



Washington  
Department of  
**FISH and  
WILDLIFE**

**2017 JOINT STAFF REPORT  
CONCERNING  
STOCK STATUS AND FISHERIES  
FOR STURGEON AND SMELT**

**Joint Columbia River Management Staff**

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Washington Department of Fish and Wildlife*

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## **INTRODUCTION**

This report describes sturgeon and smelt populations in the mainstem Columbia River and includes a review of fisheries, current management plans and guidelines, and past management actions and strategies. This report is part of an annual series produced by the Joint Columbia River Management Staff of the Oregon Department of Fish & Wildlife (ODFW) and Washington Department of Fish & Wildlife (WDFW). Members of the *U.S. v Oregon* Technical Advisory Committee (TAC) have reviewed this report.

## **THE COMPACT**

The Columbia River Compact is charged by congressional and statutory authority to adopt seasons and rules for Columbia River commercial fisheries. In recent years, the Compact has consisted of delegates for the Oregon and Washington agency directors, acting on behalf of the Oregon Fish and Wildlife Commission (OFWC) and the Washington Fish and Wildlife Commission (WFWC). In addition, the Columbia River treaty tribes have authority to regulate treaty Indian fisheries.

When addressing commercial seasons for Columbia River fisheries, the Compact must consider the effect of the commercial fishery on escapement, treaty rights, and the impact on species listed under the Endangered Species Act (ESA). Working together under the Compact, the states have the responsibility to address the allocation of limited resources between recreational, commercial and treaty Indian fishers. This responsibility has become increasingly demanding in recent years. The states maintain a conservative management approach when considering Columbia River fisheries that will affect species listed under the ESA.

## **SEASONS CONSIDERED**

Based on previous OFWC and WFWC action, effective January 1, 2014 all recreational and non-Indian commercial fisheries in the Columbia River and tributaries downstream of Bonneville Dam (LCR) closed to the retention of white sturgeon. Retention fisheries in the pools between Bonneville Dam and McNary Dam (Zone 6) remained open. The Sturgeon Management Task Force (SMTF) met in January 2017 to review results of the 2016 stock assessment in John Day Pool and to discuss management options for 2017, including harvest guidelines for 2017 Zone 6 white sturgeon fisheries.

As a result of the 2010 ESA listing of eulachon (Columbia River smelt) all eulachon-directed fisheries in the Columbia River closed as of January 2011. In 2014, 2015 and 2016, the states worked closely with the National Marine Fisheries Service (NMFS) to conduct minor eulachon research fisheries to gather biological data and adult catch-per-unit-effort (CPUE) data for monitoring the status of the population. Eulachon fisheries of a similar scale may be considered for 2017.

## ENDANGERED SPECIES ACT (ESA)

### *Salmon and Steelhead*

Status reviews occurring since 1991 have resulted in the majority of Columbia Basin salmon and steelhead stocks being listed under the ESA as shown in the table below. The *U.S. v Oregon* TAC has prepared Biological Assessments (BAs) for combined fisheries based on relevant *U.S. v Oregon* management plans and agreements since 1992.

<i>Federally-listed Species Found in Columbia River Fishery Management Areas</i>			
Species – ESU/DPS	Current Designation	Listing Date	Effective Date
<u>Chinook</u>			
Snake River Fall	Threatened	April 22, 1992	May 22, 1992
Snake River Spring/Summer	Threatened	April 22, 1992	May 22, 1992
Upper Columbia Spring	Endangered	March 24, 1999	May 24, 1999
Upper Columbia Summer/Fall	Not warranted	--	--
Middle Columbia Spring	Not warranted	--	--
Lower Columbia River Spring/Fall	Threatened	March 24, 1999	May 24, 1999
Upper Willamette Spring	Threatened	March 24, 1999	May 24, 1999
Deschutes River Summer/Fall	Not warranted	--	--
<u>Steelhead</u>			
Snake River Basin	Threatened	August 18, 1997	October 17, 1997
Upper Columbia River <sup>1</sup>	Threatened	August 18, 1997	October 17, 1997
Lower Columbia River	Threatened	March 19, 1998	May 18, 1998
Middle Columbia River	Threatened	March 25, 1999	May 24, 1999
Southwest Washington	Not warranted	--	--
Upper Willamette	Threatened	March 25, 1999	May 24, 1999
<u>Sockeye</u>			
Snake River	Endangered	November 20, 1991	Dec. 20, 1991
Okanogan River	Not warranted	--	--
Lake Wenatchee	Not warranted	--	--
<u>Chum</u> – Columbia River	Threatened	March 25, 1999	May 24, 1999
<u>Coho</u> – Columbia River	Threatened	June 28, 2005	August 26, 2005
<u>Green Sturgeon</u> - Southern DPS	Threatened	April 7, 2006	July 7, 2006
<u>Eulachon</u> - Southern DPS	Threatened	March 18, 2010	May 17, 2010

<sup>1</sup>. Status downgraded to threatened per U.S. District Court order in June 2009.

The current BA concerns Columbia River treaty Indian and non-Indian fisheries, as described in the “2008-2017 *U.S. v Oregon Management Agreement for upriver Chinook, sockeye, steelhead, coho, and white sturgeon*” (2008-2017 MA). The BA was submitted during the spring of 2008, and a Biological Opinion (BO) was subsequently issued by NMFS later that year. The current BO expires December 31, 2017, concurrent with the 2008-2017 MA. Impacts to listed salmonid species from fisheries described in this report are expected to be *de minimus*.

### ***Eulachon Smelt***

In March 2010, the NMFS published a rule (75 FR 13012) to list as threatened under the ESA the Southern Distinct Population Segment (DPS) of Pacific eulachon, which became effective May 17, 2010. This DPS encompasses all populations within the states of Washington, Oregon, and California and extends from the Skeena River in British Columbia (inclusive) south to the Mad River in Northern California (inclusive). As a result of this listing, the *U.S. v Oregon* TAC submitted to NMFS an addendum to the current BA, which covered Columbia River fisheries through 2017. This addendum addressed the incidental take of ESA-listed eulachon in Columbia River fisheries. Fisheries described in this report are not likely to adversely affect this species.

### ***Green Sturgeon***

In April 2006, the NMFS published a rule (71 FR 17757) to list the Southern DPS of the North American green sturgeon (those spawning in the Sacramento River, California) as threatened on April 7, 2006, which became effective July 6, 2006. Effective November 9, 2009, the Columbia River below River Mile 46 was designated as critical habitat of the Southern DPS (74 FR 52300). The BO covering non-Indian fisheries described in the 2008-2017 MA also addresses impacts to green sturgeon. Given that (1) the sale of green sturgeon from Columbia River commercial fisheries was prohibited effective July 6, 2006, and (2) the retention of green sturgeon in Columbia River recreational fisheries was prohibited effective January 1, 2007, impacts to green sturgeon from fisheries described in this report are expected to be *de minimus*.

### ***Marbled Murrelet***

The threatened status of the marbled murrelet has not changed since initially listed October 1, 1992 (57 Fed. Reg. 45328, October 1, 1992). On September 24, 1997, the U.S. Fish and Wildlife Service released a recovery plan for the threatened marbled murrelet for the states of Washington, Oregon, and California (USFWS 1997). On June 12, 2009, the United States Fish and Wildlife Service concluded a five year review of the status of the marbled murrelet and determined that no change in the bird's threatened status was warranted (USFWS 2009). On October 4, 2011, critical habitat was designated for the marbled murrelet (61 Fed. Reg. 26256). Fisheries described in this report are not likely to adversely affect this species.

# **STURGEON MANAGEMENT AND FISHERIES DOWNSTREAM OF BONNEVILLE DAM**

## **Stock Status**

Sturgeon abundance in the lower Columbia River collapsed at the end of the 19th century due to overfishing and remained depressed through the first half of the 20th century. The population began to rebound only after the adoption of management actions aimed at reducing overall harvest and protecting broodstock, particularly the 6-foot maximum size limit regulation enacted in 1950. White sturgeon abundance subsequently increased significantly through the 1990s and supported robust recreational and commercial fisheries. Abundance of sub-adult fish began declining in the mid-2000s, prompting changes in harvest quotas and retention seasons.

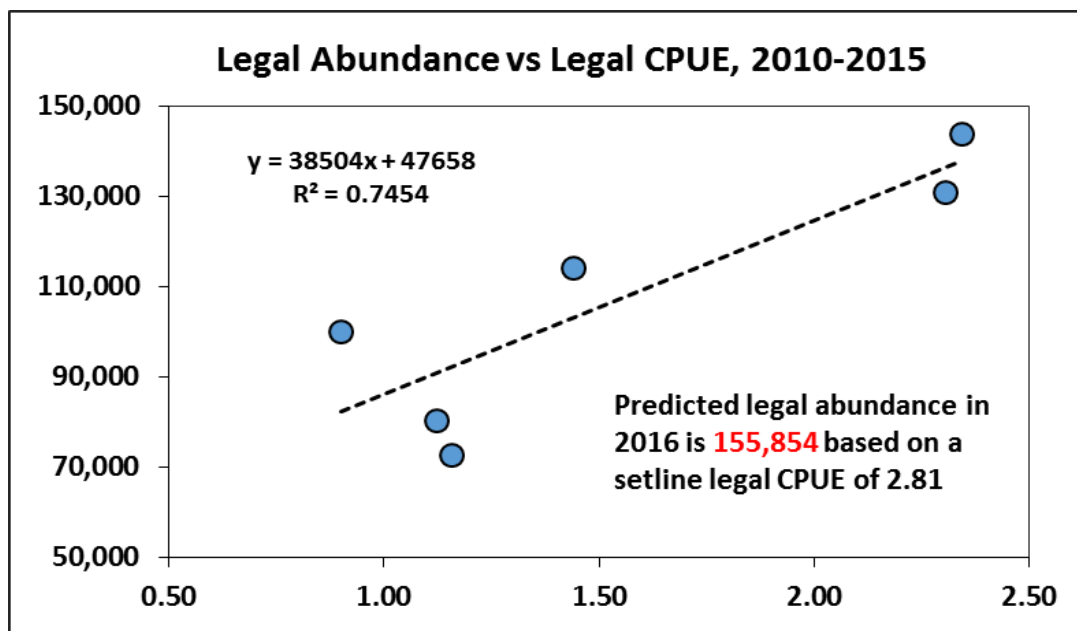
Joint state tagging and recovery programs were initiated in 1986 to provide data necessary to estimate the annual abundance of white sturgeon inhabiting the lower Columbia River. Abundance estimates, based on tagging conducted in one year and mark sampling extending into the following year, were produced from 1987 through 2012 with the exception of 1994 and 2004 (the estimates refer to the year of tagging, although final estimates require recoveries through the following year). Abundance estimates for harvestable size fish [42-60 inches total length (TL) or 38-54 inches fork length (FL)] were generally low during 1988-1992 averaging 55,600 but improved significantly during 1993-1997 when average legal abundance was 169,200 fish. The estimates from 1998 through 2007 were lower (131,400 average) but more stable, ranging between 121,600-140,700 fish (Table 1). The most recent estimates declined steeply, from 131,700 fish in 2007 to a low of 65,300 fish in 2010 before increasing to 72,800 fish in 2011 and to 83,400 fish in 2012.

In 2008, ODFW initiated development of the Oregon Lower Columbia River and Oregon Coast White Sturgeon Conservation Plan (WCP). In response to uncertainties identified in the WCP, ODFW initiated an additional survey in 2010 using research setlines during July, August and September to recover white sturgeon tagged in May and June. This “in-year” approach allows researchers to estimate current abundance and to project the next year’s abundance.

Concurrent abundance estimates resulting from the “traditional” approach using mark-recoveries through fishery-sampling and the new approach using mark-recoveries from setline sampling are available for 2010-2012 (Table 1). Setline-based estimates are 100,200, 80,500 and 72,700 legal-size fish present at the start of 2010, 2011, and 2012 respectively. These compare to estimates of 65,300, 72,800 and 83,400 legal-size fish present as of May 2010, 2011 and 2012 respectively, using the traditional approach. For 2013, 2014 and 2015, the setline approach produced estimates of 114,200, 131,000 and 143,900 legal-size fish respectively. The abundance of legal-sized fish was projected to increase in 2016 to 147,100 based on the 2015 legal abundance estimate. However, in 2016, the setline-based estimate increased 56% to 224,000 legal-size fish, with a projection of 237,900 for 2017. Although the new estimate likely indicates growth in the legal-sized population, the point estimate is not fully supported by catch rates in 2016 gillnet or setline tagging efforts. The mark-recapture survey is susceptible to biased results when marked and unmarked fish mix disproportionately among areas surveyed and not surveyed during the subsequent setline recovery effort. This could result in a positively biased estimate which may have occurred in 2016. Alternatively, an estimate based on the 2010-2015



relationship between research setline catch rates of legal-size white sturgeon and mark-recapture abundance estimates would be 155,900 fish, or an 8% increase, similar to the projected 2016 abundance estimate from 2015 (Figure 1).

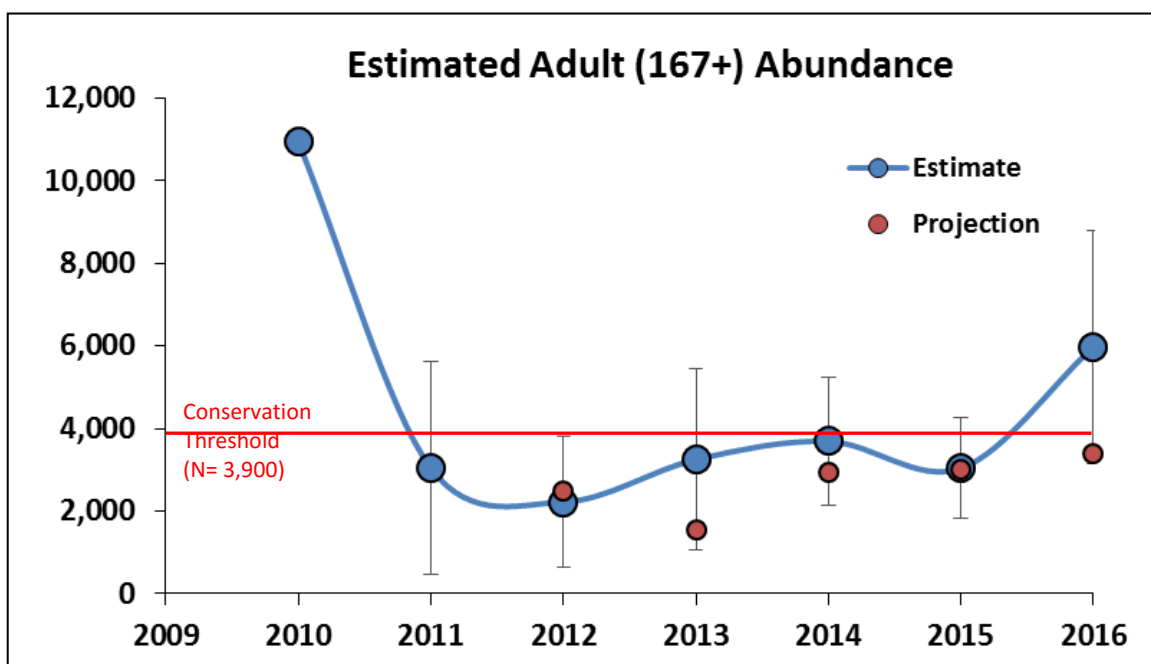


**Figure 1.** Predicted legal-size white sturgeon abundance in 2016 based on the 2010-2015 relationship between research setline legal-size white sturgeon CPUE and mark-recapture abundance estimates.

Reduced recruitment to the lower end of the legal slot drove the past decline, with abundance of 42-48 inch TL (38-43 inch FL) white sturgeon averaging 126,900 fish for 1996-2000, 95,200 fish for 2001-2007, before reaching a low of 39,100 fish in 2010 (Table 1). Numbers in this size class increased the following two years, to 46,300 fish in 2011 and to 52,600 fish in 2012. During 2014-2016, the number of fish in this size group continued to increase but as a percentage, has declined to approximately 50% of the overall 42-60 inch TL fish abundance, down from 70-90%. Conversely, the number of fish between 48 and 60 inches TL (43-54 inches FL) increased from an average of 24,000 fish for 1996-2000 to 33,500 fish for 2001-2007 and then declined to an average of 29,000 fish a year through 2012. During 2014-16, the number and percentage of fish in the 48-60 inch TL interval increased markedly. During the period 1987-2016, there has been an obvious shift in the composition of legal-sized fish from predominately 42-48 inch TL fish to a majority now represented in the 48-60 inch size group, which may be a consequence of chronic poor recruitment in recent years.

Catch per angler trip (CPUE) of sublegal (<42 inches TL, <38 inches FL) white sturgeon decreased annually from 2004 through 2009 following eight years of mostly steady increases. By 2008, CPUE of sublegal-size fish had dropped by almost 40% of the 1996-2006 average. This declining trend slowed in 2009, decreasing by just 5% that year, then remained relatively stable through 2012 before increasing by almost 6% in 2013. Angling effort for sturgeon dropped by about 90% beginning in 2014 following the prohibition on retention, so comparable data on catch per trip of sublegal fish is lacking for the past three years.

The abundance of spawner-size adult (>165-cm fork length) white sturgeon has remained depressed in recent years, averaging about 3,050 fish during 2011-2015 (Figure 2). However, similar to the trend observed for legal-size fish, the abundance estimate for 2016 increased markedly to 5,950 fish with a 2014-2016 running average of about 4,200 fish. This three-year running average is above the conservation status threshold of 3,900 adult fish identified in the WCP. However, as with the legal-size abundance estimate, the spawner-size abundance estimate resulting from the 2016 mark-recapture survey may be biased high and it is uncertain if the three-year running average is truly above the conservation status threshold.



**Figure 2.** Estimated adult white sturgeon abundance (fish 167cm FL and greater) in the lower Columbia River, 2010-2016.

Since 2004, annual monitoring of young-of-the-year (YOY) white sturgeon recruitment in the lower Columbia River has been conducted in the late fall targeting juvenile sturgeon that were spawned earlier the same year. Staff deploy small-mesh gillnets at standard index sites throughout the lower Columbia and Willamette rivers. The catch per set (CPUE) of YOY sturgeon and proportion of sets capturing at least one young-of-year sturgeon ( $E_p$ ) are used as indices to monitor trends in recruitment (Table 2). Sampling results since 2010 indicate production remains low in the mainstem Columbia River with an improving trend for the lower Willamette River. Until enough paired years of recruitment index data and detailed stock assessment data are available, it is not possible to infer absolute levels of recruitment from these data. However, the depressed recruitment of YOY sturgeon is consistent with continued low relative abundance of juvenile and sub-legal sturgeon indicating productivity issues.

A recent and substantial threat to the white sturgeon population has been predation by sea lions, especially adult-size fish taken by Steller sea lions (SSL). Observers for the U.S. Army Corps of Engineers (USACE) reported a steady annual increase in the number of individual SSL at Bonneville Dam, from zero animals in 2002 to 89 individual animals in 2011. Observers

identified 73, 80, 65, 69, and 39 individual animals in 2012, 2013, 2014, 2015, and 2016 respectively.

