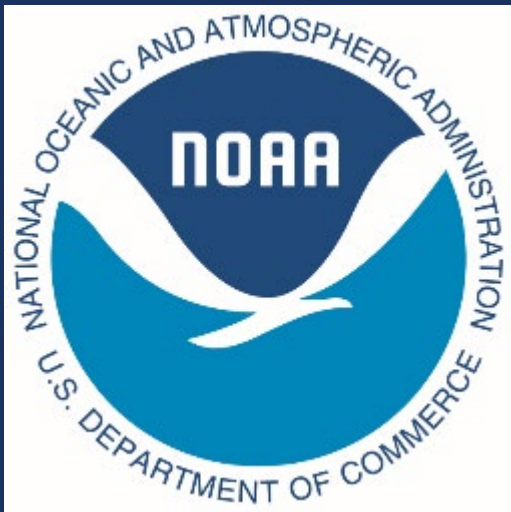
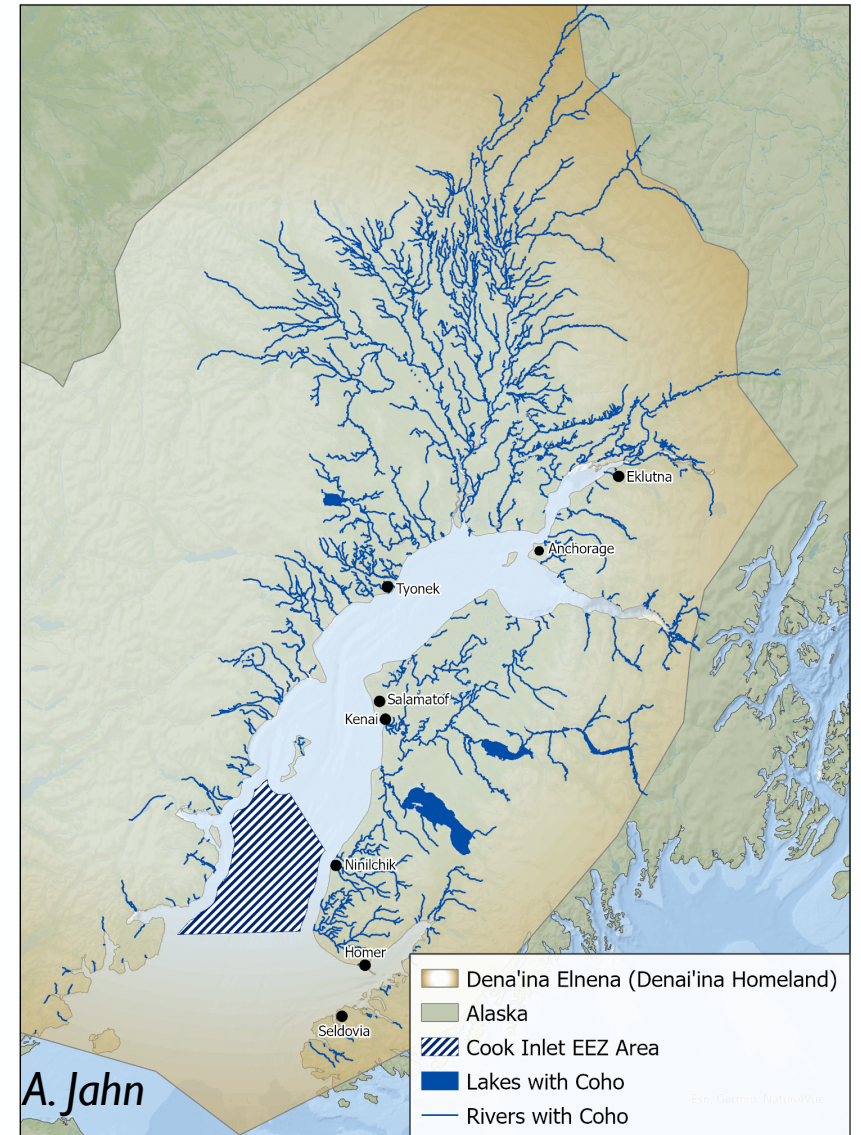


2024 COOK INLET SALMON: STOCK ASSESSMENT AND FISHERY EVALUATION (SAFE) REPORT



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5 Feb. 2024



STOCK STATUS SUMMARIES: THE ENVIRONMENTAL ASSESSMENT AND REGULATORY IMPACT REVIEW (EA/RIR ANALYSIS)

SAFE: Stock Status Summaries Section

- Socio-Economic Analysis
- Subsistence, PU, sport, commercial considerations
- Description of methods, estimates, assumptions
- Incorporated by reference into 2024 SAFE
- Presented to the Council April of 2023
- SDC methods previously presented (2019)

DRAFT

**Environmental Assessment/Regulatory Impact Review
for Proposed Amendment 16
to the Fishery Management Plan for the Salmon Fisheries in the
EEZ Off Alaska**

September 2023

Lead Agency: National Marine Fisheries Service, Alaska Region National Oceanic and Atmospheric Administration

Responsible Official: Jonathan M. Kurland, Administrator Alaska Regional Office, National Marine Fisheries Service

For further information contact: Doug Duncan, National Marine Fisheries Service
P.O. Box 21668, Juneau, AK 99802-1668
(907) 586-7221

Abstract: This Environmental Assessment/Regulatory Impact Review analyzes proposed management measures to address management of salmon fishing in the Cook Inlet EEZ. The *Fishery Management Plan for the Salmon Fisheries in the EEZ off Alaska* (FMP) manages the salmon fisheries in the United States Exclusive Economic Zone (EEZ; 3 nautical miles to 200 nautical miles offshore) off Alaska. The North Pacific Fishery Management Council developed this FMP under the Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act). In 2012, the Council comprehensively revised the FMP to comply with the recent Magnuson-Stevens Act requirements, such as annual catch limits and accountability measures, and to more clearly reflect the Council's policy with regard to State of Alaska management authority for commercial and sport salmon fisheries in the EEZ. A portion of this was challenged, and in response to a 2016 United States Court of Appeals Ninth Circuit ruling, the Council took final action in December 2020 to amend the FMP to manage the commercial salmon fishery that occurs in the EEZ waters of Cook Inlet that had been removed from Federal management with the 2012 revisions to the FMP. This action, Amendment 14 to the Salmon FMP, implemented Federal management of the EEZ waters of Cook Inlet and closed them to commercial salmon fishing. NMFS implemented Amendment 14 (86 FR 60568, November 3, 2021), but on June 21, 2022, the U.S. District Court for the District of Alaska vacated the implementing regulations for Amendment 14. NMFS is now considering new management measures to comply with Magnuson-Stevens Act requirements for the Cook Inlet salmon fishery in the EEZ, such as status determination criteria, annual catch limits, and accountability measures in response to both the 2016 Ninth Circuit ruling and the 2022 summary judgment opinion of the Alaska District Court in *UCIDA et al. v. NMFS*.

OVERVIEW

- SAFE goal: provide information needed to manage the Federal salmon fisheries in the Cook Inlet EEZ Area as per National Standard I guidelines
 - recommend harvest specifications
 - prevent overfishing.
- Presentation goal: Explain SDC and harvest specification recommendations through the stock assessments.

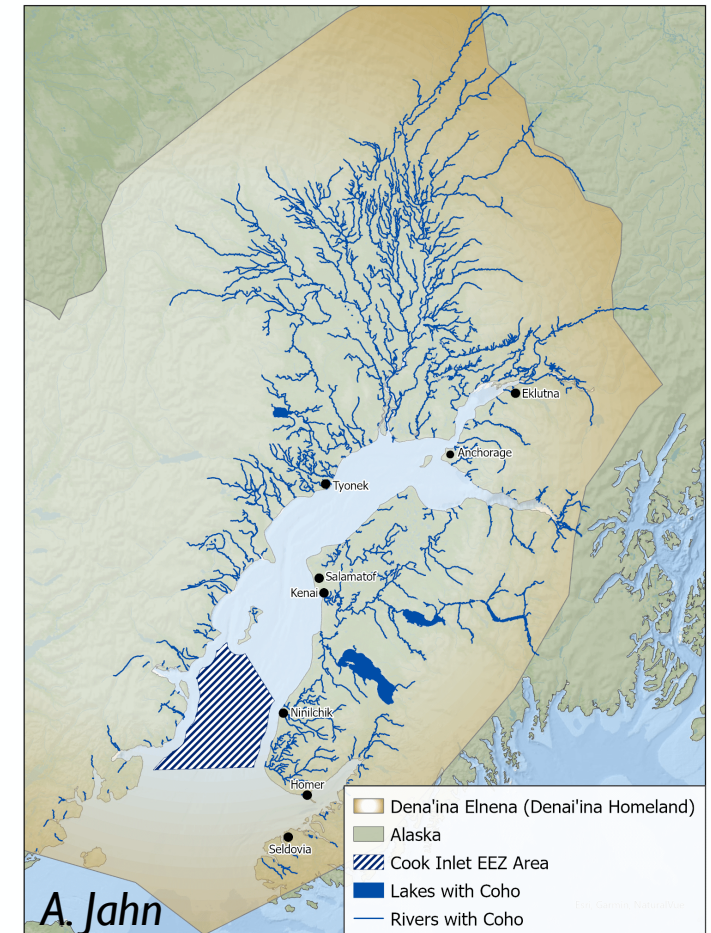
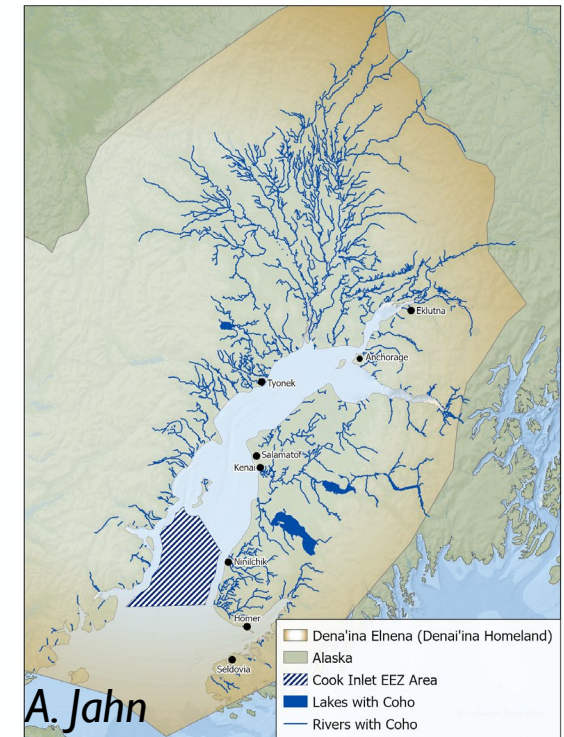


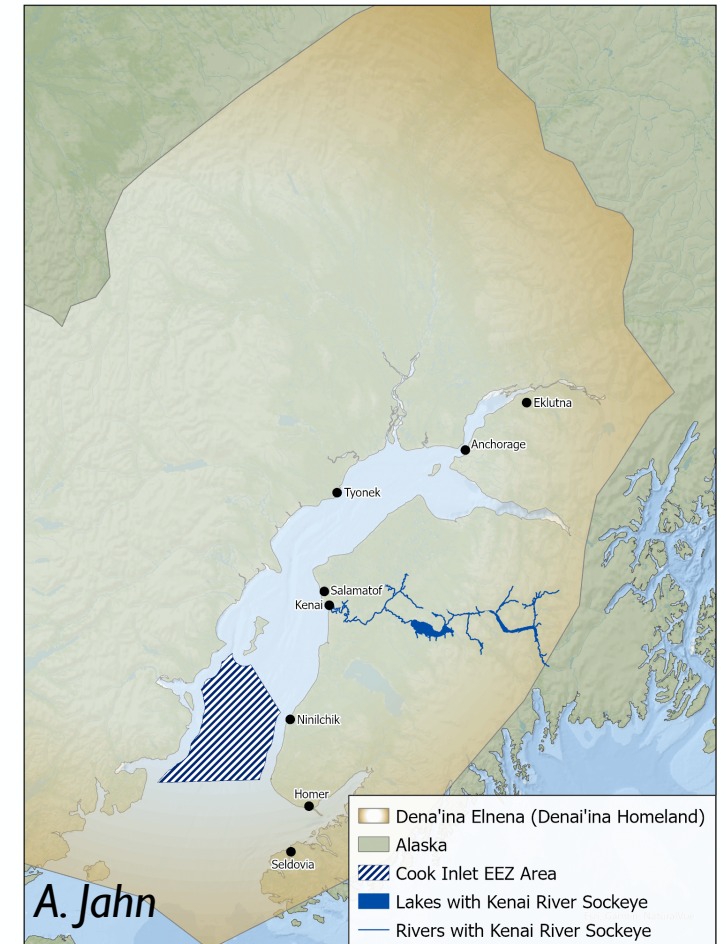
TABLE 4 IN SAFE (PG. 57): 2024 RECOMMENDED TIERS, PRESEASON OFL, BUFFER, AND ABC/ACL

Stock	Tier	Total Run Size	Escapement goal(s)	Preseason OFL	ABC buffer	ABC
Kenai River Late-Run sockeye salmon	1	3,485	750	1,364	0.478	652.5
Kasilof River sockeye salmon	1	1,125	140	623	0.694	432.6
Aggregate Other sockeye salmon (T3)	3	NA	65	888	0.200	177.5
Aggregate Chinook salmon	3	NA	15	2,697 fish	0.167	450 fish
Aggregate coho salmon (T3)	3	NA	19.3	358	0.100	35.8
Aggregate chum salmon	3	NA	3.5	442	0.500	220.9
Aggregate pink salmon	3	NA	NA	270	0.900	243.4



I. KENAI LATE-RUN SOCKEYE SALMON: STOCK DEFINITION (SAFE PG. 23)

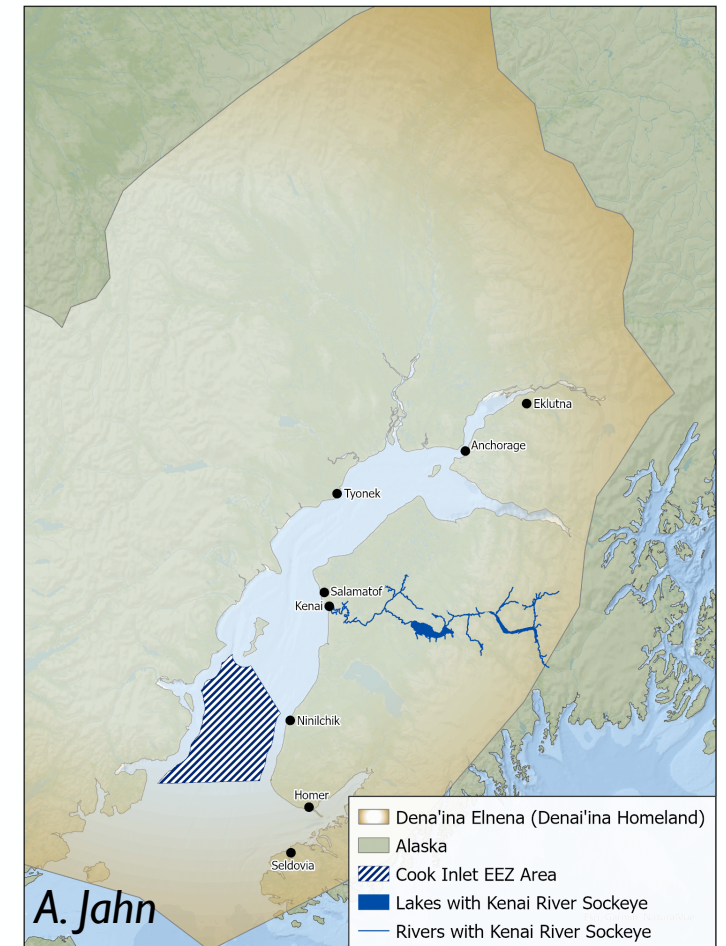
- Federal definition = same as State of Alaska (SOA):
 - Spawning escapement goal (750K – 1.3M).
 - ADF&G harvest, genetic stock composition, and escapement data.



I. KENAI LATE-RUN SOCKEYE SALMON: AVAILABLE DATA

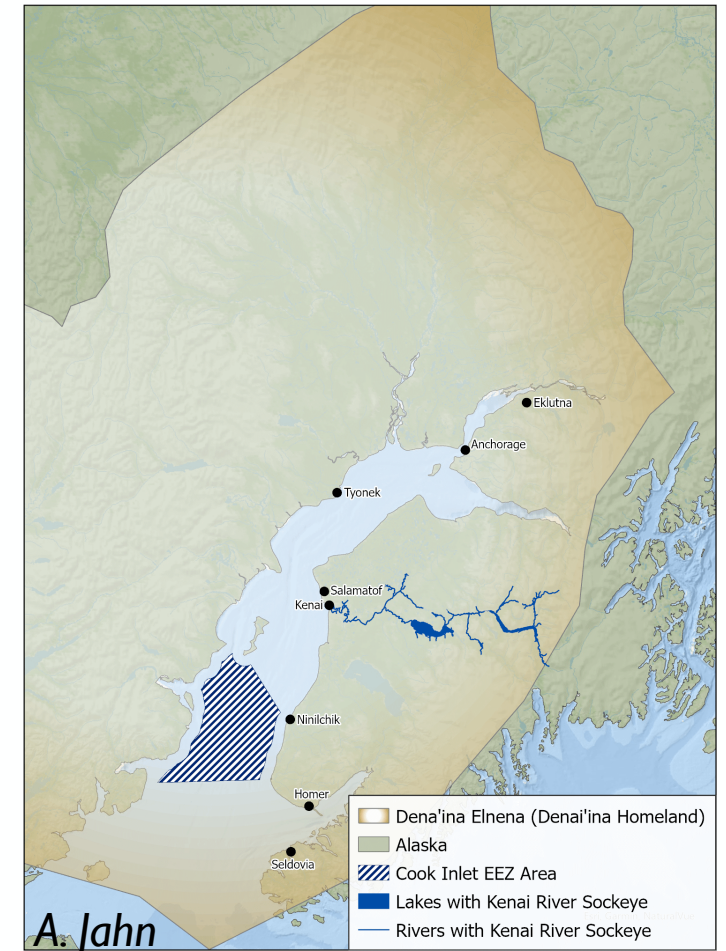
- Escapement goal and escapements
- Harvest estimates for all components: commercial, recreational, personal use
- Age estimates for all components: harvest + escapement
- Brood tables
- Spawner-recruitment estimates
- Sibling model-based preseason forecasts

- An easy call for tier placement.....



I. KENAI LATE-RUN SOCKEYE SALMON: TIER I

- Tier I = a stock with an escapement goal
- But, Tier I SDC and harvest specifications also requires:
 - postseason total run size estimate
 - Stock-specific harvests: commercial + recreational + personal use
 - Preseason forecast of total run size



I. KENAI LATE-RUN SOCKEYE SALMON STATUS DETERMINATION CRITERIA (SDC): TIER I OVERFISHED STATUS

(SAFE Definitions Section)

Tier I overfished status assessed via:

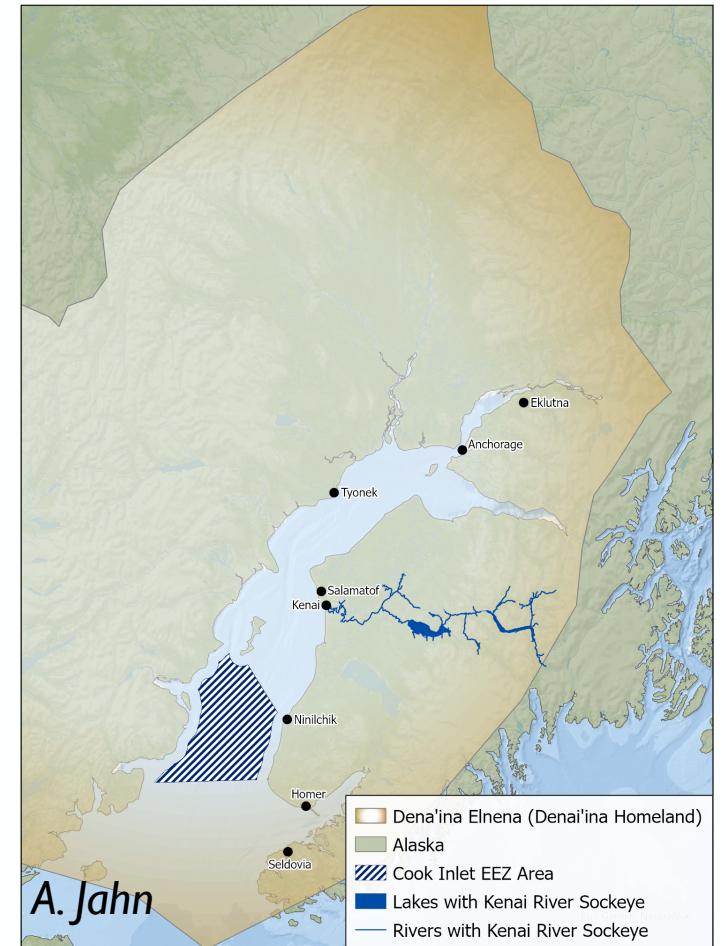
Cumulative Escapement:

Sum of actual escapements for most recent generation (5yrs)

VS.

MSST, minimum stock size threshold:

(Sum of escapement goal for generation)/2

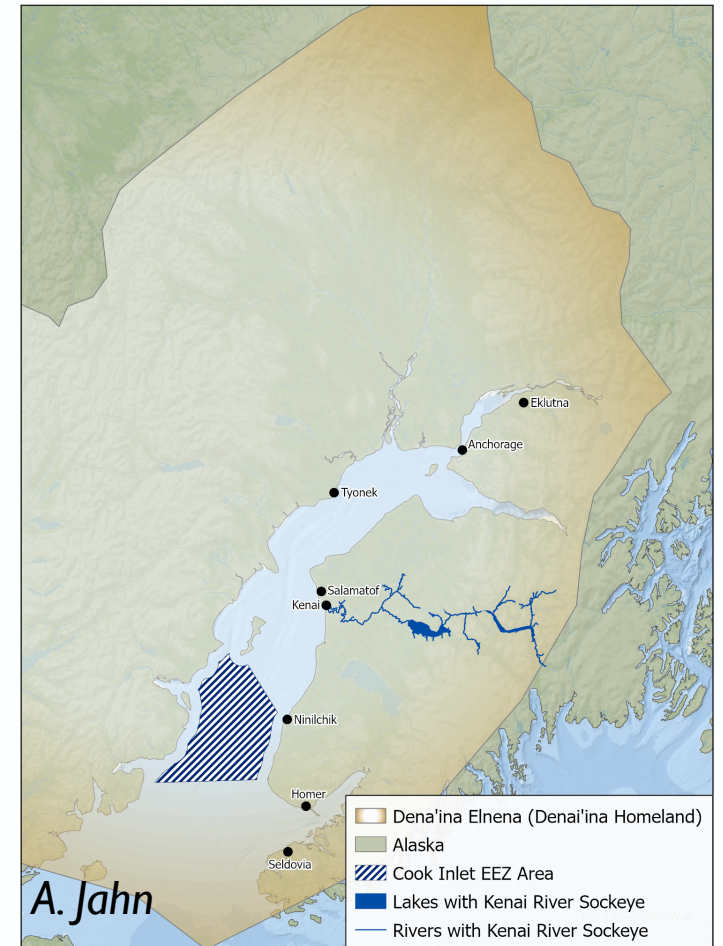


I. KENAI LATE-RUN SOCKEYE SALMON STATUS DETERMINATION CRITERIA: OVERFISHED STATUS

Cumulative escapement = $\sum_{i=t-T+1}^t S_i$

VS.

$$MSST_t = \frac{\sum_{i=t-T+1}^t G_i}{2}$$



I. KENAI LATE-RUN SOCKEYE SALMON STATUS DETERMINATION CRITERIA: OVERFISHING STATUS

Tier I, Overfishing status assessed postseason via:

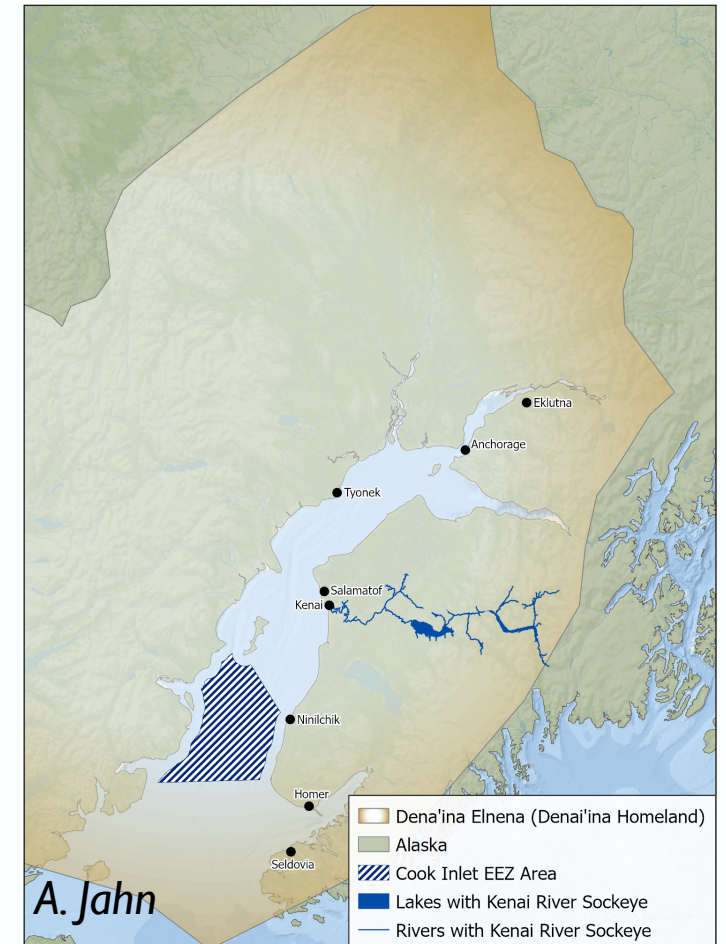
F_{EEZ} :

Actual EEZ harvest rate for most recent generation

VS.

