Research collaborations to improve selectivity for flatfish and cod trawling in Alaska 1997-present

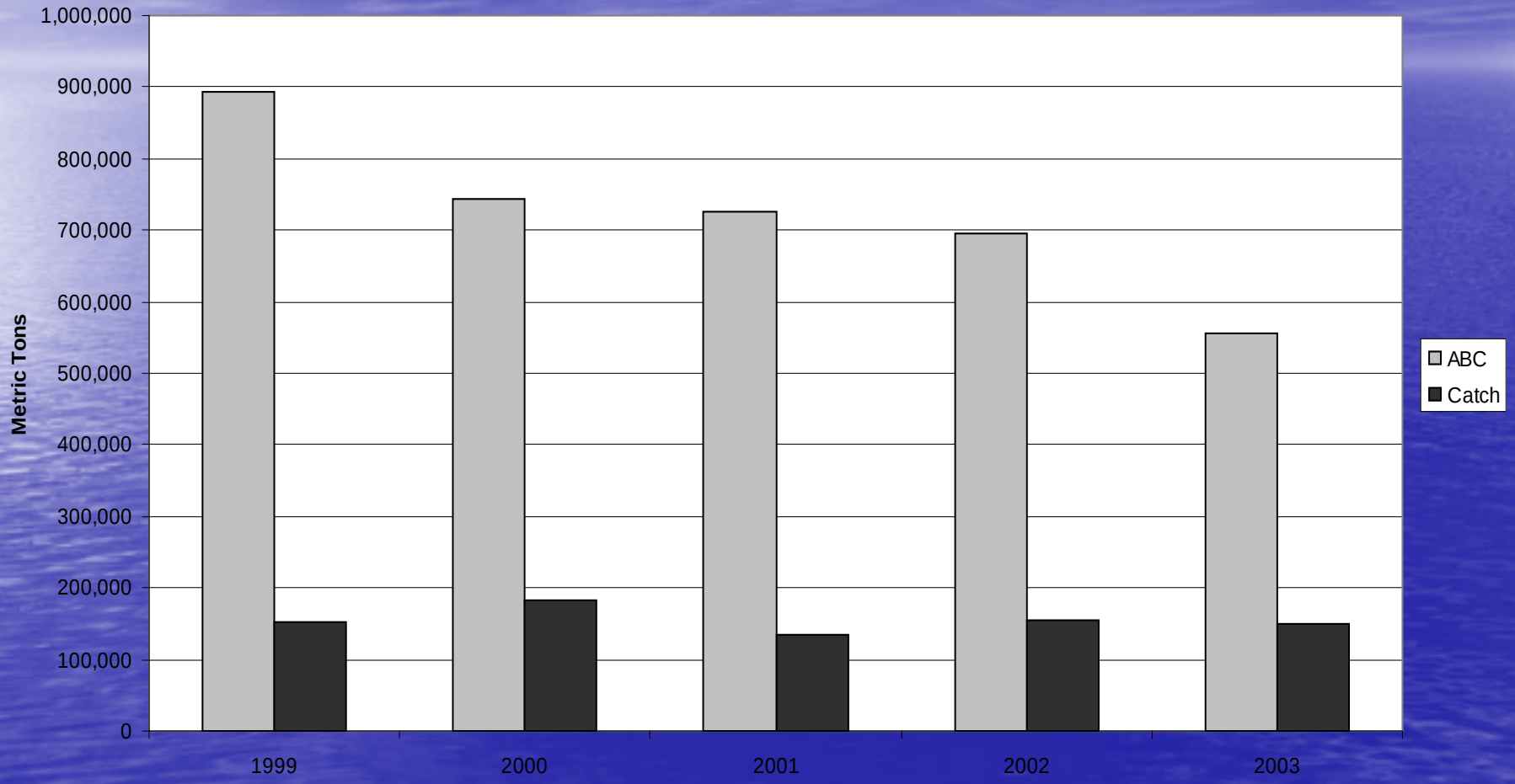
John Gauvin
Fishery Science Projects Director
Alaska Seafood Cooperative
Seattle, Washington

- Snapshot of challenges facing the Bering Sea Freezer Trawler fishery in 1997
- Description of 4 Initiatives (Sea State, halibut excluder for flatfish, halibut excluder for cod, modified trawl sweeps to reduce seafloor contact
- Ideas for future cooperative research on bycatch reduction in Alaska

Background information on Bering Sea freezer trawl sector: Main target species for H&G trawlers

Fleet of 24 freezer trawlers from 124 to 230 feet

Combined BSAI Flatfish ABC and Non-CDQ Catch, 1999 - 2003 (excluding Greenland Turbot)



Prohibited species managed under caps that, if triggered, close fisheries and areas

H&G flatfish fisheries by reputation in 1997

- High bycatch of halibut, king and tanner crab, leads to 20-45% of TAC achieved before shutdowns for PSC
- High discard rates of lower-value species (another talk in itself)
- Bottom trawls/habitat and effects on crab stocks
- Lack of coordination and follow through for problem solving
- Halibut bycatch in flatfish fishing larger than directed fishery for halibut in Bering Sea, articles in sport fishing and halibut fishery trade journals
- “Final straw” event: 104K red king crab catch in 2006. North Pacific Council one meeting away from pulling plug on Rocksole fishery

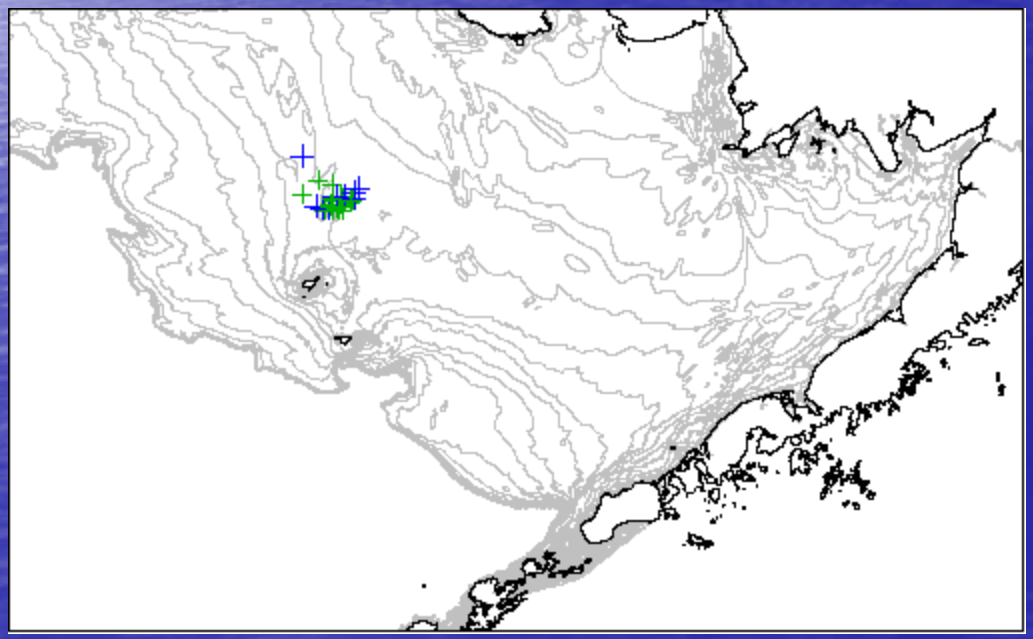
Hotspot avoidance (Sea State)

- With crab bycatch problem in Rocksole, fishermen willing to come up with program to share fishing location data and bycatch rates as long as everyone participates
- Prior situation: NMFS observer data going only to NMFS, no mechanism for industry use of data (100% coverage)
- Get confidentiality and clearance wavers and send to Sea State (Karl Haflinger hired away for Microsoft- too bad Bill Gates)
- Fishermen follow through: charts, tables, 24 hour turn around. Industry also tracks bycatch caps to ensure we don't go over them

H&G bycatch hotspot avoidance (Sea State program) 2005 Other Tanner crab in yellowfin sole

