

# Pollock fishery characteristics and salmon bycatch patterns



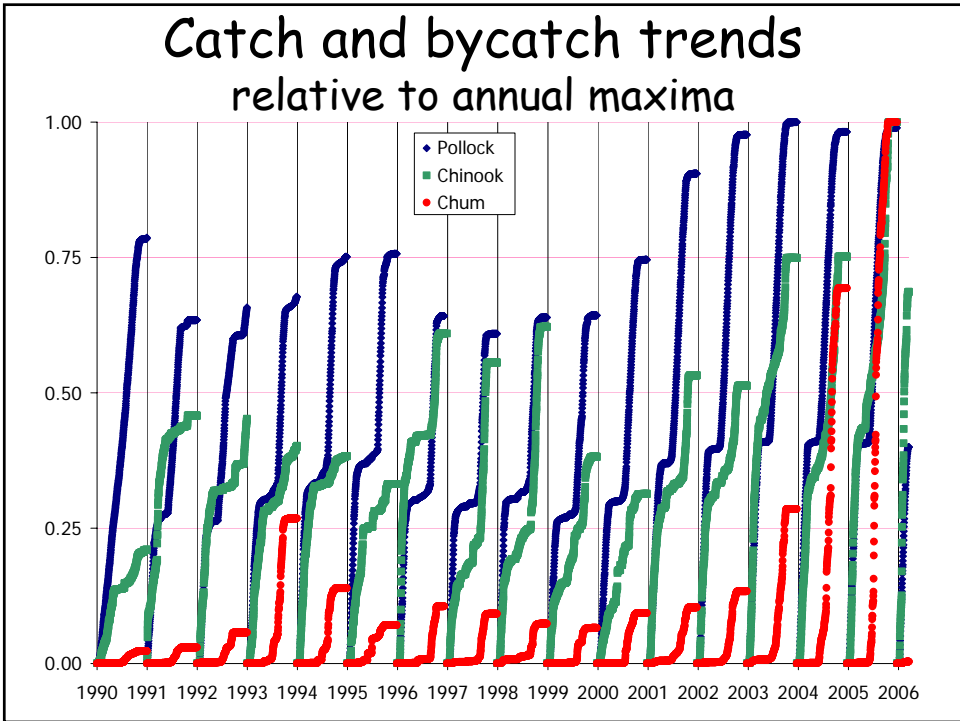
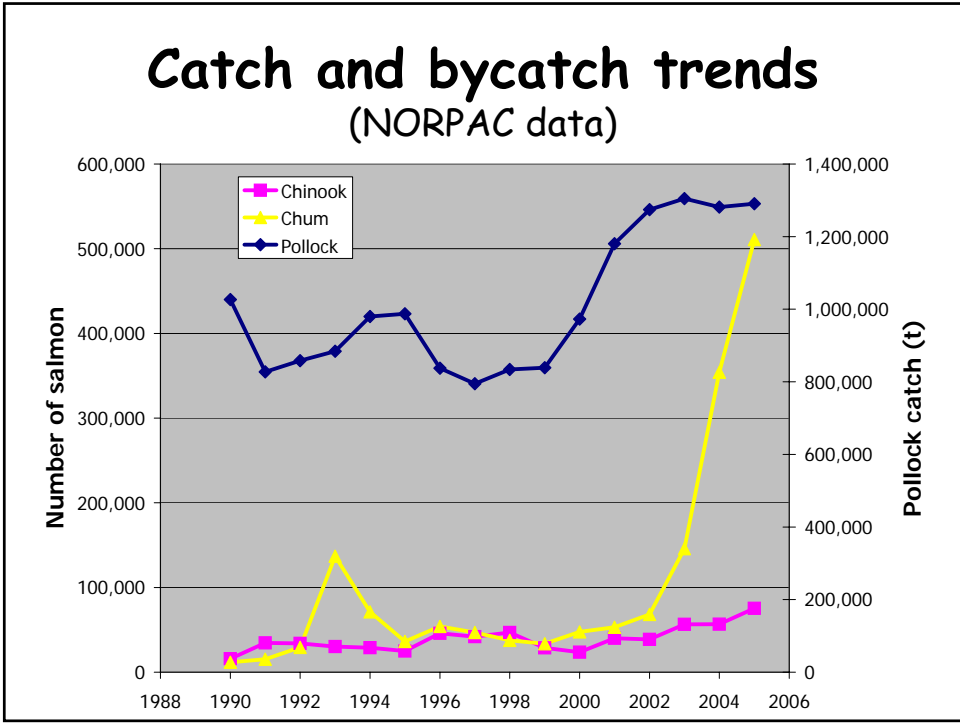
James Ianelli  
AFSC/NMFS/NOAA

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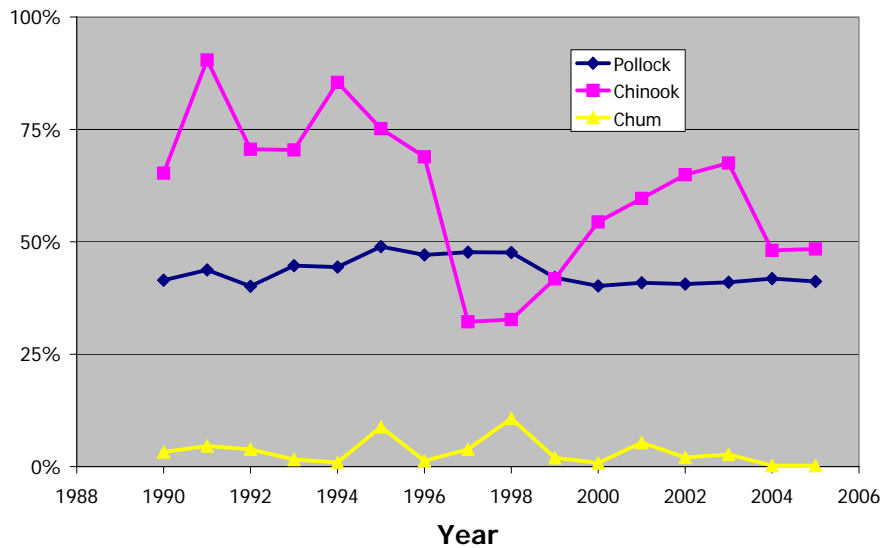
## Prohibited species bycatch

	1997	1998	1999	2000	2001	2002	2003	2004
Herring (t)	1,089	821	785	482	224	105	895	963
Red king crab (n)	0	5,098	0	0	38	6	53	10
Other king crab (n)	156	1,832	2	104	5,135	81	9	6
Bairdi crab (n)	6,525	35,594	1,078	173	86	651	784	1,200
Other tanner crab (n)	88,588	45,623	12,778	1,807	2,179	1,667	761	740
Chinook salmon (n)	43,336	49,373	10,187	3,966	30,107	32,222	46,044	53,343
Other salmon (n)	61,504	62,276	44,585	56,707	52,835	76,998	190,146	436,176
Halibut (t)	127	144	69	80	164	127	97	92



