several hundred dollars for a few days, and the majority have a few days over $100.

The Indian dip net fishery accounts for the majority of fish caught above

Bonneville, although gill nets and seines fished by white fishermen account for appreciable numbers of fish. The complete elimination of fixed gear in Oregon (including seines) in 1950 resulted in an increase in the percent of fish caught by dip nets and gill nets. This same situation resulted when fixed gear was eliminated in Washington State in 1935 (Johnson, Chapman and Schoning, 1948).

Importance of Indian Commercial Fishery

In order to assess the importance of the Indian fishery the take has been compared with the total for the Columbia River for each important species for the years of record. Furthermore, since the commercial fishery above Bonneville Dam has often been criticized as being detrimental to the salmon runs, it has been deemed worthwhile to include a comparison of the Indian take with the total catch above Bonneville (Figs. 12–16, and Tables 8 and 9). The reader is here reminded that Celilo Falls and the entire Indian fishery lie above Bonneville Dam.

The appreciable Indian subsistence take during the various closed seasons, at which time sales cannot be made, as is mentioned elsewhere in this report, is not recorded in the commercial landings. While the Oregon Fish Commission's staff has in recent years obtained considerable catch data covering these otherwise unknown takes, no closed season data are available for earlier years. Consequently, it is not possible to compare all the catches throughout the period of record. It is logical, therefore, to consider only the regular commercial catches, keeping in mind that closed season catches are not included. The percentage total take by the Indian fishery is higher than that indicated by their regular commercial catches.

The Indian landings of spring chinook (January to July, inclusive) and their relationship to the rest of the river are depicted in Figure 12 and Table 9. Although fluctuations have occurred, since 1938 the annual Indian

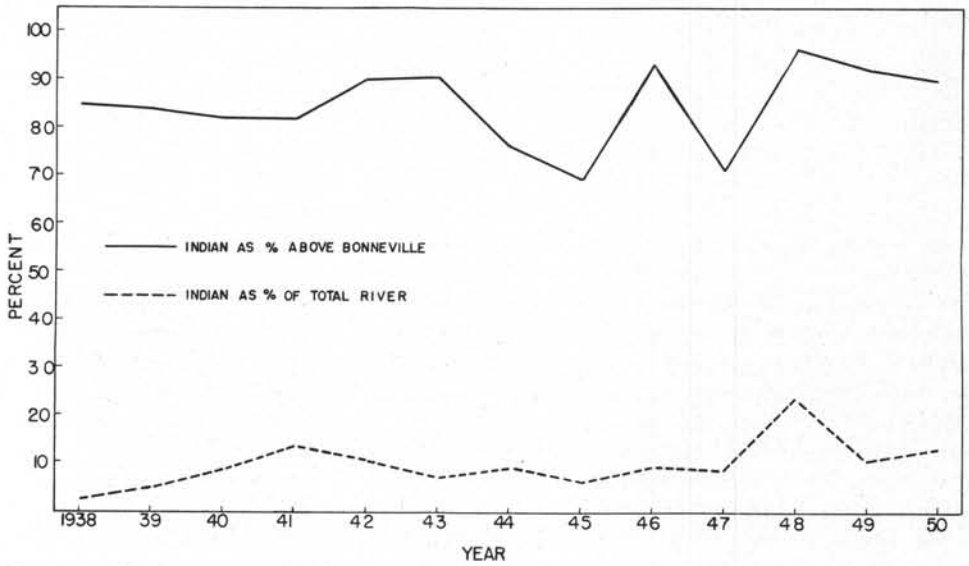

Figure 12. The Importance of Indian Commercial Landings of Spring Chinooks on the Columbia River 1938–1950, January–July Inclusive.

take has averaged 85.6 percent of all spring chinooks caught above Bonneville Dam. For the same period their annual landings have been 9.7 percent of all spring chinooks landed on the Columbia River. Table 9 shows the actual percentages for each year.

As shown in Figure 13 for the past 13 years, the Indians have caught an average of 67.8 percent of all fall chinooks (August to December, inclusive) landed above Bonneville and 12.3 percent of the total river landings.

The total chinook landings (i.e., spring and fall combined) as percentages are shown in Figure 14. For landings above Bonneville an average of 69.9 percent of the chinooks have been captured by dip nets. It is interesting to note the effect of the elimination of fixed gear (i.e., seines, traps, wheels, and set nets) on the Washington side of the river with respect to the Indian catch. For the seven years prior to 1935 the dip nets landed an average of 2.4 percent of all chinooks landed in the Columbia River. Since 1935 the average yearly landing has jumped to 11.2 percent. It should be pointed out that other types of fishing gear remaining in the river also profited by the regulation change.

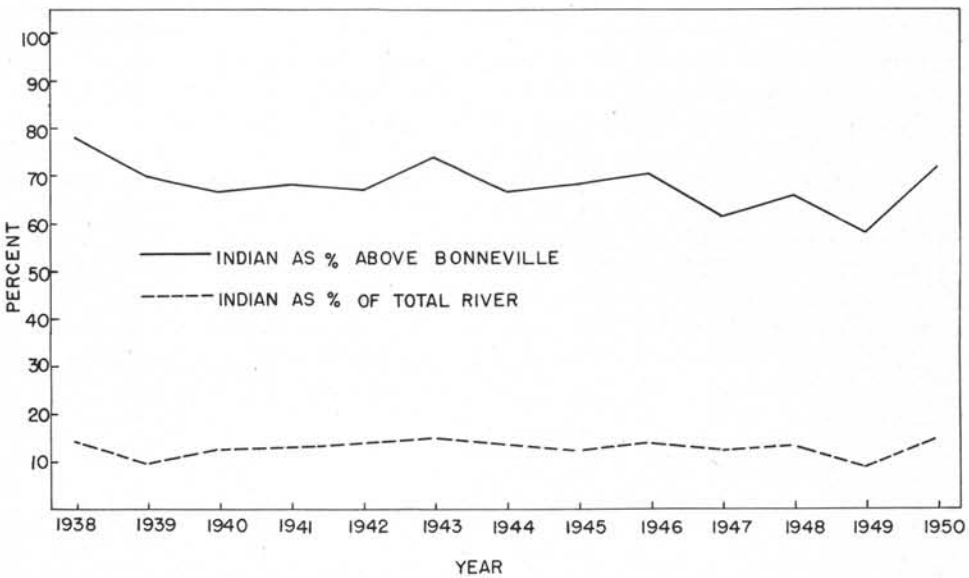

Figure 13. The Importance of Indian Commercial Landings of Fall Chinooks on the Columbia River 1938–1950, August–December Inclusive.

