2016/2017 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 2016/2017 management season. For ESA purposes, the 2016 Biological Opinion covered incidental take of ESA listed Puget Sound steelhead occurring from May 1, 2016 through April 30, 2017. However with steelhead return timing, co-manager steelhead management timeframes, and for steelhead reporting purposes, terminal fishery impacts in this report cover through May 31, 2017. 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 2016/2017.

Preseason Planning

Annual steelhead harvest management plans for the 2016/2017 management cycle were developed pre-season for the Nooksack, Samish, Skagit, Snohomish/Stillaguamish, Green, and Hood Canal management units. For Puyallup and Nisqually Management Units, respective chum management plans described expected incidental steelhead impacts. Together, 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 2016/2017 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% harvest rate. 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, 2016 and May 31, 2017. Tribal mortality estimates are provided for terminal areas where the Biological Opinion requires terminal harvest rate to not exceed an average 4.2% harvest rate (e.g. Skagit, Snohomish, Green, Puyallup and Nisqually management units). 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 2016/2017 tribal and recreational fisheries in the Skagit, Snohomish, Green, Puyallup and Nisqually rivers (management units) were lower than projected pre-season (1.7%); their average was 0.7% (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, 2016/2017 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[h/]	
	Total	Wild	Encounters	Hooking Mortality			Estimated	Preseason Estimate
Nooksack[a/]	12 encounters; plus 3 kelts	5 mortalities				1,714		
Samish	0	0				862		
Skagit[b/]	93	89	236	23	112	6,380	1.7%	3.4%
Stillaguamish	2	1				*428*[c/]		
Snohomish	3	2	178	18	20	1,992	1.0%	3.4%
Lake Washington/Cedar	0	0				0		
Green	0	0	89	9	9	1,002[d/]	0.9%	1.4%
Puyallup	0	0	1	1	1	672	0.1%	0.3%
White	0	0				432[d/]		
Nisqually[e/]	0	0	0	0	0	616	0.0%	0.0%
Skokomish	11	11			11	619		
East Hood Canal						77		
West Hood Canal						38[f/]		
South Hood Canal						29		
Dungeness	0	0				N/A - Poor survey conditions		
Elwha	0	0				1,130 (755 HOR, 375 NOR)[g/]		
Sequim Pt Townsend						39 Snow Creek		
Port Angeles						32 McDonald Creek		
						Sum 3.7/5 = 0.7%		

[a/] The Nooksack River 'Tribal Total' includes 12 encountered fish released from tangle-net selective Chinook C&S fishery conducted by Lummi fishers with an 18.5% release mortality. Wild catch depicts encounters and mortalities (n=2) associated with releases plus 3 kelts caught in the traditional net Chinook C&S fishery.

[b/] Skagit River: Skagit Tribal 'Total' and 'Wild' are mortality estimates, as release mortalities are applied to some tribal net fisheries requiring release of wild steelhead. 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 1,736.

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

[e/] The co-managers agreed that commercial and sport winter chum-directed fisheries would likely result in the chum escapement goal not to be met. The Nisqually Tribe and WDFW closed respective fisheries effective November 16, 2016.

[f/] West Hood Canal for 2017 excludes Dosewalips Rv. escapement as high, turbid waters precluded surveys to be conducted.

[g/] Keith Denton, personnel communication, December 20, 2017.
[h/] 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 (8.78% kelt adjustment rate) wild harvest mortality from July 1, 2016 to June 30, 2017 in the steelhead-directed fishery, C&S fishery, test fishery and incidental mortality in the spring Chinook and sockeye fisheries was 89, compared with the pre-season projection of 269 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 2, substantially lower than the pre-season projection of 77 including net-drop out.

The winter steelhead fishery in Duwamish/Green River closed December 31, 2016. The estimated preseason mortality was projected at 7 wild fish. No hatchery or wild winter steelhead were harvested in the Duwamish/Green River during the winter steelhead timeframe.

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 2016. The co-managers agreed that commercial and sport winter chum-directed fisheries would likely result in the chum escapement goal not to be met. The Nisqually Tribe and WDFW closed respective fisheries effective November 16, 2016. No wild steelhead were harvested during the coho fishery.

Tribal steelhead catch in other rivers was low or zero during the 2016/2017 season. There were no hatchery winter steelhead fisheries in the Nooksack River during 2017 because returns were expected to be too low. The Lummi Nation selective spring Chinook C&S fishery encountered and released 12 steelhead. Applying an 18.5% mortality rate, there were 2 mortalities. The Nooksack Tribe caught three winter steelhead kelts during their traditional net Chinook C&S fishery.

Marine Waters - Tribal and Recreational Fisheries

Preliminary tribal catch in pre-terminal marine waters (Areas 4B, 5, and 7B) during management year 2016/2017 (May 1, 2016 - April 30, 2017) was 10 steelhead of mixed origin, 90 percent of the harvest occurred Marine 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.

