



## Chinook Salmon Bycatch Management in the Bering Sea Pollock Fishery

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## Who are we?



The North Pacific Fishery Management Council (NPFMC) and the National Marine Fisheries Service (NMFS):

- Together manage Federal fisheries off Alaska (3-200 miles)
- NPFMC makes recommendations to NMFS
- NMFS approves and implements them

Bering Sea pollock fisheries management

- Goal to minimize salmon bycatch to extent practicable (MSA requirement)

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## Chinook salmon bycatch in the pollock fisheries: the problem

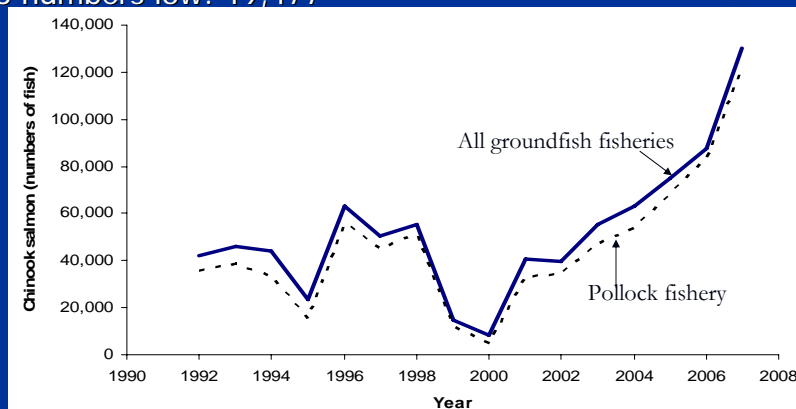
- Bering Sea pollock fishery catches Chinook salmon as bycatch
- Bycatch, by law, is counted but cannot be retained or sold
  - Some salmon is donated to food banks



## Bycatch trends



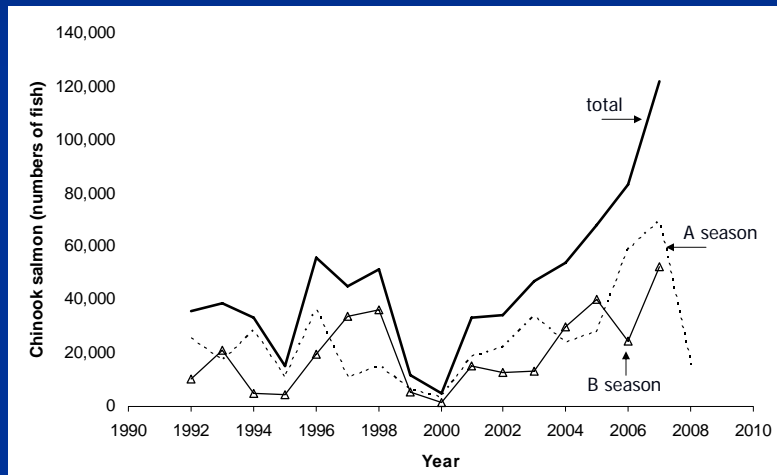
- Primarily in pollock fishery
- Five year average of 82,311 Chinook salmon
- A high of 122,000 Chinook salmon in 2007
- 2008 numbers low: 19,477



# Bycatch by season



- Bycatch taken in both winter and fall fisheries

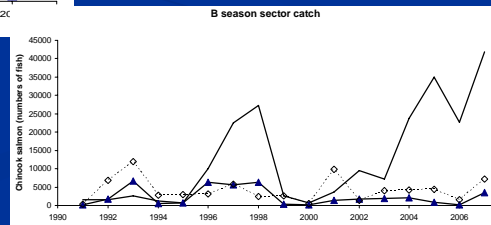
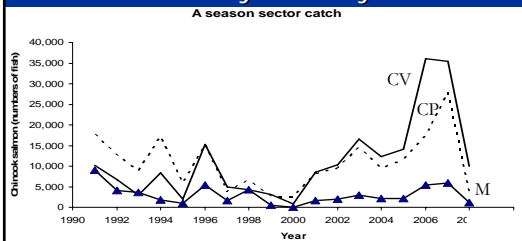


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# Bycatch by sector

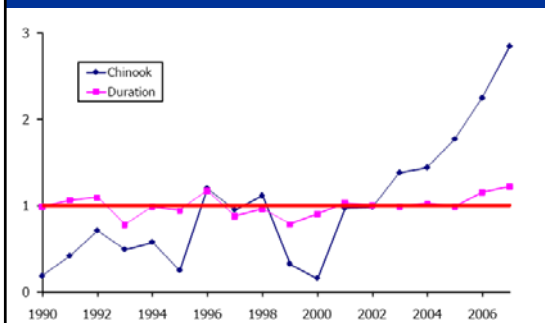


- 4 sectors in pollock fishery: offshore CPs, inshore CVs, motherships, CDO
- Differential bycatch by sector