MFMT:

Maximum fishing mortality threshold (max potential EEZ harvest rate while still achieving escapement goal and State harvests)



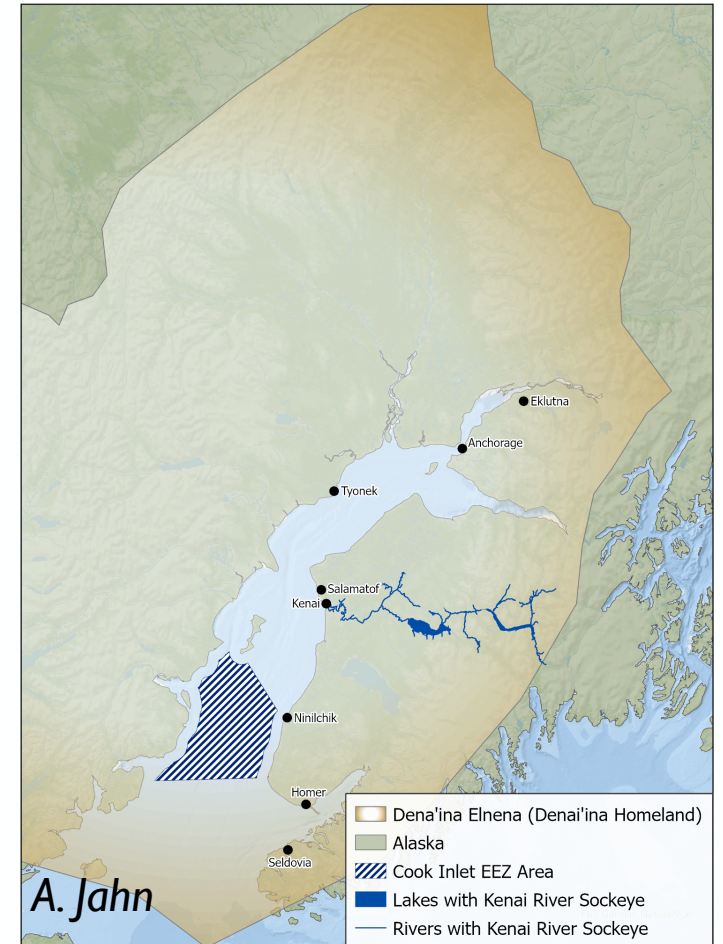
I. KENAI LATE-RUN SOCKEYE SALMON STATUS DETERMINATION CRITERIA: OVERFISHING STATUS

$$F_{EEZ,t} = \frac{\sum_{i=t-T+1}^t C_{EEZ,i}}{\sum_{i=t-T+1}^t R_i}$$

VS.

$$MFMT_t = \frac{\sum_{i=t-T+1}^t Y_{EEZ,i}}{\sum_{i=t-T+1}^t R_i}$$

where, $Y_{EEZ,i} = \max(0, R_t - G_t - C_{state,t})$



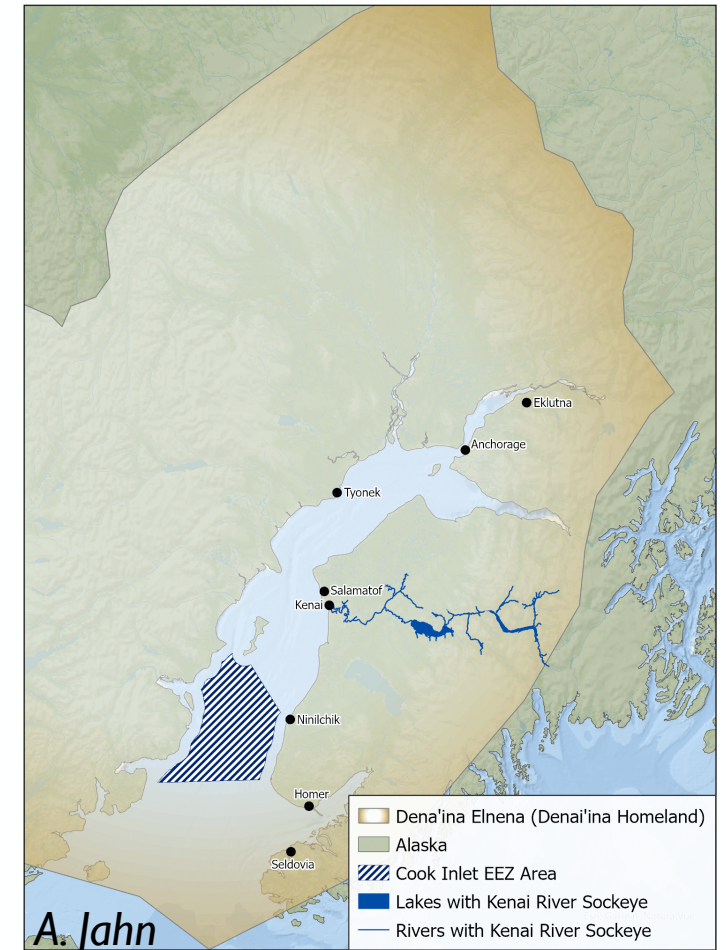
I. KENAI LATE-RUN SOCKEYE SALMON: MAX EEZ YIELD = PRESEASON OFL (OFL_{PRE}):

Postseason (numerator of MFMT calculation):

$$Y_{EEZ,i} = \max(0, R_t - G_t - C_{state,t})$$

Preseason the OFL_{PRE} :

$$\hat{Y}_{EEZ,t} = \max(0, \hat{R}_t - G_t - \bar{F}_{state,t} * \hat{R}_t)$$



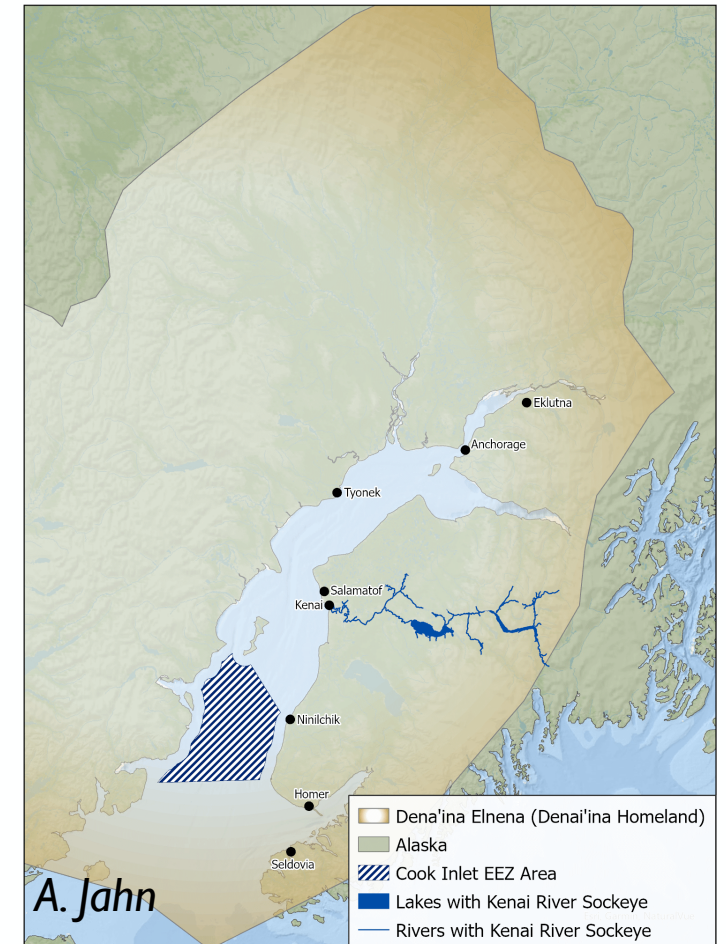
I. KENAI LATE-RUN SOCKEYE SALMON: THE PRESEASON MODEL

Preseason overfishing limit, OFL_{PRE} :

- OFL_{PRE} = Maximum potential harvest in the EEZ while still meeting escapement goal + likely State harvests.

Acceptable biological catch, ABC:

- $ABC = OFL_{PRE} \times$ a buffer to account for uncertainty in forecast of run size and likely State harvests.



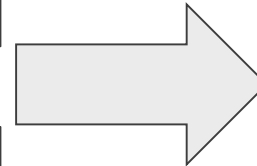
PRESEASON MODELS AND OFL → ABC BUFFER DETERMINATION (SAFE STATUS DETERMINATION CRITERIA SECTION, PG. 14)

Preseason forecasts

Preseason state harvest forecast

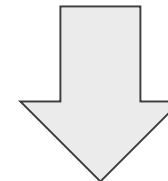
Preseason run size forecast

ARIMA models



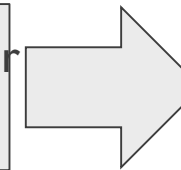
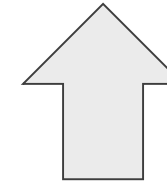
Preseason OFL determination

Preseason OFL



Buffer estimation

Buffer factor (b)



Preseason ABC determination

Preseason ABC

Retrospective % error
 $OFL_{preseason} / OFL_{postseason}$

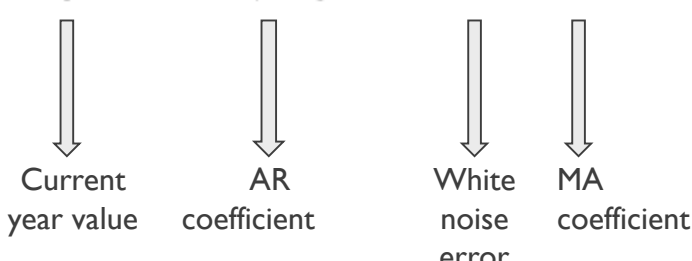


PRESEASON MODELS

- $\text{arima}(p,q) \rightarrow$ p is the order of the autoregressive component and q is the order of the moving average component
 - 'AR' linearly relates the current value of the series to its past values.
 - 'MA' linearly relates the current value of the series to past errors
 - Difference the time-series to induce stationarity as needed

• $\text{arma}(1,1) \rightarrow$

$$\eta_t = \phi_1 \eta_{t-1} + e_t + \theta_1 e_{t-1}$$



Current year value AR coefficient White noise error MA coefficient

- Select optimal orders for AR, MA and differencing using Hyndman-Khandakar algorithm via the `auto.arima()` function of the *forecast* package in R



OFL → ABC BUFFER DETERMINATION

- Use retrospective error in preseason predictions of OFL to determine OFL → ABC buffer (b)
- Integrates forecast error in both run size and state harvest
- Retrospective percent error in preseason OFL relative to postseason OFL calculated via median symmetric accuracy (MSA; Morley et al., 2018):

$$MSA = 100(\exp(\text{median}(|\log(\frac{OFL_{preseason,t} = \hat{Y}_{EEZ,t}}{OFL_{postseason,t} = Y_{EEZ,t}})|))) - 1)$$

$$b = \max(\frac{100 - MSA}{100}, 0.1)$$

$$ABC = OFL * b$$



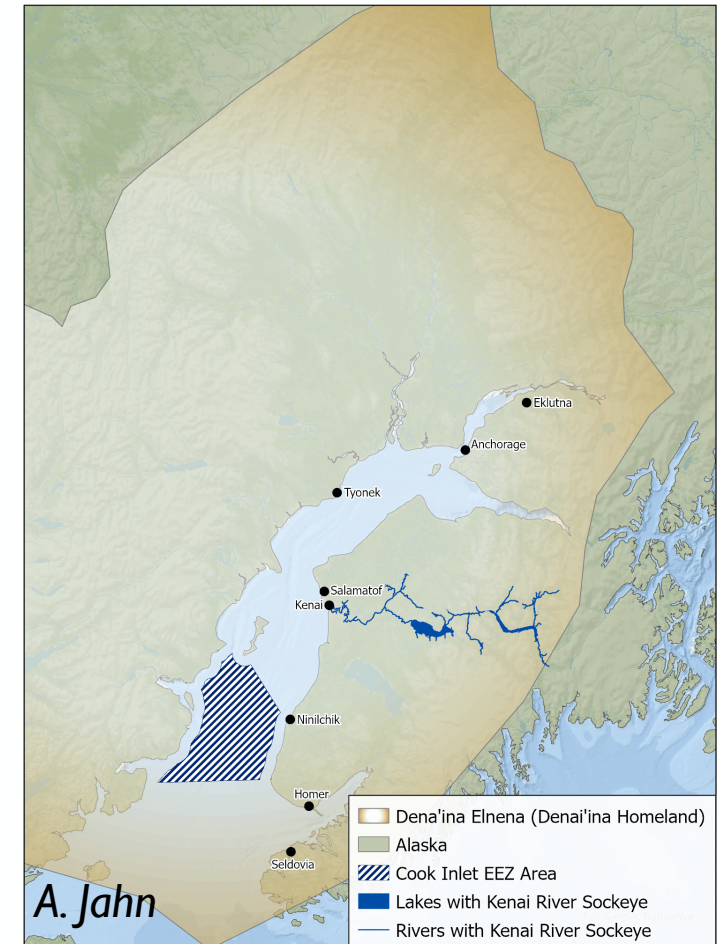
I. KENAI LATE-RUN SOCKEYE SALMON: SPAWNER-RECRUITMENT CHARACTERISTICS & YIELD CONSIDERATIONS

Considerations for the spawner-recruitment characteristics of Kenai Late Run Sockeye Salmon and defining yield in the EEZ.....

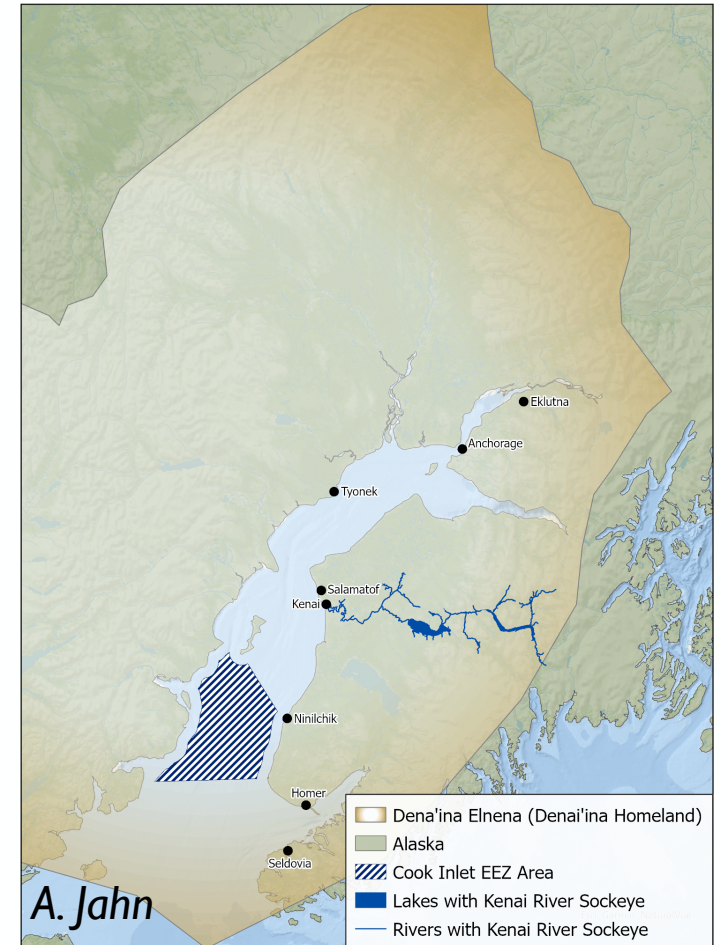
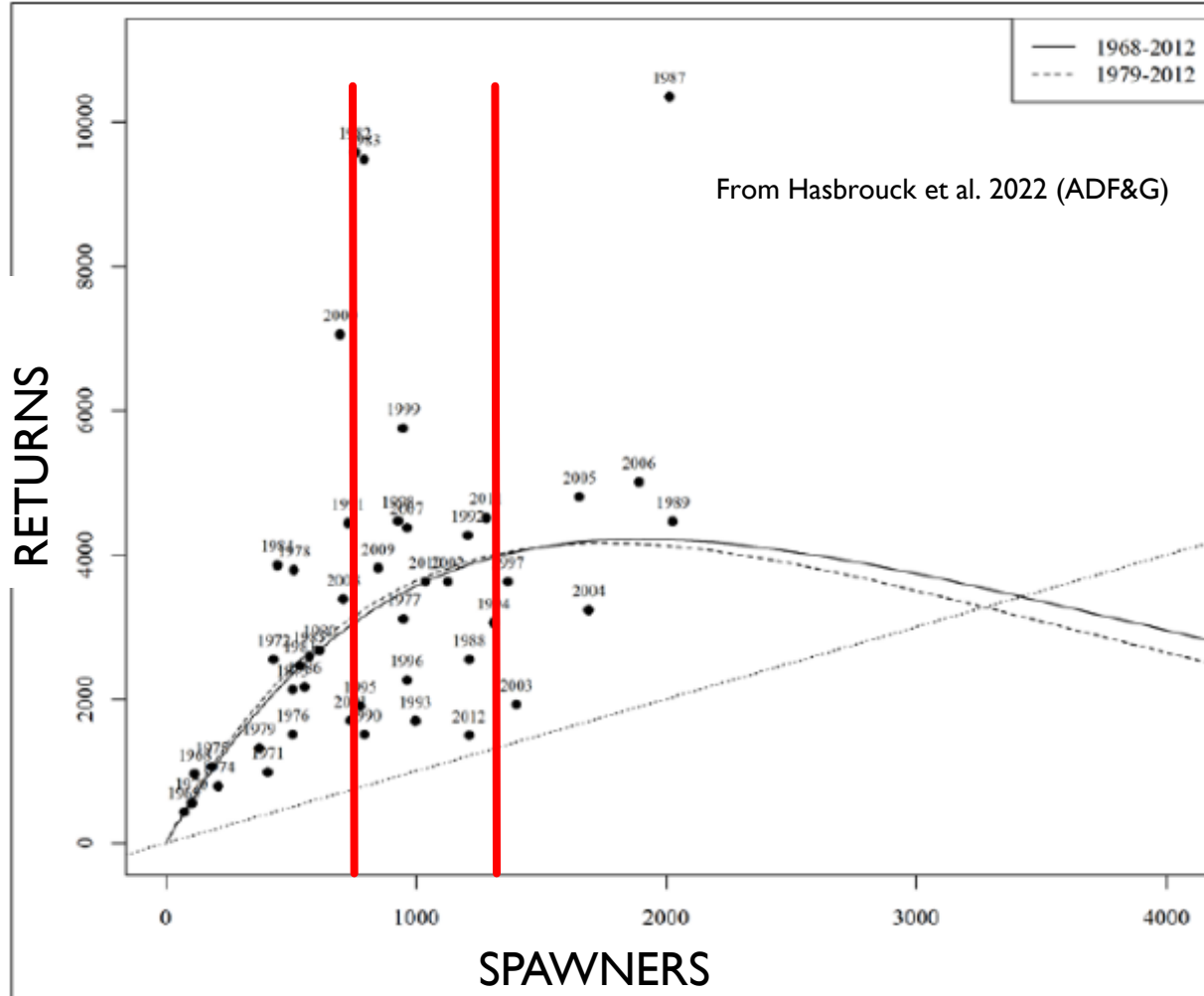
$$MFMT_t = \frac{\sum_{i=t-T+1}^t Y_{EEZ,i}}{\sum_{i=t-T+1}^t R_i}$$

where, $Y_{EEZ,i} = \max(0, R_t - G_t - C_{state,t})$

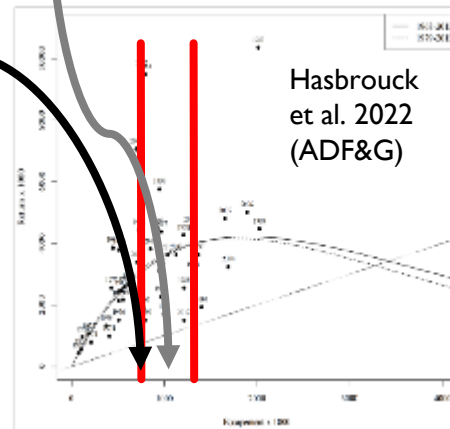
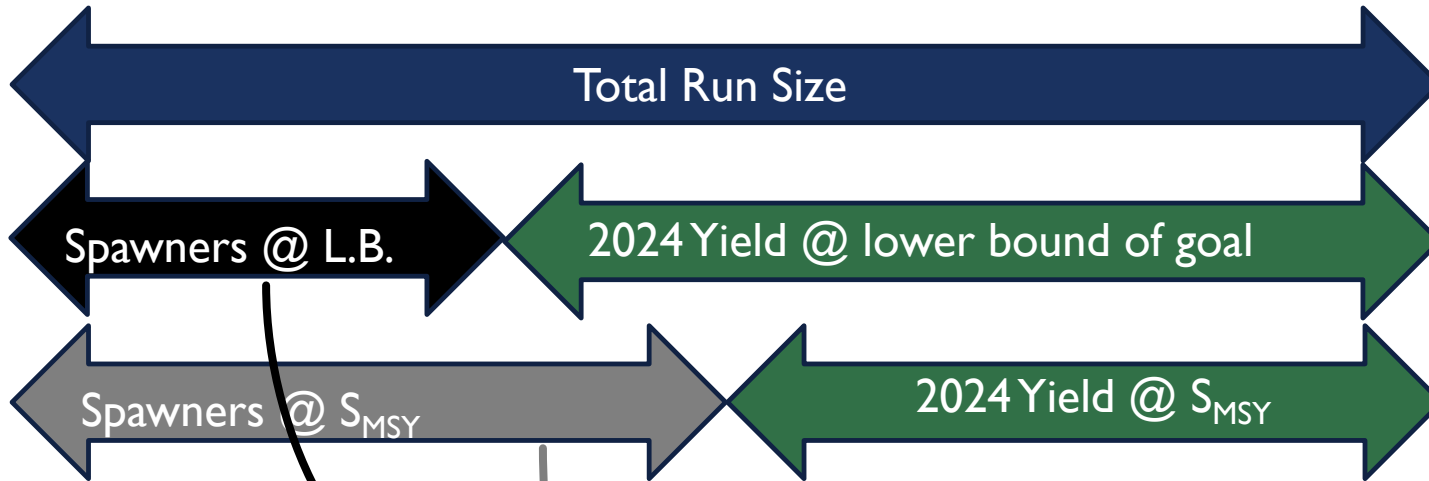
$\hat{Y}_{EEZ,t} = \max(0, \hat{R}_t - G_t - \bar{F}_{state,t} * \hat{R}_t)$



I. KENAI LATE-RUN SOCKEYE SALMON: ALWAYS WINNING!.....SO FAR

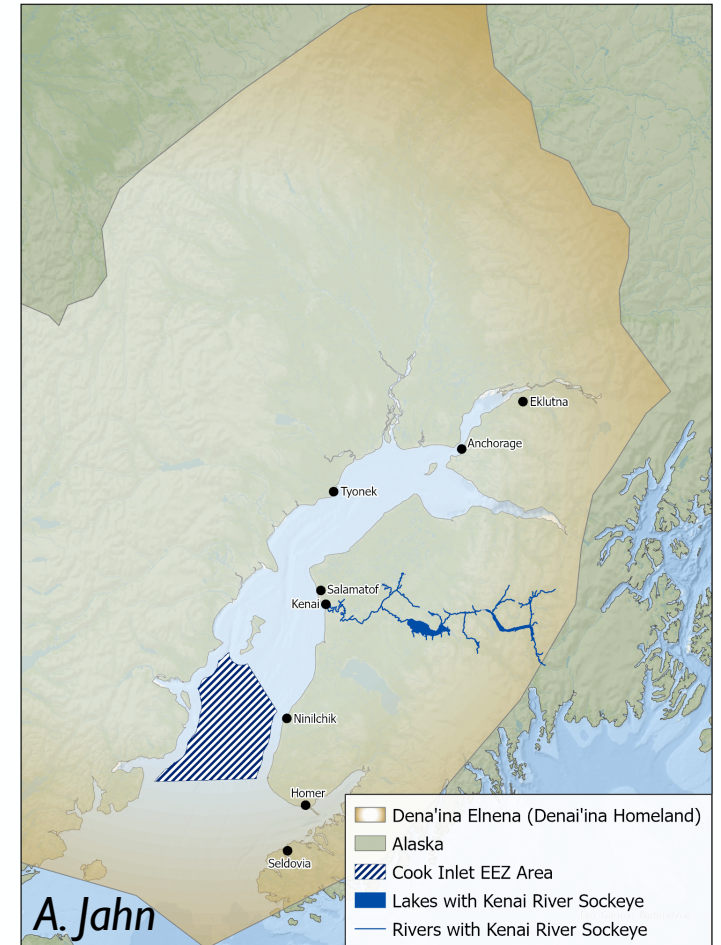


I. LOWER BOUND OF GOAL: MORE HARVEST NOW, BUT IN THE FUTURE???



What about future yield?

