ANNUAL PROGRESS REPORT FOR 2016
FALL CHINOOK SALMON CONSERVATION PLAN
ROGUE SPECIES MANAGEMENT UNIT
OREGON DEPARTMENT OF FISH AND WILDLIFE
ROGUE WATERSHED DISTRICT

INTRODUCTION

In January of 2013, the Oregon Fish and Wildlife Commission formally adopted a conservation plan for fall Chinook salmon in the Rogue Species Management Unit (SMU). This plan calls for the Oregon Department of Fish and Wildlife (ODFW) to complete annual reports that will include, at least, the following elements: (1) SMU status in relation to the desired status and conservation status statements embedded in the conservation plan, (2) summaries of annual efforts to monitor SMU attributes, (3) implications of any research or evaluation projects completed during the reporting year, (4) any updated assessments of population attributes completed during the reporting year, and (5) presentation of the rationale associated with any changes in management actions made during the reporting year.

This report summarizes the status of the SMU in relation to desired status and conservation status through the 2016 return year, completed management actions, and 2017 preseason forecasts in relation to conservation status and maximum sustained yield (Chetco, Winchuck).

A copy of the conservation plan, and annual progress reports, is available on the ODFW website at:
http://www.dfw.state.or.us/fish/CRP/rogue_fall_chinook_conservation_plan.asp

SUMMARY OF SMU STATUS

Two population strata compose the SMU: (1) the Rogue stratum and (2) the coastal stratum. The two strata are differentiated by life history and genetic differences within the constituent independent populations of naturally produced fall Chinook salmon (NP CHF). Where possible, status criteria were developed for each independent population monitored by ODFW. Populations in the Rogue stratum are monitored as an aggregate by sampling at Huntley Park near the mouth of the Rogue River, except that NP CHF in the Lower Rogue population area are also monitored annually by ODFW.

Monitoring of SMU attributes is designed to produce metrics that are to be used to characterize the current status of the SMU. All monitoring needed to update SMU status was completed by ODFW in 2016, and the results are included in tables 1 and 2. Monitoring results that most differed in 2016, as compared to previous years, include significantly reduced escapement in the Rogue Aggregate and Hunter populations.

Table 1. Comparisons of singular elements of current and desired status for naturally produced fall Chinook salmon in the Rogue Species Management Unit. Desired status criteria are described in the conservation plan, and both metrics cover the most recent ten year period. Underlined metrics of current status did not meet desired status criteria.

Status Element	Desired Status	Current Status	2016 Estimate
ROGUE AGGREGATE POPULATIONS			
Adult Abundance[a]	≥54,400	50,717	27,278
Age Structure[b]	≥10%	8%	6%
Run Timing[c]	≥8%	9%	12%
Run Composition[d]	≤5%	5%	7%
LOWER ROGUE POPULATION			
Adult Abundance[e]	≥3,500	6,268	4,374
Spawner Composition[f]	≤10%	4%	3%
CHETCO POPULATION			
Adult Abundance[e]	≥3,800	4,341	4,588
Age Structure[h]	≥16%	19%	17%
Spawner Composition[f]	≤18%	11%	4%
WINCHUCK POPULATION			
Adult Abundance[e]	≥1,000	1,138	1,485
Juvenile Abundance[g]	≥125,000	236,404	236,404
Spawner Composition[f]	≤10%	4%	6%
PISTOL POPULATION			
Adult Abundance[e]	≥1,300	1,415	1,045
Spawner Composition[f]	≤5%	3%	10%
HUNTER POPULATION			
Adult Abundance[e]	≥560	821	303
Spawner Composition[f]	≤5%	3%	10%

[a] Number of age 3-6 NP CHF that pass Huntley Park.
[b] Relative abundance of age 5+6 fish among NP CHF that pass Huntley Park.
[c] Relative abundance of October migrants among NP CHF that pass Huntley Park.
[d] Relative abundance of hatchery fish among CHF that pass Huntley Park.
[e] Number of NP CHF spawners.
[f] Relative abundance of hatchery fish among CHF spawners.
[g] Number of juvenile NP CHF produced in areas upstream of the South Fork.
[h] Relative abundance of age 5+6 fish among NP CHF spawners.

Table 2. Status of the Rogue Fall Chinook Salmon Species Management Unit as compared to conservation criteria. Conservation status criteria are described in the conservation plan and cover, unless otherwise noted, the most recent three year period. Underlined metrics of current status did not meet conservation status criteria.