# Pollock fishery description

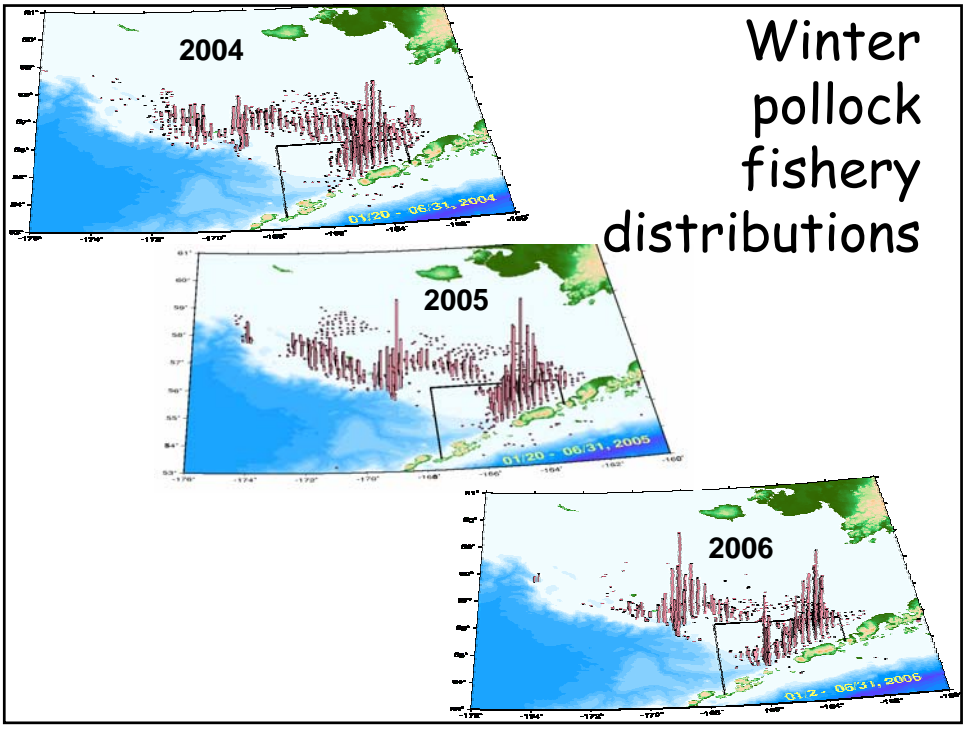
Proportion of catch in A season



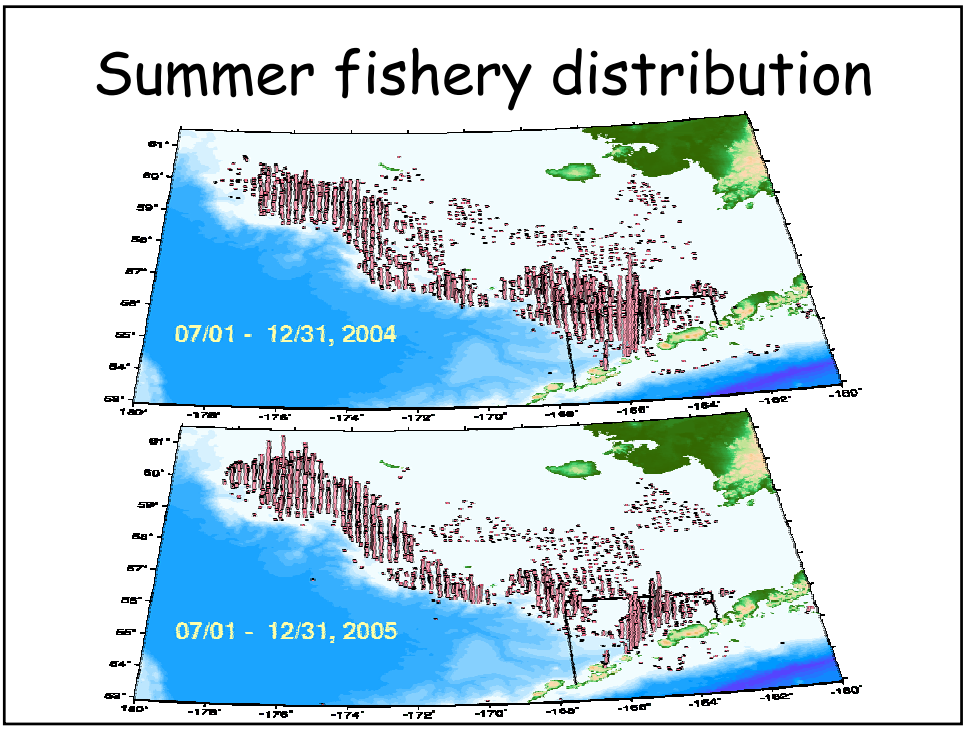
## General features of pollock distribution

- Fishery patterns
- Bottom trawl surveys

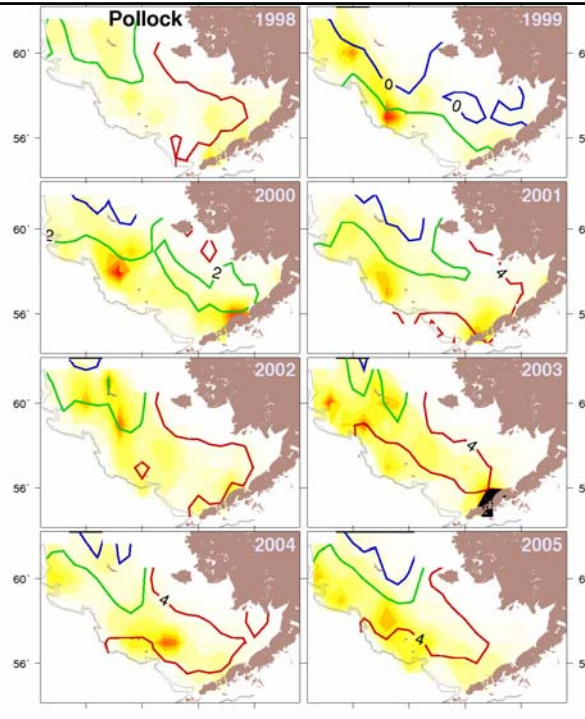
# Winter pollock fishery distributions



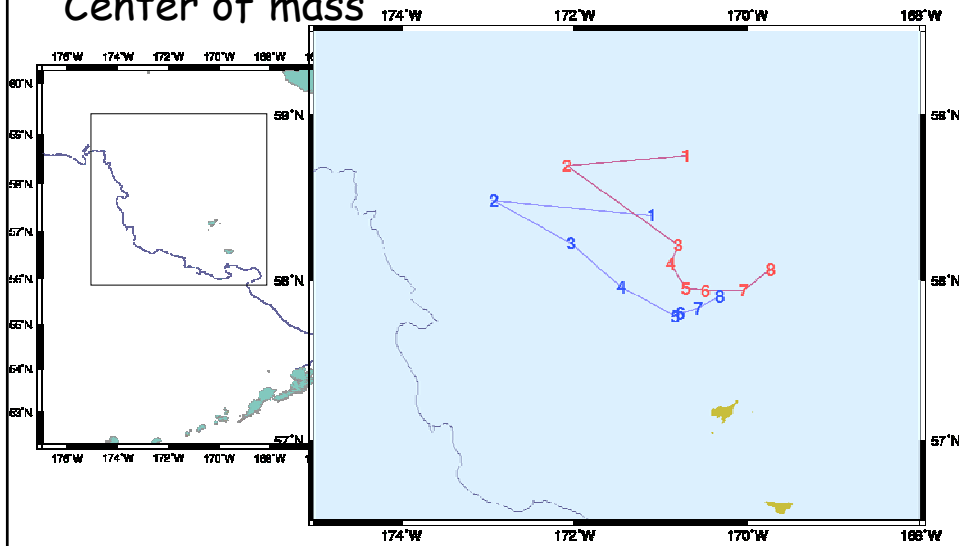
# Summer fishery distribution



Pollock  
bottom-trawl  
survey  
CPUE  
relative to  
bottom  
temperature



Pollock bottom-trawl survey  
distribution by age and temperature  
Center of mass



## Key question

- Has the EBS pollock fishery changed in a way that affects salmon bycatch?
  - Details on fishery bycatch
    - By fleet
    - By time of year
    - Time of day
    - Depth
  - Spatial bycatch trends
  - Spatial extent

## Pollock fishery patterns

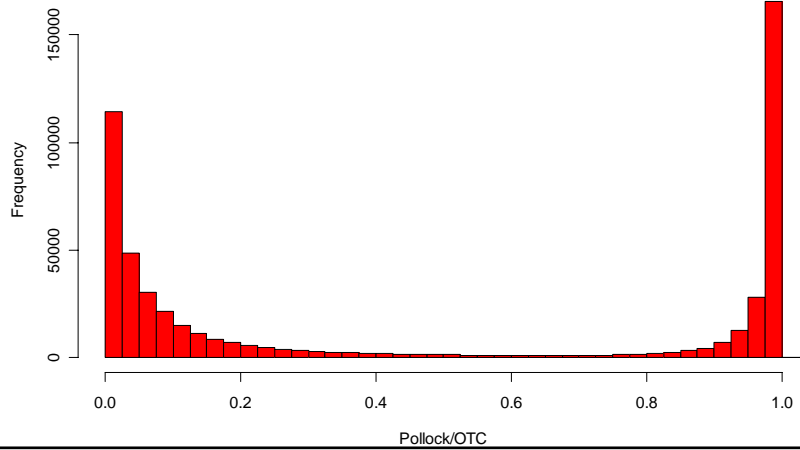
- Approaches
  - Incidence: proportion of tows where salmon observed
  - Number of salmon caught per ton of pollock
  - CPUE weighted distributions (centers of mass)
    - Weights based on species CPUE  
*(Note: "chum" refers to non-chinook salmon)*