The seines continued to operate immediately below Celilo Falls until September 14, 1950. After that date only dip nets and gill nets were allowed to fish, and the percent of fish caught by dip nets increased appreciably. In 1950, 71.9 percent of the fall chinooks caught above Bonneville were caught by dip nets, compared to an average of 67.5 percent between 1938 and 1949 inclusive. With the complete elimination of fixed gear in the Columbia River now in effect, the dip nets will presumably catch an even greater percentage of the total catch.

The importance of the Indian blueback landings on the Columbia River is graphically shown in Figure 15 and the actual percentages are given in Table 9. The dip net catch as a percentage of the landings above Bonneville

Dam has varied widely since 1938, from 65.1 to 98.0, but the average has been 83.0 percent. The Indian landings of blueback show even more markedly than the other species the effect of the elimination of fixed gear in Washington in 1935. From 1928 through 1934 the Indian catch on the average represented 5.6 percent of all blueback caught in the Columbia River. From 1935 through 1950 this increased to 29.3 percent, certainly an appreciable portion of the catch.

Figure 16 indicates the importance of the dip net steelhead landings. Since 1938 on the average the Indians have landed 73.0 percent of all steelhead caught above Bonneville Dam. The trend has been downward in the last few years, however. During the seven years prior to the gear change in Washington, the dip nets caught 2.8 percent of the total river steelhead landings. Since the change the percent has increased to 14.2.

All of the landings mentioned above included only the fish sold to commercial buyers. In addition, as was previously pointed out, appreciable amounts that were never recorded were bought by tourists, or utilized by the Indians for their own subsistence.

Table 6 summarizes the total Indian take in pounds during the four-year period 1947–50. Not included in these figures is a small unknown poundage consumed by Indians during the open commercial seasons.

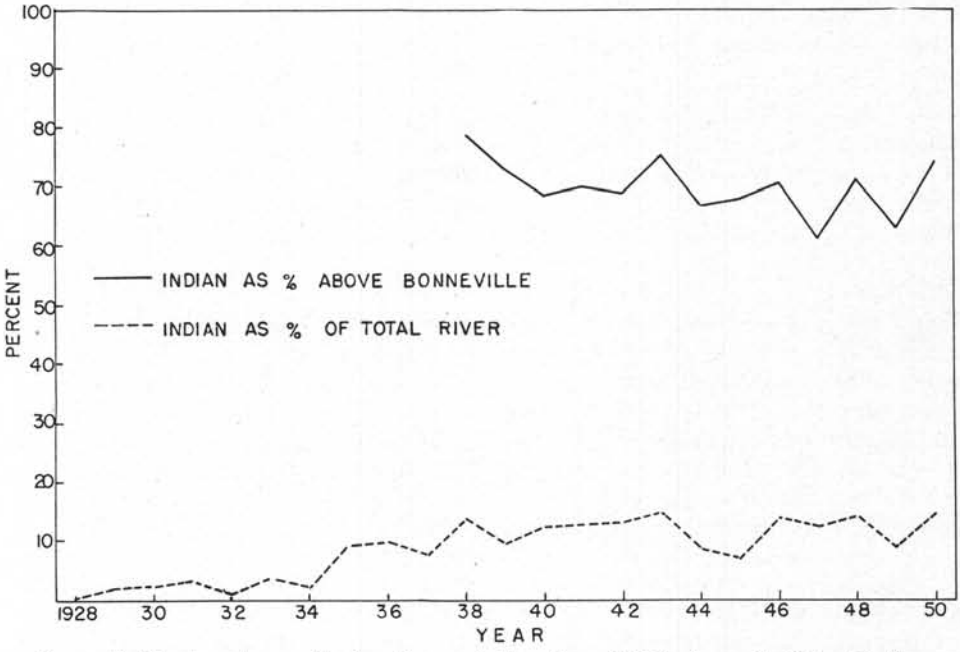

Figure 14. The Importance of Indian Commercial Landings of Chinooks on the Columbia River 1928–1950.

DISCUSSION OF CATCH

Disposition of Fish During the Closed Season

During the closed seasons, it is illegal for Indians to sell their catch commercially, and they fish primarily for their own needs. Many of them can satisfy their personal requirements for the coming year by fishing only

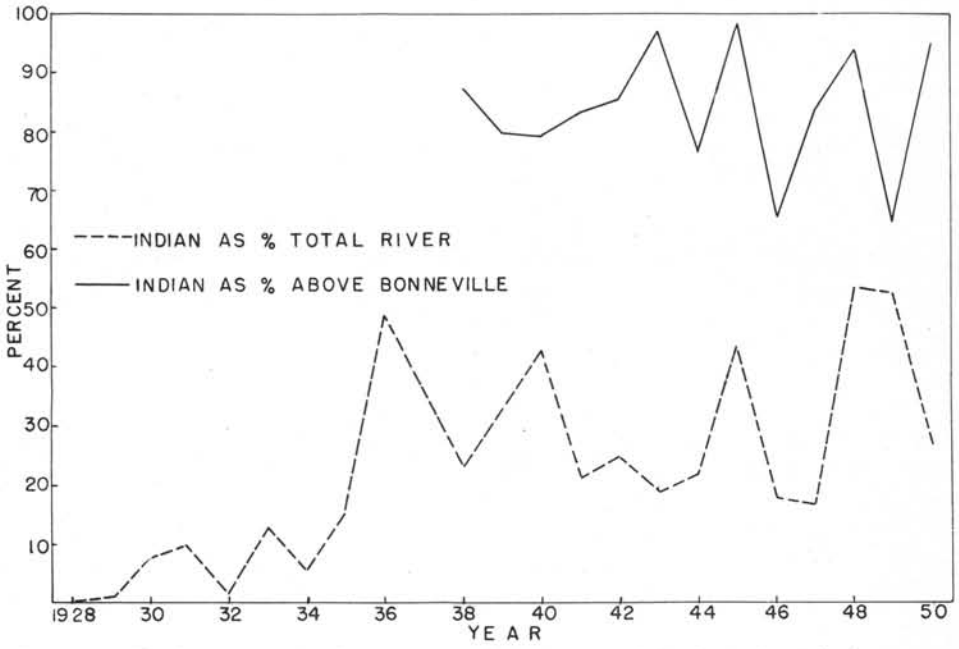

Figure 15. The Importance of Indian Commercial Landings of Bluebacks on the Columbia River 1928–1950.

a few days, although others fish every day. The majority of the catch is taken home and dried, smoked, kippered, salted, or canned; some is sold, but violators are in the minority. These illegally sold fish are bought by tourists and various fish buyers and markets within a radius of one hundred miles. At times dealers come to the grounds, but usually the fish are transported to their shops. Regardless of the ultimate destination of the fish, they have been counted and recorded by checkers, no segregation of landings being made with respect to fish sold or retained by fishermen.