Status Element	Conservation Criterion	Comparative Status	2016 Estimate
ROGUE AGGREGATE POPULATIONS			
Adult Abundance[a]	<20,400[i]	28,870	27,278
Age Structure[b]	<3%	8%	6%
Run Composition[c]	<5%	9%	12%
Run Composition[d]	>10%	6%	7%
LOWER ROGUE POPULATION			
Adult Abundance[e]	<1,500	5,246	4,373
Spawner Composition[f]	>15%	4%	3%
CHETCO POPULATION			
Adult Abundance[e]	<1,440[i]	5,190	4,588
Age Structure[h]	<5%	20%	17%
Spawner Composition[f]	>20%	7%	4%
WINCHUCK POPULATION			
Adult Abundance[e]	<300[i]	1,477	1,485
Juvenile Abundance[g]	<50,000[j]	236,404	236,404
Spawner Composition[f]	>15%	3%	6%
PISTOL POPULATION			
Adult Abundance[e]	<540	1,759	1,045
Spawner Composition[f]	>10%	3%	10%
HUNTER POPULATION			
Adult Abundance[e]	<300	1,253	303
Spawner Composition[f]	>10%	3%	10%

[a] Number of age 3-6 NP CHF that pass Huntley Park.
[b] Relative abundance of age 5+6 fish among NP CHF that pass Huntley Park.
[c] Relative abundance of October migrants among NP CHF that pass Huntley Park.
[d] Relative abundance of hatchery fish among CHF that pass Huntley Park.
[e] Number of NP CHF spawners.
[f] Relative abundance of hatchery fish among CHF spawners.
[g] Number of juvenile NP CHF produced upstream of the South Fork.
[h] Relative abundance of age 5+6 fish among NP CHF spawners.
[i] Criteria are based on a running two year average.
[j] Criterion covers every year.

COMPLETED MANAGEMENT ACTIONS - ROGUE STRATUM

The Oregon Fish and Wildlife Commission adopted Rogue Alternative 4, outlined in the conservation plan, as the preferred suite of management strategies to be employed by ODFW. Some of the relevant actions, completed by ODFW during 2016, are briefly discussed below. A tabulated progress summary related to management actions described in the conservation plan is included in Table 7.

Management Strategy 4.1

Many of the actions within Management Strategy 4.1 relate to seasonal operations of Lost Creek and Applegate reservoirs by the United States Army Corps of Engineers (USACE). ODFW worked cooperatively with the USACE to identify and implement reservoir release strategies designed to enhance naturally-produced fall Chinook (actions 4.1.1, 4.1.2, 4.1.4, 4.1.5, 4.1.6, 4.1.7, 4.1.9). A weekly conference call, implemented in 2013 to facilitate communication, was continued in 2016. ODFW participated in the USACE annual winter management coordination meeting.

Releases from Applegate dam were adaptively modified in season, based on temperature modeling (action 4.1.3), to release to coldest water possible during November – February fall Chinook incubation (action 4.1.2). Maximum release temperature for the 2016 brood was 59^0, as compared to 63^0 for the 2015 brood. The water temperatures were unnaturally warm in drought year 2015 and put developing chinook eggs at risk.

Heavy rain in October 2016 (4^{th} wettest October on record in Medford per NWS) put Applegate fall Chinook at risk as the USACE required water be released from the reservoir to prepare for flood season. Artificial freshets were implemented October 2016 on the Applegate River on ODFW's recommendation, in order to help USACE reach flood control elevation at Applegate Dam in the most fish friendly way possible. The purpose of the freshets was to maximize fall Chinook spawning distribution (action 4.1.4) while also minimizing dewatering of fall Chinook redds during the reservoir fill season (action 4.1.5).

Average flow at the USGS Agness gage was 2,444 cfs August 10 – September 10 (action 4.1.7). Flow generally exceeded ODFW recommendations during the fall Chinook migration due to the need for USACE to evacuate higher than forecasted volume out of Lost Creek Lake. Disease-related mortality of adult fall Chinook in 2016 was estimated at 1%. Mortality estimates are derived from flow-based models. Additional management actions would be triggered if disease-related losses were forecast to reach 40% (action 4.1.8).

The minimum flow needed to protect juvenile fish rearing in the mainstem in summer is 1,000 cfs as measured at the USGS Grants Pass gage. The flow in 2016 exceeded this level, averaging 1,621 cfs at Grants Pass July 1 – August 10 (action 4.1.9). The lowest average daily flow during the period was 1,490 on July 21.