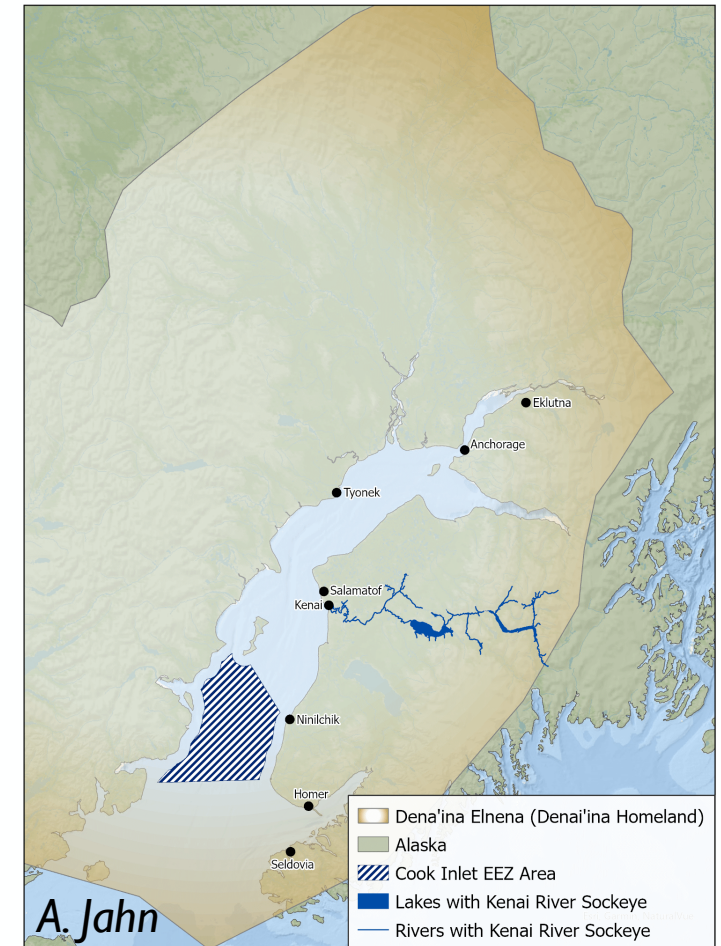
Hasbrouck et al. 2022 (ADF&G)



I. KENAI LATE-RUN SOCKEYE SALMON: METHOD RECOMMENDATION

After all that talking.....

- Recommendation: Use the lower bound of the goal to assess yield for 2024.
- Lower bound of goal provides excellent yield and assumed to provide high probability of maximum sustainable yield.
- Could consider additional methods in future analyses.



I. KENAI LATE-RUN SOCKEYE SALMON: TIER I STOCK STATUS, PROJECTIONS, AND RECOMMENDATIONS (SAFE PG. 27)

Year	Overfished? No		Tier I Overfishing? No		Total Run	EEZ Harvest	EEZ Cum. Harvest	OFL	ABC
	MSST	Cum. Escap.	MFMT	FEEZ					
2019	1,750	5,935	0.24	0.08	3,542	252	1,189		
2020	1,775	6,041	0.25	0.07	2,394	50	1,001		
2021	1,800	7,163	0.31	0.06	3,992	256	857		
2022	1,825	7,355	0.33	0.07	2,682	332	987		
2023	1,850	8,561	0.37	0.08	3,882	418	1,308		
2024	1,875		0.40	0.15	3,485		1,056	1,364	652

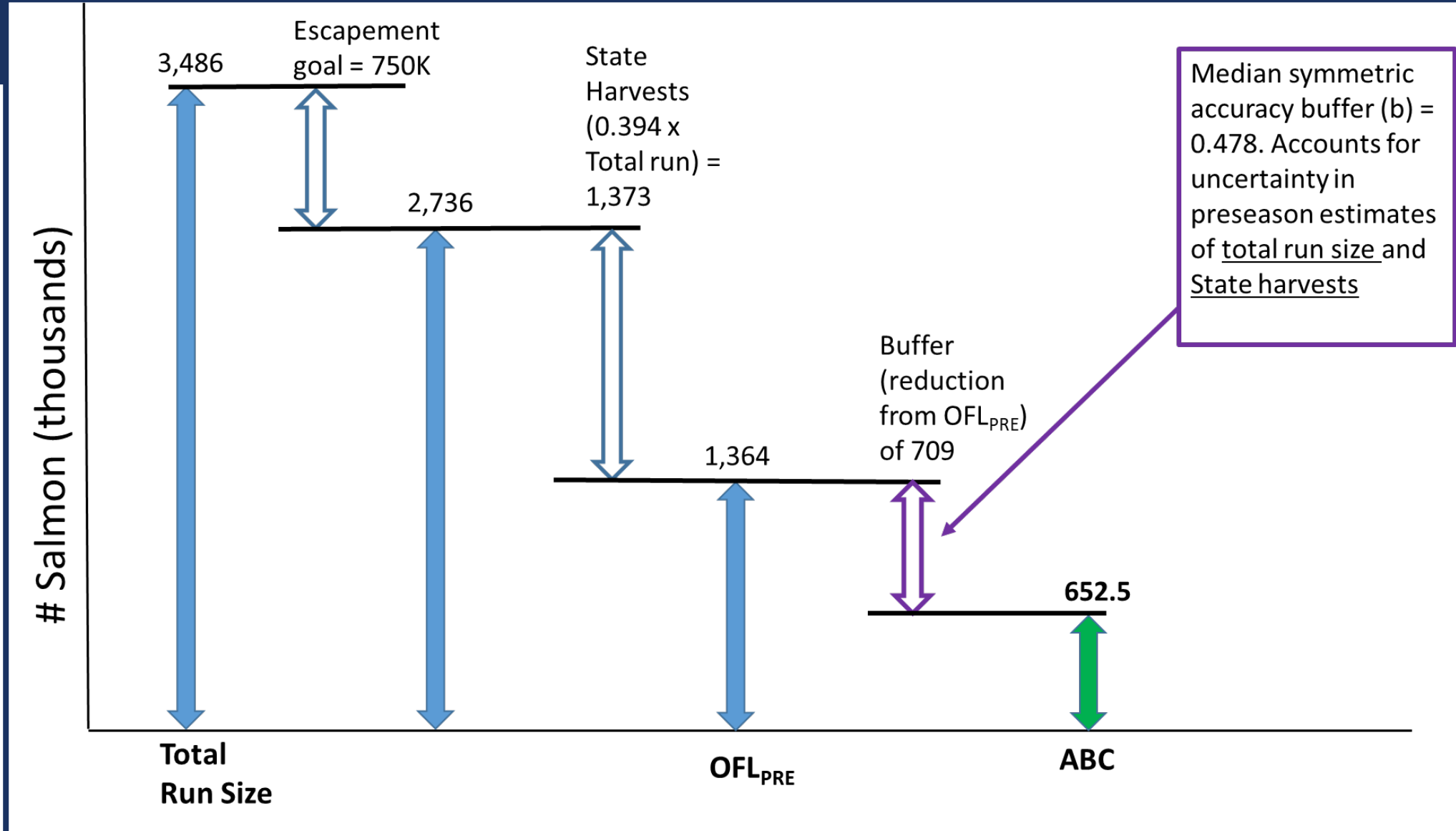
Postseason estimates

Preseason projections

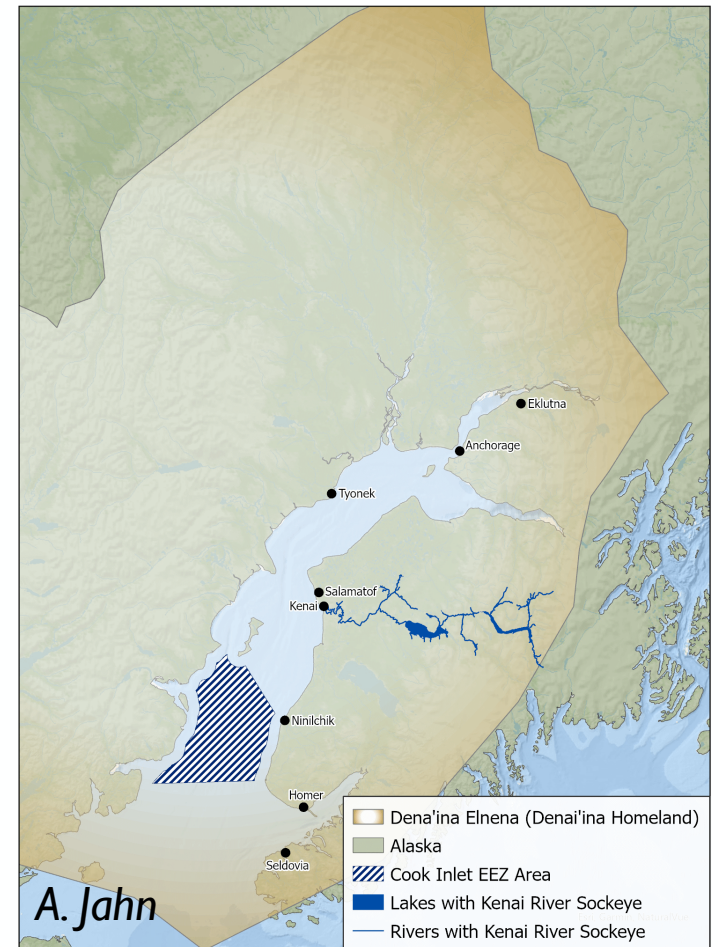
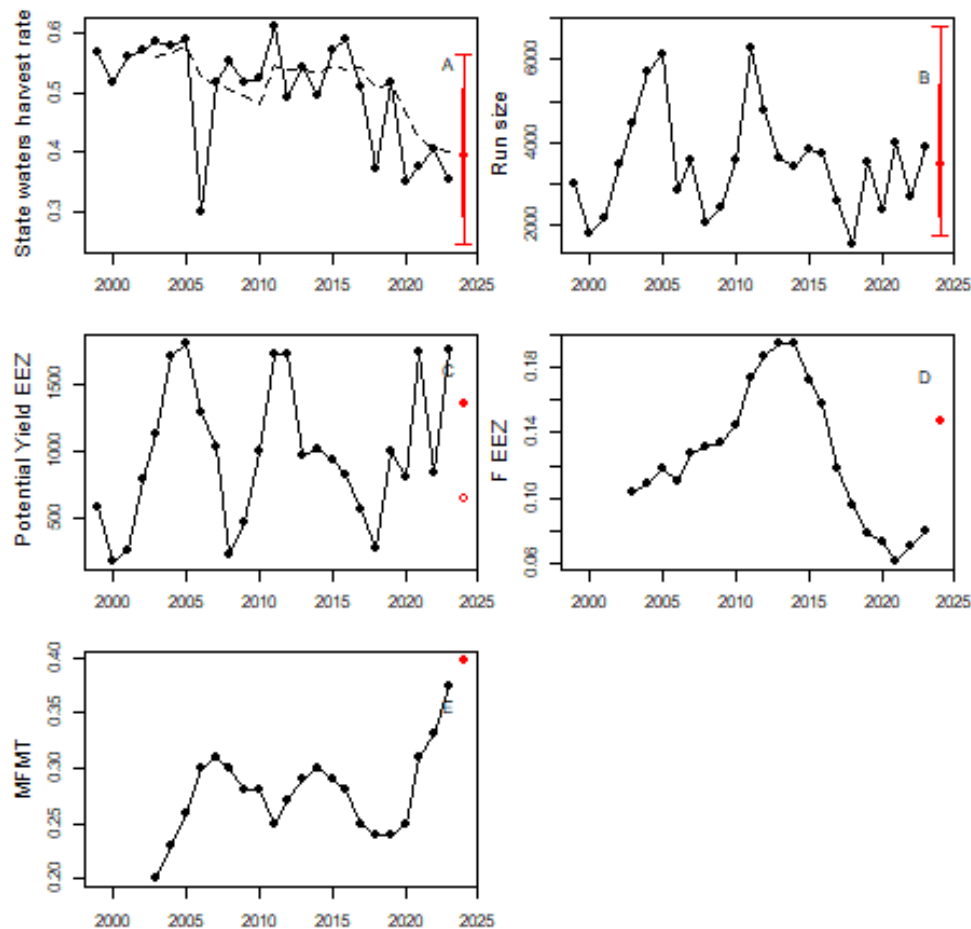
1,364 652



I. KENAI LATE-RUN SOCKEYE SALMON: TIER I HARVEST SPECS



I. KENAI LATE-RUN SOCKEYE SALMON: SUMMARY PLOTS (SAFE APPENDIX A1, PG. 61)

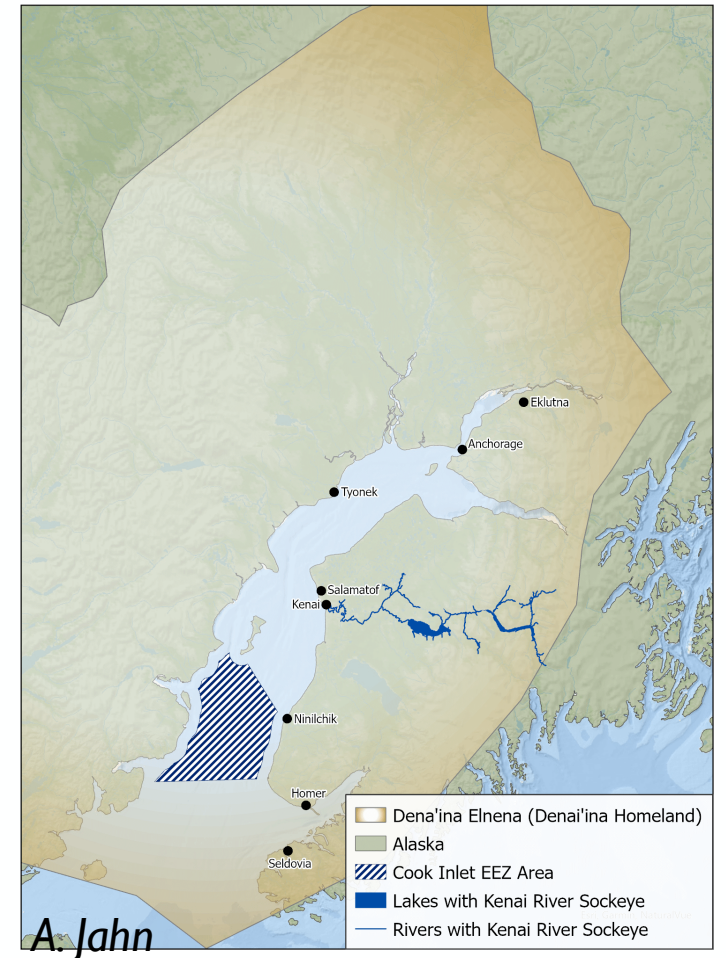


I. KENAI LATE-RUN SOCKEYE SALMON: TIER I ABC/ACL RECOMMENDATIONS

Recommendations:

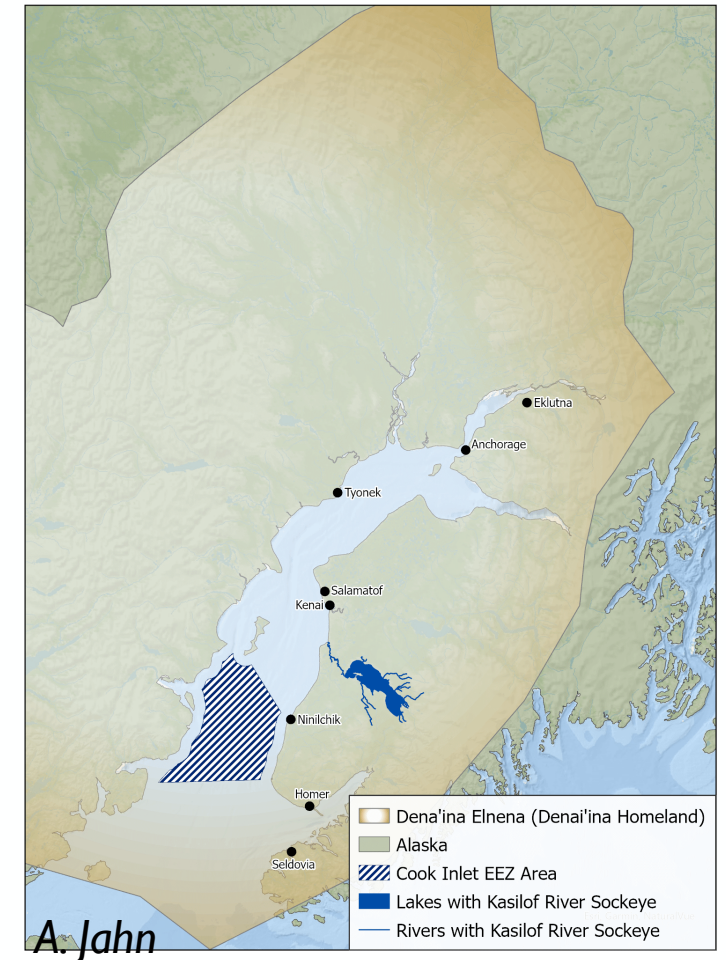
- Preseason total run size: 3,458,000 fish
- Preseason OFL..... 1,363,932 fish
- Buffer* 0.478
- ABC..... **652,454** fish
- ACL = ABC

* Buffer (b) is the fraction by which OFL is reduced to ABC to account for uncertainty in estimates of total run size and State harvests. Buffer is not the difference between the OFL and the ABC (1-b).



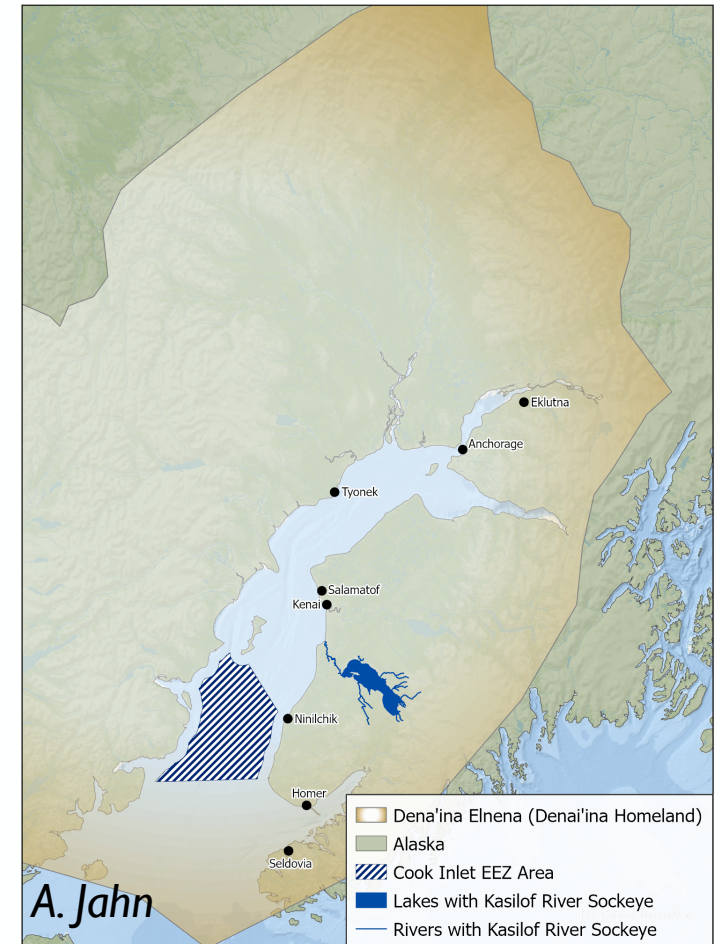
2. KASILOF SOCKEYE SALMON: STOCK DEFINITION (SAFE PG. 28)

- Federal definition = same as State of Alaska definition
 - Escapement goal: 140-370K with lower bound used in Federal assessment
 - ADF&G harvest and escapement data
 - Quantities estimated for this SAFE
 - recent sportfish harvests; proportion of drift gillnet harvest in EEZ; proportion Kasilof sockeye salmon in recent harvests



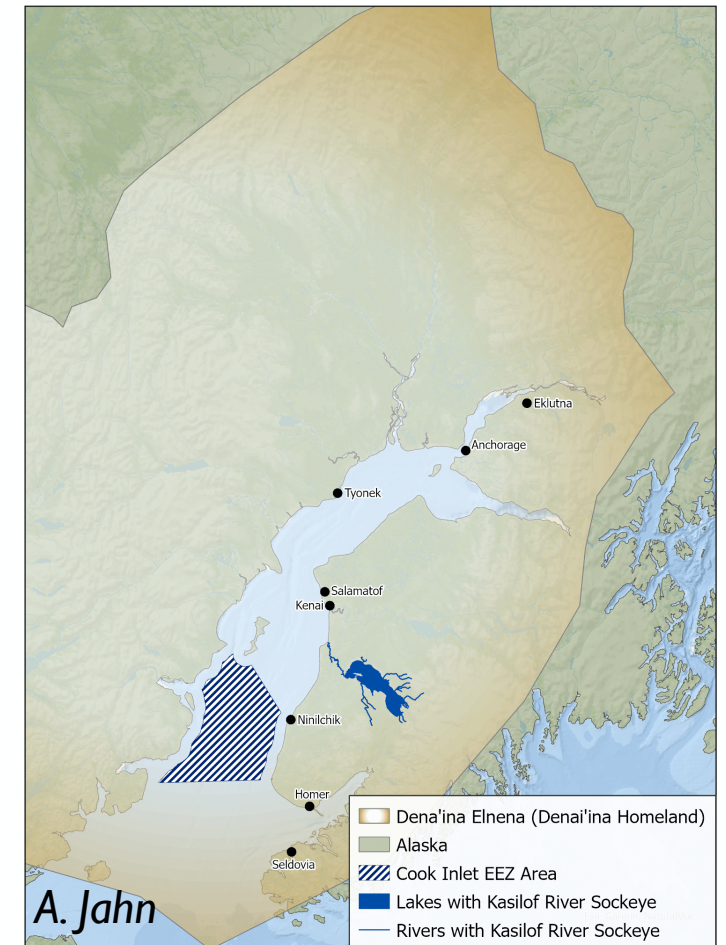
2. KASILOF SOCKEYE SALMON: AVAILABLE INFORMATION

- Escapement goal and escapements
- Harvest estimates for all components: commercial, recreational, personal use
- Age estimates for all components: harvest + escapement
- Brood tables
- Spawner-recruitment estimates
- Sibling model-based preseason forecasts
- Easy call: **Tier I!**