Other Tanner Rates (#/mt)
100 to 1,000
10 to 100
0 to 10

4/30 and 5/1



SEA STATE
P.O. Box 74, Vashon, WA 98070

Ph: (206)463-7370
Fax: (206)463-7371
Email: karl@seastateinc.com

May 2, 2005

Re: Yellowfin Sole

Opilio catch by day

Date	Opilio
4/27/05	67,809
4/28/05	110,595
4/29/05	88,186
4/30/05	10,902
5/1/05	5,522
5/2/05	4,134

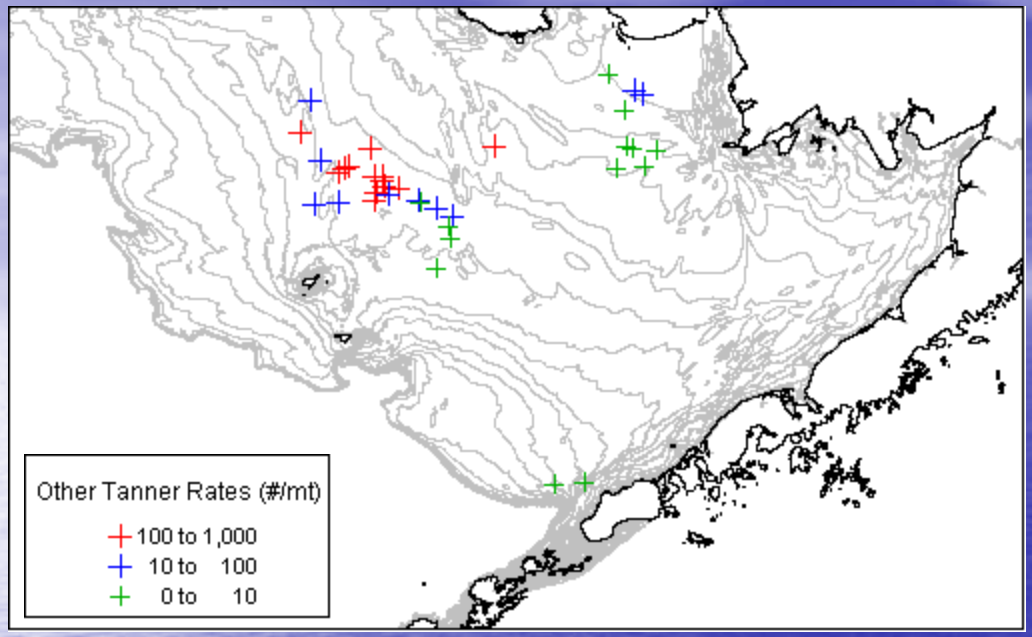
As you can see by the daily numbers the catch jumped up again on the 28th. And as you can see on the map, the majority of those crabs came from the shallow water (30 fathoms) around the 169 line. That is where the majority of the bad crab hits have taken place all season. Please don't go there unless you want crabs, lots and lots of crabs.

Katherine

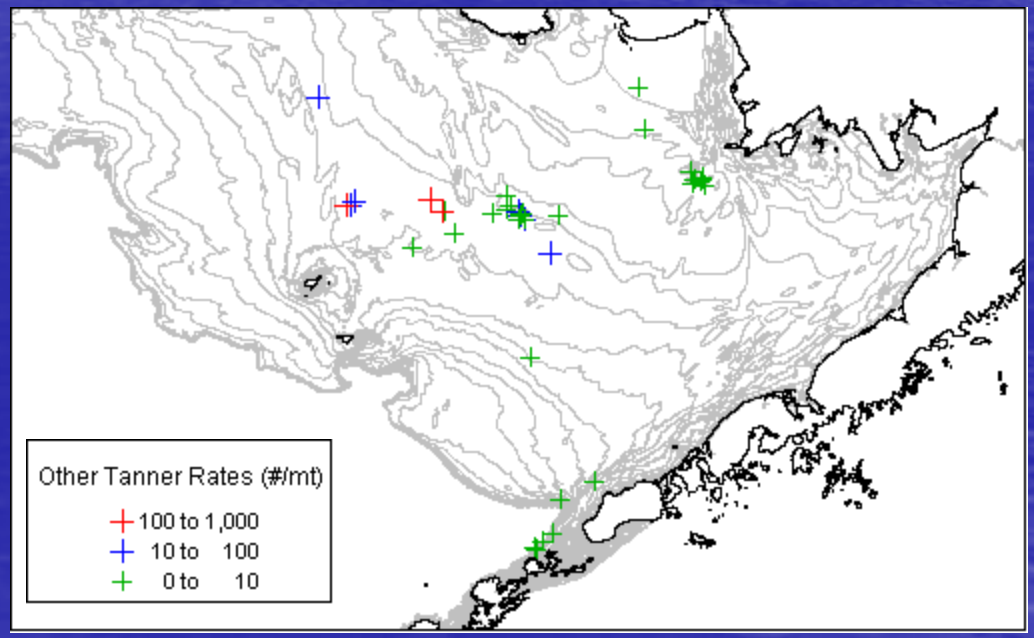
Catch rates by vessel

Vessel	4/26/05	4/27/05	4/28/05	4/29/05	4/30/05	5/1/05	5/2/05
ALASKA JURIS	39.42	45.09	38.38	86.22	4.85		
ALASKA RANGER		34.03					
ALASKA SPIRIT	0.00		73.05	89.46	5.50		17.63
ALASKA VICTORY	46.53	201.85	700.03	171.31	13.51		
ALASKA WARRIOR	4.50	134.60	505.48	4.29		5.71	
ALLIANCE					0.00	54.39	
AMERICAN NO. 1		50.51	5.99	10.22	1.63	45.79	
ARICA	2.69	5.69	15.59	1.51	1.47		
CAPE HORN	0.00		29.60	1.84	13.16		
CONSTELLATION	18.29	13.65	0.00	0.00	0.89		
DEFENDER	20.85	35.02	86.68	0.00	4.36		
ENTERPRISE	35.05			1.69	0.00		
LEGACY				0.00	0.00		
OCEAN PEACE		10.09	28.67	1.11			
REBECCA IRENE	0.00		0.00				

5/2 and 5/3



5/4 and 5/5



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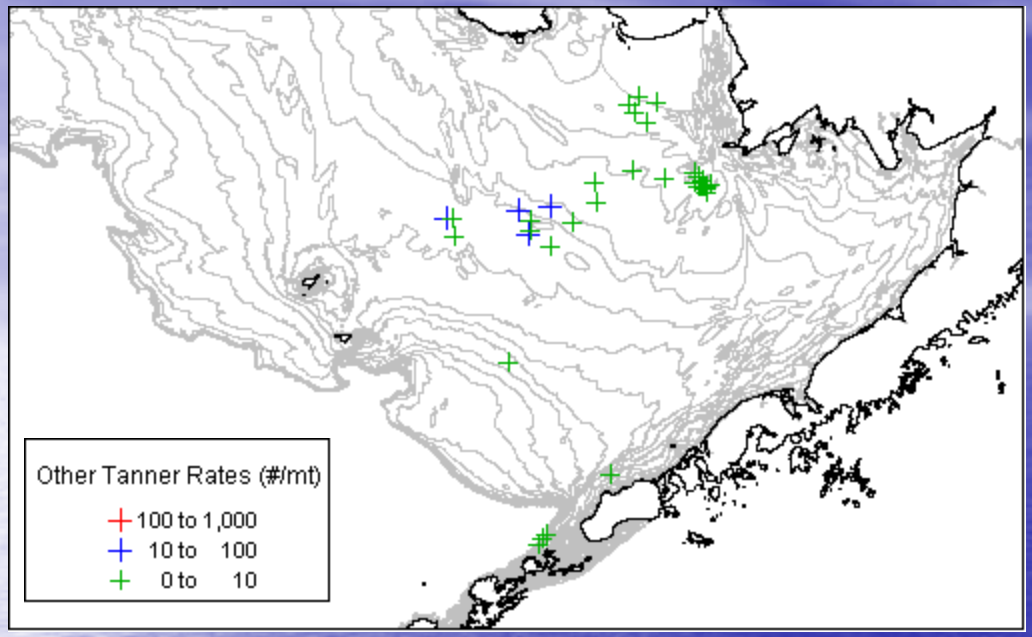
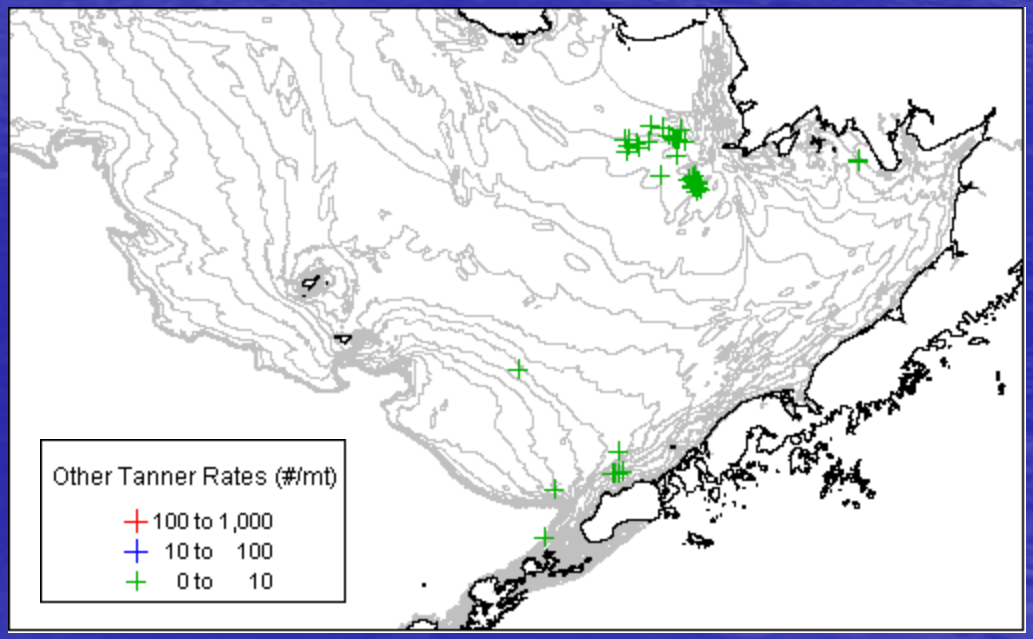


