Results from the 2016 Fall Walleye Index Netting Surveys in Washington State

Washington Department of FISH and WILDLIFE

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Suggested Citation: Schmuck, M.R. 2017. Results from the 2016 Fall Walleye Index Netting Surveys in Washington State. Washington Department of Fish and Wildlife. Olympia. 50pp.

Cover photos courtesy of WDFW and Dave Graybill.

Acknowledgements

Walleye index netting surveys require a tremendous amount of planning and coordination between agencies, fisheries managers and volunteer groups. Without a dedicated workforce we would not be able to accomplish these important surveys in a timely manner.

From the WDFW we thank Bruce Baker, Kenny Behen, Dave Burgess, Steve Caromile, Ross Copeland, Marc Divens, Danny Garrett, Evan Haug, Alainah Hendrickx, Paul Hoffarth, Leslie King, Kent Mayer, Randall Osborne, Marc Petersen, Matt Polacek, Rochelle Polacek, Kourtney Siese, Aulin Smith, Justin Spinelli and Mike Wilkinson. A special thanks to Lucinda Morrow, from the WDFW Fish Aging Lab, who aged Walleye collected during FWIN.

We are extremely grateful to the Confederated Tribes of the Colville Reservation as well as the Spokane Tribe of Indians for their valuable assistance on the FDR FWIN survey.

From the Confederated Tribes of the Colville Reservation we thank Charlee Capaul, Denise Condon, Hank Etue, Bryan Jones, Charles Joseph, Jeffery Joseph, Bill Laramie, Holly McLellan, Jason McLellan, Daniel Monaghan, Robert Thomas and Shay Wolvert.

From the Spokane Tribe of Indians, we thank Alix Blake, Donny Carter, Dan Curd, Alexander Kain, Elliott Kittel, Tamara Knudson, Chas Lawson, Rick McCrea, Randy Peone and Reuben Smit.

We would also like to thank our dedicated volunteers: Ben Addink, Chase Addink, Don Brooks, Terry Bunten, Mateo Gramse, Roseanne Green, Ashley Jahns, Chris Kossik, Dale Schielke, Dick Southwick, Trevor Thompson, Gene VanLiew, Bryan Witte, as well as Pier 4 Sunrise RV Park for the use of their facilities, and residents and staff of Mardon Resort.

The author would also like to thank Marc Petersen, Chad Jackson, Bruce Bolding and Steve Thiesfeld who provided a thoughtful critique of this manuscript.

Abstract

We conducted Fall Walleye Index Netting (FWIN) surveys on five waters in central and eastern Washington (Lake Roosevelt, Banks Lake, Moses Lake, Potholes Reservoir and Scooteney Reservoir) in fall 2016 to monitor population abundance and biological parameters of Walleye *Sander vitreus*. Walleye abundance, measured in terms of gill net catch-per-unit-effort (CPUE), decreased from 2015 on Lake Roosevelt, Potholes Reservoir and Scooteney Reservoir. Potholes Reservoir and Scooteney Reservoir had the highest decreases in Walleye abundance from 2015. Despite these declines, these populations are still healthy and contain high numbers of Walleye in multiple year-classes. The increase in CPUE on Banks Lake was due to strong age–1 year class. Moses Lake, Potholes Reservoir and Banks Lake had the highest percentage of Walleye at least 16 inches. Moses Lake and Potholes Reservoir had the fastest growing fish, with Walleye reaching 18 inches by fall at age–2. In addition to Walleye, Lake Whitefish were very abundant in Lake Roosevelt and Banks Lake, representing 28% and 20% of the total fish collected on those waters, respectively. Yellow Perch declined in abundance on all of our FWIN waters in 2016. Walleye anglers should find excellent fishing opportunities on all FWIN waters, but anglers in search of larger Walleye should focus their effort on Banks Lake, Moses Lake and Potholes Reservoir.

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Introduction

Walleye *Sander vitreus* represents an important recreational fishery resource in Washington and is a popular sport fish among anglers. Routine monitoring and evaluation of sport fisheries is essential in order to make effective and timely management decisions. One aspect of Walleye management is to maximize recreational opportunities for anglers while maintaining healthy, balanced fish communities. This includes recognizing when and where abundant harvest opportunities exist for Walleye and ensuring recreational anglers are made aware of these opportunities.

The Washington Department of Fish and Wildlife (WDFW) began monitoring important Walleye populations in Washington in 2002 using the Fall Walleye Index Netting (FWIN) methodology (Morgan 2000). The FWIN methodology was developed in Ontario, Canada as a means of monitoring a wide variety of biological parameters in Walleye populations in a standardized fashion using gill nets.

Each fall since 2002, staff from WDFW, Confederated Tribes of the Colville Reservation and the Spokane Tribe of Indians, along with numerous volunteers, have collected biological information on Walleye from five populations in central and eastern Washington. Our principle goals are to maximize recreational opportunity and maintain healthy fish communities in lakes where Walleye are a primary predator and are targeted by anglers. This information has helped fisheries managers develop and shape Walleye angling regulations specific to those populations.

This report summarizes our findings from the 2016 FWIN surveys in Washington and is primarily intended to provide anglers with updates on popular fisheries on FWIN lakes in Washington.

Methods

Sampling Area

We conducted FWIN surveys on five Walleye lakes in central and eastern Washington: Lake Roosevelt (hereafter referred to as FDR) (*Stevens County*), Banks Lake, Moses Lake, Potholes Reservoir (*Grant County*) and Scooteney Reservoir (*Franklin County*) (FIGURE 1). The FWIN surveys are conducted in fall when surface water temperatures are 50–59°F. This temperature range is one at which Walleye are more equally distributed throughout lakes, increasing our opportunity to collect a representative sample of the Walleye population.

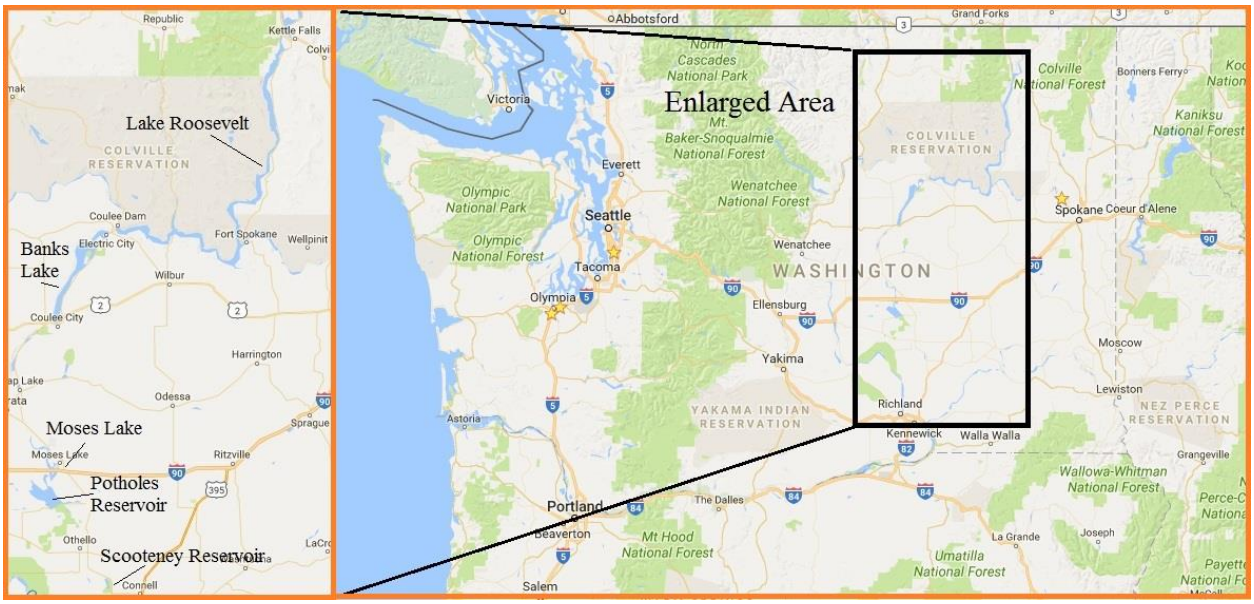

FIGURE 1. Map of FWIN lakes in Washington

Sampling Effort

The number of nets set per lake is based on two factors: Lake surface area and the number of Walleye collected. The recommended number of nets set per lake is based on lake acreage, with larger lakes receiving more sampling effort than smaller lakes (TABLE 1). This is an attempt to ensure comparable sampling effort for each lake from a statistically valid standpoint.

The status of Walleye populations, as determined from a detailed assessment of biological parameters, can often be assessed from a sample of 300 Walleye. We continue FWIN sampling until 300 Walleye are collected or the recommended number of net sets is achieved, whichever occurs first. For Moses Lake and Potholes Reservoir the 300 Walleye benchmark was achieved before the recommended number of net sets was reached. For Banks Lake and Scooteney Reservoir the recommended number of net sets was reached prior to collecting 300 Walleye. On FDR we set the recommended number of FWIN nets despite having collected over 300 Walleye.

This is necessary in order to make a detailed assessment of the Walleye population on FDR due to its size and habitat diversity.

TABLE 1. Recommended number of FWIN net sets based on lake surface area in acres (based on Morgan et al. 2000).

Water Body	Surface Area (Acres)	Recommended # of net sets
Scooteney Reservoir	710	12
Moses Lake	6,800	18
Potholes Reservoir	14,281	36
Banks Lake	26,866	48
Lake Roosevelt	80,000	150

Sampling Locations

Net set locations are randomly chosen in order to not bias Walleye catch rates and each site is sampled once. Each FWIN net consists of eight, 25 ft. x 6 ft. panels of differing mesh size (1, 1.5, 2, 2.5, 3, 4, 5 and 6–inch) sewn together in ascending order. Nets were set in either shallow (6–15 ft.), deep (15–45 ft.) or pelagic (45+ ft.) water, on the lake bottom, and soaked for 21–24 hours overnight. Nets were set perpendicular to the shore from shallow to deep water and were set alternately with the small or large mesh end toward the shoreline. Nets were retrieved and returned to shore where fishes were removed, sorted and biological data were collected.

Biological Data

Total length (mm) and weight (g) were recorded for each fish collected. Walleye were processed further and additional biological data collected included: sex, sexual maturity, gonad weight and visceral fat weight (for condition factor). Sex and sexual maturity were determined by features described in Duffy et al. (2000). Otoliths were removed from all Walleye for age and growth determination.

Catch-Per-Unit-Effort

Mean catch-per-unit-effort (CPUE ± 80% CI) is determined by enumerating the total number of Walleye collected and dividing by the total number of net sets. The 80% confidence intervals (CI) are a measure of the precision of mean CPUE based on variation in the number of Walleye collected per net. Yearly CPUE data were compared to the long-term (2002–2016) mean CPUE for each lake. It is important to understand that increases in Walleye abundance are primarily due to increases in Walleye production (age–0 Walleye); however, this increase is not detected until Walleye grow to a size that allows us to catch them effectively in gill nets. This is referred to as *recruiting to the gear*. Walleye typically recruit to FWIN nets at 8–12 inches (around age–1); however, in populations with faster growth (e.g. Moses Lake and Potholes Reservoir) this begins to occur at age–0. Increases in Walleye abundance in a population may also be due to immigration of Walleye into a lake from a connected system. Our FWIN waters are connected via the Columbia Basin Irrigation Project; however, the degree to which immigration of Walleye affects population abundance is poorly understood. Our data suggest that increases in abundance are primarily due to increases of young fish produced in that water.

Length Frequency Distribution

Length frequency distribution is determined by enumerating the number of Walleye grouped within 4-inch length categories and expressing those values as a percent of the total. The 2016 distribution was compared to the previous year's distribution as well as the long-term average length frequency distribution and was used to determine the percent of harvestable Walleye in the population. In this document we consider harvestable Walleye to be those at least 16 inches in length. It has been found that this is the size at which anglers prefer to begin harvesting Walleye (Responsive Management 2013), although we encourage anglers to retain all legal-sized (i.e. 12 inches or greater) Walleye.

Age Determination

Walleye ages were determined from otoliths, which provide a precise age estimate. Otoliths are fish ear bones, which have growth rings analogous to growth rings in a tree. Age distribution was determined by enumerating the number of Walleye collected at each age-class and expressing these values as a percent of the total. This distribution was compared with the previous year as well as the long-term average age distribution.

Length-at-Age

Length-at-age is determined by calculating the average length of Walleye at a given age. Comparisons were made to regional averages from northern and southern FWIN lakes. The northern lakes average is the regional length-at-age average for Walleye from FDR and Banks Lake from 2002–2016. Banks Lake and FDR are meso-oligotrophic reservoirs (Polacek 2013,

McClellan et al. 1999). These lakes are characterized by moderately high transparency and low to moderate primary productivity which corresponds to slow growth of Walleye. The southern lakes average is the regional length-at-age average for Walleye from Moses Lake, Potholes Reservoir and Scooteney Reservoir. These lakes are eutrophic lakes characterized by low transparency and high primary productivity which corresponds to fast Walleye growth rates.

Age-at-Maturity

Understanding the age at which the majority of fish in a population reach sexual maturity allows fisheries managers to set regulations to reduce harvest on juvenile fish where necessary. The percent of mature Walleye at a given age is an indication of how many of these fish will spawn in the following year, not necessarily how many spawned the previous spring. Percent maturity was determined by calculating the percentage of male and female Walleye that were mature by fall at each age-class.

Relative Abundance of Fishes

Relative abundance of other fish species are presented but may not be an accurate representation of those populations. Gill nets are used to collect fishes that have a fusiform body shape (spindle shaped; wide in the middle and tapered at each end) and that tend to be more active (e.g. Walleye and Yellow Perch). Low numbers of Largemouth Bass and Bluegill captured during a FWIN survey are not a cause for concern since these species tend to be more territorial and are more effectively sampled using other sampling methods. In addition, lengths of Smallmouth Bass collected in gill nets tend to be higher than those collected via boat electrofisher.

Results and Discussion

Results Summary

In 2016 we saw increases in mean CPUE of Walleye on Banks Lake and Moses Lake. On Potholes Reservoir and Scooteney Reservoir we saw marked decreases in mean CPUE of Walleye, while on FDR we saw a slight decrease in mean CPUE of Walleye (FIGURE 2).

The percentage of Walleye at least 16 inches collected from all lakes varied tremendously in 2016. With the exception of FDR, at least 32% of Walleye collected from all other lakes during FWIN in 2016 were at least 16 inches (FIGURE 3). Only 13% of the Walleye collected in FDR were at least 16 inches.

In 2016 the age–1 year-class was the most abundant collected on FDR and Potholes Reservoir. On Banks Lake the age–4 year-class was the most abundant collected and on Moses Lake and Scooteney Reservoir the age–2 year-class was the most abundant collected.

Walleye from Moses Lake and Potholes Reservoir reached maturity faster than Walleye from all other lakes. The majority of the Walleye in these populations were mature by fall as age–2. Walleye from FDR were the slowest to mature reaching 50% maturity by fall as age–2 for males and age–3 for females.