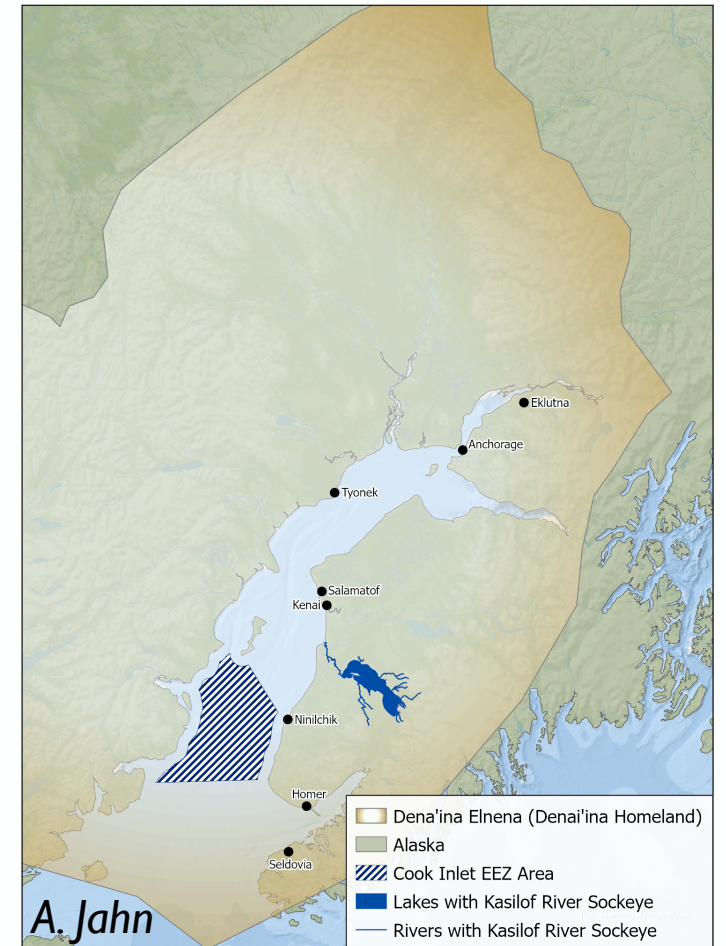
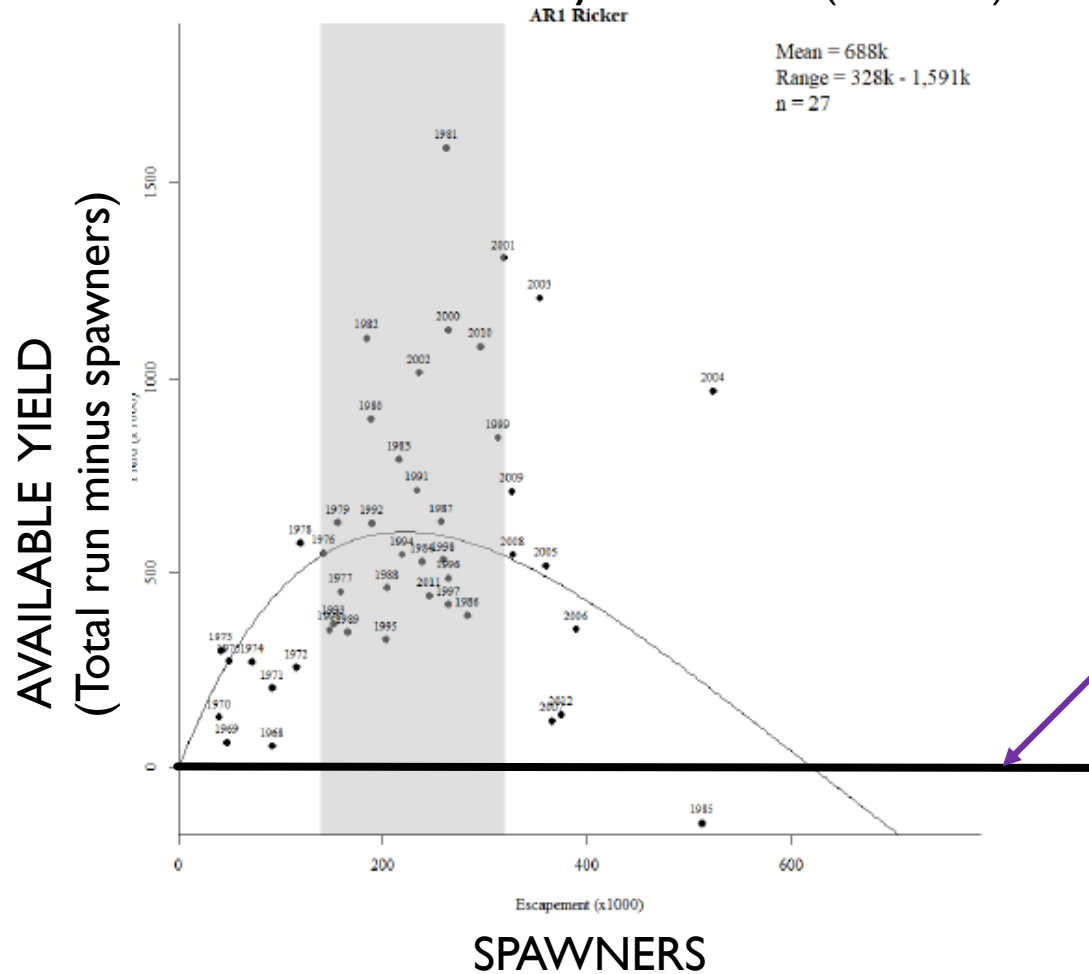
2. KASILOF SOCKEYE SALMON: SDC & HARVEST SPECIFICATIONS

- Same Tier I status determination criteria methods as for Kenai sockeye salmon
- Same Tier I harvest specification methods as for Kenai sockeye salmon



2. KASILOF SOCKEYE SALMON: A WORD ABOUT THE SPAWNER-RECRUITMENT RELATIONSHIP (SAFE FIG. 3, PG. 30)

From McKinley et al. 2020 (ADF&G)



2. KASILOF SOCKEYE SALMON: STOCK STATUS, PROJECTIONS, AND RECOMMENDATIONS (SAFE PG. 31)

Year	Overfished? No		Tier I Overfishing? No		Total Run	EEZ Harvest	EEZ Cum. Harvest	OFL	ABC
	MSST	Cum. Escap.	MFMT	FEEZ					
2019	400	1,831	0.30	0.03	613	10	98		
2020	390	1,902	0.35	0.03	845	6	86		
2021	380	2,179	0.39	0.03	925	21	107		
2022	370	2,788	0.47	0.03	1,495	45	113		
2023	360	3,333	0.52	0.03	1,393	57	140		
2024	350		0.55	0.13	1,125		130	623	433

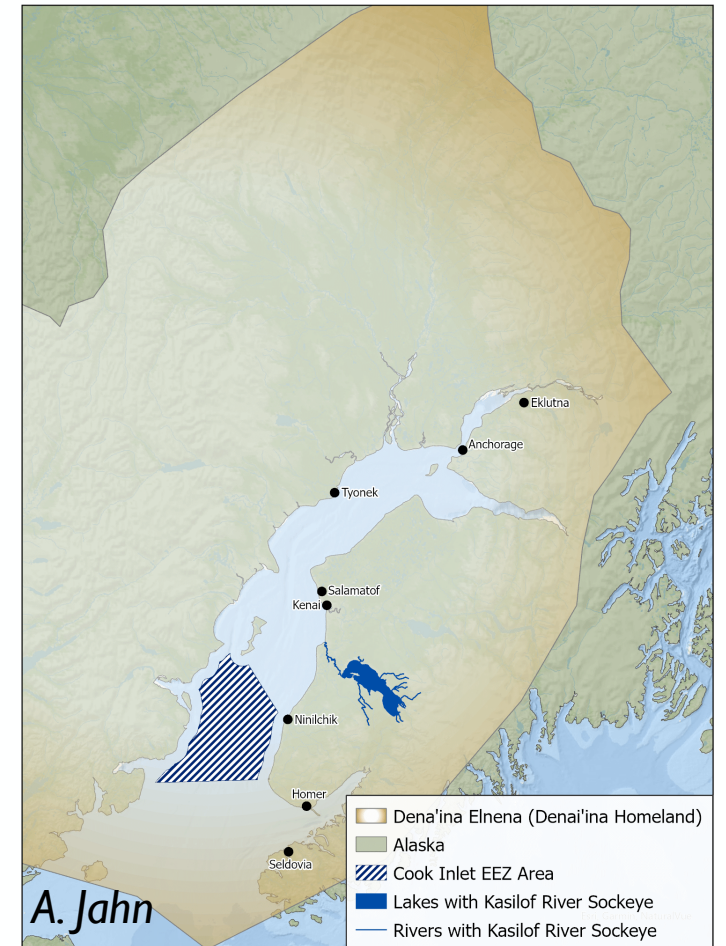
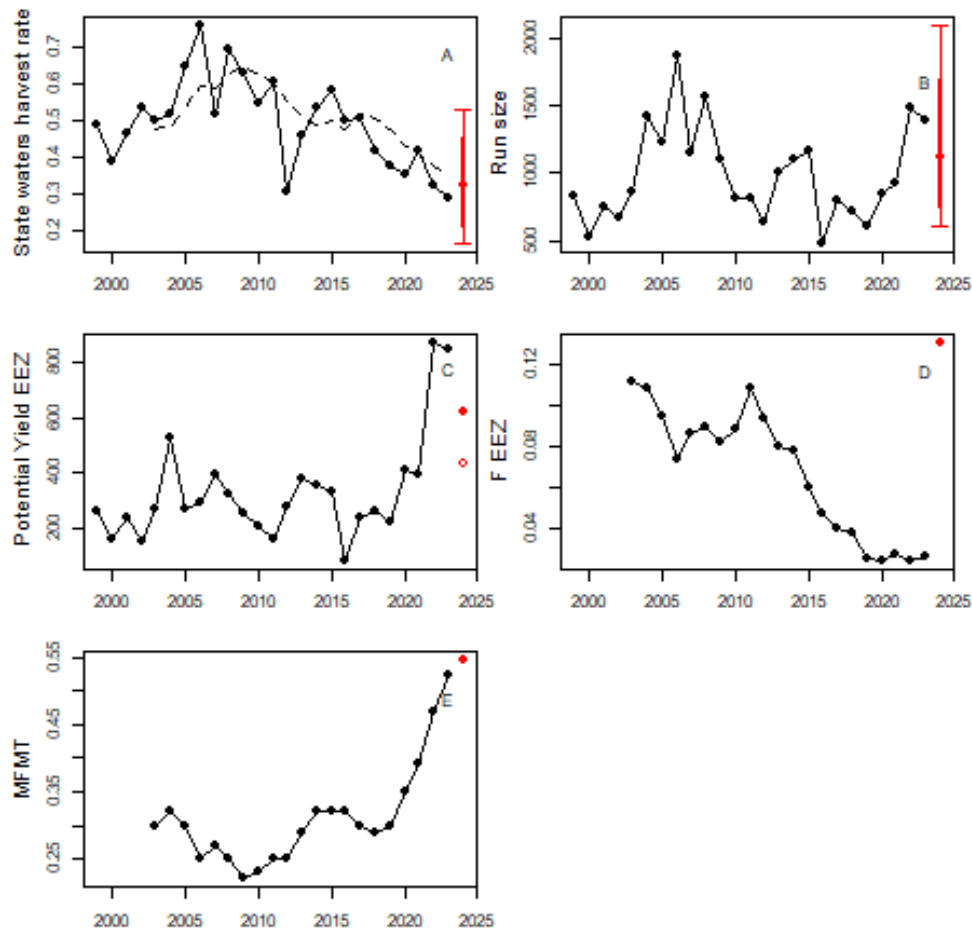
Postseason estimates

Preseason projections

623 433



2. KASILOF SOCKEYE SALMON: SUMMARY PLOTS (SAFE APPENDIX A2)



2. KASILOF SOCKEYE SALMON: TIER I ABC/ACL RECOMMENDATIONS

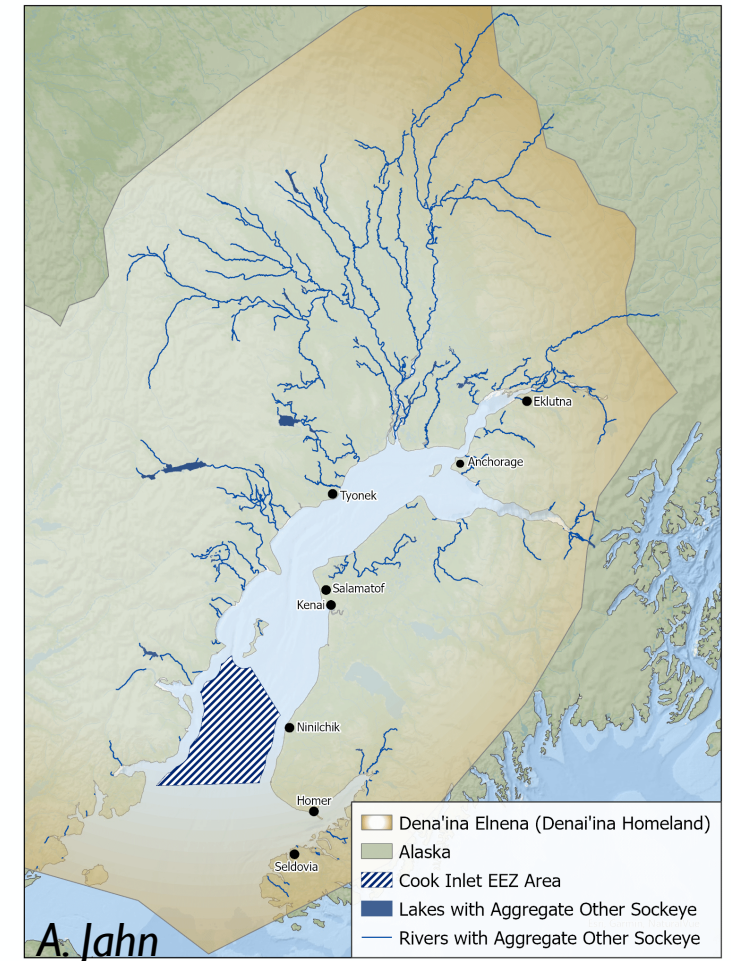
Recommendations:

- Preseason total run size: 1,225,368 fish
- Preseason OFL..... 623,084 fish
- Buffer 0.694
- ABC..... **432,578** fish
- ACL = ABC



3. AGGREGATE “OTHER” SOCKEYE SALMON: STOCK COMPLEX (SAFE PG. 32)

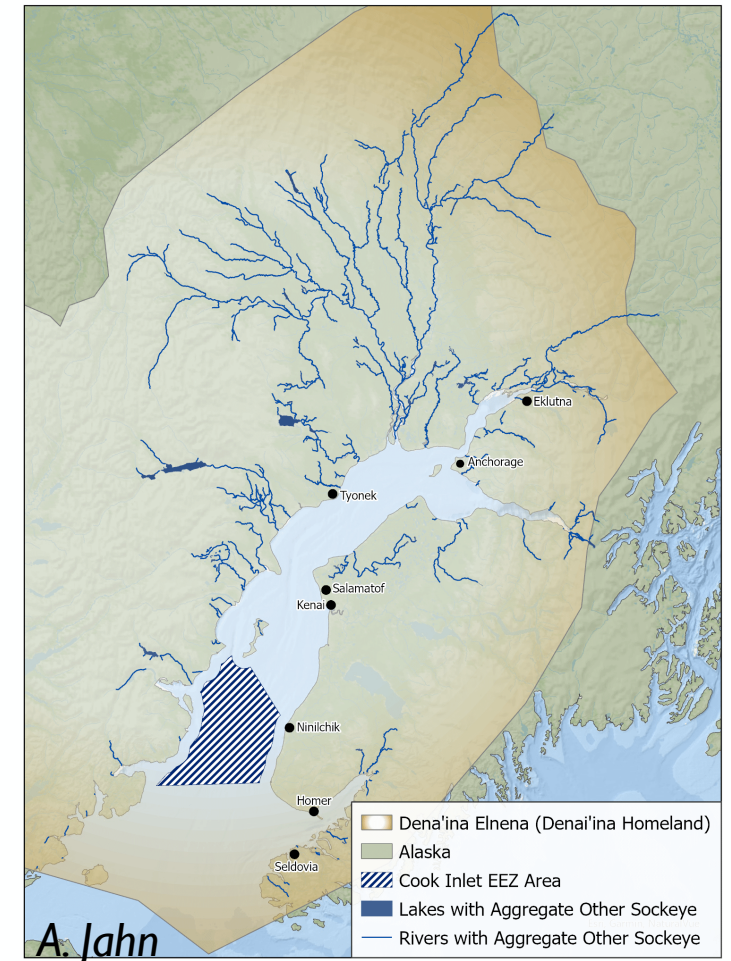
- Federal definition = All other UCI sockeye salmon harvested in the EEZ, except Kenai and Kasilof sockeye salmon
 - Escapement goal for 4 indicator stocks: Fish Creek (15,000–45,000); Chelatna Lake (20,000–45,000); Judd Lake (15,000–40,000); and Larson Lake (15,000–35,000): **65K total**
 - ADF&G harvest and escapement data; genetic stock composition data.
 - SAFE: some recent values estimated (sportfish harvests; proportion harvested in EEZ)



3. AGGREGATE “OTHER” SOCKEYE SALMON: TIER DILEMMA

Tier 2 or Tier 3?

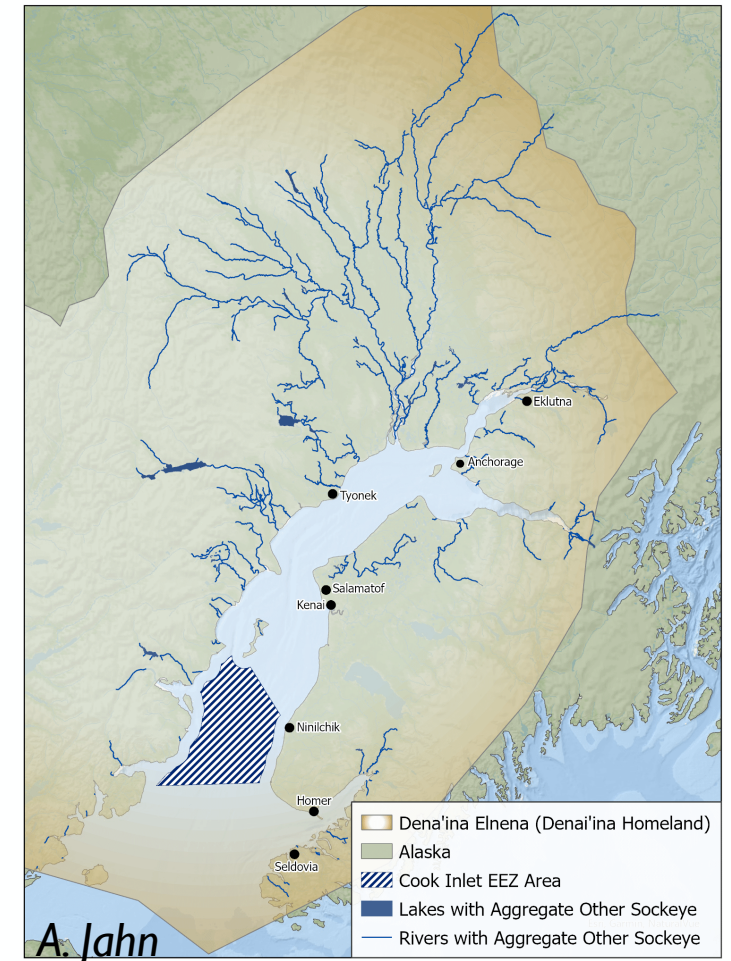
- Tier 2: A stock complex with specific stocks as indicator stocks.
- A stock complex = a stock with multiple drainages or escapement goals for multiple tributaries in the same drainage.
- Tier 2: same methods for SDC and harvest specifications as Tier 1, just for the entire complex.
- Tier 2, requires a total run size estimate.



3. AGGREGATE “OTHER” SOCKEYE SALMON: TIER DILEMMA

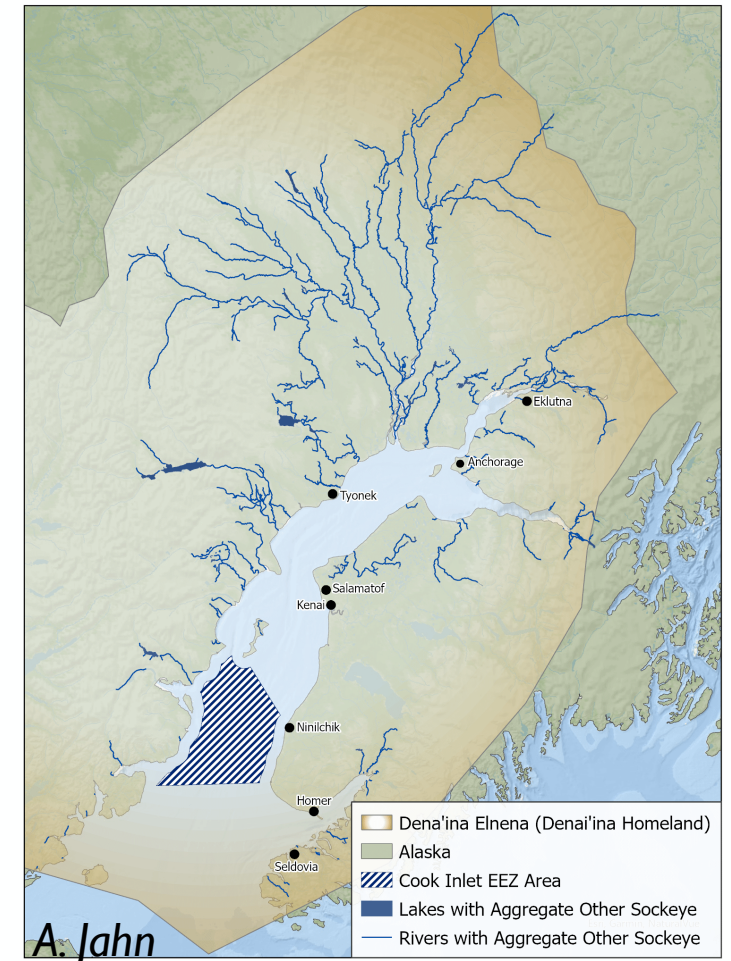
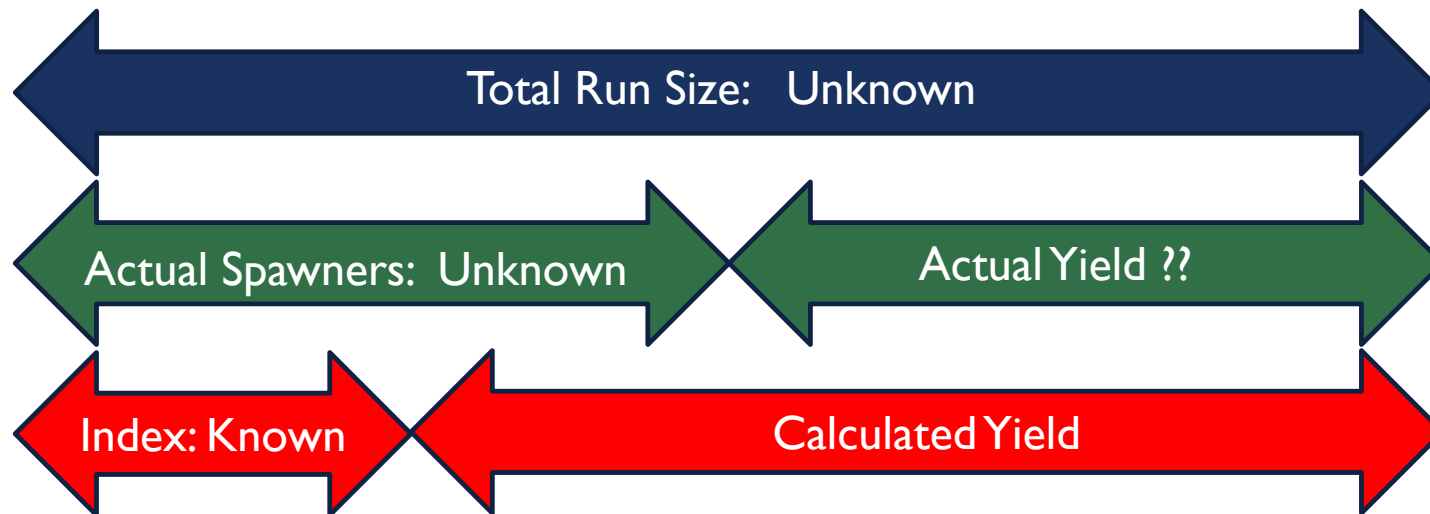
Tier 3: A stock/stock complex with no “reliable” estimate of spawning escapement.

- Tier 3: does not require an estimate of total run size.
- Tier 3: Overfishing and harvest specifications evaluated based on past harvest, not based on total run size and escapement goals (i.e., Tiers 1-2).



3. AGGREGATE “OTHER” SOCKEYE SALMON: TIER DILEMMA

- Potential risks with Tier 2 designation
 - Risk I: overestimating potential yield



3. AGGREGATE “OTHER” SOCKEYE SALMON: TIER DILEMMA

The problems with Tier 2:

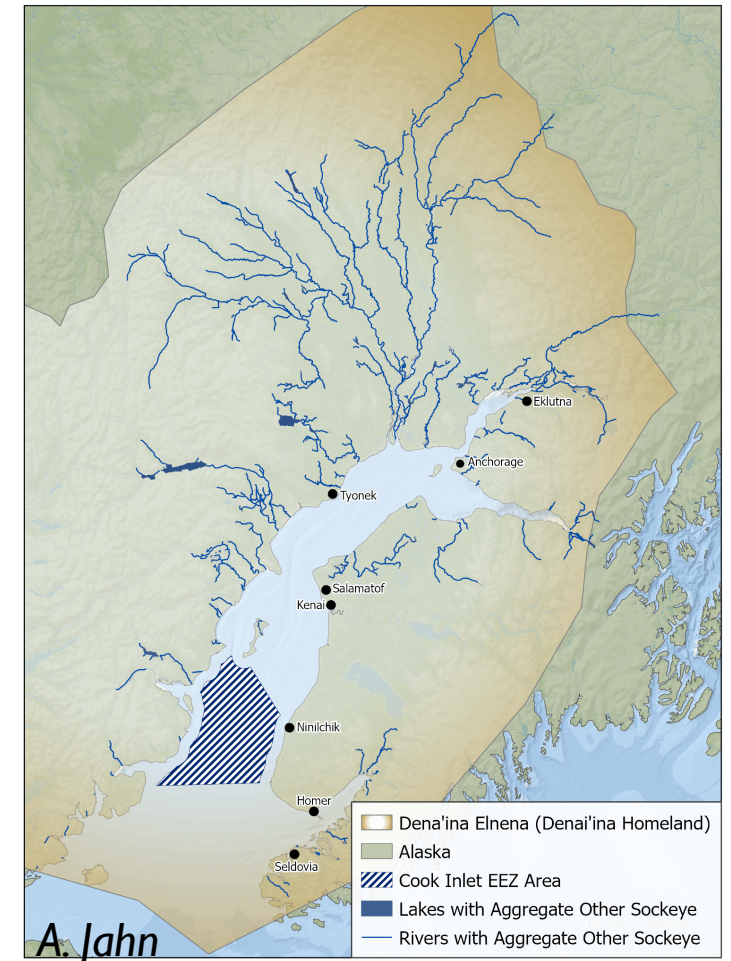
[Calculated yield (index)] >> [true (unknown) yield available]

- Risk 1: Harvest rate too high & overfishing determination should be triggered, but is not.