5/8 thru
5/10



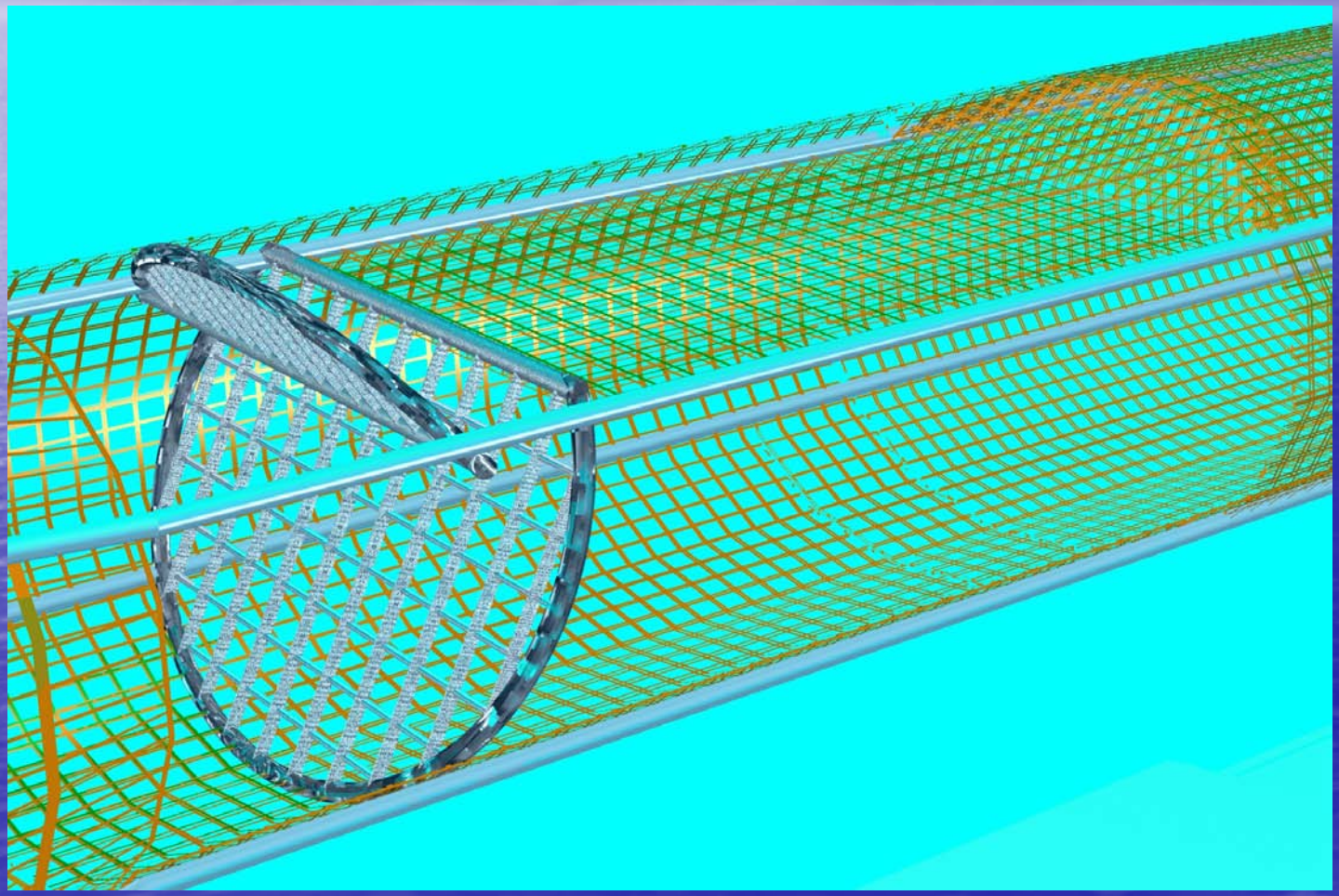
Success with Sea State program

- Crab bycatch rates dramatically lower
- RKC bycatch goes from 104K in 1997 to 19 K in 1998 (cap = 48,000)
- Episodic problems with crab since 1997 but system has always served to bring down rates and crab caps have not been triggered (even after they were reduced by managers 3 times!)
- Sea State applied to halibut bycatch later on with some success but halibut more bycatch more sporadic and difficult to control spatially.

Development of workable halibut excluder for flatfish target fisheries

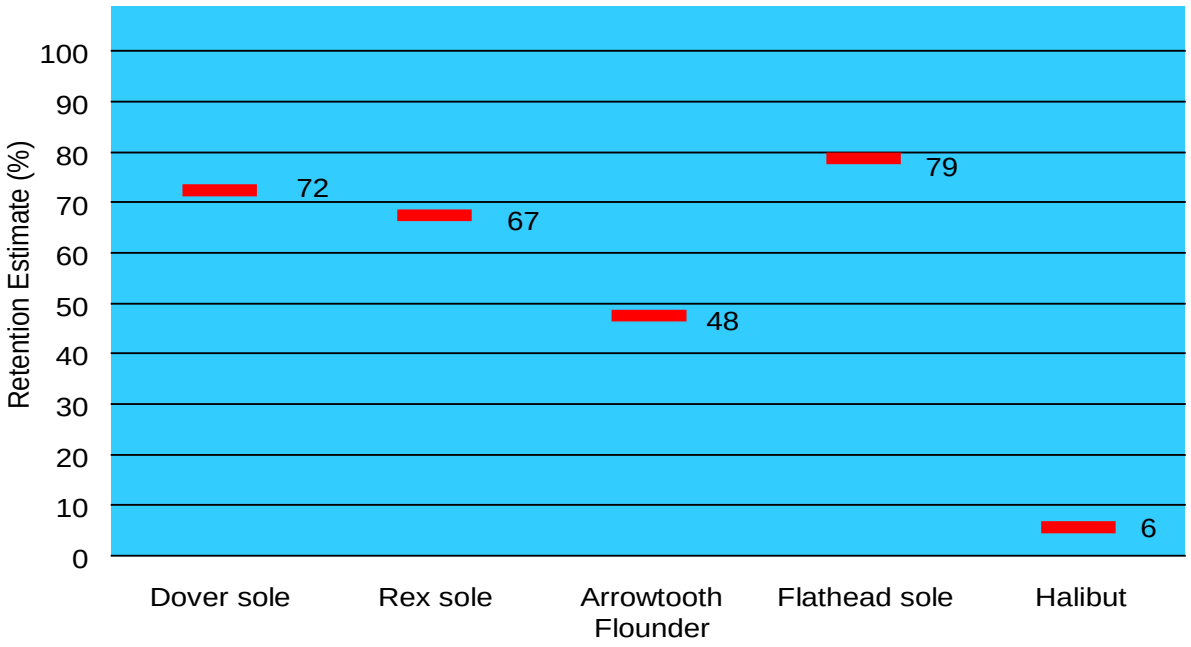
- Look at size differentials in target flatfish and halibut catch
- Engage Dr. Rose (AFSC) on how to test for effectiveness and apply for an exempted fishing permit (EFP) using paired comparisons design
- Fishermen submit designs in competition for extra fishing opportunities (halibut PSC set aside)
- Field testing in 1999 and 2000 under EFP
- Fleet-wide adoption (voluntary) once fishermen confident it works. Today, nobody goes fishing without “protection”

