

The Pacific Northwest Commercial Fishery for Sturgeon

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The sturgeons represent one of the oldest groups of fishes and have certain structures resembling the sharks, including the inferior mouth supported by jaws, the spiracles, and the heterocercal caudal fin. Sturgeons have no real scales although the body is covered with small, rough, bony plates. They have five rows of prominent bony plates, each with a curved sharp spine, located on the mid-dorsal, mid-lateral, and ventrolateral surfaces. Four prominent barbels are located in a transverse row on the lower surface of the snout (Fig. 1) (Hart, 1973).

Sturgeons are somewhat sluggish and are mostly bottom dwellers. They occur in both fresh and salt water; the marine species enter rivers to spawn (Clemens and Wilby, 1961). It is well known that all species of sturgeon are able to survive in both fresh and salt water, regardless of whether they are anadromous or purely freshwater species (Bajkov, 1951).

Prior to the late 1800's, sturgeons were very common in North American waters, but they were then of little commercial value. Caviar and smoked sturgeon then became popular, causing the prices of these products to rise rapidly. Sturgeon fishing became profitable and, as a result, they were

overfished and, in many places, almost exterminated (Bajkov, 1949).

Two species of sturgeon inhabit the waters of the northeastern Pacific Ocean. These are the white sturgeon, *Acipenser transmontanus*, and the green sturgeon, *Acipenser medirostris*. The white sturgeon is larger than the green, having a maximum weight of well over 1,000 pounds (454 kg), and is more desirable as a food fish, bringing a higher price in the market (Fig. 1). Although the white sturgeon has been generally considered an anadromous species, Bajkov (1951) states that many large sturgeon remain in the upper Columbia and Snake Rivers during their entire lives and never go to sea. White sturgeon range from northern California to the Gulf of Alaska (Hart, 1973).

The green sturgeon is an anadromous species and is seldom found above brackish water. It is much smaller, having a maximum weight of about 300 pounds (136 kg) (Fig. 1). It is less abundant and, because the flesh is of inferior quality, has a lower commercial value than the white sturgeon. Green sturgeon range from southern California to the Gulf of Alaska and Unalaska Island (Hart, 1973).

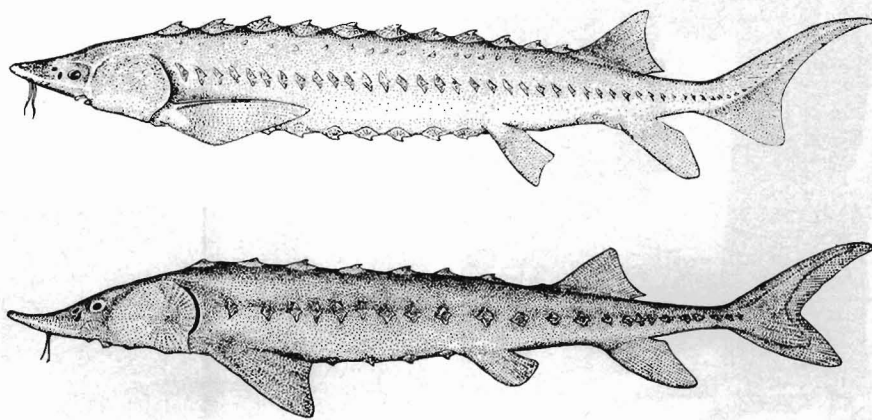
Commercial fisheries for white sturgeon exist in the Columbia and Fraser Rivers. In addition, landings which are primarily incidental to the harvest of Pacific salmon (genus *Oncorhynchus*) are made in several Oregon coastal rivers and in Willapa Bay and Grays Harbor, Wash., as well as in other areas. Most of the catches now are made with salmon nets, although some are taken with large mesh nets or bait-set lines. Green sturgeon are harvested mainly as an incidental species in the gillnet fishery for salmon in the salt or brackish water areas of bays and rivers along the Oregon and Washington coast and in some areas of British Columbia.

HISTORY OF THE FISHERY

Fraser River

Prior to 1880 in the Fraser River, B.C., there was a small Indian subsistence fishery. By 1886, with the development of the salmon fisheries,

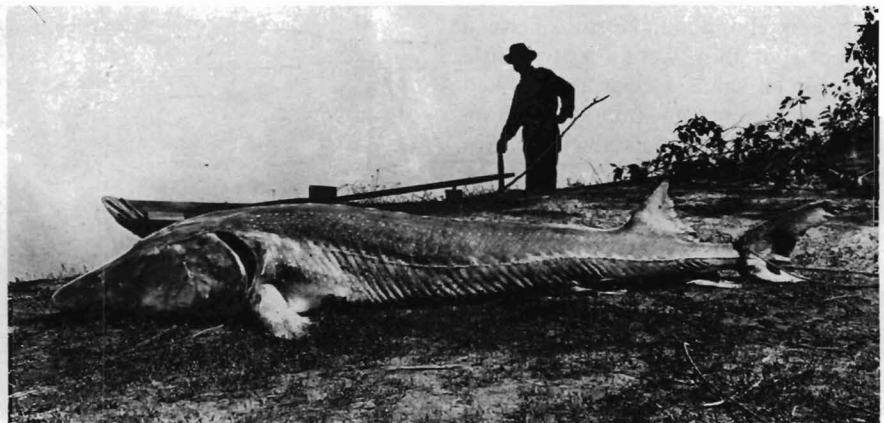
Figure 1.—White sturgeon, *Acipenser transmontanus*, top, and green sturgeon, *Acipenser medirostris*, below (after Hart, 1973).