Predation of adult-size fish observed by WDFW and ODFW employees in the vicinity of Beacon Rock peaked during December 2005 through March 2006, with over 50 kills reported. Activity then declined following initiation of a state and tribal hazing program in March 2006 that successfully moved the SSL out of the area by early April. Hazing was initiated again in February 2007 and from December 2007 through May 2008 and from February through May in 2009 and 2010; however, these efforts grew steadily less effective each year. Crews were often able to distract individuals from feeding, but were not successful in driving them out of the area (the Columbia River Gorge). In 2011, WDFW and ODFW staff expanded the area of observation from Tanner Creek (where USACE observations cease) downstream to Rooster Rock State Park, to document rates of predation in this area. Results of this work, combined with USACE observations, indicate significant predation of white sturgeon occurs throughout the 16-mile stretch immediately downstream of Bonneville Dam, with most of activity confined to the upper 10 miles. The WDFW and ODFW observations in the vicinity of Beacon Rock suggest SSL diet in this downstream location is comprised of a higher proportion of adult-size white sturgeon than that documented by the USACE observation program.

The USACE observer program at Bonneville Dam documented a steady increase in total predation of all sizes of white sturgeon through 2011. Even though California sea lions (CSL) are also present in high numbers, most of the observed take is by SSL, with very few incidences of sturgeon predation attributed to CSL. Estimated consumption of white sturgeon in this small area increased from an observed take of just one white sturgeon in 2005 to 3,003 fish in 2011. An estimated 2,498 white sturgeon were consumed in 2012, with 635, 147, 44 and 90 sturgeon were estimated taken from 2013 through 2016. It is unlikely that sea lion feeding preference has changed so the reduction in predation observed in the Bonneville Dam tailrace is likely the result of white sturgeon avoiding this area in winter and spring and instead seeking out other areas of the Columbia River and tributaries with less predation potential.

Predation on smaller white sturgeon throughout the river appears to be increasing in frequency based on observations by staff and reports from anglers and commercial fishers. Predation on larger sturgeon may also be increasing in other parts of the lower Columbia and lower Willamette rivers as well. In 2009, ODFW generated estimates of total annual predation impacts on sturgeon by SSL and CSL in the entire lower Columbia and lower Willamette Rivers as an element of a population viability model. The modeled losses increased from 6,700 fish in 2009 to a presumed maximum of 10,600 fish by 2014. Loss of juvenile fish to predation may be impacting sublegal abundance and recruitment to fisheries. Loss of adult fish is contributing to lower population productivity and reduced recruitment to fisheries.

Monitoring of pinniped predation at Willamette Falls by ODFW and cooperators in recent years indicates additional white sturgeon losses are occurring in this area, primarily by SSL. In addition, anecdotal reports of sea lion predation on white sturgeon for areas downstream of Willamette Falls appear to be increasing as well.

## **Fishery Management Actions**

Sturgeon fishery management focused on the commercial fishery during the early 1900s and expanded to encompass recreational fisheries beginning in 1940. Regulations for recreational

and commercial fisheries became increasingly restrictive and complex as the popularity and importance of sturgeon as a target species increased for both fisheries.

### **Past Management Actions**

Sturgeon management actions were initiated in 1899 with the adoption of a 4-foot minimum size limit for commercially-landed sturgeon. During 1899-1908, commercial sale of sturgeon was prohibited and beginning in 1909, commercial sturgeon sales were allowed during salmon seasons only. Between 1940 and 1989, fishery management actions primarily consisted of modifying catch limits for the recreational fishery and size restrictions for recreational and commercial fisheries. Most significant was the adoption of a 6-foot maximum size limit regulation in 1950 to protect broodstock and aid rebuilding of the Columbia River white sturgeon population. Additionally, commercial sturgeon setline seasons in place during 1975-1983 were discontinued.

Since 1989, the intent of the management strategy for lower Columbia River white sturgeon fisheries was to optimize harvest while allowing for the continued rebuilding of the population. Significant management actions taken during 1985-1996 to restrict catches to sustainable levels included: (1) increasing the minimum size limit in recreational fisheries; (2) reducing the maximum size limit in all fisheries; (3) reducing daily and annual catch limits for recreational fisheries; and (4) adopting annual catch guidelines for commercial fisheries.

Primarily due to angling regulation changes, recreational catch dropped from a peak of 62,400 fish in 1987 to a low of 17,300 fish in 1990. During the same period, commercial catch also dropped from a peak of 11,600 fish in 1986 to a low of 3,800 fish in 1991, due to reductions in fishing opportunities. In 1985, recreational regulations allowed for a daily catch limit of three fish between 36 and 72 inches total length with no annual catch limit. The maximum size limit for all white sturgeon fisheries was reduced from 72 inches to 66 inches TL in 1993. In 1996, recreational regulations were further restricted with a daily catch limit of one fish between 42 inches TL (equivalent to current 38 inch FL) and 66 inches TL and a ten fish annual catch limit. The maximum size limit for both fisheries was reduced from 66 inches TL to 60 inches TL (equivalent to current 54 inch FL) in 1997. See Table 7 for an annual summary of seasons and regulations for commercial fisheries. Table 8 summarizes annual Columbia River regulations for recreational fisheries.

These regulation changes culminated in adoption of WFWC policy C-3001 on Lower Columbia Sturgeon Management and in a series of one-to three-year Joint State Management Agreements (Accords) between Washington and Oregon that guided Columbia River sturgeon management during 1997-2013.

### **Joint State White Sturgeon Management Agreements**

The Accords contained a variety of fishery regulations including: (1) size limits for recreational and commercial fisheries, (2) daily and annual catch limits for recreational anglers, (3) gear restrictions for recreational and commercial fisheries, (4) the allowance of target sturgeon seasons in the commercial fishery, and (5) protective measures for adult-size sturgeon.

One key aspect of most of the agreements through 2009 was the adoption of a three-year average harvestable number of sturgeon designed to reduce the risk of exceeding what was deemed

sustainable. The harvestable number has been allocated 80% for recreational fisheries and 20% for commercial fisheries since implementation of the first Accord in 1997.

The tenets of the Accords also allowed for modifications if new information suggested that a change was warranted. Since adoption of the first sturgeon Accord, additional management actions have been necessary. Abundance of legal-size fish did not increase as expected during the first two years of the first Accord, and based on that new information, the annual harvestable number was reduced from 67,300 to 50,000 fish for 1999 fisheries.

In December 2002, the WFWC and OFWC (Commissions) established sturgeon management protocol to help guide the development of recreational and commercial fisheries during 2003-2005. Due to the declining trend in abundance, the Commissions adopted a reduction in the annual harvestable number from 50,000 fish to 40,000 fish per year for 2003-2005. This reduction generated a conflict in season-shaping preferences among competing recreational interests for the areas downstream (estuary) and upstream (non-estuary) of the Wauna powerline crossing at river mile (RM) 40. After much debate, the Commissions allotted 60% of the recreational share to the estuary fishery and 40% to the non-estuary (above Wauna) fishery.

By 2004, work with the Columbia River Recreational Fisheries Advisory Group (CRRAG) had established that fishery goals differed for those who participated in the estuary fishery compared to those who participated in the non-estuary fishery. For the area upstream of the Wauna powerlines, anglers preferred retention opportunity throughout as much of the year as possible, especially during the spring and fall timeframes. A days-per-week approach was adopted to achieve this, with retention allowed on Thursdays, Fridays, and Saturdays, and catch-and-release allowed on non-retention days. Retention was prohibited during August and September to ensure that the annual harvest guideline lasted through the fall timeframe. For the estuary fishery, anglers preferred retention opportunity seven days per week, and a retention season that lasted at least through July 4. To achieve this, beginning in 2004 the minimum size limit for this area increased in May annually to 45-inches TL (41-inch FL equivalent since 2009) to slow catch rates and prolong the retention season. This modification required the annual guideline for the estuary be reduced by 17% (from 19,200 fish to 16,000 fish) to maintain a comparable overall harvest rate. These basic season structures continued in subsequent Accords. Other changes to recreational fishery regulations enacted during 2004-2005 included reducing the annual limit from ten fish to five fish, and requiring anglers to use one single-point barbless hook.

The fourth Joint State Accord covered the three-year period from 2006-2008. The major tenets from the prior accord remained intact, including the 40,000 fish annual harvestable number (36,800 fish actual following adjustments to the estuary guidelines), the 80% recreational and 20% commercial allocation, and the 60% estuary and 40% non-estuary recreational sub-allocation. The agreement also called for basic monitoring of marine mammal predation of white sturgeon.

The maximum size limit for green sturgeon in the commercial fishery was lowered from 66 inches TL to 60 inches TL for 2006-2008 to provide additional protection to the species. However, when green sturgeon were ESA-listed as threatened (effective July 6, 2006) the states subsequently prohibited sales (and therefore retention) of green sturgeon from Columbia River commercial fisheries effective July 6, 2006 and retention of green sturgeon in Columbia River recreational fisheries effective January 1, 2007.

The 2006-2008 Joint State Accord for Columbia River sturgeon management was renewed for 2009 to allow for development of the Oregon WCP and refine a strategy for long-term lower Columbia River white sturgeon management. Also in 2009, Oregon and Washington converted from a total length to a fork length measurement standard in all fisheries. The conversions for slot measurements were as follows: 42-inch TL = 38-inch FL; 45-inch TL = 41-inch FL; 48-inch TL = 43-inch FL; 60-inch TL = 54-inch FL.

Due in part to the quickly changing status of the population, the Joint State Accord was again renewed for just one year in 2010. The updated WFWC policy C-3001 called for a reduction in harvest of no less than 45% from the previous level, to address the declines in abundance and uncertainties surrounding the impact of predation. Negotiations between the Directors of the ODFW and WDFW resulted in a 2010 Accord that set the harvestable number at 24,000 fish for 2010, a 40% reduction from the previous guideline.

Prior to implementation of the first Accord, the agencies in 1996 adopted a no-sturgeon-angling sanctuary just downstream from Bonneville Dam to protect spawning white sturgeon. A boat-based catch-and-release fishery targeting sturgeon larger than the legal-size limit (oversize) had been intensifying in this area since 1990. Angling for sturgeon from boats was prohibited during May and June within this sanctuary, which extended 4.5 miles downstream to Beacon Rock. In 2000, this closure was extended through mid-July to provide additional protection to the adult population.

In 2004 the duration of the sturgeon-angling prohibition within the spawning sanctuary was extended through July and the bank fishery was incorporated into the closure. Washington adopted a regulation extending the sanctuary boundary an additional 1.6 miles further downstream to U.S Coast Guard (USCG) Navigation Marker 85. Oregon did not adopt this change and Washington rescinded the regulation in order to maintain concurrence with Oregon. Instead, the Joint State Agreement was modified to include a “Best Fishing Practices” program that identified angling practices designed to maximize post-release survival rates in the oversize catch-and-release fishery. The spawning sanctuary boundary was eventually moved the 1.6 miles downstream to USCG Navigation Marker 85 with adoption of the 2006-2008 Accord.

In 2010, the Directors agreed to move the downstream sanctuary boundary to USCG Navigation Marker 82, adjacent to the upper end of Skamania Island, closing about nine miles of river to sturgeon angling. The closure period was extended an additional month, covering May through August. Also in 2010, the state of Oregon established a spawning sanctuary in the Willamette River from the I-205 Bridge upstream to Willamette Falls during May 1-August 31 following documentation of successful white sturgeon spawning in this area. In 2013, the Willamette River sanctuary was expanded downstream to the Lake Oswego-Oak Grove Railroad Bridge.

A new three-year Accord was adopted by the Commissions in February of 2011 to cover the years 2011-2013. No changes were made to allocations among fisheries or areas, and spawning sanctuaries remained as adopted in 2010. However, harvest guidelines during the period were established as a 22.5% annual harvest rate or a cap of 17,000 total harvested fish, whichever was lower. This harvest level was to be derived annually from projected abundance in the coming year, based on in-year stock assessment abundance estimates. This resulted in a guideline for 2011 that was 29% below the 2010 level.

The 2011-2013 Accord was amended for 2012 to reflect revised policy guidance based on continued concern for the status of the population. The 2012 Amendment specified that the 2012

harvest guideline be based on a 16% harvest rate of the legal-size segment of the population, or 10,400 white sturgeon. Harvest sharing remained at 80/20 sport/commercial. The Amendment resulted in a 39% reduction in the guideline, which was allocated as follows for 2012: 2,080 commercial; 4,992 below Wauna (adjusted to 4,160 to reflect the change in the minimum size limit during the summer season); 2,080 mainstem above Wauna; and 1,248 for the lower Willamette River. Since the 2012 Amendment, no modifications or new Accords have been adopted.

The WCP was developed during 2008-2011 and adopted by the OFWC in August 2011. WDFW staff was integrally involved in development of the Oregon WCP and the completed plan has since been endorsed by WDFW. The Oregon WCP examines factors and threats that may be limiting the abundance and productivity of lower Columbia River white sturgeon, and identified critical unknowns and data gaps pursuant to these factors and threats. Population goals and objectives were developed and strategies and actions identified to address the limiting factors and threats. Additional guidance was provided by the Commissions for 2013. A Columbia River Fishery Management Workgroup, formed in 2012 to develop strategies and recommendations for restructuring Columbia River fisheries, developed two specific recommendations for LCR sturgeon fisheries. The first was to allocate only 90% of the harvest guideline derived from the 16% harvest rate, holding 10% in reserve as a conservation buffer.

In response to the reduced 2013 guideline, each Commission adopted reduced statewide annual recreational bag limits, from five fish to two fish, effective April 2013. In addition, the Directors negotiated a 15% hold-back in the harvest guideline for 2013 fisheries. Harvest sharing remained at 80/20 sport/commercial. The 16% allowable harvest rate was reduced to 13.6%, resulting in a 10,105 fish guideline allocated as follows for 2013: 2,021 commercial, 4,850 below Wauna (adjusted to 4,042 to reflect the change in the summer season size slot ), 2,021 mainstem above Wauna; and 1,213 for the lower Willamette River (1,733 with 520 fish baseline added in).

The second recommendation by the Columbia River Fishery Management Workgroup to the Commissions was to consider implementing rules prohibiting retention of LCR origin white sturgeon if a decline in legal-size abundance forecast for 2012 held true, which turned out to be the case. In response, the OFWC adopted rules prohibiting retention of white sturgeon in the LCR, lower Willamette River, and Oregon coast effective January 1, 2014. The WFWC adopted similar rules, prohibiting white sturgeon retention effective January 1, 2014 in the LCR, Washington coast, Puget Sound, and their tributaries. Prohibition of white sturgeon has remained in effect since 2014.

### **Adjustments for Harvest outside the Mainstem Columbia River**

Past harvest guidelines and allocations identified in the Joint State management agreements pertained specifically to harvest in the mainstem Columbia River (and Select Areas) downstream of Bonneville Dam. However, white sturgeon from the lower Columbia River migrate into and are harvested in various Columbia River tributaries and coastal estuaries. Harvest outside the Columbia is generally low, averaging 2.6% based on 1996-2007 tag recovery data but can be higher as observed in 1996 when tag recoveries from outside the Columbia River increased to 5.3%. During that year, harvest of white sturgeon along the coast correspondingly peaked at a level more than double the average harvest for the previous decade. This phenomenon was recognized as a concern, so the Columbia River harvest guideline identified in the original 1997-1999 Joint State Management Agreement was adopted with the contingency that it could change

with a substantial increase in harvest outside the Columbia system. To assure that future harvest guidelines and allocations remained equitable, the Commissions adopted policy in the 2000-2002 and subsequent Joint State agreements, calling for management of sturgeon harvest outside the mainstem Columbia River to be consistent with Columbia River conservation and management needs.

The 2000 Willapa Bay Fishery Management Framework was developed to address the Joint State agreement policy. The Willapa Framework incorporated white sturgeon harvest guidelines for commercial and recreational fisheries based on the historic relationship between Willapa Bay and Columbia River harvest levels. The Willapa Bay guideline was adjusted by the same (20%) reduction made to the Columbia River guideline in 2003, resulting in a 1,769 fish guideline. Since adoption of the plan, non-Indian commercial harvest in Willapa Bay has declined; however, treaty harvest in Grays Harbor and tributaries has generally increased. Collectively, the combined harvest has remained fairly consistent since 1997. The Willapa guideline was adjusted downward by 40% in 2010, by 29% in 2011, and by 39% in 2012 to keep in step with the reductions adopted for the lower Columbia River. Effective January 1, 2014, retention of white sturgeon will be prohibited along the Washington coast, including all coastal tributaries.

In 2012, Washington implemented restrictions to Puget Sound recreational sturgeon fisheries. The year-round retention season was reduced to two retention periods, June 1-30 and September 1 through October 15. Effective January 1, 2014, retention of white sturgeon was prohibited in Puget Sound and its tributaries.

During 2004-2012, there was a significant shift in the winter and early spring recreational sturgeon harvest from the mainstem Columbia River into the Willamette River. This shift may have been due to warmer winter water temperatures (2-5°F higher) in the Willamette and generally poor eulachon returns to the Columbia River through 2012 that appeared to attract more sturgeon (and recreational fishers) to the Willamette River during January-May. Because of this increasing trend, staff re-calculated harvest estimates (and adjusted guidelines) for the Willamette recreational fishery to account for harvest in excess of the 1986-1996 baseline level (or adjusted baseline in more recent years). The adjusted estimates for the Willamette River have been added to catch totals in the fishery above Wauna to more accurately reflect the total recreational harvest for this river section.

The harvest adjustments (increases) for the Willamette were based on information available from the ODFW creel survey and angler punch card data during 2004-2009 (Table 4). Prior to 2009, the Willamette River creel program had been focused on estimating harvest of spring Chinook salmon. Accordingly, the program has typically only operated from March through June of each year. In order to derive full-year catch estimates, including timeframes not included during creel surveys, staff used adjusted catch record card estimates. Catch estimates from catch record cards for the time period in which creel surveys were conducted were compared with catch estimates from creel surveys to derive a ratio of creel and catch record derived catches. This ratio was then applied to catch record card harvest estimates for time periods outside the creel survey period.

In 2009, the Willamette creel program was expanded to include the January-February timeframe, but catches in the remainder of the open season were still generated by the catch card/creel survey ratio method. During 2010-2013, the creel survey was conducted during all timeframes in which retention was allowed, and no expansions for non-sampled periods were attempted. Based on the above methods, annual white sturgeon harvest in the Willamette River averaged



1,531 fish (range 989-2,206) during 1986-1996, 1,871 fish (range 1,263-2,811) during 1997-2003, and 5,193 fish (range 2,327-9,148) during 2004-2010. Since 2010, the lower Willamette River recreational sturgeon fishery has been managed under a separate harvest guideline. The Amendment to the Accord specified a 1,768 fish guideline for the Willamette River in 2012, including the baseline of 520 sturgeon. The guideline for 2013, including baseline, was 1,733 fish.

## **Sturgeon Fisheries**

Reduced salmon fishing opportunities during the mid-1970s through the late 1990s greatly increased the popularity and importance of sturgeon for both commercial and recreational fisheries. The healthy white sturgeon population allowed the commercial industry to develop stable fisheries in a time when commercial salmon fishing opportunities had been drastically reduced. A similar lack of stable recreational salmon fisheries and recognition of white sturgeon as a sport fish resulted in increased popularity of sturgeon angling since the mid-1980s. Over time, reduced white sturgeon catch guidelines impacted the stability of all Columbia River sturgeon fisheries. Based on Commission guidance, retention of white sturgeon in Columbia River commercial and recreational fisheries has been prohibited since January 2014.

