

A Review of Escapement Goals for Lower Cook Inlet Salmon Stocks, 2023

RC-3, Tab 3: LCI Esc. Goal
Oral Report to BOF

Otis et al. 2023
Written Report to BOF
RC-3, Tab 1

Goal Changes: 2 King, 2 sockeye, 12 chum, and 18 pink salmon

Stocks of Concern

- Mikfik Lake Sockeye
- McNeil River Chum

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Escapement Goal Review Process

1. Establish a review committee (CF, SF)
2. Review and evaluate existing goals
3. Propose new goals and modify or eliminate existing goals
4. Memo to CF and SF division directors for approval of recommended changes
5. Provide written and oral reports to BOF



Definition of Key Terms

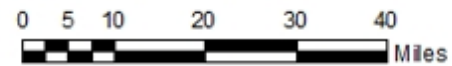
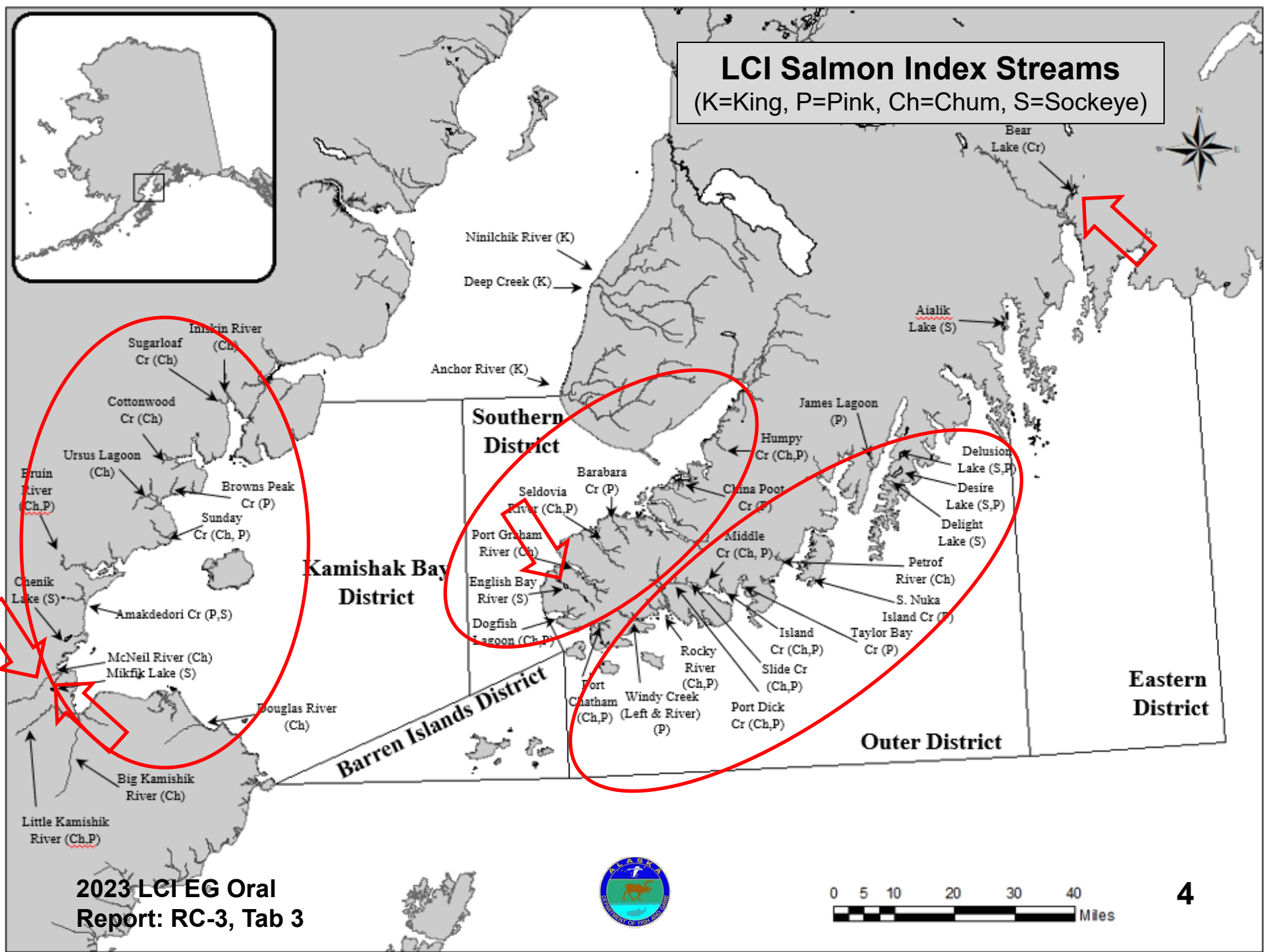
- Maximum Sustained Yield (MSY): greatest average annual yield over long term
- Biological Escapement Goal (BEG):
The escapement that provides the greatest potential for maximum sustained yield (MSY)
- Sustainable Escapement Goal (SEG):
The level of escapement known to provide for sustained yield over a 5-10 year period; used in situations where a BEG cannot be estimated