ODFW participated in a variety of habitat protection activities (action 4.1.14), including review of water right applications, removal/fill applications, R/F emergency authorizations, General Authorizations for recreational placer mining, Conditional Use permits, and compliance monitoring of municipal and county riparian ordinances.

Fielder and Wimer dams on mainstem Evans Creek were removed in 2015 (action 4.1.16). ODFW conducted spawning surveys in 2016 to monitor fall Chinook distribution in Evans Creek to help evaluate fish response to dam removal (Table 3).

Table 3. Peak adult fall Chinook counts on Evans Creek survey reached, 2016.

Survey	Peak Count (Live + Dead)	Date	Survey Length (miles)	Chinook/mile
W Evans, RM 8-9 Spot Ch	8	10/20/16	1.0	8
West Evans, RM 8-9	0		0.9	0
Evans, RM 15.5-16.5	1	11/4/16	1.0	1
Evans, RM 22-22.5	0		0.5	0
West Evans, RM 0.6-1.2	0		0.5	0
West Evans, RM 9-10	6	11/4/16	0.9	7

Management Strategy 4.2

ODFW's Aquatic Invasive Species program deployed two watercraft inspection crews in the Rogue Watershed District in 2016 (action 4.2.1). Crews based in Central Point and Gold Beach conducted boat inspections, primarily on the I-5, Hwy 97, and Hwy 101 corridors, from late spring through early fall.

Management Strategy 4.3

The minimum flow needed to protect juvenile fish rearing in the mainstem in summer is 1,000 cfs as measured at the Grants Pass gage. The flow in 2016 exceeded this level, averaging 1,621 cfs at Grants Pass July 1 – August 10. Lower water temperatures in downstream areas, as a result of the increased flow, result in fewer predation losses because of decreases in pikeminnow metabolic rates (action 4.3.2), using storage that is not needed to protect adult spring Chinook and adult fall Chinook.

Management Strategy 4.4

Zone regulations were employed in 2016 because fall Chinook escapement was forecasted to exceed escapement goals related to conservation criteria (action 4.4.1).

Management Strategy 4.5

ODFW did not complete any work specific to Management Strategy 4.5 in 2016.

COMPLETED MANAGEMENT ACTIONS - COASTAL STRATUM

The Oregon Fish and Wildlife Commission adopted Coastal Alternative 6, outlined in the conservation plan, as the preferred suite of management strategies to be employed by ODFW. Some of the relevant actions, completed by ODFW during 2016, are briefly discussed below. A tabulated progress summary related to management actions described in the conservation plan is included in Table 8.

Management Strategy 6.1

ODFW participated in a variety of habitat protection activities (actions 6.1.2, 6.1.8), including review of water right applications, removal/fill applications, R/F emergency authorizations, General Authorizations for recreational placer mining, Conditional Use permits, and compliance monitoring of municipal and county riparian ordinances.

Management Strategy 6.2

ODFW's Aquatic Invasive Species program deployed two watercraft inspection crews in the Rogue Watershed District in 2016 (action 6.2.1). Crews based in Central Point and Gold Beach conducted boat inspections, primarily on the I-5, Hwy 97, and Hwy 101 corridors, from late spring through early fall.

Management Strategy 6.3

Zone regulations were employed in 2016 because fall Chinook escapement was forecasted to exceed escapement goals related to conservation criteria (action 6.3.1). Zone regulations include gear restrictions (bobber rule) on the Chetco and Winchuck rivers between September 1 and November 3. Permanent adoption of the bobber rule on the Chetco and Winchuck rivers in 2016 was aimed at reducing snagging activity during low flow conditions, while still providing early season harvest opportunity (action 6.3.8).

Regulations for the Chetco ocean terminal area fishery in 2016 were restricted as compared to recent years. Based on both the Chetco and Winchuck preseason forecasts falling to near S_{MSY} the harvest guideline was reduced to 600 Chinook (action 6.3.5). The recreational fishery was reduced to 5 days to balance harvest between the recreational and commercial fisheries (action 6.3.8). The recreational season was open October 1-3 and 8-9, harvest was estimated at 287 Chinook. The commercial season was scheduled for the earlier of October 10-31 or a quota of 300 Chinook. The commercial fishery was open 10/10-31. Harvest was 152 Chinook.