# Methods: data screening

As a fraction of total catch

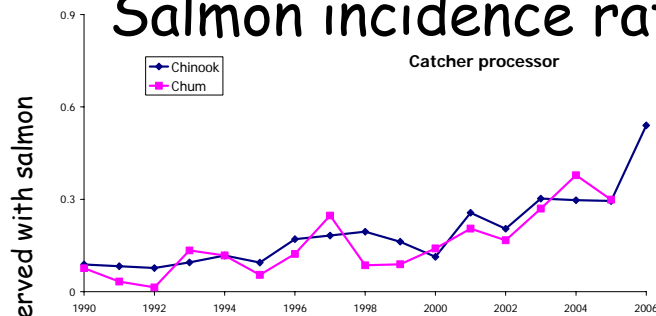
80% used as cut-off for "pollock" tows

Distribution of pollock relative to total catch

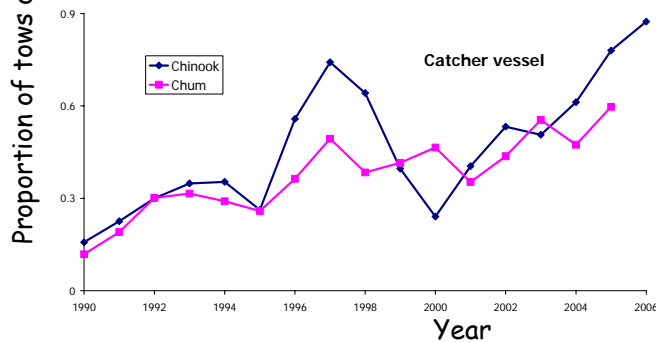


## Salmon incidence rate (by year)

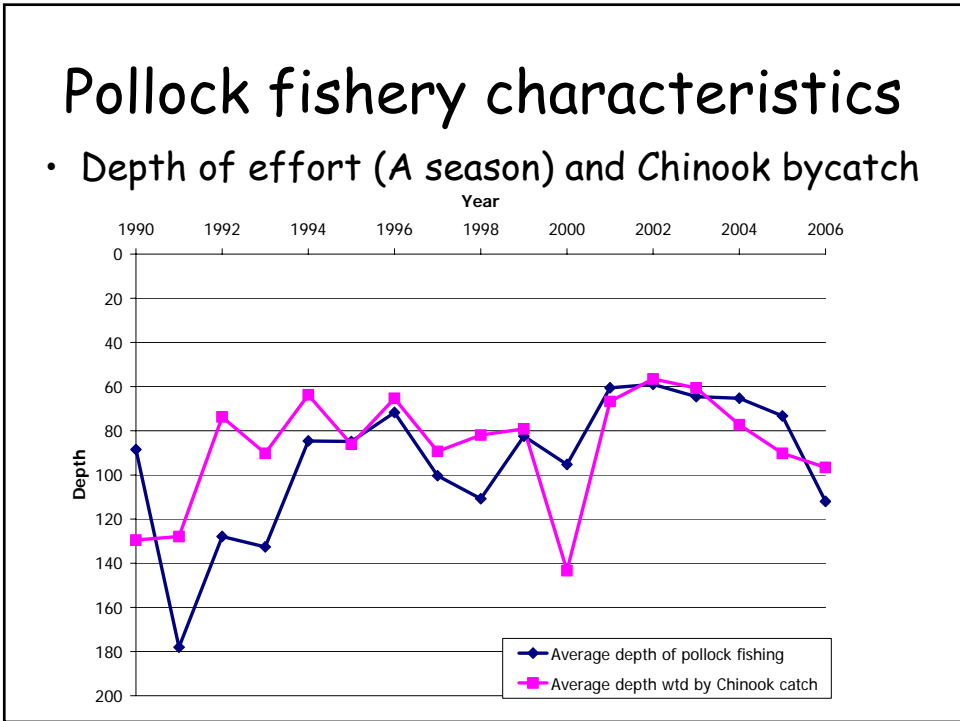
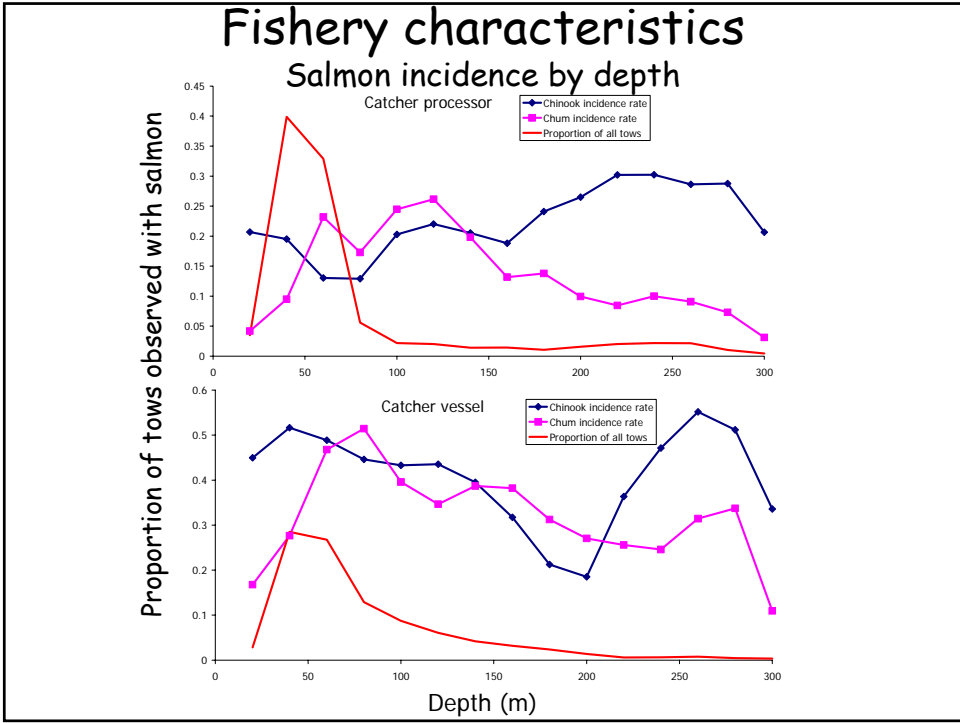
Catcher processor



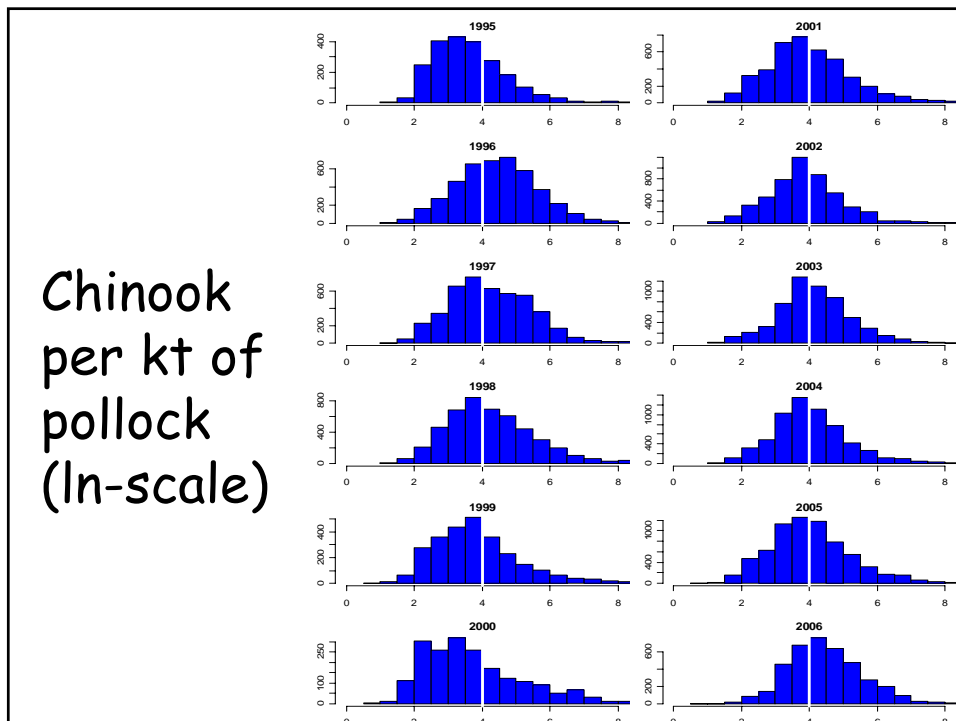
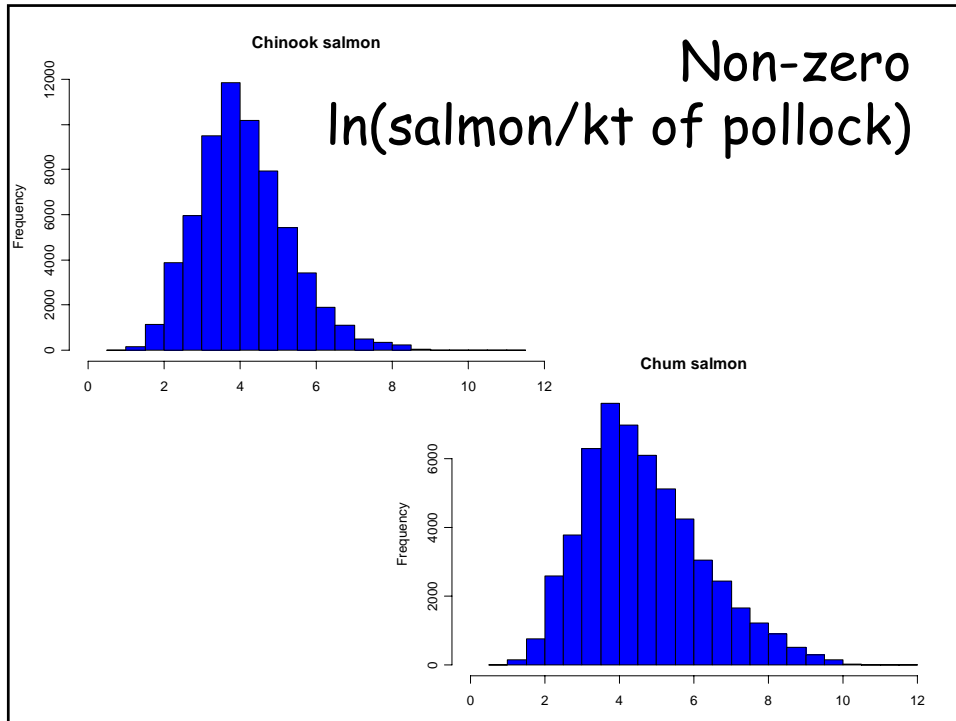
Catcher vessel