The fall catch is composed of chinooks, steelhead and silvers and an occasional sturgeon. During the closed season, some of the smallest steelhead and chinooks are thrown back into the river, because they are too small to be easily prepared for drying. When only a part of the total catch is wanted, selective retention of the fish is exercised by the Indians. Only a few fish which are returned to the water are injured, the smaller ones sometimes gilling in the large mesh of the dip nets.

Young boys often fish periodically during the day when no one is fishing at some scaffold which is available to them (Fig. 17). Fish caught by them are occasionally left on the rocks to spoil in the hot sun.

Drying is probably the most common method of preserving fish by the Indians and is accomplished by cutting the fish in slices lengthwise and hanging them on horizontal poles in dark sheds (Fig. 18). The drying process takes from a few days to about two weeks, depending on atmospheric conditions, and when finished, the dried fish are sacked and stored in a warm dry place. In recent years families of Indians have increasingly resorted to canning, the fish being brought to commercial canneries for custom canning. The widespread recent use of freezing lockers has provided another method of preservation.

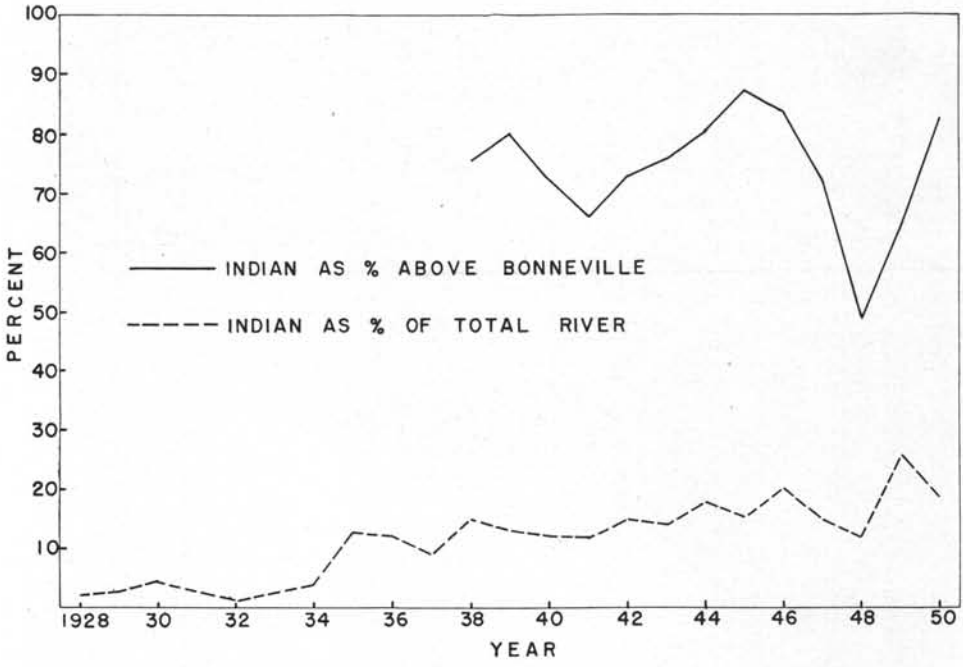

Figure 16. The Importance of Indian Commercial Landings of Steelhead on the Columbia River 1928–1950.

Conditions Affecting the Fishery

Various conditions seem to affect the landings in different ways. The Indians have explanations for many of the sudden changes in the magnitude or composition of a day's catch. An example of this is shown on September 17, 1947. It rained the night of September 16 and intermittently the following day. The catch per unit of effort decreased noticeably on September 17; such a combination of causes and effects has been noticed before. The Indians believe the rain washes the slime and blood of dead fish off the rocks and into the river causing other fish to temporarily halt their migrations. It has been observed on other occasions that the movements of fish are restricted on very windy days. Sand from the surrounding hills is blown into the river on such days, and it is believed by the Indians that sand in the water lodges under the opercles and in among the gill filaments, hampering breathing and thus curtailing migration.

Migration seems to slow up when the river becomes muddy, but after a few days of clearing water, the migration increases. This was shown when the water became muddy on September 20, 1947, reportedly due to a cloudburst on the John Day River. Fishing intensity decreased to a degree where only a few Indians fished. When the river cleared somewhat, the fish began to run again and fishing success increased.

Water conditions also affect the composition of the catch. Whenever the river is muddy few chinook are caught, steelhead comprising the bulk of the catch. The steelhead became lighter colored, particularly on their backs, whenever they moved during muddy water conditions.

Climatic conditions govern the fishermen's actions to a degree also. If the weather is disagreeable due to rain or wind, the Indians frequently land

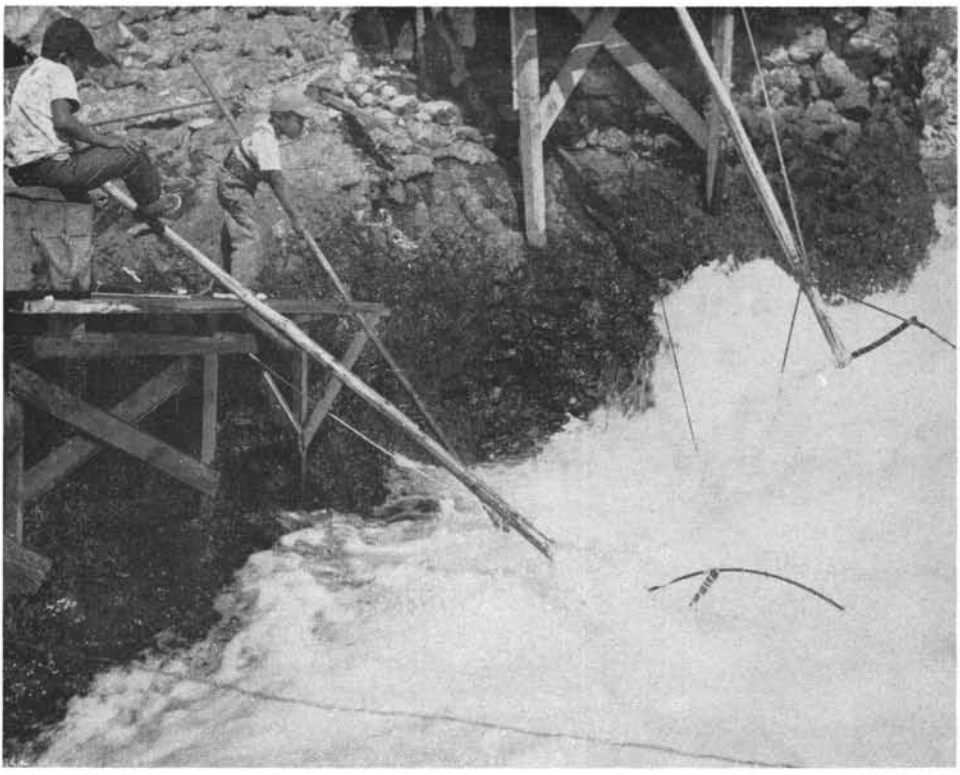

Figure 17. Young boys often fish when no one is fishing at some scaffold.

their fish earlier than usual during the day. As a result few landings are made after 6:30 P. M. on days when inclement weather prevails.

