Fishery Manuscript No. 13-09

Escapement Goal for Klawock River System Coho Salmon

by

John Der Hovanisian

November 2013

Alaska Department of Fish and Game **Divisions of Sport Fish and Commercial Fisheries**

Symbols and Abbreviations

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Weights and measures (metric)

centimeter	cm
deciliter	dL
gram	g
hectare	ha
kilogram	kg
kilometer	km
liter	L
meter	m
milliliter	mL
millimeter	mm

Weights and measures (English)

cubic feet per second	ft^3/s
foot	ft
gallon	gal
inch	in
mile	mi
nautical mile	nmi
ounce	oz
pound	lb
quart	qt
yard	yd

Time and temperature

day	d
degrees Celsius	°C
degrees Fahrenheit	°F
degrees kelvin	K
hour	h
minute	min
second	s

Physics and chemistry

all atomic symbols	
alternating current	AC
ampere	A
calorie	cal
direct current	DC
hertz	Hz
horsepower	hp
hydrogen ion activity (negative log of)	pH
parts per million	ppm
parts per thousand	ppt, ‰
volts	V
watts	W

General

Alaska Administrative Code	AAC
all commonly accepted abbreviations	e.g., Mr., Mrs., AM, PM, etc.
all commonly accepted professional titles	e.g., Dr., Ph.D., R.N., etc.
at	@
compass directions:	
east	E
north	N
south	S
west	W
copyright	©
corporate suffixes:	
Company	Co.
Corporation	Corp.
Incorporated	Inc.
Limited	Ltd.
District of Columbia	D.C.
et alii (and others)	et al.
et cetera (and so forth)	etc.
exempli gratia (for example)	e.g.
Federal Information Code	FIC
id est (that is)	i.e.
latitude or longitude	lat or long
monetary symbols (U.S.)	$, ¢
months (tables and figures): first three letters	Jan,...,Dec
registered trademark	®
trademark	™
United States (adjective)	U.S.
United States of America (noun)	USA
U.S.C.	United States Code
U.S. state	use two-letter abbreviations (e.g., AK, WA)

Mathematics, statistics

all standard mathematical signs, symbols and abbreviations	
alternate hypothesis	H_A
base of natural logarithm	*e*
catch per unit effort	CPUE
coefficient of variation	CV
common test statistics	(F, t, χ^2, etc.)
confidence interval	CI
correlation coefficient (multiple)	R
correlation coefficient (simple)	r
covariance	cov
degree (angular)	°
degrees of freedom	df
expected value	*E*
greater than	>
greater than or equal to	≥
harvest per unit effort	HPUE
less than	<
less than or equal to	≤
logarithm (natural)	ln
logarithm (base 10)	log
logarithm (specify base)	$\log_2$, etc.
minute (angular)	'
not significant	NS
null hypothesis	H_O
percent	%
probability	P
probability of a type I error (rejection of the null hypothesis when true)	α
probability of a type II error (acceptance of the null hypothesis when false)	β
second (angular)	"
standard deviation	SD
standard error	SE
variance	
population	Var
sample	var

FISHERY MANUSCRIPT NO. 13-09

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By

John Der Hovanisian
Alaska Department of Fish and Game, Division of Sport Fish, Douglas

Alaska Department of Fish and Game
Division of Sport Fish, Research and Technical Services
333 Raspberry Road, Anchorage, Alaska, 99518-1565

November 2013

This investigation was partially financed by the Federal Aid in Sport Fish Restoration Act (16 U.S.C. 777-777K) and the Pacific Coast Salmon Recovery Fund.

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John Der Hovanisian
Alaska Department of Fish and Game, Division of Sport Fish
P.O. Box 110024, Juneau, AK 99811-0024

This document should be cited as:
Der Hovanisian, J. 2013. Escapement goal for Klawock River coho salmon. Alaska Department of Fish and Game, Fishery Manuscript Series No. 13-09, Anchorage.

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ABSTRACT

Smolt-per-spawner and theoretical spawner-recruit analyses were used to develop an escapement goal for Klawock River system coho salmon *Onchorynchus kisutch*. Coho salmon run abundance and escapement data (1999–2005) were obtained from the 2006 Annual Management Plan for Prince of Wales Hatchery Association. Age, exploitation, and survival data were unavailable, so surrogate information (2002–2005) from the nearby Chuck Creek coho salmon stock was used. A range of productivity parameter α values from coho salmon systems that have survival and smolt production estimates similar to Klawock River and Chuck Creek was selected for the theoretical analysis. A sustainable escapement goal of 4,000–9,000 adult fish based on weir counts was recommended. This goal was formally adopted by the Alaska Department of Fish and Game in February 2013.

Keywords: coho salmon, *Onchorynchus kisutch*, escapement goal, Klawock River, Chuck Creek, Southeast Alaska

INTRODUCTION

The Prince of Wales Hatchery Association operates a hatchery (Klawock River Hatchery) and weir approximately 300 m below Klawock Lake on the Klawock River (Figure 1). Coho salmon *Onchorynchus kisutch* represent the majority of production, with over 15.0 million juvenile fish produced between 1980 and 2000 (Lewis and Zadina 2001). A portion of the annual coho salmon run is used for broodstock and cost recovery. The remainder of the run is allowed to pass through the weir to spawn naturally. Progeny from these fish are regarded as "wild."