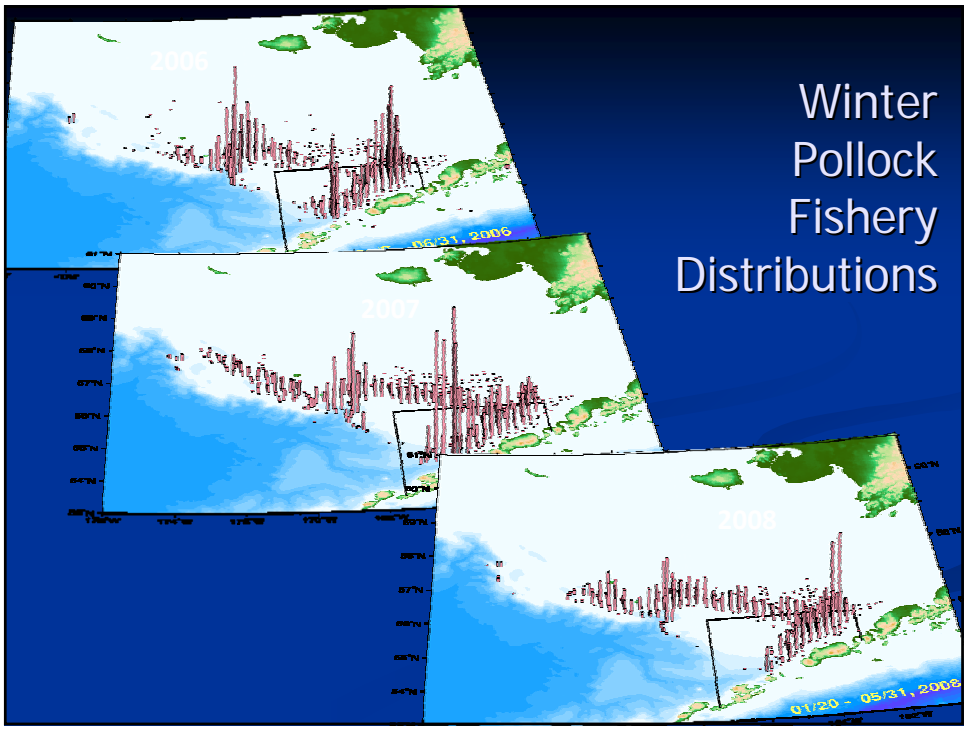
# Why is bycatch increasing?

- Either oceanographic conditions changing:
  - Possibly higher ocean salmon abundance or same or less but greater co-location with pollock
  - Multiple international initiatives examining environmental impacts on salmon stocks
- Or changing fishing practices