During the closed season some Indians do not fish on Saturday or Sunday morning due to a socially active preceding night. This is reflected in lower landings for those days.

Condition of Fish

Little information has been obtained concerning ripeness, average weight, and sex ratio of the fish landed at Celilo in the fall.

In general the bulk of fish caught during the first two weeks of September are bright fish, the fish becoming somewhat darker as the season progresses. Occasionally fish were examined to determine the degree of maturity of the gonads. After September 15, a few ripe fish were found, but they were greatly in the minority.

In 1949, 2,024 chinook salmon were sampled at Seuferts' Cannery between September 14 and 16 (Table 5). These fish were caught at Celilo by both seine and dip net, both of which types of gear are theoretically non-selective. However, there was considerable difference between the average weights of each type of gear and mixed gear. The average weight of 1,419 seine-caught chinooks was 15.4 pounds, and the average weight of 235 dip net caught fish was 18.0 pounds. An explanation of this difference might be found in the fact that the fish involved in the dip net samples may have

Figure 18. Indian woman in typical dress holding dried salmon.

come from fishing locations where large fish predominated. The seine-caught fish probably represent a fair picture of the average weight of the fall chinook population at Celilo, but such fish cannot be regarded as representative of those caught by dip net.

In the same sampling operation 659 steelhead caught in mixed dip net and seine gear weighed an average of 9.2 pounds each, and 44 silver salmon averaged 7.1 pounds each.

The average weights of dip net caught chinooks and steelhead are lower

at the cannery than was indicated by sampling on the fishing grounds. This could be explained by the fact that the Indians tend to retain all fish caught when they are sold during the open season, while they keep only the larger fish when fishing for their own use during the closed season.

Table 5. Random Weight Samples of Celilo Fish at Seuferts' Cannery September, 1949

Date	Gear	Number of Fish	Total Weight	Average Weight	Species
CHINOOK					
Sept. 14	Seine	583	8,942.5	15.33	Chinook
Sept. 15	Seine	231	3,695.	15.99	Chinook
Sept. 16	Seine	86	1,452.	16.88	Chinook
Sept. 16	Seine	519	7,740.	14.91	Chinook
Total	Seine	1,419	21,829.5	15.38 Ave.	Chinook
Sept. 15	Seine and Dip Net Mixed	370	5,752.	15.5	Chinook
Sept. 14	Dip Net	141	2,355.	16.7	Chinook
Sept. 16	Dip Net	94	1,871.	19.9	Chinook
Total	Dip Net	235	4,226.	17.98	Chinook
Grand Total	Mixed Gear	2,024	31,807.5	15.72 Ave.	Chinook
STEELHEAD					
Sept. 14	Dip Net	42	420	10.00	Steelhead
Sept. 16	Seine	617	5,676	9.20	Steelhead
Total	Mixed	659	6,096	9.25 Ave.	Steelhead
SILVERS					
Sept. 16	Mixed Dip Net and Seine	44	311.5	7.08	Silver

EVALUATION OF THE INDIAN CATCH

Since The Dalles Dam, when built, will eradicate the entire Indian fishery at Celilo Falls, it is pertinent to include herein a monetary evaluation of this fishery. The following evaluation is one method of assessing the value of the fishery; any value will be only one method of approach to the complex problem of fixing a value to the harvest of a natural resource.

Assessment of the value of the total yearly catch can be divided into two phases: first, the value of fish sold commercially and to tourists; and second, the value of the closed season salmon catch consumed by the Indians themselves. Fish consumed fresh by Indians during the open commercial season is not included, as almost all of the fish caught during open seasons is sold rather than eaten fresh.

Commercial and Tourist Values

Average landings for the four-year period 1947–1950 were used for computing values (Table 6). The current 1951 prices paid for the various species of salmon sold commercially at The Dalles were used in arriving at the values given. The value of the salmon sold to tourists was also based upon the current price during the 1951 season.

Since the commercially sold fish during the open season are the chief means of livelihood during the year for the Indian fishermen, the prices received by the Indians for these fish were used. The total average annual value for the four-year period 1947–1950 for all species sold is $500,000.

In this case the price received by the Indian fishermen was used rather than some wholesale price since any additional value accrues to the processor.

Closed Season Subsistence Catch

Evaluation of the closed season subsistence catch must be treated differently from open season commercial catch because the Indians depend upon these fish for their year's food supply. If the Celilo fishery were eliminated, the Indians presumably would buy the fish which they formerly caught themselves.

Average closed season landings for the four-year period 1947–1950 were used, with the exception of spring closed season catches, when only estimates for 1949 and 1950 were available. Prices used are based on the 1951 level, and are the cost of buying round fish from the distributor (Table 7). It is assumed that the Indians will continue to do their own processing. The total annual value of the closed season catch on this basis is $200,000.

No correction factor has been used to allow for the increased demand by a new Indian market on a smaller supply of fish due to the elimination of the Indian portion of the Columbia River catch. This effect, if any, would be slight, and would be overshadowed by other independent conditions such as variations in the size of Columbia River runs, imports of foreign and Alaska fish, and fluctuations in prices.

Total Annual Value

The total annual present value of the Celilo Indian fishery, based on the four-year average catch, 1947–1950, including closed season subsistence catch, open season tourist sales, and open season commercial sales is $700,000.

If it is assumed that the elimination of the Indian fishery will completely destroy the means of livelihood of the Indian fishermen, reparations sufficient to supply them with $700,000 annually would have to be granted. If this were in the form of government bonds at three percent annual interest, a total amount of $23,000,000 would be necessary to compensate the Indians for the loss of the Celilo fishery.