Prior to 2007, an informal maximum escapement goal of 6,000 coho salmon, as suggested by Division of Commercial Fisheries personnel to protect sockeye salmon *O. nerka*, was in place for the Klawock River system. That goal was preceded by a minimum or average goal of 6,000 fish that was arrived at by consensus between Division of Sport Fish and Commercial Fisheries area management biologists. These goals were based on qualitative assessments, which prompted the need for a defensible, scientifically-derived goal.

In fall 2006, Division of Sport Fish staff reviewed the available data and performed analyses to provide their best estimate of an escapement goal range. Because exploitation rate, marine survival rate, and smolt age composition information was not available for the Klawock River system, estimates from nearby Chuck Creek were used as surrogates.

STUDY AREA

The Klawock River system is located on the west side of Prince of Wales Island (Figure 1) and drains into Klawock Inlet at the village of Klawock. The watershed is approximately 118 km^2 and contains Klawock Lake (Figure 2). The lake outlet, Klawock River, flows 2.85 km to the estuary at the head of Klawock Inlet. Klawock Lake has 2 main basins, 4 major tributaries (Inlet Creek, Hatchery Creek, Halfmile Creek, and Threemile Creek), a surface area of 11.9 km^2, a mean depth of 17.7 m, and a maximum depth of 49.0 m. In addition to coho salmon, native fish species include sockeye, pink *O. gorbuscha*, and chum *O. keta* salmon, steelhead *O. mykiss* and cutthroat *O. clarkii* trout, Dolly Varden char *Salvelinus malma*, threespine stickleback *Gasterosteus aculeatis*, and cottids *Cottus* spp. (Cartwright and Conitz 2006).

The Chuck Creek watershed is located on Heceta Island on the west side of Prince of Wales Island (Figure 3). It drains an area of approximately 7.5 km^2 and contains Chuck Lake, which has a surface area of 0.63 km^2. Chuck Lake drains to the south into Warm Chuck Inlet by way of the 1.5 km long outlet stream, Chuck Creek. Four separate tributary streams to the lake contain

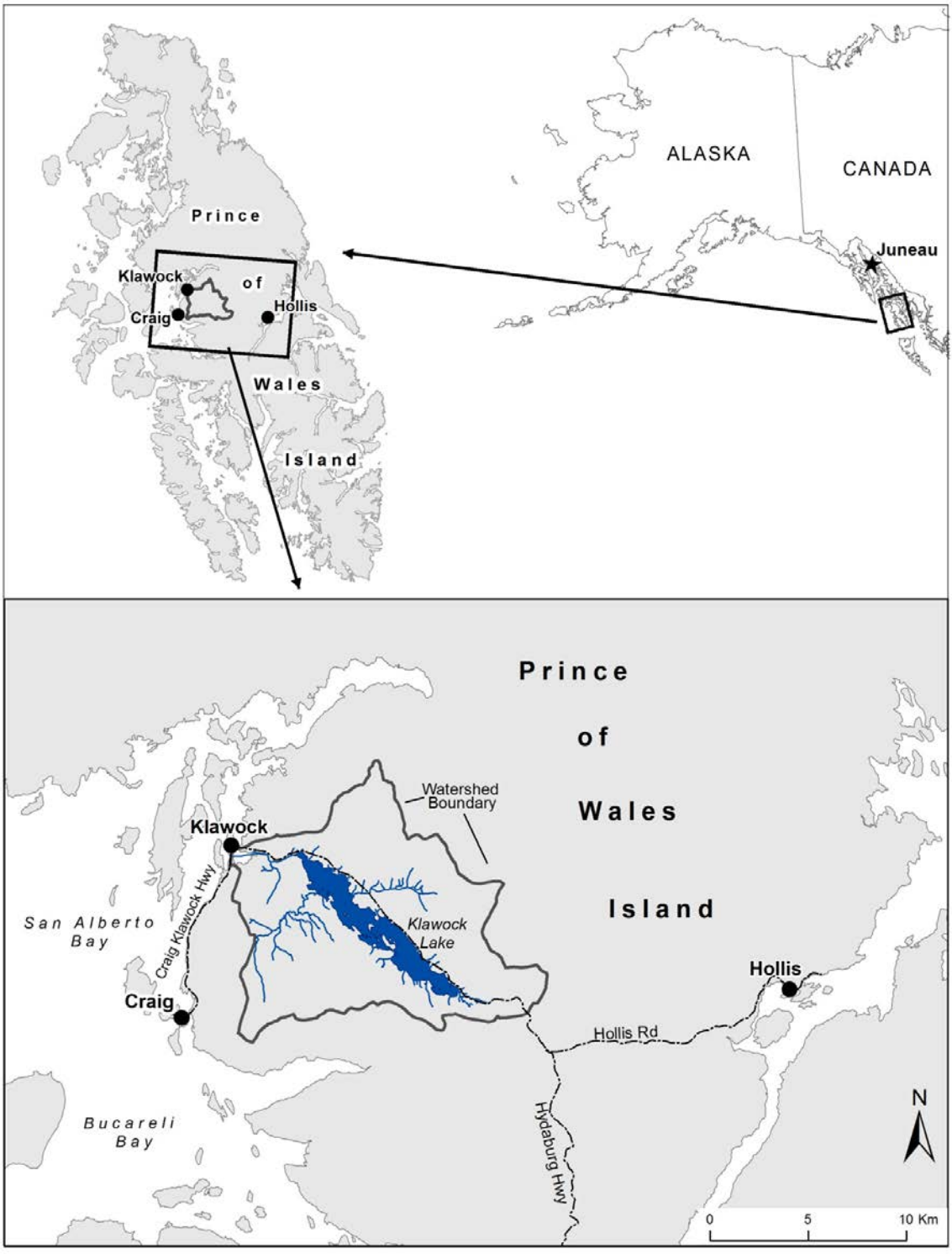

Figure 1.–Location of the Klawock River system on Prince of Wales Island in Southeast Alaska.