Management Strategy 6.4

A release group of 27,173 smolts was acclimated at Ferry Creek reservoir (Chetco) in October 2016 and subsequently released into the Chetco River at Snug Harbor (action 6.4.3). The purpose of the acclimation project is to determine whether 1) returning adult Chinook acclimated at Ferry Creek contribute to the river fishery at a higher rate than non-acclimated Chinook; 2) acclimated Chinook are recovered from natural spawning areas at a lower rate than non-acclimated Chinook.

177,236 Chetco fall Chinook smolts were released October 17-18, 2016 at Social Security (RM 4) on the Chetco River (action 6.4.4).

Management Strategy 6.5

A snorkel survey was conducted on 6/28/16 to assess passage at a partial barrier located on the South Fork Chetco River, approximately 500 meters upstream from the confluence with Quail Prairie Creek (action 6.5.1). The observed density of juvenile Chinook was similar upstream and

downstream of the barrier suggesting that the cascade did not significantly restrict the passage of adult Chinook in 2015.

OTHER

Double-crested cormorants diet study

ODFW is in the process of completing analysis for a diet study of double-crested cormorants (cormorants) in the lower Rogue River Basin. During 2013–2015, a total of 136 cormorants were lethally collected via shotgun from various portions of the lower basin during August 15–Oct 1 (Evaluation Need #4 – Rogue Stratum). Usable stomach samples were obtained from 101 collected cormorants and analyzed later at a lab at Oregon State University.

Preliminary analysis revealed that the cormorant diet varied considerably depending on the collection location (upper vs lower estuary) and the time period in which the samples were collected (early vs late sampling date). Because of this variation, diet data from all three years of the study was pooled in order to have a sufficiently large sample size for each of our primary sampling units. A simulation model was developed that employs Monte Carlo methods and bootstrap resampling to obtain estimates for consumption of salmonids using available energy values for prey species, and double-crested cormorant metabolic data and population estimates.

When combined with assumptions regarding seasonal presence of migrating smolts, preliminary results indicate Chinook salmon comprised a significant proportion of the cormorant diet during August 15 – Oct 1, 2013–2015, ranging from 0% of the diet in upper river areas, to 31% in estuary areas. Preliminary point estimates for number of Chinook smolts consumed ranged annually from ca. 150,000 to nearly 300,000 smolts during an approximately two-month time period (Table 4).

Table 4. Preliminary consumption estimates of Chinook salmon smolts by double-crested cormorants in the lower Rogue River Basin, Aug 1 – Oct 1, 2013–2015*.

Year	Site	Taxon	Estimate	95% CI
2013	Rogue	Chinook	150,000	80,000 – 250,000
2014	Rogue	Chinook	140,000	70,000 – 240,000
2015	Rogue	Chinook	290,000	130,000 – 540,000

*Average Chinook smolt production (wild + hatchery) in the Rogue is estimated at ~10,000,000 annually.

Survey data for double-crested cormorants revealed a significantly greater number of cormorants using the Rogue River estuary in 2015 compared to 2013 and 2014 (Table 5). This difference is the primary reason for the large increase in number of Chinook smolts consumed in 2015 compared to previous years.

Final analysis for the diet study is ongoing, and a final report is expected by the end of 2017.

Table 5. Number of double-crested cormorants detected during surveys in the lower Rogue River Basin during 2013–2015.

Year	Month	Mean number cormorants	STD
2013	Aug	112	39
2013	Sep	106	21
2014	Aug	86	45
2014	Sep	101	18
2015	Aug	217	53
2015	Sep	188	92
2015	Oct	145	64

Rogue Spawning Surveys

Spawning ground surveys were conducted in select reaches within the upper Rogue, middle Rogue, Applegate, and Illinois population areas in 2016 (Table 6).

Table 6. Peak adult fall Chinook counts on survey reaches within the Rogue Aggregate population areas.

