Volume III, Chapter 8
Smallmouth Bass

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8.0 Smallmouth Bass *(Micropterus dolomeiui)*

8.1 Introduction

Smallmouth bass *(Micropterus dolomeiui)*[1] belong to the order Perciformes and family Centrarchidae (the sunfishes). Perciformes can be found throughout North America and Europe (Scott and Crossman 1998). More than 70 families of fishes comprise this order. The family Centrarchidae contains 10 genera and 30 species and they are normally grouped as sunfishes, crappies, and basses (Scott and Crossman 1998). The dorsal fin is made up a spiny-rayed portion and a soft-rayed portion—distinctive to centrarchids (Scott and Crossman 1998). Unlike percids, the two parts of the dorsal fin are closely connected. Some Centrarchids are the most colored and attractive North American warmwater fishes (Scott and Crossman 1998). Centrarchids were originally restricted to North America but have been introduced elsewhere. They inhabit slow-moving streams and the shallow areas of warm, rocky, and vegetated lakes (Scott and Crossman 1998).

The original North American distribution of smallmouth bass extended from Minnesota and southern Quebec, south to the Tennessee River drainage, and as far west as eastern Oklahoma (Becker 1983). Because of their popularity with anglers, smallmouth bass have been extensively transplanted throughout the continental United States, and are now found in virtually every corner of the mainland US, with the single exception of the extreme southeast (Becker 1983) (Figure 8-1).

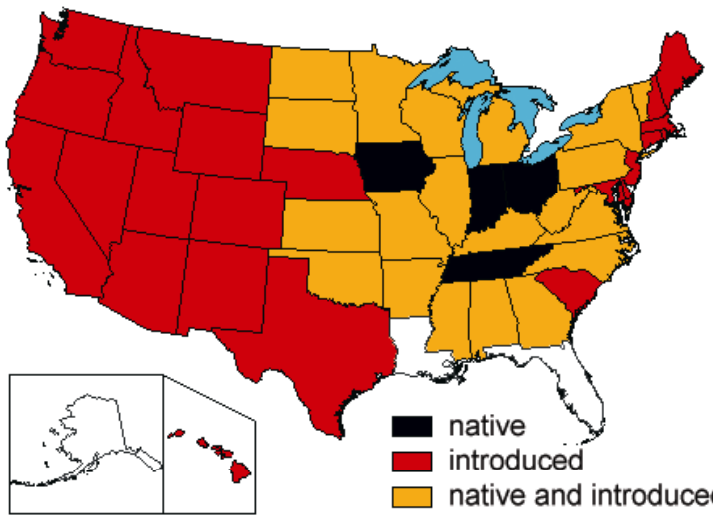

Figure 8-1. Range of smallmouth bass in the US (map courtesy of USGS)

[1] The illustration of the smallmouth bass at the beginning of this chapter is by Virgil Beck, courtesy of the Wisconsin Department of Natural Resources.

The first documented introduction of smallmouth bass in Washington occurred in 1924, when a shipment of smallmouth arrived from the "east" and was released by a private individual into a small lake on Blakely Island in the San Juans (Lampman 1946). Other early plants were made into Lake Washington in 1925 and into the Yakima River in 1926 (Lampman 1946). Since then, smallmouth have become widely distributed across Washington, and significant populations are now found in a fairly large number of Washington streams and lakes, including the Columbia, Snake, Yakima, Okanogan, and Grande Ronde Rivers, and Lake Washington, Lake Sammamish, Lake Whatcom, Lake Stevens, Lake Osoyoos, Moses Lake, Potholes Reservoir, and several other smaller lakes on either side of the Cascade Mountains (Wydoski and Whitney 1979) (Figure 8-2). WDFW has expanded the range of smallmouth bass in Washington through a program of selective transplantation aimed at increasing fishing opportunity and success rates for this highly-prized sport fish. In recent years, smallmouth bass have been successfully transplanted into Banks Lake (1981), Mayfield Lake (1982), Lake Whatcom (1983), Palmer Lake (1983), and Lake Goodwin (1984) (Fletcher 1986).