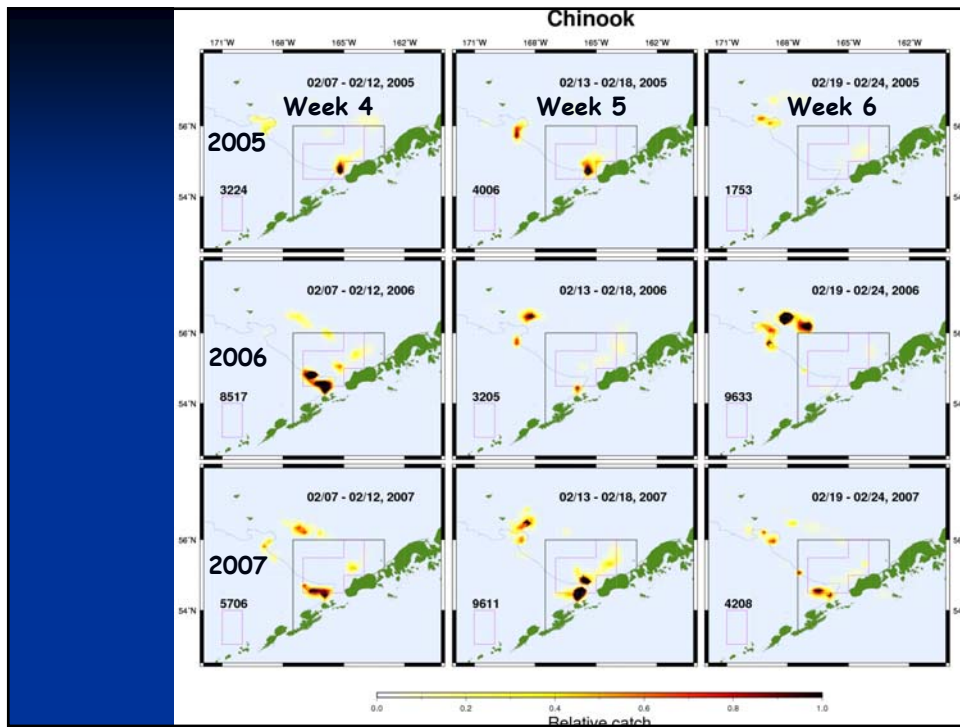
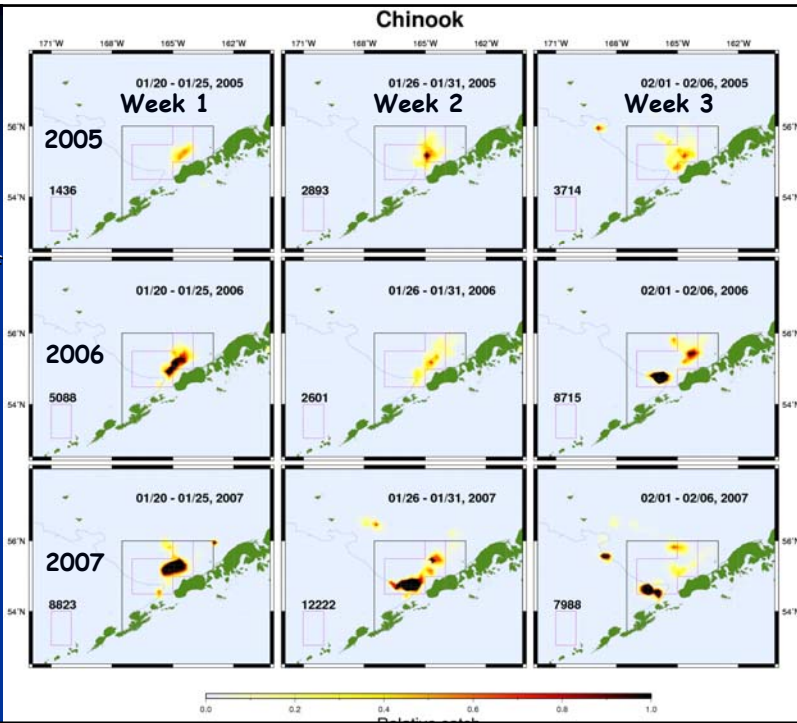


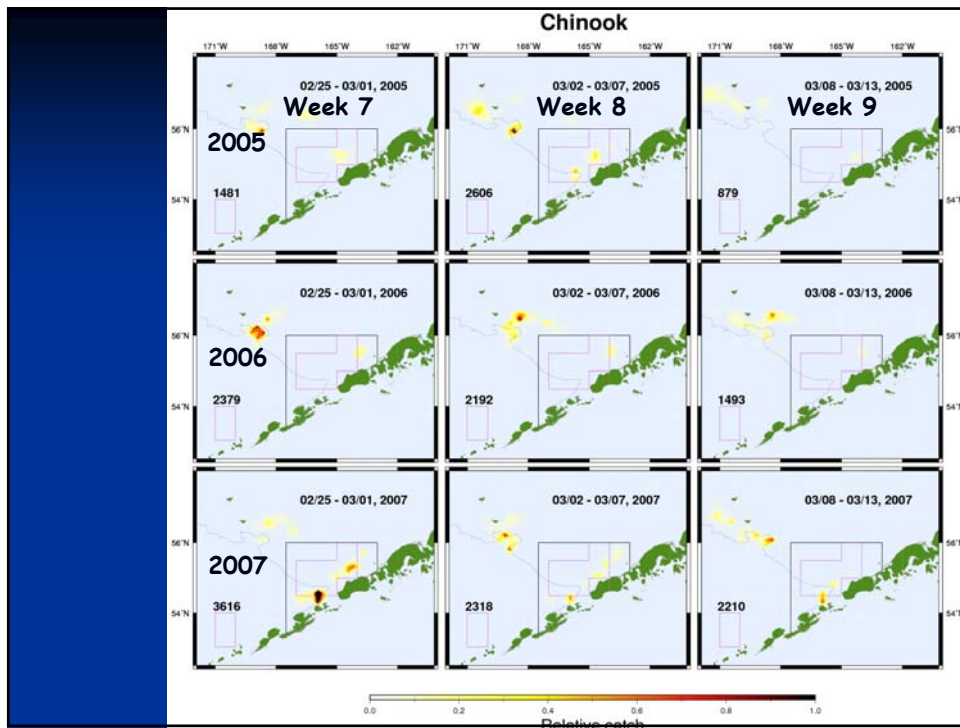
Some increase in tow time but insufficient to explain entire increase in bycatch