Gear modification to control halibut bycatch rates in flatfish. Aluminum Grate (8 inch) with deflector panel (halibut escape on top)

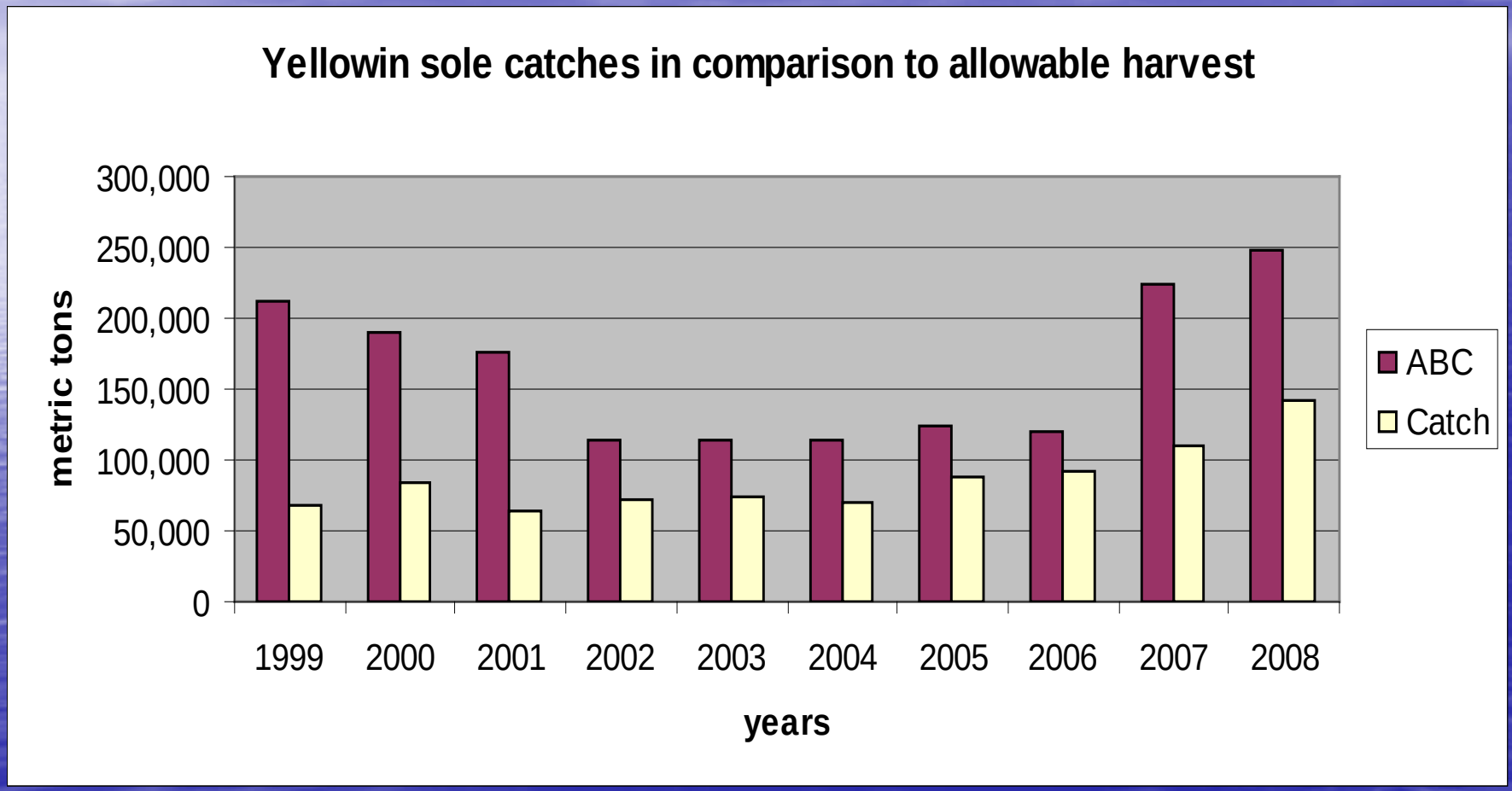


Performance as measured by paired comparison test under EFP

Figure 3. Retention of target and bycatch species with a rigid grate excluder based on 1998-01 EFP test



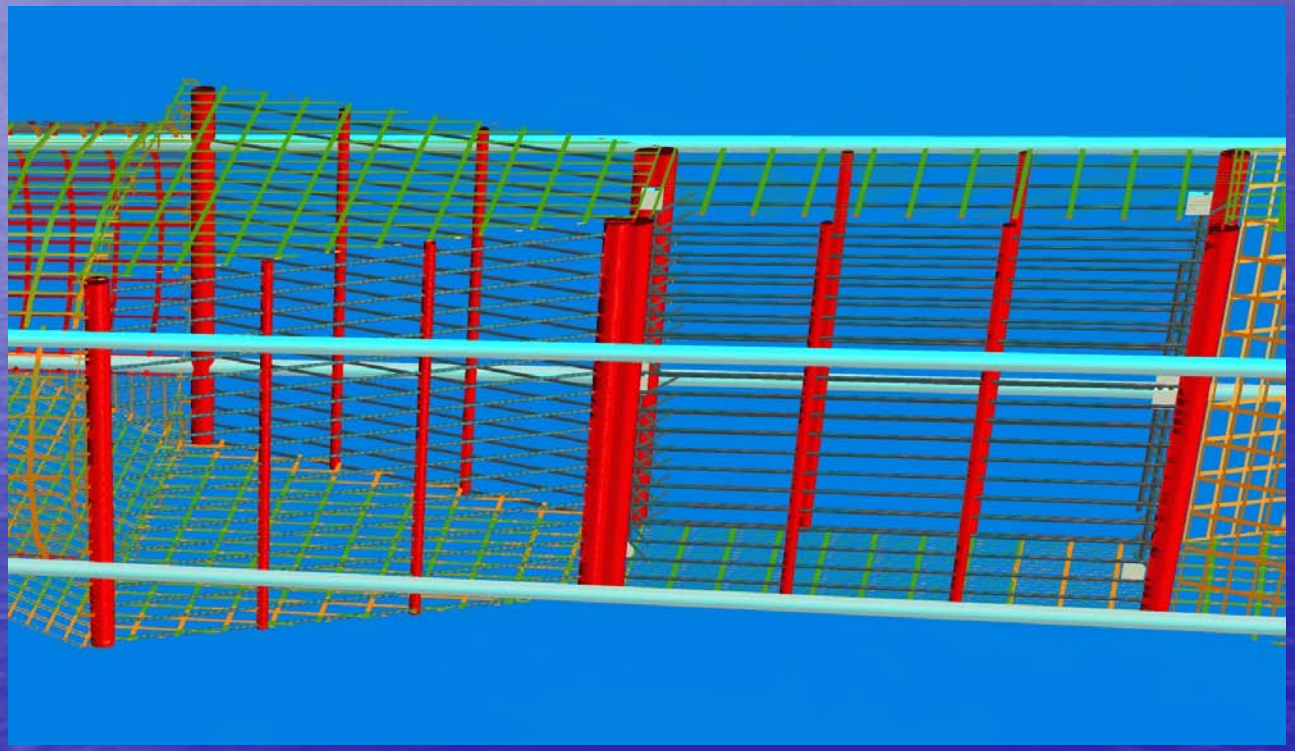
Evidence that steps to control halibut and crab bycatch are paying off