The April 2016 to March 2017 steelhead catch estimate for marine recreational fisheries was 15 (Appendix A). All fish were caught in Marine Area 9 and were identified as marked.

The total treaty and non-treaty pre-terminal April 2016 to March 2017 marine harvest of 25 (10 treaty and 15 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 *2016/2017 Washington Sport Fishing Rules, July 1, 2016 to June 30, 2017*. For the 2016/2017 season, WDFW did need to implement several emergency freshwater fishing rules, listed below, in the Puget Sound DPS. The emergency rules closed entire rivers or river systems (Snoqualmie River, Tolt River, Raging River, Nisqually River, Nooksack River system, Stillaguamish River system) to fishing for all steelhead and other game fish or all species, sections of streams and in the vicinity of hatchery facilities (Skykomish River near Reiter Hatchery Ponds and Wallace River) because of insufficient broodstock (egg-take) requirements. The Skykomish River and Wallace River emergency rule was repealed once egg-take needs were met. Also, the Nisqually River recreational chum salmon fishery was closed November 16, 2016 because of chum salmon conservation concerns.

The Puget Sound freshwater/winter steelhead emergency sport fishing rules that were put into place for the 2016/2017 season can be found at the following WDFW webpages:
https://fortress.wa.gov/dfw/erules/efishrules/erule.jsp?id=1907 (Nooksack River – closure)
https://fortress.wa.gov/dfw/erules/efishrules/erule.jsp?id=1909 (Skykomish and Wallace Rivers – closures)
https://fortress.wa.gov/dfw/erules/efishrules/erule.jsp?id=1917 (Skykomish and Wallace Rivers – reopening)
https://fortress.wa.gov/dfw/erules/efishrules/erule.jsp?id=1903 (Tokul Crk. Snoqualmie, Tolt, Raging Rvs. – closure)
https://fortress.wa.gov/dfw/erules/efishrules/erule.jsp?id=1902 (Stillaguamish River and tributaries – closure)
https://fortress.wa.gov/dfw/erules/efishrules/erule.jsp?id=1896 (Nisqually River – 2016/2017 closure)

The Samish River closed to all fishing January 1, 2017 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 Nooksack River system closed on January 1, 2017 due to exceptionally low numbers of returning hatchery winter steelhead. There were no smolt releases during 2014 and 2015.

In the Skagit River, catch-and-release mortality was estimated at 23, compared with the pre-season projection of 33. Wild steelhead encounters in the fishery were estimated at 294.

The estimated catch-and-release mortality of Snohomish River wild winter steelhead was 18 based on an estimated 178 encounters for the season. The estimate is lower than the pre-season projection of 30. 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. × 0.16) × 0.1). 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 9, six less of 15 fish preseason estimate. The 9 fish mortality is based on an estimated 89 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.

The Nisqually River closed to all recreational fishing November 16, 2016 because of chum salmon conservation concerns. The incidental catch-and-release wild steelhead mortality is considered to be 0, because of the early river closure.

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 2017 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 2017 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 2017/2018 season. The Skagit River wild steelhead escapement estimate exceeded the 6,000 fish escapement objective by 412.

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 2017 was 0. Steelhead escapements have dropped precipitously beginning in the early 1990's, with four years of zero escapement in the past 10 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 2107 spawning 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 (39) at the Snow Creek weir; no other streams were surveyed.
- For 2017 a wild steelhead escapement for the Dungeness River could not be estimated due to high flows all season long.
- The 2017 Elwha River preliminary wild steelhead escapement estimate (NOR) was 375 based on DIDSON multi-beam SONAR data.
- Within the Port Angeles Management Unit only McDonald Creek was successfully surveyed throughout the season to allow a spawning estimate to be developed. The 2017 wild steelhead escapement for McDonald Creek was 74 fish.

Based on preliminary estimates of terminal harvest mortality and escapement, 2016/2017 terminal run-size was lower than forecast for all five of the 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, 2016/2017.

Management Unit	Forecast	Observed
Skagit	9,516	6,492
Snohomish	3,145	2,012
Green	1,620	1,033[a/]
Puyallup[b/]	2,334	1,033
Nisqually	2,035	616[c/]

a/ Fish taken for broodstock included.
b/ Forecast and Observed are estimated from wild terminal runsize for the Puyallup, Carbon and White rivers. Wild steelhead (broodstock) taken for the White River supplementation program and Blank Wire Tagged fish are not included.
c/ Mainstem escapement, 308; tributary escapement, 308. (Gabe Madel, WDFW personnel communication).