Spawning escapements not monitored, leading to calculated overfishing or overfished determination when there are sufficient spawners.

- Risk 2: overfishing or overfished determination when not warranted.

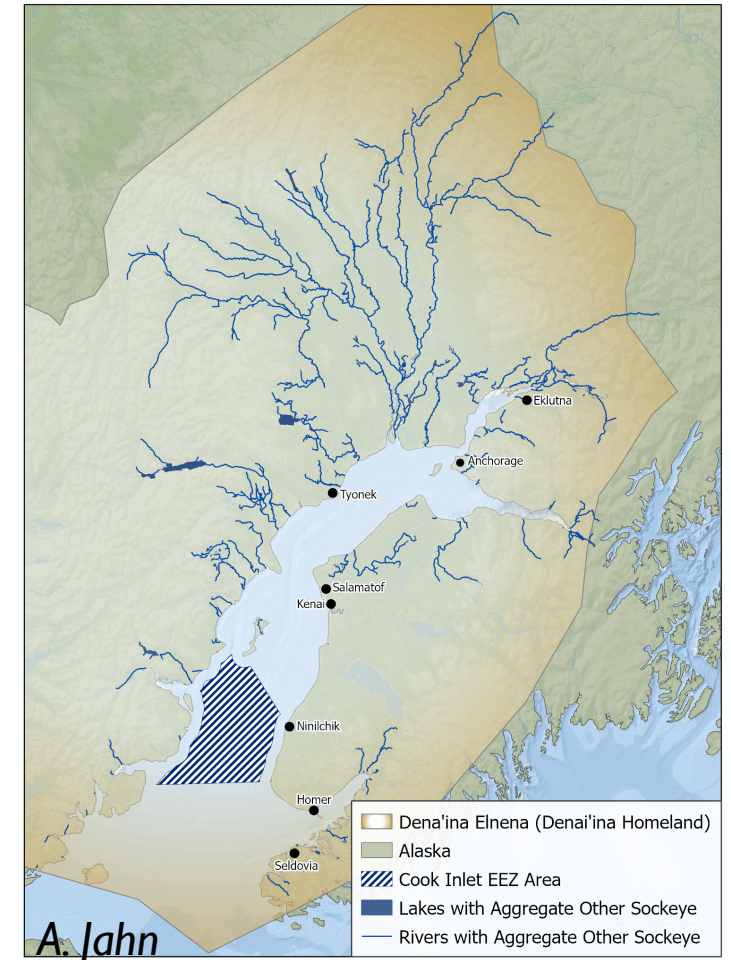
BUT.....



3. AGGREGATE “OTHER” SOCKEYE SALMON: TIER RECOMMENDATION

Considerations:

- Many unmonitored systems
- Gaps in monitoring index systems: Judd Lake & Chelatna R.
- Inability to estimate total run size for SDC and harvest specs.
- Recommendation: Tier 3 with four index systems for assessing overfished status vs. MSST.



3. AGGREGATE “OTHER” SOCKEYE SALMON: TIER 3 STATUS DETERMINATION CRITERIA (SDC)

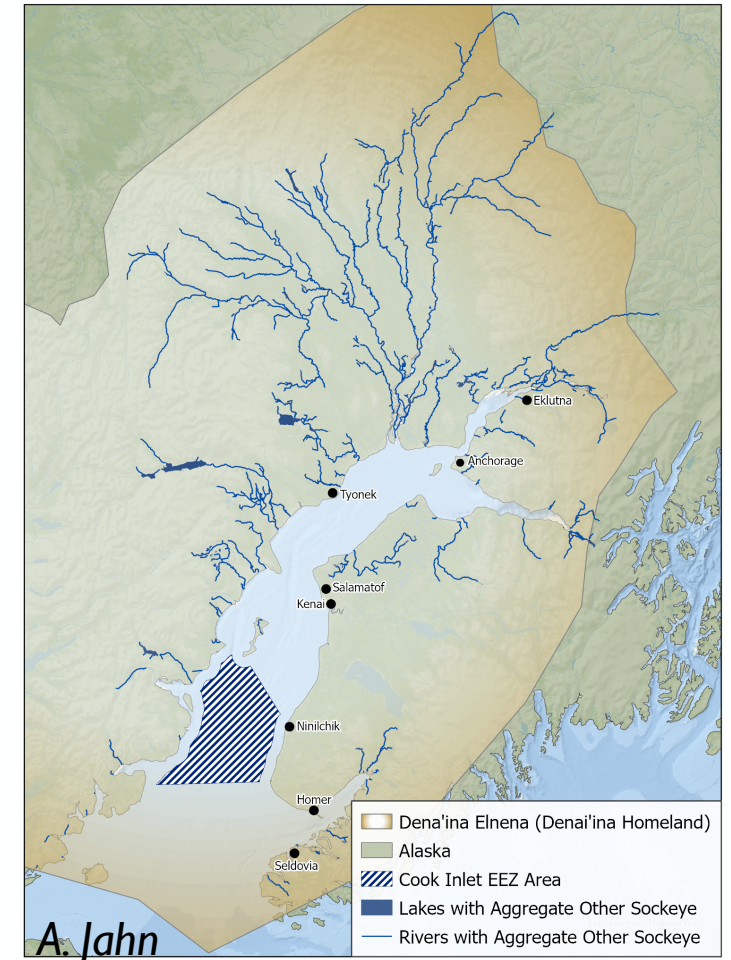
Tier 3 Status determination criteria

Overfished:

- Assessed in same manner as for Tier 1 (if there is an indicator stocks):
- Cumulative spawners for a generation vs. **MSST**

Overfishing:

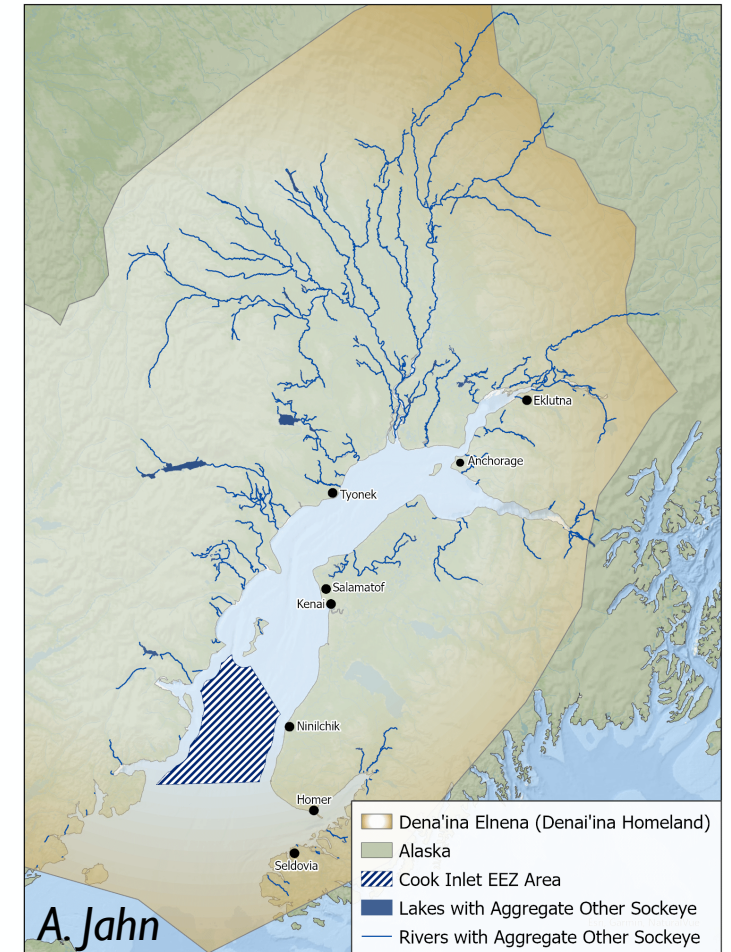
- Cumulative harvests for generation vs. **Postseason OFL**



3. AGGREGATE “OTHER” SOCKEYE SALMON: TIER 3 OFLAND ABC EXPLAINED

Tier 3

- $OFL_{POST} = (\text{maximum harvest}) \times (\text{generation time})$
- $OFL_{PRE} = (OFL) - (\text{cumulative harvest for T-1 years of generation})$.
- $ABC = OFL_{PRE} * \text{Buffer (e.g., 0.1 to 0.9)}$



3. AGGREGATE “OTHER” SOCKEYE SALMON: TIER 3 STOCK STATUS, PROJECTIONS, BUFFER, AND ABC RANGE (SAFE PG. 36)

Year	MSST	Cum. Escap.	MFMT	FEEZ	Total Run	EEZ Harvest	EEZ Cum. Harvest	OFL	ABC (10%)	ABC (90%)
2019	178	822	NA	NA	NA	73	404	1,271		
2020	170	686	NA	NA	NA	13	346	1,271		
2021	163	736	NA	NA	NA	54	352	1,271		
2022	163	695	NA	NA	NA	133	352	1,271		
2023	163	631	NA	NA	NA	183	457	1,271		
2024	163		NA	NA	NA		384	888	88	799

(T-I Cum. Harvest)

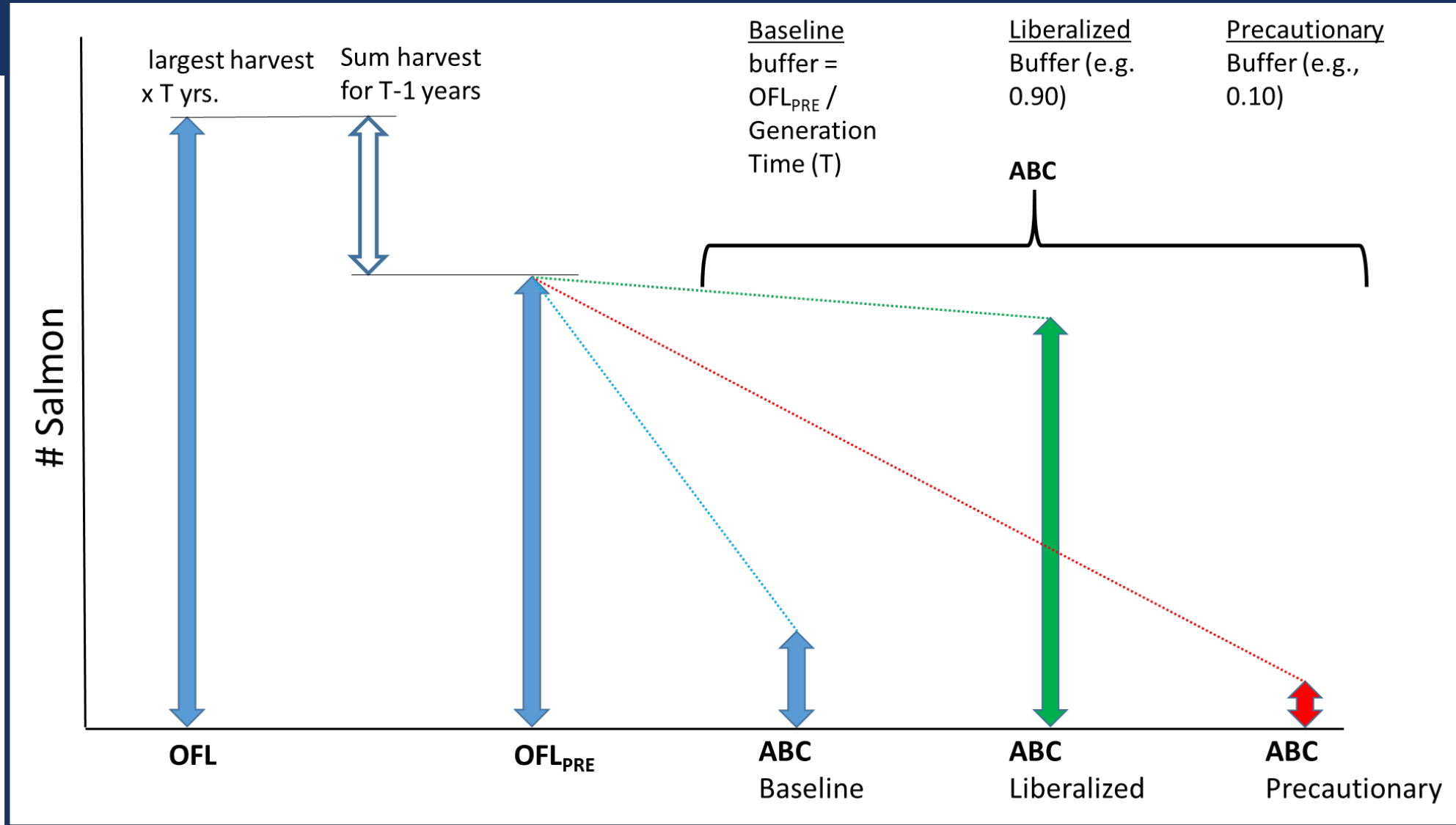
Overfishing??

OFL_{PRE}

ABC range



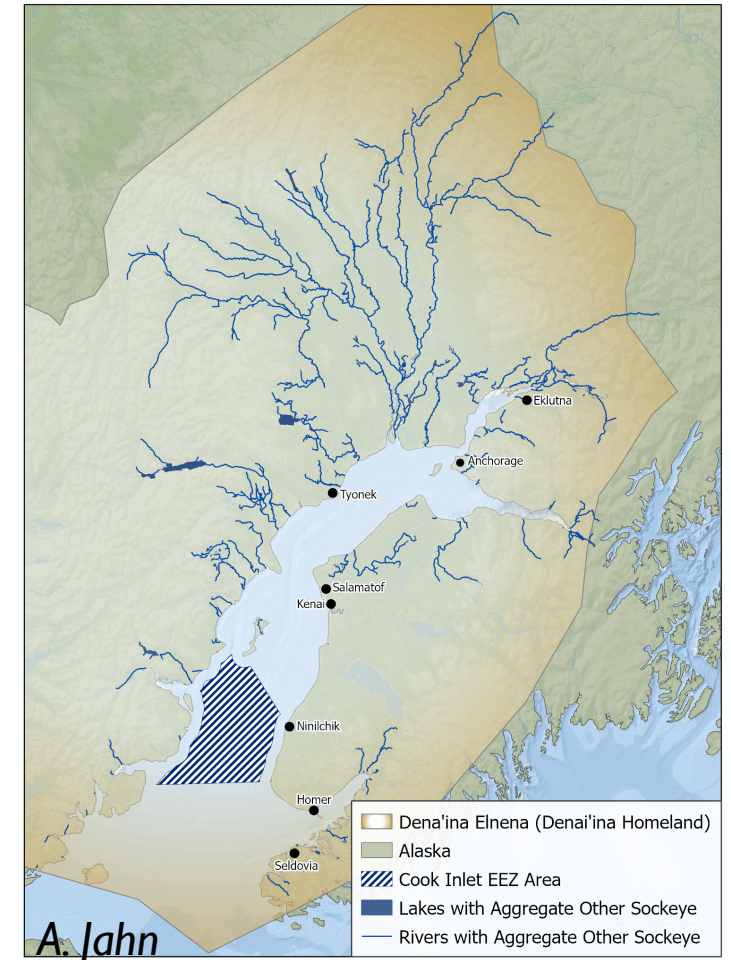
TIER 3: HARVEST SPECS EXPLAINED



3. AGGREGATE “OTHER” SOCKEYE SALMON: BUFFER CONSIDERATIONS

Tier 3: Buffer considerations

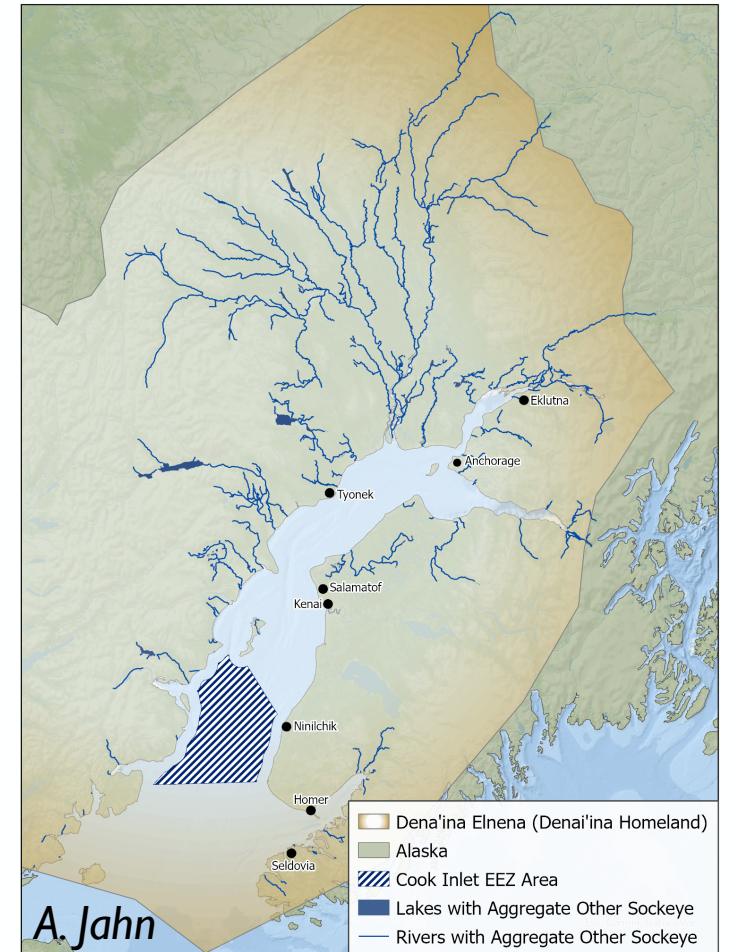
- $OFL = \text{max harvest} \times 5 \text{ years (sockeye salmon)}$
- $1/5 = 0.20 = \sim \text{max harvest for 1 year}$
- 0.20 buffer keeps ACL to a single season value.
- “apples-apples” with Kenai and Kasilof sockeye salmon ACLs for setting TAC



3. AGGREGATE “OTHER” SOCKEYE SALMON: TIER 3 ABC/ACL RECOMMENDATION

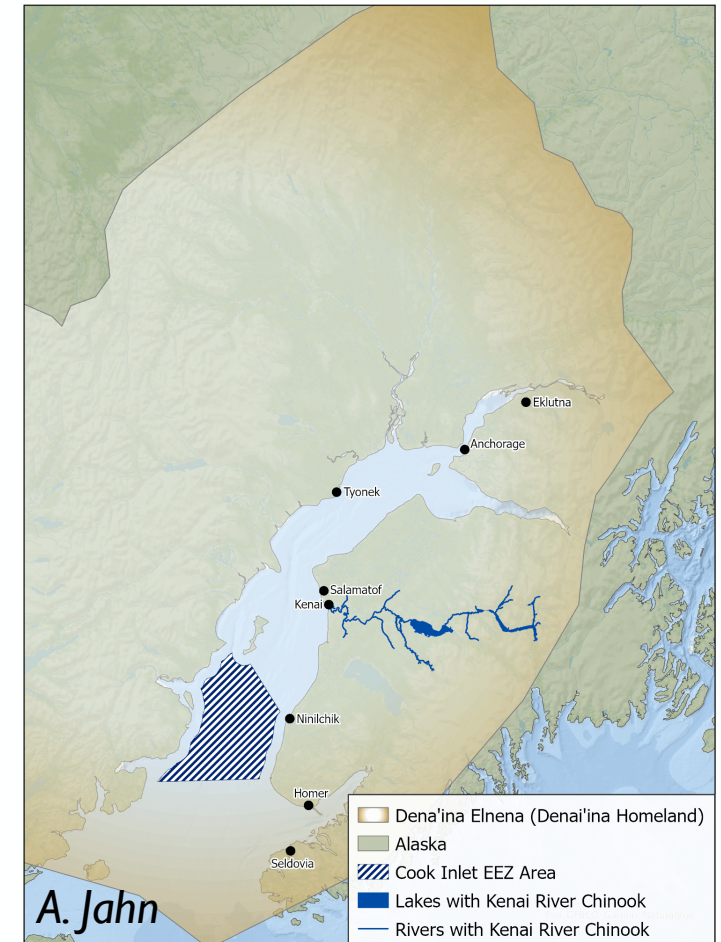
Recommendations:

- Preseason total run size: NA
- Preseason OFL..... 887,464 fish
- Buffer 0.20
- ABC..... **177,493** fish
- ACL = ABC



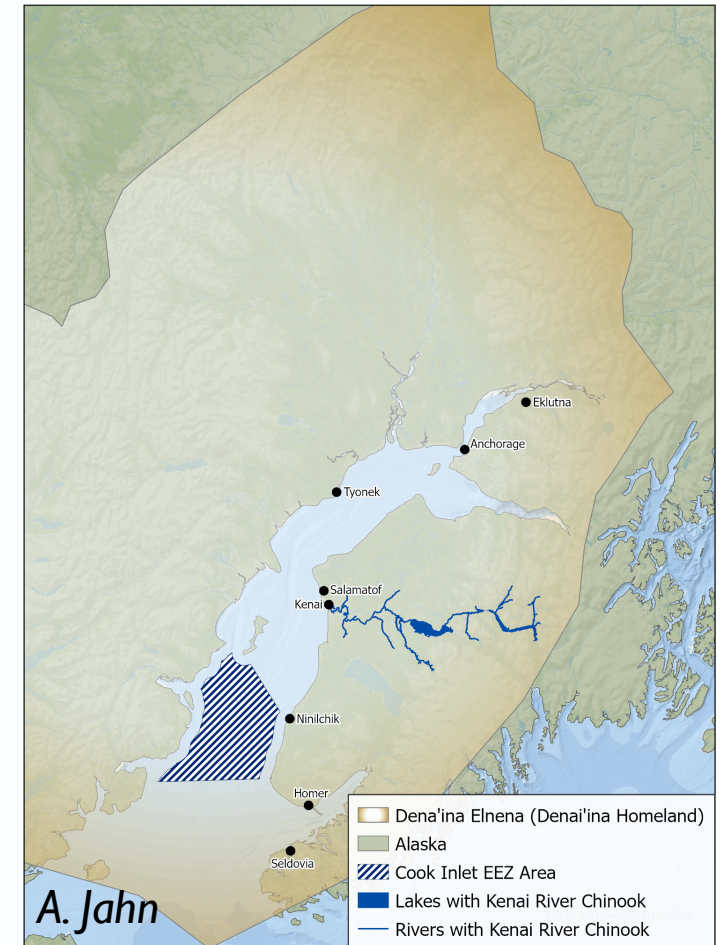
4. KENAI RIVER LATE RUN LARGE CHINOOK SALMON (SAFE PG. 37)

- Federal definition = Same stock definition as State of Alaska
 - Escapement goal: (established 2020; 15,000–30,000)
 - ADF&G harvest and escapement data
 - Estimated for SAFE: sportfish harvests; proportion of overall drift gillnet harvested in the EEZ.



