2015/2016 Puget Sound Steelhead Harvest

Management Report

Washington Department of Fish and Wildlife

and

The Puget Sound Indian Tribes

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This report was developed by the Washington Department of Fish and Wildlife and the Puget Sound Indian Tribes to summarize harvest of Puget Sound steelhead in marine and freshwater areas during the 2015/2016 management season. The report also contains preliminary estimates of spawning escapements for each management unit, if available, and a brief description of escapement and catch monitoring that occurred. The managers expect this report to satisfy the reporting requirements stipulated in the Biological Opinions issued by the National Marine Fisheries Service, which authorized harvest-related mortality of listed Puget Sound steelhead for management year 2015/2016.

Preseason Planning

Annual steelhead harvest management plans for the 2015/2016 management cycle were developed pre-season for the Nooksack, Samish, Skagit, Snohomish/Stillaguamish, Green, Puyallup, Nisqually, and Hood Canal management units. These plans provided forecasts of hatchery and wild steelhead for some management units and an expected freshwater terminal runsize harvest rate for other management units (i.e. Nisqually River winter steelhead) and harvest management strategies that would be implemented to harvest surplus hatchery steelhead or winter chum and limit the incidental take of wild steelhead. The incidental take statement in the Biological Opinion regarding 2015/2016 fisheries limited wild steelhead impacts such that the average, terminal harvest rate for five wild winter steelhead management units (Skagit, Snohomish, Green, Puyallup and Nisqually) would not exceed 4.2%. For the other management units, fisheries management measures and harvest impacts were expected to not exceed those implemented in recent seasons. The Biological Opinion also authorized harvest of up to 325 steelhead (i.e. an aggregate number comprised of unknown proportions of wild and hatchery-origin steelhead from Puget Sound and British Columbia) in Puget Sound marine pre-terminal fisheries.

Harvest Summary

Estimates of winter steelhead harvest in tribal fisheries, summarized below (Table 1), are based on a preliminary accounting of tribal landings that occurred between November 1, 2015 and May 31, 2016. Catch estimates are provided for all terminal areas where tribal landings occurred. Sampling of catch enabled estimation of the number of wild steelhead. Where appropriate, a release mortality rate (18.5%) is applied to wild steelhead released during net selective fisheries. Net drop-out mortality is not included in this accounting; by convention it has been estimated to be 2% of the landed catch. Hooking mortality in recreational fisheries was estimated as 10% of the estimated number of encounters with wild steelhead. The number of encounters is estimated from the length of the recreational season, expressed as a proportion of the total run timing.

Wild steelhead mortalities associated with the 2015/2016 tribal and recreational fisheries in the Skagit, Snohomish, Green, Puyallup and Nisqually rivers (management units) were lower than projected pre-season; their average was 0.64% (Table 1). The following summary discussion focuses on the five management units for which a maximum, average incidental mortality rate of 4.2% was specified in the incidental take statement of the current Biological Opinion rate.

Table 1. Incidental harvest and hooking mortalities in terminal fisheries and escapement of wild steelhead in Puget Sound, 2015/2016 management year. Except for Skagit River which accounts for harvest from July 1- June 30, accounts for steelhead harvest during the winter timeframe (November-May).

Management Unit	Tribal Catch		Recreational Estimates		Total Mortality Estimate	Escapement	Terminal Harvest Rate[j/]	
	Total	Wild	Encounters	Hooking Mortality			Estimated	Preseason Estimate
Nooksack[a/]	92 encounters	44 (9 morts. from 49 release encounters)				1,842		
Samish	0	0				1,456		
Skagit[b/]	49	47	256	43	90	7,918	1.12%	2.87%
Stillaguamish	0	0				684[c/]		
Snohomish	0	0	281	28	28	3,120	0.90%	3.52%
Lake Washington/Cedar	0	0				10[/d]		
Green	3	0	198	20	20	2,145[e/]	0.92%	1.78%
Puyallup	0	0	1	1	1	1,563	0.06%	0.48%
White	0	0				805[e/]		
Nisqually[f/]	0	0	41	4	4	2,035	0.20%	2.20%
Skokomish	6	6			6	1,126		
East Hood Canal						66		
West Hood Canal						170[g/]		
South Hood Canal						75		
Dungeness	6[h/]	N/A				N/A - Poor survey conditions		
Elwha	0	0				890 (570 HOR, 320 NOR)[i/]		
Sequim Pt Townsend						13 Snow Creek		
Port Angeles						93 Morse Crk. 74 McDonald Crk		
							Sum 3.20/5 = 0.64%	