Walleye in Moses Lake, Potholes Reservoir and Scooteney Reservoir exhibited fast growth with many fish reaching 18 inches by fall as age–2. Walleye in FDR and Banks Lake had slower growth with fish growing to 15 inches by age–3.

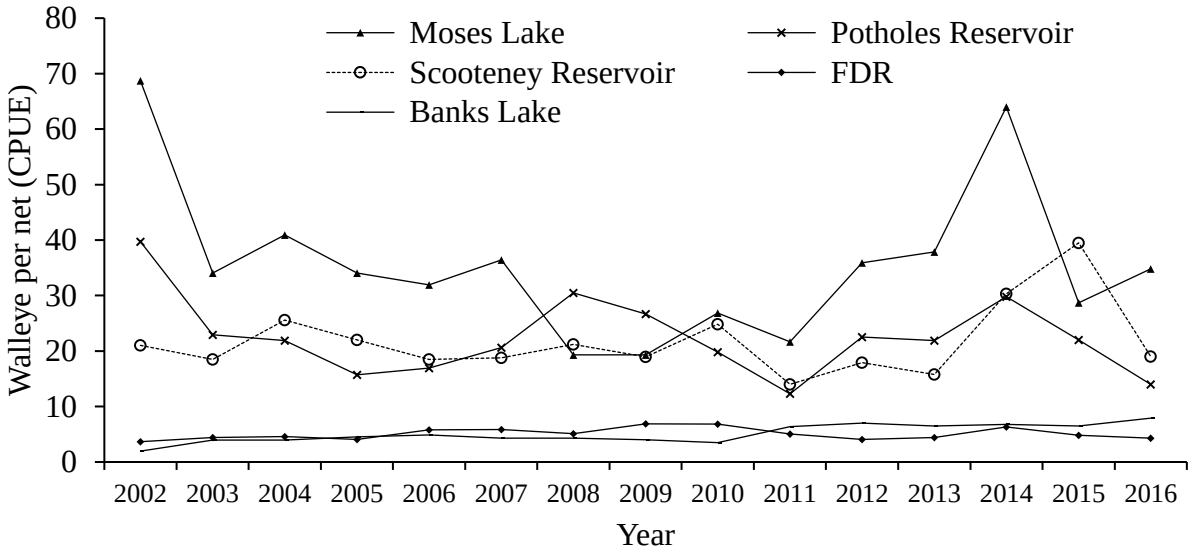

FIGURE 2. Distribution of Walleye CPUEs from all FWIN surveys conducted from 2002–2016.

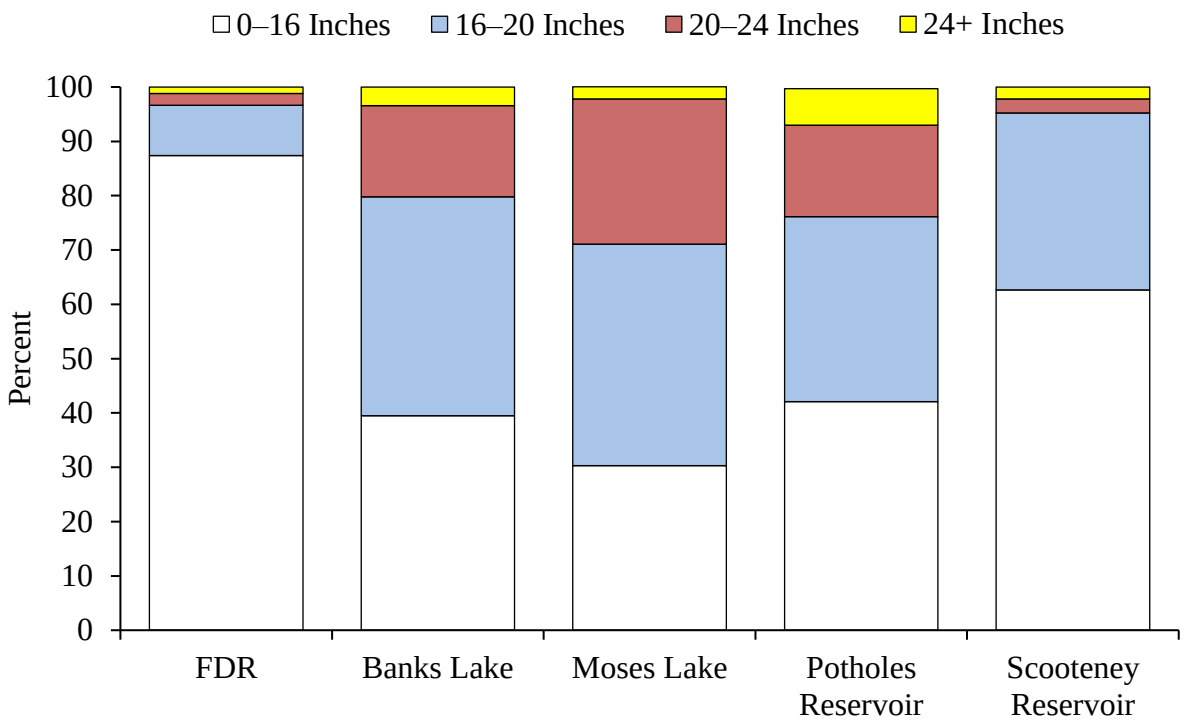

FIGURE 3. Percent size distribution of Walleye, in four size ranges, collected during FWIN surveys in 2016.

Lake Roosevelt (FDR)

Walleye Abundance

We conducted the 2016 FDR FWIN survey October 31 to November 3. A total of 150 FWIN nets were set throughout the reservoir and 650 Walleye were collected. The mean Walleye CPUE on FDR was 4.3 fish per net (FIGURE 4), which is a slight decrease from 2015 (4.8 fish per net) and below the long-term average.

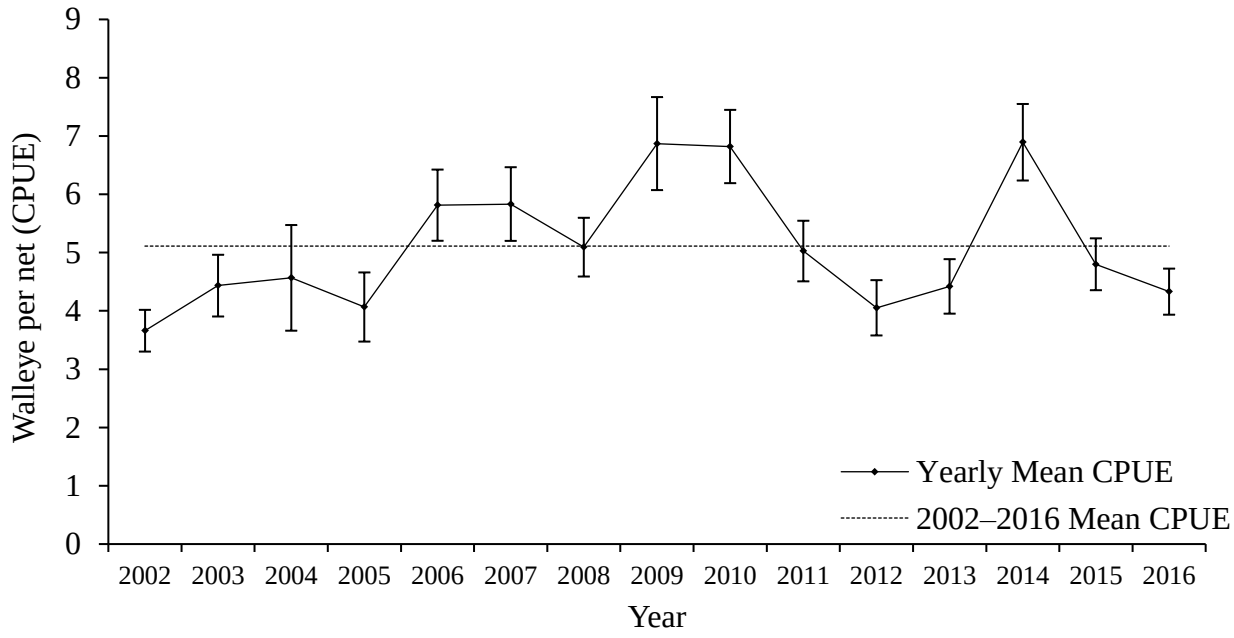

FIGURE 4. Yearly mean (± 80% CI) Walleye CPUE on FDR from 2002–2016 compared to the long-term (2002–2016) mean CPUE.

Walleye Length Distribution

Walleye collected during FWIN on FDR averaged just over 13 inches in 2016, which is identical to what we saw in 2015, but below the long-term average (14 inches). Approximately 13% of Walleye collected in 2016 were at least 16 inches (FIGURE 5). This is the lowest percentage of Walleye at least 16 inches collected in FDR since 2012. The relative abundance of Walleye in the 8–12, 12–16 and 16–20 inch range was at the long-term average in 2016. Overall, there were fewer large Walleye collected in 2016 which may indicate fewer large fish available for anglers in 2017.

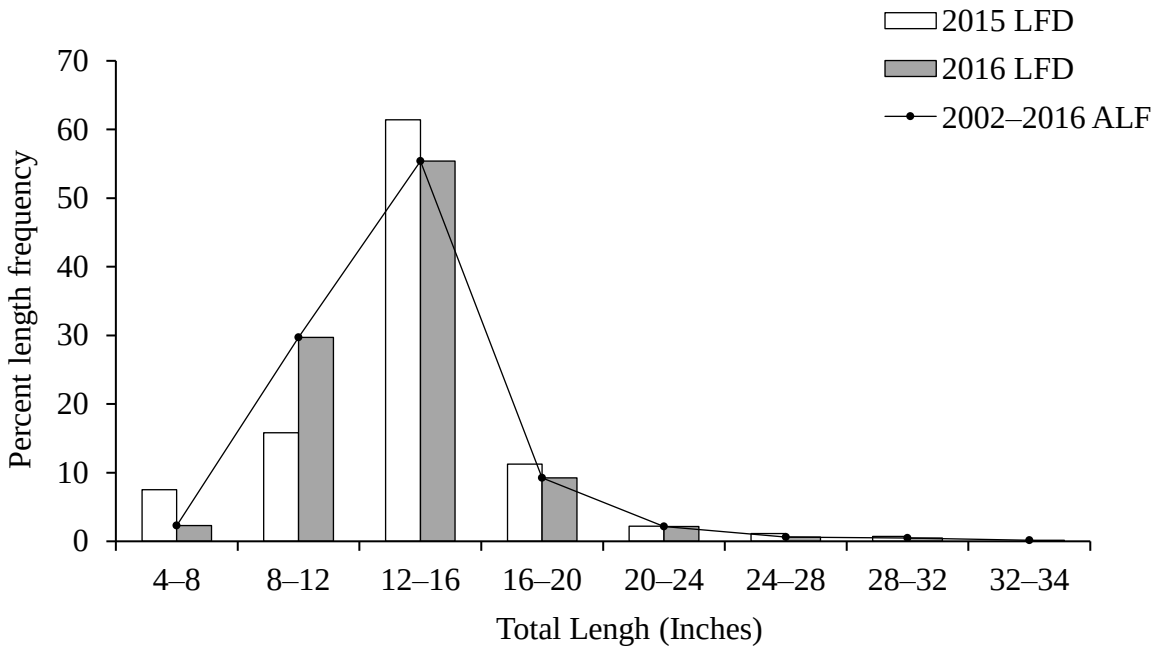

FIGURE 5. Percent length frequency distribution (LFD) of Walleye collected during FWIN on FDR in 2016 compared to 2015 and the average length frequency (ALF) from all FWIN surveys on FDR from 2002–2016.

Walleye Age-class Distribution

A total of 12 age-classes were collected during the 2016 FDR FWIN survey, ranging from 0 to 14 years (FIGURE 6). No age–11, 12 or 13 Walleye were collected. The age–1 and 3 age-classes were well above the long-term average and represented 77% of all Walleye collected. Age–1 Walleye averaged 12 inches, while age–3 Walleye averaged 15 inches. The 2013 year-class of Walleye (currently age–3) has been well above the long-term average since 2013.

FIGURE 6. Percent age distribution of Walleye collected during FWIN on FDR in 2016 compared to 2015 and the average age distribution from all FWIN surveys on FDR from 2002–2016.

Walleye Age at Maturity

When compared to Walleye from warmer, more productive waters (e.g. Moses Lake and Potholes Reservoir) Walleye in FDR were slow to mature. Of the 650 Walleye collected in FDR a total of 162 (25%) were mature. Of these, 146 were male and 16 were female. Four male Walleye sampled were mature in FDR by fall as age–1; however, this is uncommon for this reservoir. By fall as age–3, 86% of male Walleye were mature and by fall as age–4, 100% were mature (FIGURE 7). Only two age–8 male Walleye were collected. One fish was recorded as mature, the other immature. Both were below average for length-at-age (12.4 and 14 inches, respectively). Female Walleye were slower to mature reaching 50% mature by age–4 and 100% by age–5. Walleye populations with slow growth and maturity are more sensitive to weak year-classes since proportionally fewer fish in the population are mature and it takes several years for fish to become mature.

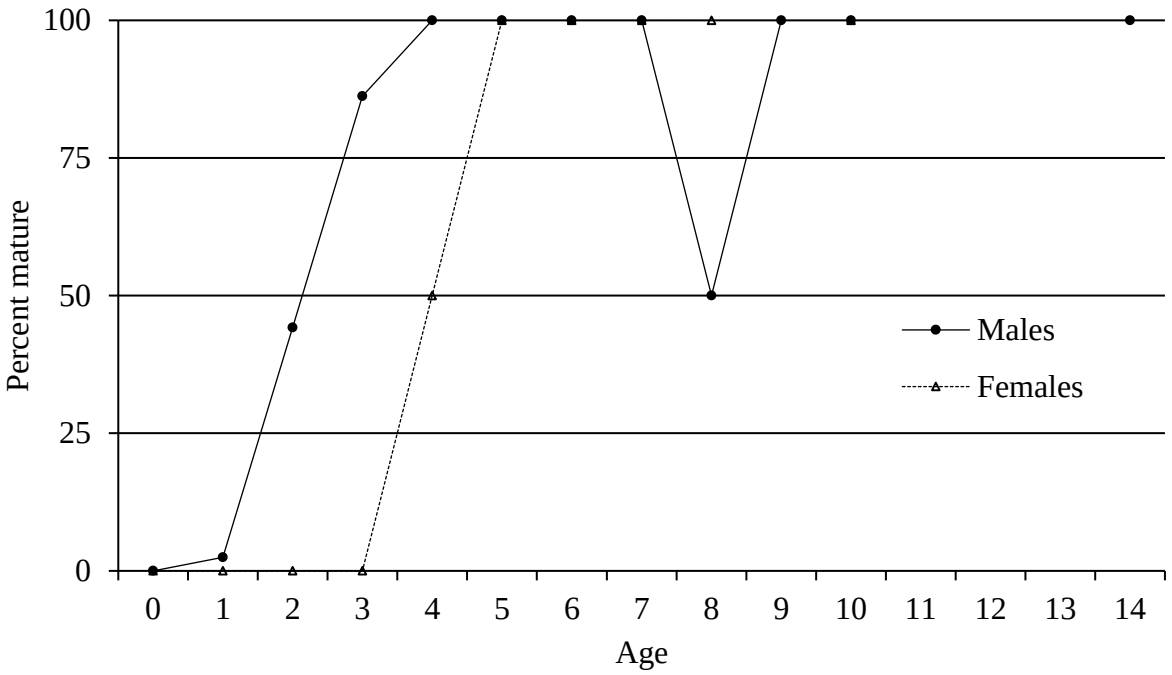

FIGURE 7. Percent of mature male and female Walleye at each age-class collected during FWIN on FDR in 2016. Breaks in data point continuity indicate missing Walleye at that age-class.