### **Past Commercial Sturgeon Fisheries**

Since the late 19<sup>th</sup> century, commercial catch of sturgeon remained very low until the mid-1940s. Through 1968, annual landings only exceeded 5,000 fish occasionally. Since 1969, landings exceeded 5,000 fish annually except in 1991 and 2010-2013. Catches peaked in the late 1970s and early 1980s with annual landings ranging from 9,400 to 22,800 fish. During the 1990s, catches ranged from a low of 3,800 fish in 1991 to a high of 13,900 fish in 1998 (Tables 5 and 9). During 1997-2013, commercial sturgeon fisheries were managed to remain within catch guidelines while maximizing economic benefit and achieving conservation objectives for other species. Plans for distribution of the commercial harvest allocation were developed annually with input from the Columbia River Commercial Fisheries Advisory Group (CRCAG), to provide fishing opportunities throughout the year while maintaining optimum market value. Weekly landing limits remained a valuable tool in maintaining consistent commercial fisheries since first adopted in 2002. During 2003-2013, harvest guidelines for commercial fisheries included fish caught in both mainstem and Select Area commercial fisheries. The retention of green sturgeon has been prohibited in commercial fisheries since July 2006. Based on Commission guidance, white sturgeon retention and sales in Columbia River commercial fisheries were prohibited beginning in 2014. Season summaries are described in Table 7. Harvest guidelines and catch data are provided in Table 5, Table 6, Table 9 and Table 10.

### **2016 Commercial Fishery**

White sturgeon retention and sales remained closed throughout all 2016 LCR spring, summer, and fall mainstem and Select Area commercial seasons.

### **Past Recreational Sturgeon Fisheries**

Recreational harvest guidelines for white sturgeon decreased steadily from 54,000 fish in 1997 to 8,100 fish in 2013 in response to declining white sturgeon abundance. During the same time period, sturgeon angler trips declined from over 200,000 trips per year to just over 33,000 trips in

2013. Based on guidance from the OFWC and WFWC in December 2013, LCR sturgeon fisheries closed to sturgeon retention effective January 1, 2014. Sturgeon retention remained prohibited for the duration of all 2014, 2015 and 2016 recreational fishing seasons downstream of Bonneville Dam and in the lower Willamette River below Willamette Falls. Season summaries are provided in Table 8. Harvest guidelines and catch data are provided in Table 3, Table 4, Table 6, Table 9 and Table 10.

## **2016 Recreational Sturgeon Fishery**

### Above Wauna (non-Estuary)

Regulations for the Columbia River and adjacent Washington tributaries upstream of the Wauna power lines (RM 40) prohibited the retention of sturgeon January 1-December 31 (Table 8). Catch-and-release angling was allowed during all retention closures, except in the area of Sand Island Slough during January 1-April 30 and in the spawning sanctuary between Marker 82 and Bonneville Dam during May 1-August 31.

### Below Wauna (Estuary)

Regulations prohibited the retention of white sturgeon below Wauna power lines January 1-December 31 (Table 8). Catch-and-release angling was allowed during all retention closures.

### Summary of 2016 Recreational Harvest

As in the past, angler participation in the catch-and-release fishery was minimal, but catch rates were exceptional. Through September, 2016 anglers made 4,300 trips for sturgeon below Bonneville Dam and released 23,800 white sturgeon.

## **2017 Non-Indian Sturgeon Fisheries Expectations**

Based on current OFWC and Washington administrative rules, all recreational and commercial fisheries in the Columbia River and tributaries downstream of Bonneville Dam remain closed to the retention of white sturgeon; however, catch and release opportunity is allowed during non-retention periods. Staff intend to provide briefings on the stock status of the LCR sturgeon population at the January 14 WFWC and the February 10 OFWC meetings and anticipate additional guidance regarding 2017 retention fisheries downstream of Bonneville Dam. Recreational fisheries in the Columbia River upstream of Bonneville Dam and in the Willamette River upstream of Willamette Falls opened January 1.

# **STURGEON MANAGEMENT AND FISHERIES UPSTREAM OF BONNEVILLE DAM**

## **Stock Status**

The healthy white sturgeon population in the lower Columbia River historically ranged into areas above the current location of Bonneville Dam; however, with the construction of Bonneville Dam in 1938, the population became segregated and fish residing upstream could no longer migrate freely between freshwater and marine environments. The population became further segregated with the completion of McNary Dam in 1953, The Dalles Dam in 1957, and John Day Dam in 1968, resulting in functionally separate populations in Bonneville, The Dalles, John Day, and McNary pools as well as each of the upriver pools as other dams were constructed. Inaccessibility to the marine environment and habitat alterations, primarily due to hydroelectric development, has rendered these populations less productive than those residing below Bonneville Dam.

Abundance of white sturgeon populations in each of the three Zone 6 pools (between Bonneville and McNary dams) is estimated every three years to monitor the effects of hydro-system operations and fishery management strategies. Mark-recapture population estimates are derived using directed sampling with gill nets and setlines. Significant harvest reductions were enacted beginning in 1988 and populations in all three pools increased as a result of reduced catch and other mitigation efforts. The most recent assessments estimated the abundance of legal-size sturgeon to be 5,177 43-54 inch FL fish in John Day Pool (2016), 1,840 43-54 inch FL fish in The Dalles Pool (2014), and 5,890 38-54 inch FL fish in Bonneville Pool (2015). Prior estimates back to 1976 of 33-65 inch FL (36-72 inch TL) fish are presented in Table 11.

## **Fishery Management Actions**

The Sturgeon Management Task Force (SMTF) consists of representatives from Oregon, Washington, and the Columbia River treaty Indian tribes (Nez Perce, Umatilla, Warm Springs, and Yakama). The SMTF was formed in 1987 in response to concerns over increasing catches (non-Indian recreational and treaty Indian commercial and subsistence) and declining white sturgeon abundance in the Zone 6 area. The purpose of the SMTF is to review the status of sturgeon and provide harvest management recommendations for fisheries occurring in the Zone 6 management area. Treaty sturgeon fisheries do not currently occur in the McNary Pool, so this area is not considered in SMTF harvest sharing agreements. There are recreational and treaty sturgeon retention fisheries in the Priest Rapids and Wanapum pools which are addressed between the area co-managers outside of the SMTF process.

The current harvest allocation is approximately 39% recreational and 61% treaty commercial for Zone 6 (2012-2016 average). Pool-specific harvest guidelines are shaped to meet fishery demands. The recreational and treaty Indian commercial fisheries are allowed an equal share of the Bonneville Pool catch, while the treaty Indian fishery is allowed a much greater share of the catch in The Dalles and John Day pools. Treaty Indian fishers also take sturgeon for subsistence purposes separate from commercial sturgeon seasons, and this catch is not included in the commercial catch guidelines. Subsistence catch is estimated through the creel monitoring

program conducted by the tribes, and has averaged 318 sturgeon annually since 2006, ranging from 144 to 652 fish (Table 12). The 2016 subsistence catch was 144.

## **Sturgeon Fisheries**

Sturgeon fisheries in Zone 6 consist of treaty-Indian commercial and subsistence fisheries and non-Indian recreational fisheries. Non-Indian fishing is restricted to hook-and-line recreational fishing only, while treaty Indian commercial fishing is conducted with three main types of gear: hook-and-line, setlines, and gillnets, although small numbers of legal sized sturgeon can be caught from hoop-nets.

Since 1994, sturgeon fisheries occurring in Zone 6 are managed in accordance with reservoir-specific harvest guidelines set forth by the SMTF (Table 15). Due in part to intensive fishery management, abundances of legal-sized fish in the Zone 6 pools generally increased from the early 2000s through 2011. These trends allowed for increased harvest guidelines in most areas. John Day abundance continued to increase through 2013, but since substantial declines had been observed in the other two pools, managers avoided increasing guidelines in John Day Pool beyond the higher level set in 2011 as a precautionary measure. More recently, abundances have been declining as the relatively large year class which resulted from the high flows in 1996 grows out of the legal-size slot. Guidelines in Bonneville and The Dalles pools have been reduced correspondingly. The 2016 stock assessment showed a substantial drop in legal size abundance for John Day Pool as well and the guideline has now been reduced.

In recent years, most treaty sturgeon catch has occurred in the winter season (Table 13). Under permanent regulations, treaty commercial setline fisheries are open in all three Zone 6 pools during January 1-31. A winter commercial gillnet fishery normally begins February 1 and continues no later than March 21, but is often closed earlier if sturgeon harvest guidelines are met in any pool. In some years, the tribes allow commercial setline fishing in the summer or fall seasons. Treaty Indian subsistence sturgeon seasons are open the entire year. Most treaty subsistence harvest occurs in association with salmon fisheries occurring throughout the year.

Recreational fisheries typically begin on January 1 in all pools and continue until the pool-specific guide line is met (Table 14). Since 2011, the Bonneville Pool fishery structure has been managed to allow for a summer season beginning in late June. To accomplish this, the winter season retention period in Bonneville Pool is managed to use less than 50% of the harvest guideline in order to have fish remaining for a summer retention period. Catch-and-release recreational fishing is allowed once recreational guidelines are reached.

### **2016 Treaty Indian Fisheries**

The 2016 treaty Indian winter setline fishery harvested 57 sturgeon from the John Day Pool. No fish were harvested in The Dalles Pool or the Bonneville Pool. The winter setline fishery catch represented 5.7% of the 1,000 fish commercial guideline for the John Day Pool. The slot limit sizes for sturgeon retention were between 43-54 inches fork length in The Dalles and John Day pools and between 38-54 inches fork length in the Bonneville Pool. The balance of the Zone 6 commercial treaty harvest was caught during the winter gillnet fishery and fall setline fisheries (Table 16).

The winter gillnet fishery occurred in The Dalles pool between February 1 and March 5 and in the John Day Pool during February 1 to March 12. A fishery in the Bonneville Pool ran from

March 14 until March 21. During the winter gillnet fishery, landings totaled 1,136 fish, which included 776 sturgeon in the John Day Pool, 258 in The Dalles Pool, and 102 in the Bonneville Pool. An early fall setline fishery was opened in the Bonneville Pool from August 1-13 which harvested 30 fish. In October and November, a series of setline fisheries opened in all three pools, with landing of 104 fish in Bonneville Pool, 6 fish in The Dalles Pool, and 48 fish in the John Day Pool.

Commercial season totals amounted to 73%, 81% and 88% of the respective harvest guidelines for the Bonneville, The Dalles, and John Day pools (Table 16). Treaty Indian subsistence sturgeon fishing is open year-round and normally involves the retention of legal-sized sturgeon caught in association with other commercial and subsistence fishing activity. The subsistence catch in 2016 is estimated to be 145 fish, or 37% of the previous 5-year average of 389 white sturgeon (Table 12).

### **2016 Non-Indian Recreational Fisheries**

Recreational retention seasons for each Zone 6 pool began January 1 and remained open until pool-specific catch guidelines were reached, except the retention season in Bonneville Pool was split into winter and summer segments. Bonneville Pool was open to retention January 1-February 7 with the intent of accessing approximately half of the guideline of 325 sturgeon. As of February 8, 157 sturgeon had been retained, so the winter retention season was closed. On April 7, the Compact adopted a two-day summer retention season for June 18 and July 1. An estimated 192 sturgeon were caught June 18, bringing the season total to 349 sturgeon caught. The July 1 fishery was rescinded (Tables 13 and 14). Retention continued through April 29 in The Dalles Pool and through May 28 in the John Day Pool (Tables 13 and 14) with preliminary catches of 96 and 520 fish, respectively. The combined Zone 6 recreational catch of 965 fish was 104% of the combined recreational guideline of 925 white sturgeon (Table 15).

The retention season for McNary Pool/Hanford Reach and the Snake River below Ice Harbor Dam was open from February 1 through July 31, per permanent regulation. Due to normal delays in angler catch record card reporting, a 2016 recreational harvest estimate for McNary Pool/Hanford Reach is not available. The preliminary 2015 estimate of white sturgeon harvest by Washington anglers for McNary Pool/Hanford Reach and the Snake River downstream from Ice Harbor Dam is 413 fish.

Due to continued poor annual production of white sturgeon in the lower Snake River, the WFWC adopted permanent rules prohibiting retention of white sturgeon in the Snake River upstream of Ice Harbor Dam effective July 1, 2015. Catch and release continues to be allowed year-round.

### **2017 Zone 6 Sturgeon Fisheries Expectations**

The SMTF met in January 2017 to review 2016 management, results of the 2016 stock assessment in John Day pool, and to discuss management of 2017 fisheries. The SMTF recommended new guidelines for the John Day pool for 2017-2019 as follows:

- 2017: 400 total including 295 treaty commercial and 105 recreational
- 2018: 315 total including 210 treaty commercial and 105 recreational
- 2019: 280 total including 175 treaty commercial and 105 recreational

As per permanent regulations, treaty Indian winter commercial seasons include a setline season scheduled for January 1-31, 2017. A gillnet fishery is typically scheduled to begin annually on February 1.

As per permanent regulations, Zone 6 recreational seasons begin January 1, 2017 and continue until guidelines are met in The Dalles and John Day pools. It is anticipated that the season will be split in Bonneville Pool, as it has been since 2011. Per permanent regulation, McNary Pool/Hanford Reach and the Snake River below Ice Harbor Dam will be open to retention February 1 through July 31.

# **SMELT MANAGEMENT AND FISHERIES**

## **Stock Status**

Eulachon (also known as Pacific or Columbia River smelt) return to the Columbia River to spawn as early as age two and as late as age five (most returning at ages three and four). On rare occasions, eulachon of age six or age seven have been detected. The fish typically begin to enter the Columbia River in December. Peak spawner abundance is usually in February, with variable abundance of adults through April. Eulachon typically spawn annually in the mainstem Columbia River downstream of Bonneville Dam and in the Cowlitz River, with inconsistent runs and spawning events occurring in the Grays, Skamokawa, Elochoman, Lewis, Kalama, and Sandy rivers. Spawning can occur soon after freshwater entry. Eulachon are broadcast spawners, preferring areas with a coarse, sandy bottom. Females produce 20,000 to 60,000 eggs and the adults die following spawning. The adhesive eggs settle to the bottom and incubate for about 30-40 days, depending on water temperature. Young eulachon larvae are about 4 mm in length and drift with the current to sea.

Effective May 17, 2010, the Southern DPS of eulachon were federally-listed as threatened under the ESA. This genetic group is comprised of eulachon spawning in rivers from the Skeena River in British Columbia (inclusive) to the Mad River in Northern California (inclusive). Of the numerous streams and rivers in this geographic area, the Columbia River has the largest spawning run.

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## **Adult Returns**

Although commercial landings are not applicable for developing annual population estimates because they are influenced by consumer demand, season structure, and environmental conditions, they do provide a useful measure of the relative annual run strength (Tables 17 and 18). The smelt fishery can be traced back to the late 1800s. Commercial landings from 1938-1992 were in the millions of pounds annually. In 1993, eulachon strayed into many Washington coastal streams and bays due to cold Columbia River water temperature, only 513,900 pounds were landed in the Columbia River and tributaries. Landings in 1994 were only 43,400 pounds, and beginning in 1995 fishery restrictions were enacted. In 2001, 2002, and 2003 commercial harvest increased but decreased again in 2004 and 2005.

Other populations of eulachon along the Pacific coast of Canada experienced a similar pattern of declines. In 2005 a precipitous drop was observed in the Fisheries and Oceans Canada (DFO) New Westminster test fishery for adult eulachon returning to the Fraser River. In 2006 the northern British Columbia (BC) stock (e.g. Skeena River), and central BC stock (e.g. Bella Coola River) groups collapsed, along with the southern stocks (Fraser River and Columbia River).

During the winters of 2007-2009, Columbia River landings improved slightly while catch CPUE dropped. The pounds landed and CPUE both dropped off significantly in 2010. Oregon and Washington waters were closed to the harvest of eulachon during 2011-2013, so no landings or CPUE information is available (Tables 17 and 18); however, estimates of spawning stock biomass (SSB) indicate that adult presence improved during 2011, 2012, and 2013. Short commercial seasons were allowed during 2014, 2015, and 2016 for research purposes. The modest commercial landings and CPUE (Figure 3, Tables 17 and 18) were not consistent with the angler success in the sport fishery or with the SSB estimates for 2014-2016.

Age composition of the Columbia River eulachon run has shifted from a relative young composition in 2013 (94% age-2 and age-3 fish), to increasingly older fish in 2015 and 2016. The decline in the presence of the younger brood years is likely due to deteriorating ocean conditions, since age-2 fish for run years 2015 and 2016 would have been from brood years 2013 and 2014 respectively (which were large run years that produced large numbers of out-migrating larvae, Table 20).

### **Spawning Stock Biomass (SSB)**

During the 2011-2016 run years, the larval density data (gathered during late fall through spring) was analyzed with information on daily river flow and adult gender ratios and fecundity values to derive annual estimates of spawning stock biomass (SSB) for areas above the mainstem Columbia River larval sample site (Clifton Channel / Price Island transect). The spawning stock biomass (expressed in pounds or metric tons), is an estimate of the minimal number of spawners needed to have produced the eulachon larval outflow observed. Adult eulachon average about 10-11 fish per pound. The SSB for the Columbia River has increased annually from 2012 through 2015, with 2014 having the largest estimated run at 16,420,000 pounds. The estimate for 2016 is considerably lower than in 2014 and 2015, with a run size of 4,886,900 pounds.

The Cowlitz River escapement is included in the mainstem Columbia River SSB estimates since it is a tributary upstream of the mainstem Columbia River (transect) larval sample site. The Cowlitz Tribe estimated a mean SSB for the Cowlitz River in 2015 to be 9,728,000 pounds, which was 88% of the corresponding mainstem Columbia River SSB estimate. Sex ratios in adult samples tend toward male dominance as one moves further upstream from the estuary, and using a higher male to female ratio results in a higher Cowlitz River SSB estimate than what would be obtained by applying an equal male to female ratio (as was done for the mainstem Columbia River SSB estimate). Regardless, the Cowlitz River accounts for a large portion of production (eulachon egg and larvae drift at the mainstem Columbia River larval sample site) at 34.2% in 2015 and about 52.0% in 2016. The only notable eulachon spawning area downstream of the mainstem Columbia River transect site is the Grays River. Grays River SSB estimates were made during 2011-2013, 2015, and 2016 (700 pounds, 900 pounds, 2,000 pounds, 17,000 pounds and 79,000 pounds respectively). From 2011-2015 the SSB estimates for the Grays River ranged between 0.02% and 0.17% of the estimates for the mainstem Columbia River, however, in 2016 the Grays River estimate was much larger at 1.5%.