Halibut excluder gear modification concept for flatfish not workable for cod fishing and different excluder concept needed there

- Loss of cod in quite high with grate excluder
- With cod prices increasing, fleet wants to fish cod in directed fishing mode
- Size/shape differential almost opposite with cod/halibut problem
- Data suggests slotted excluder should allow halibut to escape but not cod due to their “big heads” (*Gadus macrocephalus*)

Concept for halibut excluder devised by Dr. Rose



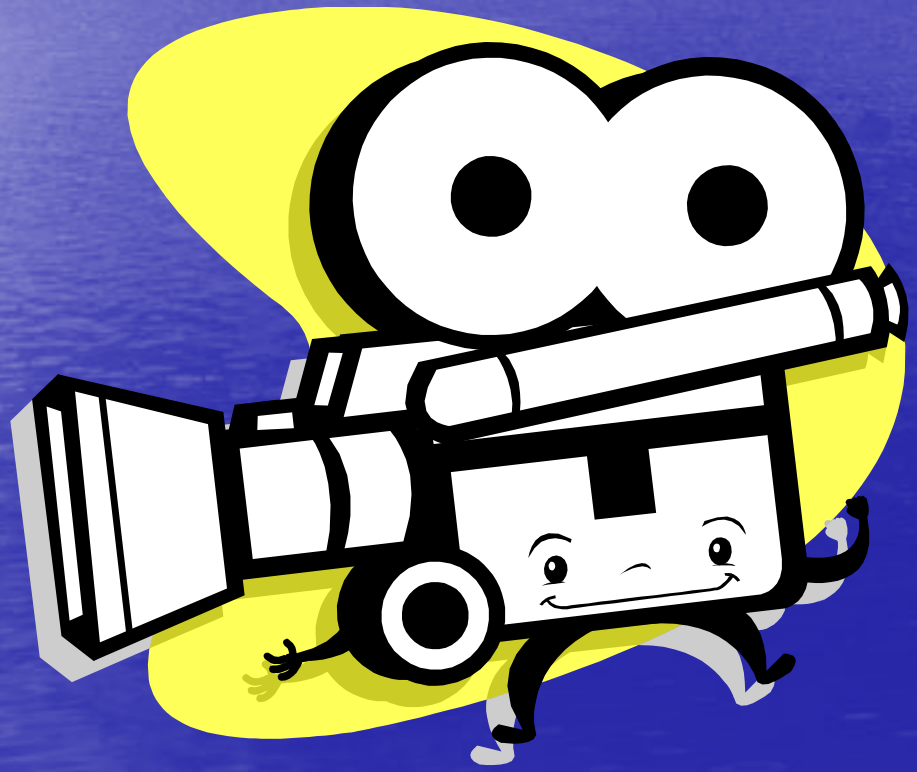
Field trial of “concept device” made from fiberglass rods and hydraulic hose

Once concept is demonstrated, fishermen come up with alternative construction using scrap co-ax cable (3rd wire). Excluder is 8 meters long

Co-ax cable construction allows device to roll up on net reels

Trawl floats narrow passage and slow the water flow

Video of halibut escapement in cod trawls



Modifying flatfish trawls to reduce seafloor contact and minimize effects on common sessile invertebrates found on the Bering Sea shelf

The concept and design of the
Elevated Flatfish Trawl

The objective of the modification is to lift the sweeps and reduce effects on typical Bering Sea shelf living structure forming invertebrates found on the sand/mud substrates of the Bering Sea shelf

Common depiction of bottom trawl from Amendment 89 EA- most trawls used for dedicated flatfish fishing in Bering Sea differ dramatically from depiction