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Top, a catch of sturgeon from the Columbia River. The sturgeon at right was taken at Cascade Locks, Oreg. The 1,500-pound specimen below was caught in the Snake River near Payette, Ida. At left is a 900-pound, 11½-foot female take at The Dalles, Oreg. Photos are from files of the Oregon Historical Society, 1230 S. W. Park Avenue, Portland, OR 97205.



there was a growing incidental catch of sturgeon in salmon nets. Local markets for caviar and sturgeon flesh gradually increased, and by 1894 export to eastern markets was underway. The white sturgeon fishery reached a peak just before the turn of the century. The peak catches in 1897 and 1898 of over 1,000,000 pounds (453,515 kg) and of 750,000 pounds (340,136 kg), respectively, were followed by a sharp decline to only 65,000 pounds (29,478 kg) in 1901.

In 1907 the catches began to increase again with 500,000 pounds (226,757 kg) or more being taken in each year from 1909 to 1912. Beginning in 1913 catches again began to decrease, and since 1917 commercial catches have seldom exceeded 50,000 pounds (22,676 kg) (Semakula and Larkin, 1968). The earlier sturgeon fishery from 1880 to 1900 apparently depleted the virgin stock, followed by the remaining small accumulation between 1907 and 1915. Catches during the last 10 years (1965-75) have averaged approximately 26,000 pounds (12,159 kg) per year.

Columbia River

Prior to about 1880, when the white sturgeon fishery was just beginning, this species was apparently extremely abundant in the Columbia River, between Washington and Oregon. The prices paid for dressed fish and for caviar at that time were so low that tremendous numbers of large and small sturgeon were destroyed by the fishermen because the fish had little commercial value and caused considerable damage to the gill nets used by early salmon fishermen (Cleaver, 1951). The sturgeon fishery had its beginning as an important industry on the Columbia River in 1888 when 94 tons of sturgeon were salted and pickled and the first car of frozen sturgeon was shipped east. The advent of freezing methods and the acceptance of smoked sturgeon and of caviar made from the eggs gave the sturgeon new value to the fishermen and resulted in rapid expansion of the fishery. The sturgeon fishery was soon of substantial importance and became

second in value to only the salmon (Craig and Hacker, 1940).

Sturgeon were caught with the various types of gear used to capture the salmon—including gill nets, seines, fish wheels, and traps, as well as hook-and-line gear. In 1892, which was only the fourth year of intensive fishing, the sturgeon catch reached its peak on the Columbia River when about 5,500,000 pounds (2,494,331 kg) were landed (Pruter, 1972). Table 1 shows the average annual commercial landings of sturgeon caught in the Columbia River and tributary streams from 1889 to 1975.

The sturgeon fishery held its place as a major part of the commercial fisheries of the Columbia River for only a few years. Immediately thereafter acute depletion of the stock became evident and the high production level could not be maintained. Therefore, the catches declined so that in 1899, after only 10 years of intensive fishing, the total catch was less than 100,000 pounds (45,351 kg) for the river. From that time on, the sturgeon fishery has been merely incidental to the salmon fisheries in the Columbia River (Craig and Hacker, 1940). Depletion was rapid because sturgeon are slow growing and the average weight dropped from 150 pounds (68 kg) at the turn of the century to the present average of about 40 pounds (18 kg)¹. Catches during the last 10 years (1966-75) have ranged from 176,000 to 527,000 pounds (79,819 to 239,002 kg) and have averaged 357,000 pounds (162,000 kg) annually. During each of the last 3 years (1973-75), catches have increased to over 465,000 pounds (211,000 kg).

Green sturgeon catches were not differentiated in early years but were included in the catches beginning in about 1913. Green sturgeon made up approximately 5, 21, and 22 percent of the total Columbia River sturgeon catch in

¹Fish Commission of Oregon 1972. Oregon resource analysis, Columbia River drainage. Fish. Comm. Oreg., Manage. Res. Div., 3 p. Typescript.

Table 1.—Average annual commercial landings, in pounds, of sturgeon caught in the Columbia River and tributary streams, 1889-1975¹.