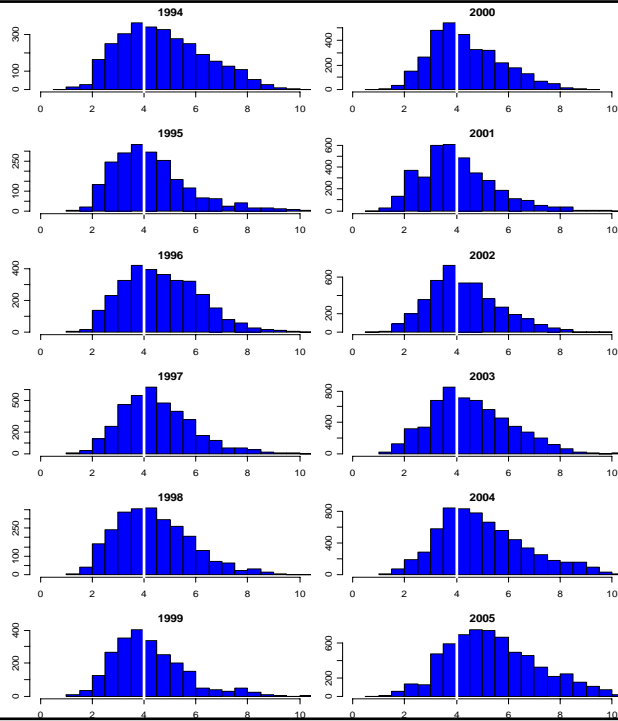
Note: Catch-vessel data based on port-sampler assignments to tows





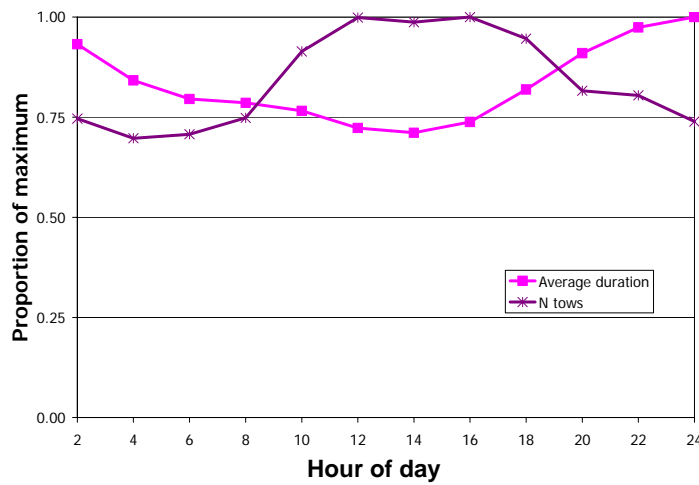


Chum  
per kt of  
pollock  
(ln-scale)



## Pollock fishery and time of day

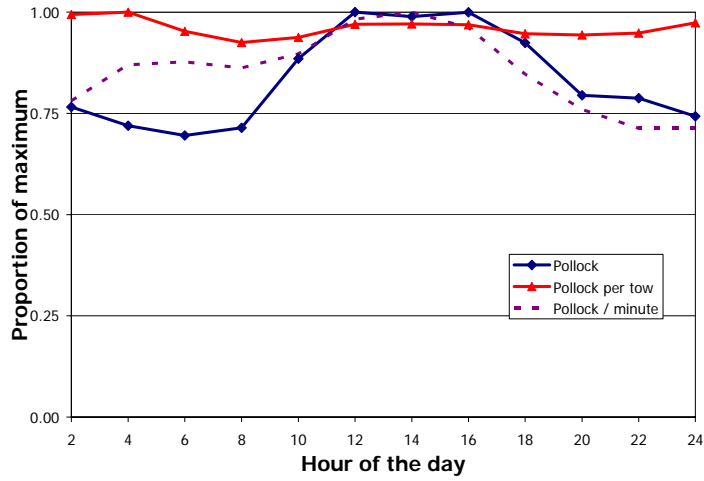
- Tow duration and frequency (1990-2006)