Ideally, the actual number of spawners would be greater than the SSB to account for egg to larvae mortalities. To derive a conservative estimate of the run size returning to the Columbia River, commercial, recreational, and tribal harvest was added to the SSB estimate yielding run

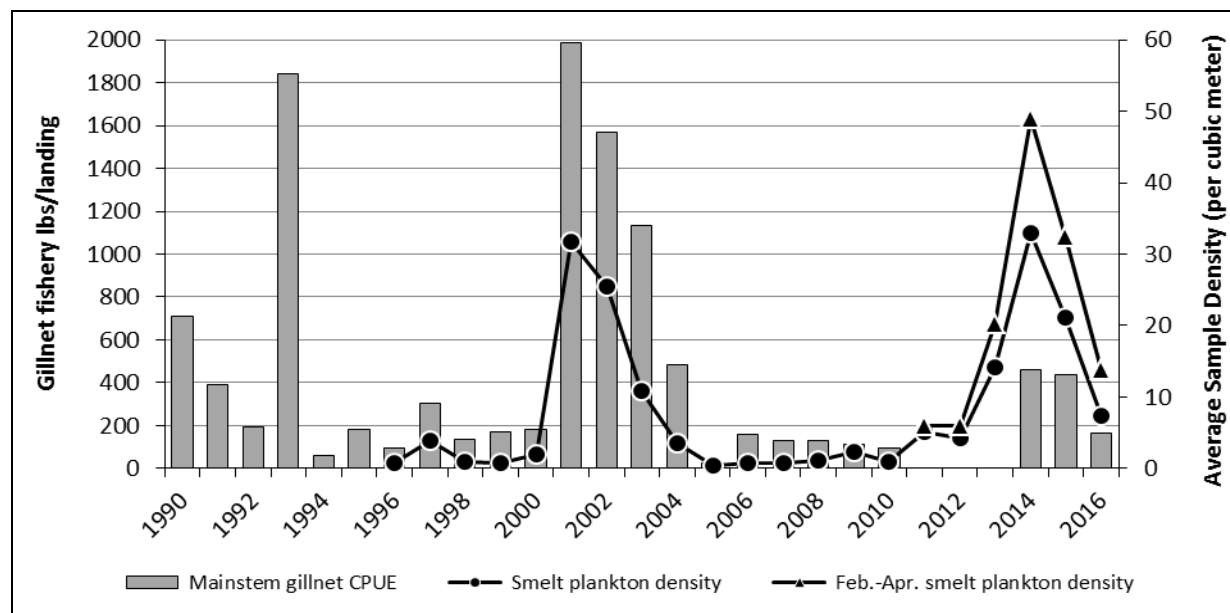


size estimates of 16,600,000 pounds for 2014, 11,400,000 pounds for 2015 and 5,120,000 pounds for 2016 (Table 20).

The SSB approach has been used over the past three decades in other eulachon spawning rivers: Bella Coola River 2001-2007 (less than 411 pounds), Chehalis River (24,360 pounds in 2015, 62,330 pounds in 2016), Fraser River 1995-2016 (9,000 to 4,214,000 pounds, 970,000 pounds for 2016), Kemano River (754,000 pounds in 1990, 183,000 pounds in 1991), Kingcome River (31,000 pounds in 1997), Kitimat River (51,000 pounds in 1993), Klinaklini River (265,000 pounds in 1997), Nass River (3,748,000 pounds in 1983), Naselle River (3,260 pounds in 2015, only 60 pounds in 2016), Skeena River (7,000 pounds in 1997), and, Wannock River (2,000 pounds in 1997).

### Juvenile Production

Average eulachon larval densities were first determined for the Cowlitz River in 1986. WDFW resumed that work in 1994. By 1996, the mainstem Columbia River and other tributaries were added to the program (Table 19). The larval sampling was conducted only for a few days near what was assumed to be the peak larval outflow (about a month following peak adult presence). Beginning in 2003, multiple collections were conducted at the mainstem Columbia River (Price Island and Clifton Channel) site throughout the outmigration season, which provide the data necessary to identify the peak timing and duration of the outmigration from the bulk of the production area. Average larval densities have improved significantly since 2010 (Figure 3 and Table 19); however, the smelt plankton density has declined the past two years. The 2016 February-April value was a modest 13.8 larvae per cubic meter. Prior to 2014, annual eulachon larval densities for the mainstem Columbia River site correlated well with the adult CPUE trend from commercial mainstem fisheries (Figure 3).



**Figure 3.** Comparison of CPUE of eulachon in mainstem Columbia River commercial fisheries and larval densities in mainstem Columbia index sites, 1989-2016. Adjusted density is February through April only for 2011 through 2016, which is more comparable to pre-2011 sampling periods. CPUE are not available for 2011, 2012, and 2013 due to no fisheries in those years.

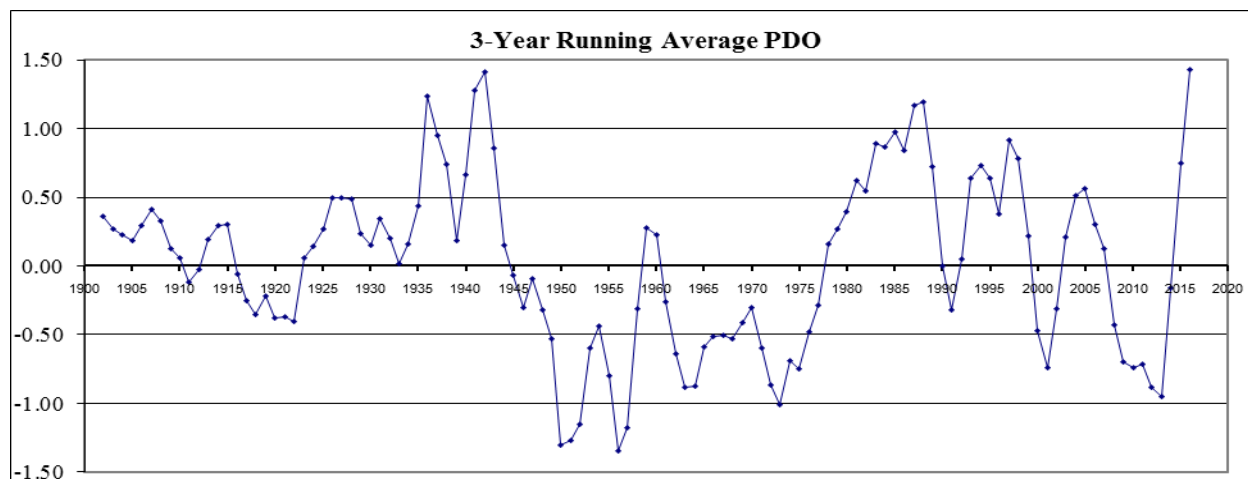
## **Early Life-Stage Survival**

The time for eulachon eggs to hatch, the timing and duration of the outmigration of eulachon larvae, and the nearshore ocean distribution of larvae depends upon the Columbia River water temperatures and flow. Yolk sac absorption and first feeding stage are critical stages in the development of most fishes. Larvae have fully developed sensory, mouth, and gut development at the time of yolk sac absorption, and therefore are capable at that stage to switch to exogenous feeding. It is possible that eulachon larvae are capable of surviving for a few days without food after the yolk reserves are depleted; however, at some point the larvae must arrive at an area where they have sufficient prey of the right kind available. Therefore, arriving late to the ocean, and not being disbursed well in the ocean, might reduce a eulachon larva's chance of survival. During the winter and spring of 2012, water temperatures were relatively cold and flows were above normal, suggesting that the larvae probably arrived in the estuary with yolk sac remaining. The water particle residence time in the estuary was below normal which means the larvae likely entered marine waters on time or early. The 2012 Columbia River plume was at or near its record size for March through June, suggesting broad dispersal of the eulachon larvae. It appears that early life-stage survival was very good for brood year 2012 fish (those returning as Age-5 during 2017). During the winter and spring of 2013, water temperatures were relatively warm and flows were about normal, suggesting that some of the larvae arrived in the estuary without yolk sac remaining. The water particle residence time in the estuary was above normal which means the larvae may have entered marine waters later than normal, likely all of them with yolk sac absorbed. The 2013 Columbia River plume volume varied but was within 25% to 75% of average size for March through June, suggesting a typical dispersal of the eulachon larvae. It appears that early life-stage survival was somewhat less than normal for brood year 2013 fish (those returning as Age-4 during 2017). During the winter and spring of 2014, water temperatures were relatively cold and flows were above normal, suggesting that the larvae probably arrived in the estuary with yolk sac remaining. The water particle residence time in the estuary was below normal which means the larvae likely entered marine waters on time or early. The 2014 Columbia River plume was at its record size for March through June, suggesting a very broad dispersal of the eulachon larvae. It appears that early life-stage survival was good for brood year 2014 fish (those returning as Age-3 during 2017). During the winter and spring of 2015, water temperatures were quite warm and flows were well below normal, suggesting that most of the larvae arrived in the estuary without yolk sac remaining. The water particle residence time in the estuary was above normal and grew longer during the spring, which means that fully button-up larvae entered marine waters later than normal. The 2015 Columbia River plume volume was at or near the record smallest size for March through June, suggesting a very poor dispersal of the eulachon larvae. It appears that early life-stage survival was less than normal for brood year 2015 fish (those returning as Age-2 during 2017).

## **Ocean Survival**

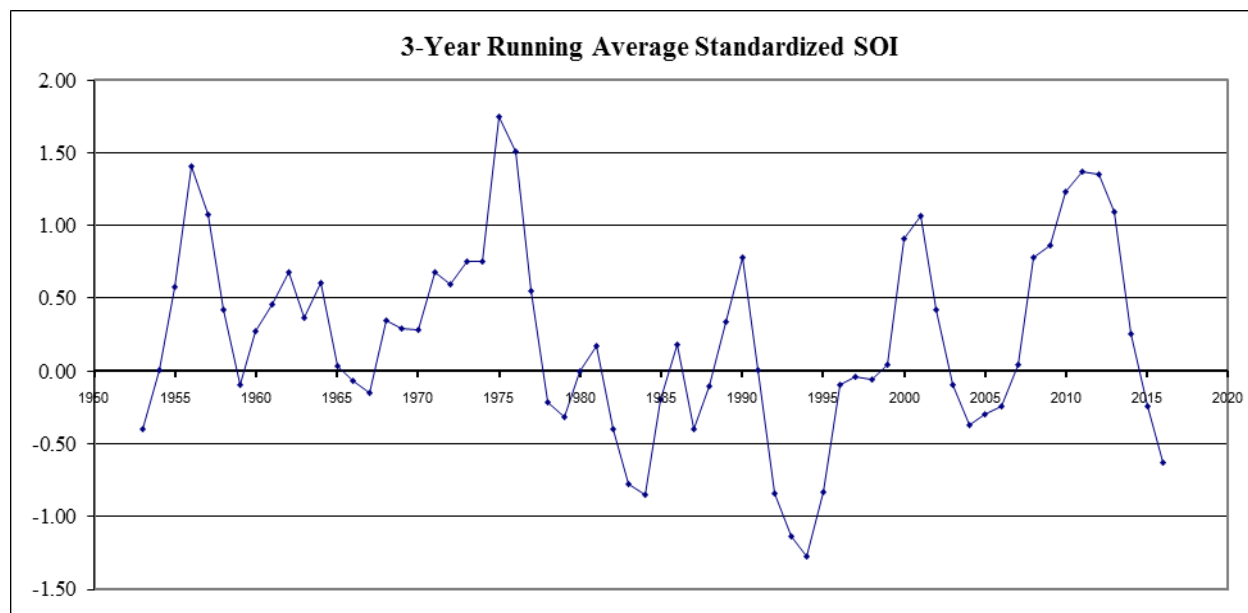
All Oregon/Washington/British Columbia stock groups have remained depressed since the 2006 coast-wide collapse, suggesting that protracted poor ocean conditions were prevalent off the coast of Oregon, Washington, and British Columbia. Scientists have developed various indices of oceanic environmental conditions. Of these, the Pacific Decadal Oscillation (PDO) Index and the Southern Oscillation Index (SOI) are useful in estimating how well smelt survive their ocean-phase.

The PDO is an index based on North Pacific sea surface temperature and pressure that correlates with changes in northeast Pacific marine ecosystem productivity. Warm PDO eras (positive PDO values) have coincided with enhanced coastal ocean biological productivity in Alaska and inhibited productivity off the west coast of the contiguous United States, while cold PDO eras (negative PDO values) have coincided with the opposite pattern. Conditions have been warming over the past two years, which means that the ocean conditions for eulachon are becoming unfavorable (Figure 4).



**Figure 4.** Three-year running average values for the Pacific Decadal Oscillation (PDO) Index.

Recent trends in eulachon abundance also follow the Southern Oscillation Index (SOI), which describes El Niño and La Niña events. Generally speaking, El Niño events (negative SOI values) are unfavorable for ocean phase eulachon, while La Niña events (positive SOI values) are cooler and therefore more favorable. The development of unfavorable conditions for eulachon is indicated by the declining trend for the three-year running averages of the Standardized SOI (Figure 5).



**Figure 5.** Three-year running average values for the Southern Oscillation Index (SOI).

Run strength predictions for the upcoming year are complicated by the variability in the ocean indices in the three years prior. As of November 10, 2016, the National Oceanic and Atmospheric Administration Climate Prediction Center stated that La Niña conditions are present and slightly favored to persist (~55% chance) through winter 2016-17. However, periods of good ocean conditions do not necessarily make up for the negative survival impact during periods of bad ocean conditions.

Though the upwelling off the coast had been weak through 2014, the food base was relatively abundant and of good quality. The copepods off of Newport, Oregon were mostly composed of the nutritionally-rich northern species from late 2010 through early 2014. Although upwelling improved in 2015, the copepod composition has shifted toward less nutritionally-rich southern species. Strong upwelling does not necessarily mean nutrient rich water. Temperature and salinity (affecting copepod diversity) seems to be a more important factor in deterring conditions favorable for juvenile fish including eulachon.

During the months of May through September, it is not unusual for small portions of the continental shelf (out beyond the 30 m depth contour) to become hypoxic (dissolved oxygen levels less than 1.4 ml/L) in the lower 10-30 m of the water column. However, in recent years there have been broad areas of the shelf north of Newport, Oregon, that have been hypoxic (approximately 28% of the area in June 2012, 40% in September 2012, 40% in June 2013, 28 % in June 2014). The presence of hypoxic waters may be lethal to the eulachon and the plankton they feed upon.

A more direct measure of ocean survival could theoretically be obtained from eulachon marine catch data where eulachon are caught as bycatch in the ocean pink shrimp trawl fishery. Eulachon bycatch in the Washington and Oregon shrimp trawl fishery increased dramatically in 2012, but dropped slightly in 2013 and 2014 despite the shrimp catch continuing to increase. Pink shrimp trawl gear configurations have changed recently with the requirement for smaller spacing of the excluder bars, and adoption by the fleet in 2015 of LED lighting of the net (both measures taken together dramatically reduce eulachon bycatch). These gear changes will complicate interpretation of eulachon bycatch trends for the next few years.

## **Fishery Management Actions**

Beginning in 1999, the Washington and Oregon Departments of Fish and Wildlife began work on a Joint State Eulachon Management Plan to guide all aspects of eulachon management for future years. During 1999, WDFW and ODFW developed an interim Eulachon Management Plan to guide fishery management decisions in 2000, because a draft plan had not been completed prior to adoption of recreational and commercial fishing seasons for that year.

In 2001 the WDFW, with input from ODFW, finalized the Washington and Oregon Eulachon Management Plan (WOEMP). The plan contains recommended policies concerning smelt fishery management, which are considered 'wise-use' management precepts consistent with an ecosystem approach in making resource decisions. The ecological importance of eulachon is underscored in much of the body of research in the Northeast Pacific ecosystem, and should be a fundamental consideration when making fishery management decisions affecting the health of this resource.

***Policy Recommendations for Eulachon Conservation and Fishery Management  
from the Washington and Oregon Eulachon Management Plan***

**Conservation Policy**

- ✓ Maintain healthy populations of eulachon while assuring the integrity of the ecosystem and habitat upon which they depend.
- ✓ Management actions will consider the role of eulachon in both the marine and freshwater ecosystems and the need to maintain sufficient populations of eulachon for proper ecosystem functioning.
- ✓ A precautionary approach to resource management shall be utilized.
- ✓ Consider the best scientific information available and strive to improve the information base for eulachon.

**Fishery Management Recommendations**

- ✓ Maintain commercial and recreational fishing opportunity in the lower Columbia River, to include opportunities in both mainstem and tributaries for both fleets.

The management plan includes recommendations concerning fisheries occurring in the mainstem Columbia River and its tributaries downstream of Bonneville Dam. Fishery recommendations have been categorized into three levels, depending on run size expectations based on (1) parental run strength as indexed by fishery landings, (2) juvenile production as indicated by larval sampling, and (3) estimates of ocean productivity. Columbia River smelt fishing seasons were regulated in accordance with the WOEMP from 2001 through March 2010 prior to closure of all Columbia River smelt fisheries.

## **Smelt Fisheries**

Smelt fisheries historically occurred in the mainstem Columbia River and several tributaries, primarily the Cowlitz River. Mainstem fisheries consisted of a commercial fishery using gillnets with some commercial fishers using small trawls. Recreational fishing was also open in the mainstem Columbia River; however, there was very little interest in this fishery. Tributary fisheries included recreational and commercial seasons with the Cowlitz River providing the most consistent fishing opportunities. Both fisheries used dip nets to capture smelt, with most recreational effort occurring from the bank and most commercial effort occurring by boat. Minimal tribal harvest may occur for ceremonial and subsistence purposes. In most years the Yakama Nation, in coordination with WDFW, has harvested smelt from the Cowlitz River. Since around 2011, the Cowlitz Tribe has also taken smelt from the Cowlitz River for ceremonial and subsistence purposes. Beginning in 2013 the Warm Springs Tribe has harvested smelt from the Cowlitz River for subsistence purposes.

### **Past Commercial, Recreational, and Tribal Fisheries**

During 1960-1977, commercial smelt fisheries were open year-round 3½ days per week, except for 1965 and 1966 when the season was expanded to 4½ days per week. During 1978-1994, the commercial season was expanded to seven days per week but the season was reduced to the December-March time frame beginning in 1986 to better reflect the run timing of Columbia River eulachon. Large trawl gear was also prohibited in 1986.

As Columbia River eulachon abundance began to decline during the early 1990s, fishery managers recognized the need to restrict fisheries to increase escapement to spawning areas. Columbia River mainstem and tributary commercial fisheries were greatly reduced beginning in

1995 in response to exceptionally poor landings in 1993 and 1994. During 1995 and 1996, commercial fisheries were restricted to fewer fishing days per week, but the season was extended through the end of March. During 1997-2000, commercial fisheries were further restricted to test fisheries with limited days per week and a short season. These test fisheries were intended to allow minimal eulachon catch and collection of biological data to provide fishery managers with data necessary to assess the annual run strength. Starting in 2001, commercial fisheries were managed according to the WOEMP. Smelt returns began to improve, and the number of open fishing days increased through 2003. The returns declined in 2004, and for 2005-2010, the seasons were again restricted to two short periods per week. See Table 17 for commercial mainstem harvest and Table 21 for season structures.

Commercial fisheries in Washington tributaries were closed during the 1999-2000 seasons. Starting in 2001, commercial fisheries were reopened in the Cowlitz, Kalama, and Lewis rivers and managed according to the WOEMP (Table 22). As the returns declined, these tributary fisheries were scaled back. Commercial fishing in the Kalama River ceased in 2005, and for the period of 2006-2010, Washington tributary commercial fishing was restricted to the Cowlitz River. Commercial fishing in Oregon tributaries remained open year-round, 7 days a week, 24 hours a day, per permanent regulations up through the 2010 season (Table 22); however, commercial landings in Oregon tributaries only occurred in the Sandy River during 2003 (Table 17). The Sandy River is the only Oregon tributary known to have substantial, albeit highly sporadic, eulachon returns.