It is important to have properly managed smallmouth bass populations in Washington to satisfy a growing public demand for recreational fishing opportunities and harvest. There is concern that smallmouth bass may negatively impact other native species, specifically salmonids. Smallmouth bass and salmonids have overlapping habitats. However, in 1985 WDFW completed an exhaustive evaluation of the interaction between smallmouth bass and native salmonid populations in the Northwest. Fletcher (1991) found that there was no clear evidence of reduced salmonid survival as a result of smallmouth bass interaction. However, smallmouth bass may negatively impact other native fish species.

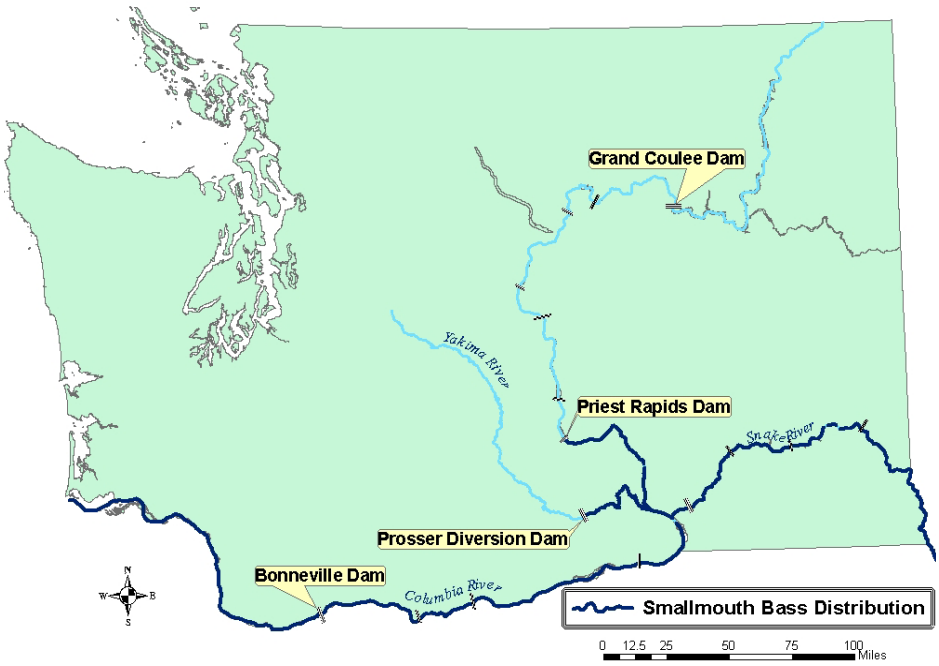

Figure 8-2. Distribution of smallmouth bass in the Columbia and Snake Rivers.

Before the 1930s, managing smallmouth bass and other non-indigenous warmwater game fish species primarily aimed at increasing their availability to Washington anglers. During this period, little was known of the biology, life history, or habitat requirements of this recently-introduced species, or how it was adapting to Washington's cooler water ecosystems.

Before 1935, bass fishing regulations were established by individual county governments and varied widely (Zook 1993), ranging from no catch or size limit to surprisingly conservative regulations. These included spring spawning closures and somewhat restrictive catch and size limits. Statewide fishing regulations were not established for bass and other warmwater game fish species until 1935, a year after the Department of Game was established (Zook 1993).

From 1935-50, the catch and possession limits for bass in Washington were 20 fish, not to exceed 10 pounds plus one bass.

The subsequent history of bass fishing regulations is summarized in Table 8-1. Current statewide harvest regulations for smallmouth bass went into effect in April 2001. They include a daily catch limit of five bass, only bass less than 12 inches (30 cm) or greater than 17 inches (43 cm), with no more than one bass over 17 inches (43 cm). The possession limit allows for two daily catch limits to be retained. There is no minimum size limit for bass.

A small, but growing body of lakes and rivers in the state are managed with special harvest regulations for bass. These regulations often include a slot size limit (bass between either 12-15 inches [30-38 cm] or 12-17 inches [30-43 cm] being protected from harvest), catch and release stipulations, or restrictive size and/or daily limits. The objective of protected length or slot limit regulation is to increase the number of larger bass in the population, for either recreational or predation reasons (Gablehouse 1986).

Sport fishing regulations covering the lower Columbia River have essentially followed the statewide regulations (Table 8-1). Whereas the statewide regulations changed in 2002, the lower Columbia regulations have remained virtually unchanged since mid-April 1992. Only the possession limits have changed.