- Longer tows at night, most tows in mid afternoon

# Pollock fishery characteristics

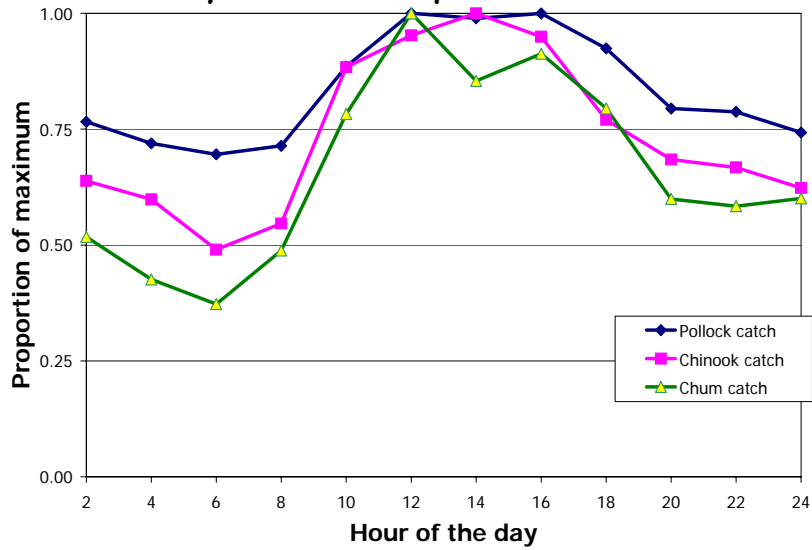
## • Pollock catch



• Best CPUE and most pollock caught in mid afternoon

# Pollock fishery characteristics

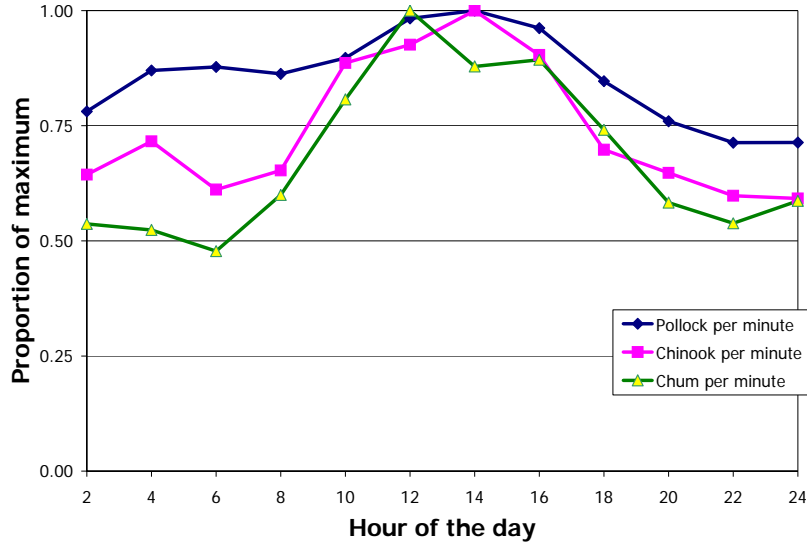
## • Salmon bycatch and pollock catch



• Most salmon caught in mid afternoon

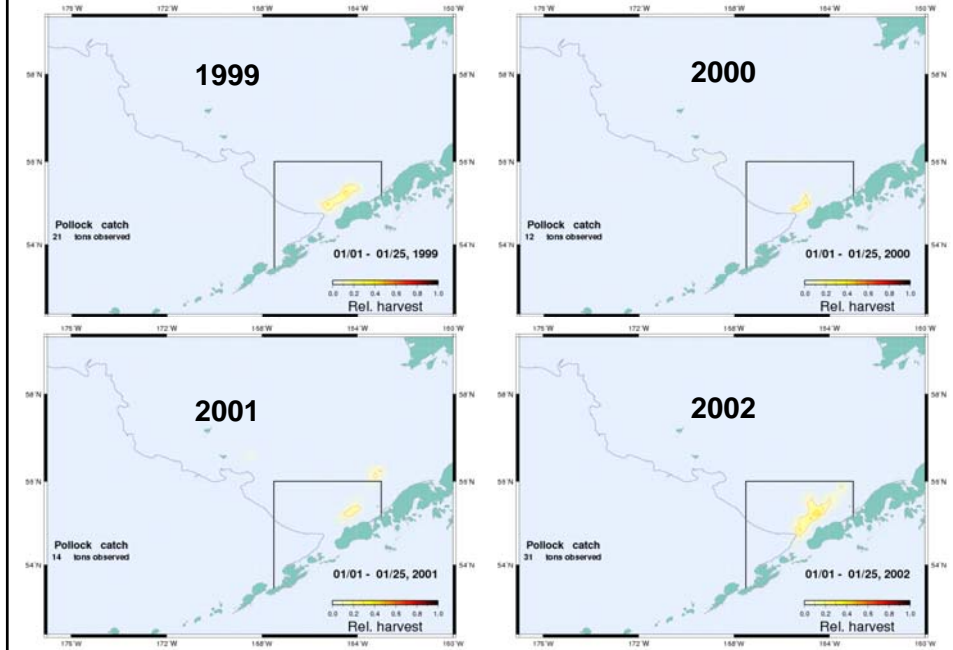
# Pollock fishery characteristics

- Salmon and pollock catch rates

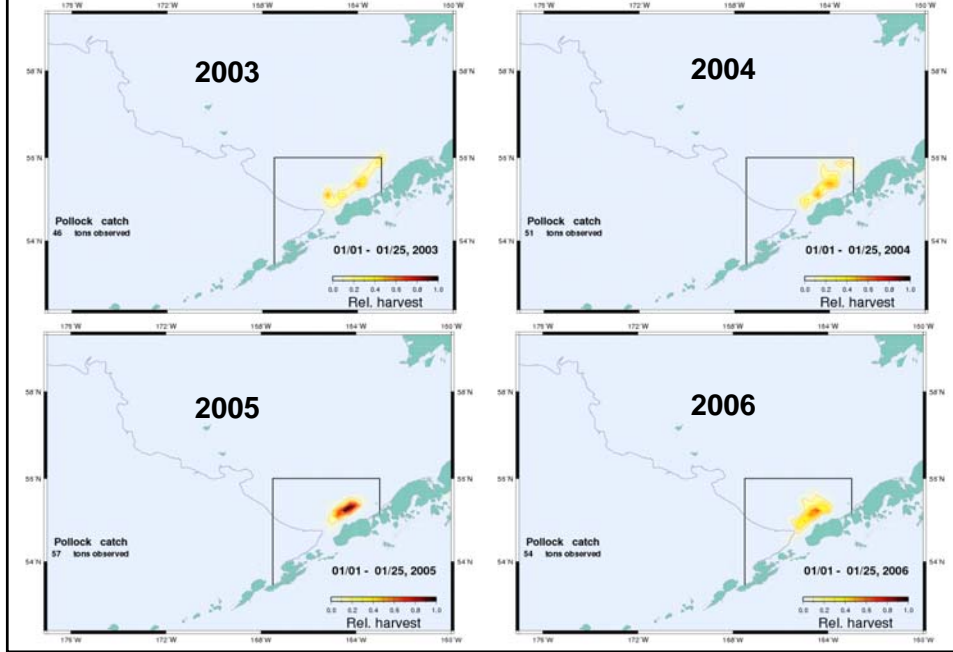


• Salmon CPUE drops more during night

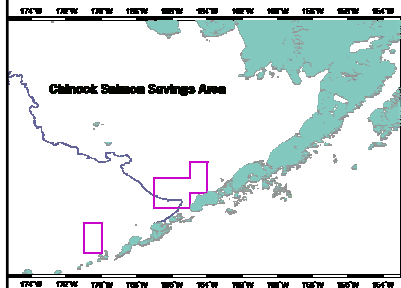
# Pollock A season, 1999-2002



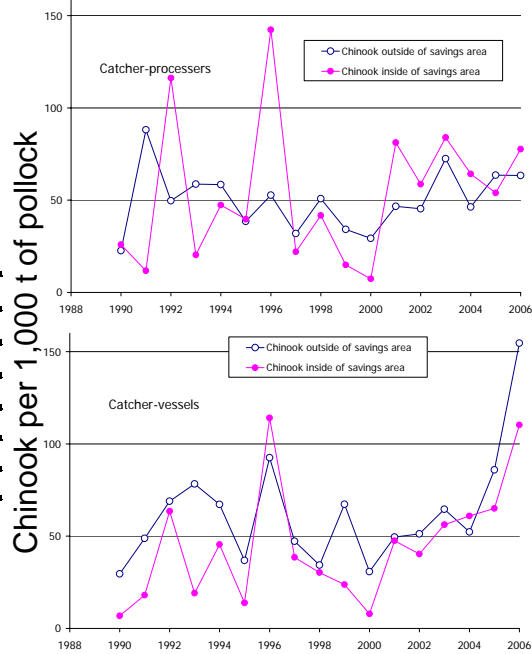
# Pollock A season, 2003-2006



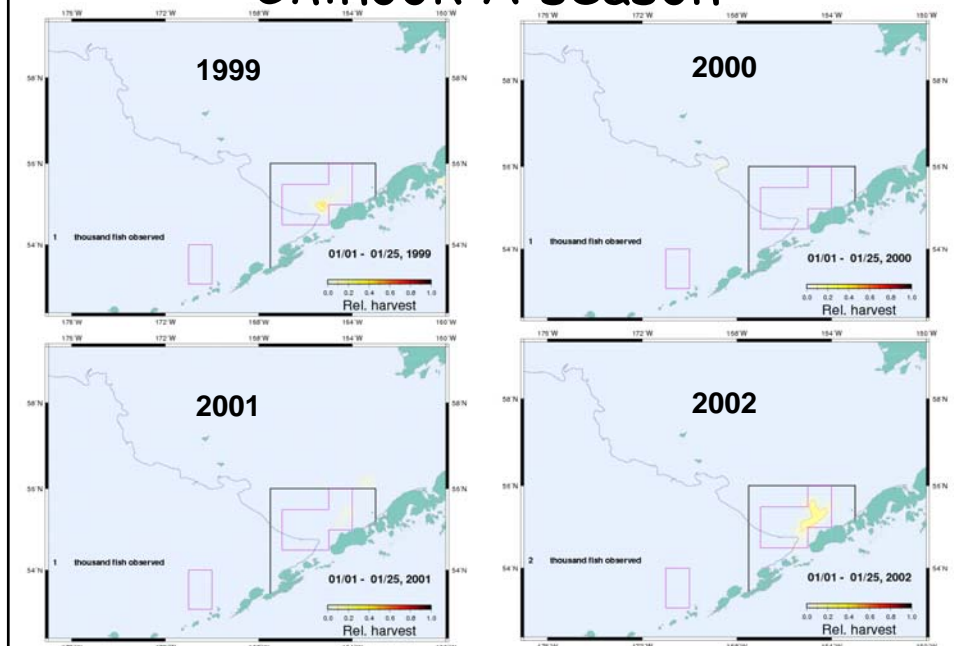
# Chinook



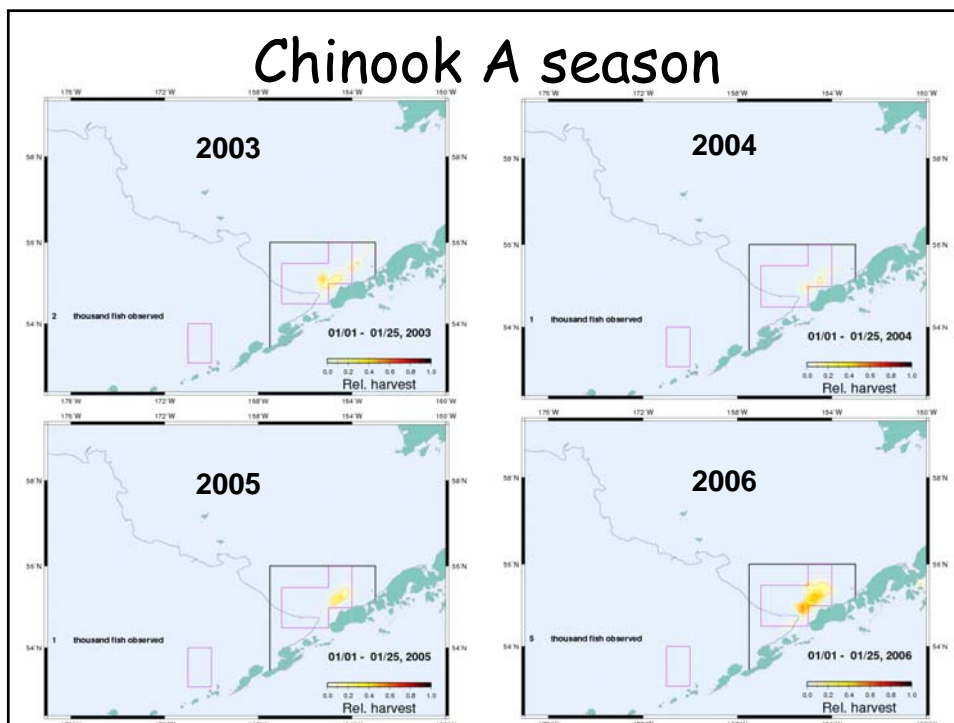
• Chinook / kt of pollock variable can be higher inside CSSA