SUMMARY

1. The Indians at Celilo Falls catch an average of over 2,600,000 pounds of fish each year, in dip nets in a manner very much the same as used by their ancestors.
2. The bulk of the fish caught at Celilo Falls is from the upriver fall run of chinook salmon which spawns in the main Columbia, between Pasco and Rock Island Dam and on the main Snake River between Swan Falls and Marsing.
3. Until the present study, the magnitude of the Indian closed season subsistence catch, averaging 500,000 pounds annually, has been unknown.
4. Most of the fall closed season catch is dried for home use by the Indians during the year although some is sold illegally.
5. The annual average of 50,000 pounds of fish sold directly to tourists is relatively insignificant when compared to the amount sold through regular commercial channels during the open season.

6. The elimination of fixed gear in the Columbia River has increased the percentage of total fish caught by the Indians. In the case of chinooks, the Indian commercial catch increased 8.8 percent.
7. The average annual value of the total Indian catch 1947–1950 is estimated to be $700,000.

ACKNOWLEDGMENTS

The authors wish to thank the many persons who cooperated in gathering data for this report. Seufert Brothers Cannery at The Dalles, Oregon furnished evaluation and commercial catch data. Chris Kito aided in tabulation of Lower Cables Area catch. A number of temporary student-biologists assisted in gathering closed season catch data, particularly H. L. Rietze, R. E. Loeffel, and J. R. Donaldson. Dr. Seymour Fiekowsky, Reed College, provided the basis for the evaluation of the Indian catch.

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Table 6. Total Celilo Indian Catch in Pounds and Value 1947–1950 Excluding Subsistence Take During Open Commercial Seasons

Year	CHINOOK Spring	CHINOOK Fall	Steelhead	Silvers	Blueback
1947:					
Closed Season	.....①	432,000	45,000	9,600	.....①
Open Season Tourist	0	60,000	9,000	800	0
Open Commercial	205,265	1,915,287	245,575	12,712	119,624
Total	205,265①	2,407,287	299,575	23,112	119,624①
1948:					
Closed Season	.....①	342,000	71,100	800	.....①
Open Season Tourist	0	62,000	5,400	0	0
Open Commercial	626,922	1,973,035	188,295	680	51,605
Total	626,922①	2,377,035	264,795	1,480	51,605①
1949:					
Closed Season	6,800	466,000	60,100	800	7,800
Open Season Tourist	0	20,000	5,400	0	0
Open Commercial	213,047	798,431	211,590	731	12,579
Total	219,847	1,284,431	277,090	1,531	20,379
1950:②					
Closed Season	6,800	420,000	62,100	30,400	400
Open Season Tourist	0	40,000	6,300	400	0
Open Commercial	230,122	1,286,640	156,099	6,575	45,394
Total	236,922	1,746,640	224,499	37,375	45,794
Average Catch in Pounds:					
Closed Season	6,800③	415,000	59,575	10,400	4,100③
Open Season Tourist	0	45,500	6,525	300	0
Open Commercial	318,839	1,493,348	200,390	5,175	57,301
Total	325,639①	1,953,848	266,490	15,875	59,351①
Average Value of Catch:					
Closed Season	$ 4,896	$166,000	$ 23,830	$ 4,160	$ 2,870
Open Season Tourist	0	13,650	1,958	90	0
Open Commercial	114,782	298,670	40,078	1,035	20,055
Total	$119,678	$478,320	$ 65,866	$ 5,285	$ 22,925

GRAND TOTAL: $692,074

① No estimates of spring closed season catch were made in 1947 and 1948.
② 1950 commercial landing figures subject to minor additions.
③ 1949-1950 average.

Table 7. Prices Used in Evaluation of Indian Fishery in Cents per Pound of Round Fish, 1951

Prices Paid to Indians by:	CHINOOK Spring	CHINOOK Fall	Steelhead	Silvers	Blueback
Tourists	.....	.30	.30	.30	.....
Commercial Buyers	.36	.20	.20	.20	.35
Prices which would have to be paid by Indians for subsistence if present fishery were eliminated	.72	.40	.40	.40	.70

Table 8. Dip Net Landings, Total Commercial Landings Above Bonneville Dam, and Total Columbia River Commercial Landings (Washington and Oregon), in Pounds, 1928–1950

	SPRING CHINOOK—January-July			*CHINOOK—August-December*			*CHINOOK—Total*		
	Dip Net	*Above Bonneville*	*Total① River*	*Dip Net*	*Above Bonneville*	*Total River*	*Dip Net*	*Above Bonneville*	*Total② River*
1928	.....	.....	7,400,000	.....	.....	9,100,000	81,663	.....	17,210,985
1929	.....	.....	7,600,000	.....	.....	6,700,000	302,479	.....	16,940,363
1930	.....	.....	7,200,000	.....	.....	9,100,000	407,811	.....	19,093,456
1931	.....	.....	8,500,000	.....	.....	12,500,000	708,588	.....	21,176,339
1932	.....	.....	8,300,000	.....	.....	7,800,000	199,148	.....	15,793,756
1933	.....	.....	8,400,000	.....	.....	10,000,000	729,105	.....	18,184,789
1934	.....	.....	6,500,000	.....	.....	11,900,000	410,000	.....	18,259,184
1935	.....	.....	7,600,000	.....	.....	7,700,000	1,424,966	.....	15,206,377
1936	.....	.....	5,800,000	.....	.....	9,900,000	1,536,461	.....	15,960,379
1937	.....	.....	6,300,000	.....	.....	12,200,000	1,493,052	.....	18,653,645
1938	108,329	127,289	3,921,551	1,203,176	1,543,386	8,496.929	1,311,505	1,670,675	12,418,480
1939	262,214	311,880	5,031,700	825,322	1,182,085	8,467,116	1,087,536	1,493,965	13,498,816
1940	240,853	293,225	2,660,391	1,375,657	2,063,040	10,855,742	1,616,510	2,356,265	13,516,133
1941	478,829	583,844	3,413,791	2,559,415	3,756,051	19,824,677	3,038,844	4,340,495	23,238,468
1942	287,697	318,995	2,561,808	2,176,877	3,254,280	16,117,263	2,465,124	3,573,825	18,689,071
1943	166,525	183,387	2,220,902	1,381,820	1,869,424	9,205,580	1,548,345	2,052,811	11,426,482
1944	213,024	279,441	2,244,047	1,060,394	1,583,098	11,850,808	1,273,418	1,862,539	14,059,641
1945	133,927	192,553	2,080,659	808,022	1,185,903	10,892,021	941,949	1,378,659	12,972,680
1946	167,804	178,997	1,691,571	1,759,267	2,491,386	12,586,238	1,927,242	2,670,554	14,277,809
1947	205,265	286,685	2,262,738	1,915,287	3,125,874	15,039,923	2,120,693	3,412,730	17,309,762
1948	626,922	650,819	2,621,625	1,973,035	2,997,369	14,730,698	2,599,957	3,648,188	17,352,323
1949	213,047	230,876	1,993,990	798,431	1,377,776	8,773,550	1,011,687	1,608,861	10,775,393
1950③	230,122	255,684	1,738,354	1,286,640	1,790,114	8,549,139	1,516,762	2,045,848	10,287,493

① 1928–1937 Total River spring and fall chinook from "Columbia River Fisheries", Washington State Department of Fisheries, Fish Commission of Oregon, and U. S. Fish and Wildlife Service.