The recreational dip net fishery has been open in the tributaries and mainstem Columbia River for decades, with almost all the effort taking place in the tributaries. Prior to 1997, the recreational fishery in Washington tributaries was open seven days per week the entire year. The 1997-2000 seasons were cut short, limited to certain days, and/or restricted to the Cowlitz River only due to persistent low eulachon returns. Starting in 2001, the recreational fisheries were managed according to the WOEMP. As returns improved, the number of fishing periods and areas fished expanded through 2003, but were scaled back as eulachon returns declined (Table 23). Smelt dippers in Washington tributaries were allowed 20 pounds per person each day up through 2004, and only 10 pounds per person per day during 2005 through 2010 (Table 23). In Oregon tributaries, the eulachon recreational fisheries remained opened year-round, 7 days a week, 24 hours a day, per permanent regulations up through the 2010 season (Table 22). Annual estimates of recreational tributary catch prior to 2014 are not available; however, limited past creel census information suggests that the recreational catch equaled commercial tributary landings when eulachon were abundant for a long period of time. See Table 23 for recent-year recreational season structures and Table 20 for recreational harvest.

In response to the ESA listing, the states took precautionary action and prohibited commercial sales of eulachon from Columbia River and tributary fisheries effective December 10, 2010 and closed all recreational eulachon fisheries effective January 1, 2011. Historically, fishery managers relied on “fishery-dependent” assessments comprised of commercial fishery landings and pounds per landing data as an indicator for run strength. This data also helped managers identify population trends. This long-term set of data ended in 2011 with the discontinuation of Columbia River and tributary fisheries. Limited conservation-level fisheries provide the opportunity to collect fishery landing and pounds per landing (CPUE) data so the status and run strength of the Columbia River eulachon can be better assessed. Similar information was used in the decision to list eulachon under the ESA.

In 2014, and again in 2015, the Columbia River Compact adopted commercial and recreational smelt seasons after working closely with NMFS. These seasons were research-based, closely monitored, and provided the opportunity to collect biological data to develop a better understanding of the structure of the Columbia River sub-population. Fishery assessment data allows for a better understanding and calibration of the SSB estimation calculations and help state agencies provide NMFS with improved data for a viability assessment as part of a eulachon recovery plan.

Although the early indicators for the 2014 and 2015 smelt return allowed for Level 2 fisheries under the WOEMP, Washington and Oregon staff proposed (and the Compact adopted) a season structure that was more conservative than past Level 1 fisheries in order to emphasize a conservative approach to management in 2014 and 2015.

Commercial mainstem fishing periods these years consisted of two 7-hour periods per week in Zones 1-3 from early February through early March totaling 8 open fishing days for the seasons. Commercial landings totaled nearly 19,000 pounds in 2014 and 17,000 pounds in 2015 (Table 20). No commercial tributary seasons were set in either year.

Recreational fisheries were conducted in two tributaries in 2014 and 2015; no mainstem seasons were set. In 2014 the Cowlitz River was open for 6 hours on Saturdays between February 8 and March 1. The Sandy River was open for 6 hours on Saturdays between March 1 and March 22. In 2015 the seasons were restricted to two 6-hour periods during 6 AM-noon February 7 and 14 on the Cowlitz River and March 7 and 15 on the Sandy River. Both tributaries had a daily limit of 10-pounds per person. These fisheries were very popular, especially the Cowlitz River where daily limits were quickly met. Catch exceeded expectations, due in part to the large smelt returns. Catch estimates from the recreational tributary fisheries include 197,900 pounds from the Cowlitz River and 6,000 pounds from the Sandy River in 2014 and 287,400 pounds from the Cowlitz River and less than 100 pounds from the Sandy River in 2015. The poor catch rates for the Sandy River were due to the fishing dates not aligning with the modest return (Table 20).

Tribal ceremonial and subsistence fisheries harvested 6,970 pounds in 2014 and 10,440 pounds in 2015 from the Cowlitz River (Table 20). This was similar in magnitude to the 7,470 pounds harvested in 2013.

## **2016 Commercial, Recreational, and Tribal Fisheries**

In 2016, after working closely with NMFS, the Columbia River Compact again adopted limited commercial and recreational smelt seasons at levels below those allowed under Level 1 of the Eulachon Management Plan. Commercial mainstem fishing periods consisted of two 7-hour periods per week in Zones 1-3 from February 1-25 (Table 21). Commercial landings totaled 4,820 pounds (Table 20), with the majority of the landings occurring during the second and third weeks of February. The 2016 catch per unit effort (CPUE) was about a third of the 2014 and 2015 averages (Table 18). No commercial tributary seasons were set in 2016 (Table 22).

A one day recreational fishery occurred in the Cowlitz River in 2016; no mainstem seasons were set (Table 23). The Cowlitz River was open for 6 hours on Saturday February 6, with the daily limit of 10-pounds per person. Catch estimates from the Cowlitz River recreational fishery are 141,050 pounds (Table 20). The Oregon Department of Fish and Wildlife monitored the Sandy River for the presence of smelt during February-March, but no adult presence was confirmed and Sandy River remained closed in 2016.

Tribal ceremonial and subsistence fisheries occurred in the Cowlitz River. The estimated tribal harvest of 8,560 pounds during 2016 was less than the previous year (Table 20), but consistent with the decreased run size.

### **2017 Smelt Fisheries Expectations**

The marine environment (as defined by the PDO, SOI, ONI, and other ocean environmental indicators) was favorable during 2012-2013, but began deteriorating during 2014 and 2015. Primary production likely improved as upwelling strengthened in 2015; however, the prey base for eulachon shifted to less nutrient-rich species. Also, large portions of the continental shelf have experienced hypoxic conditions during the past few summers. The 2017 run will be composed of returns from the moderate to strong brood years of 2012-2015; however, age composition of the Columbia River eulachon runs have been shifting toward older age classes since 2013, which suggests that the more recent brood years have been significantly affected by the worsening ocean conditions. Furthermore, early life-stage survival (from spawning ground to ocean arrival and dispersal) was likely poor for brood years 2013 and 2015. The potential cropping of the run by recent deterioration in the ocean environment leads the Joint Staff to conclude that the eulachon run is continuing to decline, and that the 2017 run is likely to be at or below the 3,000,000 pound level (less than 2016, similar to 2011 and 2012).

The states are discussing with NMFS the possibility of conducting a limited research-based eulachon fishery in 2017 to gather adult biological samples needed to parameterize the SSB estimation model and to collect catch and effort data (CPUE) used for monitoring the status of the population.



**Table 1. Estimated and Projected Abundance of 42-60 Inch Total Length (38-54 Inch Fork Length) White Sturgeon in the Lower Columbia River, 1987-2017.**

Year	Historic (H)	Setline (S)			Estimation Method (H/S) and Number (%) by size class	
		Actual	Projected <sup>1</sup>		42-48 TL	48-60 TL
1987	104,000			H	75,900 (73%)	28,100 (29%)
1988	68,100			H	34,400 (51%)	33,700 (49%)
1989	48,700			H	31,900 (66%)	16,800 (34%)
1990	37,800			H	25,800 (68%)	12,000 (32%)
1991	44,200			H	32,500 (74%)	11,700 (26%)
1992	79,100			H	70,400 (89%)	8,700 (11%)
1993	129,700			H	115,500 (89%)	14,200 (11%)
1994 <sup>2</sup>	N/A			H	N/A	N/A
1995	202,200			H	143,200 (71%)	59,000 (29%)
1996	170,600			H	137,100 (80%)	33,500 (20%)
1997	174,300			H	146,600 (84%)	27,700 (16%)
1998	140,700			H	116,800 (83%)	23,900 (17%)
1999	134,500			H	116,800 (87%)	17,700 (13%)
2000	134,700			H	117,300 (87%)	17,400 (13%)
2001	127,500			H	102,200 (80%)	25,300 (20%)
2002	121,600			H	87,400 (72%)	34,200 (28%)
2003	131,200			H	85,000 (65%)	46,200 (35%)
2004 <sup>2</sup>	N/A			H	N/A	N/A
2005	136,900			H	106,900 (78%)	30,000 (22%)
2006	123,400			H	88,100 (71%)	35,300 (29%)
2007	131,700			H	101,800 (77%)	29,900 (23%)
2008	101,200			H	69,800 (69%)	31,400 (31%)
2009	95,000			H	65,000 (68%)	30,000 (32%)
2010	65,300	100,200		H	39,100 (60%)	26,200 (40%)
2011	72,800	80,500	77,000	H	46,300 (64%)	26,500 (36%)
2012	83,400	72,700	65,000	H	52,600 (63%)	30,800 (37%)
2013 <sup>3</sup>	N/A	114,900	74,300	-	N/A	N/A
2014 <sup>3</sup>	N/A	131,000	131,700	S	76,200 (55%)	54,800 (45%)
2015 <sup>3</sup>	N/A	143,900	138,200	S	74,100 (51%)	69,700 (49%)
2016 <sup>3 4 5</sup>	N/A	224,000	147,100	S	104,100 (46%)	119,900 (54%)
2017 <sup>4 5</sup>	N/A		237,900			

1. Projected abundance based on the previous year's setline estimate.

2. Abundance estimates were not developed in 1994 because insufficient numbers of fish were tagged and in 2004 due to data collection and modeling concerns.

3. The historic approach involves sampling kept catch for tags during the 16 months following tagging. Retention prohibitions in effect since January 1, 2014 preclude estimates for 2013-16.

4. The 2016 setline-based estimate and 2017 setline-based projection are preliminary.

5. The estimated legal abundance for 2016 based on setline catch rates would be 155,900.

**Table 2. Catch per set (CPUE) and proportion of positive sets (Ep) for young-of-year white sturgeon in the lower Columbia and Willamette rivers, 2004-2016.**

Year	Lower Columbia River		Willamette River	
	CPUE	Ep	CPUE	Ep
2004	1.29	0.44		
2005	1.74	0.49		
2006	1.88	0.52		
2007	--	--		
2008	1.23	0.45		
2009	5.66	0.78		
2010	0.19	0.18	0.50	0.28
2011	0.58	0.34	0.06	0.06
2012	0.77	0.35	0.75	0.25
2013 <sup>1</sup>	0.21	0.12	--	--
2014 <sup>2</sup>	0.56	0.31	1.38	0.38
2015 <sup>2</sup>	0.06	0.05	0.58	0.26
2016 <sup>2</sup>	0.20	0.13	0.75	0.48

1. Incomplete sampling year in both LCR and Willamette rivers.

2. Preliminary assessments based on length frequency examinations.

**Table 3. Annual Recreational Catch of White Sturgeon in the Lower Columbia River with Catch Guidelines, 1994-2016.**

Year	Below Wauna <sup>1</sup>		Above Wauna		Combined	
	Catch	Guideline <sup>2</sup>	Catch	Guideline <sup>3</sup>	Catch	Guideline
1994	15,578	N/A	17,893	N/A	33,500	
1995	29,714	N/A	15,423	N/A	45,100	
1996	27,694	N/A	15,068	N/A	42,800	
1997	24,511	N/A	13,646	N/A	38,200	53,840
1998	30,303	N/A	11,293	N/A	41,600	53,840
1999	29,238	N/A	10,561	N/A	39,800	40,000
2000	24,267	N/A	16,238	N/A	40,500	40,000
2001	21,619	N/A	19,597	N/A	41,200	39,500
2002	26,234	N/A	12,045	N/A	38,300	38,300
2003	18,367	19,200	13,565	12,800	31,932	32,000
2004	15,050	16,000	10,519	12,800	25,569	28,800
2005	17,911	17,783	11,891	11,560	29,802	29,343
2006	15,726	16,000	8,545	12,800	24,271	28,800
2007	19,131	16,274	10,675	13,852	29,806	30,126
2008	13,614	13,143	7,959	12,387	21,573	25,530
2009	13,109	15,529	4,599	11,430	17,708	26,959
2010	6,491	9,600	4,831	4,835	11,322	14,435
2011	6,117	6,800	2,908	3,410	9,025	10,210
2012	4,466	4,160	1,859	2,080	6,325	6,240
2013	4,559	4,042	1,942	2,021	6,501	6,063
2014 <sup>4</sup>	0	0	0	0	0	0
2015 <sup>4</sup>	0	0	0	0	0	0
2016 <sup>4</sup>	0	0	0	0	0	0

1. Recreational catch estimates for 1994-2002 are above and below the western tip of Puget Island (RM 38).
2. The switch to a 45-inch min. (TL) size limit in 2004 required a 17% reduction in the base guideline.
3. Actual in-season guidelines were different than represented here. Beginning in 2010, the guideline for the area above Wauna does not include the Willamette guideline.
4. No sturgeon retention allowed during 2014-16.

**Table 4. Annual Recreational Catch of White Sturgeon in the Lower Willamette River with Catch Guidelines, 2004-2016.**

Year	Estimated Annual Catch <sup>1</sup>	Catch in Excess of		Guideline <sup>3</sup>	% of Guideline
	Baseline <sup>2</sup>	Baseline <sup>3</sup>			
2004	4,099	1,225	2,874	Na	
2005	2,327	1,225	1,102	Na	
2006	3,348	1,225	2,123	Na	
2007	6,555	1,225	5,330	Na	
2008	9,148	1,225	7,923	Na	
2009	7,346	1,225	6,121	Na	
2010	3,529	735	2,794	2,865	98%
2011	2,690	520	2,170	2,030	107%
2012	1,535	520	1,015	1,248	81%
2013	1,410	520	890	1,213	73%
2014 <sup>4</sup>	0	0	0	0	NA
2015 <sup>4</sup>	0	0	0	0	NA
2016 <sup>4</sup>	0	0	0	0	NA

1. Harvest estimates revised November 2011 based on updated punch card and existing creel information.
2. Baseline harvest levels for the lower Willamette River were based on average harvest during 1986-1996 (1,225 fish). The lower Willamette River baseline decreased to 735 fish in 2010 and 520 fish in 2011.
3. During 2004-2009, harvest in excess of the baseline was applied to the above Wauna recreational harvest guideline. Beginning in 2010, a separate harvest guideline was established for the lower Willamette River.
4. No sturgeon retention allowed during 2014-16.

**Table 5. Annual Commercial Catch of White Sturgeon in the Lower Columbia River by Season, with Catch Guidelines, 1993-2016.**

Year <sup>1</sup>	Mainstem							Select Area			Grand Total	Guide-line
	Winter Sturgeon <sup>2</sup>	Winter Salmon	Summer	Early August	Late August	Late Fall	Total	Spring/Summer	Fall	Total		
1993	990			0	0	7,010	8,000	30	20	50	8,050	6,000
1994	2,990			0	0	3,380	6,370	30	0	30	6,400	6,000
1995	0			0	0	5,980	5,980	110	70	180	6,160	8,000
1996	800			0	330	6,580	7,710	580	110	690	8,400	8,000
1997	2,710			1,740	140	7,790	12,380	350	100	450	12,830	13,460
1998	2,680			2,540	90	8,060	13,370	360	170	530	13,900	13,460
1999	1,780			2,770	60	4,180	8,790	520	190	710	9,500	10,000
2000	2,260			2,490	300	5,130	10,180	540	160	690	10,870	10,000
2001	3,060			4,720	1,020	0	8,800	490	20	510	9,310	9,100
2002	2,720			1,340	380	4,200	8,640	650	330	980	9,620	9,800
2003	1,490	27		2,170	410	3,430	7,527	250	170	420	7,947	8,000
2004	1,696	174	9	1,550	917	3,219	7,565	184	117	301	7,866	8,000
2005	473	70	1,369	1,129	965	3,793	7,799	279	74	353	8,152	8,200
2006	288	1,651	544	1,548	363	3,492	7,886	317	109	426	8,312	8,000
2007	1,424	47	414	2,646	91	2,734	7,356	257	148	405	7,761	7,850
2008	869	17	523	2,706	103	3,170	7,388	337	134	471	7,859	7,927
2009	1,697	21	624	2,213	756	2,001	7,312	311	114	425	7,737	8,000
2010	518	28	289	1,578	297	1,348	4,058	211	116	327	4,385	4,800
2011	50	125	504	967	353	1,187	3,186	201	0	201	3,387	3,400
2012	40	14	281	585	409	368	1,697	225	0	225	1,922	2,080
2013	15	274	326	0	719	324	1,658	254	100	354	2,012	2,021
2014 <sup>3</sup>	0	0	0	0	0	0	0	0	0	0	0	0
2015 <sup>3</sup>	0	0	0	0	0	0	0	0	0	0	0	0
2016 <sup>3</sup>	0	0	0	0	0	0	0	0	0	0	0	0

1. Data since 2003 preliminary.

2. Prior to 2003, values reflect all winter fisheries.

3. No sturgeon retention allowed during 2014-16.

<b>Table 6. Recreational and Commercial White Sturgeon Harvest in the Lower Columbia River, 1997-2016.</b>						
Year	Recreational		Commercial		Combined	
	Harvest	Guideline <sup>1</sup>	Harvest	Guideline	Harvest	Guideline <sup>1</sup>
1997	38,157	53,840	12,830	13,460	50,987	67,300
1998	41,596	53,840	13,900	13,460	55,496	67,300
1999	39,799	40,000	9,500	10,000	49,299	50,000
2000	40,505	40,000	10,870	10,000	51,375	50,000
2001	41,216	40,000	9,310	9,100	50,526	49,100
2002	38,279	38,500	9,620	9,700	47,899	48,200
2003	31,932 <sup>2</sup>	32,000	7,947	8,000	39,879 <sup>2</sup>	40,000
2004	28,443 <sup>2</sup>	28,800	7,866	8,000	36,309 <sup>2</sup>	36,800
2005	30,904 <sup>2</sup>	29,343	8,152	8,200	39,056 <sup>2</sup>	37,543
2006	26,394 <sup>2</sup>	28,800	8,312	8,000	34,706 <sup>2</sup>	36,800
2007	35,136 <sup>2</sup>	30,126	7,761	7,850	42,897 <sup>2</sup>	37,976
2008	29,496 <sup>2</sup>	25,530	7,859	7,927	37,355 <sup>2</sup>	33,457
2009	23,829 <sup>2</sup>	26,959	7,737	8,000	31,566 <sup>2</sup>	34,959
2010	14,116 <sup>2</sup>	17,300	4,385	4,800	18,501 <sup>2</sup>	22,100
2011	11,195 <sup>2</sup>	12,240	3,387	3,400	14,582 <sup>2</sup>	15,640
2012	7,340 <sup>2</sup>	7,488	1,922	2,080	9,262 <sup>2</sup>	9,568
2013 <sup>3</sup>	7,391 <sup>2</sup>	7,276	2,012	2,021	9,403 <sup>2</sup>	9,297
2014 <sup>4</sup>	0	0	0	0	0	0
2015 <sup>4</sup>	0	0	0	0	0	0
2016 <sup>4</sup>	0	0	0	0	0	0