Walleye Length-at-Age

Length-at-age of Walleye collected from FDR in 2016 was below both the northern and southern lakes average for most age-classes collected (FIGURE 8). Age–6, 7 and 10 Walleye were above the northern lakes average for length-at-age. One age–14 Walleye was collected; however, this fish had a length of 10 inches. This is uncommon and is either a data collection error or an incredibly slow-growing Walleye. As stated previously, no age–11, 12 and 13 Walleye were collected. Walleye in FDR had the slowest growth rates among all FWIN waters. On average, Walleye in FDR reached 17 inches by fall as age–5 fish.

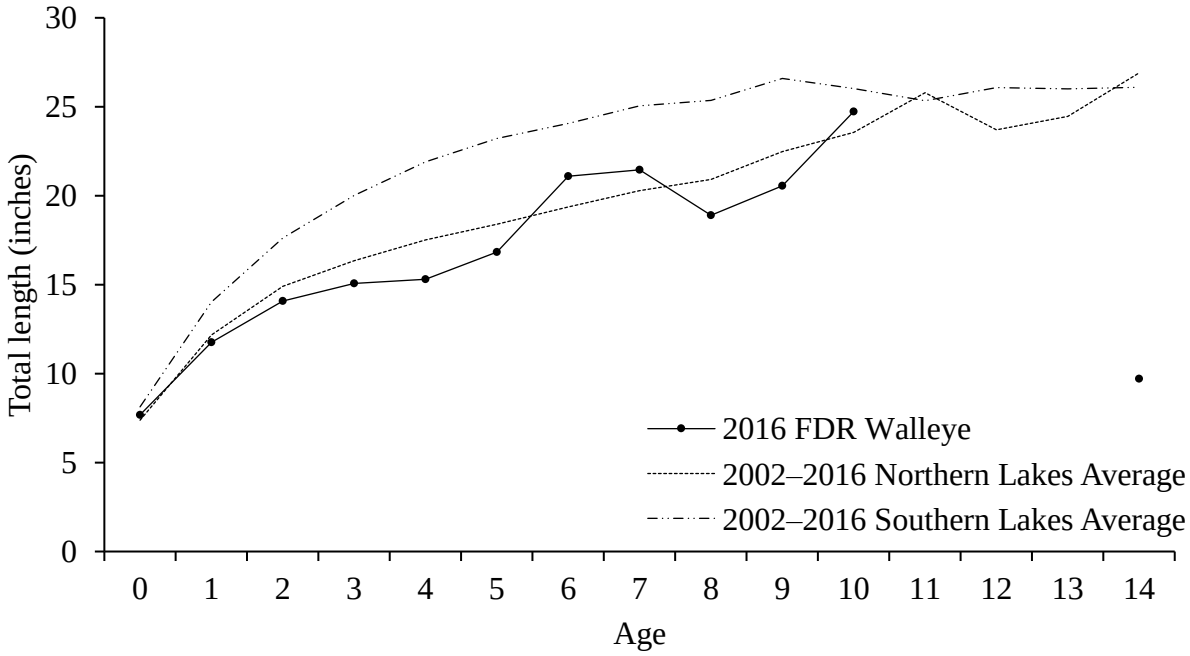

FIGURE 8. Average length-at-age of Walleye collected during FWIN on FDR in 2016 compared to the northern and southern lakes average from FWIN surveys conducted from 2002–2016. Breaks in data point continuity indicate missing Walleye at that age-class.

FDR Fish Community

In addition to Walleye, which was the most abundant species collected, 15 other fish species were collected during the 2016 FWIN survey on FDR, and anglers can expect to find diverse fishing opportunities (FIGURE 9). Lake Whitefish was second in abundance and represented 28% of the total catch followed by Smallmouth Bass (14%) and Burbot (12%). The remaining species ranged from less than 1% to 7% of the total catch. Lake Whitefish are abundant in many of our lakes but this species is underutilized in Washington. This is likely a regional phenomenon but anglers should be aware that Lake Whitefish are a very popular food fish in the upper Midwestern United States since they make excellent table fare. Rainbow Trout fishing can be excellent, especially in winter, due to the cooperative net-pen rearing projects at numerous locations along the reservoir. The net-pen project stocks approximately 750,000 catchable sized Rainbow Trout annually into Lake Roosevelt. Check the latest regulations pamphlet for special trout rules. In addition, please visit http://www.wdfw.wa.gov/fishing/washington/ for informational videos on fishing FDR as well as other lakes throughout Washington.

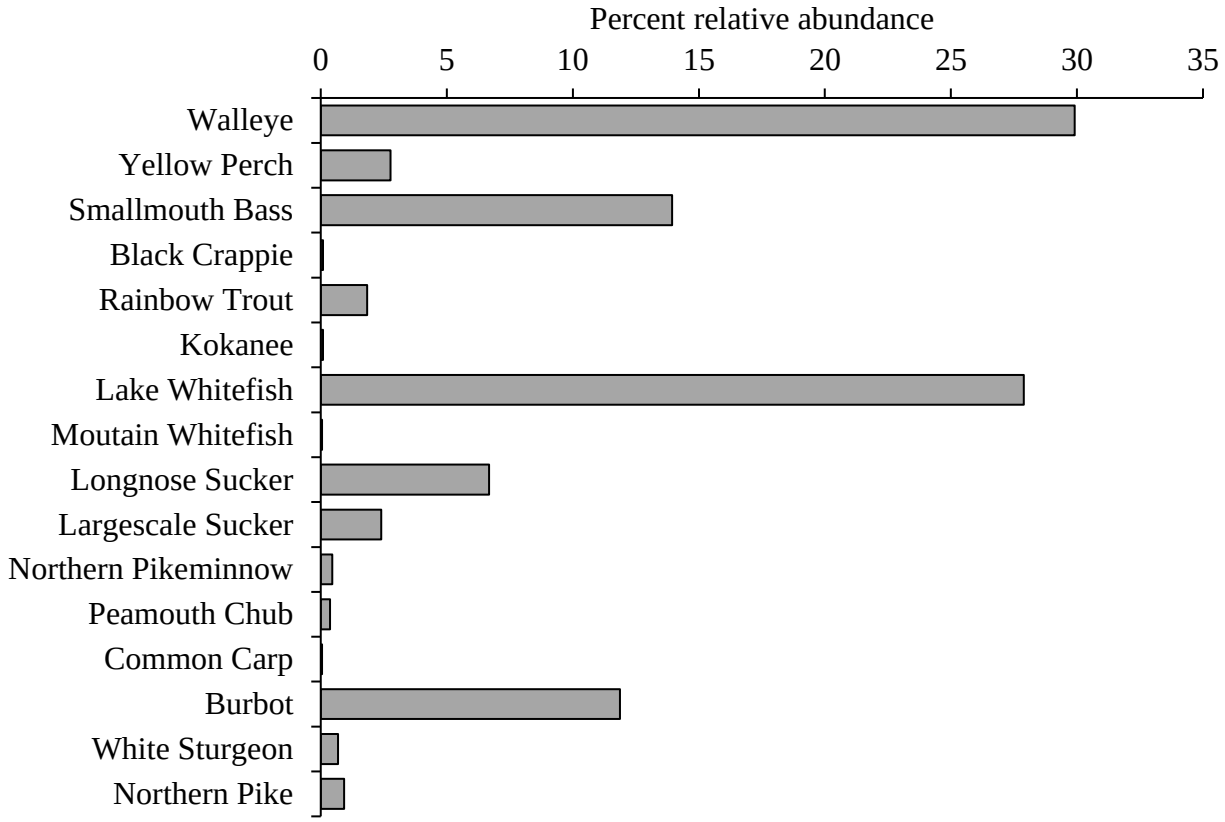

FIGURE 9. Percent relative abundance of the total number of fishes collected during FWIN on FDR in 2016.

Lake Roosevelt Recreational Opportunities

Lake Roosevelt is more than 150 miles in length, from Grand Coulee Dam to British Columbia, Canada. There are numerous access points along the 150 mile length of FDR on both sides. They are owned and operated by state, city, county and federal agencies, along with tribes and private businesses. There are both boat ramps and good shore angling opportunities. There are also numerous campgrounds, resorts and RV parking. The National Park Service operates 35 recreation areas along the 660 miles of shoreline. Maps are available at the Grand Coulee Dam visitor center and WDFW Spokane office. Water level fluctuations can be a problem for boat launching. For current water level information, call (800) 824–4916. For more information on Lake Roosevelt please visit http://www.wdfw.wa.gov/fishing/vacation/lake_roosevelt.html.

Banks Lake

Walleye Abundance

We conducted the 2016 Banks Lake FWIN survey October 9–12. A total of 48 FWIN nets were set throughout the lake and 382 Walleye were collected. The mean Walleye CPUE on Banks Lake was 7.9 fish per net (FIGURE 10) and is the highest CPUE recorded from FWIN on Banks Lake. We have seen above average CPUE of Walleye since 2012 when that year's production of age–0 Walleye surpassed all previous years. Since 2012 this year-class of Walleye, which is now age–4, has represented 52–83% of our total catch.

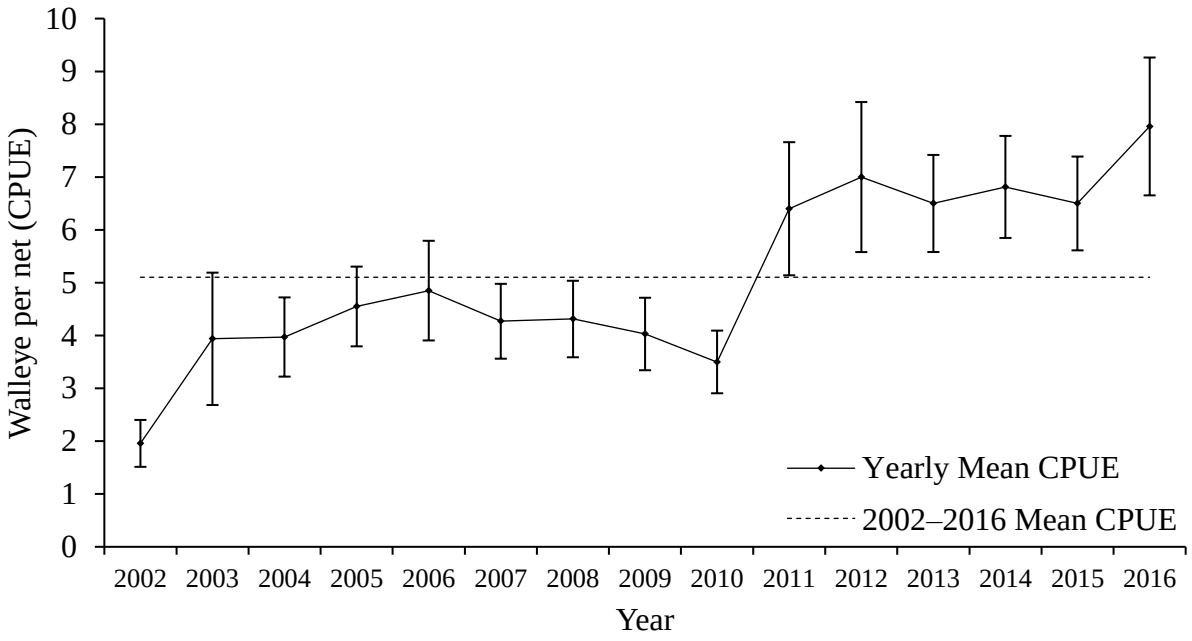

FIGURE 10. Yearly mean (± 80% CI) Walleye CPUE on Banks Lake from 2002–2016 compared to the long-term (2002–2016) mean CPUE.

Walleye Length Distribution

Walleye collected during FWIN on Banks Lake averaged 16.5 inches in 2016. This was an increase from 2015 and above the long-term average (both 15 inches). Approximately 87% of the Walleye collected were between 12 and 24 inches (FIGURE 11). The abundance of 16–24 inch Walleye increased in 2016. Approximately 60% of the Walleye collected were at least 16 inches. Since 2002 we have only seen two years with higher relative abundance of Walleye in this size range. This increase is a good indication that more harvestable Walleye will be available for anglers in 2017.

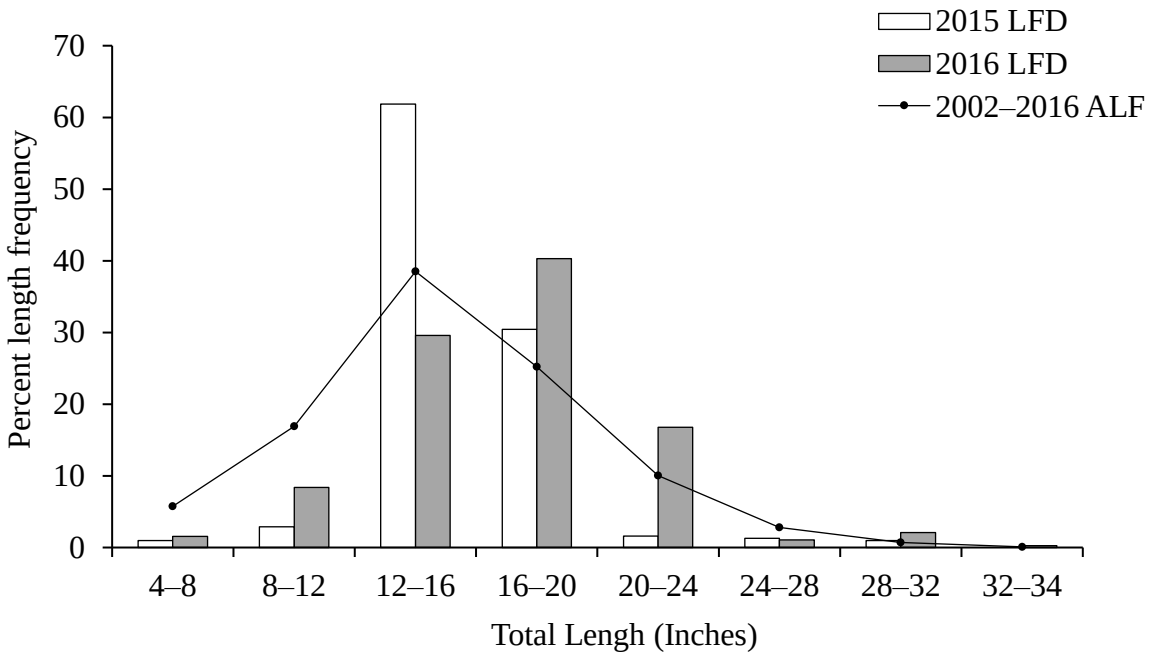

FIGURE 11. Percent length frequency distribution (LFD) of Walleye collected during FWIN on Banks Lake in 2016 compared to 2015 and the average length frequency (ALF) from all FWIN surveys on Banks Lake from 2002–2016.