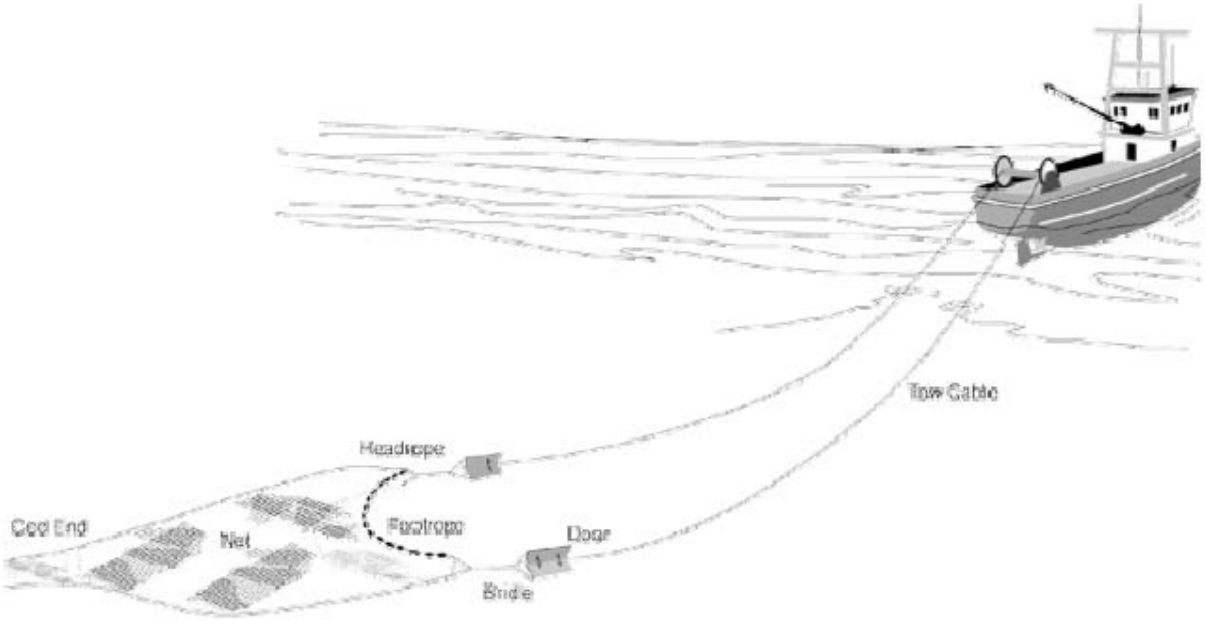


Figure 1.3-1 Depiction of otter trawl gear

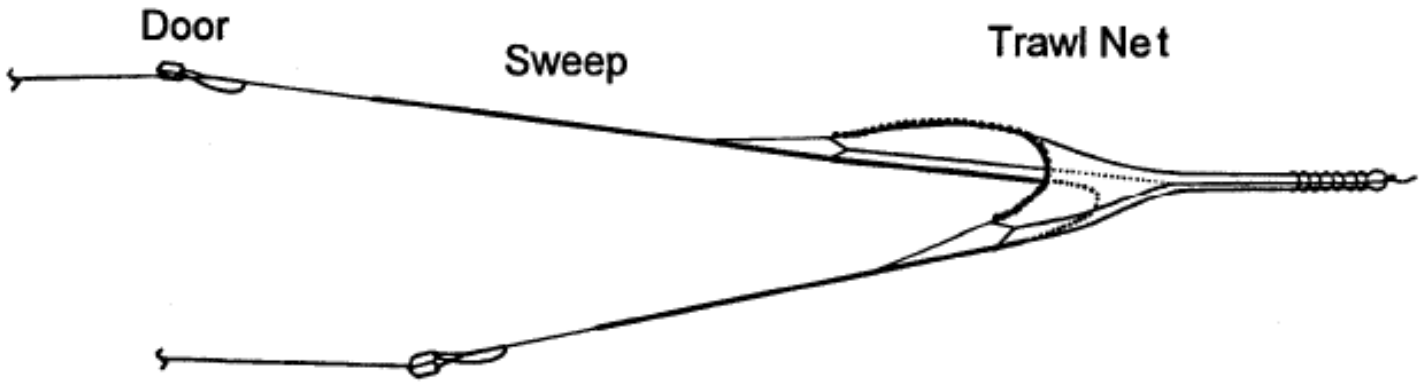
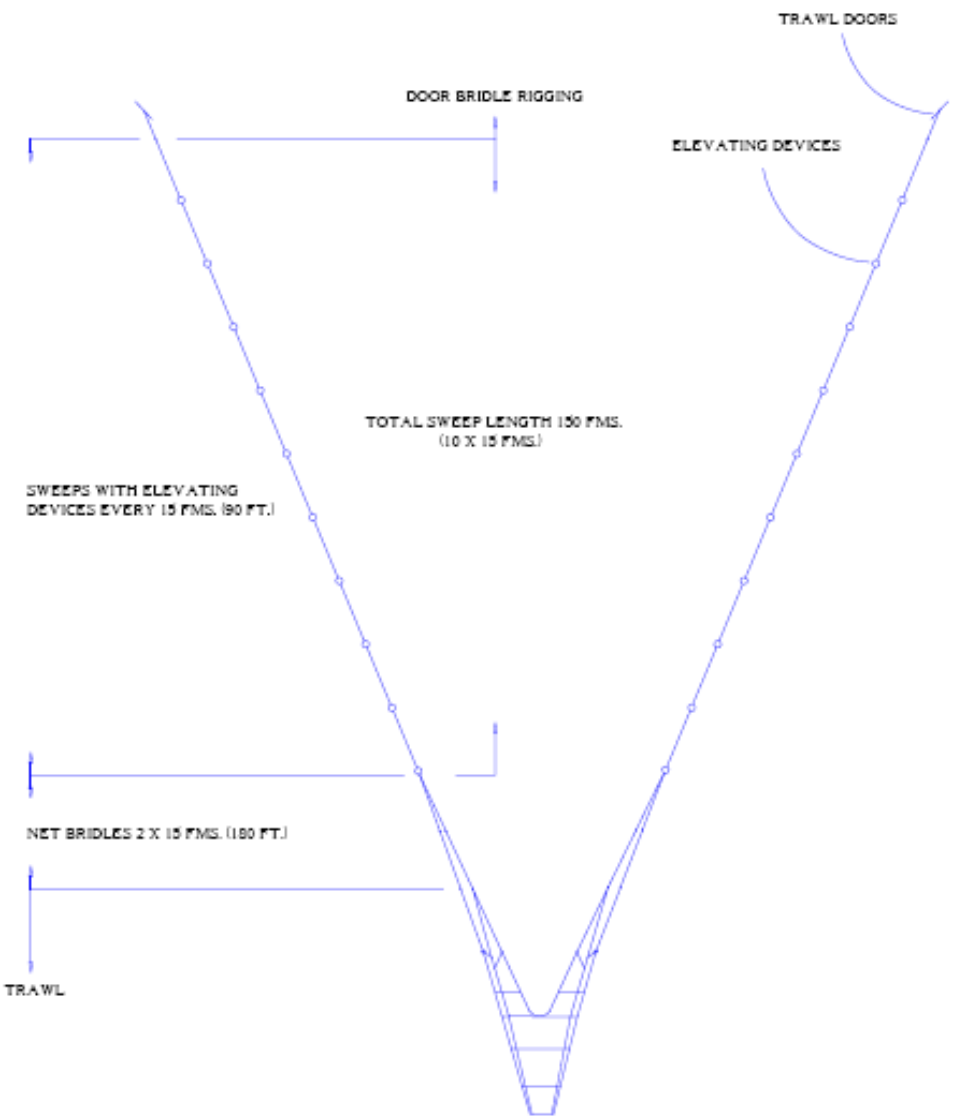


Figure 1 – Relative positions of doors, sweeps and trawl in an otter trawl system. Length of sweep varies with target species and seafloor. For most Bering Sea sole trawls sweeps are so long (up to 1500 ft) that they sweep 90% of the area covered between the doors.