1. Actual guidelines used in-season may have been different than shown here.

2. Includes estimated Willamette River recreational harvest in excess of the adjusted 1986-1996 baseline harvest.

3. Preliminary.

4. No sturgeon retention allowed during 2014-16.

**Table 7. Summary of Mainstem Commercial Seasons and Sturgeon Regulations in the Lower Columbia River, 1997-2016.**

<b>Winter</b>
<p>1997-2002: Two 30-hr fishing periods per week from the 2<sup>nd</sup> week of January through mid-February (Zones 1-5).</p> <p>2003: Three 30-hour fishing periods (one per week) followed by one 12-hour period. January only (Zones 1-5).</p> <p>2004: Five 24-hour fishing periods from mid-January through mid-February (Zones 1-5).</p> <p>2005: Seven 24-hour fishing periods from January through late February (Zones 1-5).</p> <p>2006: Ten fishing periods from January-February (Zones 1-5). Seven were 24 hours and three were 12 hours.</p> <p>2007: Nine fishing periods from January-February. Seven were 24 hours and two were 18 hours (Zones 1-5).</p> <p>2008: Eleven fishing periods from January - February. Six were 24 hours and five were 18 hours. Three openers were restricted to portions of Zones 4-5 and the remainder occurred in Zones 1-5.</p> <p>2009: Eight fishing periods from January – February (Zones 1-5). Six were 24 hours and 2 were 18 hours. Landing limit of 12 during the last 4 periods.</p> <p>2010: Five 24-hour fishing periods during January-February (Zones 1-5) with a 15 fish landing limit in effect.</p> <p>Sturgeon catch also occurs in spring Chinook fisheries. Annual protocol adopted for the Winter/Spring season typically includes 200 sturgeon be set aside for Chinook-directed fisheries. Catches of sturgeon in these fisheries is typically low; therefore, weekly landing limits for sturgeon are generally not utilized in winter/spring salmon-directed fisheries.</p> <p>2011: Four 24-hour fishing periods took place in late-January to early-February (Zones 1-5) with a 10 white sturgeon/vessel/week landing limit in effect. Some sturgeon harvest also occurs during the spring Chinook fishery. Protocol adopted for the winter/spring timeframe was 800 total (400 for set aside for winter sturgeon, and 400 for winter/spring salmon). Catches of sturgeon in winter/spring salmon directed fisheries is typically low; therefore, weekly landing limits for sturgeon are generally not utilized.</p> <p>2012: Three 24-hour fishing periods took place during January 30-February 7 in Zones 1-5 with a 10 white sturgeon/vessel/week landing limit in effect. Some sturgeon harvest also occurs during the spring Chinook fishery; there were two fishing periods in early April (April 3 &amp; 10) with six white sturgeon/vessel/week allowed.</p> <p>2013: Three 24-hour fishing periods took place during January 31-February 7 in Zone 1-5 with a 10 white sturgeon/vessel/week landing limit in effect. Some sturgeon harvest also occurs during the spring Chinook fishery; there was one 9-hour fishing period on April 9<sup>th</sup> in Zones 1-5 with no landing limit for white sturgeon, and three fishing periods during May in Zones 1-5 with landing limits (May 15, 14-hours with a <b>five</b> white sturgeon/vessel/weekly limit; May 22-23, a 12-hour fishing period also with a <b>five</b> white sturgeon/vessel/weekly limit, and May 29-30, a 12 hour fishing period with a <b>three</b> white sturgeon/vessel/weekly limit).</p> <p>2014-2016: No winter sturgeon seasons. Sturgeon retention was not allowed during 2014, 2015 and 2016.</p>
<b>Summer</b>
<p>2004: Two 12-hour fishing periods during late June and early July targeting sockeye and summer Chinook.</p> <p>2005: Six 10-hour fishing periods during late June through late July targeting summer Chinook.</p> <p>2006: Three 10-hour and ten 12-hour fishing periods from late June through July 31 targeting summer Chinook. Retention of green sturgeon in commercial fisheries was prohibited effective July 6, 2006.</p> <p>2007: Two 10-hour fishing periods in late June and early July targeting summer Chinook. Weekly limit 5 white sturgeon per vessel.</p> <p>2008: Three 10-hour fishing periods in late June and early July targeting summer Chinook. A 6-hour target sockeye fishery also occurred in Area 2S on June 30, 2008. Weekly limit 5 white sturgeon per vessel.</p> <p>2009: One 12-hour fishing period on June 18 and two 10-hour fishing periods on June 24 and 30 targeting summer Chinook. Weekly limit 5 white sturgeon per vessel.</p>

**Table 7. Summary of Mainstem Commercial Seasons and Sturgeon Regulations in the Lower Columbia River, 1997-2016, continued.**

2010: Two 10-hour fishing periods on June 17 and 22 targeting summer Chinook. Weekly limit of 3 white sturgeon per vessel.

2011: Two 8-hour fishing periods, one on June 16-17 and another on June 22 -23. The weekly limit was 5 white sturgeon per vessel.

2012: One 8-hour fishing period took place on June 17-18. The weekly limit was 5 white sturgeon per vessel.

2013: Two 8-hour fishing periods took place on June 16-17, and July 15-16. The weekly limit was **five** white sturgeon per vessel during the first fishing period, and **two** white sturgeon per vessel during the second period.

2014-2016: No sturgeon retention during 2014, 2015 and 2016.

**Early August**

1998-2001: One 12-hour fishing period below Longview Bridge targeting sturgeon during the 1<sup>st</sup> week of August.

2002: Three fishing periods with a five white sturgeon per vessel per day limit. Possession and sales prohibited during the final two fishing periods.

2003-2005: Four 12-hour Chinook fishing periods each year in Zones 1-5.

2006: Six fishing periods in all or portions of Zones 1-5. Weekly landing limits ranged from five to seven white sturgeon per vessel.

2007: Three early August periods of 12 hours each in Zones 1-5. Weekly landing limits = 12 white sturgeon per vessel.

2008: Five fishing periods (four in Zones 1-5 and one in Zones 2-5). Weekly landing limits = 10 white sturgeon per vessel per week.

2009: Three 12-hour fishing periods (two in Zones 1-5 and one in Zones 2-5).

2010: Four 12-hour fishing periods (three in Zones 1-5 and one in Zones 2-5).

2011: One 9-hour fishing period in Zones 1-5 with a weekly landing limit of 10 white sturgeon per vessel.

2012: One 9-hour fishing period in Zones 1-5 (August 5-6) with a weekly landing limit of seven white sturgeon per vessel.

2013: There were no early-August seasons in Zones 1-5 during 2013.

2014-2016: No sturgeon retention during 2014, 2015 and 2016.

**Late August**

1997-2003: Target Chinook seasons in Area 2S or expanded Area 2S during late August.

2004-2005: Four fishing periods during mid to late-August with varying area and possession limit restrictions.

2006: One fishing period in Zones 3-5 and one in Zones 4-5 (upstream of the I-205 Bridge), with a weekly landing limit of seven white sturgeon.

2007: One 11-hour fishery in Zones 4-5 with a three white sturgeon per vessel weekly landing limit.

2008: Two fishing periods in Zones 4-5, with a weekly landing limit of three white sturgeon.

2009: Two 10-hour fishing periods in Zones 3-5 (upstream of Kalama River) with a weekly landing limit of nine white sturgeon and one 10-hour period in Zone 5 only with a weekly landing limit of three white sturgeon.

2010: One 10-hour and two 9-hour fishing periods in Zones 4-5, with a weekly landing limit of four white sturgeon.

2011: Seven 9-hour fishing periods in Zones 4-5 with weekly landing limits of 10 white sturgeon per vessel.

**Table 7. Summary of Mainstem Commercial Seasons and Sturgeon Regulations in the Lower Columbia River, 1997-2016, continued.**

2012: Eight 9-hour fishing periods in Zones 4-5 with weekly landing limits: of three white sturgeon per vessel during August 12 through August 24; and five white sturgeon per vessel during August 26 through August 29.

2013: Eight 9-hour fishing periods in Zones 4-5 with weekly landing limits of **four** white sturgeon per vessel during August 11 through August 29.

2014-2016: No sturgeon retention during 2014, 2015 and 2016.

#### **Late Fall**

Fisheries occur during mid-September through the end of October and include both salmon- and sturgeon-directed fisheries. Salmon seasons vary depending on run sizes and available impacts for listed species. Target Chinook and/or coho fisheries occur throughout the late fall timeframe while target sturgeon seasons most often occur during October, if sturgeon remain available on the quota.

1997-2000: Target fall sturgeon seasons occurred.

2001: Sturgeon sales prohibited in late-fall due to high landings earlier in the year.

2002: A five white sturgeon per day per vessel possession and sales limit was in effect for nearly the entire late fall season except for the final 3-day fishing period when sturgeon possession and sales were prohibited.

2003: Sturgeon possession and sales limits ranged from three to nine per vessel per week.

2004: Sturgeon possession and sales limit of five white sturgeon per vessel per week was in place for most of the late fall period, but was increased to ten fish during the final three fishing periods.

2005: Sturgeon possession and sales limits ranged from three to 15 fish per vessel.

2006: White sturgeon possession and sales limits were maintained at eight white sturgeon per week per vessel when retention was allowed.

2007: White sturgeon possession and sales limits ranged from 7-12 white sturgeon per vessel through October 5 after which white sturgeon sales in the mainstem were prohibited.

2008: Most fishing periods occurred in Zones 4-5, however, some fishing did occur in all or portions of Zones 1-3. Sturgeon sales were allowed in all periods, with weekly landing limits of 10 fish per vessel through October 3, followed by three fish landing limits thereafter.

2009: Most fishing periods occurred in Zones 4-5, however, some fishing did occur in all or portions of Zones 1-3. Sturgeon sales were allowed through October 23, with weekly landing limits ranging from 5-8 fish per vessel. Sales were prohibited after October 23.

2010: Eleven fishing periods during September 22-October 22 with weekly landing limits of 5-8 fish per vessel.

2011: Ten fishing periods during September 18 – October 20 with weekly landing limits of 2 -7 white sturgeon per vessel.

2012: Sturgeon retention allowed in five (September 19-28 and October 4-5) of 15 late fall fishing periods. The landing limit for the first four fishing periods (three in Zones 4 – 5, and the fourth in Zones 1 – 5) was five white sturgeon per vessel. On October 4 – 5, (one period in Zones 1 – 5), the vessel limit was two white sturgeon.

2013: Sturgeon retention was allowed for the first seven of 34 late fall fishing periods (during September 15-30). The landing limit was **two** white sturgeon per vessel during each week sturgeon were allowed. Sturgeon retention was not allowed from October 1-November 1.

2014-2016: No sturgeon retention during 2014, 2015 and 2016.



**Table 8. History of Sturgeon Regulations for the Lower Columbia River Recreational Fishery.**

Year	Daily Bag Limit	Annual Bag Limit	Size Restrictions	Other Regulations
Pre-1940	None	None	None	None
1940	Only 3 < 4'	"	"	"
1942	Five, (3 < 4' and 2 ≥ 4')	"	"	"
1950	" "	"	30" min.-72" max.	"
1951	3 Fish	"	"	"
1957	"	"	"	Cannot remove head or tail in the field.
1958	"	"	36" min.-72" max.	
1986	2 Fish	OR-30	"	<u>OR</u> --required sturgeon tag: <u>WA</u> --no gaffing.
1989	"	OR-30, WA-15	40" min.-72" max.	<u>WA</u> --required sturgeon tag. New minimum size limit effective April 1.
1990	"	15	"	Single-point barbless hooks required. <u>OR</u> --no gaffing.
1991	"1 and 1" slot limit	"	"	Daily limit changed to one fish 40-<48" and one fish 48-72".
1992	"	"	"	<u>WA</u> --60" max. length effective April 16, 1992-April 15, 1993. <u>WA</u> --Beacon Rock to Bonneville Dam sturgeon spawning sanctuary (boat and bank) April 16-June 15, 1992.
1994	"	10	42" min.-66" max.	Daily limit changed to one fish 42-<48" and one fish 48-66".
1995	"	"	"	LCR closed to retention September 1-December 31.
1996	1 Fish	"	"	One 42-66" fish daily bag limit effective April 1. Closed to boat angling from Beacon Rock to Bonneville Dam May 1-June 30.
1997	"	"	42" min.-60" max.	80% allocation of 67,300 annual harvest guideline to sport fishery (53,840).
1999	"	"	"	Harvest guideline adjusted to 50,000 in-season (40,000 sport). U.S. Army Corps implements Bonneville Boat Restricted Zone from Robins Is. to Hamilton Is. boat ramp.
2000	"	"	"	Retention disallowed below Wauna powerlines April 1-30. Beacon Rock-Bonneville boat angling closure extended through 7/15. Annual limit 10 fish even if licensed in both states.
2001	"	"	"	LCR closed to retention August 1-September 30.
2002	"	"	"	LCR closed to retention on Sundays and Mondays during March 3-May 13 and seven days per week during July 25-November 22.
2003	"	"	"	32,000 annual harvest guideline split 40% above Wauna and 60% below Wauna. Retention allowed above Wauna January 1-March 23 and July 1-October 31 and below Wauna January 1-June 27.
2004	"	5	42" min.-60" max. 45" min. below Wauna during May 15-July 3	28,800 annual harvest guideline split 12,800 above Wauna and 16,000 below Wauna. Retention allowed above Wauna January 1-31, then three days per week (Thur.-Sat.) during February 1-July 31 and October 1-December 31. Retention allowed below Wauna January 1-April 30 under permanent rules, then May 15-July 3 with a 45" minimum size limit. Closed to boat and bank angling from Beacon Rock to Bonneville Dam May 1-July 31. Annual limit reduced to five sturgeon.

**Table 8. History of Sturgeon Regulations for the Lower Columbia River Recreational Fishery, continued**

Year	Daily Bag Limit	Annual Bag Limit	Size Restrictions	Other Regulations
2005	"	"	42" min.-60" max. 45" min. below Wauna during May 14-July 10- and July 15-August 15	29,343 annual harvest guideline split 11,560 above Wauna and 17,783 below Wauna. Retention allowed above Wauna three days per week (Thur.-Sat.) January 1-July 31 and October 1-December 31. Retention allowed below Wauna January 1-April 30 under permanent rules, then May 14-July 10 and July 15-August 15 with a 45" minimum size limit.
2006	"	"	42" min.-60" max. 45" min. below Wauna during May 13-July 4	28,800 annual harvest guideline split 12,800 above Wauna and 16,000 below Wauna. Retention allowed above Wauna three days per week (Thur.-Sat.) during January 1-July 31 and October 1-December 31. Retention allowed below Wauna January 1-April 30 under permanent rules, then May 13-July 4 with a 45" minimum size limit. Closed to boat and bank angling from Navigation Marker 85 to Bonneville Dam May 1-July 31.
2007	"	"	42" min.-60" max. 45" min. below Wauna during May 12-July 4	30,126 harvest guideline split 13,852 above Wauna and 16,274 below Wauna. Retention allowed above Wauna three days per week (Thur.-Sat.) January 1-31 and four days per week (Thur.-Sun.) February 1-July 31 and seven days per week August 18-December 31. Sturgeon retention allowed below Wauna January 1-April 30 under permanent rules then May 12-July 4 with a 45" minimum size limit. Retention of green sturgeon prohibited.
2008	"	"	42" min.-60" max. 45" min. below Wauna during May 10-July 26	25,530 harvest guideline split 12,387 above Wauna and 13,143 below Wauna. Retention allowed above Wauna four days per week (Thur.-Sun.) January 1-December 31. Sturgeon retention allowed below Wauna January 1-April 30 under permanent rules then May 10-June 24, July 10-12, July 17-19, and July 26 with a 45" minimum size limit.
2009	"	"	38" min. FL - 54" max. FL 41" min. FL below Wauna May 9-July 25.	Fork length measurement. 26,959 harvest guideline split 11,430 above Wauna and 15,529 below Wauna. Retention allowed above Wauna three days per week (Thur.-Sat.) January 1-July 31 and October 1-December 31. Retention allowed below Wauna January 1-April 30 under permanent rules, then May 9-June 28, July 2-5, 10-12, 17-19 and 24-26 with a 41" minimum size (FL) limit.
2010	"	"	38" min. FL - 54" max. FL 41" min. FL below Wauna May 22- August 1.	17,300 annual harvest guideline split 7,700 above Wauna (including a sub-allocation for the Willamette River of 2,865) and 9,600 for the estuary. Retention allowed above Wauna three days per week (Thur.-Sat.) January 1-July 31 and October 1-December 31, except closed inside Sand Island (near Rooster Rock) April 29-July 31. Closed to all sturgeon angling during May 1-August 31 from Skamania Island upstream to Bonneville Dam. Retention allowed below Wauna January 1-April 30 under permanent rules, then May 22-July 11 and July 15-August 1 with a 41" minimum size (FL) limit.

**Table 8. History of Sturgeon Regulations for the Lower Columbia River Recreational Fishery, continued**

Year	Daily Bag Limit	Annual Bag Limit	Size Restrictions	Other Regulations
2011	1	5	38" min. FL – 54" max. FL 41" min. FL below Wauna May 14-July 31.	12,240 annual harvest guideline split 5,440 above Wauna (including a sub-allocation for the Willamette River of 2,030) and 6,800 for the estuary. Retention allowed above Wauna three days per week (Thur.-Sat.) January 1-July 31 and October 1-December 31, except closed inside Sand Island (near Rooster Rock) January 1-April 30. Retention allowed below Wauna January 1-April 30 under permanent rules, then May 14-July 31 with a 41" minimum size (FL) limit.
2012	"	"	38" min. FL – 54" max. FL 41" min. FL below Wauna May 12-July 4.	7,488 annual harvest guideline split 3,328 above Wauna (including a sub-allocation of 1,248 for the Willamette), and 4,160 for the estuary. Retention allowed above Wauna three days per week (Thur.-Sat.) January 1-July 31, except closed inside Sand Island (near Rooster Rock) February 1-April 30. Retention allowed below Wauna January 1-April 30 under permanent rules, then May 12-July 4 with a 41" minimum size (FL) limit.
2013	"	2	38" min. FL – 54" max. FL 41" min. FL below Wauna May 11-June 20.	7,276 annual harvest guideline split 3,234 above Wauna (including a sub-allocation of 1,213 for the Willamette), and 4,042 for the estuary. Retention allowed above Wauna three days per week (Thur.-Sat.) January 1-June 15, except closed inside Sand Island (near Rooster Rock) January 1-April 30. Retention allowed below Wauna January 1-April 30 under permanent rules, then May 11-June 20 with a 41" minimum size (FL) limit.
2014	0	0	No retention.	Catch and release only. Sand Island Slough and Bonneville Dam sanctuaries in effect per permanent regulations.
2015	0	0	No retention.	Catch and release only. Sand Island Slough and Bonneville Dam sanctuaries in effect per permanent regulations.
2016	0	0	No retention.	Catch and release only. Sand Island Slough and Bonneville Dam sanctuaries in effect per permanent regulations.