Harvest Monitoring

For the 2016/2017 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 (2016/2017) and summer (2016) 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 January 14, 2017 through January 31, 2017 between Interstate 405 and the City of Tacoma Diversion Dam at RM 60.9. Low angler turnout was anticipated given that few hatchery fish were expected to return. During the creel

survey 104 anglers were interviewed over the 11 surveyed days. Anglers kept 5 adipose fin-clipped steelhead, and caught-and-released 29 adipose fin-intact steelhead.

Recreational Chinook and Sockeye Creel Surveys

A Chinook salmon recreational creel survey was conducted from August 26 to October 28, 2017 on the Green/Duwamish River. All areas below downstream of the Auburn-Black Diamond Bridge were surveyed. No steelhead were harvested or encountered during the creel survey time period.

The 2016 summer sockeye recreational fishery in the Skagit River was creel surveyed. During the June 24 through July 15 intensive survey, anglers reported to WDFW creel surveyors that no hatchery steelhead were harvested or released. Three wild steelhead were released and one was kept. (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 2016/2017 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 were also caught in 2016 outside of the winter accounting period in a small number of terminal areas with hatchery summer steelhead. The Green River (n=9 in September/October) and Tulalip Bay (n=10, June-August) accounted for the majority of the summer catch. Steelhead were also incidentally harvested during the summer period in 10F – Lake Washington Ship Canal (n=3 in July), however, sampling of these catches indicated they were all hatchery origin fish (adipose clipped) and based on their timing are believed to be summer-run hatchery steelhead and not part of the DPS.

Research Fisheries

Harvest oriented research activities in Lake Washington (MIT 2017) and Marine Catch Area 5 (Van Will, et al. 2017) had no incidental steelhead encounters during the 2016/2017 season.

Literature Cited

Muckleshoot Indian Tribe (MIT). 2017. Lake Washington warm water fish diet analysis. Auburn, WA. 9pgs + test fishery updates for Jan-March and April-June, 2017. Submitted to S. Bishop, NMFS, July, 2017.

Van Will, P., J. Candy, C. McConnell, L. Kearey, and B. Patton. 2017. Joint US and CA Juan de Fuca Chum Sampling Program 2016. 34 pgs. http://www.psc.org/fund-project/juan-de-fuca-strait-chum-sampling-program-dfo-portion-year-1-of-4/. Accessed December 12th, 2017.

Appendix A - DRAFT 2016-2017 Puget Sound Steelhead Sport Harvest Estimates from CRCs - near final (E. Kraig, WDFW, 01/02/2018)

System	Water	Race	Mark	2016									2017			Total
				Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	
Marine Water *	Area 9: Admiralty Inlet	S	Marked			5										5
		W	Marked	5									5			10
Deep Cr. System (Clallam) *	Deep Creek (Clallam Co.)	W	Marked									5				5
Dungeness R. System *	Dungeness River	W	Marked									5				5
Green-Duwamish R. Sys *	Green (Duwamish River) (King Co.)	S	Marked			27	38	38		5						108
		W	Marked								5		5			10
Hoko R. System *	Hoko River	W	Marked									114	10	5		129
Lyre R. System *	Lyre River	W	Marked										5			5
Puyallup R. System *	White (Stuck) River	W	Marked										5			5
Pysht R. System *	Pysht River	W	Marked									21				21
Sekiu R. System *	Sekiu River	S	Marked					5								5
		W	Marked									5				5
Skagit R. System *	Baker Lake	S	Marked					11								11
	Cascade River	S	Marked						5							5
	Sauk River	W	Marked									10				10
	Skagit River	S	Marked				14									14
		W	Marked										13			13
	Skagit R. System Totals	S	Marked				14	11	5							30
		W	Marked									10	13			23
Snohomish R. System *	Pilchuck River (Snohomish System)	W	Marked										3			3
	Raging River	S	Marked				3									3
	Skykomish River	S	Marked		3	213	481	116	74	119						1,006
		W	Marked								66	456	123	22		667
	Skykomish River, No. Fork	S	Marked				6		3	3						12
		W	Marked									3				3
	Snohomish River	S	Marked			16	6									22
		W	Marked								3	16				19
	Tokul Creek	W	Marked										6			6
	Wallace River	S	Marked							6						6
		W	Marked								57	208	28	19		312
	Snohomish R. System Totals	S	Marked		3	229	496	116	77	128						1,049
		W	Marked								126	683	160	41		1,010
Stillaguamish R. System *	Stillaguamish R, No. Fork	W	Marked								21					21
	Stillaguamish R, So. Fork	W	Marked								5					5
	Stillaguamish River	W	Marked									5				5
	Stillaguamish R. System Totals	W	Marked								26	5				31
Whatcom Cr. System *	Whatcom Creek	W	Marked									5				5
PUGET SOUND REGION TOTALS	PUGET SOUND REGION TOTALS	S	Marked		3	261	548	170	82	133						1,197
		W	Marked	5							157	853	203	46		1,264