[a/] The Nooksack River 'Tribal Total' catch includes harvested/landed fish and encountered fish released from tangle-net selective fishery conducted by Lummi fishers with an 18.5% release mortality. Wild catch depicts encounters and mortalities associated with releases.

[b/] Skagit River: Estimated recreational hooking mortality from Chinook and sockeye recreational fisheries as well as hooking-release mortality from genetic sampling activities included in recreational hooking mortality estimates.

[c/] Stillaguamish estimate represents only un-expanded index reach survey data. Expanded estimate is 2,775.

[d/] Uncertainty exists whether observed redds in Cedar River were steelhead produced or cutthroat trout from Lake Washington.

[e/] Includes returns from wild broodstock program; broodstock numbers removed.

[f/] Due to low runsize numbers the late chum season closed approximately 4 weeks earlier than customary.

[g/] West Hood Canal for 2016/17 excludes Dosewalips escapement as high, turbid waters precluded surveys to be conducted.

[h/] Six steelhead caught in Dungeness for C&S.

[i/] DIDSON Multi-beam Sonar Estimates. Denton, K.P., McHenry, M., Moses, R., Ward, E., Stefankiv, O., Wells, W., and Pess G., 2016. 2016 Elwha River Steelhead Escapement Estimate Based on DIDSON/ARIS Multi-Beam SONAR Data. Prepared for the Lower Elwha Klallam Tribe, 34 p.

[j/] Harvest rate estimates are subject to rounding error.

Tribal Fisheries

In general, the tribal terminal-area fisheries that impact listed steelhead operated as specified in the pre-season annual management plans. Wild steelhead mortality associated with these fisheries was lower than the number projected pre-season. The following discussion focuses on the five management units for which the incidental take statement in the Biological Opinion specified a harvest rate. Wild steelhead impacts in other basins within Puget Sound are also presented.

In the Skagit River, total kelt adjusted (8.85% kelt adjustment rate) wild harvest mortality from July 1, 2015 to June 30, 2016 in the steelhead-directed fishery, C&S fishery, test fishery and incidental mortality in the spring Chinook and sockeye fisheries was 47, compared with the pre-season projection of 206 with net drop out. A portion of the steelhead impacts in Skagit River are attributed to release mortalities from a tangle-net test fishery (18.5% release mortality rate).

The stock composition of wild winter steelhead harvested in tribal fisheries conducted in Areas 8A and 8D is approximated by referring to the post-season, reconstructed abundance of the Snohomish and Stillaguamish returns, and assumptions about the composition of catch in sub-areas of 8A. The estimated mortality of Snohomish wild winter steelhead was 0, substantially lower than the pre-season projection of 72 including net-drop out.

The winter steelhead fishery in Duwamish/Green River closed December 31, 2015. The estimated preseason mortality was projected at 8 wild fish. However, no wild winter steelhead were harvested.

The Puyallup tribal fishery directed at chum salmon was conducted as planned in November and December. Incidental harvest of wild winter steelhead, projected to be 5, was zero.

The Nisqually tribe's coho fishery operated during early November with the winter chum-directed fishery opening November 15 and closing for the season on December 29, 2015. Zero wild steelhead were harvested during these fisheries.