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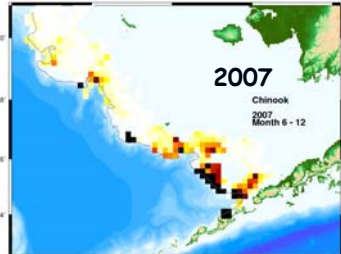
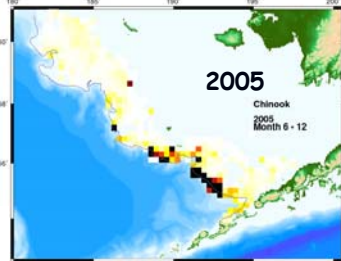
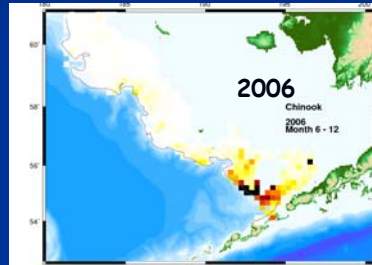


Spatial patterns of bycatch & previous closures





## Summer Chinook Rates



## Chinook salmon measures

- Previous time/area closures were not flexible
  - Unable to respond to changes in abundance or location of salmon or pollock in the Bering Sea.
- Council responding to concerns about bycatch
  - potential impacts on Western AK salmon runs
  - international treaty obligations
- Council is considering absolute limits (caps) on the pollock fishery's catch of Chinook salmon
  - Reaching cap would close pollock fishery
- Analysis of appropriate caps considers:
  - bycatch stock of origin (genetics)
  - Adult equivalents returning to river systems
  - Assessments of run strengths by rivers

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## Alternatives



- Alternative 1: No Action
  - Existing management measures
    - Voluntary time/area closure management
- Alternative 2: Hard caps
  - Range of hard caps: 29,323 to 87,500 Chinook salmon
    - Based on historical bycatch averages
  - Divides cap between A (winter) and B (fall) seasons
- Alternative 3: Triggered Closures
  - Revised time/area closures based on updated bycatch information
- Alternative 4: Preliminary Preferred Alternative
  - Variation of alternative 2

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## Alternative 4 – Preliminary Preferred Alternative



- High Cap of 68,392 Chinook salmon
    - = >Applies if participate in incentive program to reduce bycatch below cap levels (*note presentation tonight*)
      - Lower “backstop” cap of 32,482 Chinook salmon for vessels that do not participate in incentive program
- Council objective = to reduce and minimize salmon bycatch regardless of annual abundance
- OR**
- Low Cap of 47,591 Chinook salmon in absence of an approved incentive program

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## Alternative 4 – preliminary preferred alternative



- High and low cap management:
  - Divided between A (70%) and B (30%) seasons
  - 80% of remaining A season (winter) caps could be ‘rolled over’ (made available) to the B season (fall) in the same calendar year
  - Caps allocated to the 4 pollock fishing sectors (CDQ, inshore catcher vessels, mothership sector, offshore catcher processors)
  - Sectors could transfer caps among sectors in a given season

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## Transferable sector and cooperative level caps will require 100% Observer coverage for management

- Current observed catch (2007 fishery)

Vessel category	Number of Vessels	Pollock (mt)	Percent of Pollock Catch	Number of Chinook salmon	Percent of Chinook Salmon
Catcher/processor	16	488,528	41%	32,212	28%
Motherships	3	121,514	10%	6,663	6%
CV 60 ft.-125 ft.	56	240,546	20%	31,381	27%
CV ≥ 125 ft.	26	332,081	28%	45,937	40%
<b>Total</b>	<b>102</b>	<b>1,182,669</b>	<b>100%</b>	<b>116,193</b>	<b>100%</b>

Does not include 8 catcher vessels that deliver only unsorted codends to motherships and do not require an observer.

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## The analysis evaluates impacts of the alternatives on:



- Chinook and chum salmon
- Pollock
- Other marine resources
  - Other groundfish, crab, herring, halibut, marine mammals, seabirds, habitat, & ecosystem
- Environmental Justice
  - are there disproportional impacts on low income or minority populations?
- Economic impacts
  - Salmon: commercial and subsistence fisheries
  - Recognizes cultural value of salmon
  - Pollock fishery

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## How are impacts of the alternatives evaluated?