Walleye Age-class Distribution

A total of thirteen age-classes were collected during the 2016 Banks Lake FWIN survey, ranging from 0 to 21 years (FIGURE 12). Nine year-classes between age–9 and age–20 were not collected. Of the 382 Walleye collected only 18 fish were older than age–4. The age–4 year-class represented 52% of the Walleye collected in 2016. This year-class has been well represented in our samples since 2012, when these fish were age–0. Age–4 Walleye ranged from 15–22 inches and will likely comprise the majority of harvestable fish for anglers in 2017. The age–1 year class was the second most abundant collected and the majority of these fish were less than 15 inches.

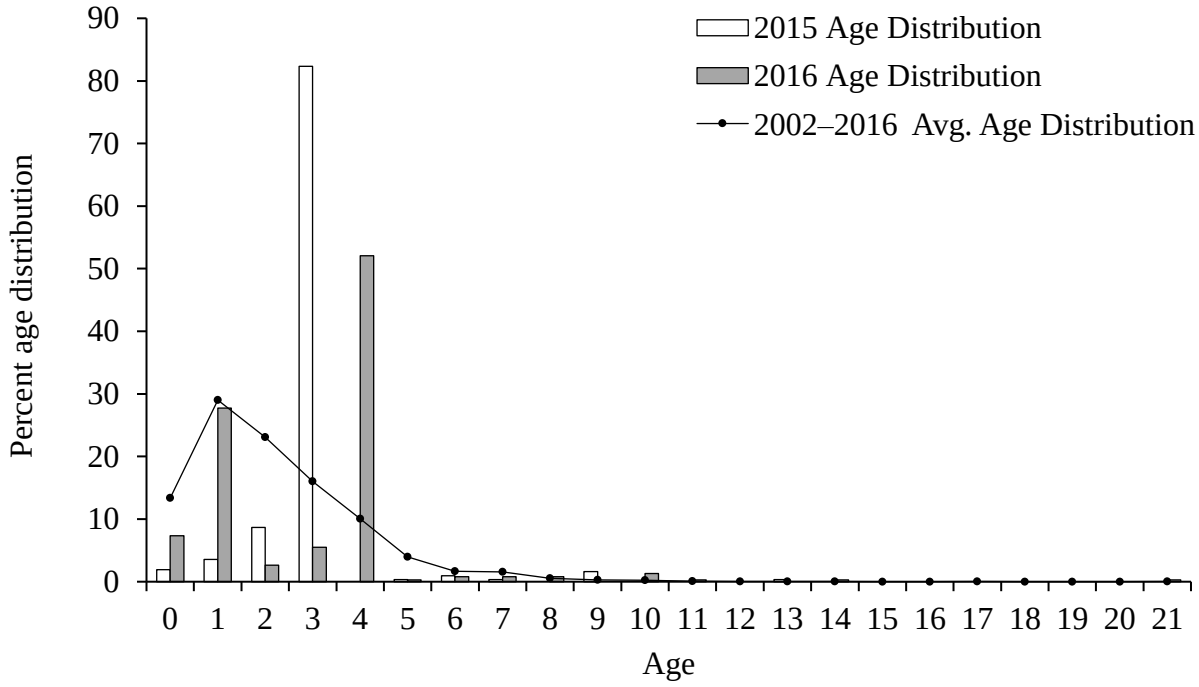

FIGURE 12. Percent age distribution of Walleye collected during FWIN on Banks Lake in 2016 compared to 2015 and the average age distribution from all FWIN surveys on Banks Lake from 2002–2016.

Walleye Age at Maturity

Of the 382 Walleye collected in Banks Lake a total of 193 (50%) were mature. Of these, 56 were female and 137 were male. Approximately 86% of male Walleye were mature by fall as age–2 fish and 100% were mature by fall as age–5 (FIGURE 13). Approximately 50% of female Walleye were mature by fall as age–3 fish and 100% were mature by age–6. Similar to FDR, Walleye in Banks Lake are slower to mature than in Moses Lake, Potholes Reservoir or Scooteney Reservoir.

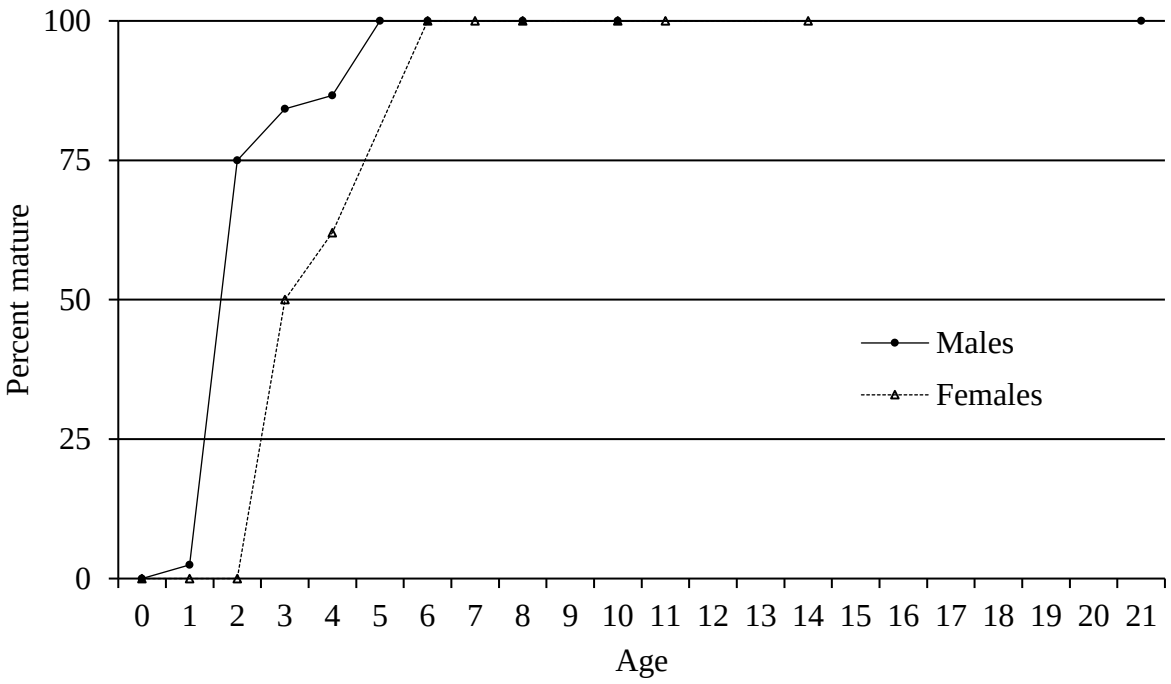

FIGURE 13. Percent of mature male and female Walleye at each age-class collected during FWIN on Banks Lake in 2016. Breaks in data point continuity indicate missing Walleye at that age-class.

Walleye Length-at-Age

Length-at-age of Walleye collected from Banks Lake in 2016 was more variable than in previous years. On average, length-at-age was higher than the northern lakes average for most year-classes (FIGURE 14). Only one age–5 Walleye was collected and this fish was 11 inches. It is possible that this fish was incredibly slow growing, or that this was an error in data collection. Very few fish over age–4 were collected during this survey which often creates inconsistent trends in growth rates. Small samples of fish at these age-classes created inconsistent length-at-age trends that made comparisons with long-term regional averages difficult.

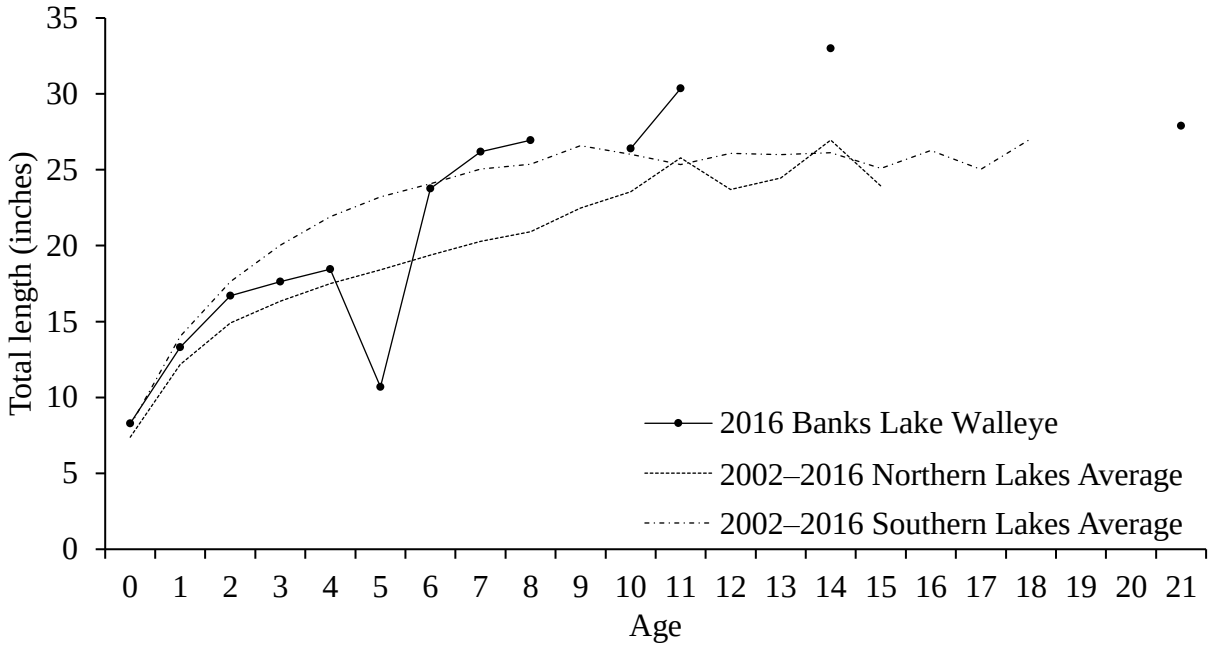

FIGURE 14. Average length-at-age of Walleye collected during FWIN on Banks Lake in 2016 compared to the northern and southern lakes average determined from FWIN surveys conducted from 2002–2016. Breaks in data point continuity indicate missing Walleye at that age-class.

Banks Lake Fish Community

In addition to Walleye, which was second in abundance, 12 other fish species were collected during our 2016 FWIN survey on Banks Lake (FIGURE 15). Yellow Perch was the most abundant species collected and represented 34% of the total catch in 2016. Lake Whitefish was the third most abundant species collected. The relative abundance of Lake Whitefish has decreased since 2014. Remaining species ranged in abundance from 0.1–14% of the total catch. Despite removal efforts by WDFW and increased popularity of this fishery Lake Whitefish remain abundant in Banks Lake and we encourage anglers to seek out, and harvest, Lake Whitefish. Similar to FDR, Banks Lake is an important Smallmouth, and Largemouth Bass fishery hosting several bass tournaments each year. Banks Lake also contains very good opportunities for Yellow Perch, Rainbow Trout, Black Crappie and Kokanee. A Rainbow Trout net-pen rearing project in Coulee City helps provide excellent fishing for Rainbow Trout up to 5 pounds. Kokanee fishing can also be excellent on Banks Lake as approximately 1 million Kokanee have been stocked annually in recent years.

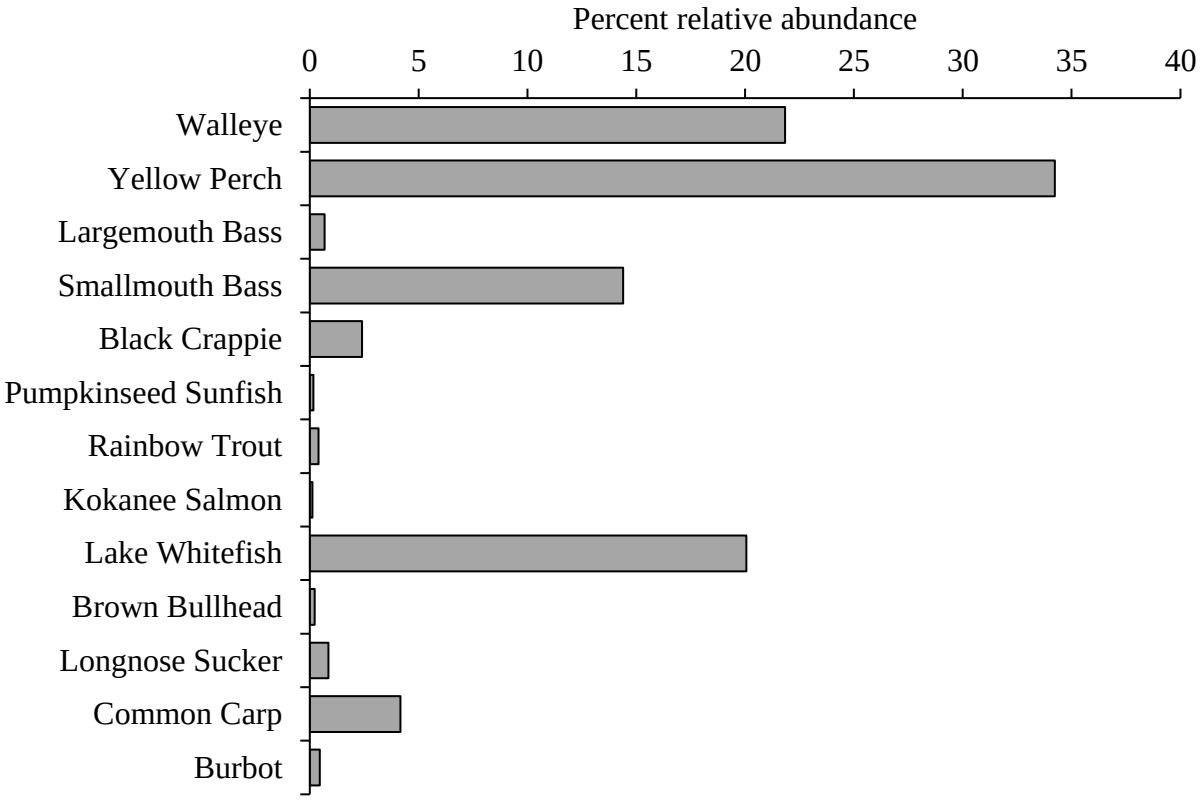

FIGURE 15. Percent relative abundance of the total number of fishes collected during FWIN on Banks Lake in 2016.