All LCI Goals are SEGs. There are no OEGs in LCI



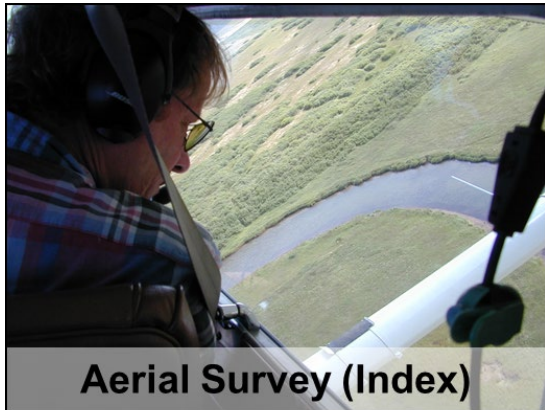
LCI Salmon Index Streams

(K=King, P=Pink, Ch=Chum, S=Sockeye)



Overview of LCI

- **41 salmon stocks in LCI have escapement goals: 3 king, 12 chum, 18 pink, and 8 sockeye**



- **LCI goals are SEGs because we lack sufficient data to calculate the # of spawners needed to achieve Maximum Sustained Yield (MSY)**

Esc. Goal Methods

- **Percentile Approach:** used to develop half of the SEGs currently in use in Alaska (Clark et al. 2014)
 - **Principle:** A select range of historical escapements, shown to be sustainable, can serve as a proxy for MSY
 - **3 “tiers”** of percentiles, based on stock characteristics: *escapement contrast, measurement error and harvest rate (≤ 0.4)*
 - **Tier 1: 20th–60th percentiles** for stocks with high escapement contrast (>8) and high measurement error monitoring (e.g., aerial or foot survey)

Clark et al. 2014. An evaluation of the percentile approach for establishing sustainable escapement goals in lieu of stock productivity information. Alaska Department of Fish and Game, Fishery Manuscript No. 14-06, Anchorage.

<https://www.adfg.alaska.gov/FedAidPDFs/FMS14-06.pdf>





Sockeye SEGs



- **8 sockeye stocks with SEGs: 2 will change**
 - **No Change**: Delight, Desire, Aialik, Mikfik, and Chenik Lakes, and Amakdedori Ck
- **English Bay Lakes**
 - Current SEG: **6,000–13,500** (adopted in 2002 using outdated methods)
 - **New SEG: 6,300–12,200** based on Clark et al. (2014) Percentile Approach
- **Bear Lake**
 - Current SEG: 700–8,300 (adopted in 2002 using outdated methods)
 - **New SEG: 600–8,600** based on Clark et al. (2014) Percentile Approach