Looking backwards 2003-2007 data, asks:

Given alternative management scenarios, when would the pollock fishery have had to stop fishing?

Given date fishing would have stopped, how many salmon would not have been caught?

Chinook salmon savings recorded

How much would pollock catch have been reduced?

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## Estimated salmon bycatch under various alternatives

Bycatch year	Alternative	Bycatch cap level	Projected salmon bycatch			Reduction from actual bycatch in that year
			A season	B season	Annual Total	
2007	PPA1	68,392	46,130	20,193	66,323	46%
	PPA2	47,591	32,175	14,208	46,383	62%
Actual bycatch: 121,638	Lowest 2007 Alt. 2 bycatch	29,300	2,801	6,557	9,358	92%
	Highest 2007 Alt. 2 bycatch	87,500	40,415	36,828	77,243	37%
2003	PPA1	68,392	33,578	13,113	46,691	1%
	PPA2	47,591	31,520	13,113	44,633	5%
Actual bycatch: 46,993	Lowest 2003 Alt. 2 bycatch	29,300	11,550	11,084	22,634	52%
	Highest 2003 Alt. 2. bycatch	87,500	33,808	13,185	46,993	0

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## How do bycatch numbers translate to salmon returning to the rivers?

- Not all salmon caught as bycatch would have survived to return to the river systems as adults
- To understand impacts, we need to know how many salmon *would have* returned
  - Consider estimated ocean mortality
  - Take into account the age of the salmon, and what year they would have returned to spawn
  - Result = "Adult equivalents" (AEQ)

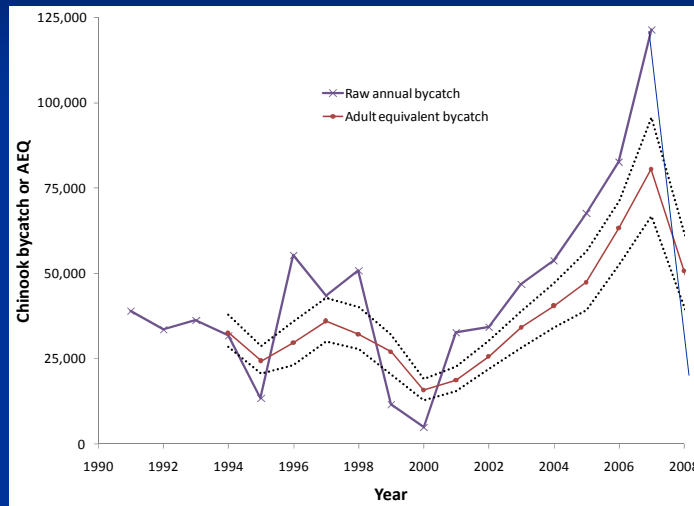
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## Incorporation of age-data, ocean mortality, maturation

- Age-data
  - Myers et al (2003) data used to construct age-length keys
  - Length-frequency data available from observer program (multiple seasons, areas and sectors)
  - Stratum weighted by official bycatch estimates by region
- Ocean mortality
  - Variable by age
- Maturation
  - Weighted mean of multiple river systems age-specific maturation by brood year

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## Actual bycatch compared with estimated Adult Equivalent mortality



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## Salmon bycatch river of origin



- Vary depending on fishery
  - Season and
  - Location
- AEQ estimates estimated to river of origin based on recent genetic data
- Uncertainty in genetic data
  - NMFS and ADF&G working to improve genetic sample collections

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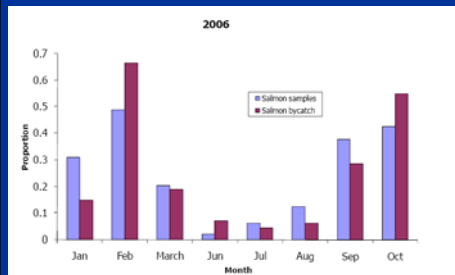
# Genetic data and limitations in analysis

- Genetic data from Templin et al (in prep): aggregated to 9 groups for purposes of impact analysis:
  - PNW, Coast W AK, Cook Inlet, Middle Yukon, N AK Peninsula, Russia, TBR, Upper Yukon, Other
- Coastal WAK, Middle Yukon, Upper Yukon estimates aggregated and Myers et al (2003) proportions used to break out individual river systems: Yukon, Kuskokwim, Bristol Bay
  - Genetics and scale pattern studies generally agree for estimated WAK proportions
- Sampling limitations in data addressed by extrapolation to observed catch
  - Sampling uncertainty accounted for via bootstrapping