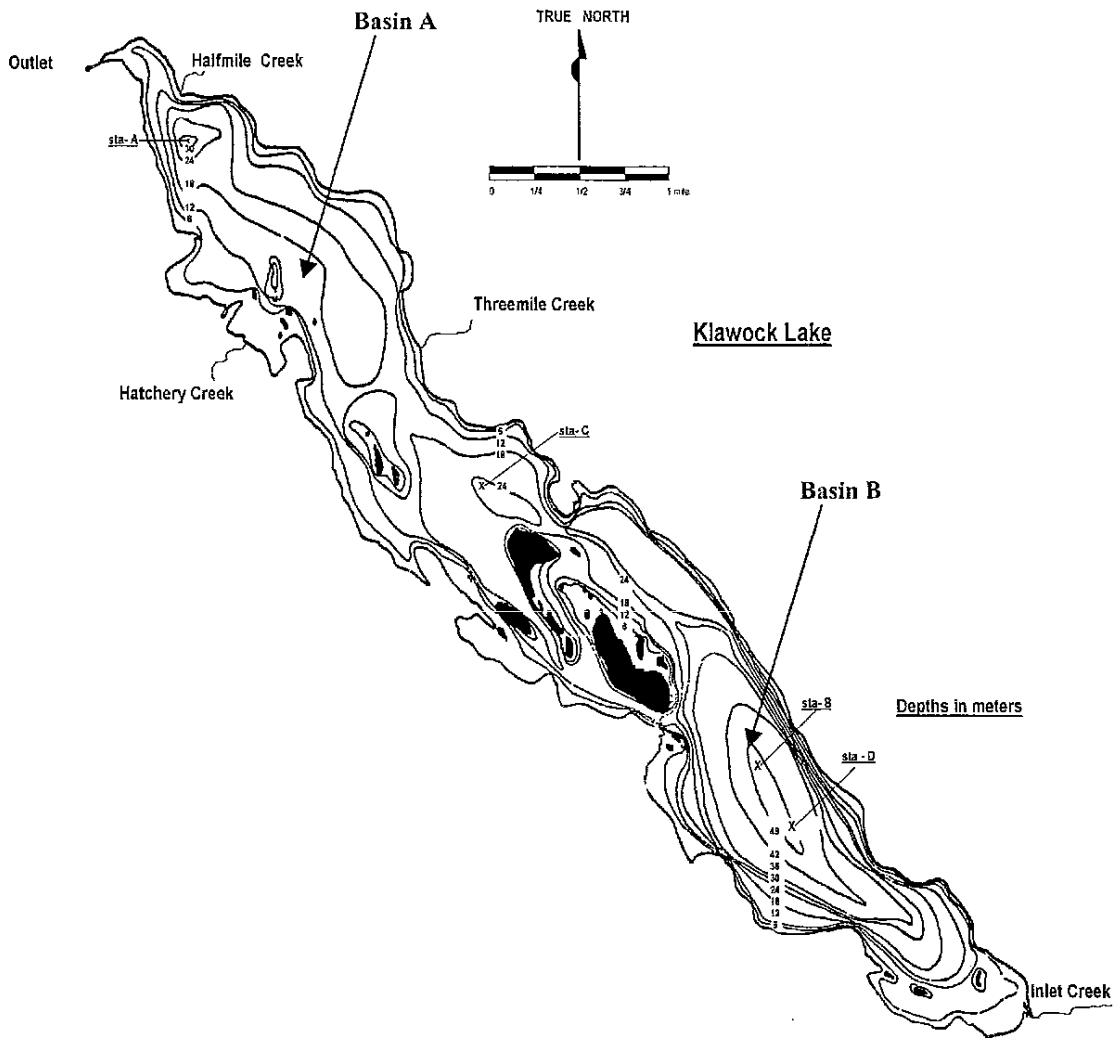

Figure 2.–Bathymetric map of Klawock Lake (from Cartwright and Conitz 2006).