**Table 9. Estimated Catch of White Sturgeon (in 1000s) in 1-Foot Legal (Total) Length Groups in Mainstem Lower Columbia River Commercial and Recreational Fisheries, 1977-2016. <sup>1</sup>**

Year	Recreational Fisheries <sup>2</sup>							Commercial Fisheries <sup>3</sup>				
	3-4 Ft		4-5 Ft		5-6 Ft		Total	4-5 Ft		5-6 Ft		Total
	No.	%	No.	%	No.	%		No.	%	No.	%	
1977-79 Ave	22.2	76	5.4	18	1.6	5	29.2	12.5	94	0.8	6	13.3
1980-84 Ave	24.5	78	5.3	15	1.6	5	31.5	12.3	93	0.9	7	13.2
1985	37.0	84	5.3	12	1.5	3	43.8	7.6	90	0.8	10	8.4
1986	42.3	85	6.1	12	1.5	3	49.8	10.4	90	1.1	9	11.6
1987	55.0	88	5.9	10	1.6	3	62.4	8.8	91	0.8	8	9.7
1988	37.5	87	4.2	10	1.5	3	43.1	6.2	91	0.6	9	6.8
1989	20.8	82	3.5	14	1.0	4	25.4	4.5	90	0.5	10	5.0
1985-89 Ave	38.5	86	5.0	11	1.4	3	44.9	7.5	90	0.8	10	8.3
1990	14.0	81	2.5	14	0.7	4	17.3	4.6	87	0.6	11	5.3
1991	19.6	87	2.2	10	0.8	4	22.7	3.4	89	0.3	8	3.8
1992	34.9	87	4.2	11	1.0	2	40.1	6.0	97	0.2	3	6.2
1993	33.4	88	3.9	10	0.6	2	37.9	7.9	98	0.2	2	8.1
1994	25.9	77	7.0	21	0.6	2	33.5	6.3	98	0.1	2	6.4
1990-94 Ave	25.6	84	4.0	13	0.7	2	30.3	5.6	93	0.3	5	6.0
1995	35.9	80	8.9	20	0.3	1	45.1	6.1	98	0.1	2	6.2
1996	30.7	72	11.4	27	0.6	1	42.8	8.3	99	0.1	1	8.4
1997	29.0	76	9.1	24	<0.1	<1	38.2	12.8	100	0.0	0	12.8
1998	32.1	77	9.4	23	0.1	<1	41.6	13.9	100	0.0	0	13.9
1999	31.8	80	7.9	20	<0.1	<1	39.8	9.5	100	0.0	0	9.5
1995-99 Ave	31.9	77	9.3	22	0.2	<1	41.5	10.1	99	<0.	<1	10.2
2000	33.3	82	7.2	18	<0.1	<1	40.5	10.9	100	0.0	0	10.9
2001	31.4	76	9.8	24	<0.1	<1	41.2	9.3	100	0.0	0	9.3
2002	28.0	73	10.3	27	<0.1	<1	38.3	9.8	100	0.0	0	9.8
2003 <sup>4</sup>	20.9	66	11.0	34	<0.1	<1	31.9	8.0	100	0.0	0	8.0
2004 <sup>4</sup>	13.8	54	11.8	46	<0.1	<1	25.6	7.9	100	0.0	0	7.9
2000-04 Ave	25.5	72	10.0	28	<0.1	<1	35.5	9.2	100	0.0	0	9.2
2005 <sup>4</sup>	17.2	58	12.6	42	0.1	<1	29.8	8.2	100	0.0	0	8.2
2006 <sup>4</sup>	13.8	57	10.4	43	0.1	<1	24.3	8.3	100	0.0	0	8.3
2007 <sup>4</sup>	16.6	56	13.1	44	0.1	<1	29.8	7.8	100	0.0	0	7.8
2008 <sup>4</sup>	10.7	49	10.9	50	<0.1	<1	21.6	7.9	100	0.0	0	7.9
2009 <sup>4,5</sup>	6.7	38	11.0	62	0.1	<1	17.7	7.7	100	0.0	0	7.7
2005-09 Ave	13.0	53	11.6	47	<0.1	<1	24.6	8.0	100	0.0	0	8.0
2010 <sup>4,5</sup>	4.9	44	6.3	56	<0.1	<1	11.3	4.4	100	0.0	0	4.4
2011 <sup>4,5</sup>	3.8	42	5.2	58	<0.1	<1	9.0	3.4	100	0.0	0	3.4
2012 <sup>5,6</sup>	2.5	40	3.8	60	<0.1	<1	6.3	1.9	100	0.0	0	1.9
2013 <sup>5,6</sup>	2.4	37	4.1	62	<0.1	<1	6.5	2.0	100	0.0	0	2.0
2014 <sup>7</sup>	0.0	0	0.0	0	0.0	0	0.0	0.0	0.0	0.0	0	0.0
2010-14 Ave	2.7	41	3.9	58	<0.1	<1	6.6	2.3	100	0.0	0	2.3
2015 <sup>7</sup>	0.0	0	0.0	0	0.0	0	0.0	0.0	0.0	0.0	0	0.0
2016 <sup>7</sup>	0.0	0	0.0	0	0.0	0	0.0	0.0	0.0	0.0	0	0.0

1. Individual columns may not add up to total column due to rounding errors. Recreational harvest in the Willamette River is not included.
2. White sturgeon legal size limits were 36"-72" during 1977-1988, 40"-72" during 1989-1993, 42"-66" during 1994-1996, and 42"-60" thereafter.
3. White sturgeon legal size limits were 48"-72" during 1977-92, 48"-66" during 1993-96, and 48"-60" thereafter.
4. Commercial data is preliminary.
5. Converted from current regulation fork length measurements to total length equivalent measurements.
6. Preliminary data.
7. No sturgeon retention allowed during 2014-2016.

**Table 10. Recreational and Commercial Sturgeon Catch (in 1,000s) and White Sturgeon Catch Sharing Percentages in the Lower Columbia River, 1977-2016.**

Year	<i>W h i t e   S t u r g e o n</i>					<i>G r e e n   S t u r g e o n</i>		
	Recreational <sup>1</sup>		Commercial <sup>2</sup>		Total Catch	Recreational Catch	Commercial <sup>1</sup> Catch	Total Catch
	Catch	%	Catch	%				
1977-79 Ave	29.2	70	13.3	30	42.5	0.0	1.2	1.2
1980-84 Ave	31.5	70	13.2	30	44.6	<0.1	1.2	1.3
1985	43.8	84	8.4	16	52.2	0.5	1.6	2.1
1986	49.8	81	11.6	19	61.4	0.4	6.0	6.4
1987	62.4	87	9.7	13	72.1	0.2	4.9	5.1
1988	43.1	86	6.8	14	49.9	0.1	3.3	3.4
1989	25.4	84	5.0	16	30.4	0.1	1.7	1.8
1985-89 Ave	44.9	84	8.3	16	53.2	<0.1	3.5	3.8
1990	17.3	77	5.3	23	22.6	0.1	2.2	2.3
1991	22.7	86	3.8	14	26.5	<0.1	3.2	3.2
1992	40.1	87	6.2	13	46.3	0.1	2.2	2.3
1993	37.9	82	8.1	18	46.0	<0.1	2.2	2.2
1994	33.5	84	6.4	16	39.9	0.1	0.2	0.3
1990-94 Ave	30.3	83	6.0	17	36.3	0.1	2.0	2.1
1995	45.1	88	6.2	12	51.3	<0.1	0.4	0.4
1996	42.8	84	8.4	16	51.2	0.1	0.6	0.7
1997	38.2	75	12.8	25	51.0	<0.1	1.6	1.6
1998	41.6	75	13.9	25	55.5	0.1	0.7	0.8
1999	39.8	80	9.5	20	49.3	0.1	0.8	0.9
1995-99 Ave	41.5	80	10.2	20	51.7	0.1	0.8	0.9
2000	40.5	79	10.9	21	51.4	<0.1	1.2	1.3
2001	41.2	82	9.3	18	50.5	0.1	0.3	0.4
2002	38.3	80	9.6	20	47.9	0.1	0.2	0.2
2003 <sup>3</sup>	31.9	80	8.0	20	39.9	0.1	<0.1	0.1
2004 <sup>3</sup>	28.4	78	7.9	22	36.3	<0.1	0.1	0.1
2000-04 Ave <sup>3</sup>	36.0	80	9.1	20	45.1	<0.1	0.4	0.4
2005 <sup>3</sup>	30.9	79	8.2	21	39.1	0.1	0.1	0.2
2006 <sup>3</sup>	26.4	76	8.3	24	34.7	0.1	<0.1	0.1
2007 <sup>3</sup>	35.1	82	7.8	18	42.9	<0.1	0.0	<0.1
2008 <sup>3</sup>	29.5	79	7.9	21	37.4	0	0	0
2009 <sup>4</sup>	23.8	76	7.7	21	31.5	<0.1	0	<0.1
2005-09 Ave <sup>4</sup>	29.1	78	8.0	22	37.1	<0.1	0	<0.1
2010 <sup>4</sup>	14.1	76	4.4	24	18.5	<0.1	0	<0.1
2011 <sup>4</sup>	11.2	77	3.4	23	14.5	<0.1	0	<0.1
2012 <sup>4</sup>	7.3	79	1.9	21	9.2	<0.1	0	<0.1
2013 <sup>4</sup>	7.4	79	2.0	21	9.4	0	0	0
2014 <sup>5</sup>	0.0	0	0.0	0	0	0	0	0
2010-14 Ave <sup>4</sup>	8.0	78	2.9	22	10.3	<0.1	0	<0.1
2015 <sup>5</sup>	0.0	0	0.0	0	0	0	0	0
2016 <sup>5</sup>	0.0	0	0.0	0	0	0	0	0

1. Includes Willamette River harvest in excess of the adjusted 1986-1996 baseline.

2. Includes Youngs Bay (1979-present) and other Select Area landings (1998-present).

3. Commercial landings are preliminary.

4. Preliminary data.

5. No sturgeon retention allowed during 2014-16.

<b>Table 11. Annual 33-65 Inch Fork Length (36-72 Inch Total Length) Abundance Estimates by Pool in Zone 6, 1976-2016. <sup>1</sup></b>			
Year	Bonneville Pool	The Dalles Pool	John Day Pool
1976-1978	5,400	--	--
1987	--	18,900	--
1988	--	6,300	--
1989	17,900	--	--
1990	--	--	2,200
1991	--	--	--
1992	--	--	--
1993	--	--	--
1994	19,800	6,500	--
1995	--	--	--
1996	--	--	24,100
1997	--	46,800	--
1998	--	--	--
1999	45,600	--	--
2000	--	--	--
2001	--	--	14,200
2002	--	20,600	--
2003	34,220	--	--
2004	--	--	12,800
2005	--	11,800	--
2006	42,100	--	--
2007	--	--	26,600
2008	--	76,800	--
2009	117,600	--	--
2010	--	--	33,800
2011	--	54,900	--
2012	72,000	--	--
2013	--	--	24,400
2014	--	34,600	--
2015	35,000	--	--
2016 <sup>2</sup>	--	--	14,000

1. Data compiled from annual reports for BPA Project 1986-050-00 and from Sturgeon Management Task Force summaries.
2. Preliminary data.

<b>Table 12. Zone 6 Treaty Commercial and Subsistence Catch and Recreational Catch of White Sturgeon, 2006-2016.</b>					
Year <sup>1</sup>	Treaty Commercial			Treaty Subsistence	Non-Indian Recreational
	Gill Net	Setline	Total		
2006 <sup>2</sup>	815	45	860	201	962
2007 <sup>3</sup>	1,114	10	1,124	161	1,039
2008	1,588	0	1,588	226	1,134
2009 <sup>4</sup>	1,587	31	1,618	219	1,000
2010	2,889	137	3,026	616	1,946
2011	2,799	1,102	3,901	652	3,087
2012	4,153	393	4,546	447	2,548
2013	2,917	86	3,003	366	1,845
2014	2,362	107	2,469	270	1,490
2015	1,273	314	1,587	208	1,521
2016 <sup>5, 6</sup>	1,136	245	1,381	145	965

1. Numbers prior to 2006 are available in previous Winter Joint Staff Reports.
2. Setline total includes two sturgeon landed during hook and line fisheries.
3. Setline total includes one sturgeon landed during hook and line fisheries.
4. Gill net total includes four sturgeon landed during hook and line fisheries.
5. Winter Setline catches only. Catches from fall setline fishery not available at time of publication.
6. Preliminary estimates.

<b>Table 13. Zone 6 Treaty Commercial Setline and Gill Net Seasons and White Sturgeon Catch, 2012-2016.</b>					
Fishery	Dates	Open Pools <sup>1</sup>	Length (days)	Mesh Size Restriction	Catch <sup>2</sup>
<b><u>2012</u></b>					
Winter	January 1-31	All	30 days	Setline	243
"	February 1-March 1	JD	28.5 days	None	1,237
"	February 1-March 6	BO	33.25 days	None	2,073
"	February 1-March 21	TD	49.25 days	None	843
Spring	Closed season	--	--	--	--
Summer	Closed season	--	--	--	--
Fall	July 30-August 11	TD	11.75 days	Setline	150
<b>Total</b>					<b>4,546</b>
<b><u>2013</u></b>					
Winter	January 1-31	All	30 days	Setline	57
"	February 1-27	JD	26.5 days	None	1,017
"	February 1-March 6	BO	33.5 days	None	1,261
"	February 1-March 21	TD	48.5 days	None	639
Spring	May 24-June 15	TD	22.5 days	Setline	29
Summer	Closed season	--	--	--	--
Fall	Closed season	--	--	--	--
<b>Total</b>					<b>3,003</b>
<b><u>2014</u></b>					
Winter	January 1-31	All	30 days	Setline	73
"	February 1-26	JD	25.5 days	None	1,203
"	February 1-March 15	BO	42.5 days	None	697
"	February 1-March 3 March 12-March 21	TD	40.0 days	None	462
Spring	Closed season	--	--	--	--
Summer	Closed season	--	--	--	--
Fall	October 17-Nov. 29	TD	33.5 days	Setline	34
<b>Total</b>					<b>2,469</b>
<b><u>2015</u></b>					
Winter	January 1-31	All	30 days	Setline	82
"	February 2-24	TD, JD	22.5 days	None	896
"	February 23-March 21	BO	26.5 days	none	377
Spring	Closed Season	All	--	--	--
Summer	Closed Season	All	--	--	--
Fall	October 19-30	TD	11.5 days	Setline	0
Fall	November 2-13	BO	11.5 days	Setline	0
Fall	November 16-25	TD	9.5 days	Setline	165
Fall	November 27-December 31	BO	34.5 days	Setline	67
<b>Total</b>					<b>1,587</b>
<b><u>2016</u></b>					
Winter	January 1-31	All	30.5 days	Setline	57
"	February 1-March 5	TD	33.5	None	258
"	February 1-March 12	JD	40.5	None	776
"	March 14- March 21	BO	7.5	None	102
Spring	Closed Season	All	--	--	--
Summer	Closed Season	All	--	--	--
Fall	August 1-13	BO	12.5	Setline	30
Fall	October 24-November 5	JD	12.5	Setline	48
Fall	November 7-12	TD	5.5	Setline	6
Fall	November 14-26	BO	12.5	Setline	104
<b>Total</b>					<b>1,381</b>

1. BO = Bonneville Pool, TD = The Dalles Pool, JD = John Day Pool.

2. Legal-sizes of 38-54inched FL in Bonneville Pool and 43-54 inches FL adopted January 29, 2009.



<b>Table 14. Zone 6 Recreational Fishery Retention Seasons, 2007-2016.<sup>1</sup></b>			
Year	Bonneville Pool	The Dalles Pool	John Day Pool
2007	January 1-July 29	January 1-March 28	January 1-June 10
2008	January 1-July 11	January 1-March 14	January 1-March 25
2009	January 1-June 5	January 1-April 18	January 1-April 12
2010	January 1-February 20	January 1-May 5	January 1-February 28
2011	Jan 1-Feb 18, Jun 30-Jul 2, Jul 7-8	January 1-July 29	January 1-April 9
2012	Jan 1-Feb 17, Jun 15-16, Jun 22-23	January 1-November 3	January 1-May 20
2013	Jan 1-Feb 10, Jun 14-15, Jun 21	January 1-November 11	January 1- June 28
2014	Jan 1-Feb 17, Feb 24-Mar 9, Jun 13-14, Jun 20-21, Jul 11-12, Jul 18-19	January 1- July 31	January 1-June 13
2015	Jan 1-Mar 1, Jun 19-21, Jun 26-28, Jul 3-5	January 1- May13	January 1-June 2
2016	Jan 1-Feb 7, Jun 18	January 1-Apr 29	January 1-May 28

1. Retention or restriction dates prior to 2006 are available in the previous Winter Joint Staff Reports.

<b>Table 15. Zone 6 Catch Estimates and Guidelines for Treaty and Recreational Fisheries, 2006-2016.<sup>1</sup></b>						
Year	Bonneville Pool		The Dalles Pool		John Day Pool	
	Catch	Guideline	Catch	Guideline	Catch	Guideline
<b><u>Treaty Commercial Fisheries</u></b>						
2006	153	400	397	550	312	335
2007	285	"	607	"	232	"
2008	744	"	571	"	277	"
2009	431	"	862	1,000	325	"
2010	1,540	1,400	1,184	"	302	"
2011	2,089	2,000	604	"	1,208	1,000
2012	2,203	"	996	"	1,347	"
2013	1,277	1,100	676	"	1,050	"
2014	644	1,100	345	1,000	1,198	1,000
2015	445	1,100	258	325	884	1,000
2016 <sup>2</sup>	236	325	264	325	881	1,000
<b><u>Non-Indian Recreational Fisheries</u></b>						
2006	727	700	93	100	142	165
2007	682	"	108	"	249	"
2008	841	"	128	"	165	"
2009	638	"	216	300	146	"
2010	1,451	1,400	336	"	159	"
2011	2,334	2,000	220	"	533	500
2012	1,796	"	279	"	473	"
2013	1,022	1,100	314	"	509	"
2014	877	"	121	"	492	"
2015	874	"	155	100	532	"
2016 <sup>2</sup>	349	325	96	"	520	"

1. Numbers prior to 2006 are available in previous Winter Joint Staff Reports.

2. Preliminary estimates

<b>Table 16. Zone 6 Treaty Commercial Catch by Season and Pool with Catch Guidelines, 2016.</b>						
Pool	January Setline	Winter Gill Net	Early Fall Setline	Late Fall Setline	Commercial Total	Guideline
Bonneville	0	102	30	104	236	325
The Dalles	0	258	--	6	264	325
John Day	57	776	--	48	881	1,000
<b>Total</b>	<b>57</b>	<b>1,136</b>	<b>30</b>	<b>158</b>	<b>1,381</b>	<b>1,650</b>

<b>Table 17. Columbia River and Tributary Smelt Commercial Landings (in thousands of pounds), 1938-2016.</b>								
Year(s)		Columbia River <sup>1</sup>	Grays River	Cowlitz River	Kalama River	Lewis River	Sandy River	Total
1938-1949	Range	200-1,000	0-59	1-3,000	0-77	0-2,000	0-1,400	1,000-5,700
	Average	610	18	1,400	13	300	300	3,000
1950-1959	Range	400-1,300	0-16	0-2,000	0-44	0-900	0-500	1,300-2,600
	Average	800	3	700	11	200	100	1,800
1960-1969	Range	100-800	0-53	1,000	0-0	0-82	0-0	800-1,500
	Average	700	10	600	0	8	0	1,100
1970-1979	Range	900	0-6	100	0-300	0-900	0-800	500-3,200
	Average	300	1	1,400	4	100	100	2,000
1980-1989	Range	53-500	0-35	100-3,700	0-8	0-2,700	0-300	500-3,800
	Average	200	4	2,500	1	600	59	2,400
1990		6.4	0.0	2,756.2	0.0	21.6	0.0	2,784.2
1991		5.8	0.0	2,944.6	0.0	0.0	0.0	2,950.4
1992		0.8	0.0	3,673.0	0.0	0.0	0.0	3,673.8
1993		33.2	0.0	413.9	66.8	0.0	0.0	513.9
1994		0.2	0.0	43.2	0.0	0.0	0.0	43.4
1995		7.7	0.0	431.4	0.9	0.0	0.0	440.0
1996		7.1	0.0	2.0	0.0	0.0	0.0	9.1
1997		37.1	0.0	21.5	0.0	0.0	0.0	58.6
1998		11.9	0.0	0.2	0.0	0.0	0.0	12.1
1999		20.9	0.0	0.0	0.0	0.0	0.0	20.9
2000		31.0	0.0	0.0	0.0	0.0	0.0	31.0
2001		158.8	0.0	154.3	0.0	0.0	0.0	313.1
2002		58.0	0.0	169.6	0.0	493.6	0.0	721.2
2003		66.9	0.0	464.4	0.0	529.1	23.0	1,083.4
2004		15.4	0.0	216.2	0.0	0.0	0.0	231.7
2005		0.1	0.0	0.1	0.0	0.0	0.0	0.2
2006		13.1	0.0	0.0	0.0	0.0	0.0	13.1
2007		7.1	0.0	1.2	0.0	0.0	0.0	8.3
2008		11.4	0.0	5.9	0.0	0.0	0.0	17.3
2009		5.6	0.0	12.1	0.0	0.0	0.0	17.7
2010 <sup>2</sup>		3.6	0.0	0.0	0.0	0.0	0.0	3.6
2011-2013		--	--	--	--	--	--	--
2014 <sup>3</sup>		18.6	0.0	0.0	0.0	0.0	0.0	18.6
2015 <sup>3</sup>		16.6	0.0	0.0	0.0	0.0	0.0	16.6
2016 <sup>3</sup>		4.8	0.0	0.0	0.0	0.0	0.0	4.8