Survey	Peak Count (Live + Dead)	Date	Survey Length (miles)	Chinook/mile
Bear Creek[1]	22	10/13/16	1.0	22
NF Little Butte[1]	0		1.5	0
SF Little Butte[1]	5	10/24/16	1.0	5
Grave Creek[2]	3	11/09/16	1.5	2
Reuben Creek[2]	0		0.5	0
Grave Creek[2]	1	11/09/16	0.25	4
Applegate RM 7.4-0	201	11/07/16	7.4	27
Applegate RM 14.5-7.4	211	11/03/16	7.1	30
Applegate RM 25.5-14.5	656	10/21/16	11.0	60
Waters Cr RM 1.5-1.9[4]	1	10/20/16	0.4	2
Cheney Cr RM 2.75-3.25[4]	5	10/27/16	0.5	10
W Fk Illinois	9	11/08/16	0.1	90
E Fk Illinois	55	11/15/16	0.8	69
Sucker Creek[3]	5	11/08/16	0.5	10
Elk Creek[3]	15	11/08/16	1.0	15
Rough & Ready Creek[3]	0		1.0	0
Deer Creek[3]	6	11/14/16	2.7	2

[1] Upper Rogue Population Area
[2] Middle Rogue Population Area
[3] Illinois Population Area
[4] Applegate Population Area

Table 7. Summary of progress related to management actions described in the fall Chinook salmon Conservation Plan, as related to the **Rogue Stratum** of the SMU. The "X" symbol means that ODFW completed work on an action that requires annual attention. The "Y" symbol means that ODFW completed the action and that no further work is needed. The "Z" symbol means that ODFW completed work on an allied topic that complemented the action item included in the conservation plan. The "--" symbol means that no ODFW work was completed on the action item during the year.

Action	Year of completion for action item								
Item	2013	2014	2015	2016	2017	2018	2019	2020	2021
			MANAGEMENT STRATEGY 4.1						
4.1.1	X	X	X	X					
4.1.2	X	X	X	X					
4.1.3	Y								
4.1.4	X	X	X	X					
4.1.5	X	X	X	X					
4.1.6	X	X	X	X					
4.1.7	X	X	X	X					
4.1.8	n/a	n/a	n/a	n/a					
4.1.9	X	X	X	X					
4.1.10	--	--	--	--					
4.1.11	--	--	--	--					
4.1.12	--	--	--	--					
4.1.13	--	--	--	--					
4.1.14	X	X	X	X					
4.1.15	X	n/a	n/a	n/a					
4.1.16	X	X	X	X					
4.1.17	X	X	X	X					
			MANAGEMENT STRATEGY 4.2						
4.2.1	X	X	X	X					
			MANAGEMENT STRATEGY 4.3						
4.3.1	--	--	--	--					
4.3.2	X	X	X	X					
			MANAGEMENT STRATEGY 4.4						
4.4.1	X	X	X	X					
4.4.2	n/a	n/a	n/a	n/a					
4.4.3	n/a	n/a	n/a	n/a					
4.4.4	n/a	n/a	n/a	n/a					
			MANAGEMENT STRATEGY 4.5						
4.5.1	X	X	X	X					
4.5.2	n/a	n/a	n/a	n/a					
4.5.3	Y								
4.5.4	X	X	X	X					

Table 8. Summary of progress related to management actions described in the fall Chinook salmon Conservation Plan, as related to the **Coastal Stratum** of the SMU. The "X" symbol means that ODFW completed work on an action that requires annual attention. The "Y" symbol means that ODFW completed the action and that no further work is needed. The "Z" symbol means that ODFW completed work on an allied topic that complemented the action item included in the conservation plan. The "--" symbol means that no ODFW work was completed on the action item during the year.

Action	Year of completion for action item								
Item	2013	2014	2015	2016	2017	2018	2019	2020	2021
				MANAGEMENT STRATEGY 6.1					
6.1.1	--	--	--	--					
6.1.2	X	X	X	X					
6.1.3	--	--	--	--					
6.1.4	--	--	--	--					
6.1.5	--	--	--	--					
6.1.6	--	--	--	--					
6.1.7	--	--	--	--					
6.1.8	X	X	X	X					
6.1.9	--	--	--	--					
6.1.10	X	X	X	X					
6.1.11	--	--	--	--					
6.1.12	--	--	--	--					
6.1.13	--	--	--	--					
6.1.14	--	--	--	--					
6.1.15	--	--	--	--					
6.1.16	n/a	n/a	n/a	n/a					
6.1.17	--	--	--	--					
				MANAGEMENT STRATEGY 6.2					
6.2.1	X	X	X	X					
				MANAGEMENT STRATEGY 6.3					
6.3.1	X	X	X	X					
6.3.2	n/a	X	n/a	n/a					
6.3.3	n/a	n/a	n/a	n/a					
6.3.4	n/a	n/a	n/a	n/a					
6.3.5	X	X	X	X					
6.3.6	n/a	X	n/a	n/a					
6.3.7	n/a	X	n/a	n/a					
6.3.8	--	Y							
				MANAGEMENT STRATEGY 6.4					
6.4.1	X	X	X	X					
6.4.2	n/a	n/a	n/a	n/a					
6.4.3	X	X	X	X					
6.4.4	X	X	X	X					
6.4.5	Y								
6.4.6	X	X	X	X					
				MANAGEMENT STRATEGY 6.5					
6.5.1	--	--	X	X					

