

Volume III, Chapter 9

Channel Catfish

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9.0 Channel Catfish (*Ictalurus punctatus*)

9.1 Introduction

Channel catfish (*Ictalurus punctatus*)¹ belong to the order Siluriformes and family Ictaluridae (bullhead catfishes). Ictalurids are representative of exclusively soft rayed families of North American origin (Becker 1983). In the United State and Canada, there are six genera and 39 species of bullheads (Robins et al. 1991). A spinous ray in the dorsal and pectoral fins (Becker 1983) eight barbels, which look like whiskers and are sensitive to touch and chemical stimuli (Becker 1983). In Washington, the channel catfish is the only ictalurid that has a deeply forked tail (Wydoski and Whitney 1979).

Channel catfish are restricted to fresh waters and to some, brackish waters (Scott and Crossman 1998). The original North American distribution of channel catfish appeared to be from the St. Lawrence River and its tributaries in Quebec, south along the western Appalachian Mountains to southern Georgia and Florida (Lake Okeechobee), west through the Gulf states to eastern Texas and northern Mexico, and northwest throughout eastern New Mexico to Montana (Missouri River drainage), east to the Red River system in Manitoba, southwestern Ontario, southern Minnesota, Wisconsin, and Michigan through Ontario and Quebec at the level of Lake Nipissing (Wydoski and Whitney 1979; Scott and Crossman 1998) (Figure 9-1). Channel catfish have been widely introduced outside this native range and can be found almost everywhere in the United States (Scott and Crossman 1998).

Channel catfish reportedly were first introduced into Washington in 1892 at Clear Lake (Lampman 1946). Skagit County stocked into an unnamed privately owned farm pond near Vancouver and into Deer Lake in Spokane County (Lampman 1946). Additional releases of channel catfish were made in various lakes and streams across the state in the ensuing years, as all forms of catfish (predominately bullheads) became abundant and popular in the region with sport and commercial anglers alike (Lampman 1946).

While bullhead catfish thrived in many of Washington's lakes and streams following these early introductions, channel catfish abundance and distribution was limited by their very specific spawning habitat requirements and the region's generally low water temperatures. Today, naturally reproducing populations of channel catfish are found only in the Snake, Columbia, and lower reaches of the Yakima (Prosser Dam to the mouth), Tucannon, and Walla Walla Rivers (Doug Fletcher, WDFW, personal communication; Paul Hoffarth, WDFW, personal communication) (Figure 9-2).

¹ The channel catfish illustration at beginning of this chapter is courtesy of the Michigan Department of Natural Resources, Fisheries Division.



Figure 9-1. North American distribution of channel catfish (map courtesy of Worldwaters.com, Bend, Oregon).

In the last decade, WDW has introduced channel catfish into a number of Washington lakes, attempting to increase predation on overabundant forage fish populations and/or add diversity to mixed-species fisheries. Plans to expand this program are currently under consideration. Of the 30 lakes planted in Washington since 1982, Fazon Lake, Sprague Lake, and McCabe Pond (Kittitas County), Swofford Pond (Lewis County), Gissberg Ponds (Snohomish County), Harts Lake (Pierce County), and Kress Lake (Cowlitz County) have produced the most significant fisheries (Steve Jackson, WDFW, personal communication).

Prior to the 1930s, the management of channel catfish and other non-indigenous warmwater game fish species in Washington was primarily directed at increasing their geographic distribution, availability to anglers, and, in some cases, in regulating harvest. During this period, little was known of the biology, life history, or habitat requirements of these species in Washington's coldwater streams and lakes.

9.2 Life History & Requirements

9.2.1 *Spawn Timing & Conditions*

Channel catfish spawning is initiated when water temperatures reach 75°F, with 80°F the optimal spawning temperature (Becker 1983).