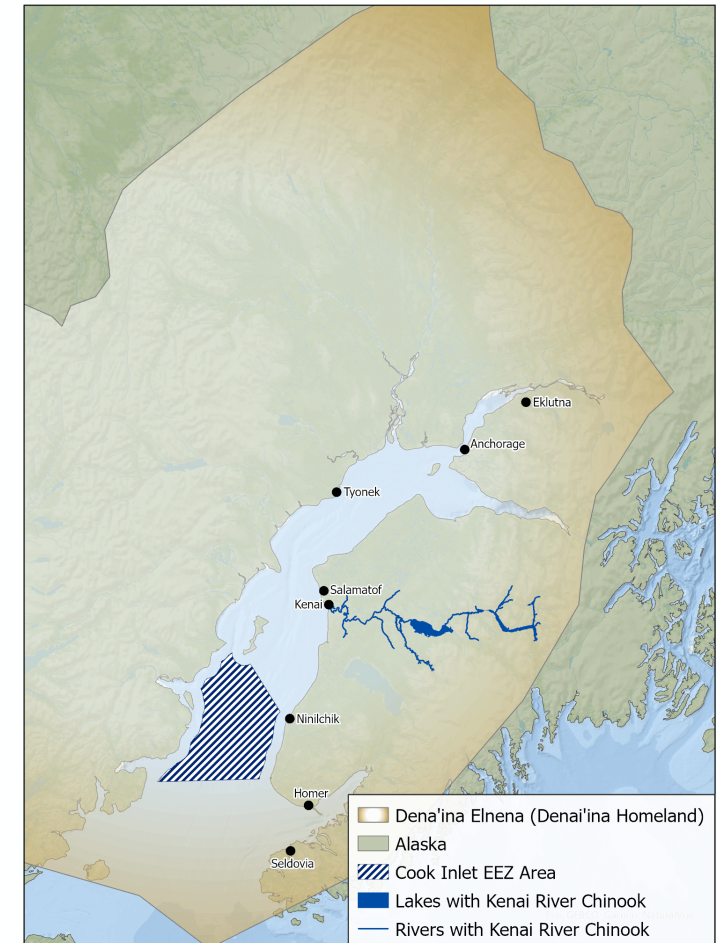
4. KENAI RIVER LATE RUN LARGE CHINOOK SALMON: TIER?

- EEZ stock composition is not supported
 - No genetic data (that we could find)
- 2023 EEZ harvest estimate: 51 Chinook salmon from any stock.
- ~21 fish (??) from Kenai Late Run Large Chinook salmon stock.....no data to support.



4. KENAI RIVER LATE RUN LARGE CHINOOK SALMON: RECOMMENDATION

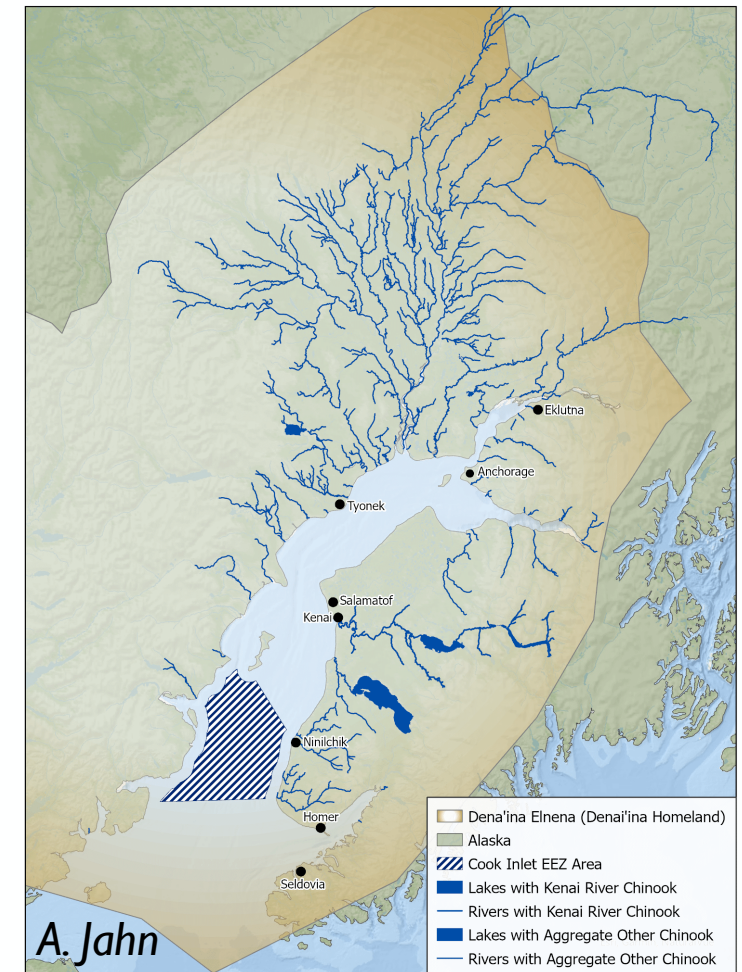
- Recommendation: Combine with all other Chinook salmon harvested in the EEZ.
 - Aggregate Tier 3.
- Recommendation (precautionary measure): Keep Kenai Late Run Large Chinook Salmon as indicator stock to assess overfished determination.



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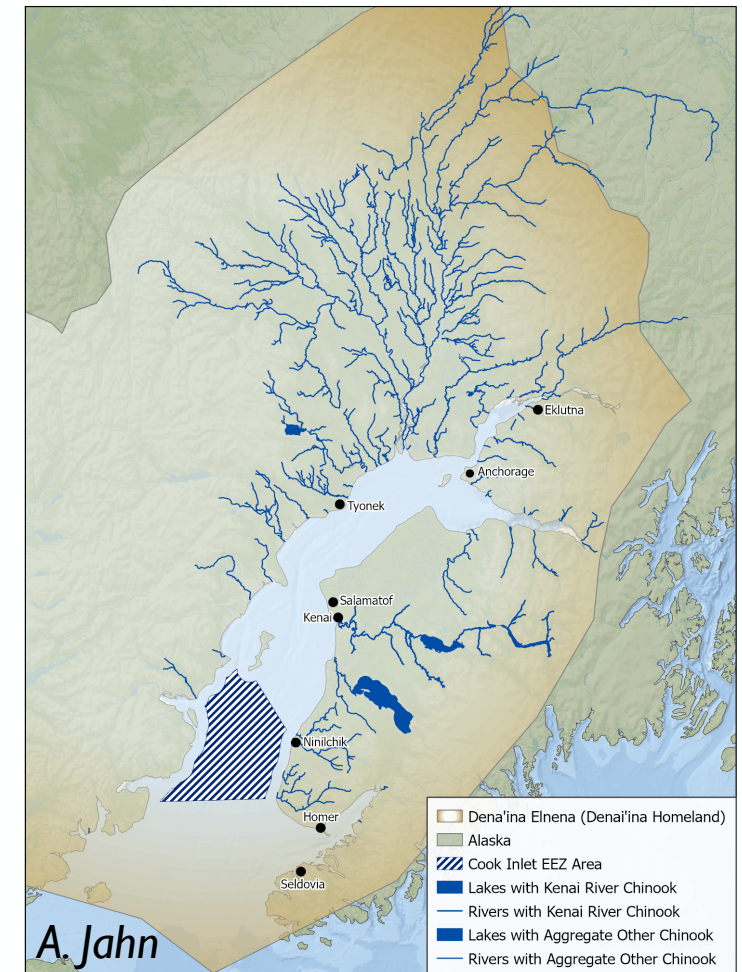
5. AGGREGATE CHINOOK SALMON: STOCK COMPLEX DEFINITION (SAFE PG. 40)

- Any Chinook salmon harvested in the EEZ.
- Definition would include many tributaries and drainages known to contain Chinook salmon throughout UCI
- Kenai Late Run Large Chinook salmon used as an indicator stock to assess overfished status vs. MSST (Tier 3).



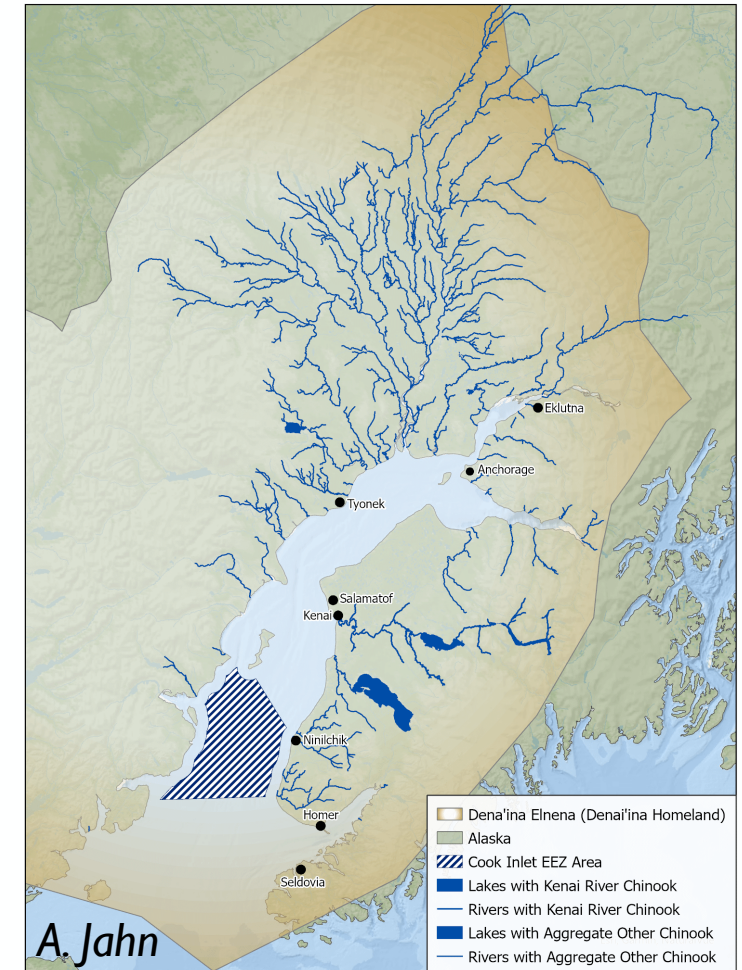
5. AGGREGATE CHINOOK SALMON: TIER RECOMMENDATION

- Total escapements to entire stock complex unknown, therefore total run size unknown.
- Recommendation: Tier 3
- Recommendation (Precautionary Measure): Kenai Late Run Large Chinook salmon as an indicator stock to assess overfished status vs. MSST.



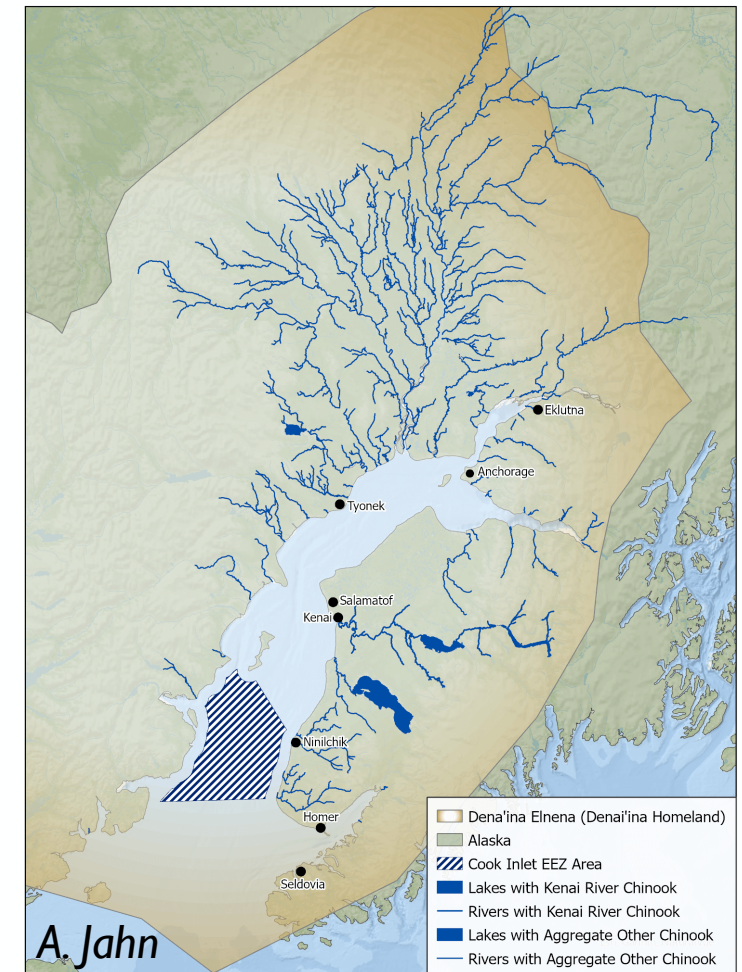
5. AGGREGATE CHINOOK SALMON: STOCK CONSIDERATION

- Chinook salmon in a low state of abundance throughout N. Pacific.
- 4 State of Alaska “Stock of Concern” designations for UCI Chinook salmon.
 - Chuitna, Theodore, and Eastside Susitna rivers & Alexander Creek.
- Kenai Late Run Large Chinook salmon below goal recently.



5. AGGREGATE CHINOOK SALMON: STOCK ATTRIBUTES

- Susitna Chinook stocks not thought to be harvested in appreciable quantities in drift gillnet fishery (Reimer and DeCovich, 2020).
 - Run timing mismatch.
- Unknown stocks harvested, but only 51 fish total in 2023.
- SAFE Assumption: low risk to any stock from EEZ fishery.



5. AGGREGATE CHINOOK SALMON: TIER 3 STOCK STATUS, PROJECTIONS, BUFFER, AND ABC RANGE (SAFE PG. 43)

Year	MSST	Cum. Escap.	MFMT	FEEZ	Total Run	EEZ Harvest	EEZ Cum. Harvest	OFL	ABC (10%)	ABC (90%)
2019	40.5	93	NA	NA	NA	81	934	3,072	note: SAFE report caption says “thousands of fish,” but the circled values are numbers of fish, not thousands.	
2020	41.3	92.9	NA	NA	NA	76	879	3,072		
2021	42.0	88.2	NA	NA	NA	87	810	3,072		
2022	42.7	87.5	NA	NA	NA	80	659	3,072		
2023	43.5	81.5	NA	NA	NA	51	635	3,072		
2024	44.2		NA	NA	NA		375	2,697		270



5. AGGREGATE CHINOOK SALMON: BUFFER CONSIDERATIONS

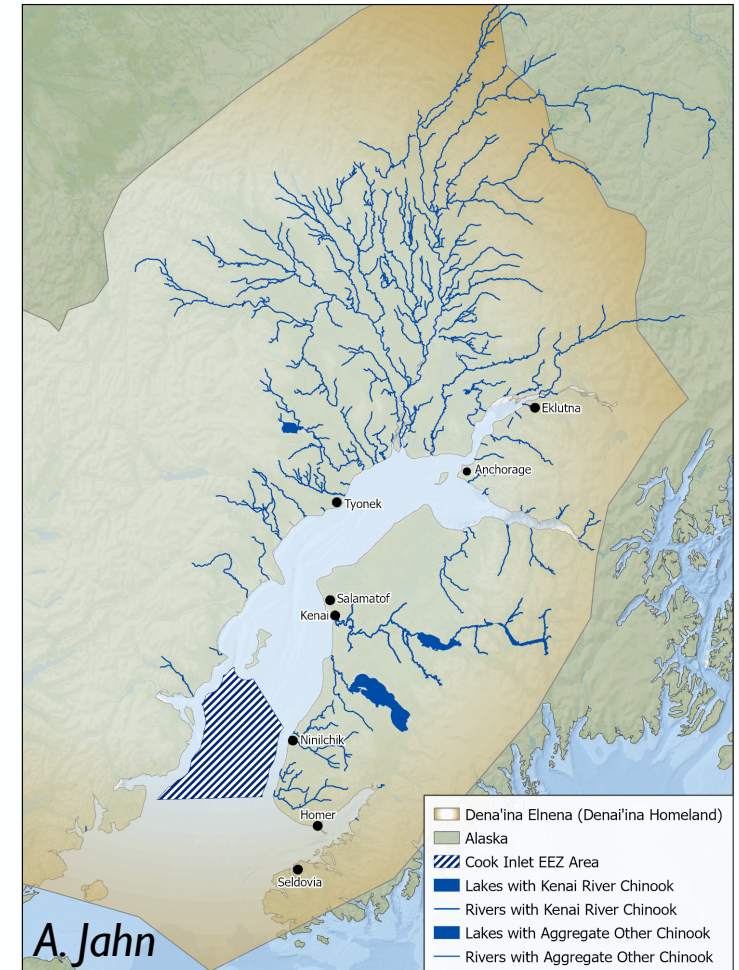
- Generation time = 6 years.
- **Recommendation:** buffer of $1/6 = 0.167$ = equivalent of max harvest for a single year in the generation time of Chinook salmon.
- Precautionary given small overall EEZ harvests.



5. AGGREGATE CHINOOK SALMON: TIER 3 ABC/ACL RECOMMENDATION

Recommendations:

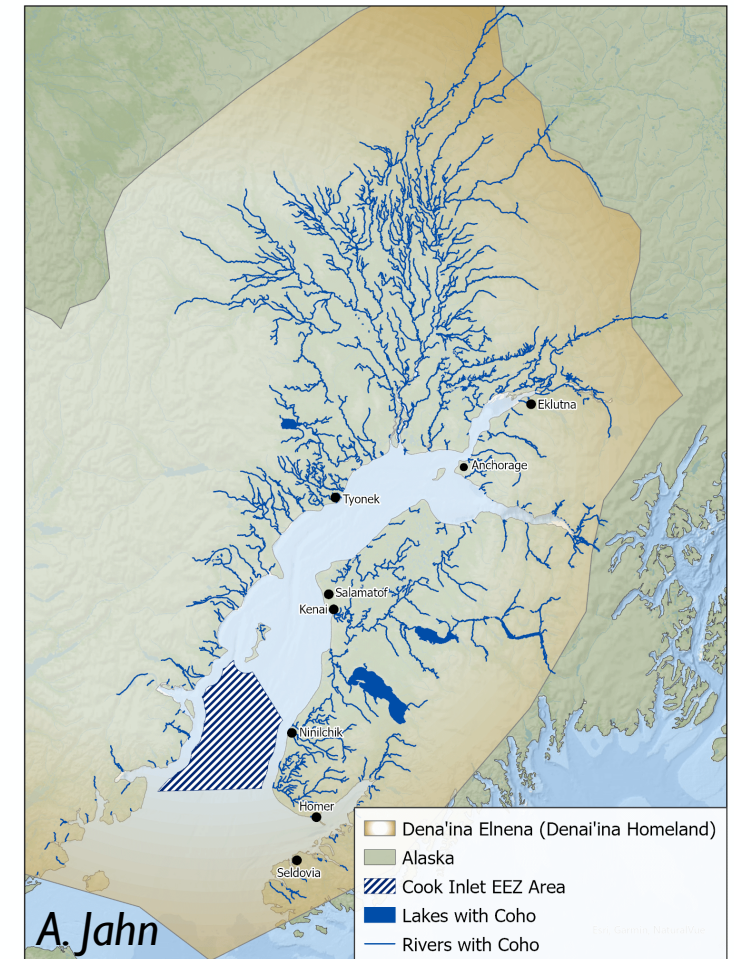
- Preseason total run size: NA
- Preseason OFL..... 2,697 fish
- Buffer 0.167
- ABC..... **450 fish**
- ACL = ABC



6. AGGREGATE COHO SALMON: STOCK COMPLEX DEFINITION (SAFE PG. 44)

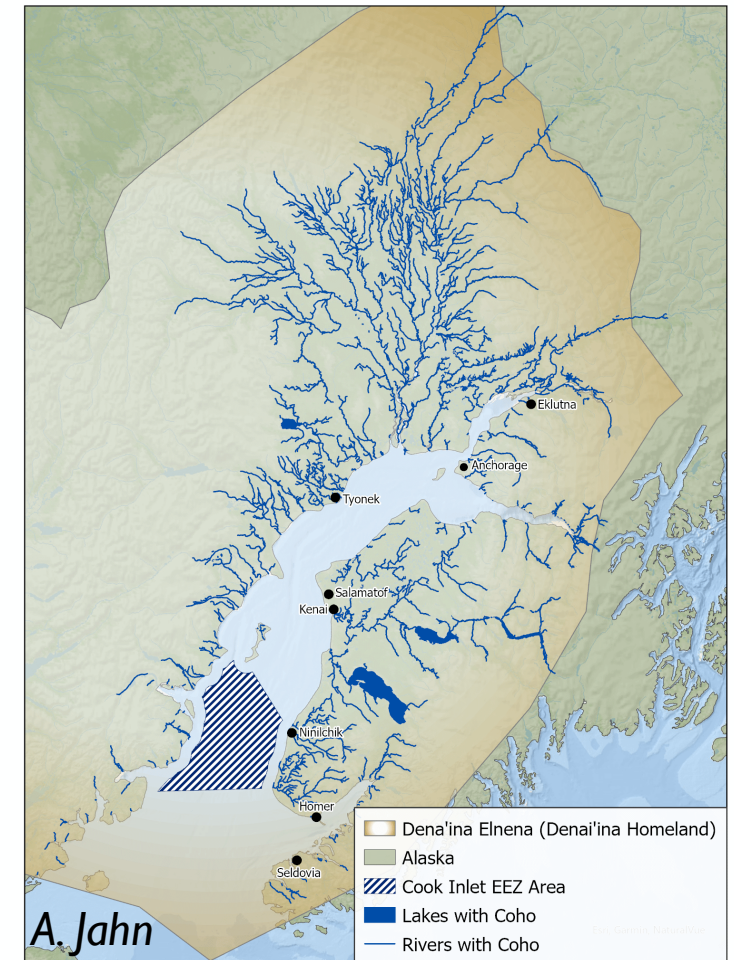
Recommended Federal stock definition:

- All coho salmon harvested in the Cook Inlet EEZ Area.
- Two indicator stocks (Deshka and Little Susitna rivers).
- All unmonitored drainages are part of the stock complex



6. AGGREGATE COHO SALMON: DATA AVAILABLE

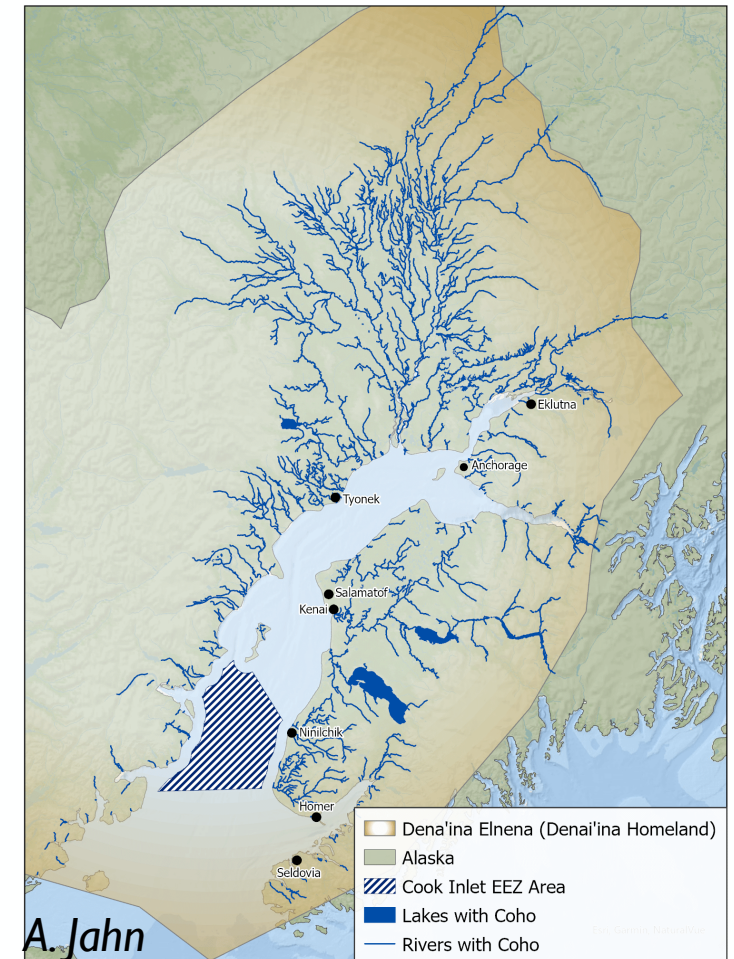
- Escapement data and goals
 - Deshka R. (10,200 – 24,100)
 - Little Susitna R. (9,200 – 17,700)
 - 19,400 total
 - Two additional systems monitored by ADF&G (Jim and Fish creeks).
- ADF&G harvest estimates for all components
 - Recreational, personal use, commercial
- ADF&G genetic stock composition of harvests for select years (2013-2016).