PRE-SEASON FORECASTS

ODFW fishery managers will utilize pre-season forecasts to determine if (1) NP CHF populations might reach conservation criteria and (2) to determine the number of NP CHF that can be harvested in the late-season terminal fishery that operates off the mouths of the Chetco and Winchuck rivers. The efficacy of any annual forecast will, by default, be questionable because of substantial uncertainty in (1) the stock size estimates before the onset of any fishing in spring, (2) the forecasted harvest rates of CHF in the ocean fisheries that operate in federally managed waters, and (3) the forecasted harvest rates in the recreational freshwater fisheries. However, management criteria for each population are based on spawner escapements over multiple (2 or 3) years, which helps buffer the uncertainty associated with the pre-season forecasts.

Preseason Forecasts in Relation to Conservation Criteria

Harvest opportunities in the recreational freshwater fisheries will be constrained to some degree if the pre-season forecasts indicate that NP CHF populations will drop into conservation status. As described in the conservation plan, this situation can be expected in 6-23% of the years, depending on the population in question. Based on the pre-season forecasts for 2017, no additional constraints appear warranted for any of the freshwater recreational fisheries (Table 9).

Table 9. Forecasted 2017 spawning escapement of age 3-6 NP CHF in relation to conservation status criteria that cover multiple years. For each population, the forecasted number of spawners includes the 2017 forecast and estimated spawner numbers in the previous year or previous two years.

Population(s)	Conservation criterion	Forecasted number of spawners	Conservation shortfall
Rogue Aggregate	20,400[ab]	39,452[ab]	0
Lower Rogue	1,500[c]	5,673[c]	0
Chetco	1,440[b]	3,145[b]	0
Winchuck	300[b]	993[b]	0
Pistol	540[c]	932[c]	0
Hunter	300[c]	939[c]	0

[a] Criterion covers passage at Huntley Park instead of spawning escapement.
[b] Covers 2016 (estimated spawners) and 2017 (forecasted spawners).
[c] Covers 2015 and 2016 (estimated spawners) and 2017 (forecasted spawners).

Preseason Forecasts in Relation to Management of the Chetco Terminal Fishery

The conservation plan outlines that harvest opportunities in the late-season, near-shore, Chetco terminal fishery will be based on the number of estimated spawners needed for maximum sustained yield (Smsy) in population areas proximal to the Chetco River (Action 6.3.5 in Management Strategy 6.3 for the Coastal Stratum). ODFW completed an assessment of the efficacy of pre-season forecasting needs associated with this fishery and because the Smsy estimates pertain to *average* conditions, ODFW concluded that harvest opportunities in the Chetco terminal fishery should be based on a three year arithmetic mean. ODFW also concluded that management of the Chetco terminal fishery should only be based on the Chetco and Winchuck populations, because the other populations in the SMU contribute to the fishery at very low rates; as described in the conservation plan.

Harvest opportunities in the late-season, near-shore Chetco terminal fishery will be constrained to some degree if the pre-season forecasts indicate that NP CHF populations will drop below individual Smsy needs estimated for the Chetco and Winchuck populations of NP CHF. ODFW estimates that this situation can be expected in 40% of the years. Estimated spawner numbers in 2015 and 2016 were well above Smsy. However, the pre-season forecast for spawner numbers in 2017 is below Smsy (1,701 for Chetco and 501 for Winchuck). So while there is an opportunity to harvest NP CHF based on the 3 year average (Table 10), a conservative harvest guideline is warranted for the 2017 terminal fishery.

Table 10. Forecasted 2017 spawning escapement of age 3-6 NP CHF in relation to Smsy estimates for the Chetco and Winchuck populations. For each population, the forecasted number of spawners includes the 2017 forecast and estimated spawner numbers in 2015 and 2016.

Population	S_{msy}	Forecasted number of spawners	Difference
Chetco	2,740	4,027[a]	1,287
Winchuck	560	1,152[a]	592

[a] Covers 2015 and 2016 (estimated spawners) and 2017 (forecasted spawners).