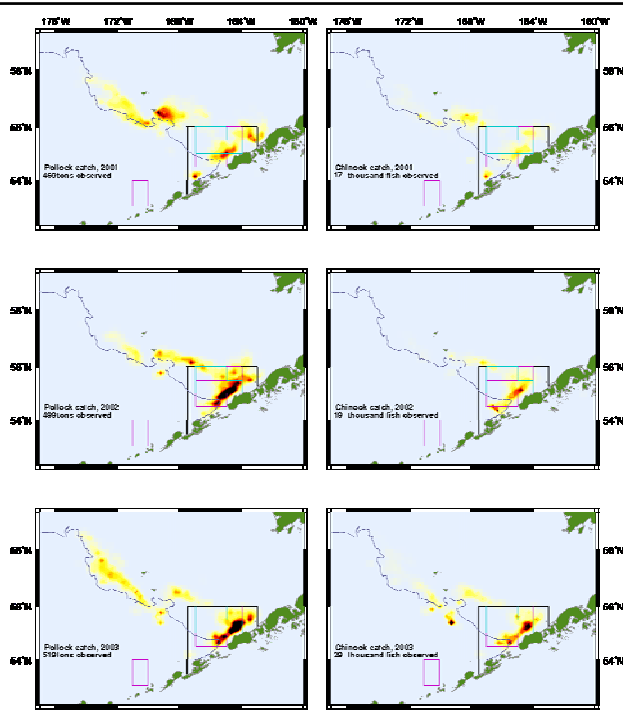
# Chinook A season



# Chinook A season

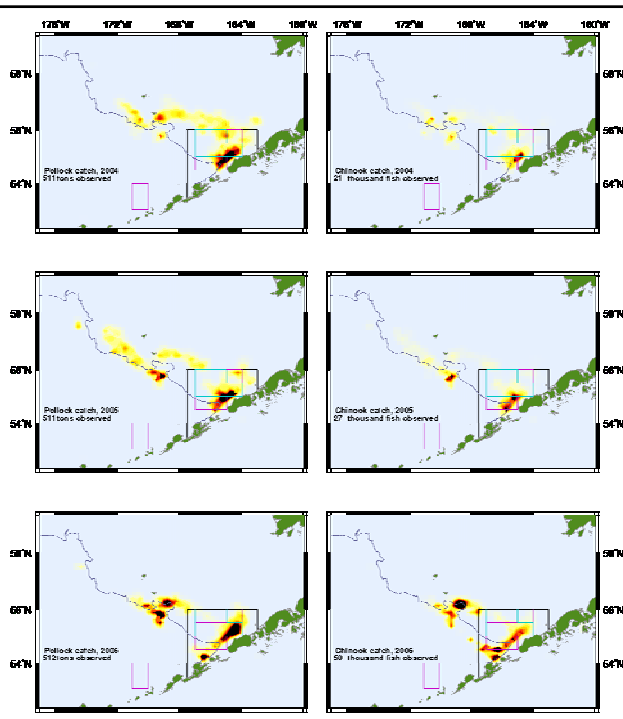


# Pollock and chinook A-season

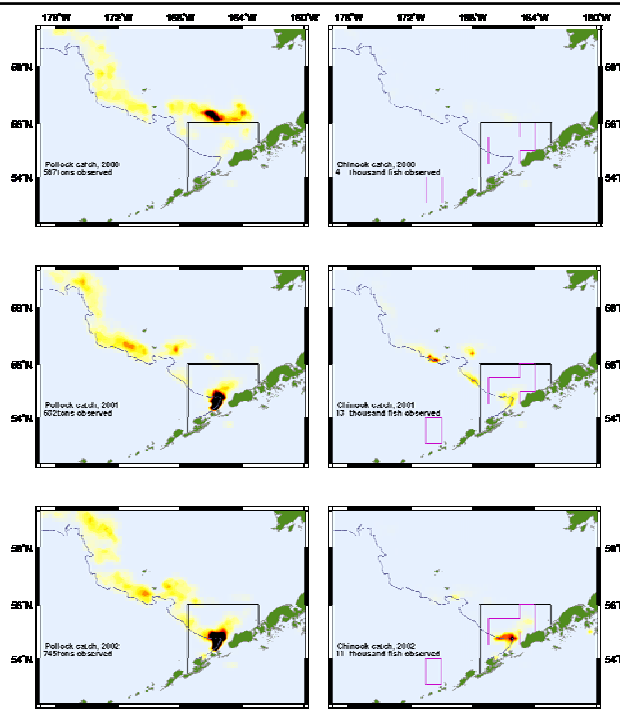


# Pollock and chinook A-season

- Chinook bycatch often at fringe of pollock catch

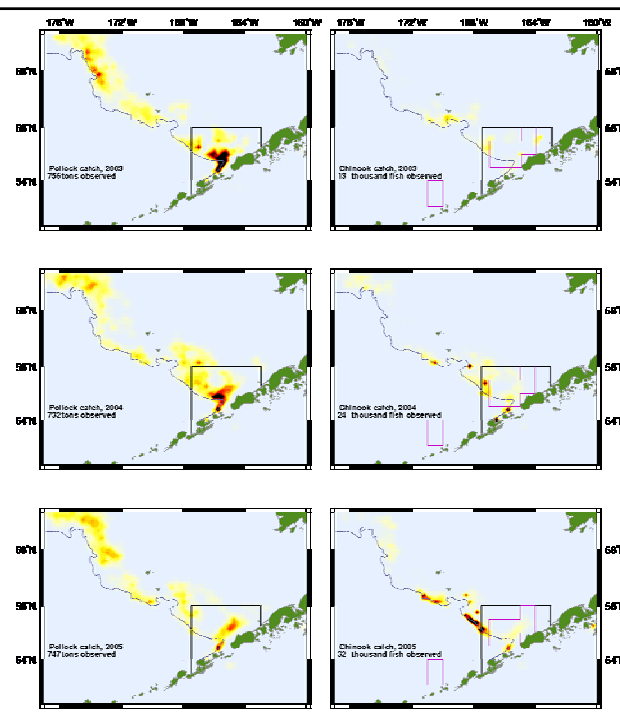


# Pollock and chinook B-season



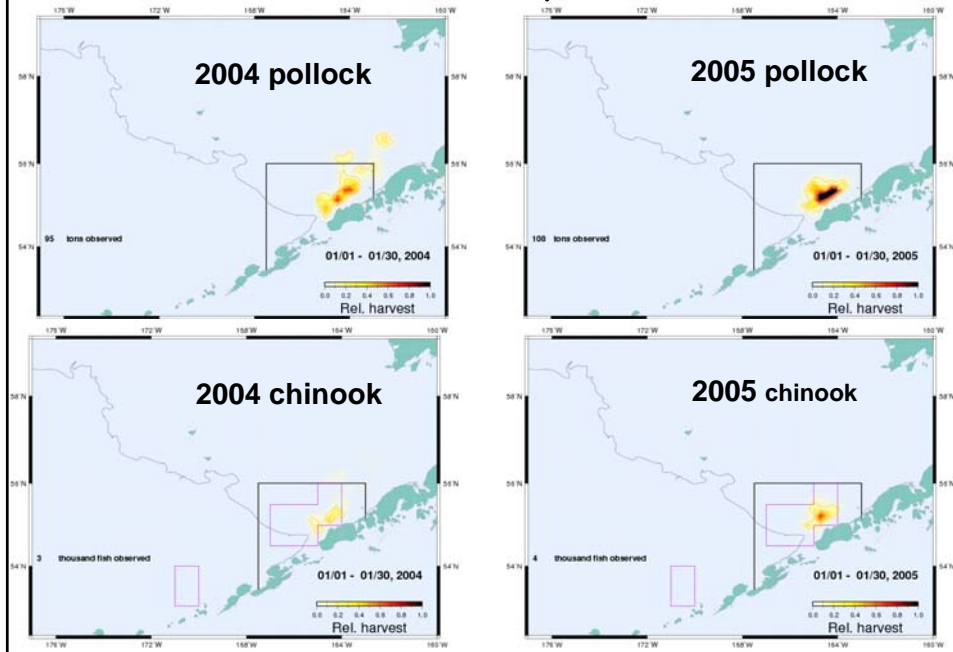