6. AGGREGATE COHO SALMON: TIER CONSIDERATIONS

Same considerations as for Aggregate “Other” Sockeye Salmon:

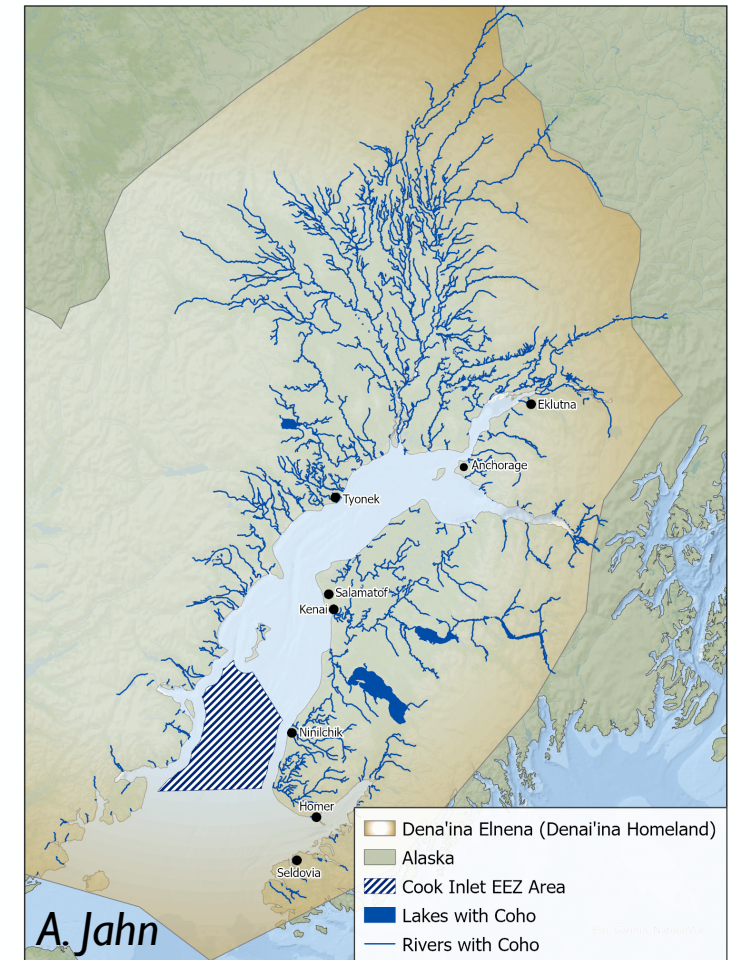
- Incomplete escapement monitoring via weirs.
 - Inability to estimate escapement for entire stock complex.
 - Inability to estimate total run size.
 - Risk of overestimating potential yield.
 - Risk of declaring overfishing/overfished when not warranted
-
- Recommendation: Tier 3



6. AGGREGATE COHO SALMON: STOCK CONSIDERATIONS

Escapement monitoring missing/incomplete

- Deshka River (missing): 2020, 2021, 2022
- Little Susitna River (incomplete): 2014, 2018, 2019, 2022
- Stock would have been subject to overfishing in 2013 (if Federal mgmt.)
- Overall: Caution warranted



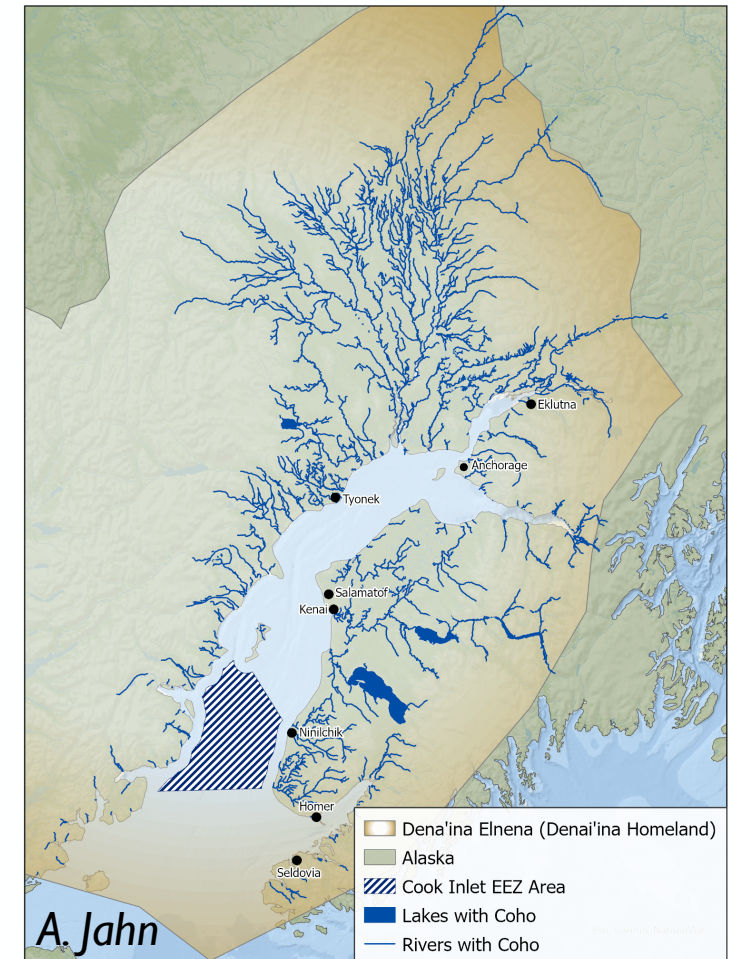
6. AGGREGATE COHO SALMON: TIER 3 STATUS DETERMINATION CRITERIA

Overfished assessed by:

- Cumulative escapement for generation vs. MSST
- But, escapement values suspect due to incomplete/missing monitoring.
- No good options

Overfishing assessed by:

- Cumulative harvest for generation vs. OFL_{POST}



6. AGGREGATE COHO SALMON: TIER 3 OFL, BUFFER, ABC (SAFE PG. 49)

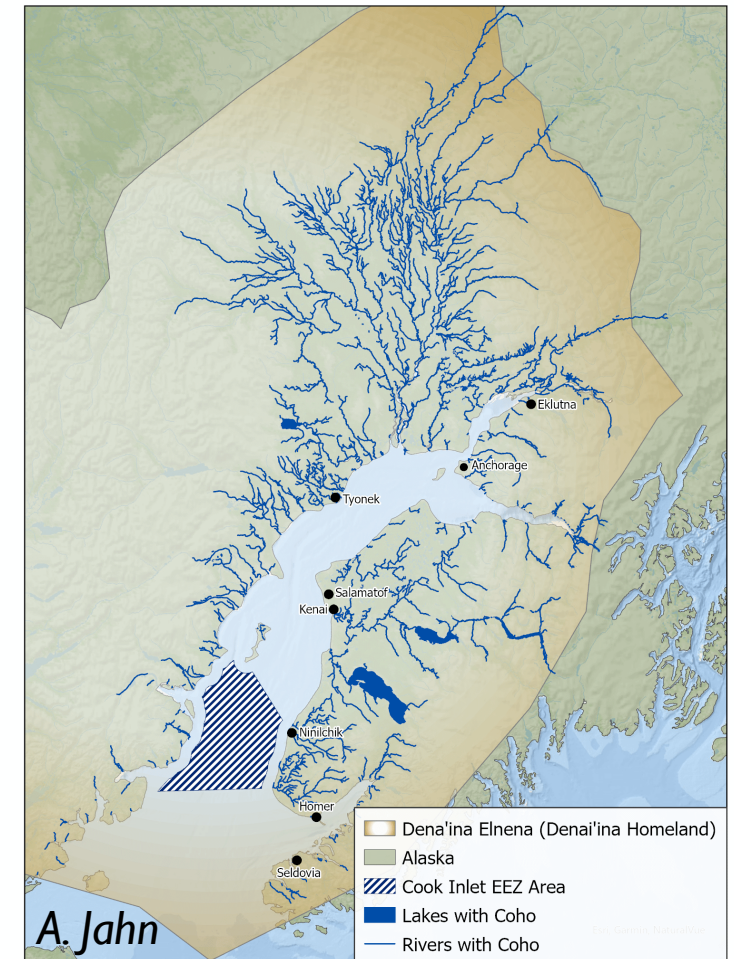
Year	MSST	Cum. Escap.	MFMT	FEEZ	Total Run	EEZ Harvest	EEZ Cum. Harvest	OFL	ABC (10%)	ABC (90%)
2019	38.6	106	NA	NA	NA	39	211	439		
2020	38.6	101	NA	NA	NA	2	178	439		
2021	38.6	57	NA	NA	NA	33	135	439		
2022	38.6	41	NA	NA	NA	24	98	439		
2023	38.6	32	NA	NA	NA	25	83	439		
2024	38.6		NA	NA	NA		82	358	36	322



6. AGGREGATE COHO SALMON: BUFFER CONSIDERATIONS

Buffer considerations

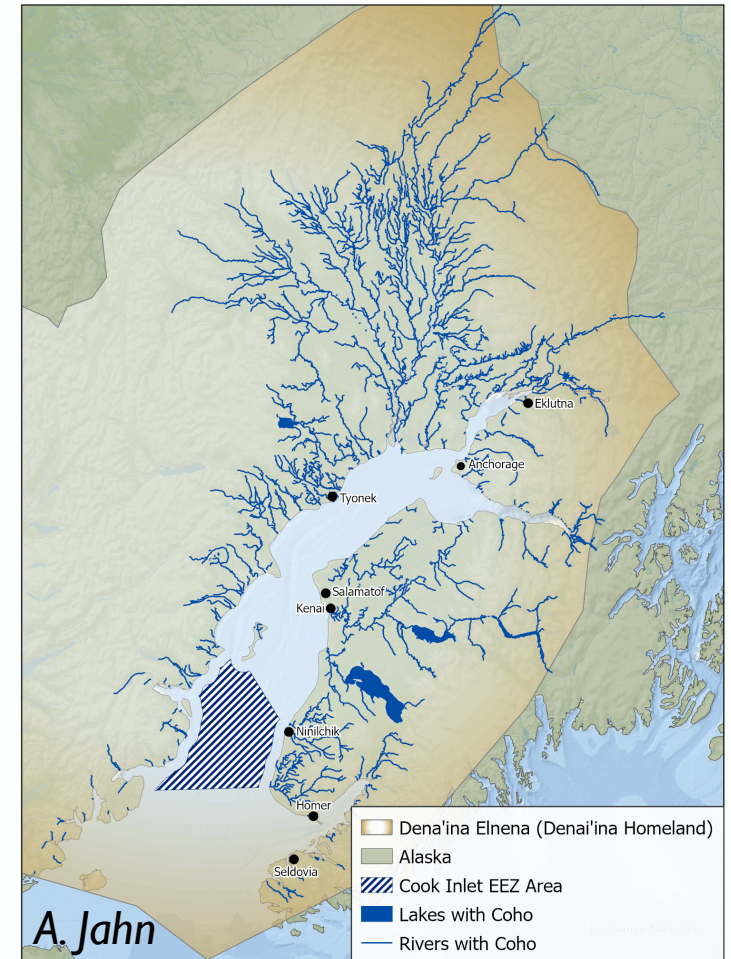
- Escapement estimates incomplete, missing, below goal = **CAUTION.**
- Species subject to gillnet harvest.
- Genetic data shows drift gillnet harvests of fish bound for N. Cook Inlet.
 - State FMP: prioritization of coho salmon passing through Central district.
- Literature: coho salmon a preferred prey item of endangered Cook Inlet beluga whales.



6. AGGREGATE COHO SALMON: TIER 3 ABC/ACL RECOMMENDATIONS

Recommendations:

- Preseason total run size: NA
- Preseason OFL..... 357,688
- Buffer 0.10
- ABC..... **35,769** fish
- ACL = ABC



6. AGGREGATE COHO SALMON: ADDITIONAL RECOMMENDATIONS AND CONSIDERATIONS

Recommendations:

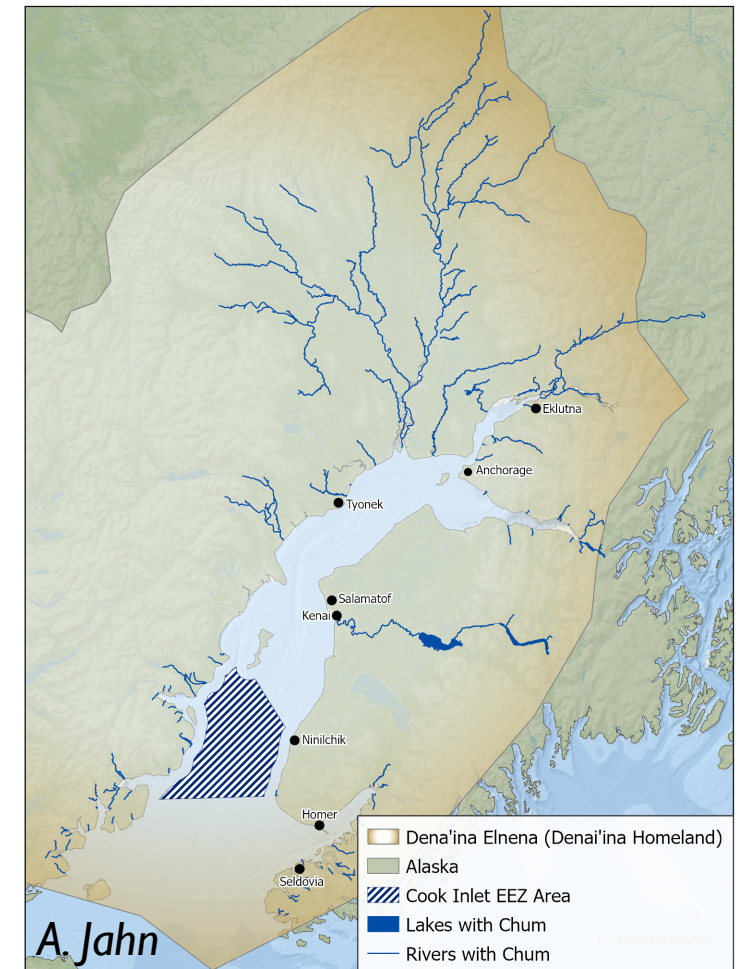
- Additional research on estimating escapements to the entire stock complex.
- Total run size estimates would inform management decisions
- Buffer of 0.10 is lower than method prescribed for Aggregate “Other” Sockeye Salmon and Aggregate Chinook Salmon.
 - Greater caution warranted given harvest potential in the EEZ, missed escapement goals, and other considerations.



7. AGGREGATE CHUM SALMON: STOCK COMPLEX DEFINITION (SAFE PG. 50)

Recommended Federal stock definition:

- All chum salmon harvested in the Cook Inlet EEZ Area.
- All UCI drainages/tributaries with chum salmon are part of the stock complex.



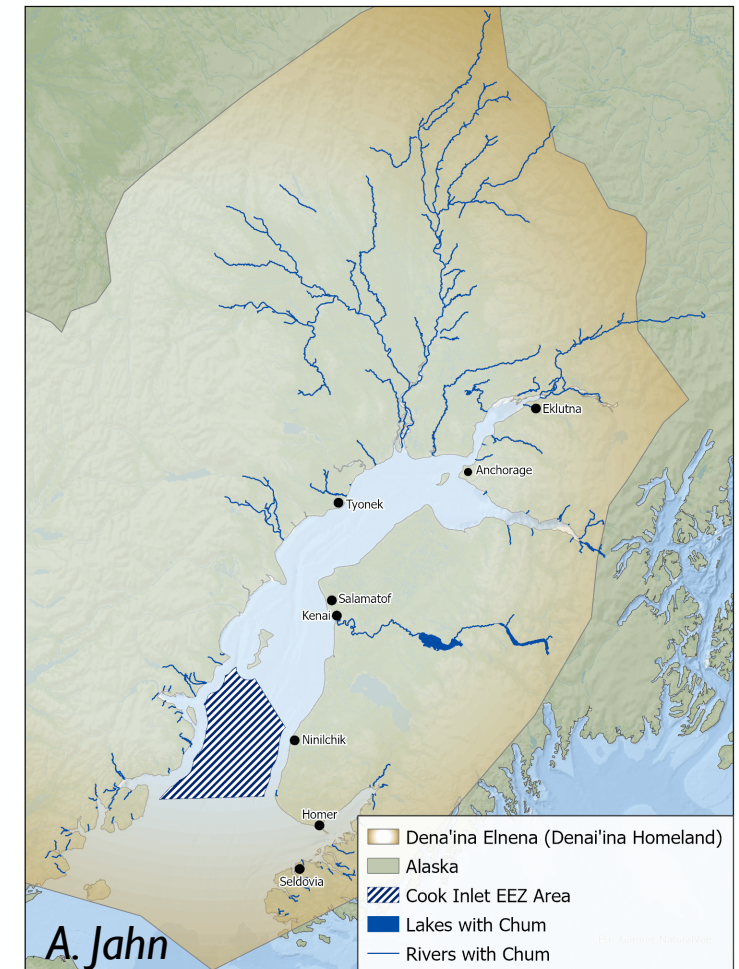
7. AGGREGATE CHUM SALMON: DATA AVAILABLE

Escapement data and goals

- Clearwater Ck. (3,500 – 8,000)
- via peak aerial survey

ADF&G harvest estimates for all components:
Recreational, personal use, commercial

SAFE assumption: no reliable estimate of stock
complex-wide escapement or total run size.

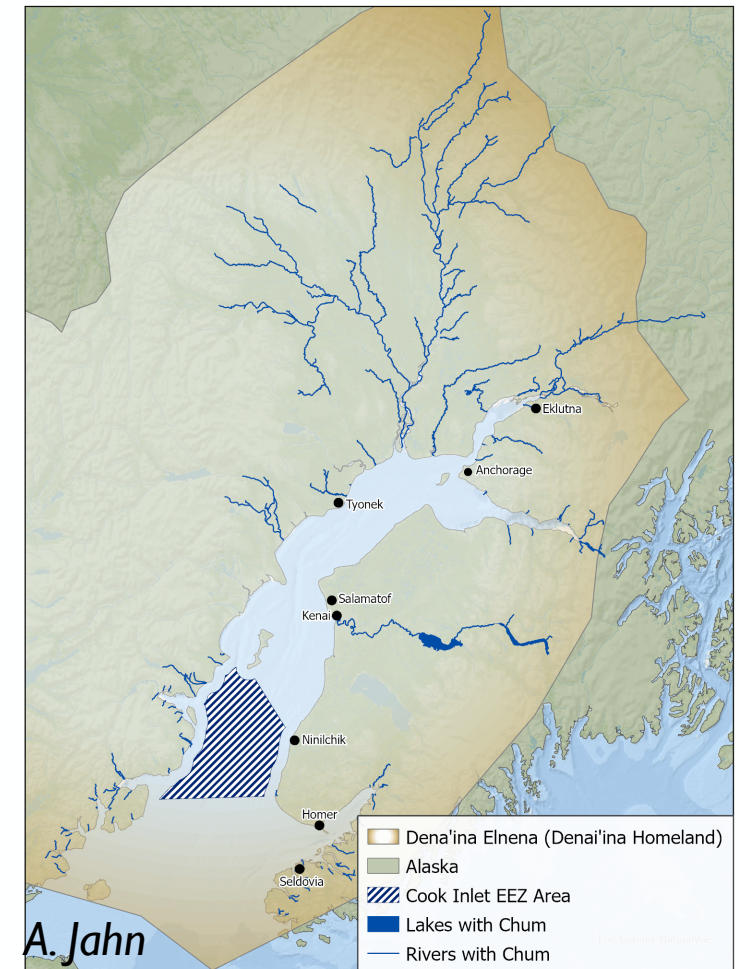


7. AGGREGATE CHUM SALMON: TIER RECOMMENDATION



No reliable estimate of spawning escapement.

Therefore, **recommendation** for **Tier 3** for SDC and harvest specifications.



7. AGGREGATE CHUM SALMON: TIER 3 STOCK STATUS, PROJECTIONS, BUFFER, AND ABC RANGE (SAFE PG. 52)

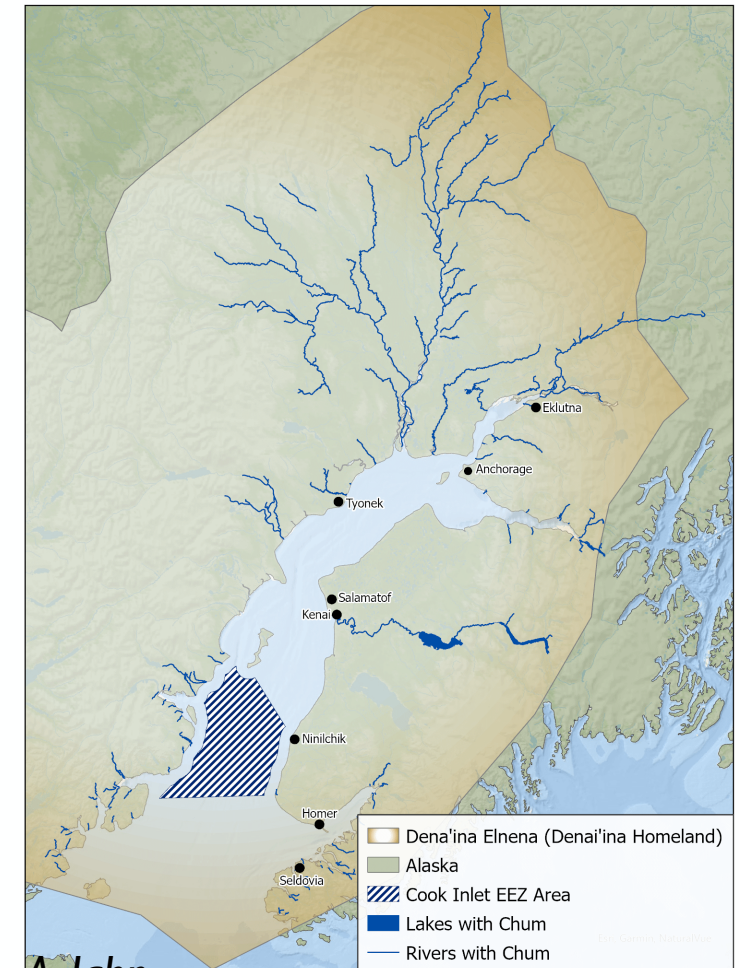
Year	MSST	Cum. Escap.	MFMT	FEEZ	Total Run	EEZ Harvest	EEZ Cum. Harvest	OFL	ABC (10%)	ABC (90%)
2019	NA		NA	NA	NA	54	262	561		
2020	NA		NA	NA	NA	8	230	561		
2021	NA		NA	NA	NA	29	155	561		
2022	NA		NA	NA	NA	39	130	561		
2023	NA		NA	NA	NA	51	127	561		
2024	NA		NA	NA	NA		119	442	44.2	397.5



7. AGGREGATE CHUM SALMON: BUFFER CONSIDERATIONS

Buffer considerations

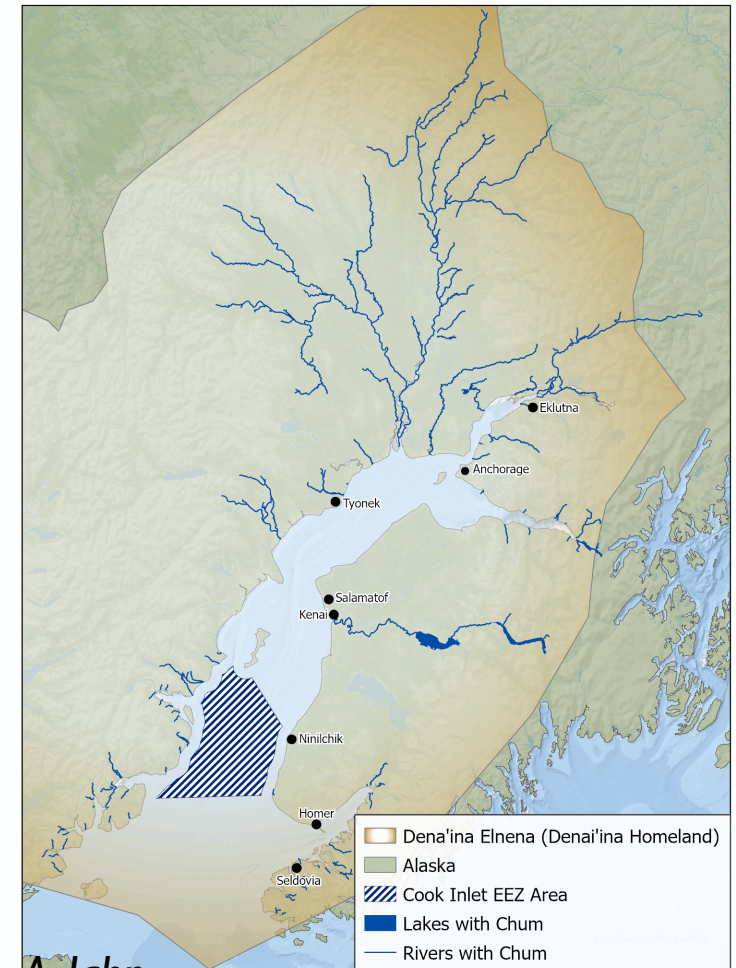
- Tier 3 method: chum salmon gen time = 4 yrs.
- Baseline buffer of $\frac{1}{4}$ of OFL = 0.25
- SAFE assumption: stock is not overfished, not subject to overfishing, not targeted in EEZ.
- But, chum salmon susceptible to gillnet harvest
 - Not many chum salmon systems.
- Recommendation: liberalized buffer of 0.50



7. AGGREGATE CHUM SALMON: TIER 3 ABC/ACL RECOMMENDATIONS

Recommendations:

- Preseason total run size: NA
- Preseason OFL..... 441,727
- Buffer 0.50
- ABC..... **220,864 fish**
- ACL = ABC

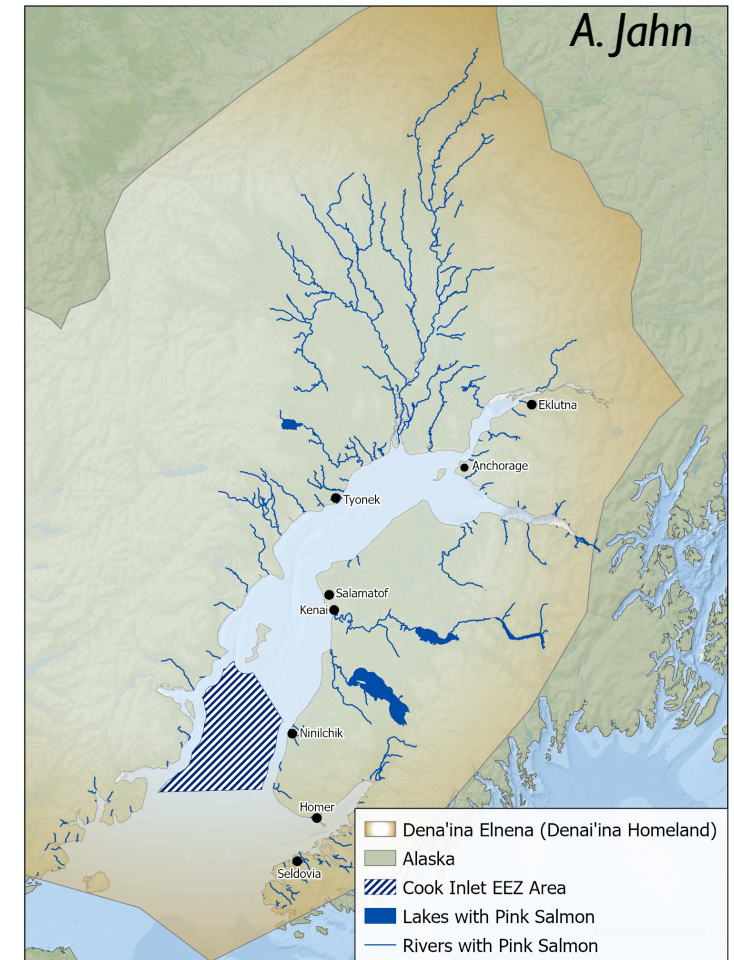


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8. AGGREGATE PINK SALMON (EVEN YEAR): STOCK COMPLEX DEFINITION (SAFE PG. 53)

Recommended Federal stock definition:

- All pink salmon harvested in the Cook Inlet EEZ Area.
- No indicator stocks
- All unmonitored drainages are part of the stock complex



8. AGGREGATE PINK SALMON: DATA AVAILABLE

Escapement data and goals

- No escapement goals

ADF&G harvest estimates for all components

- Recreational, personal use, commercial

SAFE Estimates: recreational harvests for recent years; proportion harvested in the EEZ.