Aggregate SEGs: Pink and Chum



- **5 AAC 39.223(b)(5):** “establish escapement goals for aggregates of individual spawning populations with similar productivity and vulnerability to fisheries and for salmon stocks managed as units”
- LCI is the only management area in AK not using aggregate goals for pink and chum salmon

Aggregate SEGs: Pink and Chum



- **Pros** for transitioning to aggregate SEGs for pink and chum salmon
 - **Consistency**: SEAK, PWS, and Kodiak transitioned to aggregate pink and chum salmon SEGs years ago
 - **Simplicity**: Simplifies inseason management by providing managers with more flexibility; simplifies BOF EG review process
 - **Improved Assessment**: By aggregating goals to the District level, staff can better assess recruitment from given spawner levels without the uncertainty associated with apportioning mixed-stock harvests among contributing stocks

Aggregate SEGs: Pink and Chum



- **Con** for transitioning to aggregate SEGs
 - Potential impact to weak performing stock(s)
- **Solution:** Inseason management objectives
 - Continue to monitor escapements to all index streams
 - Close subdistricts where escapement is lagging behind
- **Development of Aggregate SEGs**
 - Sum historical escapements for all contributing stocks and apply the Percentile Approach to the resulting time series



Pink SEGs



- **Finding:** Convert 18 stock SEGs into 3 District SEGs
- **Criteria:** for determining which index streams to include/exclude in aggregate SEG analysis
 - **Include:**
 - Stocks with a history of consistent escapement monitoring
 - Stocks that are targeted or incidentally harvested in commercial fisheries (low-moderate harvest, ≤ 0.40)
 - **Exclude:**
 - Stocks where escapements are significantly influenced by hatchery returns (2 stocks)

Southern District Pink Salmon: SEG = 50,000–110,000

Sum of median escapements: ~80,000

Humpy Creek: median esc. = 40,000 (50%)
Humpy Mgt Objective: 25–55 thousand (50%)
Current Humpy Ck SEG: 17,500–51,400

Humpy

China Poot

Mgt. Obj: 2.4–5.3
SEG: 2.5–6.3

Barabara

Mgt. Obj: 3.2–7.0
SEG: 2.0–5.6

Tutka

Seldovia

Mgt. Obj: 18.7–41.0
SEG: 21.8–37.4

Port Graham

Pink salmon hatchery

Pink Salmon- Mgt. Objectives

District	Stock	History of fishery ^a	Median Esc.		Proportion of Dist. Escap.	Monitoring method ^b	Mgmt. target	
			(1976–2022)	n			Lower	Upper
Southern	Barabara Creek	PS, SGN	5,100	47	6.4%	MFS	3,200 – 7,000	
Southern	China Poot Creek	PS, SGN	3,900	47	4.9%	MFS	2,400 – 5,300	
Southern	Humpy Creek	PS, SGN	41,213	47	51.4%	MFS	25,700 – 56,500	
Southern	Seldovia River	PS, SGN	30,000	47	37.4%	MFS	18,700 – 41,100	

Southern District Aggregate Pink Salmon SEG: 50,000 – 110,000

Outer	Desire Lake	PS	9,000	46	4.6%	MAS	4,800 – 10,700	
Outer	Dogfish Lagoon Creeks	PS	6,700	47	3.4%	MAS or MFS	3,600 – 8,000	
Outer	Island Creek	PS	25,000	47	12.7%	MAS or MFS	13,300 – 29,800	
Outer	James Lagoon Creeks*	PS	3,842	28	2.0%	MAS	2,000 – 4,600	
Outer	Middle Creek*	PS	5,004	20	2.5%	MAS or MFS	2,700 – 6,000	
Outer	Port Chatham Creeks	PS	16,550	47	8.4%	MAS or MFS	8,800 – 19,800	
Outer	Port Dick Creek	PS	44,700	47	22.7%	MAS or MFS	23,800 – 53,400	
Outer	Rocky River	PS	26,100	47	13.3%	MAS	13,900 – 31,200	
Outer	Slide Creek*	PS	13,471	21	6.8%	MAS or MFS	7,200 – 16,100	
Outer	South Nuka Island Creek	PS	2,453	47	1.2%	MAS	1,300 – 2,900	
Outer	Taylor Bay Creeks*	PS	10,857	20	5.5%	MAS	5,800 – 13,000	
Outer	Windy Bay Left Creek	PS	23,300	47	11.8%	MAS	12,400 – 27,800	