Banks Lake Recreational Opportunities

Banks Lake stretches almost 27 miles from Coulee City at the south end to Grand Coulee at the north end and has numerous access points for launching boats and shore angling. Restaurants, lodging as well as city-owned parks (some with water access) can be found in Coulee City, Electric City and Grand Coulee. Steamboat Rock State Park offers camping, trailer and RV hook-ups, well maintained boat ramps, shore angling and it surrounds the "Devil's Punch Bowl", which has very good Largemouth Bass and Black Crappie habitat.

Moses Lake

Walleye Abundance

We conducted the 2016 Moses Lake FWIN survey October 10–12. A total of 9 FWIN nets were set throughout the lake and 314 Walleye were collected. The mean Walleye CPUE on Moses Lake was 34.8 fish per net (FIGURE 16). This is a slight increase from 2015 and very close to the long-term average.

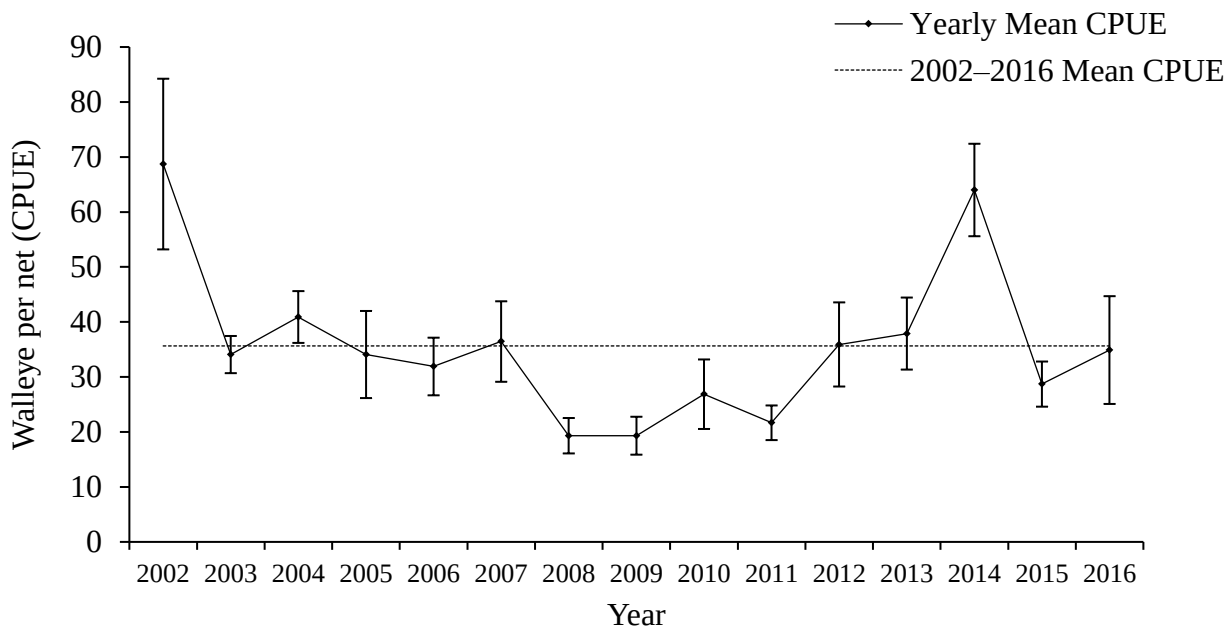

FIGURE 16. Yearly mean (± 80% CI) Walleye CPUE on Moses Lake from 2002–2016 compared to the long-term (2002–2016) mean CPUE.

Walleye Length Distribution

Walleye collected during FWIN on Moses Lake averaged 17 inches in 2016. This is a slight increase from 2015 (16.5 inches) and above the long-term average (16 inches). Approximately 70% of the Walleye collected in 2016 were at least 16 inches and 29% were at least 20 inches (FIGURE 17). Anglers should find a higher percentage of Walleye greater than 16 inches in Moses Lake in 2017 and the increase in abundance of 20–24 inch fish indicates that there will be a higher than average number of trophy Walleye available to anglers.

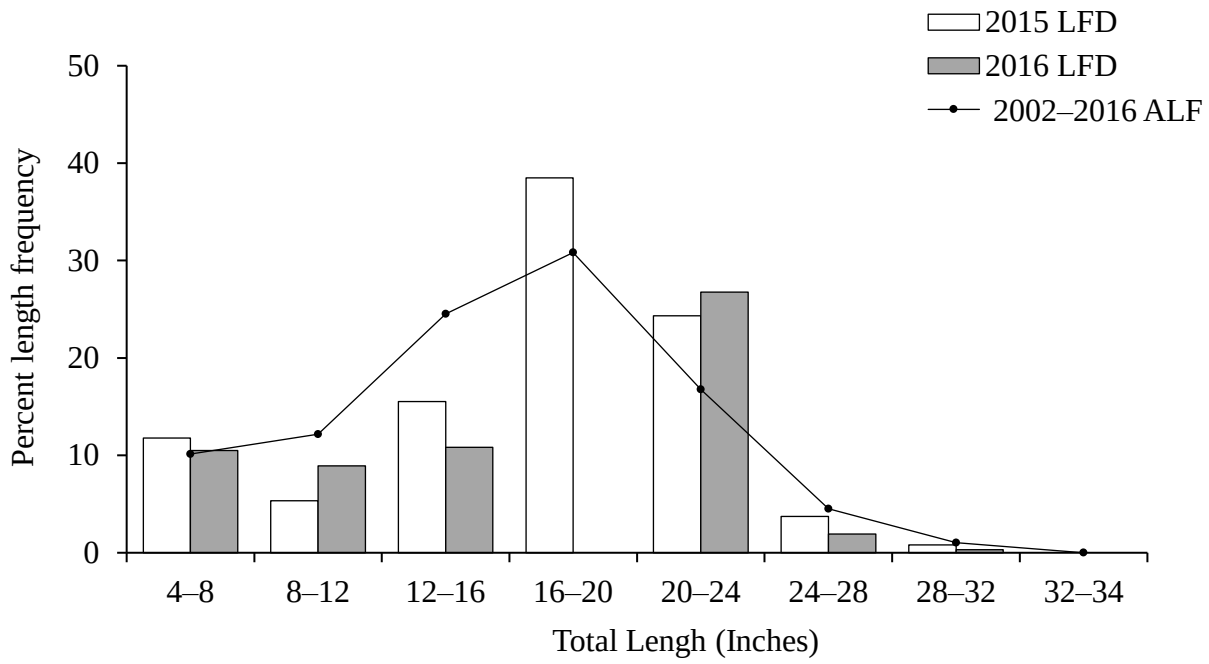

FIGURE 17. Percent length frequency distribution (LFD) of Walleye collected during FWIN on Moses Lake in 2016 compared to 2015 and the average length frequency (ALF) from all FWIN surveys on Moses Lake from 2002–2016.

Walleye Age-class Distribution

A total of 11 age-classes were collected during the 2016 Moses Lake FWIN survey, with fish ranging from 0 to 14 years (FIGURE 18). Walleye aged 6, 9, 11, and 13 were not collected. The age–0 and 2 year-classes were the most abundant collected (FIGURE 18). The percentages of Walleye aged 2, 4 and 7 collected were above the long-term average. Age–2 and 4 Walleye should provide the bulk of the fish available to anglers in 2017.

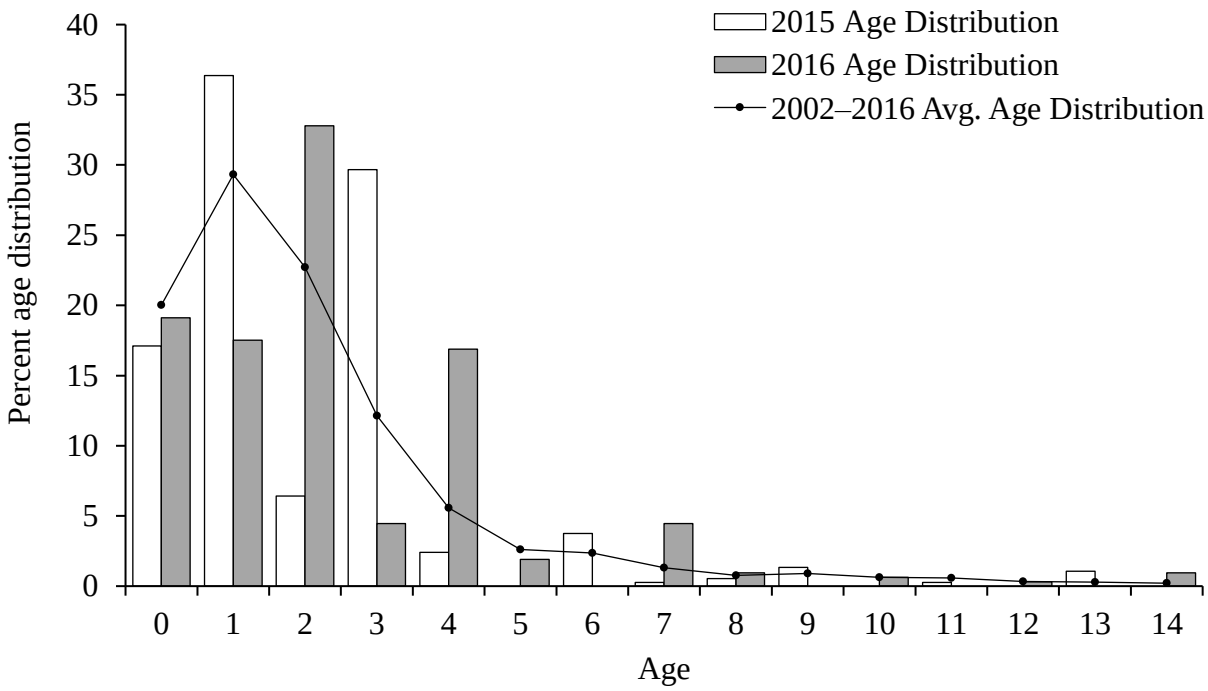

FIGURE 18. Percent age distribution of Walleye collected during FWIN on Moses Lake in 2016 compared to 2015 and the average age distribution from all FWIN surveys on Moses Lake from 2002–2016.

Walleye Age at Maturity

Of the 314 Walleye collected in Moses Lake a total of 222 (71%) were mature. Of these, 52 were female and 170 were male. Male Walleye began to mature by fall as age–1 fish and reached 100% maturity by fall as age–3 (FIGURE 19). A smaller percentage of female Walleye were mature by fall as age–1 fish; however, by fall as age–3 100% of female were mature (FIGURE 19). Walleye in this population mature quickly and this likely contributes to consistently productive year classes each year.

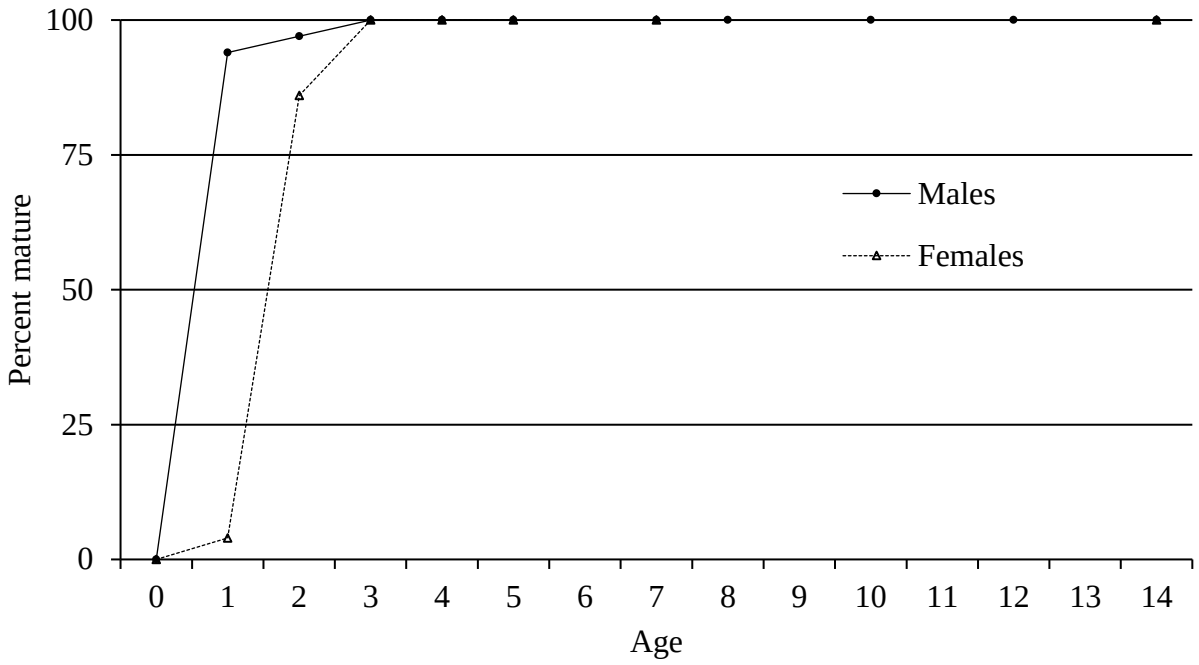

FIGURE 19. Percent of mature male and female Walleye at each age-class collected during FWIN on Moses Lake in 2016. Breaks in data point continuity indicate missing Walleye at that age-class.

Walleye Length-at-Age

Length-at-age of Walleye collected in Moses Lake was above the southern lakes average for fish age–1, and 2. From age–0 to 5 we found a consistent increasing trend in length-at-age. Past age–5 very few Walleye were collected and there was no consistent trend in length-at-age (FIGURE 20). Collecting very few fish in an age-class on any water prevents us from making precise estimates of average length-at-age and estimates for older Walleye should be viewed with caution. Overall, Walleye in Moses Lake exhibited fast growth, with most fish reaching 16–21 inches by fall as age–2. These growth rates were a good indication of abundant forage in Moses Lake and that Walleye will recruit to the sport fishery more quickly than on less productive waters such as FDR and Banks Lake.