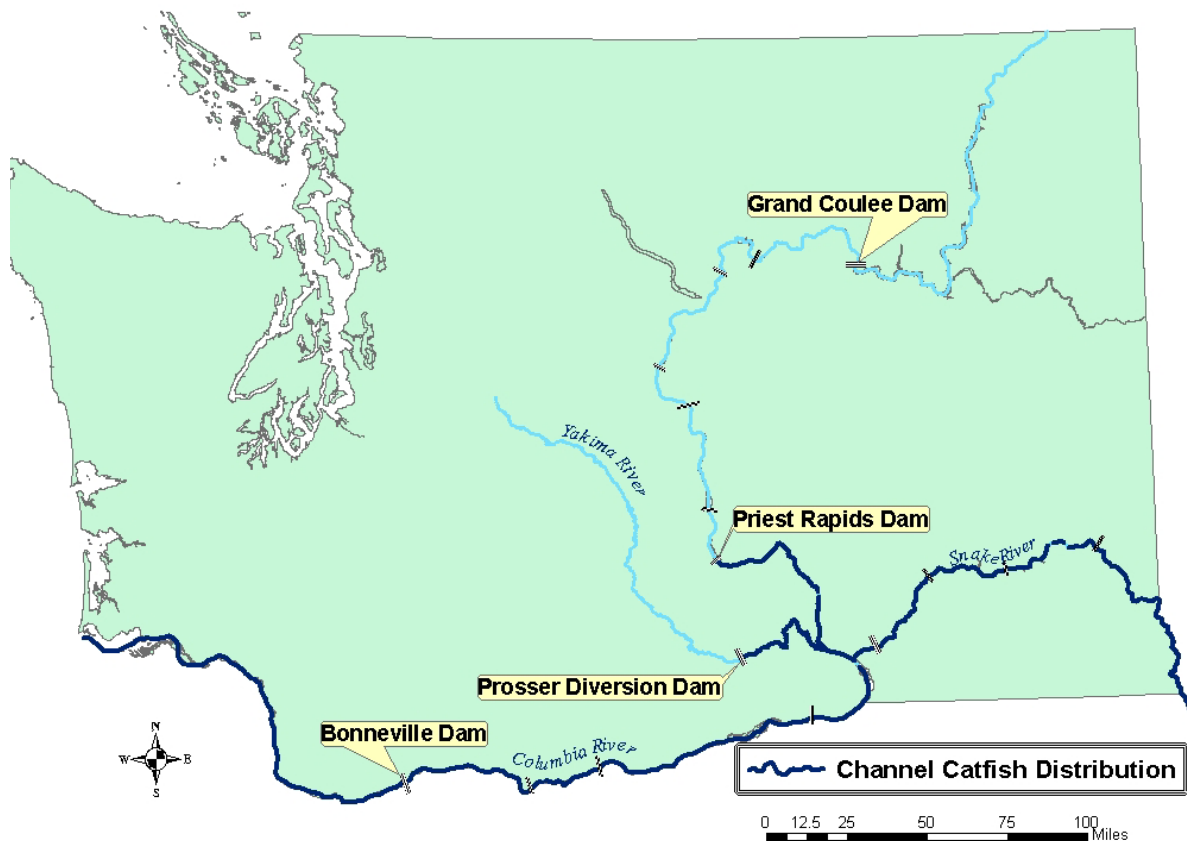


Figure 9-2. Distribution of channel catfish in the Columbia River basin. Distribution below Bonneville Dam is questionable.

Channel catfish are true cavity spawners. A dark cavity or crevice in the substrate, hollowed log, undercut bank, overhanging rock ledge, or similar habitat is required for successful reproduction. The clearer the water, the more formidable the nesting cavity must be to provide the apparent security needed to initiate spawning activity (Becker 1983). In very turbid water, nest may be made directly on the bottom in the mud (Becker 1983). A current or rocky substrate is not necessary for spawning (Becker 1983).

9.2.2 Incubation

Channel catfish eggs are demersal and adhesive, sticking to one another at the bottom of the nest. The eggs average 3.5-4.0 mm in diameter before they are laid (Scott and Crossman 1998). At 26.7°C, incubation takes 7-8 days. During incubation, the male will guard the nest and also during this time, will fan the eggs and loosen up the egg mass (Wydoski and Whitney 1979; Becker 1983) to provide aeration and water circulation.