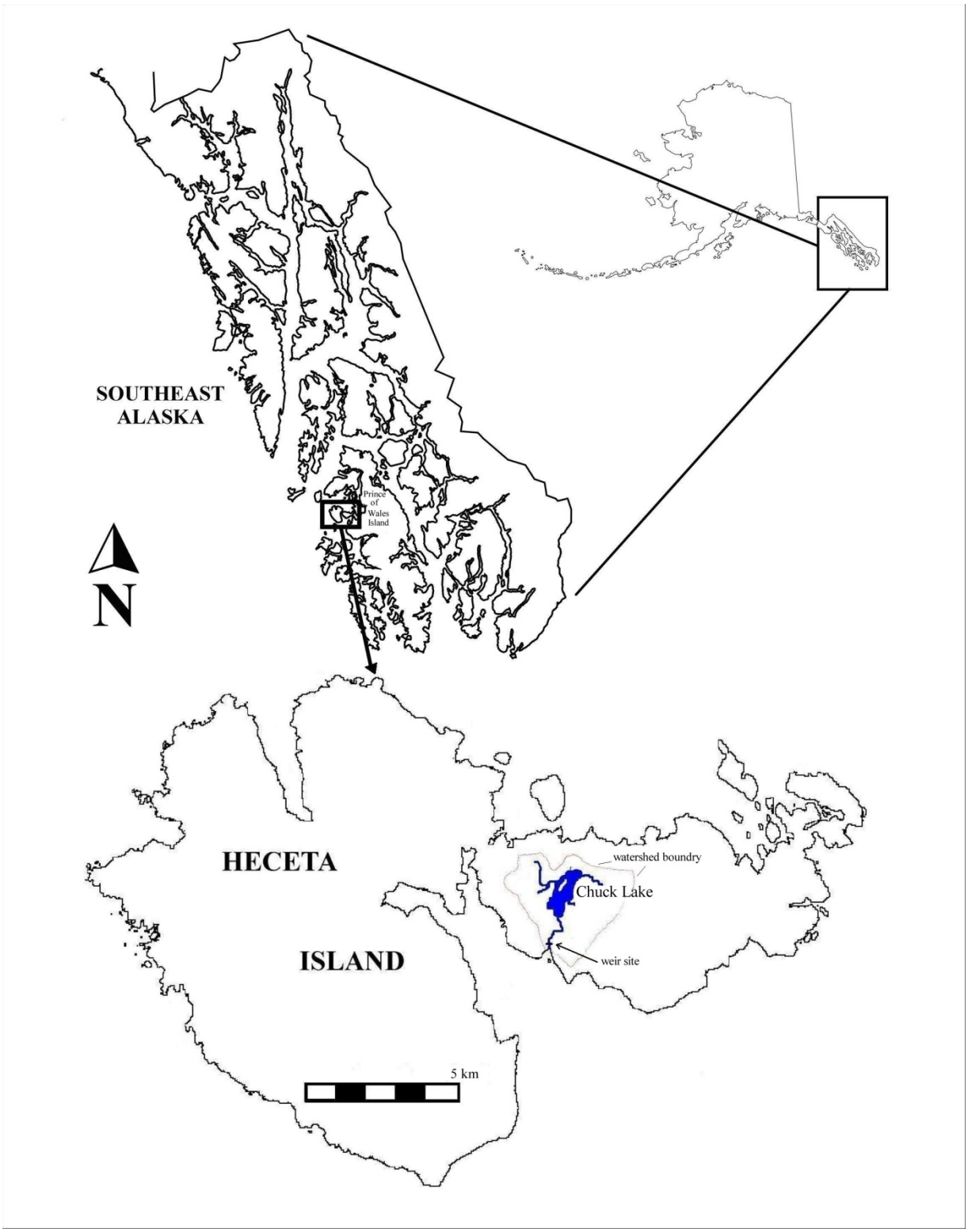

Figure 3.–The Chuck Creek system on Heceta Island in Southeast Alaska (from McCurdy 2005).

spawning and rearing habitat for anadromous fish. The watershed is generally low gradient and the highest point of elevation in the drainage is 169 m above sea level. In addition to coho salmon, Chuck Creek contains sockeye, pink, and chum salmon, Dolly Varden char, steelhead and cutthroat trout, as well as three-spine stickleback and cottids (McCurdy 2005).

DATA SOURCES

Coho salmon run abundance and escapement data (Table 1) were obtained from the 2006 Annual Management Plan for Prince of Wales Hatchery Association.[1] The "wild" adult run (note: the adult runs were comprised of age-1.1. and -2.1 fish from 2 brood years) was estimated by first expanding the observed number of adipose-finclipped fish (i.e., coded wire tagged fish released by the Klawock River Hatchery):

$$a'_t = \frac{a_t}{\theta_{t-1}}, \tag{1}$$

where a'_t is the expanded number of adipose fin clips in year t, a_t is the number of adipose-finclipped fish observed, and θ_{t-1} is the marked fraction of smolts released from the hatchery in year t-1. The number of adult hatchery fish in the run was estimated by:

$$\hat{N}_{H,t} = \frac{\left(a'_t N_{R,t}\right)}{n_t}, \tag{2}$$

where $N_{R,t}$ is the total number of adult fish in the run in year t, and n_t is the number of adults examined for adipose fin clips. The number of wild adult fish in the run was estimated by:

$$\hat{N}_{W,t} = N_{R,t} - \hat{N}_{H,t}. \tag{3}$$

Although there was no stock-specific information available for marine recreational and commercial fisheries, exploitation and marine survival rates from nearby Chuck Creek were available for the 2003–2005 adult runs, as were estimates of smolt age composition for the 2002–2004 emigrations (Tables 2 and 3). Averages were used for missing data.