Outer District Aggregate Pink Salmon SEG: 105,000 – 235,000

Kamishak	Amakdedori Creek*	PS	2,497	41	2.3%	MAS	800 – 3,400	
Kamishak	Brown's Peak Creek	PS	15,000	47	13.8%	MAS	4,800 – 20,700	
Kamishak	Bruin River	PS	74,900	47	68.9%	MAS	24,100 – 103,400	
Kamishak	Little Kamishak River*	PS	2,100	32	1.9%	MAS	700 – 2,900	

Kamishak District Aggregate Pink Salmon SEG: 35,000 – 150,000





Chum SEGs



- **Finding:** Convert 12 stock SEGs into 3 District SEGs
- **Criteria:** for determining which index streams to include/exclude in aggregate SEG analysis
 - **Include:**
 - Stocks with a history of consistent escapement monitoring
 - Stocks that are targeted or incidentally harvested in commercial fisheries (low-moderate harvest)
 - **Exclude:**
 - Stocks where escapements are significantly influenced by hatchery returns (None)

Chum Salmon- Mgt Objectives

District	Stock	History of fishery	Median Esc. (1976–2022)	n	Proportion of Dist. Escap.	Monitoring method	Mgmt. target	
							Lower	Upper
Southern	Humpy Creek*	PS, SGN	1,143	21	20.7%	MFS	300	1,000
Southern	Port Graham River	PS, SGN	2,200	47	39.8%	MFS	600	2,000
Southern	Seldovia River*	PS, SGN	2,188	21	39.6%	MFS	600	2,000

Southern District Aggregate Chum Salmon SEG: 1,500 – 5,000

Outer	Dogfish Lagoon Creeks	PS	6,400	47	24.0%	MAS/MFS	4,200	7,700
Outer	Island Creek	PS	8,700	47	32.6%	MAS/MFS	5,700	10,400
Outer	Middle Creek*	PS	745	20	2.8%	MAS/MFS	500	900
Outer	Petrof River*	PS	920	21	3.4%	MAS	600	1,100
Outer	Port Chatham Creeks*	PS	493	21	1.8%	MAS/MFS	300	600
Outer	Port Dick Creek	PS	3,300	47	12.4%	MAS/MFS	2,200	4,000
Outer	Rocky River	PS	4,350	47	16.3%	MAS	2,900	5,200
Outer	Slide Creek*	PS	1,775	21	6.7%	MAS/MFS	1,200	2,100

Outer District Aggregate Chum Salmon SEG: 17,500 – 32,000

Kamishak	Big Kamishak River	PS	14,900	44	15.7%	MAS	7,900	18,100
Kamishak	Bruin River	PS	9,900	47	10.4%	MAS	5,200	12,000
Kamishak	Cottonwood Creek	PS	8,300	47	8.8%	MAS	4,400	10,100
Kamishak	Douglas River*	PS	3,225	20	3.4%	MAS	1,700	3,900
Kamishak	Iniskin River	PS	12,000	47	12.7%	MAS	6,300	14,500
Kamishak	Little Kamishak River	PS	15,335	44	16.2%	MAS	8,100	18,600
Kamishak	McNeil River	PS	19,290	47	20.3%	MAS	24,000	48,000
Kamishak	Sugarloaf Creek*	PS	1,606	20	1.7%	MAS	800	1,900
Kamishak	Sunday Creek*	PS	1,290	19	1.4%	MAS	700	1,600