Years	Avg. annual landings (lb)	Years	Avg. annual landings (lb)
1889-90	2,416,000	1931-35	93,000
1891-92	4,514,000	1936-40	109,000
1895	4,704,000	1941-45	170,000
1899	73,000	1946-50	414,000
1904	138,000	1951-55	320,000
1915 ²	135,000	1956-60	341,000
1923	183,000	1961-65	237,000
1925 ³	231,000	1966-70	269,000
1926-30	181,000	1971-75	445,000

¹Sources: Pruter (1972) for 1889-1960; Fish Commission of Oregon and Washington Department of Fisheries (1972) for 1961-70; Oregon Department of Fish and Wildlife and Washington Department of Fisheries (1976) for 1971-75.

²Green sturgeon entered the catch in 1913.

³Landings prior to 1925 are known only for the indicated years.

Table 2.—Average commercial sturgeon landings, in pounds, in Oregon and Washington coastal districts and in Puget Sound, 1939-73¹.

Years	Average annual landings (lb)		
	Oreg. coastal districts	Wash. coastal districts	Puget Sound ²
1939-40	1,150	12,900	—
1941-45	2,380	40,600	5,033
1946-50	1,480	25,440	13,280
1951-55	860	44,100	8,080
1956-60	1,020	102,860	8,100
1961-65	5,220	132,520	25,740
1966-70	4,280	178,940	23,040
1971-73	10,667	155,833	9,133

¹Sources: U.S. Fish and Wildlife Service (1942-69), and National Marine Fisheries Service (1970-76).

²Although these sturgeon are landed in Puget Sound ports, a great majority of them are captured in coastal waters.

1941-50, 1951-60, and 1961-70, respectively.

The average annual commercial landings of sturgeon in Oregon and Washington coastal districts and in Puget Sound are shown in Table 2.

PRODUCTS

In the early days of the fishery there were four products taken from sturgeon: the flesh, roe, spinal marrow, and swim bladders. The flesh was sold fresh and frozen; the spinal marrow was prepared and dried by the Chinese for use in making soups, and the bladders were used in manufacturing isinglass (Craig and Hacker, 1940). In recent years there has been a high demand for fresh, smoked, and canned sturgeon as well as the eggs which are used to make caviar.

DESCRIPTION OF THE FISHERY

Areas and Seasons

Sturgeon are taken commercially in coastal waters and in many coastal rivers of Oregon, Washington, and British Columbia as well as in Puget Sound. White sturgeon are taken mainly in the freshwater areas of the Columbia and Fraser Rivers; however, some are landed in Grays Harbor, Willapa Bay (Wash.), and in several other rivers. Green sturgeon are mainly taken incidentally to the other fisheries in coastal waters, the brackish water of rivers, and occasionally in Puget Sound. Sturgeon are caught during all commercial fishing seasons, with the largest catches being made between May and October.

Season closures for other species and size limits are the regulations that have provided protection for the sturgeon population in the northeastern Pacific. In the Columbia River, a minimum size limit of 4 feet (1.22 m) in the commercial fishery provides protection for the young sturgeon until they approach spawning size. The maximum limit of 6 feet (1.83 m) provides protection to the majority of the large female brood stock (footnote 1).

Gear

In the Columbia and Fraser Rivers, most commercially caught sturgeon are now taken in gill nets during salmon and steelhead trout (*Salmo gairdneri*) fishing, but a few are taken with handlines. In Puget Sound most of the catch is taken incidentally in otter trawls. However, small numbers are captured in gill nets and, occasionally, in purse seines. In the Washington coastal district most of the sturgeon are taken inci-

dentally in gill nets, with small numbers taken in otter trawls. However, in recent years catches of about 10,000 to 29,000 pounds (4,535 to 13,152 kg) have been taken using set lines, primarily in the Grays Harbor area. In Oregon coastal areas, sturgeon are taken incidentally in otter trawls offshore and in gill nets in the rivers.

CURRENT TREND AND FUTURE STATUS

Construction of dams on the mainstream Columbia and Snake Rivers has considerably reduced available habitat, particularly in the Snake River. Dams restrict the migration of sturgeon and isolate them in the pools between dams. However, available habitat in the lower Columbia River below Bonneville has not changed greatly in recent years (footnote 1). Because sturgeon are slow growing and seldom spawn before the age of 15 years, overfishing has greatly depleted stocks in the past. Current regulations now in effect should protect sturgeon from overfishing in the future.

Sturgeon catches have been relatively stable during recent years on the Fraser River and have increased on the Columbia River. The incidental catches have generally been increasing in the Oregon and Washington coastal areas (Tables 1 and 2). These catches indicate that the commercial regulations, including size limits and the closed seasons for other species, have been successful in halting the decline in the sturgeon population and that the sturgeon populations are now relatively stable. As the fishery has become mostly incidental and the older fish are, therefore, largely unexploited, it seems likely that there is now an accumulation

of older fish to maintain the populations and possibly support a modest increase in the landings.

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