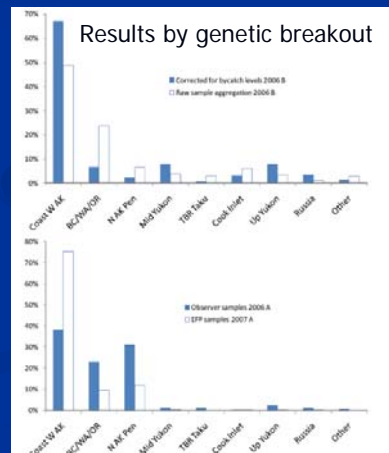
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# Extrapolation of genetics to observed bycatch to account for sampling limitations

- Opportunistic sampling 2005-2007, 'corrected' for observed spatial and temporal extent of bycatch



Sampling by month



## Estimated impacts on Western Alaska Chinook salmon returns

- Overall bycatch reduction under the alternatives:
  - 37-92% reduction overall in highest year (2007)
  - 0%-52% in lowest year (2003)
- Specific impacts on Western AK Rivers (under assumptions of ~54% to aggregated Western AK)
  - **Yukon** (40% of Western AK)
    - ~0-15,000 salmon 'saved'
  - **Kuskokwim** (26% of Western AK)
    - ~0-9,000 salmon 'saved'
  - **Bristol Bay** (Nushagak) (34% of Western AK)
    - ~0-13,000 salmon 'saved'
  - **Other Western AK** river systems may be affected

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## AEQ estimates of alternatives by river system: approximation of impact on salmon fisheries (commercial, subsistence, sport)

Yukon River (Alaska)					
Catch and AEQ Estimates	Year				
	2003	2004	2005	2006	2007
Commercial Catch	40,438	56,151	32,029	45,829	33,634
Subsistence Catch	55,109	53,675	52,561	47,710	59,242
Sport Catch	2,719	1,513	483	739	960
Total Catch	98,266	111,339	85,073	94,278	92,876
PPA1	-329	591	1,952	3,409	5,228
PPA2	-61	463	1,944	5,921	8,840
Alt. 2, 87,500, opt2d, 70/30	561	-2	1,267	2,107	3,299
Alt. 2, 29,300, opt2d, 70/30	3,690	3,469	4,989	9,786	14,938

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## Economic impacts: Salmon fishery management

River	Escapement goals met from 2003-2007	Additional restrictions imposed from 2003-2007			Likely management changes if additional AEQ Chinook salmon had been available 2003-2007
		Subsistence	Commercial	Sport	
Yukon	2006-2007 some key goals not met	No	No	No	2006-2007 additional fish would accrue towards escapement; in all years increased potential for higher subsistence and commercial harvest
Kuskokwim	Most	No	No	No	Potential for increased commercial harvests within market constraints
Bristol Bay	2007 goals not met	No	No	2007	If additional Chinook salmon were sufficient to meet escapement then 2007 sport fish restriction would not have been imposed; In all years additional fish towards escapement, increased potential for higher subsistence and commercial harvest

## Economic impacts: pollock fishery primarily characterized as forgone revenue

Option	Relative economic impact on pollock industry
Cap level: 29,300-87,500	<ul style="list-style-type: none"> <li>• Lowest cap leads to highest constraint on pollock fishery in all years.</li> <li>• In high bycatch years (e.g. 2007), even the highest cap (87,500) is constraining for the pollock fishery.</li> </ul>
Sector allocation	<ul style="list-style-type: none"> <li>• See Table ES-20 and Table ES-21</li> </ul>
Seasonal allocation	<ul style="list-style-type: none"> <li>• Higher forgone pollock revenue when seasonal allocations are lower in the A season (E.g. 50/50 and 58/42).</li> <li>• 70/30 seasonal split least constraining due to higher roe value in A season.</li> </ul>
Rollover	<ul style="list-style-type: none"> <li>• 80% rollover in PPA scenarios mitigates forgone revenue impacts in B season.</li> </ul>
Transferability	<ul style="list-style-type: none"> <li>• Full transferability mitigates forgone revenue impacts in the A season</li> </ul>