8.2 Life History Requirements

8.2.1 Spawn Timing & Conditions

Smallmouth spawn along shoreline areas of large rivers and lakes, preferring gravel and rubble, but also utilizing sand and large rock as spawning substrate when necessary (Becker 1983). Spawning activity is normally initiated when the water temperature reaches the 60-65°F (15.6-18.3°C) range. However, smallmouth bass spawning activity has been reported at water temperatures as low as 53°F (11.7°C) (Becker 1983). Most smallmouth bass spawning occurs between mid-May and late June in Washington (Fletcher 1982). Spawning is usually located in 2-5 feet (0.6-1.5m) of water and adjacent to a log, boulder, or other submerged cover.

8.2.2 Incubation

The number of smallmouth bass eggs per nest ranges from 2,000 to 10,000. The eggs are a light amber to pale yellow in color, demersal, adhesive, and 1.2-2.5 mm in diameter (Scott and Crossman 1998). It normally takes somewhere between 9.5 days at 55°F (12.8°C) to 2.25 days at 75°F (23.9°C) for eggs to hatch. Flooding, which results in a rapid drop in water temperature and/or excessive siltation, and excessive lowering of the water level during spawning are the two most common habitat-related reasons for reproductive failure (Becker 1983).

Table 8-1. History of bass sport fishing regulations for Washington and the lower Columbia River.

Year	Statewide Daily Bag Limit	Size Minimum	Size Maximum	Lower Columbia River
1935	20 fish not to exceed 10 lbs. plus one bass	none	none	same as statewide regs.
1951	15 fish not to exceed 10 lbs. plus one bass	none	none	same as statewide regs.
1956	none	none	none	same as statewide regs.
1963	10 fish not to exceed 20 lbs. plus one bass	none	none	same as statewide regs.
1976	10	none	no more than 3 > 17"	same as statewide regs.
1980	10 fish possession limit	none	no more than 3 > 17"	same as statewide regs.
1992	5	none	no more than 3 > 15"	same as statewide regs.
2001	5	none	no more than 3 > 15"	same as statewide regs.
2002	5	only fish <12" and >17" with no more than one bass >17"		no more than 3 > 15"

8.2.3 Larvae & Juveniles

Newly-hatched smallmouth bass fry may remain in a tightly grouped ball in the nest for up to 15 days after hatching, after which they leave the nest and begin to disperse. Young smallmouth bass begin their carnivorous existence very early in life, feeding on midge larvae, Daphnia, and other small crustaceans even before their yolk-sac is completely absorbed. The yolk-sac is absorbed in approximately 6-15 days (State of Iowa DNR, 2001). By the time they reach 3 inches in length, juvenile smallmouth bass are actively feeding on crawfish, other bass fry, and almost any other suitably-sized life form that swims or floats (Becker 1983).

8.2.4 Adult

Smallmouth bass prefer medium to large rivers and large, clearwater lakes (Becker 1983). They are most often associated with gravel or rocky substrate, but thriving populations of smallmouth bass are found in a number of Washington waters with little or no rocky habitat, most notably Lake Sammamish (Wydoski and Whitney 1979). In these cases, rooted aquatic vegetation and other forms of natural or artificial cover play an especially important role in providing the required spawning, rearing, and feeding cover (Becker 1983). Rock outcroppings, boulders, logs, aquatic vegetation, and in some cases, artificial structures such as bridge pilings and boat docks protect juveniles from predation and concentrate forage for feeding adults. Smallmouth bass prefer water temperatures in the 70-80°F (21.1-26.7°C) degree range (Wydoski and Whitney 1979). During the long hot days of summer, smallmouth bass will seek deeper, cooler water (Scott and Crossman 1998). In the lower Columbia River above Bonneville Dam, smallmouth bass can be similarly distributed throughout the reservoir (Zimmerman and Parker 1995). Below the dam, smallmouth bass are fewer in number and are basically found down river as far as RKm 71 (Zimmerman and Parker 1959). Smallmouth bass have a home range and do not travel long distances (Wydoski and Whitney 1979; Scott and Crossman 1998; Becker 1983).