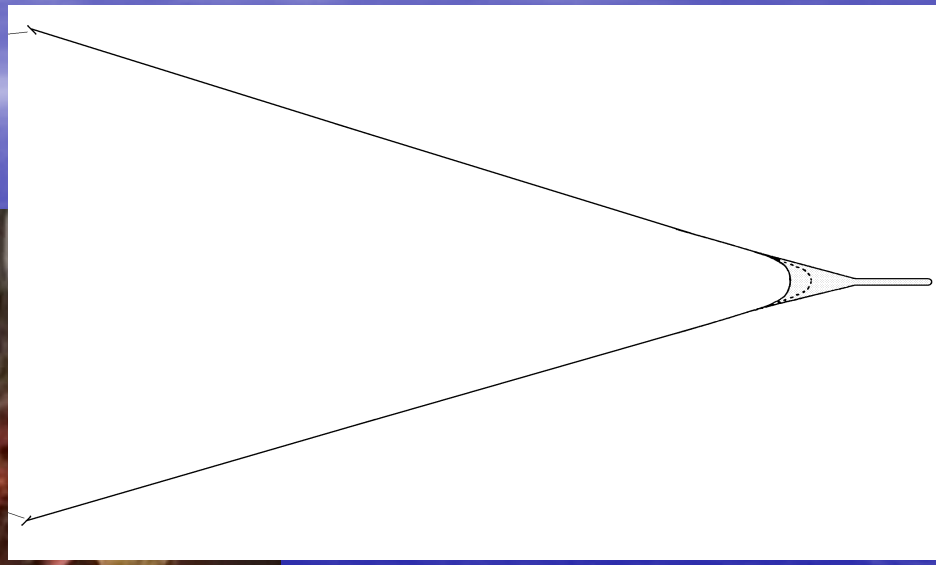
TOP VIEW – NONPELAGIC TRAWL

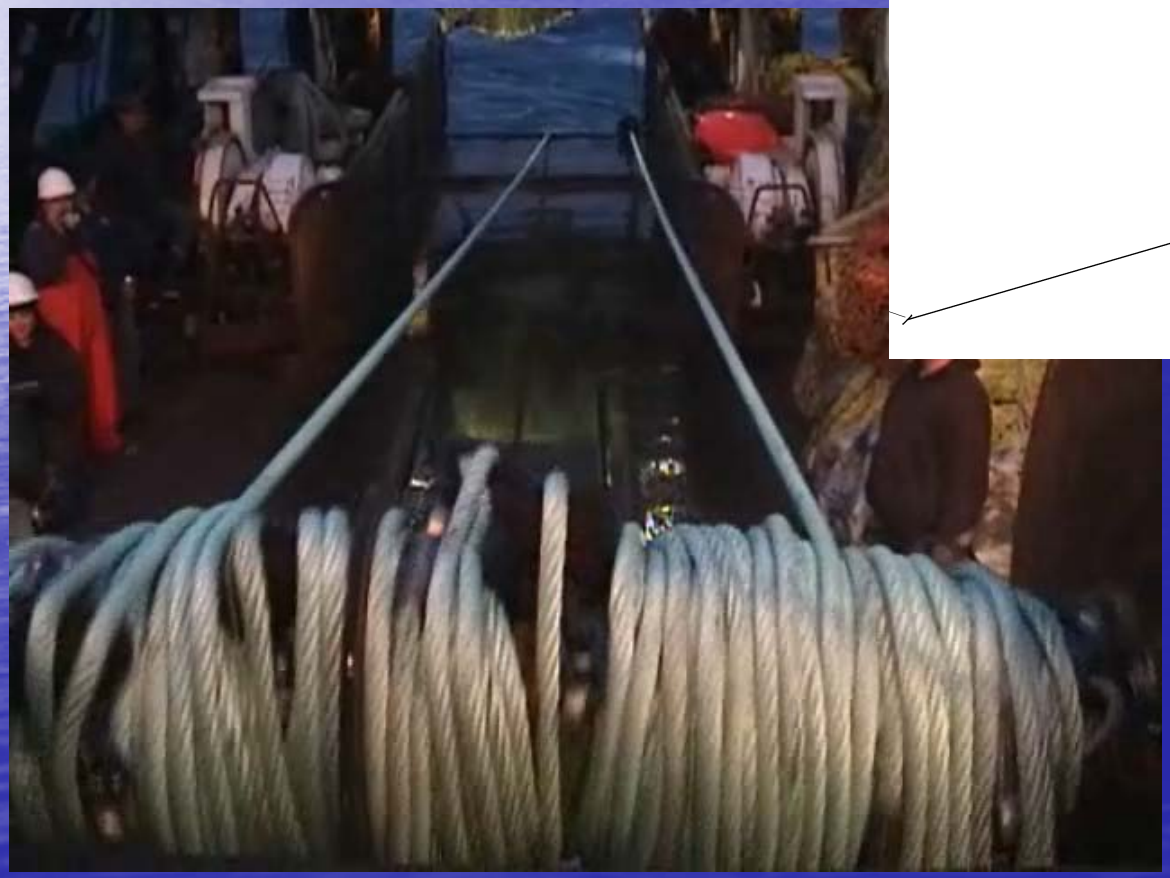


SCALED DRAWING

Trawls used for BS flatfish

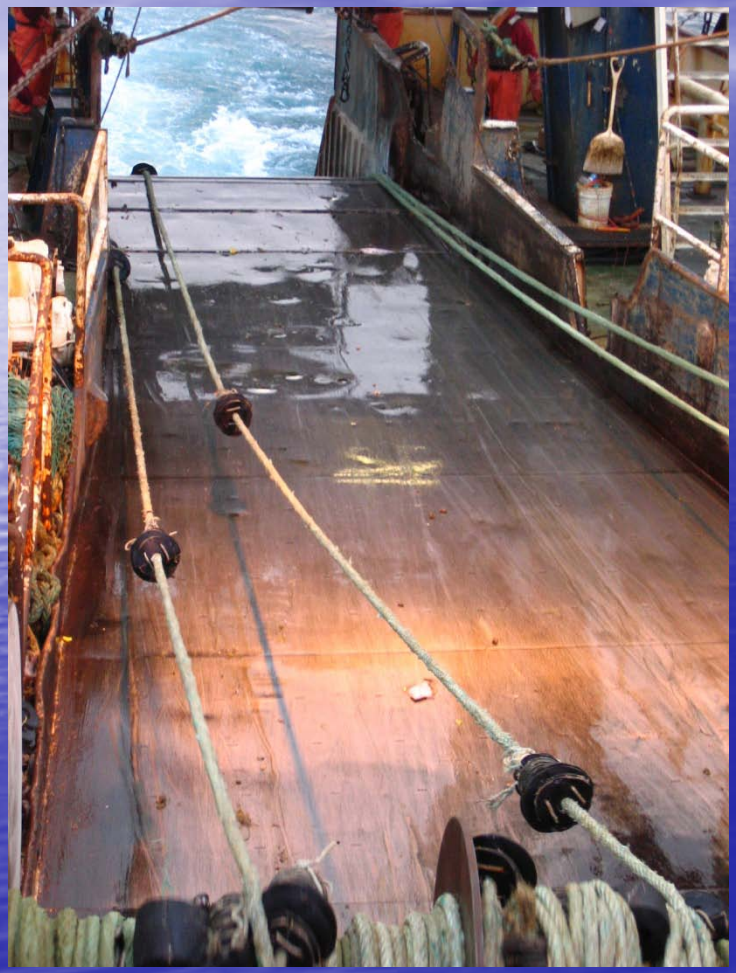
- Long sweeps – herding fish to trawl
- Sweeps cover 90%
- of fished area





- Most effective to reduce sweep effects

Sweep modifications



- Elevating devices widely spaced on sweeps
- Keep cable off seafloor and create space below

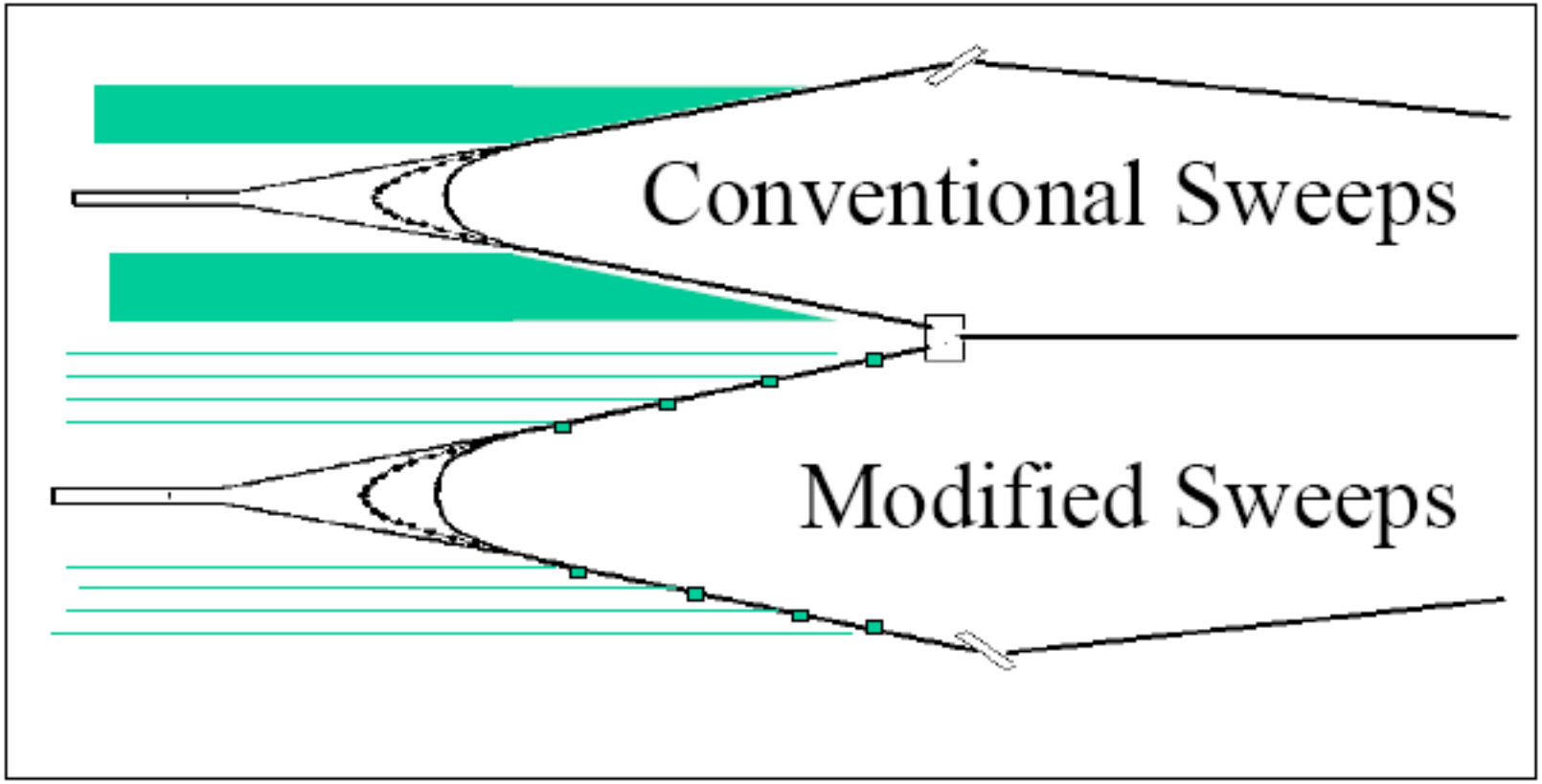


Figure 7 – Schematic of a twin trawl system, showing the concept of reducing bottom contact area of sweeps by limiting contact to disk clusters.