ANALYSIS

SMOLT-PER-SPAWNER ANALYSIS

This analysis was based on the approach used by Shaul and Tydingco (2006) wherein the average productivity (smolts per spawner at maximum sustained yield [MSY]) of coastwide coho salmon systems was used to set goals for Ketchikan and Sitka indicator stocks. In this analysis, exploitation and marine survival estimates from Chuck Creek were used to back calculate the number of smolt that produced the "wild" adult component of the Klawock River system coho salmon run in year t (Table 2):

$$\hat{N}_{S,t-1} = \frac{\hat{N}_{W,t}}{\left[\left(1-\hat{U}_t\right)\hat{S}_t\right]}, \tag{4}$$

where $\hat{U}_t$ and $\hat{S}_t$ are exploitation and survival rates, respectively. Smolt age composition estimates for Chuck Creek from 2002 to 2004 (Table 3; averages were used for missing data) were used to

[1] POWHA. 2006 Annual management plan for Prince of Wales Hatchery Association. Unpublished document obtained from Sam Rabung, ADF&G Private Nonprofit Hatchery Coordinator, Juneau.

Table 1.–Klawock River system adult coho salmon run abundance and escapement, 1997–2006.

Calendar year, t	Marked fraction of hatchery smolt, θ_{t-1}	Escapement[a], $N_{E,t}$	Total run abundance[a], $N_{R,t}$	Number of adults examined, n_t	Number of adipose clips observed, a_t	Expanded number of adipose clips, a'_t	Total number of hatchery fish in the run, $\widehat{N}_{H,t}$	Total number of "wild" fish in the run, $\widehat{N}_{W,t}$
1997	0.026	15,007	17,355	ND	ND	ND	ND	ND
1998	0.000[b]	9,023	9,477	ND	ND	ND	ND	9,477
1999	0.085	8,506	15,153	5,850	216	2,541	6,582	8,571
2000	0.059	10,478	28,579	18,056	659	11,198	17,724	10,855
2001	0.094	5,058	21,332	13,438	320	3,422	5,432	15,900
2002	0.064	15,694	40,844	25,096	1,038	16,246	26,441	14,403
2003	0.061	5,954	25,002	22,513	325	5,314	5,901	19,101
2004	0.049	4,137	14,359	11,969	217	4,407	5,287	9,072
2005	0.022	9,876[c]	53,435	42,967	253	11,339	14,102	39,333
2006	0.044	5,507[d]	17,492[e]	ND	ND	ND	ND	ND

[a] Date for years 1997-2005 from the 2006 Annual Management Plan for Prince of Wales Hatchery Association, *Unpublished* document obtained from Sam Rabung, ADF&G Private Nonprofit Hatchery Coordinator, Juneau.

[b] Hatchery smolt were not released in 1997.

[c] Escapement is a guesstimate, weir was overtopped.

[d] Data were preliminary at the time of analysis; escapement is a guesstimate, weir was overtopped.

[e] Data were preliminary at the time of analysis.

Table 2.–Estimates of smolt production associated with the "wild" component of the Klawock River system adult coho salmon run based on exploitation and marine survival rates from Chuck Creek, 1999–2005. Also shown are the escapement reference points based on a target range of 46.3 to 92.6 smolts per spawner.

Calendar year, t	"Wild" run component, $\widehat{N}_{W,t}$	Exploitation, $\widehat{U}_t$ [a]	Marine survival, $\hat{S}_t$ [b]	"Wild" smolt, $\widehat{N}_{S,t-1}$	Reference points based on smolts per spawner		
					Lower 92.6 [c]	Average 50.2	Upper 46.3[c]
1999	8,571	0.603	0.089	241,870	2,612	4,818	5,224
2000	10,855	0.603	0.089	306,331	3,308	6,102	6,616
2001	15,900	0.603	0.089	448,698	4,846	8,938	9,691
2002	14,403	0.603	0.089	406,455	4,389	8,097	8,779
2003	19,101	0.582	0.119	383,993	4,147	7,649	8,294
2004	9,072	0.618	0.054	439,791	4,749	8,761	9,499
2005	39,333	0.610	0.095	1,061,619	11,465	21,148	22,929
			Average, all years		5,074	9,359	10,147

[a] Exploitation estimates: 2003 from McCurdy (2005), 2004 from McCurdy (2006a), and 2005 from McCurdy (2006b). Average = 0.603.

[b] Marine survival estimates: 2003 from McCurdy (2005), 2004 from McCurdy (2006a), and 2005 from McCurdy (2006b). Average = 0.089.

[c] The upper bound was set at double the lower bound, which was set at the maximum estimated production value in Table 5.

Table 3.–Klawock River system coho salmon smolt abundance-at-age based on smolt age composition estimates $\hat{p}_a$ from Chuck Creek, 1998–2004.

Calendar year	$\hat{p}_a$ [a]		Smolt abundance		
	Age 1.	Age 2.	Age 1.	Age 2.	Total
1998	0.792	0.208	191,521	50,349	241,870
1999	0.792	0.208	242,564	63,767	306,331
2000	0.792	0.208	355,295	93,403	448,698
2001	0.792	0.208	321,845	84,609	406,455
2002[b]	0.765	0.235	293,755	90,238	383,993
2003[c]	0.744	0.256	326,988	112,804	439,791
2004[d]	0.867	0.133	920,424	141,195	1,061,619

[a] Smolt age composition: 2002 from McCurdy (2005), 2003 from McCurdy (2006a), and 2004 from McCurdy (2006b). Average $\hat{p}_a$, age 1. = 0.792; average $\hat{p}_a$, age 2. = 0.208.

partition the smolt estimates into production by brood year to obtain estimates of smolts per spawner (Table 4); average productivity was estimated at about 50 smolts per spawner.