# Pollock and chinook B-season

• *Chinook bycatch often at fringe of pollock catch*

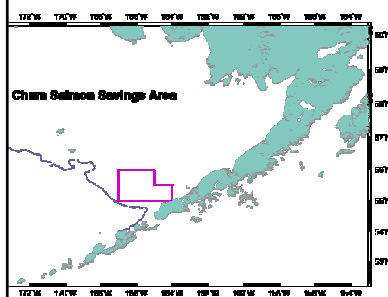




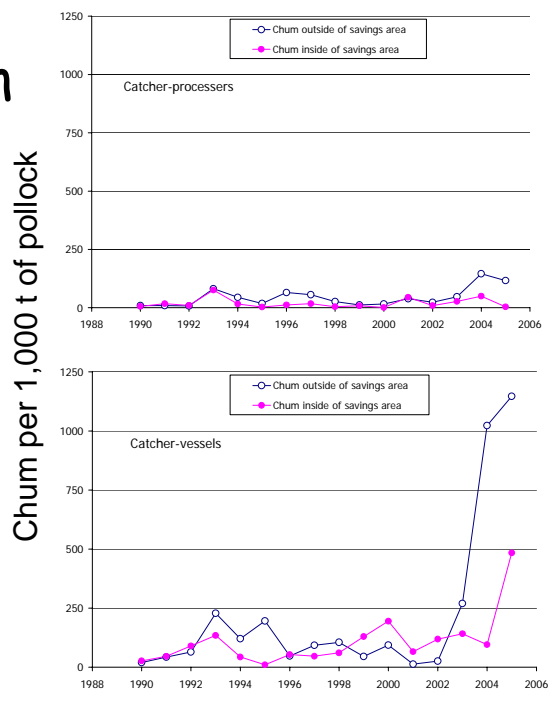
# Pollock & chinook, 2004-05 shifts



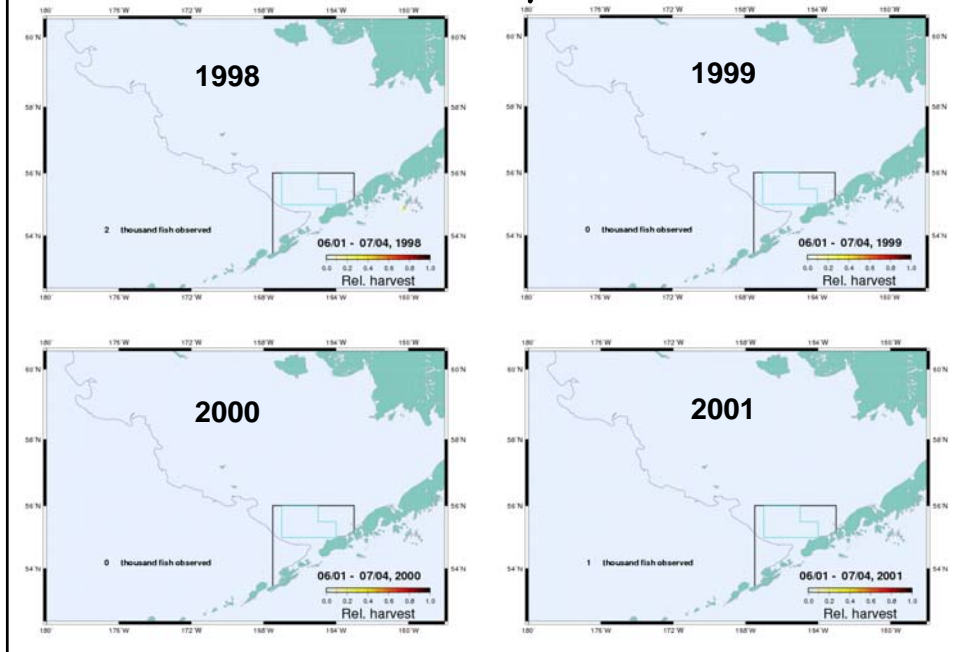
# Chum salmon



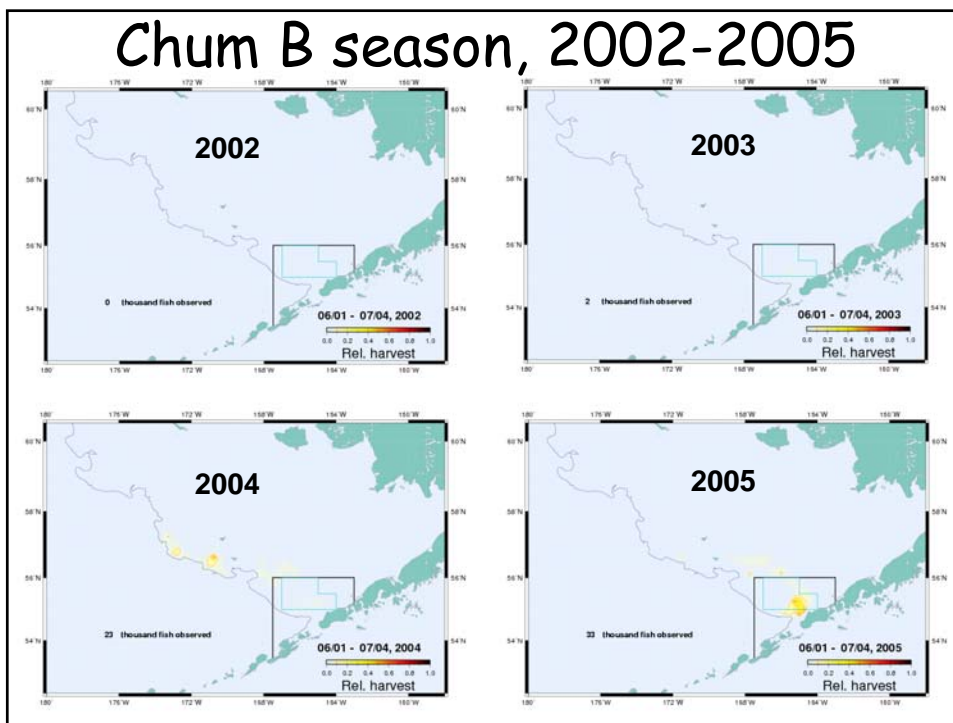
• Chum / kt of pollock variable can be higher inside CSSA