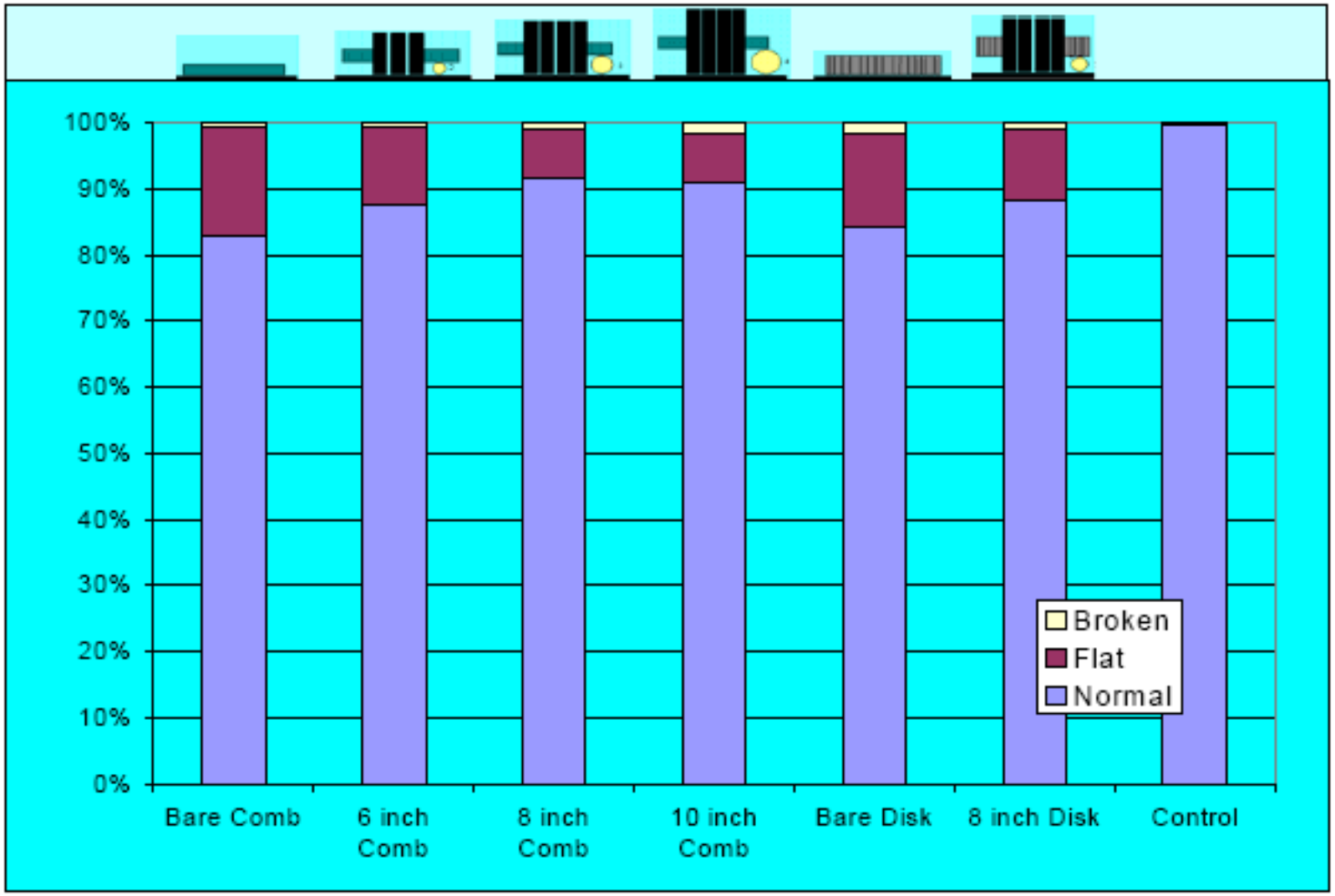


Figure 6 – Percent of sea whips in different condition categories after exposure to trawl sweep modifications.

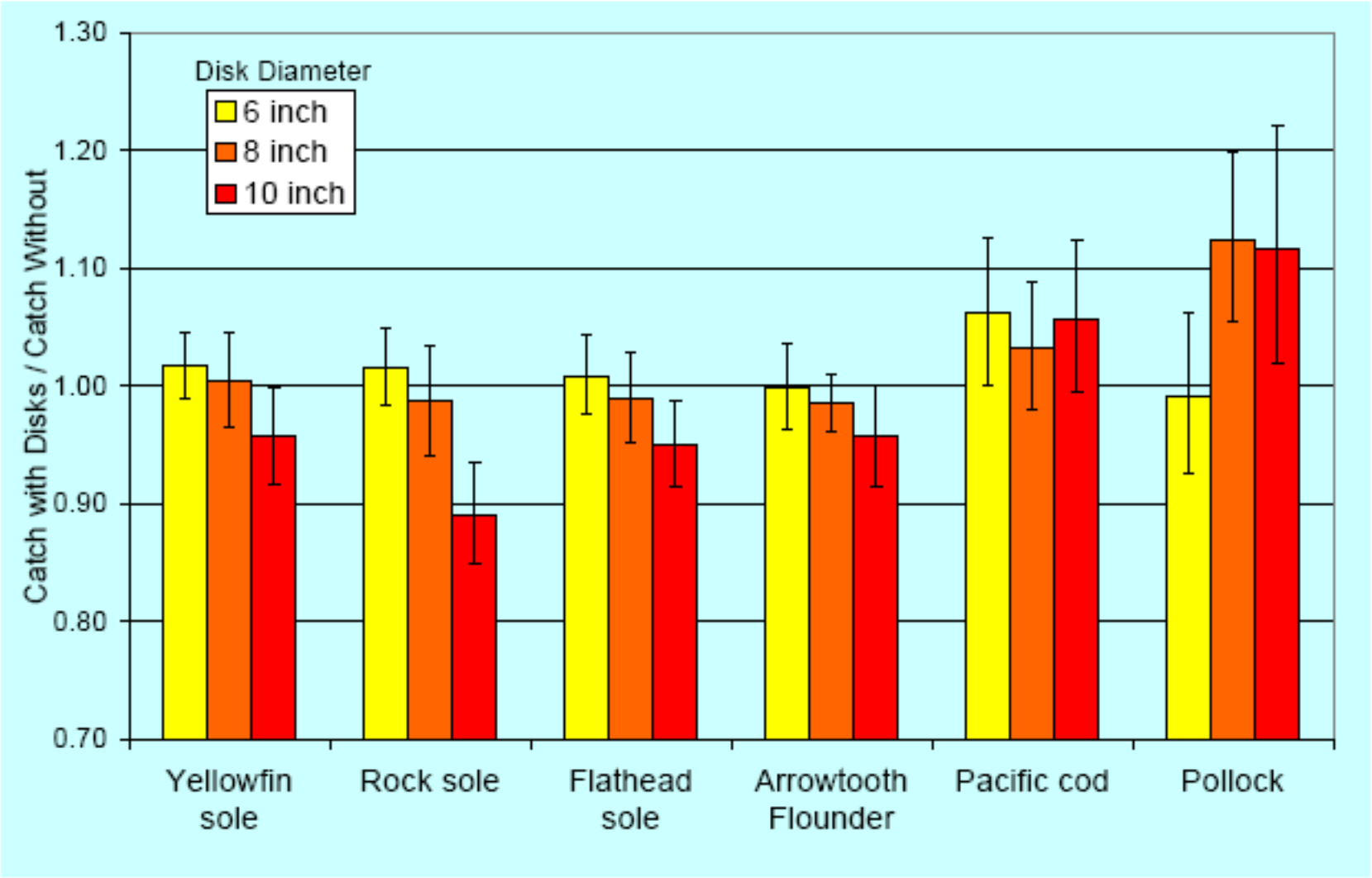


Figure 8 – Preliminary analysis of the proportional change in catch rates when trawl sweeps had disk clusters (6, 8 and 10 inch diameters) installed at 30 ft intervals.

In additional to reduction in seafloor effects, modified sweeps also create:

- Reduction in seafloor contact and effects on common benthic invertebrates
- Reduced wear rate on combination rope
- Reduced crab bycatch (relative to area swept with bigger net)
- Reduction in injury rates to crab that encounter sweeps (NMFS research later shows sweeps are “crab neutral” for bairdi and opilio)

Areas of interest for future cooperative research to improve H&G and pollock fisheries

- Assessing bottom contact, bycatch reduction potential, and feasibility of pelagic trawling for rockfish in the GOA and Aleutian Islands
- Reductions of crab impacts from flatfish footropes (complement to sweep mod work)
- Improving the effectiveness of salmon excluders for reducing Chinook salmon bycatch
- Modifications to pollock trawls to reduce Chum salmon bycatch (see John Gruver's talk)

Acknowledgements

The work presented today would not have been possible without:

- Dr. Craig Rose, NMFS AFSC
- Carwyn Hammond, NMFS AFSC
- Karl Haflinger (Sea State Inc.) Vashon Island
- Elias Olafson (Dantrawl USA)
- Katy McGauley AGDB Kodiak
- Countless hours of work and idea exchanges by H&G and catcher vessel captains and crews during 11 years of field work