9.2.3 Larvae & Juveniles

Upon hatching, channel catfish fry remain in a tightly grouped mass at the bottom of the nest. The newly hatched fry have a large yolk-sac and depending on the water temperature, it can take up to 10 days to be fully absorbed, which after, therefore make trips to surface and begin to feed (Scott and Crossman 1998; Wellborn 1988). They rely on the protective cover of the nesting cavity through the early stages of development. The male continues to guard the nest during this time.

Prior to dispersal, the fry may travel in schools anywhere from several days to or for weeks (Mansueti and Hardy 1967).

After dispersal, juvenile catfish begin feeding in quiet, shallow areas, usually over sand bars, around drift piles, or among rocks, before progressively seeking out moderately flowing rocky riffle areas or more turbulent areas near sand bars. They also rely on rock and woody debris for protective cover. Some juveniles seek shelter during the winter under boulders in swiftly flowing water (Becker 1983). Young channel catfish feed primarily on aquatic insects or on bottom-dwelling arthropods. When channel catfish reach a length of 4-5 inches, they become more omnivorous, feeding on a variety of insects, small fish, and plant material (Becker 1983). They rarely feed during the winter (Becker 1983).

9.2.4 Adult

Channel catfish are found in a variety of habitats including clear fast-moving streams, and moderately eutrophic lakes and reservoirs, and are commonly found in large rivers below dams (Scott and Crossman 1998). Adults are usually found associated with boulders or submerged logs or in deep pools during daylight hours, and feeding in the shallows at night (Becker 1983). Protective cover is an especially critical habitat requirement for channel catfish.

Adult channel catfish have been known to forage on an incredible variety of food organisms including: frogs; crawfish; clams; snails; worms; pond weeds; seeds; snakes; and birds; in addition to the more traditional forage of fish, insects, and algae (Becker 1983). They normally detect their food by touch and smell (Becker 1983). Feeding activity is generally greatest at night and channel catfish feed only at water temperatures above 15.6°C. Channel catfish rarely feed in the winter and there is some evidence that the adults do not feed during the breeding season (Becker 1983). Members of the cyprinid (minnow) family are the most common fish species consumed by channel catfish, although they are known to prey on perch, sunfish, and even on salmonids (Becker 1983; Poe et al. 1988).

The age and size at which channel catfish reach sexual maturity vary greatly. No age and growth data is available for channel catfish in Washington, although 7-year old catfish as large as 28 pounds have been taken from ponds stocked by the Department of Wildlife (Doug Fletcher, WDFW, personal communication). The average calculated length at annulus formation (spines) for channel catfish from the Mississippi River was reported to be 3 inches at age 1, 6.5 inches at age 2, 9.5 inches by age 3, 12 inches at age 4, 14.5 inches by age 5, 17 inches by age 6, 19.5 inches at age 7, 21.5 inches by age 8, and 24.5 inches at age 9 (Becker 1983). Few channel catfish live more than 8 years, although large specimens up to fifteen years or older are occasionally taken. The maximum size recorded for channel catfish is 58 pounds, from the Santee Cooper Reservoir in South Carolina. The Washington record sport-caught channel catfish weighed in at 32.5 pounds and was caught from a borrow pit adjacent to the Naches River near Yakima (Doug Fletcher, WDFW, personal communication).

Depending on the habitat, channel catfish may or may not migrate to moving water or rivers to spawn (Scott and Crossman 1998). The male channel catfish selects and prepares the nest by cleaning away debris with vigorous finning action. The male may also secrete mucous to make a smooth surface within the nest (Wydoski and Whitney 1979; Scott and Crossman 1998). The female takes no part in preparing the nest, nor care for the young (Becker 1983). The male waits at the nest for a ripe female to spawn with (Davis 1959). Becker (1983) reports that the largest or oldest fish spawn first, and the smallest fish are the last to spawn. A female channel catfish lays approximately 4,000 eggs per pound of body weight (Becker 1983). Spawning can

last up to six hours (Clemens and Sneed 1957). Upon completion of spawning, the male eventually drives the female away (Clemens and Sneed 1957).