Tribal steelhead catch in other rivers was low or zero during the 2015/2016 season. There were 29 estimated wild winter steelhead mortalities in the Nooksack River during the winter hatchery steelhead management period (Nov-May) and 15 (9 are estimated release mortalities), of which five were known kelts based on sampling, caught incidentally during the C&S fishery for spring Chinook. No winter steelhead were harvested in the Elwha River, Stillaguamish River, Lake Washington/Cedar River or Samish River during 2015/2016.

Marine Waters - Tribal and Recreational Fisheries

Preliminary tribal catch in pre-terminal marine waters (Areas 4B, 5, 7, 7A and 7B) during management year 2015-2016 was 87 steelhead of mixed origin, with 77% of the harvest in Areas 4B and 5 which are outside the Puget Sound Distinct Population Segment. The Swinomish Tribal Community fishery occurs partly in Area 8 (and Area 78C) and the harvest is accounted for in the Skagit River management unit. The Stillaguamish – Snohomish terminal winter (November-May) steelhead fishery occurs in Areas 8A and 8D and this harvest is accounted to

those regional management units. For the summer period (June – October) of 2015, three steelhead, of unknown origin, were caught in Area 8D; one in June and two in July.

The April 2015 to March 2016 steelhead catch estimate for marine recreational fisheries was 213 (Appendix A). All fish were caught in Marine Area 9 and were identified as marked.

The total treaty and non-treaty pre-terminal April 2015 to March 2016 marine harvest of 300 (87 treaty and 213 non-treaty harvest) was less than the 325 allowed by the Biological Opinion incidental take statement for steelhead.

Recreational Fisheries

Recreational winter steelhead fisheries in the Puget Sound DPS were conducted as described in the pre-season, annual management plans and the *2015/2016 Washington Sport Fishing Rules, May 1, 2015 to June 30, 2016*. For the 2015/2016 season, WDFW did need to implement several emergency freshwater fishing rules, listed below, in the Puget Sound DPS. The emergency rules closed sections of streams and in the vicinity of hatchery facilities (Nooksack River and Whatcom Creek and Stillaguamish River), because of insufficient broodstock (egg-take) requirements. These emergency rules were repealed once egg-take needs were met. The waters closed to fishing around WDFW's Tokul Creek Hatchery were opened to sport fishing four weeks earlier than anticipated, because broodstock requirements had been met earlier than expected. The upper Green River was closed to all fishing in mid-October to protect spawning coho and Chinook salmon. The river section was reopened December 2, 2016 to the fishing for trout and other game fish. Also, the Nisqually River recreational chum salmon fishery was closed four weeks earlier than anticipated for chum salmon conservation concerns.

The Puget Sound freshwater/winter steelhead emergency sport fishing rules that were put into place for the 2015/2016 season can be found at the following WDFW webpages:
https://fortress.wa.gov/dfw/erules/efishrules/erule.jsp?id=1734 (Nooksack River & Whatcom Creek – closure)
https://fortress.wa.gov/dfw/erules/efishrules/erule.jsp?id=1744 (Nooksack River & Whatcom Creek – reopening)
https://fortress.wa.gov/dfw/erules/efishrules/erule.jsp?id=1733 (Stillaguamish River – release of all steelhead)
https://fortress.wa.gov/dfw/erules/efishrules/erule.jsp?id=1742 (Stillaguamish River – allow steelhead retention)
https://fortress.wa.gov/dfw/erules/efishrules/erule.jsp?id=1704 (Green River – closure)
https://fortress.wa.gov/dfw/erules/efishrules/erule.jsp?id=1732 (Green River – reopening)
https://fortress.wa.gov/dfw/erules/efishrules/erule.jsp?id=1738 (Tokul Creek – early hatchery WSH opening)
https://fortress.wa.gov/dfw/erules/efishrules/erule.jsp?id=1745 (Nisqually River – closure)

The Samish River was closed to all fishing January 1, 2016 to protect all returning wild steelhead. Winter steelhead smolt releases were discontinued in 2008, very few hatchery-origin steelhead were anticipated to stray into the Samish River.