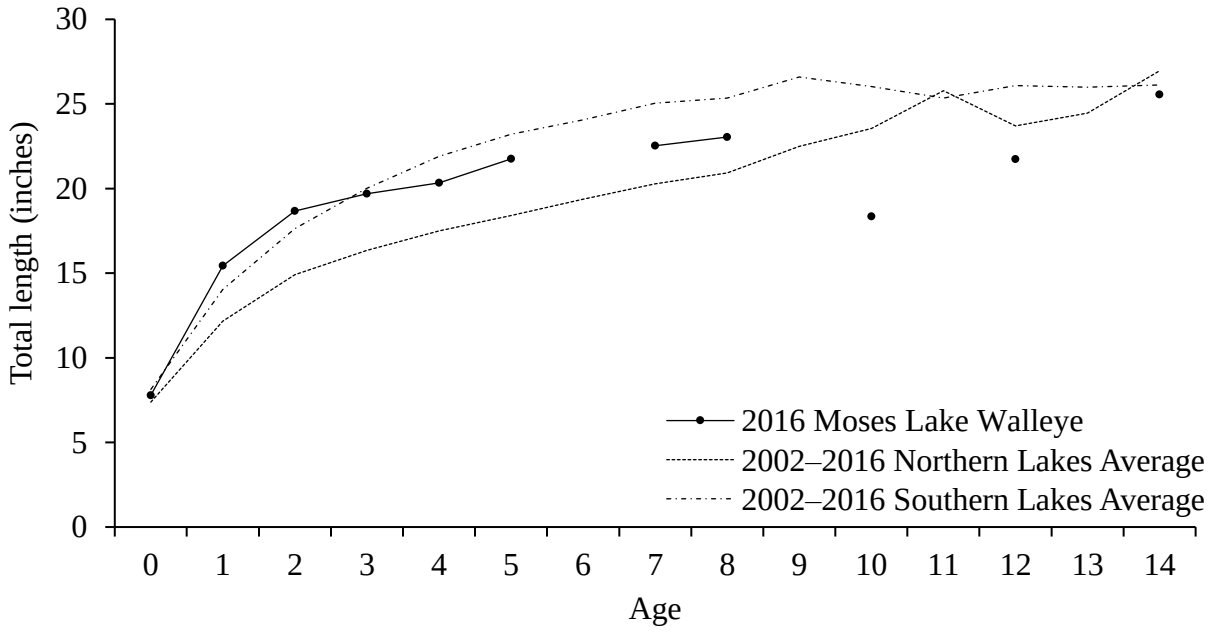

FIGURE 20. Average length-at-age of Walleye collected during FWIN on Moses Lake in 2016 compared to the southern and northern lakes average determined from FWIN surveys conducted from 2002–2016. Breaks in data point continuity indicate missing Walleye at that age-class.

Moses Lake Fish Community

In addition to Walleye, 10 other fish species were collected during this survey (FIGURE 21). Walleye was the most abundant species collected, followed by Black Crappie and Yellow Perch. Black Crappie have increased in relative and overall abundance on Moses Lake; however, the majority of those collected were less than 6 inches. Abundance of Yellow Perch decreased 60% from 2015. In addition, the average size of Yellow Perch decreased compared to 2015. In 2015, 15% were at least ten inches and 3% were at least 12 inches. In 2016, only 9% were at least 10 inches and 4% were at least 12 inches. Historically, Moses Lake has been a popular Walleye and Smallmouth Bass fishery; however, in recent years it has become a well-respected Largemouth Bass fishery with anglers reporting catches of Largemouth Bass weighing 8–10 pounds. Perch fishing can be quite good on Moses Lake, especially during winter near Blue Heron Park. Some anglers also target Common Carp with both hook and line or bow and arrow.

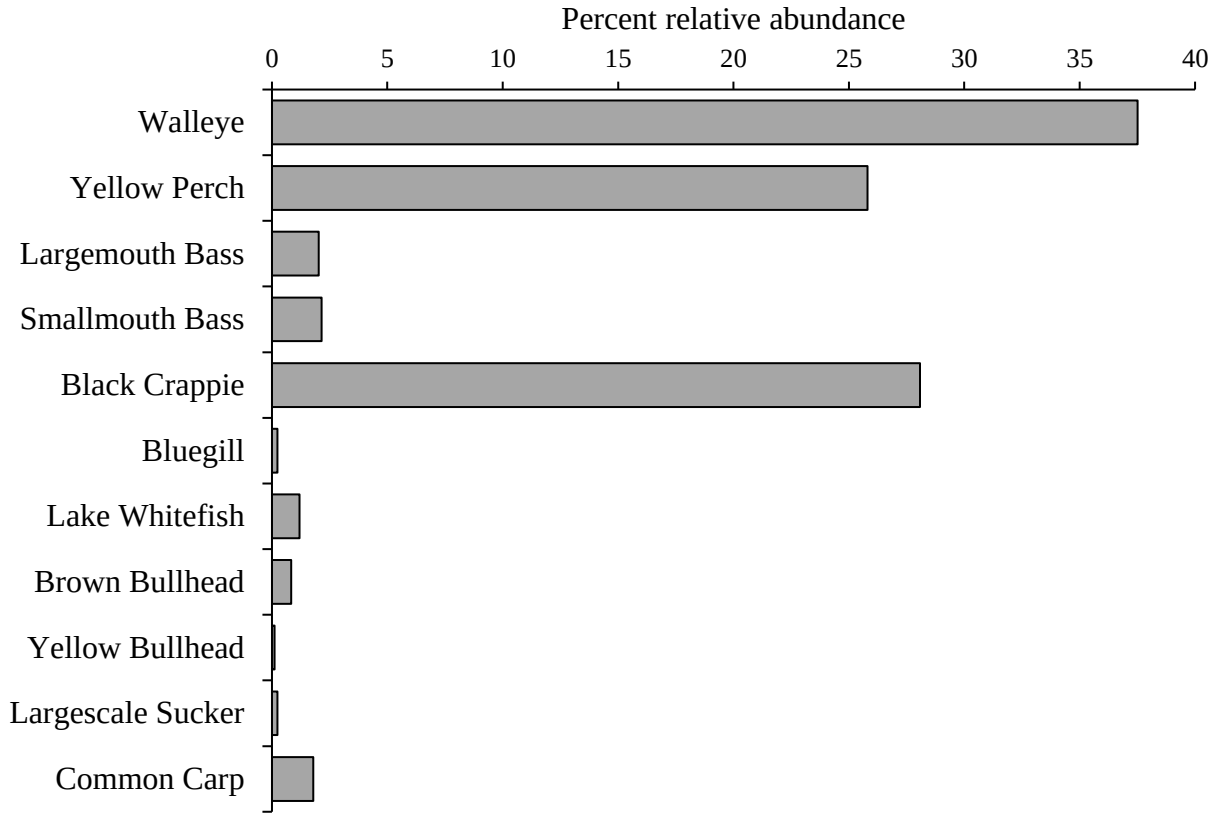

FIGURE 21. Percent relative abundance of the total number of fishes collected during FWIN on Moses Lake in 2016.

Moses Lake Recreational Opportunities

There are six improved public boat launches on Moses Lake and one gravel launch at the north end of the lake. The City of Moses Lake offers lodging and two city-owned parks with boat ramps and docks. In addition to water access these parks offer grass day-use areas with picnic tables. Cascade Park also has camping facilities and boat moorage. An annual "Fishing Kids" derby, held at Cascade Park in early summer introduces youth ages 5–14 to sport fishing.

Potholes Reservoir

Walleye Abundance

We conducted the 2016 Potholes Reservoir FWIN survey October 11–13. A total of 24 FWIN nets were set throughout the reservoir and 330 Walleye were collected. The mean Walleye CPUE on Potholes Reservoir was 14 fish per net (FIGURE 22). This is a decline from 2015 and is well below the long-term average.

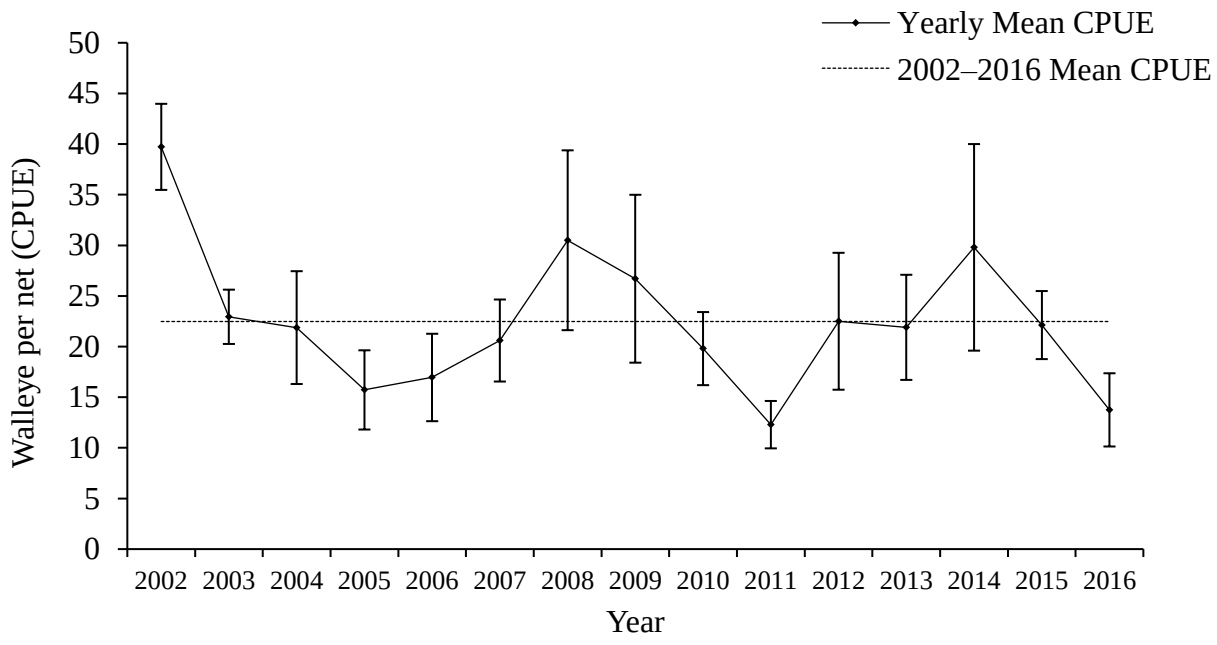

FIGURE 22. Yearly mean (± 80% CI) Walleye CPUE on Potholes Reservoir from 2002–2016 compared to the long-term (2002–2016) mean CPUE.

Walleye Length Distribution

Walleye collected during FWIN on Potholes Reservoir averaged just over 17 inches in 2016. This is higher than the 2015 average length and the long-term average length (both 16 inches). Walleye in the 12–16 inch range represented 34% of the Walleye collected (FIGURE 23). This group averaged 15 inches and should grow to 17–19 inches in 2017. Walleye in the 16–20 inch range increased in relative abundance from 2015. Approximately 58% of the Walleye collected were at least 16 inches. Walleye abundance has declined in Potholes Reservoir, however, there should still be plenty of opportunity for anglers to seek out and fish for large Walleye on Potholes Reservoir in 2017.

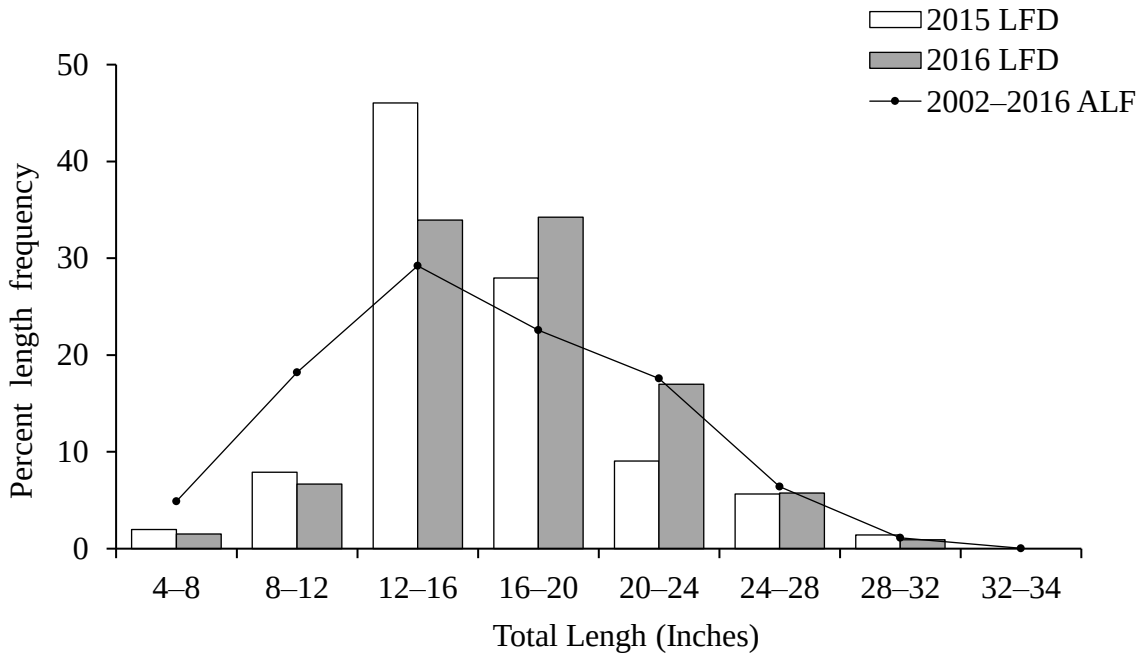

FIGURE 23. Percent length frequency distribution (LFD) of Walleye collected during FWIN on Potholes Reservoir in 2016 compared to 2015 and the average length frequency (ALF) from all FWIN surveys on Potholes Reservoir from 2002–2016.

Walleye Age-class Distribution

A total of 14 age-classes were collected during the 2016 Potholes FWIN survey, ranging from 0 to 17 years. Walleye aged 11, 12, 14 and 15 were not collected. The age–1 year-class was the most abundant, accounting for 43% of the total Walleye collected (FIGURE 24). The relative abundance of age–2 Walleye was above the long-term average and represented 30% of Walleye collected. Walleye older than age–3 represented approximately 16% of all Walleye collected. Relative abundance of age–0 Walleye was well below the long-term average. This may be an indication of a weak 2016 year-class; however, age–0 Walleye are often not collected effectively in gill nets and this may not accurately reflect their abundance in this population.

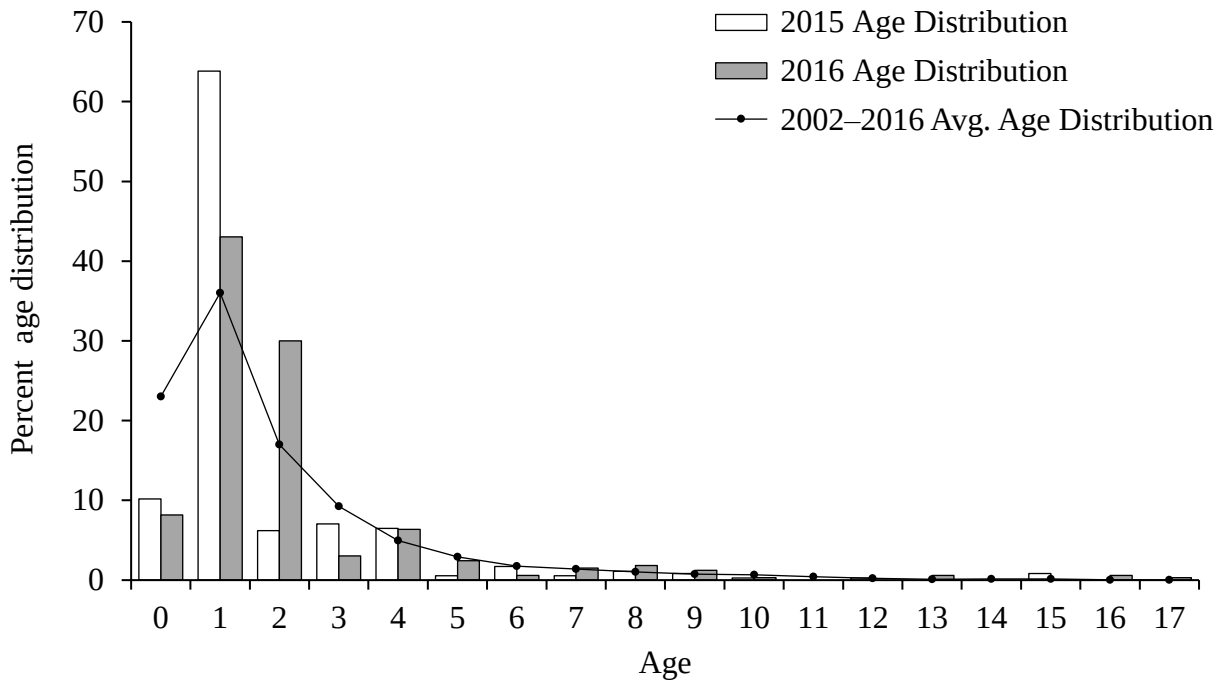

FIGURE 24. Percent age distribution of Walleye collected during FWIN on Potholes Reservoir in 2016 compared to 2015 and the average age distribution from all FWIN surveys on Potholes Reservoir from 2002–2016.