## Forgone revenue pollock fishery (millions \$)

### PPA 1 cap (68,392)

Sector	CDQ	Inshore CV	Mothership	Offshore CP	Total
Alternative 2: option 2d					
A season	\$0	\$124.7	\$20.7	\$108.1	\$253.5
B season	\$2.2	\$37.5	\$1.5	\$3.6	\$44.7
<b>Total Alternative 2</b>	<b>\$2.2</b>	<b>\$162.2</b>	<b>\$22.2</b>	<b>\$111.7</b>	<b>\$298.2</b>
Alternative 4: PPA1					
A season	\$0	\$114.0	\$12.0	\$105.0	\$231.0
B season	\$3.0	\$33.0	\$2.0	\$18.0	\$57.0
<b>Total Alternative 4</b>	<b>\$3.0</b>	<b>\$147.0</b>	<b>\$14.0</b>	<b>\$123.0</b>	<b>\$288.0</b>

### PPA 2 cap (47,591)

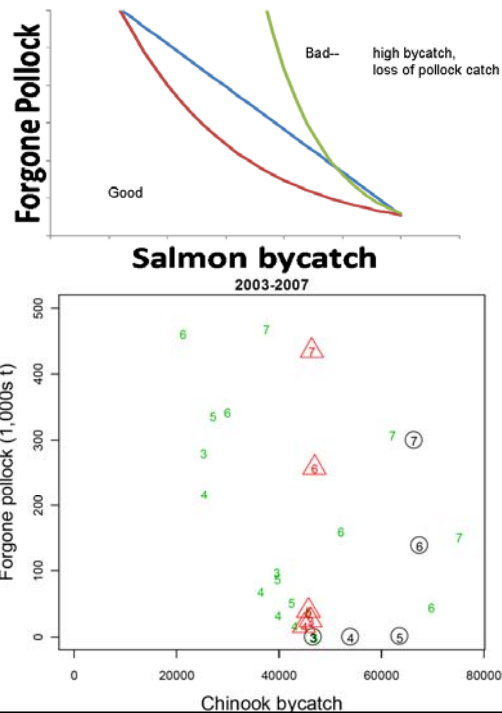
Sector	CDQ	Inshore CV	Mothership	Offshore CP	Total
Alternative 2: option 2d					
A season	\$22.2	\$185.6	\$34.5	\$142.4	\$384.7
B season	\$3.9	\$50.2	\$3.1	\$11.3	\$68.4
<b>Total Alternative 2</b>	<b>\$26.1</b>	<b>\$235.8</b>	<b>\$37.6</b>	<b>\$153.7</b>	<b>\$453.1</b>
Alternative 4: PPA2					
A season	\$12.0	\$160.0	\$29.0	\$141.0	\$341.0
B season	\$4.0	\$42.0	\$3.0	\$26.0	\$76.2
<b>Total Alternative 4</b>	<b>\$16.0</b>	<b>\$202.0</b>	<b>\$32.0</b>	<b>\$167.0</b>	<b>\$417.2</b>

## Salmon saved and foregone pollock

Year	Bycatch Cap level (results for specific sector and seasonal allocations)	% salmon reduction (compared to actual)	% pollock catch foregone (compared to actual)
<b>2007 (highest)</b> Actual bycatch= <b>122,000</b>	87,500	37%	22%
	68,392 Council Pref. Alt (high)	46%	23%
	47,591 Council Pref. Alt (low)	62%	32%
	29,300	92%	46%
<b>2003 (lowest)</b> Actual bycatch= <b>47,000</b>	87,500	0%	0%
	68,392 Council Pref. Alt (high)	1%	0%
	47,591 Council Pref. Alt (low)	5%	4%
	29,300	52%	22% <sup>32</sup>



- Policy tradeoffs in Council decision-making



Where are we in the process?



- Council is conducting outreach meetings
- Draft analysis released for public review on December 2, 2008
- ➔ 60-day public comment period: December 5 -February 3, 2009
- Council scheduled to take final action in April 2009
- NMFS scheduled to implement new program by January 2011

## Council and NMFS are seeking public input



- From local residents, communities, agencies, organizations, and the general public
- Ways to provide input:
  - Write a letter to the Council or NMFS
  - Talk to Council and staff members at a Council meeting, SBW meeting, other regional mtgs
  - Testify at the April 2009 Council meeting
- Comments may address:
  - the scope, content, and adequacy of the document
  - the analysis of impacts (environmental, social, economic)
  - the merits of the alternatives
  - your recommendation for a preferred alternative

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## When and where can I get the analysis?