The diet of adult smallmouth bass consists primarily of fish, crawfish, and aquatic insects. Of the fish species eaten, various cyprinids, perch, and sunfish are the most common fish species consumed by adult smallmouth bass (Becker 1983). In the lower Columbia River, smallmouth bass primarily preyed upon sculpins, cyprinids, suckers, and sand rollers (Zimmerman 1999). Crayfish were the most important non-fish food item consumed by smallmouth bass (Ward and Zimmerman 1999). Zimmerman (1999) also found that, during the spring and summer, smallmouth bass consumed more fish in the lower Columbia River below Bonneville Dam than above. Smallmouth bass also prey upon juvenile salmonids (Gray et al. 1984; Beamesderfer and Rieman 1988; Connolly and Rieman 1988; Rieman and Beamesderfer

1988; Rieman et. al. 1991; Ward and Zimmerman 1999; Zimmerman 1999). Salmonid consumption by smallmouth bass was somewhat similar below and above Bonneville Dam (Zimmerman 1999).

The growth rate of Washington smallmouth bass is, on average, below that reported for most areas within the native range for the species (Fletcher et al. 1993; Becker 1983). However, growth rates in Washington exhibit a high degree of variability, and in some areas of the state—including portions of the Snake and Columbia Rivers—growth exceeds the reported averages for those areas. On average, smallmouth bass in Washington attain a length of 2-4 inches (5-10cm)at age 1, 3-7.5 inches (8-19 cm) by age 2, 4.5-11 inches (11-28 cm) by age 3, 6-13.5 inches (15-34 cm) at age 4, 10-15 25-38 cm) inches by age 5, 12-15 inches (30-38 cm) at age 6, 13-17 inches (33-43 cm) at age 7, and 14-18.5 inches (35-46 cm) by age 8. Smallmouth bass have attained a reported maximum age of 13 years and weight of 8 pounds, 12 ounces in Washington (Fletcher 1982).

Smallmouth bass normally attain sexual maturity at a length of 10-12 inches, between three and five years of age for most Washington waters (Fletcher 1982). Spawning activity is normally initiated when the water temperature reaches the 60-65°F (15.6-18.3°C) range. However, smallmouth bass spawning activity has been reported at water temperatures as low as 53°F (11.7°C) (Becker 1983). Most smallmouth bass spawning occurs between mid-May and late June in Washington (1982).

Smallmouth spawn along shoreline areas of large rivers and lakes, preferring gravel and rubble, but also utilizing sand and large rock as spawning substrate when necessary (Becker 1983). Spawning usually takes place in 6-10 days (Scott and Crossman 1998). The male selects and constructs the nest, usually located in 2-5 feet (0.6-1.5m)of water adjacent to a log, boulder, or other submerged cover. The nest is approximately 2-6 feet (0.6-2m) in diameter. Scott and Crossman (1998) report that some males will return to the same nest in subsequent years and that over 85% return to within 150 yards of where they nested the previous year. A lot of nest building takes place in the early morning. After it has been built, the male awaits a female (Becker 1983). Female smallmouth may spawn in more than one nest and with several different males. Ordinarily, male smallmouth spawn with only one female at a single nest site (Becker 1983). After spawning—a process lasting from 15 minutes to over 2 hours—the female leaves the nest while the male remains to care for the eggs. The male smallmouth usually guards the nest for 2-8 days after hatching, but there are times when the male will continue to guard the brood for up to 30 days after hatching (Becker 1983). Predation by various species of cyprinids, catfish, and sunfish (same and other species) is common and in some situations results in the total loss of eggs or fry (Becker 1983).

8.2.5 Movements

Smallmouth bass are essentially non-migratory and the adults rarely school (Becker 1983). The majority of studies have revealed that smallmouth limit their movements to 0.83-8.33 Km (Scott and Crossman 1998). Mark and recapture studies done on smallmouth bass in John Day Reservoir (Nigro et al 1984; Nigro et al. 1985) also found that smallmouth bass exhibited limited movement. Smallmouth are most active at dawn and dusk (Becker 1983; Todd and Rabeni 1989). Their movements respond to spawning, wanting to remain in their preferred temperature range, prey availability, and cover (Horning II and Pearson 1973; Becker 1983; Todd and Rabeni 1989; Scott and Crossman 1998). They will seek deeper depths during the day to avoid bright light and find a more tolerable water temperature. During the winter, smallmouth will seek deeper depths and become semidormant (Becker 1983; Scott and Crossman 1998).