Escapements needed to produce the estimated number of smolt were calculated by dividing smolt production by average productivity. The upper bound was set at double the lower bound, which was based on the maximum estimated production value in Table 4 (92.6 smolts per

spawner), i.e., the best guesstimate of the carrying capacity for the system. The point goal was about 9,400 adult coho salmon with a range of around 5,100–10,100 fish (Table 2).

THEORETICAL SPAWNER-RECRUIT ANALYSIS

This approach was used to develop escapement goals for coho salmon stocks along the Juneau (Clark 2005) and Kodiak (Clark et al. 2006) road systems. Theoretical Ricker spawner-recruit (S-R) relationships for Klawock River system adult coho salmon were developed by choosing a range of productivity parameter (α) values from coho salmon systems that have survival and smolt production estimates similar to Klawock River and Chuck Creek (Table 5). Assuming that the average exploitation rate observed at Chuck Creek (0.603) could be applied to Klawock River system coho salmon and exploitation was in equilibrium with escapement, escapement that produces MSY was calculated as (Hilborn and Walters 1992; Ricker 1975):

$$S_{MSY} = \overline{N}_E \frac{0.5\ln(\alpha) - 0.07\ln(\alpha)^2}{\ln\left(\alpha\left(1-\overline{U}\right)\right)}, \quad (5)$$

where $\overline{N}_E$ is the average Klawock River system escapement from 1997 to 2005. To compare the estimates of S_{MSY} and the S-R relationships derived at different levels of α, the density-dependent parameter (β) for each relationship was estimated by first solving:

$$\ln(\alpha) = U_{MSY} - \ln\left(1 - U_{MSY}\right)$$

for U_{MSY}, and then β was calculated as (Ricker 1975):

$$\beta = \frac{U_{MSY}}{S_{MSY}}. \quad (6)$$

Spawner-recruit relationships were developed for the systems in Table 5 with the highest and lowest α values, and for the average α for the three systems. Point goals ranged from about 4,900 to 7,000 adult coho salmon, and the overall range of escapements that would theoretically provide for 90% or more of MSY across the range of possible α values was 3,000–8,900 (Table 6; Figure 4).

Table 4.–Estimates of smolts per spawner for "wild" Klawock River system adult coho salmon.

		Smolt production		
Brood year	Escapement	Age 1.	Age 2.	Smolts per spawner
1997	15,007	242,564	93,403	22.4
1998	9,023	355,295	84,609	48.8
1999	8,506	321,845	90,238	48.4
2000	10,478	293,755	112,804	38.8
2001	5,058	326,988	141,195	92.6
2002	15,694	920,424	NA[a]	ND[b]
Average				50.2

[a] Estimate not available at the time of analysis

[b] Data incomplete at time of analysis.

Table 5.–Productivity parameter estimates α from coho salmon systems with mean marine survival and smolts-per-spawner values similar to Chuck Creek (marine survival = 0.089) and Klawock River (approximately 50 smolts per spawner).

System	α	ln (α)	Marine survival	Smolts per spawner
Ford Arm[a]	6.20	1.82	0.108	29
Toboggan[b]	10.0	2.30	0.103	39
Hugh Smith[a]	11.8	2.47	0.128	41
Average	9.02	2.20		

[a] Estimates from Clark et al. (1994).

[b] Estimates from Shaul and Van Alen (2001).

Table 6.–Parameter estimates from theoretical Ricker spawner-recruit analyses for Klawock River system adult coho salmon.

α	β	S_{MSY}	Lower	Upper
6.20	0.000097	7,021	4,440	8,880
9.02	0.000137	5,555	3,480	6,960
11.8	0.000166	4,867	3,020	6,040

DISCUSSION

Some of the data used in the above analyses were problematic. The weir was overtopped in 2005 and 2006 and escapements were guesstimated. Although the 2006 data were not used in the analyses, uncertainty in the 2005 weir count leads to uncertainty in the 2004 smolt abundance and average escapement estimates. In addition, estimates of the number of hatchery smolt marked and released with coded wire tags were unreliable in a few years. It is also possible that the hatchery rack was sampled only when tagged fish were observed (see Lewis and Zadina 2001 for details on sampling returns of coded wire tagged sockeye salmon), so estimated marked fractions based on return data could also be suspect. This shortcoming not only precluded estimation of exploitation and marine survival rates using coded wire tag information from Klawock River system coho salmon, but it also compromised the smolt-per-spawner analysis. Possible smolt aging and composition issues could have also confounded the smolt-per-spawner estimates (see below).

Surrogate data from Chuck Creek were used in the smolt per spawner analysis. Across the state, 7 of 32 coho salmon escapement goals were developed using surrogate information (Andrew Munro, Fisheries Scientist, Alaska Department of Fish and Game, Division of Commercial Fisheries, Anchorage, personal communication). In Southeast Alaska these include goals for Montana and Peterson creeks that use exploitation rates from Auke Creek (Clark 2005), and Ketchikan and Sitka area aggregate goals that use exploitation and marine survival rates from Hugh Smith Lake and Nakwasina River, respectively (Shaul and Tydingco 2006). In the Southcentral Alaska there are 3 goals on Kodiak Island where the populations were assumed to be in equilibrium to estimate S_{MSY} using a range of productivity parameters that were based on the likely range of productivity for coho salmon populations (Clark et al. 2006).