Kamishak District Aggregate Pink Salmon SEG: 50,000 – 115,000

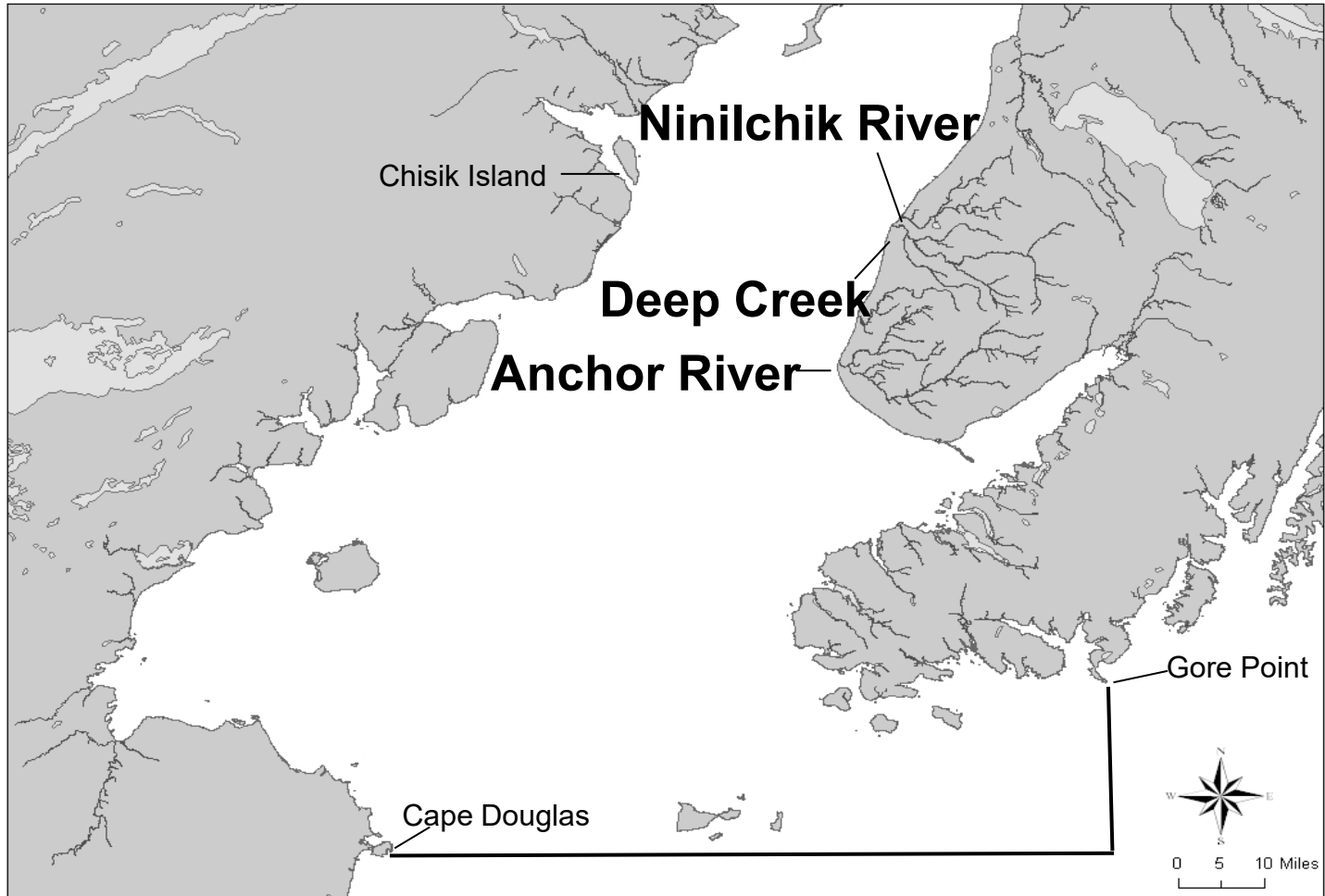


Outline (Continued)