9.2.5 Movements

Becker (1983) reports that there are downstream and upstream migrations by channel catfish, although data on channel catfish movements in the lower Columbia River is lacking.

9.3 Status & Abundance

9.3.1 Abundance

Although channel catfish have inhabited Washington waters for more than a century, their abundance and distribution remain very limited. Early translocation efforts succeeded in establishing self-sustaining populations in only a few areas, and recent attempts to expand their distribution and increase their abundance have only slightly increased their range or numbers (Doug Fletcher, WDFW, personal communication). This species does, however, have the potential to provide additional fishing opportunity in Washington through the use of artificial production.

The low abundance and limited distribution of channel catfish in Washington is primarily attributable to relatively low water temperature and lack of suitable spawning habitat. There are only a few waters in Washington that have both suitable habitat and sustained water temperatures of 23.9°-26.7°C or higher.

Zimmerman and Parker (1995) did not capture any fish below Bonneville Dam, but there have been reports of fish being present in the Multnomah Channel and as far downstream as Puget Island (Jimmy Watts, ODFW, personal communication). Zimmerman and Parker (1995) however, did capture channel catfish above the dam in the (Bonneville Pool). The number of fish captured was very low, and most were found in the tailrace below The Dalles Dam.

9.3.2 Productivity

Because Washington waters do not provide the minimal spawning habitat requirements for successful channel catfish reproduction, population levels are generally low and statewide distribution is limited. Washington's streams are typically steep, cold, fast moving, and generally devoid of good cavity nesting habitat.

Channel catfish are present but are not stocked in the lower Columbia River, so their presence indicates that some natural reproduction is occurring.

9.3.3 Supplementation

There are no supplementation programs or efforts in the lower Columbia River.

9.3.4 Harvest

There is no commercial harvesting of channel catfish.

Prior to 1983 there were no regulations governing the statewide catch, possession, minimum size limit, or maximum size limit for channel catfish in Washington. In 1983 a four-fish limit was established for Fazon Lake (Whatcom County). In 1988 the daily limit for Fazon Lake was decreased to two fish. A five-fish daily limit was established at Sprague Lake (Adams and Lincoln Counties) in 1987 and was in place until 2000, when it came under statewide rules. In 1998, limits were established statewide (for lakes, ponds and reservoirs), a five-fish daily limit

with a minimum size of 12 inches and no more than one fish greater than 24 inches. In 2002, the statewide regulations were modified and the size limits were dropped.

The most productive channel catfish fisheries in Washington are found in areas where natural reproduction occurs, namely the lower Yakima Rivers and throughout the Washington portion of the Snake and mid (downstream of the Tri-Cities area) Columbia Rivers.

9.4 Factors Affecting Population Status

9.4.1 Harvest

There is limited fishing for channel catfish in the lower Columbia River and it is probably restricted to the upper Bonneville Pool. Data from the Volunteer Angler Diary Program has not shown any anglers targeting channel catfish, nor catching any in the lower Columbia River. There is no creel survey information that is specific to channel catfish above Bonneville Dam (Dennis Gilliland, WDFW, personal communication). However, from 1991 to 2002 creel survey data for channel catfish was collected during sturgeon creel surveys conducted below Bonneville Dam (Eric Winthrop, WDFW, personal communication).