② 1928–1949 Total River from 1951 Statistical Bulletin (Oregon Fish Commission Contribution Number 16).

③ 1938–1950 Dip Net and Above Bonneville figures from Oregon Fish Commission and Washington State Department of Fisheries, 1950, subject to minor additions.

Table 8 (continued). Dip Net Landings, Total Commercial Landings Above Bonneville Dam, and Total Columbia River Commercial Landings (Washington and Oregon), in Pounds, 1928–1950

	BLUEBACK			STEELHEAD			SILVER		
	Dip Net	Above Bonneville	Total① River	Dip Net	Above Bonneville	Total River	Dip Net	Above Bonneville	Total① River
1928	688	.....	327,352	53,666	.....	2,160,150	1,826	.....	1,920,340
1929	6,287	.....	684,896	82,845	.....	2,870,097	2,393	.....	4,494,512
1930	45,500	.....	667,964	159,955	.....	2,404,117	7,270	.....	3,284,551
1931	24,072	.....	280,500	70,747	.....	2,126,028	7,414	.....	900,537
1932	2,593	.....	190,060	21,300	.....	1,431,771	8,153	.....	1,339,582
1933	57,644	.....	470,628	54,995	.....	1,958,303	8,628	.....	1,261,202
1934	22,800	.....	467,092	97,100	.....	1,919,184	0	.....	2,735,275
1935	7,814	.....	45,633	216,509	.....	1,763,968	1,400	.....	2,683,972
1936	207,360	.....	302,399	275,579	.....	2,303,771	0	.....	1,738,873
1937	125,129	.....	335,066	177,340	.....	1,933,410	500	.....	1,841,580
1938	86,497	99,085	424,583	262,903	349,162	1,764,429	281	1,123	2,310,973
1939	71,648	89,840	269,818	186,771	233,669	1,438,499	153	1,373	1,529,720
1940	155,372	196,791	361,867	340,936	472,660	2,825,372	711	819	1,373,191
1941	106,179	127,975	505,692	320,506	486,434	2,663,736	22,180	22,566	1,045,034
1942	47,832	55,993	192,423	274,033	376,375	1,839,114	1,238	1,816	644,501
1943	27,461	28,349	146,084	214,729	283,277	1,514,466	694	694	706,258
1944	16,331	21,378	54,754	303,506	376,051	1,720,062	3,320	3,603	1,533,294
1945	3,794	3,873	8,693	302,118	347,497	1,963,507	1,229	1,229	1,835,533
1946	22,898	35,194	128,515	345,294	412,973	1,725,629	1,193	1,193	1,059,577
1947	119,624	143,621	718,334	245,575	349,674	1,649,085	12,712	13,315	1,498,201
1948	51,605	55,018	95,854	188,295	388,412	1,579,023	680	1,363	1,173,182
1949	12,579	19,613	23,975	211,590	328,410	814,045	731	1,505	899,217
1950②	45,394	48,006	169,158	156,099	188,884	851,284	6,575	6,605	1,036,162

① 1928–1949 Total River from 1951 Statistical Bulletin (Oregon Fish Commission Contribution Number 16).
② 1938–1950 Dip Net and Above Bonneville figures from Oregon Fish Commission and Washington State Department of Fisheries, 1950, subject to minor additions.

Table 9. Dip Net Landings as Percentages of Total Commercial Catch Above Bonneville and Total Columbia River Catch (Washington and Oregon), 1928–1950[1]

	SPRING CHINOOK (Jan.-July)		FALL CHINOOK (Aug.-Dec.)		TOTAL CHINOOK		BLUEBACK		STEELHEAD	
	Dip Net as % of Above Bonneville	Dip Net as % of Total	Dip Net as % of Above Bonneville	Dip Net as % of Total	Dip Net as % of Above Bonneville	Dip Net as % of Total	Dip Net as % of Above Bonneville	Dip Net as % of Total	Dip Net as % of Above Bonneville	Dip Net as % of Total
1928	.....	.....	.....	.....	.....	0.5	.....	0.2	.....	2.1
1929	.....	.....	.....	.....	.....	2.1	.....	0.9	.....	2.9
1930	.....	.....	.....	.....	.....	2.4	.....	7.9	.....	4.8
1931	.....	.....	.....	.....	.....	3.5	.....	9.5	.....	2.4
1932	.....	.....	.....	.....	.....	1.3	.....	1.4	.....	1.0
1933	.....	.....	.....	.....	.....	4.0	.....	13.3	.....	2.4
1934	.....	.....	.....	.....	.....	2.3	.....	5.5	.....	3.9
1935	.....	.....	.....	.....	.....	9.4	.....	15.6	.....	12.7
1936	.....	.....	.....	.....	.....	9.9	.....	49.6	.....	12.0
1937	.....	.....	.....	.....	.....	8.0	.....	37.2	.....	8.8
1938	85.1	2.8	77.9	14.2	78.5	10.6	87.3	23.3	75.3	14.9
1939	84.1	5.2	69.8	9.7	72.8	8.1	79.8	33.3	79.9	13.0
1940	82.1	9.1	66.7	12.7	68.6	12.0	79.0	42.9	72.1	12.1
1941	82.0	14.0	68.1	12.9	70.0	13.1	83.0	21.0	65.9	12.0
1942	90.2	11.2	66.9	13.5	69.0	13.2	85.4	24.9	72.8	14.9
1943	90.8	7.5	73.9	15.0	75.4	13.6	96.9	18.8	75.8	14.2
1944	76.2	9.5	66.9	8.9	68.4	9.1	76.4	21.8	80.7	17.6
1945	69.6	6.4	68.1	7.4	68.3	7.3	98.0	43.6	86.9	15.4
1946	93.7	9.9	70.6	14.0	72.2	13.5	65.1	17.8	83.6	20.2
1947	71.6	9.1	61.3	12.7	62.1	12.3	83.3	16.6	70.2	14.9
1948	96.3	23.9	65.8	13.4	71.3	15.0	93.8	53.8	48.5	11.9
1949	92.3	10.7	58.0	9.1	62.9	9.4	64.1	52.5	64.4	26.0
1950	90.0	13.2	71.9	15.0	74.1	14.7	94.6	26.8	82.6	18.3
Ave. 1928–1934	.....	.....	.....	.....	.....	.....	.....	5.6	.....	2.8
Ave. 1935–1950	.....	.....	.....	.....	.....	.....	.....	29.3	.....	.....
Ave. 1938–1950	85.6	9.7	67.8	12.3	69.9	11.8	83.0	.....	73.0	14.2

[1] 1928-1937 data from Oregon Fish Commission Contribution Number 11. 1938-1950 data from Oregon Fish Commission and Washington State Department of Fisheries.