8.3 Status & Abundance Trends

8.3.1 Abundance

Zimmerman and Parker (1995) found similar densities of smallmouth bass in the forebay, mid-reservoir, and tailraces in lower Columbia River impoundments. Densities of smallmouth bass were lower in the free-flowing portion of the Columbia River and they also were found as far as RKm 71. In recent creel surveys conducted by ODFW, anglers reported catching smallmouth on the downstream side of Puget Island (Jimmy Watts, ODFW, personal communication), just downstream of the location reported by Zimmerman and Parker (1995). Because of saltwater intrusion, smallmouth bass are probably not found much farther downstream than Puget Island (Jimmy Watts, ODFW, personal communication).[2]

8.3.2 Productivity

The carrying capacity of the lower Columbia River smallmouth bass habitat is unknown. Parker and Zimmerman (1995) reported that the factors affecting smallmouth bass proliferation in the Columbia and Snake Rivers had not been studied. Since smallmouth bass are not stocked in the lower Columbia River and they continue to be caught and harvested recreationally, there must be some natural reproduction occurring.

8.3.3 Supplementation

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

8.3.4 Harvest

There is no commercial harvesting of smallmouth bass. Current sport fishery harvest regulations for smallmouth bass in the lower Columbia River (Bonneville Pool and below Bonneville Dam) include a limit of five fish with no more than three fish over 15 inches in length. Exploitation rates for the smallmouth bass fishery are very low. Data from WDFW's Volunteer Angler Diary Program revealed that from 1993-2002, three smallmouth bass fishing trips were taken in the lower Columbia River; a combined total of three fish (data was only available for fish ≥10") were caught in a combined effort of 14 hours for a catch per unit effort (CPUE) of 0.21. The state average for CPUE for smallmouth bass for the 11-year period from 1990-2001 was 0.59.

Competitive fishing is not unique to the bass fishery. Fishing contests are very visible and important to the sport of bass fishing in North America. On the national level, competition is almost synonymous with the sport for many anglers. However, in Washington, the level of competitive bass fishing by comparison is relatively subdued. Most bass clubs sponsoring tournaments in Washington believe fishing contests are for enjoyment and to promote the sport and conservation ethic.

The results of bass fishing contests held in Washington since 1978 show a low of 38 contests in 1983 and a high of 178 in 2002. As the number of bass fishing contests began to increase, fish managers and some anglers began to be concerned about their potential impacts. In 1984, WDW undertook a study and concluded that bass fishing contests—at the current or projected level of future activity—did not have a significant impact on Washington's bass resources (Fletcher 1986).

[2] As far upstream as RKm 33 daily and, under low flows, as far upstream as RKm 50.

In 1987, WDW changed fishing contest rules and began to require permits for all clubs and/or sponsors. Most contests target *bass* rather than smallmouth bass. Since 1987, 41 fishing contests have been held in the lower Columbia River—all but one below Bonneville Dam—and 31 reported catching smallmouth bass (Table 8-2). The yearly number of contests ranged from 0-9. Although these tournaments are catch and release fishing, some mortality occurs (99.8% of the fish released alive). Compared to other fishing contents around the state, the CPUE for the lower Columbia River is very low. For 1990-2001, the CPUE for the lower Columbia River was 0.10, while for the rest of the state it was 0.59.

8.4 Factors Affecting Population Status

8.4.1 Harvest

8.4.1.1 Tournament Fishing

Since 1987, 41 bass fishing contests (registered with WDFW) have been held in the lower Columbia River (Table 8-2). Smallmouth bass were caught in 34. Almost all were released alive. The CPUE ranged from 0.01 to 0.24 fish per hour. The catch rate does appear to be lower in the lower Columbia River than in other parts of the Columbia River basin, and is fairly comparable to the average catch rate for the entire state. For example, in 2001, the CPUE for the lower Columbia River was 0.17 and the statewide average was 0.20, while the average for five Columbia and Snake River impoundments was 0.29.