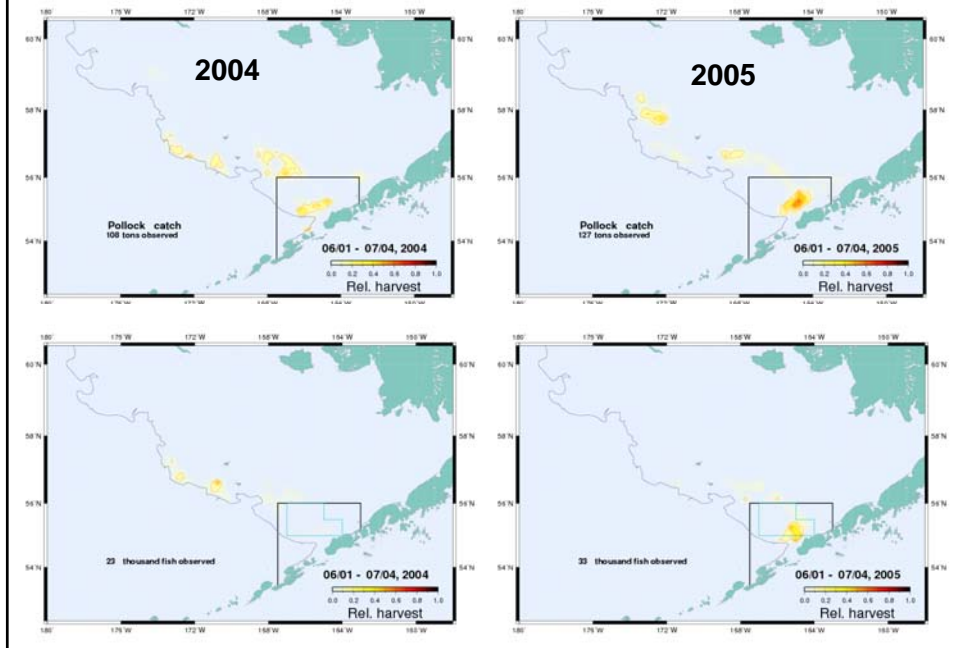
# Chum B season, 1998-2001



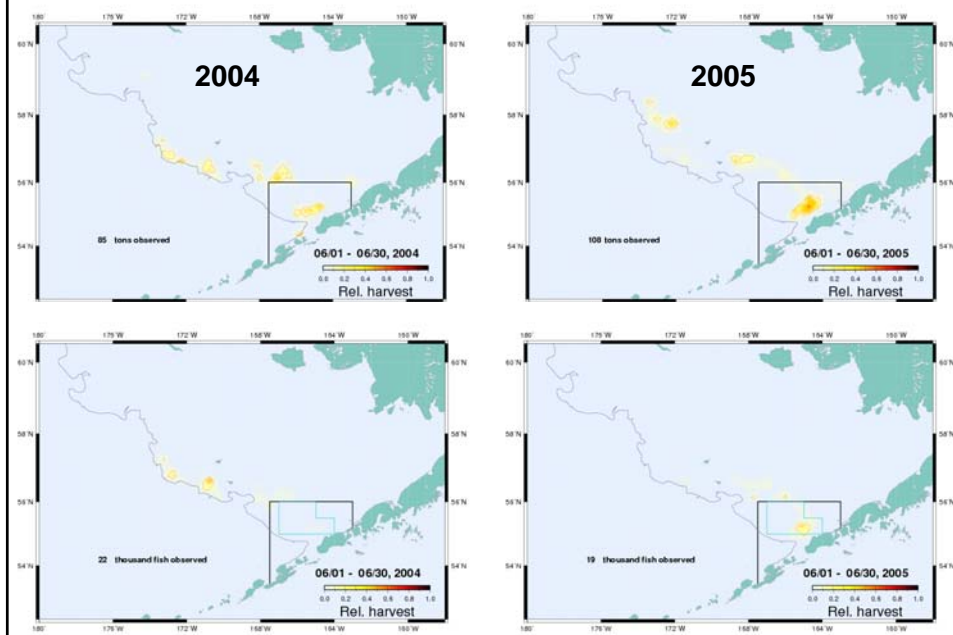
# Chum B season, 2002-2005



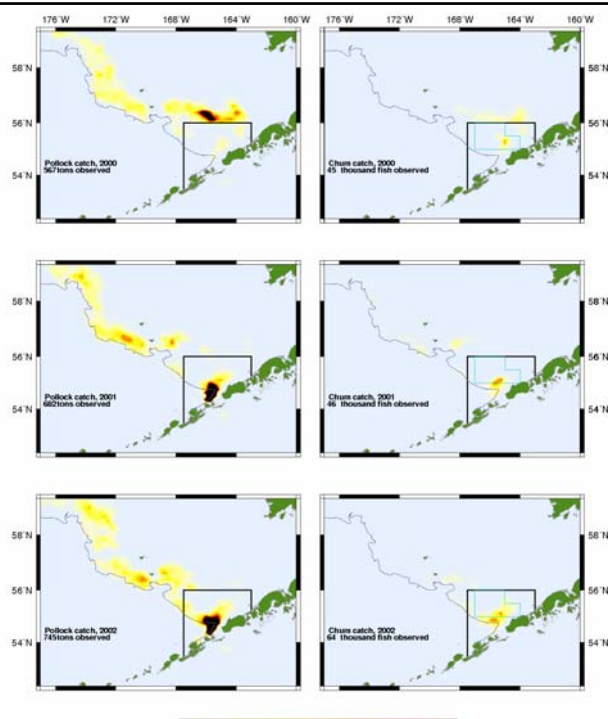
# Pollock & chum B season, 2004-05



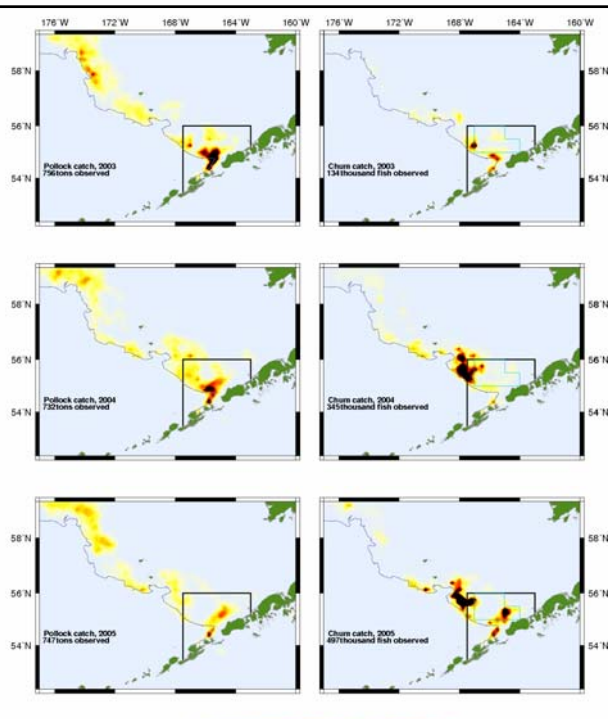
# Pollock & chum B season, 2004-05 shifts



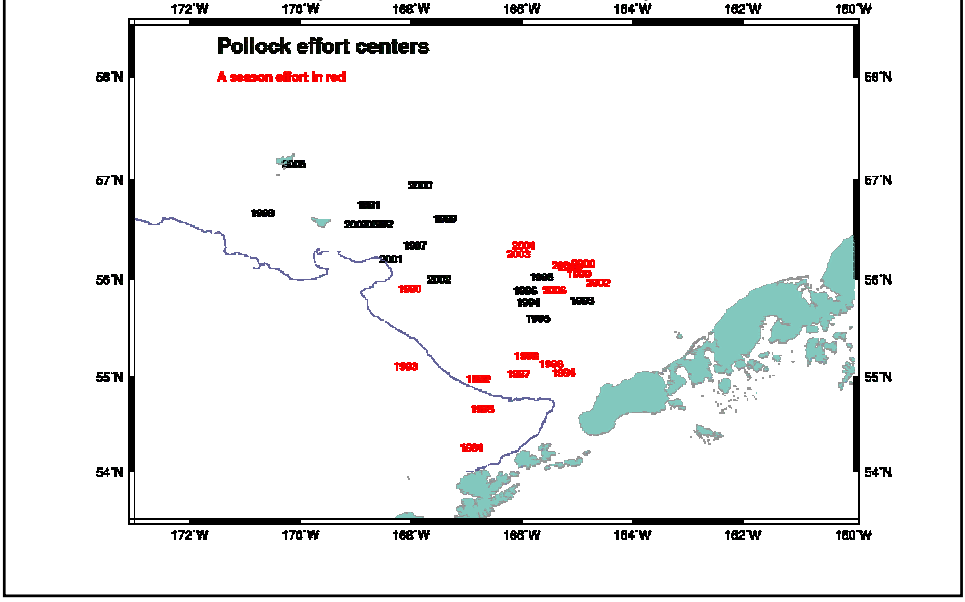
# Pollock and chum B-season



# Pollock and chum B-season



# Centers of effort (A and B seasons)

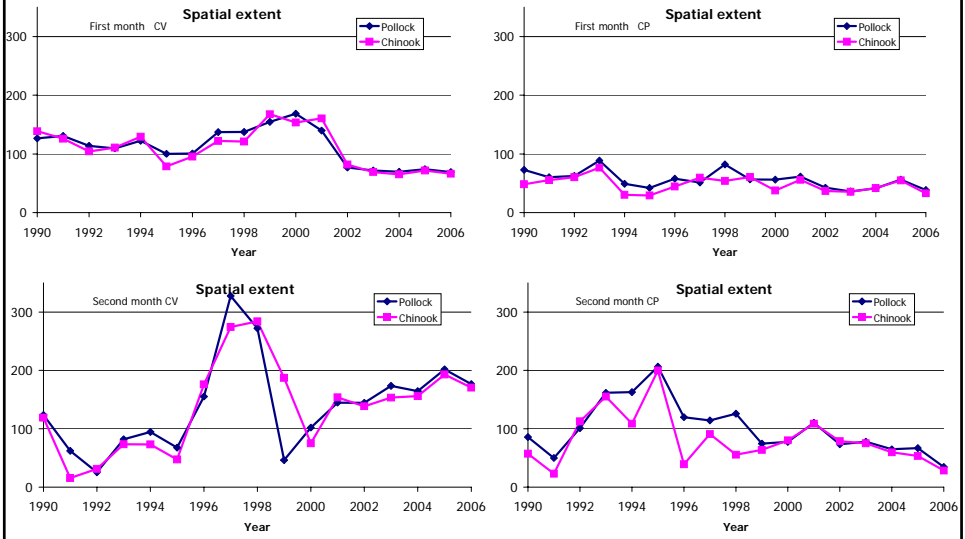


# Fleet dispersion

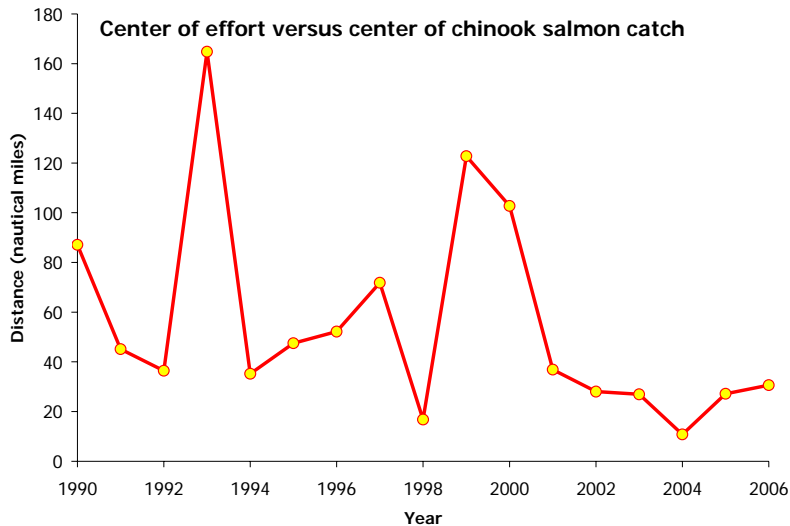
$$S = \frac{\sum_{i=1}^n D_i}{n}$$

## Catcher vessels

## Catcher processors



## Center of mass...



## Conclusions

- Salmon bycatch rates have increased
  - Both numerically and by incidence
- Pollock fishery patterns are variable
  - But show little trend related to salmon bycatch rates
- Some diurnal patterns are evident
- Spatial patterns of salmon bycatch difficult to predict