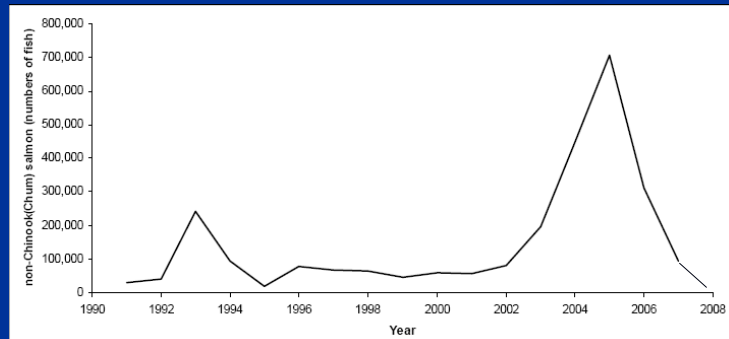


- Analysis (DEIS) is currently available
- Download from the NMFS Alaska website  
<http://www.fakr.noaa.gov/sustainablefisheries/bycatch/salmon/deis1208.pdf>
- Request a printed copy or a CD from the web site
- Call NMFS at 586-7228 to request a copy

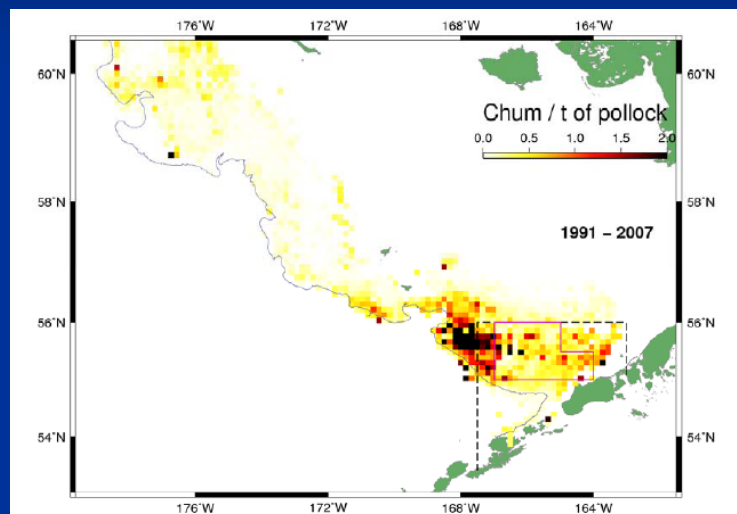
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## Non-Chinook (chum) salmon bycatch

- Non-Chinook category includes coho, sockeye, pink and chum salmon (>99% chum)
- Since 2002 pollock fishery >95% of total chum bycatch
- Historical high in 2005 (704,000)
- 2008 total = ~15,000



## Historical chum bycatch rates 1991-2007



## Chum salmon analysis

- Council to refine alternatives and establish analytical timeline in December 2008
- Current alternatives include hard caps and triggered closure
- Hard caps range between 58,176-488,045 non-Chinook
- caps by fishery or by sector
- Analysis modeled after Chinook impact analysis
- Timeframe for analysis TBD, initial review likely no sooner than October 2009

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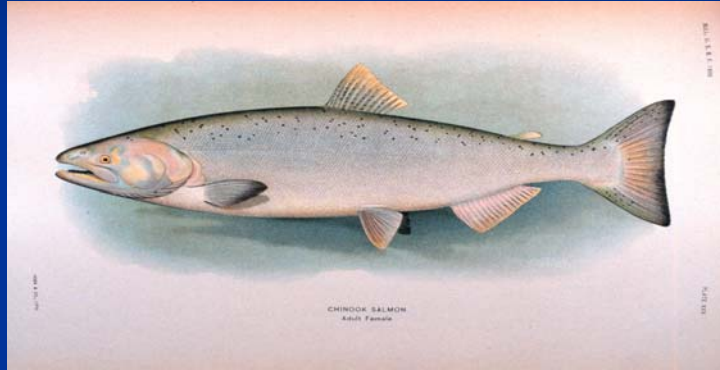
## Salmon bycatch related discussions at Council or related meetings

December 2008	Chum salmon discussion by Council; YRP presentation and dialog with Panel and Council members, evening workshop on incentive-based bycatch programs
January 2009	Salmon Bycatch Workgroup meeting (1/20); Nome outreach mtg (1/22)
February 2009	SSC/AP/Council review of incentive-based programs; end public comment period on DEIS
April 2009	Final action on Chinook management measures (DEIS): Council review outreach report, summary of public comments on DEIS, review of staff analysis, select final preferred alternative; Chum salmon: review and revise alternatives
June 2009	Chum salmon review alternatives/preliminary analysis (tentative)
October 2009	Chum salmon initial review of analysis
Dec 09 or Feb 10	Final action on chum salmon analysis

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Thank You!

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Council website: [www.fakr.noaa.gov/npfmc](http://www.fakr.noaa.gov/npfmc)

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