Table 9-1. Channel catfish harvest, catch, and effort estimates from below Bonneville Dam creel surveys (1991-2002)

Year	Harvest	Catch	No. Trips
1993	*	*	*
1994	*	*	*
1995	*	*	*
1996	*	*	*
1997	*	*	*
1998	*	*	*
1999	*	*	*
2000	*	*	*
2001	*	*	*
2002	27	210	*
Total	27	210	*

* Data not available for inclusion in this report

9.4.2 Supplementation

Until now, channel catfish needed for stocking purposes have been imported from other states. In the future, it may become cost-effective to establish an in-state source of fingerling channel catfish for stocking projects, depending on the outcome of ongoing research efforts. There is no supplementation of channel catfish in the lower Columbia River, nor is there any plan to do so in the future.

9.4.3 Water Development

9.4.3.1 Dams

Dams may provide increased suitable spawning habitat as well as more favorable water temperatures. Bonneville Pool has a greatly reduced water velocity compared to the lower Columbia River unimpeded section. This may allow the water to warm up to temperatures more favorable for channel catfish. There may be some habitat available to channel catfish that would otherwise be unavailable if it were free flowing.

9.4.3.2 Flow Alterations

Channel catfish can be found in a variety of habitats (Becker 1983). They occur in rivers, lakes, and reservoirs. Channel catfish can be found inhabiting clear, rocky, swift-flowing streams, to slow-flowing, silty streams. They are often found in the tailraces of power dams. Currently, there is insufficient research on channel catfish in the lower Columbia River to determine how they would be affected by flow alterations.

9.4.3.3 Channel Maintenance & Dredging

A study by Zimmerman and Parker (1995) did not find any catfish below Bonneville Dam. If channel catfish are actually present, it is unclear what the impacts of dredging would have on channel catfish.

9.4.4 Water Quality

Low oxygen levels can have a harmful affect on the early life stages of channel catfish (Becker 1983). If oxygen levels are too low, it can affect embryonic and larval development or even be lethal. The lethal or deleterious affects of low oxygen levels are dependent upon temperature (Becker 1983). Adult catfish are more tolerant of waters with below optimal oxygen levels (Becker 1983, Smith 1985).

9.4.4.1 Temperature

In most cases, Washington waters do not provide acceptable temperatures for successful reproduction. Lower temperatures would also result in decreased metabolism and decreased prey consumption. Conversely, warmer temperatures would increase metabolism and result in increased prey consumption. An increase in metabolism could result depending on the time of year, in an increase in consumption of juvenile salmonids (Poe et al. 1988; Vigg et al. 1988).

9.4.4.2 Turbidity

Although catfish prefer clean water, in some instances, turbidity could be beneficial to channel catfish. As previously mentioned, catfish prefer to spawn in cavities, crevices, or some area where there is some protective structure.

9.4.4.3 Chemicals

Since channel catfish are omnivorous, there is the possibility of bioaccumulating methylmercury from predation on fish. Mercury occurs naturally in aquatic ecosystems and methylated mercury (methylmercury) is highly bioavailable for aquatic organisms. Methylmercury is accumulated quickly, but slowly depurated, which allows it to be biomagnified in higher trophic levels (Beckvar et al. 1996). Fish-eating predators tend to have the highest levels of methylmercury (Beckvar 1996). Methylmercury can affect reproduction, growth, behavior, and development in walleye. Borton et al. (1996) studied the effect of high-substitution bleached kraft mill effluent (HS BKME) on three species of fish, one of which was channel catfish. In the experiment, channel catfish were exposed to 0, 4, and 8% HS BKME by volume in experimental streams for 263. The channel catfish were not adversely affected by the effluent and their productivity increased.

9.4.5 Species Interactions

9.4.5.1 Competition

The channel catfish probably competes for food with other bottom dwelling feeding animals and with some predatory species of fish in its habitat (Scott and Crossman 1998).

9.4.5.2 Predation

Adult channel catfish do not have many predation issues as a result of their long spines (Becker 1983). However, young channel catfish are vulnerable to predation by insects, other fish, and fish-eating birds. There may be some cannibalism on young catfish by adults 12 inches or greater in length (Bailey and Harrison 1948).

9.5 Inventory & Assessment of Existing Management Plans

A draft Warmwater Fish Management Plan is currently for WDFW internal discussion only.

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