Table 8-2. Bass fishing contests held in the lower Columbia River, 1987-2001.

Year	Contests	Smallmouth Bass Caught	Fish Caught	Pounds	% Released	CPUE
1987	0	0				
1990	5	2	20	1.5	100	0.05
1991	2	1	1	2.5	100	0.01
1992	4	2	42	7.8	100	0.04
1993	2	1	24	36.4	100	0.24
1994	2	2	3	1.9	100	0.01
1995	1	1	2	4.6	100	0.01
1996	3	3	37	65.8	100	0.12
1997*	3	3	188	353.2	100	0.15
1998	2	2	15	9.0	100	0.07
1999	1	1	1	1.0	100	0.01
2000	9	9	307	343.3	98	0.09
2001	7	7	190	381.4	100	0.17
Total or Average	41	34	830	1208.4	99.8	0.08

* one tournament was held in Bonneville Pool

8.4.1.2 Sport Fishing

From 1991 to 2002, creel survey data for smallmouth bass was collected during sturgeon creel surveys at Bonneville Pool and below Bonneville Dam (Dennis Gilliland, WDFW, personal communication; Eric Winthrop, WDFW, personal communication). The data collected at Bonneville Pool (1993-2001) suggests that the low exploitation rate continues (Table 8-3). A total of 31,981 smallmouth bass were caught in the sport fishery from 10,237 trips during 1993-2001 in Bonneville Pool by Washington anglers. Smallmouth were not caught in three years (1997, 1999, and 2000). The reported harvest was 6,410 fish (range 5-28%, average = 20%) and the average CPUE was 3.12 fish per trip (range 0-4.63).

Table 8-3. Smallmouth bass harvest, catch, and effort estimates from creel surveys conducted at Bonneville Pool (1993–2001) and below Bonneville Dam (1991–2002).

	Bonneville Pool			Below Bonneville Dam		
Year	Harvest	Catch	Trips	Harvest	Catch	Trips
1991				*	*	*
1992				*	*	*
1993	1,764	6,365	1,993	*	*	*
1994	1,739	8,543	2,782	*	*	*
1995	1,227	10,784	2,330	*	*	*
1996	767	2,808	1,384	*	*	*
1997	0	0	102	*	*	*
1998	9	198	237	*	*	*
1999	0	0	118	*	*	*
2000	0	0	15	*	*	*
2001	904	3,283	1,276	*	*	*
2002				295	1,686	
Total	6,410	31,981	10,237	295	1,686	

* Data was not available for inclusion in this report

8.4.2 Supplementation

There is one hatchery in Washington State (Meseberg Hatchery) with the facilities for rearing smallmouth bass. The smallmouth bass population in the lower Columbia River is self-sustaining and there are issues with the interaction of bass with salmonids. Therefore, there are no plans for supplementation of smallmouth bass in the lower Columbia River.

8.4.3 Water Development

Dam construction has inadvertently created habitat suitable for smallmouth bass. The once free-flowing Columbia is now a series of large slow-flowing pools. Preferred habitat structures became submerged and water temperatures have risen toward those favored by bass.

8.4.4 Flow Alterations

Two life stages of smallmouth bass are most vulnerable to current flows (Simonson and Swenson 1990). Of the two, the fry stage is probably the more sensitive to increases in velocity. While fry are developing in the nest, high velocities can displace them and result in catastrophic mortalities. When the young have dispersed from the nest and become independent, their first year survival also can be greatly affected. Shuter et al. (1980) found that growth during the first summer was important for overwintering survival. High stream flows can lower foraging activity

because the smallmouth bass can be forced to occupy areas that are subpar for feeding and growth. Because they may have to expend more energy for positioning, their fitness could be suboptimum for overwinter survival and increased mortality could result. Increased flows also could lead to an increase in turbidity. Rankin (1986) observed that when the current velocity increased, smallmouth bass decreased their foraging behavior and just moved through the habitat instead.

8.4.5 In-Channel Habitat Conditions

As mentioned above, smallmouth bass prefer inhabiting clear lakes and streams; turbidity would affect their presence or absence in a given body of water. Although dredging probably will have a negative affect on smallmouth bass, its impact on smallmouth bass population(s) is uncertain.