- Overview of the EG review process
- Definition of key terms
- Description of the LCI Management Area
- Methods & Rationale for revising LCI goals
- Review of recent escapement performance
- 2023 Recommendations
- **Review of king salmon goals**



There are 3 king salmon systems with escapement goals in LCI

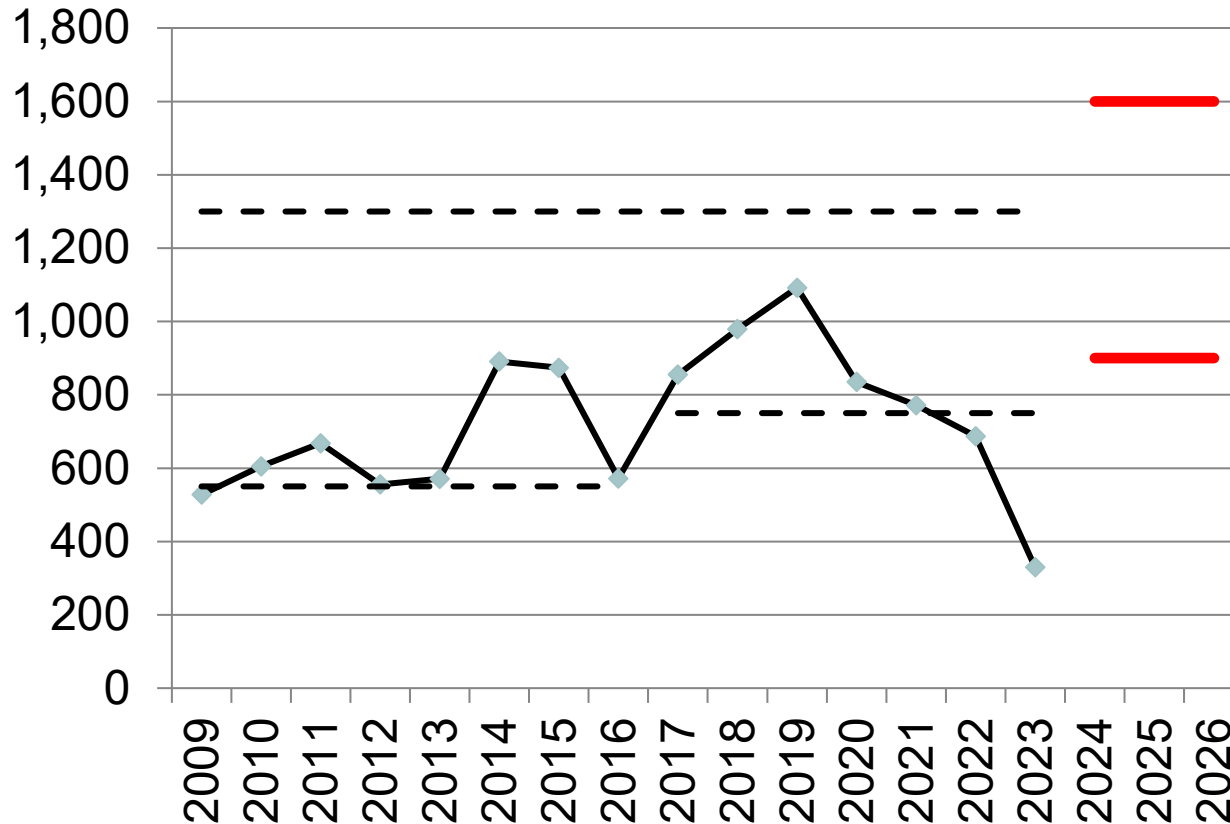


Committee findings are for changes to 2 of the 3 king salmon SEG's

- ▶ **Ninilchik River: increase both ends of the SEG with a change in the assessment location**
- ▶ **Deep Creek: no change to the lower bound SEG**
- ▶ **Anchor River: lower both ends of the SEG**