1. Season totals may contain landings from previous December.

2. Commercial fisheries closed effective December 1, 2010, due to ESA status.

3. Minor research fishery conducted in 2014, 2015 and 2016.

<b>Table 18. Smelt CPUEs and Catch in Columbia River Commercial Fisheries, 1989-2016.<sup>1</sup></b>								
Year	CPUE's by Calendar Week						Season Totals	
	5	6	7	8	9	10	CPUE	Catch <sup>2</sup>
1989	200	0	0	0	419	1,516	1,253	65,170
1990	0	0	0	0	0	0	709	6,381
1991	0	107	685	0	0	940	389	5,841
1992	344	232	290	0	0	50	203	2,644
1993	18	0	224	1,731	2,274	3,100	1,843	33,172
1994	0	0	0	0	35	109	59	235
1995	216	250	67	0	137	35	180	7,612
1996	122	0	445	59	150	20	95	7,208
1997	161	216	672	214	0	0	304	37,069
1998	94	30	17	0	0	0	134	11,866
1999	143	183	297	110	0	0	172	20,834
2000	371	123	330	241	37	0	211	31,042
2001	0	520	1,604	2,322	3,875	2,194	2,033	158,809
2002	1,401	2,014	106	0	2,057	7,320	1,920	57,980
2003	445	581	778	4,350	2,216	2,486	1,132	66,875
2004	34	693	368	47	21	153	548	15,431
2005	25	28	0	0	0	0	27	108
2006	194	209	14	0	0	0	157	13,099
2007	0	0	0	209	163	39	153	8,702
2008	0	63	210	58	1	0	133	11,381
2009	34	3	65	50	45	47	101	5,539
2010	43	22	7	3	0	0	96	3,539
2011-13 <sup>3</sup>	--	--	--	--	--	--	--	--
2014 <sup>4</sup>	--	--	0	32	631	200	453	18,558
2015 <sup>4</sup>	--	76	534	469	61	--	435	16,546
2016 <sup>4</sup>	--	146	225	148	36	--	166	4,822

1. CPUE = pounds per delivery.

2. Season total catch may include catch during the previous December.

3. Commercial fisheries closed effective December 1, 2010, due to ESA status.

4. Minor research fishery conducted in 2014, 2015 and 2016.

<b>Table 19. Results of Larval Sampling Program in the Lower Columbia River Basin, 1999-2016. <sup>1</sup></b>							
Year	C a t c h ( L a r v a e p e r c u b i c m e t e r ) <sup>2</sup>						
	Mainstem Columbia	Cowlitz River	Grays River	Elochoman River	Kalama River	Lewis River	Sandy River
1999	0.7	0.2	0.6	0.8	0.4	0.0	0.1
2000	1.3	41.6	25.7	3.5	0.1	0.2	0.1
2001	42.1	192.0	24.4	0.0	5.5	17.6	N/S
2002	28.2	283.0	N/S	N/S	0.5	0.6	N/S
2003	12.3	1.4	N/S	24.5	N/S	36.2	0.1
2004	3.5	0.9	20.4	N/S	N/S	N/S	N/S
2005	0.3	N/A	0.6	N/S	N/S	N/S	N/S
2006	0.7	0.1	0.0	N/S	N/S	N/S	N/S
2007	0.7	2.8	N/S	N/S	N/S	0.3	N/S
2008	1.1	6.2	44.0	3.3	N/S	<0.1	N/S
2009	2.3	0.1	0.2	N/S	N/S	0.5	N/S
2010	1.0	4.2	178.9	N/S	N/S	0.9	N/S
2011	6.0	29.1	0.2	2.0	0.4	<0.1 <sup>3</sup>	N/C
2012	5.9	N/S	1.6	N/S	N/S	N/S	N/S
2013	20.3	N/S	1.4	N/S	N/S	N/S	N/S
2014	49.0	N/S	N/S	N/S	N/S	N/S	N/S
2015	32.5	N/S	13.4	N/S	N/S	N/S	N/S
2016	13.8	N/S	48.7	N/S	N/S	N/S	N/S

1. Inter-annual comparisons of abundance are tentative as sampling has not been systematic from year to year. Mainstem Columbia R. data since 2003 includes multiple collections at Price Island and Clifton Channel sites.
2. N/S = not sampled. N/C = larval density not calculated, but some larvae collected.
3. Average density observed by the Cowlitz Tribe Fish and Wildlife staff was 28 larvae per cubic meter.

<b>Table 20. Eulachon smelt run size based on estimated spawning stock biomass (SSB) combined with harvest, and estimated harvest in Columbia River commercial and tributary sport and tribal fisheries, 2011-2016.</b>							
Year	Weeks sampled for SSB	Run size (SSB plus harvest in lbs)	Harvest (pounds)				
			Commercial		Sport	Tribal	Combined
			Mainstem	Tributary			
2011	19	3,300,000	0 <sup>1</sup>	0 <sup>1</sup>	0 <sup>1</sup>	N/A	0
2012	25	3,200,000	0 <sup>1</sup>	0 <sup>1</sup>	0 <sup>1</sup>	N/A	0
2013	29	9,600,000	0 <sup>1</sup>	0 <sup>1</sup>	0 <sup>2</sup>	7,470	7,470
2014	22	16,600,000	18,560	0 <sup>1</sup>	203,880	6,970	229,410
2015	33	11,400,000	16,550	0 <sup>1</sup>	290,770	10,400	317,760
2016	25	5,100,000	4,820	0 <sup>1</sup>	141,050	8,560 <sup>2</sup>	154,430

1. Closed to fishing.
2. Includes 200 pounds landed by the Cowlitz Indian Tribe.

<b>Table 21. Mainstem Columbia River Commercial Smelt Seasons, 1985-2016.</b>				
Year	Season	Fishery Level <sup>1</sup>	Weekly Period	Days Open
1985	Jan. 1 – Dec. 31	--	7 d/wk (upstream of Cowlitz R. 2/22-3/1)	365
1986-1994	Dec. 1 – Mar. 31	--	7 days/week	121
1994/1995	Dec. 7 – Jan. 7	--	7 days/week	38
	Jan. 7 – Mar. 31	--	8 PM Sat – 8 AM Wed	48
1995/1996	Dec. 1 – Feb. 2	--	7 days/week	64
	Feb. 3 – Mar. 31	--	Noon Mon – 6 PM Fri	32
1996/1997	Dec. 1 – Jan. 27	--	7 days/week	58
	Jan. 30 – Feb. 21	--	6 AM Thu – 6 PM Fri	8
1997/1998	Dec. 1 – Dec. 31	--	7 days/week	31
	Jan. 2 – Feb. 13	--	6 AM – 6 PM Mon & Fri	13
1998/1999	Dec. 1 - Dec. 23	--	7 days/week	23
	Dec. 30 - Feb. 10	--	7 AM - 7 PM Wed	7
1999/2000	Dec 1 - Dec 26	--	7 days/week	26
	Dec. 29 Feb. 23	--	7 AM - 7 PM Wed	9
2000/2001	Dec 1 - Dec 31	-- <sup>3</sup>	7 days/week	31
	Jan. 3 - Mar. 7	One	3 AM - 9 PM Wed	10
	Mar. 12 - Mar. 31	Two (3/06)	3 AM - 9 PM Mon & Wed	6
2001/2002	Dec. 1 - Dec. 31	-- <sup>3</sup>	7 days/week	31
	Jan. 2 - Jan. 31	Two	3 AM - 9 PM Sun & Wed	9
	Feb. 1 - Mar. 31	Two (1/31)	3 AM - 9 PM Sun, Wed & Fri	26
2002/2003	Dec. 1 - Dec. 31	-- <sup>3</sup>	7 days/week	31
	Jan. 1- Mar. 31	Three	3 AM - 9 PM Sun, Tues, Thurs, & Fri	51
2003/2004	Dec. 1- Dec. 31	-- <sup>3</sup>	7 days/week	31
	Jan. 1 - Mar. 21	Three	3 AM – 9PM Sun, Tues, Thurs, & Fri	34
	Mar. 22- Mar. 31	Two (3/18)	3 AM – 9 PM Fri, & Sun	2
2004/2005	Dec. 1 - Dec. 31	-- <sup>3</sup>	7 days/week	31
	Jan. 1- Feb. 23	Two	3 AM - 9 PM Mon, & Thurs	15
	Feb. 24 – Mar. 31	One (2/23)	3 AM – 9 PM Thurs	6
2005/2006	Dec. 1 – Dec. 31	-- <sup>3</sup>	7 days/week	31
	Jan. 1 – Mar. 2	One	7 AM - 4 PM Mon, & Thurs	20
	Mar. 7	One (3/08)	7 AM - 4 PM Mon	1
	Mar. 13 – Mar. 31	One (3/08)	7 AM - 4 PM Mon & Thurs	6
2006/2007	Dec. 1 - Dec. 31	-- <sup>3</sup>	7 days/week	31
	Jan. 1 - Mar. 31	One	7 AM - 4 PM Mon,& Thurs	20
	Mar. 11	One (3/05)	7 AM - 4 PM Sun	1
	Mar. 15- Mar. 31	One (3/05)	7 AM - 4 PM Mon & Thurs	5
2007/2008	Dec. 1 - Dec. 31	-- <sup>3</sup>	7 days/week	31
	Jan. 1 - Mar. 31	One	7 AM - 4 PM Mon & Thurs	26
2008/2009	Dec. 1 - Dec. 31	-- <sup>3</sup>	7 days/week	31
	Jan. 1 - Mar. 31	One	7 AM - 2 PM Mon & Thurs	26
2009/2010 <sup>4</sup>	Dec. 1 - Dec. 31	-- <sup>3</sup>	7 days/week	31
	Jan. 1 - Mar. 31	One	7 AM - 2 PM Mon & Thurs	25
2011-2013	Closed			
2014 <sup>5</sup>	Feb. 10-Mar. 6	< One	7 AM - 2 PM Mon & Thurs	8
2015 <sup>5</sup>	Feb. 2-Feb. 26	< One	7 AM - 2 PM Mon & Thurs	8
2016 <sup>5</sup>	Feb. 1-Feb. 25	< One	7 AM - 2 PM Mon & Thurs	8

1. Fishery levels are described in the Joint State Eulachon Management Plan.
2. A second reduced test fishery (1-3 boats with state observers onboard) occurred on January 31, February 7, and February 18, 1999 during daylight hours.
3. Under permanent rules (prior to December 2010), December 1-31 was open 7 days/week, 24 hours.
4. Commercial fisheries were closed effective December 1, 2010, due to ESA listing.
5. Minor research fishery conducted.

<b>Table 22. Washington and Oregon Tributary Commercial Smelt Seasons, 2002-2016. <sup>1</sup></b>				
Year	Cowlitz River <sup>2</sup>	Kalama River <sup>3</sup>	Lewis River <sup>4</sup>	Oregon Rivers <sup>5</sup>
2002	1/02-1/31: 6 PM Sun – 6 AM Mon, and 6 PM Wed – 6 AM Thu 2/01-2/25: 6 PM Sun – 6 AM Mon, and 6 PM Tue – 6 AM Wed, and Wed – 6 AM Thu 2/26-3/31: 6 PM Sun – 6 AM Mon, and 6 PM Tue – 6 AM Wed, and Wed – 6 AM Thu, and 6 PM Thu – 6 AM Fri	2/05-2/25: 6 PM Sun – 6 AM Mon, and 6 PM Tue – 6 AM Wed, and Wed – 6 AM Thu 2/26-3/31: 6 PM Sun – 6 AM Mon, and 6 PM Tue – 6 AM Wed, and Wed – 6 AM Thu, and 6 PM Thu – 6 AM Fri	2/05-3/31: 6 PM Sun – 6 AM Mon, and 6 PM Tue – 6 AM Wed, and Wed – 6 AM Thu 2/26-3/31: 6 PM Sun – 6 AM Mon, and 6 PM Tue – 6 AM Wed, and Wed – 6 AM Thu, and 6 PM Thu – 6 AM Fri	24-hours, Everyday
2003	1/01-3/31: 6 PM Sun – 6 AM Mon, and 6 PM Tue – 6 AM Wed, and 6 PM Wed – 6 AM Thu	1/01-3/31: 6 PM Sun – 6 AM Mon, and 6 PM Tue – 6 AM Wed, and 6 PM Wed – 6 AM Thu	1/01-3/31: 6 PM Sun – 6 AM Mon, and 6 PM Tue – 6 AM Wed, and 6 PM Wed – 6 AM Thu	24-hours, Everyday
2004	1/01-3/17: 6 PM Sun – 6 PM Tue and 6 PM Wed- 6 PM Fri Effective 6 PM Thu 3/18- 3/31: 6 PM Sun – 6 AM Mon and 6 PM Wed – 6 AM Thu	1/01-3/17: 6 PM Sun – 6 PM Tue and 6 PM Wed- 6 PM Fri Effective 6 PM Thu 3/18- 3/31: 6 PM Sun – 6 AM Mon and 6 PM Wed – 6 AM Thu	1/01-3/17: 6 PM Sun – 6 PM Tue and 6 PM Wed- 6 PM Fri Effective 6 PM Thu 3/18- 3/31: 6 PM Sun – 6 AM Mon and 6 PM Wed – 6 AM Thu	24-hours, Everyday
2005	1/01-2/22: 6 PM Sun – 6 AM Mon and 6 PM Wed- 6 AM Thu 2/23-3/31: 6 PM Wed- 6 AM Thu	Closed	1/01-2/22 6 PM Sun – 6 AM Mon and 6 PM Wed- 6 AM Thu 2/23-3/31: 6 PM Wed- 6 AM Thu	24-hours, Everyday
2006	1/01-3/31: 6 PM-11:59 PM, Sun and Wed	Closed	Closed	24-hours, Everyday
2007	1/01-3/31: 6 PM-11:59 PM, Sun and Wed			24-hours, Everyday
2009	1/01-3/31 6 AM – 10:PM, Saturdays:	Closed	Closed	24-hours, Everyday
2010 <sup>6</sup>	2/03-2/28 7 PM–10 PM Sun and Wed	Closed	Closed	24-hours, Every day, Through November
2011- 2016	Closed	Closed	Closed	Closed

1. The table contains the emergency regulations that modify the seasons during the January 1 – March 31 period. Washington tributaries not mentioned above were closed by emergency regulation during this period. All tributary commercial fisheries are restricted to dip net gear.
2. Area restricted to downstream of Peterson's Eddy (approximately River Mile [RM] 8.0).
3. Area restricted to downstream of Modrow Bridge (RM 2.9).
4. Area restricted to the mainstem and north fork downstream from the overhead powerlines near Eagle Island (approximately RM 11.5).
5. Oregon tributaries (e.g., Sandy River) are open 24 hours per day, 7-days/week, all year.
6. Tributary commercial fisheries were closed effective December 2010 due to ESA listing.

<b>Table 23. Lower Columbia River Basin Recreational Smelt Seasons, 2002-2016.</b>	
2002	The Columbia River and Oregon tributaries open 7 days per week the entire year. Washington tributaries open Saturdays, Sundays, and Wednesday from 6 AM to 10 PM during January 1-February 25, 2002. Washington tributaries open 7 days per week from 6 AM to 10 PM during February 26-March 31, 2002.
2003	The Columbia River and Oregon tributaries open 7 days per week the entire year. Washington tributaries open 7 days per week from 6 AM to 10 PM during January 1-March 31, 2003.
2004	The Oregon portion of the Columbia River and Oregon tributaries open seven days per week the entire year (25-lbs. daily limit), and the Washington portion of the Columbia River was open 7 days per week during January 1- March 31, 2004 (20-lbs. daily limit). Washington tributaries were open 7 days per week from 6 AM to 10 PM during January 1 – March 19, 2004, and on Wednesdays and Saturdays from 6 AM to 10 PM during March 19-31, 2004 (20-lbs. daily limit).
2005	The Oregon portion of the Columbia River and Oregon tributaries open seven days per week the entire year (25-lbs. daily limit), and the Washington portion of the Columbia River was open 7 days per week during January 1- March 31, 2005 (25-lbs. daily limit). Washington tributaries (Grays River, Cowlitz River, Kalama River, and Lewis River) were open on Tuesdays and Saturdays from 6 AM to 10 PM during January 1 – February 23, 2005 (10-lbs. daily limit), and in the Cowlitz River only, on Saturdays from 6 AM to 10 PM during February 26 – March 31, 2005 (10-lbs. daily limit).
2006-2007	The Oregon portion of the Columbia River and Oregon tributaries open seven days per week the entire year (25-lbs. daily limit), and the Washington portion of the Columbia River was open 7 days per week during January 1- March 31 (25-lbs. daily limit). Washington tributaries were closed with the exception of the Cowlitz River, which was open on Saturdays only, from 6 AM to 10 PM, during January 1 – March 31 (10-lbs. daily limit).
2007-2009	The Oregon portion of the Columbia River and Oregon tributaries open seven days per week the entire year (25-lbs. daily limit), and the Washington portion of the Columbia River was open 7 days per week during January 1- March 31 (25-lbs. daily limit). Washington tributaries were closed with the exception of the Cowlitz River, which was open on Saturdays only, from 6 AM to 10 PM, during January 1 – March 31 (10-lbs. daily limit).
2009-2010 <sup>1</sup>	The Oregon portion of the Columbia River and Oregon tributaries open seven days per week the entire year (10-lbs. daily limit), and the Washington portion of the Columbia River was open 7 days per week during January 1-March 31 (10-lbs. daily limit). Washington tributaries were closed with the exception of the Cowlitz River, which was open on Saturdays only from 7 AM to 3 PM, during February (10-lbs. daily limit).
2011-2013	Closed
2014 <sup>2</sup>	Columbia River closed. All tributaries closed except the Cowlitz River on the Washington shore, which was open on Saturdays (6 AM-noon) during February 8 - March 8 (10-lbs. daily limit) and the Sandy River on the Oregon shore, which was open on Saturdays (6 AM-noon) during March 1-22 (10-lbs. daily limit).
2015 <sup>2</sup>	Columbia River closed. All tributaries closed except the Cowlitz River on the Washington shore, which was open on 6 AM-noon Saturday February 7 and 14 (10-lbs. daily limit) and the Sandy River on the Oregon shore, which was open 6 AM-noon Saturday March 7 and Sunday March 15 (10-lbs. daily limit).
2016 <sup>2</sup>	Columbia River closed. All tributaries closed except the Cowlitz River on the Washington shore, which was open on 7 AM-1PM Saturday February 6 (10-lbs. daily limit).

1. Recreational fisheries were closed effective December 2010 due to ESA listing.
2. Minor research fishery.