The majority of the Nooksack River system closed on February 1, 2016 except for the North Fork Nooksack River from the mouth to Maple Creek which closed to all fishing on February 16, 2016, which is in the vicinity of Kendall Creek hatchery.

In the Skagit River, catch-and-release mortality was estimated at 25, compared with the pre-season projection of 28. Wild steelhead encounters in the fishery were estimated at 256.

The estimated catch-and-release mortality of Snohomish River wild winter steelhead was 28 based on an estimated 281 encounters for the season. The estimate is slightly higher than the pre-season projection of 26. Pre-2011, recreational fishery impacts assume anglers handle (hook) 16% of wild population when the fishery closes March 1st and a 10% hooking mortality, = (Est. Wild Esc. x0.16)x0.1). Starting in 2011 rivers were closed January 31 to reduce recreational impacts on wild winter steelhead to an estimated 9% of wild winter steelhead run encountered, Hooking mortality = ((Est. Wild Esc.*0.09)*0.1).

The estimated catch-and-release mortality in the Green River winter steelhead fishery was 20, more than twice the preseason estimate of 9 fish. The 20 fish mortality is based on an estimated 198 encounters.

Puyallup River hooking mortality was estimated to be less than 1 fish. This estimate was calculated using the chum to steelhead encounter rates during the treaty chum directed fishery and a release mortality of 10%. Treaty fisherman caught less than one steelhead for every 5,000 chum harvested during the same period as sport fisherman reported from catch record cards. Sport anglers caught an average of 503 chum annually during the 2011/2012 to 2015/2016 time period. There was no sport chum harvest during 2015/2016.

Incidental catch-and-release wild steelhead mortality was estimated at 4 based on 41 encounters during the late-chum directed fishery in the Nisqually River. The mortalities were based on the return timing of steelhead to the Mud Mountain Fish Passage Facility on the White River, near Buckley, Washington. The run-timing to the facility suggests that fewer than 2% of the annual return of steelhead may be accessible to the fishery prior to January 15th, Hooking mortality = ((Est. Wild Esc.*0.02)*0.1)/4.07 = ((2,035*0.02)*0.1. This assumes little or no delayed migration in the river below the Buckley collection trap. Due to low runsize numbers the late chum season closed January 6, 2016, approximately 4 weeks earlier than is customary.

Winter Steelhead Escapement and Runsize Estimates

Surveys of wild steelhead escapements were conducted in all the Management Units. However some estimates were index estimates or partial system estimates. The 2016 preliminary wild winter steelhead escapement estimates for the Skagit, Snohomish, Green, Puyallup and Nisqually are total system estimates (Table 1). Wild steelhead escapement estimates for 2016 for the Snohomish, Green, Puyallup and Nisqually (mainstem escapement below 2,000 wild steelhead) rivers (management units) were below the escapement goals used for determining the potential wild surplus for planning the 2015/2016 season. The Skagit River wild steelhead escapement estimate exceeded the 6,000 fish escapement objective by 1,918.

High flow and turbidity influenced survey accuracy and frequency in many systems, so all estimates should be considered minimums. Following are further notes on estimates for other rivers:

- The Lake Washington/Cedar River steelhead escapement estimate for 2016 was 10. There is uncertainty regarding whether the observed redds in 2016 were constructed by cutthroat trout from Lake Washington spawning in Cedar River or steelhead, which may have been strays from the Green River DIP. Recent steelhead escapements have dropped

precipitously beginning in the early 1990's, with three years of zero escapement in the past 8 years.