Ninilchik River king salmon: The SEG has been achieved in 3 of the last 5 years



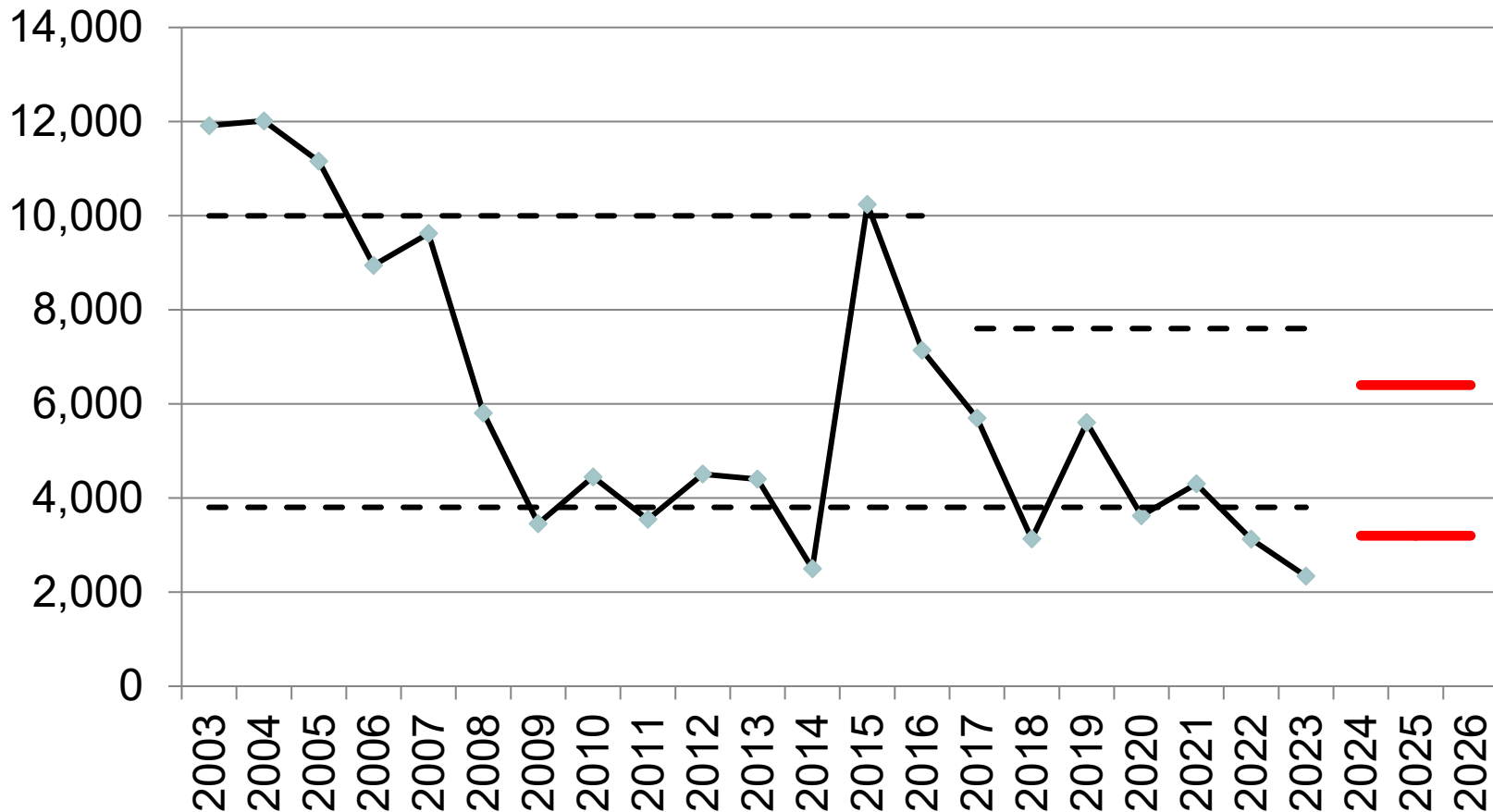
Ninilchik River king salmon

Committee findings: SEG of 900 – 1,600

1. Previous SEG is 750 – 1,300
2. Reconstructed entire escapement for assessment at a lower weir location
3. Tier 3 Percentile approach (5th and 65th percentiles; low contrast, low harvest)