Although coded wire tag information from Klawock River system coho salmon could not be used to estimate exploitation, it could be used to describe the distribution of the harvest. From 2003 to 2005 (the years that exploitation rate information from Chuck Creek was available), the percentage of coded wire tags recovered by gear type was similar for the Klawock and Chuck

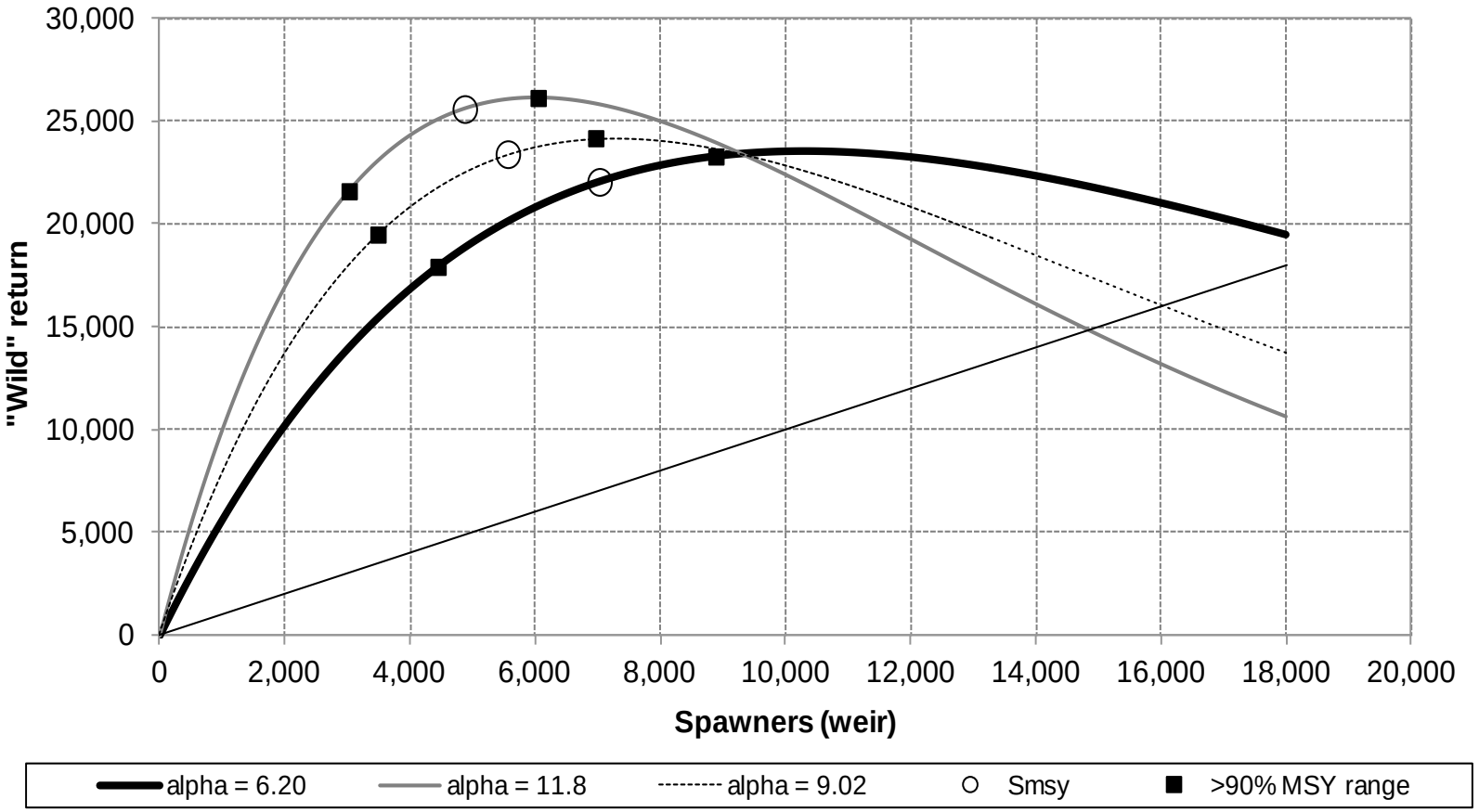

Figure 4.–Theoretical Ricker spawner-recruit relationships for Klawock River coho salmon.

Creek stocks, and about 90% of the tag recoveries for each stock occurred in the same four districts (districts 103, 104, 105, and 113; Tables 7 and 8). Therefore, each stock appeared to be exposed to the same fisheries and although this evidence is not conclusive, the assumption that each stock experienced similar exploitation rates was not unreasonable.

Smolt age composition from Chuck Creek was used to partition the smolt estimates into production by brood year to obtain estimates of smolt per spawner. Because Klawock River and Chuck Creek are lake systems in close proximity to each other, it was assumed the smolt age composition for each stock would be similar. Age-1. was the dominant smolt age class at Chuck Creek, which is exceptional in a lake system, but not unprecedented. For example, age-1. smolt have composed the majority of the emigration in other lake systems such as Naha River (Freeman 2003) and Situk River (Ericksen and McPherson 1997) in Southeast Alaska, and Billy's Hole (Bullock and Miller 2005) in Prince William Sound.