Table 10. Total Closed Season Landings by Indians at Celilo Falls by Date, Species, and Area for August 26–September 10, 1947 (In Numbers of Fish)

	UPPER CABLES				*OREGON SHORE*				*LOWER CABLES*		*BRIDGE*		*CELILO TOTAL*			
	Chin.	*SH.*	*Jack*	*Sil.*	*Chin.*	*SH*	*Jack*	*Sil.*	*Chin.*	*SH*	*Chin.*	*SH*	*Chin.*	*SH*	*Jack*	*Sil.*
Aug. 26	200	102	0	0	23	12	0	0	12	6	10	0	245	120	0	0
27	399	178	0	0	45	21	0	0	24	11	21	0	489	210	0	0
28	431	158	2	2	43	32	3	1	15	5	30	0	519	195	5	3
29	707	132	28	3	21	58	2	0	18	6	30	0	776	196	30	3
30	596	297	34	0	46	58	6	1	18	6	30	0	690	361	40	1
31	633	188	29	11	43	10	9	0	18	6	50	0	744	204	38	11
Sept. 1	656	185	58	12	79	25	11	3	12	4	50	0	797	214	69	15
2	819	198	71	22	108	51	25	2	18	6	50	0	995	255	96	24
3	908	303	44	27	79	24	13	4	18	6	50	0	1,055	333	57	31
4	1,524	385	79	79	129	39	12	3	67	17	75	0	1,795	441	91	82
5	1,942	436	68	159	188	26	15	13	91	19	100	0	2,321	481	83	172
6	1,674	338	48	187	391	41	18	16	164	34	100	0	2,329	413	66	203
7	2,061	425	77	224	222	33	27	18	180	45	100	0	2,563	503	104	242
8	2,122	452	111	180	308	37	15	11	180	45	100	0	2,710	534	126	191
9	2,148	437	74	224	181	23	9	9	180	45	100	0	2,609	505	83	233
10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	16,820	4,214	723	1,130	1,906	490	165	81	1,015	261	896	0	20,637	4,965	888	1,211

Table 11. Total Closed Season Landings by Indians at Celilo Falls by Date, Species, and Area for August 26–September 10, 1948 (In Numbers of Fish)

	UPPER CABLES				OREGON SHORE				LOWER CABLES		BRIDGE	CELILO TOTAL			
	Chin.	SH	Jack	Sil.	Chin.	SH	Jack	Sil.	Chin.	SH	Chin.	Chin.	SH	Jack	Sil.
Aug. 26	45	50	0	0	7	17	2	0	23	17	20	95	84	2	0
27	120	152	0	0	18	54	2	1	55	69	30	223	275	2	1
28	125	291	3	0	11	76	7	0	79	125	50	265	492	10	0
29	42	203	15	0	12	96	0	0	70	83	50	174	382	15	0
30	48	220	10	0	5	86	25	0	68	67	50	171	373	35	0
31	122	281	34	0	14	76	16	0	103	61	80	319	418	50	0
Sept. 1	173	207	33	3	7	48	31	0	49	41	90	319	296	64	3
2	276	359	70	1	19	57	19	1	132	86	90	517	502	89	2
3	416	454	105	1	40	81	41	0	123	85	90	669	620	146	1
4	375	335	82	7	12	46	16	0	114	65	100	601	446	98	7
5	729	320	186	6	85	93	74	5	190	89	100	1,104	502	260	11
6	1,009	421	186	10	87	111	186	2	127	64	100	1,323	596	372	12
7	1,504	639	282	18	276	112	110	4	276	113	110	2,166	864	392	22
8	2,247	757	340	23	194	171	167	5	414	110	120	2,975	1,038	507	28
9	2,513	578	252	19	586	238	230	1	386	153	120	3,605	969	482	20
10	0	0	0	0	0	0	0	0	27	0	0	27	0	0	0
Total	9,744	5,267	1,598	88	1,373	1,362	926	19	2,236	1,228	1,200	14,553	7,857	2,524	107

Table 12. Total Closed Season Landings by Indians at Celilo Falls by Date, Species, and Area for August 26–September 10, 1949 (In Numbers of Fish)

	UPPER CABLES				OREGON SHORE				LOWER CABLES		BRIDGE			CELILO TOTAL②			
	Chin.	SH	Jack	Sil.	Chin.	SH	Jack	Sil.	Chin.	SH	Chin.	SH	Jack	Chin.	SH	Jack	Sil.
Aug. 26	56	38	5	0	2	3	0	0	.....	.....	.....	.....	.....	58	41	5	0
27	327	241	36	0	26	26	2	0	13	7	.....	.....	.....	366	274	38	0
28	313	231	49	0	41	30	13	0	11	6	.....	.....	.....	365	267	62	0
29	474	362	101	0	43	17	2	0	50	17	.....	.....	.....	567	396	103	0
30	624	499	146	4	68	17	13	0	79	42	.....	.....	.....	771	558	159	4
31	556	405	72	5	82	33	21	1	97	47	.....	.....	.....	735	485	93	6
Sept. 1	862	475	148	7	104	22	17	0	80	62	.....	.....	.....	1,046	559	165	7
2	1,014	445	127	7	153	49	21	1	95	39	.....	.....	.....	1,262	533	148	8
3	1,193	343	109	19	149	46	13	1	79	44	.....	.....	.....	1,421	433	122	20
4	1,040	266	108	5	74	14	8	2	69	29	.....	.....	.....	1,183	309	116	7
5	1,527	371	133	11	213	30	37	1	104	26	.....	.....	.....	1,844	427	170	12
6	1,780	461	145	6	250	46	43	1	107	39	.....	.....	.....	2,137	546	188	7
7	1,577	394	175	7	120	13	21	0	89	27	.....	.....	.....	1,786	434	146	7
8	2,066	286	170	7	217	20	5	0	148	37	.....	.....	.....	2,431	343	175	7
9	2,646	443	231	9	267	21	16	0	172	47	.....	.....	.....	3,085	511	247	9
10	128	42	29	0	0	0	0	0	.....	.....	.....	.....	.....	128	42	29	0
Total	16,183	5,302	1,784	87	1,809	387	232	7	1,193	469	1,960①	330	130	21,145	6,488	2,146	94

① Bridge landings estimated as explained in paper.
② Daily totals do not include Bridge counts.