- The Skokomish estimate is based on standard surveys of the North Fork, South Fork and tributaries which are thought to comprise most of the suitable steelhead spawning habitat.
- The East Hood Canal estimate is based on surveys in the Big Beef Creek and Dewatto River.
- The West Hood Canal estimate is based on surveys in the Hamma Hamma River, Duckabush River, and Big/Little Quilcene River. For the 2016/2107 spawn season, flow conditions in Dosewallips were too high and turbid to conduct surveys.
- The South Hood Canal estimate is based on surveys in the Union and Tahuya rivers.
- The Sequim-Port Townsend estimate comprises the adult count (13) at the Snow Creek weir; no other streams were surveyed.
- For 2016 a wild steelhead escapement for the Dungeness River could not be estimated due to high flows all season long.
- The 2016 Elwha River the wild steelhead escapement estimate (NOR) was 320 based on DIDSON multi-beam SONAR data.
- The 2016 wild steelhead escapement for streams within the Port Angeles Management Unit are 93 fish in Morse Creek and 74 fish in McDonald Creek.

Based on preliminary estimates of terminal harvest mortality and escapement, 2015/2016 terminal run-size was higher than forecast for four of the five primary Puget Sound management units (Table 2).

Table 2. Preliminary accounting of the terminal runsize of wild winter steelhead compared to forecasted levels for five Puget Sound management units, 2015/2016.

Management Unit	Forecast	Observed
Skagit	8,184	8,008
Snohomish	2,817	3,120
Green	957	2,165[a/]
Puyallup	1,462	1,563
Nisqually	1,127	2,035[b/]

[a/] Fish taken for broodstock included.
b/ Mainstem escapement, 1,411; tributary escapement, 624. Mainstem escapement includes estimates from Pealo's Slough and Clear Creek. (Gabe Madel, WDFW personnel communication).

Harvest Monitoring

For the 2015/2016 season the harvest of winter-run (and summer-run) steelhead by the sport fishery harvest was estimated from the Catch-Record-Cards. The preliminary harvest of winter (2015/2016) and summer (2015) steelhead can be found in Appendix A. The attached draft estimates show no wild steelhead being harvested in the Puget Sound DPS. Phone surveys of

anglers have shown that close to 100% of all unmarked fish recorded onto Catch-Record-Cards by respective anglers are released by recreational anglers. Phone surveys also indicated that some anglers were confused about the statewide "Wild Steelhead Release" rule, particularly on the Columbia River (Eric Kraig, WDFW personnel communication).

A limited creel survey was conducted on the Green River from December 30, 2015 through January 31, 2016 between Interstate 405 and the City of Tacoma Diversion Dam at RM 60.9. Low angler turnout resulted from high river flows and rumors of low hatchery fish return rates. During the creel survey 229 anglers were interviewed over the 20 surveyed days. Anglers kept 26 adipose fin-clipped steelhead, released 7 adipose fin-clipped fish, and caught-and-released 40 adipose fin-intact steelhead. Most of the adipose fin-intact fish were caught in mid-January when flows were low and before heavy rains in the third week of January limited fishing.

Recreational Chinook and Sockeye Creel Surveys

There was one non-intensive Chinook salmon recreational creel survey conducted in the Puget Sound DPS in 2016. The creel survey was conducted on the Skokomish River. There were no encounters with steelhead during the fishery (Mark Downen, WDFW personnel communication).

From June and July 2015 the Skagit River sockeye salmon sport fishery was creel surveyed. During the June 16 through July 15 intensive survey, anglers reported to WDFW creel surveyors that one wild steelhead had been released. No hatchery steelhead were reported harvested or released. WDFW creel surveyors did see two illegally kept wild steelhead (Brett Barkdull, WDFW personnel communication).

Tribal Fisheries

Commercially retained tribal steelhead harvest is accounted on commercial sales receipts (fish tickets) and recorded in the TOCAS database. The majority of catch taken during the 2015/2016 season terminal fisheries was sampled to determine the hatchery-wild composition. Scales are collected from wild catch, when feasible, to quantify age composition, and this information is utilized in forecasting.