Walleye Age at maturity

Of the 330 Walleye collected in Potholes Reservoir a total of 195 (59%) were mature. Of these, 51 were female and 144 were male. By fall as age–2, 98% of male Walleye collected were mature (Figure 25). Female Walleye were slower to mature reaching 100% maturity by fall as age–3. Only 80% of the age–8 male Walleye were mature due to the fact that we were unable to detect the maturity of one male Walleye. It is possible that this Walleye is slow to mature or this could be an error in data collection. Similar to Moses Lake, Walleye in Potholes Reservoir mature quickly and this population does not suffer as much due to the effects of weak year classes.

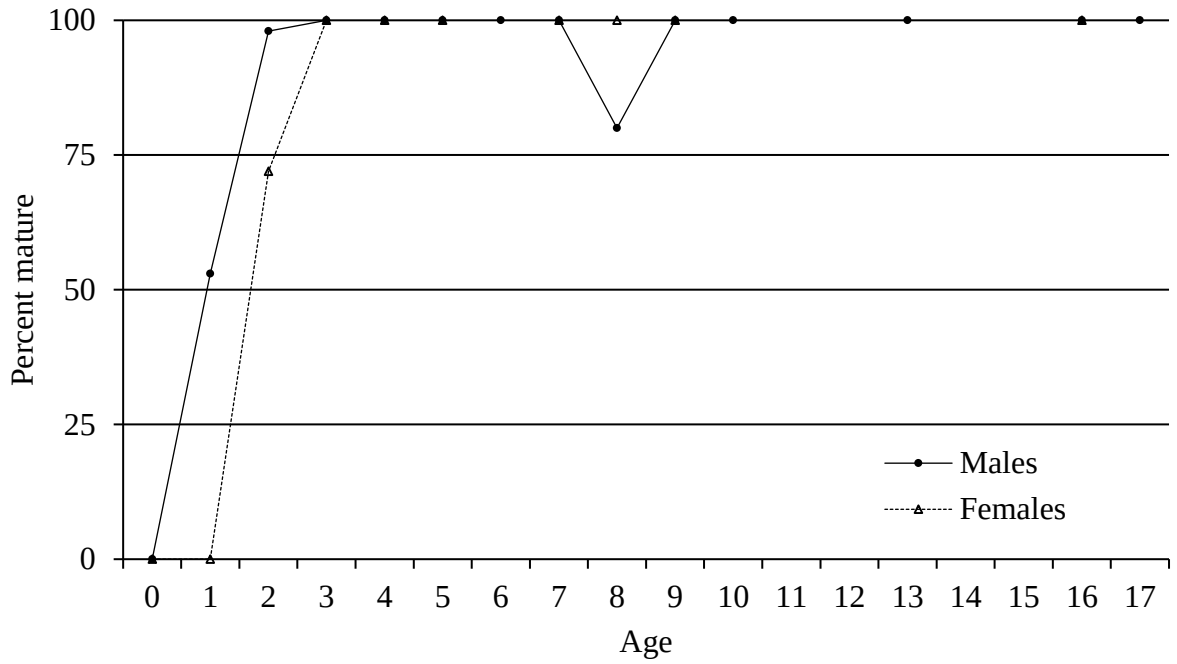

FIGURE 25. Percent of mature male and female Walleye at each age-class collected during FWIN on Potholes Reservoir in 2016. Breaks in data point continuity indicate missing Walleye at that age-class.

Walleye Length-at-Age

Length-at-age of Walleye collected in Potholes Reservoir was above the southern lakes average for most age classes (FIGURE 26). Beyond age–4 the trend in length-at-age became erratic, which corresponded to small samples of older age Walleye (n = 22). Potholes Reservoir Walleye have the fastest growth rate of all our FWIN waters, reaching 15 inches, on average, by fall as age–1 and over 19 inches, on average, by fall as age–2. Anglers should continue to find excellent opportunities to catch Walleye on Potholes Reservoir in 2017.

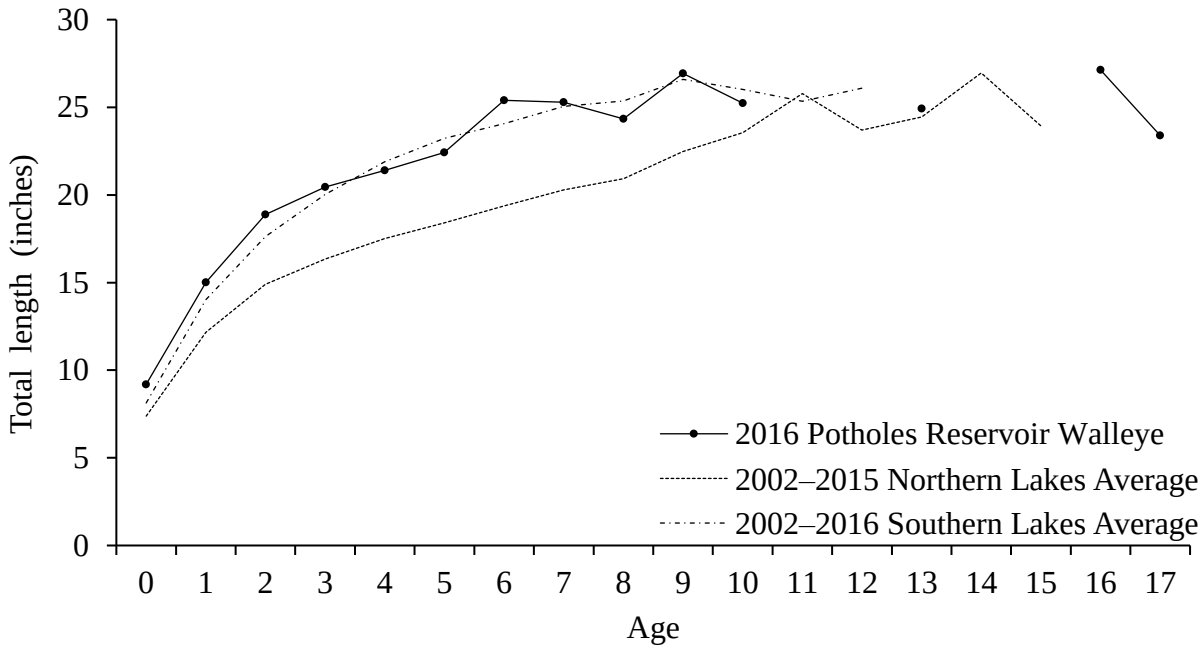

FIGURE 26. Average length-at-age of Walleye collected during FWIN on Potholes Reservoir in 2016 compared to the northern and southern lakes average from FWIN surveys conducted from 2002–2016. Breaks in data point continuity indicate missing Walleye at that age-class.

Potholes Reservoir Fish Community

In addition to Walleye, 13 other fish species were collected during the 2016 FWIN survey on Potholes Reservoir (FIGURE 27). Yellow Perch was second in abundance, yet only represented 11% of the fish collected. This is a decline from the previous four years (19%, 32%, 52% and 65%, respectively) and represents an overall decline in Yellow Perch abundance in our samples, not simply a decline in relative abundance. The average size of Yellow Perch declined to just under 10 inches in 2016; in 2015 average length was 11 inches. While Potholes Reservoir is widely recognized as a world class Walleye fishery it is also one of the most popular bass fisheries (Smallmouth and Largemouth) in Washington. Smallmouth Bass fishing can be very good along the face of O'Sullivan Dam and in Lind Coulee. Excellent Largemouth Bass fishing can be found in the sand dunes at the north end of the reservoir. Black Crappie fishing is popular in the sand dunes of Potholes Reservoir as well as along the docks at Mardon Resort.

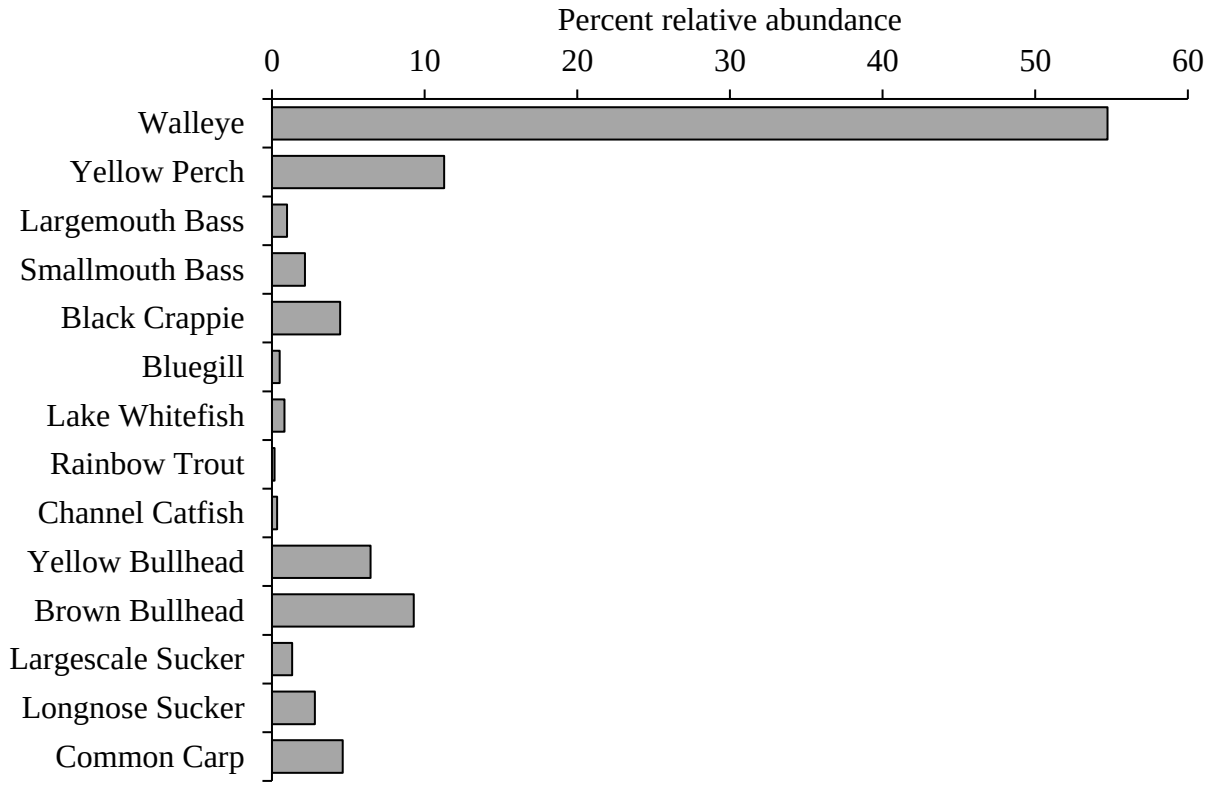

FIGURE 27. Percent relative abundance of the total number of fishes collected during FWIN on Potholes Reservoir in 2016.

Potholes Reservoir Recreational Opportunities

Potholes Reservoir is the home of Potholes State Park and Mardon Resort. Both offer water access for boat launching and shore fishing, as well as camping and RV hook-ups. Mardon Resort also offers cabin rental and a store that sells a wide variety of fishing supplies and licenses. Both facilities are in close proximity to the desert lakes and chain lakes directly adjacent to the south side of Potholes Reservoir where anglers can find numerous opportunities for Walleye and bass fishing as well as trout and panfish. Those lakes are relatively small and offer very good shore access for fishing.

Scooteney Reservoir

Walleye Abundance

We conducted the 2016 Scooteney Reservoir FWIN survey October 17–18. A total of 12 FWIN nets were set throughout the reservoir and 230 Walleye were collected. The mean Walleye CPUE on Scooteney Reservoir was 19 fish per net (FIGURE 28). This is well below the 2015 CPUE (40 Walleye per net) and just below the long-term average.

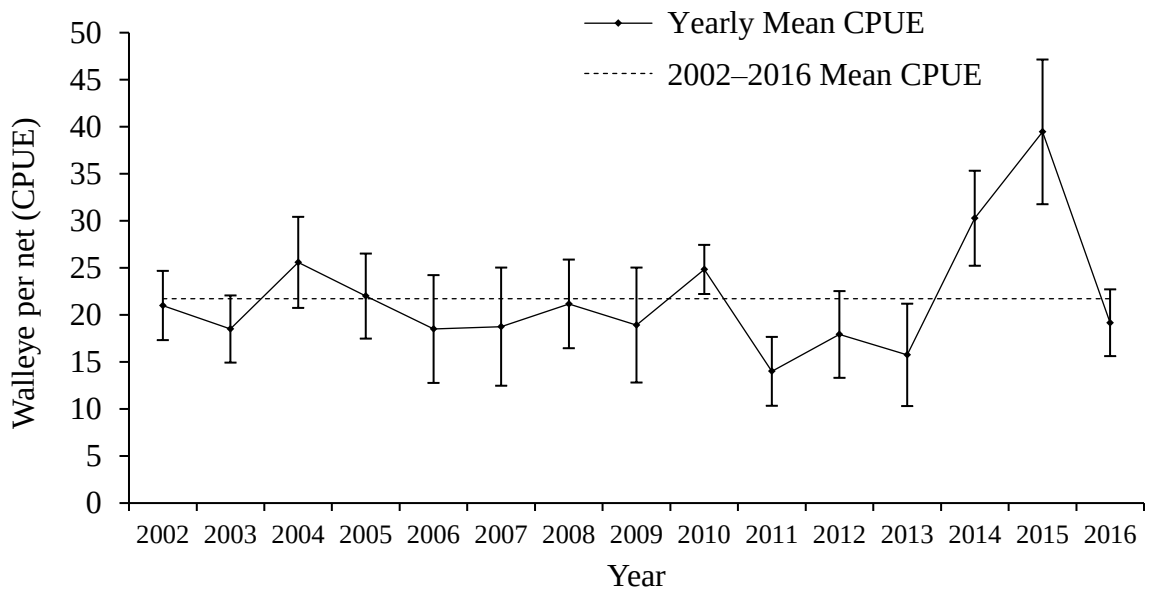

FIGURE 28. Yearly mean (± 80% CI) Walleye CPUE on Scooteney Reservoir from 2002–2016 compared to the long-term (2002–2016) mean CPUE.

