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







Protecting Bering Sea habitat

 Actions to date: Closures of large areas (Witherell & Woodby 2005)





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.



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



What the modified sweeps look like on deck





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.

New effect results – effect over time





Further developments and testing

- Spacing (F/V Arica)
- Tests at 45, 60 and 90 ft
- + 90 ft with 10" bobbin
- Developed tilt recorders to measure clearance
- Enforcability (F/V Vaerdahl)
- Discussions on definitions
- Demonstration for non- fishers







Collaboration with the Bering Sea Bottom Trawl Fleet

- Sustained interest and participation from fleet
- Necessary to develop effective, practical solutions
- Additional modifications:
- More footrope clearance
- Off-bottom doors