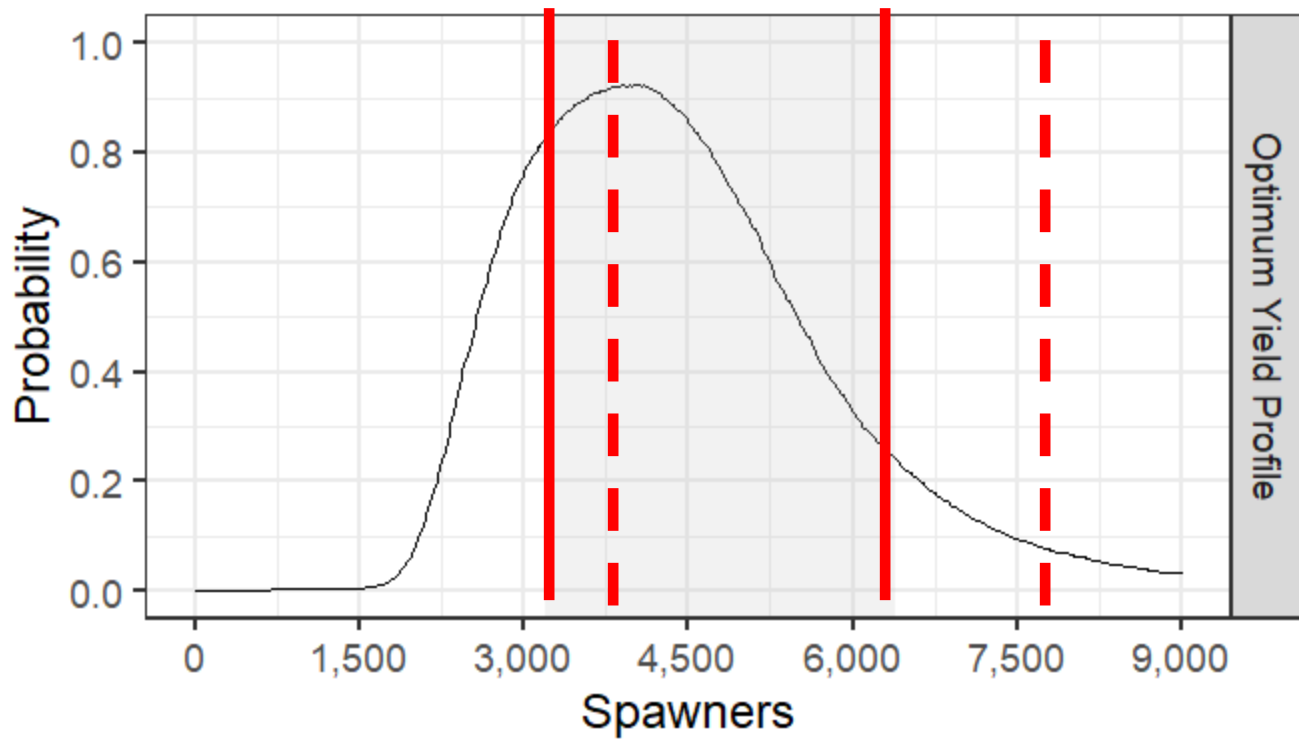


Anchor River king salmon: With management actions during the downturn in production, the SEG has been achieved in 2 of the last 5 years



Anchor River king salmon Optimal Yield Profile: the probability that a specified spawning escapement will result in 90% of maximum sustained yield.

Red dashed lines bracket the previous goal
Red solid lines bracket the current goal



Anchor River king salmon

Committee findings: SEG of 3,200–6,400

1. Previous SEG is 3,800 – 7,600
2. Updated stock-recruit analysis lowering both ends of the range



Questions?