8. AGGREGATE PINK SALMON: TIER 3 STOCK STATUS, PROJECTIONS, BUFFER, AND ABC RANGE (SAFE PG. 55)

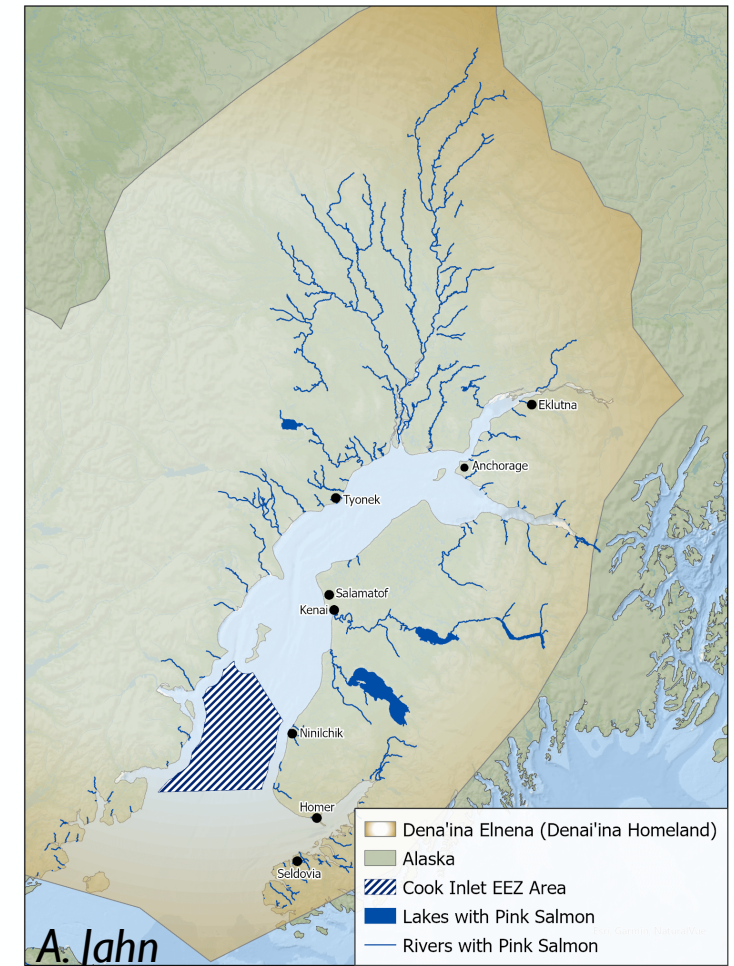
Year	MSST	Cum. Escap.	MFMT	FEEZ	Total Run	EEZ Harvest	EEZ Cum. Harvest	OFL	ABC (10%)	ABC (90%)
2014	NA	NA	NA	NA	NA	150	283	300		
2016	NA	NA	NA	NA	NA	109	260	300		
2018	NA	NA	NA	NA	NA	39	148	300		
2020	NA	NA	NA	NA	NA	12	51	300		
2022	NA	NA	NA	NA	NA	30	41	300		
2024	NA	NA	NA	NA	NA		30	270	27	243



8. AGGREGATE PINK SALMON: BUFFER CONSIDERATIONS

Buffer considerations

- Tier 3: pink salmon gen time = 2 yrs. = baseline buffer of 1/2 of OFL = 0.50
- SAFE assumption: stock is not overfished, not subject to overfishing, not targeted in EEZ, many fish not susceptible to gillnet harvest.
- Recommendation: liberalized buffer of 0.90



8. AGGREGATE PINK SALMON: TIER 3 ABC/ACL RECOMMENDATIONS

Recommendations:

- Preseason total run size: NA
- Preseason OFL..... 270,435
- Buffer 0.90
- ABC..... **243,392 fish**
- ACL = ABC

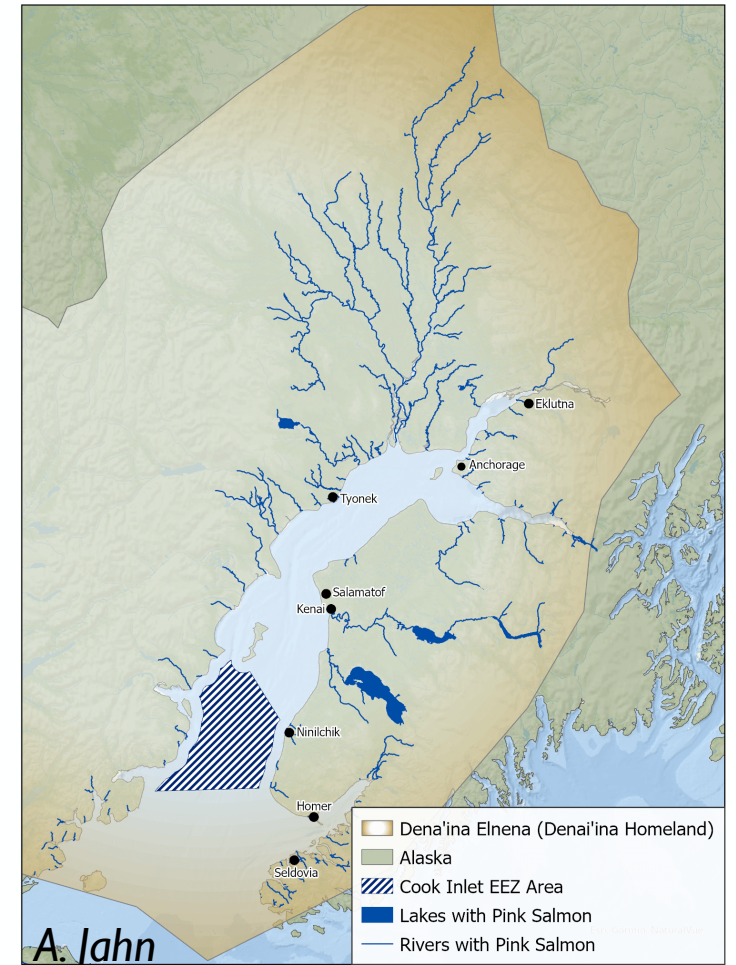


TABLE 3 (PG. 56) : 2023 STOCK STATUS (IF THERE HAD BEEN A FEDERAL FISHERY)

Overfished?

Tier I
Overfishing?

Tier 3
Overfishing?

Stock	Tier	MSST	Cum. Escap	MFMT	FEEZ	Total Run	EEZ Catch	Cum. Harvest Gen.	Potential yield EEZ	Tier 3 OFL
Kenai River Late-Run sockeye salmon	1	1,850	8,561	0.37	0.08	3,882	418	1,308	1,761	
Kasilof River sockeye salmon	1	360	3,333	0.52	0.03	460	57	140	850	
Aggregate Other sockeye salmon (T2)	2*	163	631	0.36	0.22*	270*	183	457	201	
Aggregate Other sockeye salmon (T3)	3	163	631				183	457	NA	1,271
Kenai River Late-Run Large Chinook salmon	1*	44	82	0.046	0.003*	14.7	21 fish*	239 fish	0 fish	
Aggregate Other Chinook salmon	3*						30 fish*			
Aggregate Chinook salmon	3	44	82				51 fish	635 fish	NA	3,072
Aggregate coho salmon (T2)	2*	40	32*	0.05*	0.09*	204*	25	83	11	
Aggregate coho salmon (T3)	3	40	32*				25	83	NA	440
Aggregate chum salmon	3	NA	NA	NA	NA	NA	51	127	NA	561
Aggregate pink salmon	3	NA	NA	NA	NA	NA	30	41	NA	300

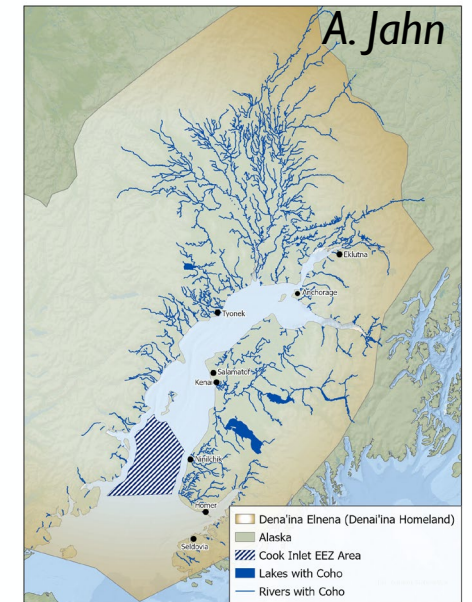
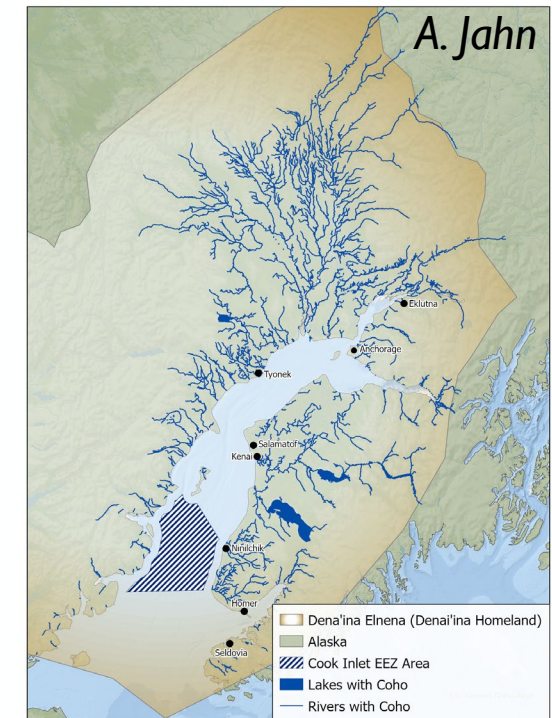


TABLE 4: 2024 RECOMMENDED TIERS, PRESEASON OFL, BUFFER, AND ABC/ACL (SAFE PG. 57)

Stock	Tier	Total Run Size	Escapement goal(s)	Preseason OFL	ABC buffer	ABC
Kenai River Late-Run sockeye salmon	1	3,485	750	1,364	0.478	652.5
Kasilof River sockeye salmon	1	1,125	140	623	0.694	432.6
Aggregate Other sockeye salmon (T3)	3	NA	65	888	0.200	177.5
Aggregate Chinook salmon	3	NA	15	2,697 fish	0.167	450 fish
Aggregate coho salmon (T3)	3	NA	19.3	358	0.100	35.8
Aggregate chum salmon	3	NA	3.5	442	0.500	220.9
Aggregate pink salmon	3	NA	NA	270	0.900	243.4



RECOMMENDATIONS FOR THE SSC (SAFE PG. 58)

Stock definitions : Tables 1, 3, 4

Tier assignments : Table 4

Recommendations for analysis approach and model : SDC Section; Appendix B

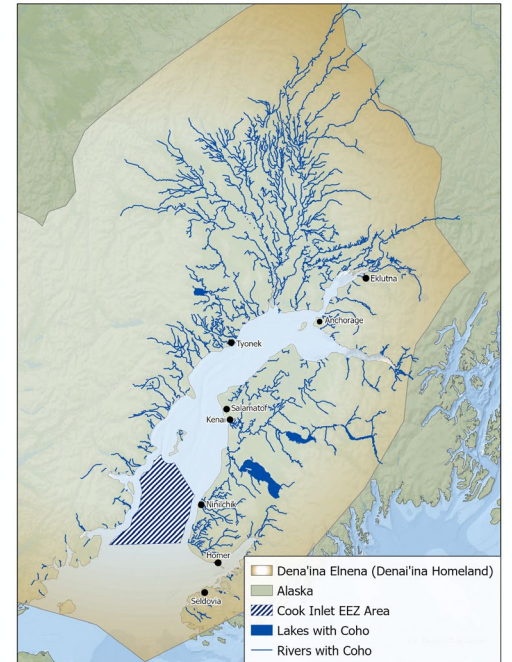
Recommendations for data, estimates, and assumptions used : Stock Status Summaries; Appendices A1-A10; GitHub repository

Recommendations for OFL : Stock Status Summaries; Table 4; Appendices A1-A10

Recommendations for buffers of OFL and the resulting ABC : Stock Status Summaries; Table 4

Recommendations for ACL : Same as ABC

Recommendations for de minimis harvest : NA with stock and tier recommendations



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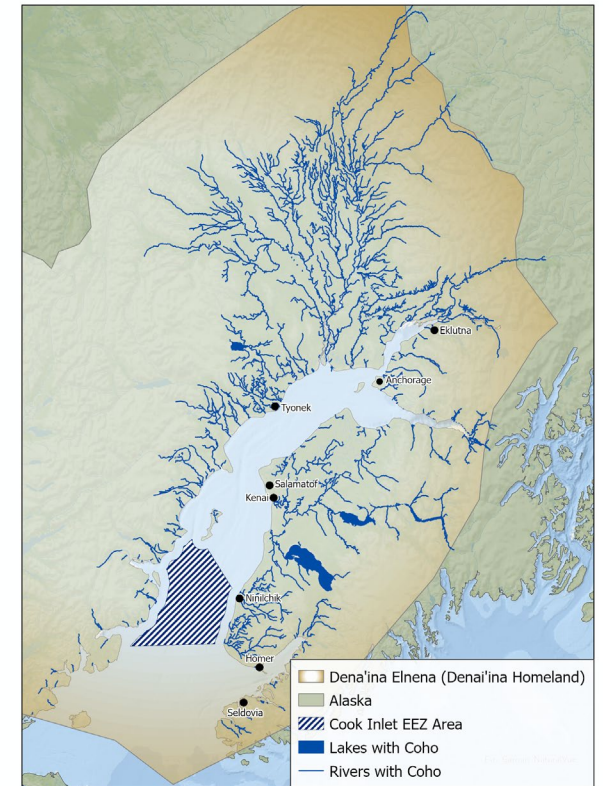
Other recommendations by the NOAA SAFE Team :



ADDITIONAL RECOMMENDATIONS

The NOAA SAFE Team **recommends** additional research to:

- Estimate total run size for coho and Aggregate “Other” Sockeye salmon in particular.
 - Improved confidence in future SAFE recommendations.
 - Better inform estimates of potential yield and risks.
- Improve forecasts of salmon run size and run timing for UCI salmon stocks harvested in the EEZ.



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RECOMMENDED TAC (SAFE PG. 60 AND EXECUTIVE SUMMARY)

Recommended 2024 Federal Cook Inlet EEZ Area TAC by species:

Sockeye salmon: **1,262,525 fish***

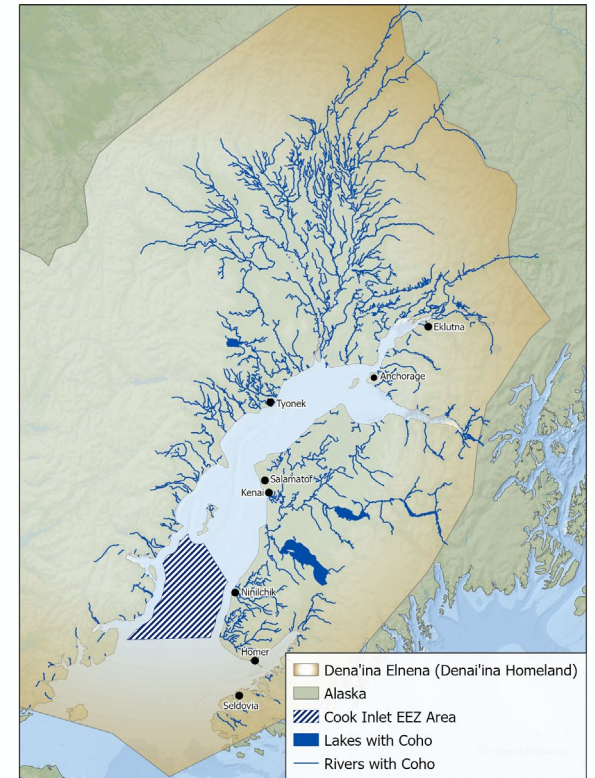
Chinook salmon: **450 fish**

Coho salmon: **35,769 fish**

Chum salmon: **220,864 fish**

Pink salmon: **243,392 fish**

*The sum of 3 ACLs. Based on historical harvest proportions, it is assumed that no individual ACLs will be exceeded.



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CLOSING COMMENTS

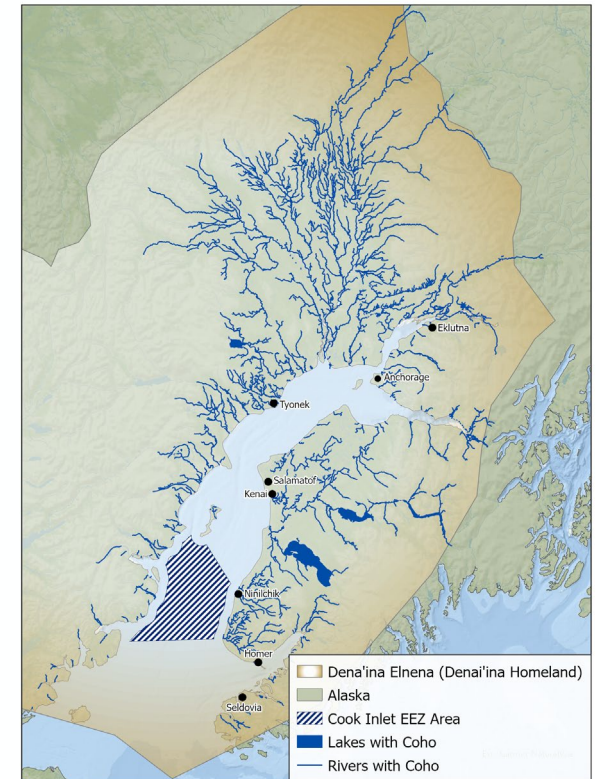
This SAFE is a first step, more improvements in the future.

Getting beyond historical estimates: actual EEZ harvests will provide better information to inform future Federal fisheries management.

NOAA SAFE Team assumptions

- Model suggests that tier 1 buffers are precautionary.
- More difficult to assess Tier 3 stock status, but assumed to be precautionary.

The NOAA SAFE Team welcomes corrections and suggestions on data, estimate, modeling approaches, and assumptions.



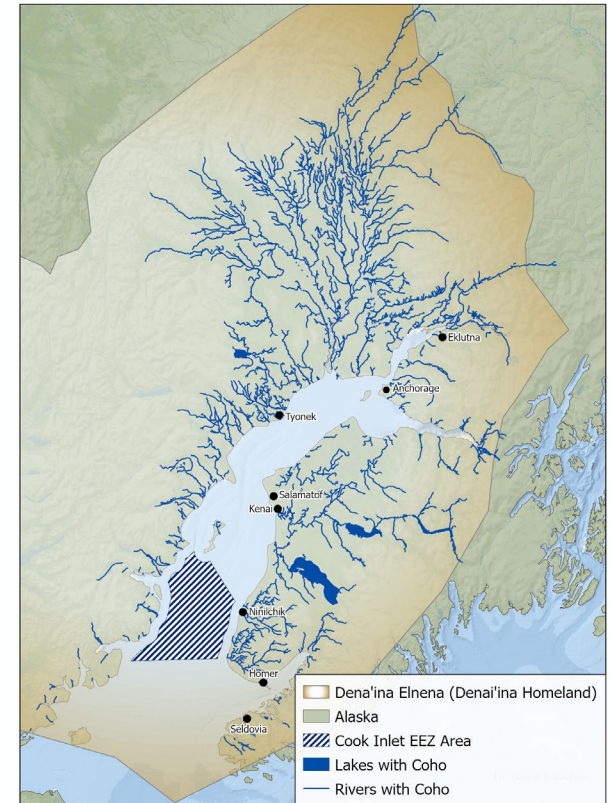
A. Jahn



CLOSING COMMENTS: 2024 ASSUMED LEVEL OF PRECAUTION WARRANTED BY STOCK

2024 Federal EEZ SAFE assumed level of precaution warranted across stocks based on stock status summaries, and expressed in the buffer to reduce OFL to the ABC and ACL:

- High: Aggregate Coho salmon
- Medium: Aggregate Chinook salmon*, Aggregate “Other” Sockeye Salmon
- Low: Kenai Late Run Sockeye Salmon, Kasilof Sockeye Salmon, Aggregate Chum Salmon, Aggregate Pink Salmon



A. Jahn

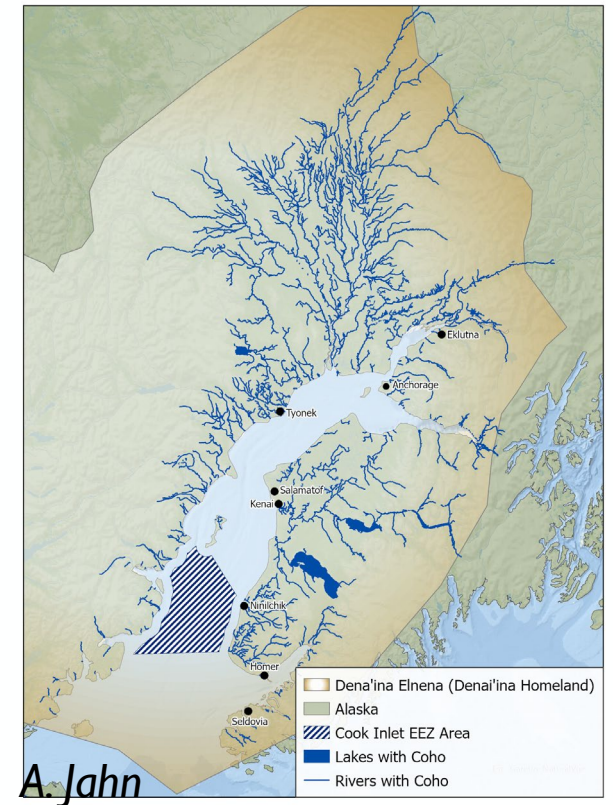


*very low harvest in the EEZ

CLOSING COMMENTS: ADDITIONAL UNCERTAINTY & CONSIDERATIONS

Additional Uncertainty:

- Historical harvests estimates in the EEZ
 - Effects of uncertainty on SAFE recommendations
- Spatial distribution of Federal fishery participants in EEZ
- Harvests and harvest rates on stocks given both Federal and State fisheries
- Impacts to smaller stocks and unmonitored stocks
- Socio-economic considerations (EA/RIR Analysis)
 - Uncertain impacts to subsistence, personal use, sport, and commercial fishers, associated businesses, and communities



COOK INLET SALMON: REVIEW OF 2024 SAFE



THANK YOU