Table 13. Total Closed Season Landings by Indians at Celilo Falls by Date, Species, and Area for August 26–September 10, 1950 (In Numbers of Fish)

	UPPER CABLES				OREGON SHORE				LOWER CABLES				BRIDGE				MISCELLANEOUS				DAILY CELILO TOTALS			
	Ch.	SH	Jack	Sil.	Ch.	SH	Jack	Sil.	Ch.	SH	Jack	Sil.	Ch.	SH	Jack	Sil.	Ch.	SH	Jack	Sil.	Ch.	SH	Jack	Sil.
Aug. 26	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	100	144	36	8	100	144	36	8
27	40	135	16	0	8	101	46	0	0	0	0	0	113	5	9	13	.....	.....	.....	.....	161	241	71	13
28	43	156	18	1	3	39	13	5	49	38	0	0	126	6	10	15	.....	.....	.....	.....	221	239	41	21
29	88	270	19	3	4	25	17	0	28	20	0	0	138	6	11	17	.....	.....	.....	.....	258	321	47	20
30	197	192	32	15	19	35	16	10	79	70	0	0	151	7	12	18	.....	.....	.....	.....	446	304	60	43
31	460	263	48	55	27	45	17	14	75	58	0	0	163	8	13	19	.....	.....	.....	.....	725	374	78	88
Sept. 1	681	361	80	126	80	71	44	46	154	85	4	5	189	17	28	25	10	5	3	4	1,114	539	159	206
2	735	256	57	116	66	64	28	33	153	58	4	5	170	8	13	20	10	5	3	4	1,134	391	105	178
3	592	710	105	94	63	73	53	36	19	7	4	5	126	9	19	18	10	5	3	4	810	804	184	157
4	647	220	69	153	67	94	65	58	351	70	4	22	204	16	23	31	10	5	3	4	1,279	405	164	268
5	734	234	88	207	56	44	42	75	310	97	0	27	242	24	24	40	10	5	3	4	1,352	404	157	353
6	1,265	253	77	260	151	85	99	135	214	77	0	14	274	6	19	31	10	5	3	4	1,914	426	198	444
7	1,784	357	124	234	230	127	109	137	290	72	0	17	257	1	5	26	30	12	5	7	2,591	569	243	421
8	2,437	660	253	440	640	168	160	169	350	37	0	6	328	10	24	37	14	3	0	3	3,769	878	437	655
9	2,300	728	193	371	410	95	173	133	233	45	0	3	245	3	2	14	.....	.....	.....	.....	3,188	871	368	521
10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	.....	.....	.....	.....	0	0	0	0
Total ..	12,003	4,795	1,179	2,075	1,824	1,066	882	851	2,305	734	16	104	2,726	126	212	324	204	189	59	42	19,062	6,910	2,348	3,396
Rounded grand totals:①																					21,050	6,900	.....	3,750

① Jacks have been added to the totals of large chinooks and silvers on the basis of the percentage composition of large chinooks and silvers.

Table 14. Actual Counts and Estimates of Total Closed Season Landings by Species and Area, August 26–September 9

	CHINOOKS				STEELHEAD				JACKS				SILVERS			
	Count	Est.	Comb.	% Est.	Count	Est.	Comb.	% Est.	Count	Est.	Comb.	% Est.	Count	Est.	Comb.	% Est.
1947:																
Upper Cables	15,535	1,420	16,955	8.4	3,740	524	4,264	12.3	692	31	723	4.3	1,095	35	1,130	3.1
Oregon Shore	1,764	74	1,838	4.0	432	25	457	5.5	158	7	165	4.2	78	3	81	3.7
Lower Cables and Bridge Area	0	1,844	1,844	100.0	0	244	244	100.0	0	0	0	.....	0	0	0	.....
Total	17,299	3,338	20,637	16.2	4,172	793	4,965	16.0	850	38	888	4.3	1,173	38	1,211	3.1
1948:																
Upper Cables	9,207	537	9,744	5.5	4,866	401	5,267	7.6	1,500	98	1,598	6.1	83	5	88	5.7
Oregon Shore	1,295	78	1,373	5.7	1,262	100	1,362	7.3	866	60	926	6.5	19	0	19	0.0
Lower Cables	2,196	40	2,236	1.8	1,172	56	1,228	4.6	.....	.....	.....	.....	.....	.....	.....	.....
Bridge Area	.....	1,200	1,200	100.0	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Total	12,698	1,855	14,553	12.7	7,300	557	7,857	7.1	2,366	158	2,524	6.3	102	5	107	4.7
1949:																
Upper Cables	16,183	0	16,183	0.0	5,302	0	5,302	0.0	1,784	0	1,784	0.0	87	0	87	0.0
Oregon Shore	1,809	0	1,809	0.0	387	0	387	0.0	232	0	232	0.0	7	0	7	0.0
Lower Cables	1,193	0	1,193	0.0	469	0	469	0.0	.....	0	.....	0.0	.....	0	.....	0.0
Bridge Area	916	1,044	1,960	53.3	158	172	330	52.1	75	55	130	42.3	.....	0	.....	0.0
Total	20,101	1,044	21,145	4.9	6,316	172	6,488	2.7	2,091	55	2,146	2.6	94	0	94	0.0
1950:																
Upper Cables	11,723	280	12,003	0.2	4,478	317	4,795	6.6	1,141	38	1,179	3.2	2,028	47	2,075	2.3
Oregon Shore	1,732	92	1,824	5.0	921	145	1,066	13.6	791	91	882	10.3	810	41	851	4.8
Lower Cables	2,305	0	2,305	0.0	734	0	734	0.0	16	0	16	0.0	104	0	104	0.0
Bridge Area	1,575	1,151	2,726	42.2	83	43	126	34.1	125	87	212	41.0	185	139	324	42.9
Miscellaneous	104	100	204	49.0	45	144	189	76.2	23	36	59	61.0	34	8	42	19.0
Total	17,439	1,623	19,062	8.5	6,261	649	6,910	9.4	2,096	252	2,348	10.7	3,161	235	3,396	6.9