Conversely, age-2 smolt have composed >60% of the emigration at Hugh Smith Lake (Shaul 1994) and Auke Lake (Hoover 2007; Echave 2009) in Southeast Alaska, although age-1. smolt have occasionally dominated the overall production at Auke Lake (Hoover 2008).[2] Given that it was possible that age-1. was the predominant age class in the Klawock River system, the assumption that smolt age composition was similar for each stock was not unreasonable.

The smolt-per-spawner analysis indicated that 5,100–10,100 spawners would provide for sustainable yields, while the theoretical S-R analysis suggested a range of 3,000–8,900. Escapements reported in the 2006 Annual Management Plan for Prince of Wales Hatchery Association were never lower than 4,000 and because that was the average minimum of the two methods, it was selected as a suitable lower bound. Further, escapements averaged 9,300 adults from 1997 to 2005, and results from the two analyses and examination of the curves in Figure 4 supported an upper bound of 9,000. For the period 1997–2005, escapements were within this range in 4 of 9 years and above it in five.

CONCLUSIONS AND RECOMMENDATIONS

The recommended escapement goal for Klawock River system coho salmon is 4,000–9,000 adults based on weir counts, which was adopted by the Alaska Department of Fish and Game in February 2013. Because of uncertainty in the data, this is considered a sustainable escapement goal. Although this goal was reviewed by select members of the Southeast Region Interdivisional Escapement Goal Review Team and informally used from 2007 to 2012, it was not officially adopted by the department until 2013. This delay was an oversight that was in part due to a loss in continuity following personnel transitions in the regional and director's offices, and development of the goal outside of the Board of Fisheries cycle.

Since the analyses were conducted, 5 additional years of data from Chuck Creek (production from the 2005–2009 smolt emigrations), as well as escapement information from the Klawock River system, are available. The additional data should be reviewed and incorporated if and when the goal is revised.

[2] Taylor, S.G., and J. L. Lum. *Unpublished*. Auke Creek Weir 2003 annual report, operations, fish counts, and historical summaries. Available at National Marine Fisheries Service, Ted Stevens Marine Research Institute, Juneau, Alaska.

Table 7.–Coded wire tags released by Klawock River Hatchery and recovered from coho salmon in common property fisheries by gear type and district, 2003–2005. Only random recoveries that included gear and district information are presented.

	District																
Gear	101	102	103	104	105	106	109	112	113	114	116	152	154	156	157	189	Total
Number of tags recovered																	
Drift	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1
Purse	2	5	31	58	2	0	1	0	0	0	0	0	0	0	0	0	99
Troll	10	4	453	384	63	1	22	0	92	2	0	15	1	0	1	0	1,048
Sport	0	1	64	70	1	0	0	0	15	0	0	0	0	0	0	0	151
Total	12	10	548	512	66	2	23	0	107	2	0	15	1	0	1	0	1,299
Percentage of tags recovered																	
Drift	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
Purse	0.2	0.4	2.4	4.5	0.2	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	7.6
Troll	0.8	0.3	34.9	29.6	4.8	0.1	1.7	0.0	7.1	0.2	0.0	1.2	0.1	0.0	0.1	0.0	80.7
Sport	0.0	0.1	4.9	5.4	0.1	0.0	0.0	0.0	1.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	11.6
Total	0.9	0.8	42.2	39.4	5.1	0.2	1.8	0.0	8.2	0.2	0.0	1.2	0.1	0.0	0.1	0.0	100.0

Table 8.–Coded wire tags released at Chuck Creek and recovered from coho salmon in common property fisheries by gear type and district, 2003–2005. Only random recoveries that included gear and district information are presented.

	District																
Gear	101	102	103	104	105	106	109	112	113	114	116	152	154	156	157	189	Total
Number of tags recovered																	
Drift	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Purse	0	2	21	19	1	0	1	0	0	0	0	0	0	0	0	0	44
Troll	0	1	67	169	62	0	12	0	63	1	1	17	1	0	0	0	394
Sport	0	0	11	29	1	0	0	0	5	0	0	0	0	0	0	0	46
Total	0	3	99	217	64	0	13	0	68	1	1	17	1	0	0	0	484
Percentage of tags recovered																	
Drift	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Purse	0.0	0.4	4.3	3.9	0.2	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	9.1
Troll	0.0	0.2	13.8	34.9	12.8	0.0	2.5	0.0	13.0	0.2	0.2	3.5	0.2	0.0	0.0	0.0	81.4
Sport	0.0	0.0	2.3	6.0	0.2	0.0	0.0	0.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	9.5
Total	0.0	0.6	20.5	44.8	13.2	0.0	2.7	0.0	14.0	0.2	0.2	3.5	0.2	0.0	0.0	0.0	100.0

ACKNOWLEDGEMENTS

Thanks to Steve McCurdy for providing the Chuck Creek data, and to Bob Clark and Leon Shaul for reviewing the analyses. Thanks to Rocky Holmes, Brian Frenette, and Scott Kelley for their leadership and persistence, to Kathy Smikrud for preparing maps, and to Ed Jones and Steve Heinl for reviewing drafts of the manuscript. Finally, thanks to Stacey Poulson for formatting this report.

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