In addition to winter steelhead catch accounted in Table 1, a small number of steelhead are also caught outside of the winter accounting period in a small number of rivers with hatchery summer steelhead; the Green River and Nooksack River accounted for the majority of the summer catch. Steelhead were also incidentally harvested during the summer period in 10F – Lake Washington Ship Canal (n=4 in July) and in the Nisqually River (n=5) in August and early September, however sampling of these catches indicated they were all hatchery origin fish (adipose clipped). Given the timing of these encounters, we assume they are summer-run hatchery steelhead and not a part of the DPS. Numbers of steelhead caught in the Skagit River outside of the conventional winter accounting period are provided above, because the Skagit management unit encompasses summer and winter steelhead populations.

Appendix A - 2015-2016 Puget Sound Steelhead Sport Harvest Estimates from CRCs (02/02/2017, E. Kraig, WDFW)

System	Water	Race	Mark	2015									2016			Total
				Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	
Marine Water *	Area 9: Admiralty Inlet	S	Marked		34		8									42
		W	Marked	57								23	46	34	11	171
Clallam R. System *	Clallam River	W	Marked								3		13			16
Dungeness R. System *	Dungeness River	W	Marked									3	7			10
Green-Duwamish R. Sys *	Green (Duwamish River) (King Co.)	S	Marked			4	26	4	18	15						67
		W	Marked								3	13	54			70
	Soos Creek	S	Marked				4	4								8
	Green-Duwamish R. Sys Totals	S	Marked			4	30	8	18	15						75
		W	Marked								3	13	54			70
Hoko R. System *	Hoko River	W	Marked								13	91	13	13		130
Morse Cr. System *	Morse Creek (Clallam Co.)	W	Marked									13				13
Nisqually R. System *	Nisqually River	S	Marked						4							4
Nooksack R. System *	Nooksack River, No. Fork	W	Marked										7			7
	Nooksack River, below North Fork	W	Marked									3	7			10
	Nooksack R. System Totals	W	Marked									3	14			17
Puyallup R. System *	Puyallup River	S	Marked							7						7
		W	Marked									7				7
Salt Cr. System *	Salt Creek (Clallam Co.)	W	Marked									7				7
Sekiu R. System *	Sekiu River	W	Marked									3	3			6
Skagit R. System *	Cascade River	S	Marked							11						11
		W	Marked								17	30	54			101
	Skagit River	W	Marked								7		13			20
	Skagit R. System Totals	S	Marked							11						11
		W	Marked								24	30	67			121
Snohomish R. System *	Pilchuck River (Snohomish System)	W	Marked										4			4
	Skykomish River	S	Marked			399	126	412	402	171						1,510
		W	Marked								207	830	713	55		1,805
	Skykomish River, No. Fork	S	Marked			6	10	6		10						32
		W	Marked								4		4			8
	Skykomish River, So. Fork	S	Marked			3		3	6							12
		W	Marked									8	12			20
	Snohomish River	S	Marked			16		13	16	6						51
		W	Marked									23	31			54
	Snoqualmie River	S	Marked			3		3	3							9
		W	Marked								12	55	66			133
	Sultan River	W	Marked								4	4				8
	Tokul Creek	W	Marked									117	140	19		276
	Wallace River	S	Marked							48						48
		W	Marked								74	199	144	4		421
	Snohomish R. System Totals	S	Marked			427	136	437	427	235						1,662
		W	Marked								301	1,236	1,114	78		2,729

Stillaguamish R. System *	**Canyon Creek**	**S**	**Marked**			4										**4**
	Stillaguamish R, No. Fork	**S**	**Marked**						15							**15**
		W	**Marked**								7					**7**
	Stillaguamish R, So. Fork	**W**	**Marked**										3			**3**
	Stillaguamish River	**S**	**Marked**						4							**4**
		W	**Marked**									3	10			**13**
	Stillaguamish R. System Totals	**S**	**Marked**			4			19							**23**
		W	**Marked**								7	3	13			**23**
PUGET SOUND REGION TOTALS	**PUGET SOUND REGION TOTALS**	**S**	**Marked**		**34**	**435**	**174**	**445**	**468**	**268**						**1,824**
		W	**Marked**	**57**							**351**	**1,432**	**1,344**	**125**	**11**	**3,320**