Walleye Length Distribution

Walleye from Scooteney Reservoir averaged 15 inches in 2016. This is a slight increase from 2015 (14.5 inches) and the long-term average (14 inches). The majority of Walleye collected was in the 12–16 inch range (FIGURE 29) and were primarily age–2 fish. This size range decreased in relative abundance from 2015. Walleye in the 16–20 inch range increased in relative abundance since 2015 and nearly all of these fish were age–2. Relatively few Walleye over 20 inches were collected; however, anglers should continue to find plenty of harvestable Walleye in this population.

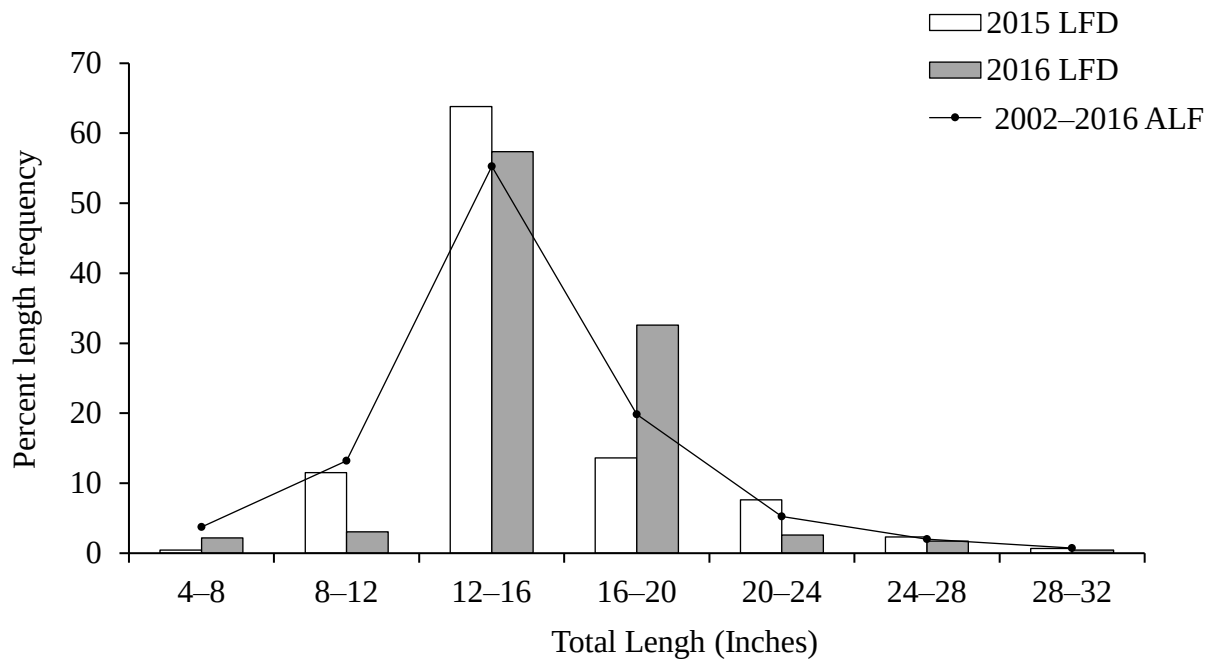

FIGURE 29. Percent length frequency distribution (LFD) of Walleye collected during FWIN on Scooteney Reservoir in 2016 compared to 2015 and the average length frequency (ALF) from all FWIN surveys on Scooteney Reservoir from 2002–2016.

Walleye Age-class Distribution

A total of 8 age-classes were collected during the 2016 Scooteney Reservoir FWIN survey, ranging from 0 to 10 years (FIGURE 30). Walleye aged 6, 8 and 9 were not collected. The age–2 year-class was the most abundant collected and was well above the long-term average in terms of relative abundance (FIGURE 30). Only 4% of Walleye collected were older than age–3; however, this is not uncommon for this population. The long-term relative abundance of Walleye over age-3 collected in Scooteney Reservoir is consistently lower than on our other FWIN waters.

FIGURE 30. Percent age distribution of Walleye collected during FWIN on Scooteney Reservoir in 2016 compared to 2015 and the average age distribution from all FWIN surveys on Scooteney Reservoir from 2002–2016.

Walleye Age at Maturity

Of the 230 Walleye collected in Scooteney Reservoir 65 (28%) were mature. Of these, 10 were female and 55 were male. A small percentage of male Walleye began to mature in fall as age–1 fish and by age–3 100 % were mature (FIGURE 31). Female Walleye reached 100% maturity by fall as age–4 fish.

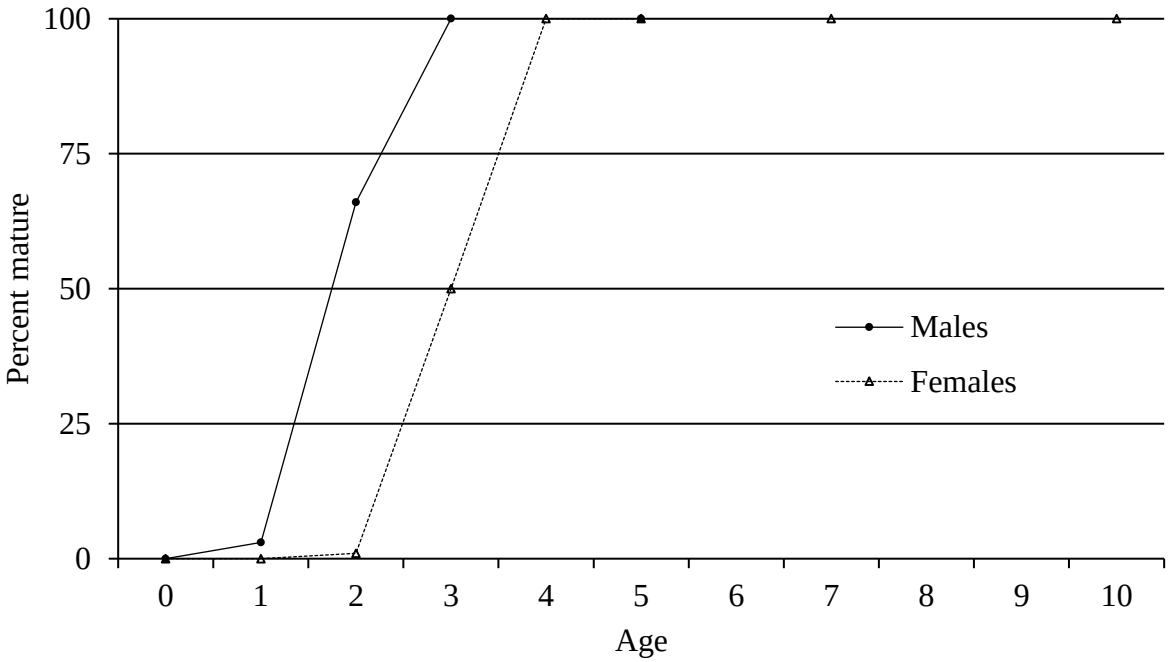

FIGURE 31. Percent of mature male and female Walleye at each age-class collected during FWIN on Scooteney Reservoir in 2016. Breaks in data point continuity indicate missing Walleye at that age-class.

Walleye Length-at-Age

Length-at-age of Walleye in Scooteney Reservoir was below the southern lakes average for age–0, 1, 2, 3 and 5 Walleye, while age–4, 7 and 10 Walleye were above the southern lakes average (FIGURE 32). Walleye reached 13 inches by fall as age–1 fish and 16 inches by fall as age–2. Only 9 fish older than age–4 were collected. As stated previously, Walleye aged 6, 8 and 9 were not collected.

FIGURE 32. Average length-at-age of Walleye collected during FWIN on Scooteney Reservoir in 2016 compared to the northern and southern lakes average from FWIN surveys conducted from 2002–2016. Breaks in data point continuity indicate missing Walleye at that age-class.

Scooteney Reservoir Fish Community

In addition to Walleye, which was the most abundant species collected, 13 other fish species were collected during the 2016 FWIN survey on Scooteney Reservoir (FIGURE 33). Yellow Perch was second in abundance and represented 17.5% of the fish collected. Yellow Perch declined in overall abundance from 2015 and average size decreased slightly as well. Of the remaining 11 species collected none represented more than 7% of the total catch. Angling opportunities for the other species can be very good, however.

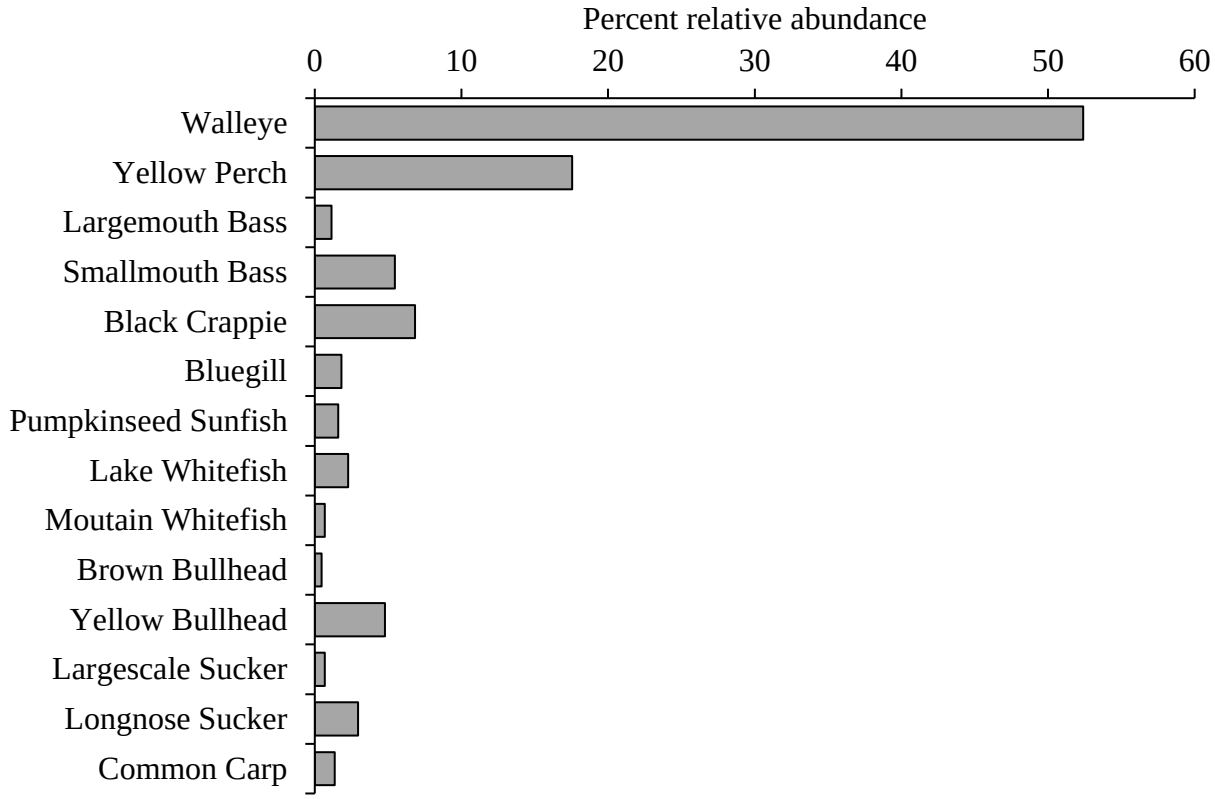

FIGURE 33. Percent relative abundance of the total number of fishes collected during FWIN on Scooteney Reservoir in 2016.

Scooteney Reservoir Recreational Opportunities

Water access is plentiful at Scooteney Reservoir, with abundant shore fishing and several boat ramps, including a double paved ramp with a launching float at the Bureau of Reclamation Park. That park also has a meticulously maintained grassy day-use area with picnic tables, overnight camping and RV hook-ups.

Conclusions

Walleye gill net catch-per-unit-effort declined from 2015 to 2016 in three of five FWIN waters. These declines are part of the natural cycles that exist in many fish populations. On Potholes Reservoir, where we saw the highest decline in Walleye CPUE, we found low numbers of Yellow Perch, a primary forage species of Walleye. This decline in Yellow Perch could have affected survival of young Walleye due to a lack of forage and may have made adult Walleye more susceptible to anglers. Declines in Walleye CPUE on FDR and Scooteney Reservoir also reflect normal cycles in Walleye populations. These populations are robust and contain plenty of harvestable fish. We continue to encourage anglers to harvest their limit of Walleye when they have the opportunity. Too many Walleye in a population can have a negative impact on the rest of the fish community, which will in turn negatively impact the Walleye population as forage is reduced. Routine monitoring of these fisheries, through the use of FWIN as well as creel surveys, will ensure that we are not negatively impacting Walleye populations and that we are maintaining balance in these fish communities.

In speaking to many anglers and fishing clubs we have found that there is a strong catch-and-release mentality among Walleye anglers. Our data on Walleye populations over the past 12 years indicate that these populations can sustain more harvest and indeed need more harvest.

In 2006 the WDFW raised the daily limit to 8 Walleye per day on Lake Roosevelt, Potholes Reservoir, and Moses Lake. Unfortunately, few anglers took advantage of this as the results from our two-year creel survey on Potholes Reservoir and Moses Lake indicated low overall Walleye harvest. Creel surveys on FDR indicated that Walleye harvest was approximately 50,000 Walleye annually, which was 1/3 of the management goal. In 2013 WDFW raised the Walleye daily limit to 16 fish and removed size restrictions. In addition, WDFW opened the Spokane Arm to angling during the Walleye spawning season (April and May), when it had been previously closed. These regulations were liberalized in order to accomplish two primary management goals: improve Walleye growth and condition and bring about a balance in the predator/prey fish community. We are relying on anglers to help us achieve these management goals. We encourage anglers to help shape our Walleye populations to a more healthy condition by harvesting more fish.

Besides Walleye, Yellow Perch, Smallmouth Bass and Lake Whitefish were abundant in several of our FWIN lakes. Yellow Perch fishing on Banks Lake, Moses Lake and Potholes Reservoir can be excellent at times. Smallmouth Bass are abundant, and anglers report excellent fishing for them on all our FWIN lakes with the exception of Scooteney Reservoir, although they do present an opportunity there. Lake Whitefish are very abundant on FDR, Banks Lake, and Potholes Reservoir, yet are underutilized by most angler groups. There is a small, but dedicated,

group of wintertime Lake Whitefish anglers on Banks Lake who target whitefish when they are spawning and also under the ice.

This report serves as a status update on popular Walleye fisheries in Washington and also as an informational guide on other fisheries in these lakes. For further details on the FWIN surveys conducted on various waters please contact regional warmwater fisheries biologists.

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