8.4.6 Water Quality

Smallmouth bass prefer inhabiting waters with pH values greater than 6.3 (Johnson et al. 1977). In waters where the pH value falls between 5.5 and 6.0, reproduction is limited or altogether absent (Kane and Rabeni 1987). Waters with pH levels less than 5.5 can impact smallmouth bass densities or prevent their colonization (Kane and Rabeni 1987). YOY smallmouth bass are less pH tolerant and prone to slower growth rates and overwintering mortalities in acidified environments (McCormick and Leino 1999).

8.4.6.1 Temperature

Long term (> 7 days) exposure of smallmouth bass juveniles to temperatures below 5°C impairs survival (Horning II and Pearson 1973), and mortality occurs at temperatures above 36°C (Mundahl 1990). During the summer, juvenile smallmouth bass prefer to inhabit areas that are slightly warmer than the preference of adult bass (Barans and Tubbs 1973; Horning II and Pearson 1973; Coutant 1977). Water temperature fluctuations can impact the growth and distribution of smallmouth bass (Hubert and Lackey 1980; Wrenn 1980; Serns 1982; Shuter et al. 1985; King et al. 1999; Zweifel et al. 1999; Stefan et al. 2001). Patton and Hubert (1996) found growth was impaired at 20°C and Oliver et al (1979) found that at 10°C, the fish became inactive and stopped feeding. Sowa and Rabeni (1995) observed that the density of lotic fish greater than 100 mm (TL) decreased as maximum summer temperatures increased from 22-34°C. In some circumstances, smallmouth bass will remain in an area with a water temperature above their comfort range if food and cover are available (Bevelhimer and Adams 1991).

8.4.6.2 Turbidity

Smallmouth bass generally prefer clear water with Secchi depths greater than 3 meters (Johnson et al. 1977). Turbidity will affect their presence or absence in or within a given body of water (Bayley and Peterson 2001). Smallmouth bass prefer water with nephelometric turbidity unit (NTU) readings of 1.6 or less. Smallmouth bass are somewhat intolerant of waters having NTU readings between 1.6 and 4.0 (Whittier and Hughes 1998). High levels of turbidity can reduce the visual search range of smallmouth bass (Paragamian and Wiley 1987), which would decrease foraging efficiency and result in poor growth.

8.4.6.3 Dissolved Gas

At the northern end of its range, smallmouth bass inhabit lakes with dissolved oxygen (DO) levels of 2.9 to 6.5 mg/L (Johnson et al. 1977). The early life stages of smallmouth bass are most susceptible to low DO levels. The survival of swim-up fry may decrease by 20% if DO

levels are around 4 mg/L and the water temperature is 20°C. If the DO levels were to decrease further to 2.5 mg/L, almost all the swim-up fry would die within one week of exposure. The hatching of smallmouth bass would be averted when DO levels fall below 1.5 mg/L (Siefert et al. 1974).

8.4.6.4 Chemicals

Acidification of water causes aluminum to be released from the sediments (Horne and Goldman 1994), and this can result in deformities, reduced activity, and abnormal swimming behavior, which in turn would increase the susceptibility of smallmouth bass to natural mortality (Kane and Rabeni 1987).

There is also the possibility of bioaccumulation of methylmercury. Since smallmouth bass are piscivorous, there is the possibility of bioacummulating methylmercury from predation on fish. Please refer to section .1.1.1.4.6.4 in the walleye species overview chapter.

8.4.7 Species Interactions

8.4.7.1 Competition

The smallmouth bass has the opportunity to interact intra- and interspecifically at various levels of its life history for food and spawning sites (Vander Zanden et al. 1997; Scott and Crossman 1998). Competing for food with other fishes is not a serious limiting factor (Scott and Crossman 1998). Juvenile smallmouth bass may compete with other non-game fishes or even themselves for food and shelter (Schlosser 1987; Easton and Orth 1992).

8.4.7.2 Predation

The fry and juvenile stages of smallmouth bass are susceptible to predation by older smallmouth bass, other species of fish (i.e., northern pikeminnow Zimmerman [1999]), crayfish, frogs, and birds (Beck 1983).

8.5 Inventory & Assessment of Existing Management Plans

Draft Warmwater Fish Management Plan (currently for WDFW internal discussion only).

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