

Development and Implementation of Trawl Sweep Modifications to Reduce Effects on Benthos and Commercially Valuable Crabs

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Captains of Bering Sea bottom trawlers and fishing gear manufacturers collaborated with government scientists to modify bottom trawls, reducing their effects on structure-forming benthos and commercially valuable crabs.

2005	FEB	NMFS and Council considering actions to protect essential fish habitat Final action on EFH left action on Bering Sea open for consideration of actions—including Gear Modifications
	MAY	First meeting with captains and trawl manufacturers - Develop concepts and plan research
	SEPT	Research to develop twin trawl tests of sweep effectiveness for fish capture (F/V Cape Horn)
2006	MAR	Meeting with captains and trawl manufacturers - discuss results and research plan
	SEPT	Twin trawl experiment on effects of different sweep elevations on fish capture (F/V Cape Horn)
	MAY	Experiment to measure effects on benthos—video / sonar sled (F/V Pacific Explorer)
	NOV	Meeting with captains and trawl manufacturers - discuss results and research plan
2007	DEC	Presented Initial results to Management Council (NPFMC)
	DEC	Workshop - initial discussions of potential regulations and enforcement
	MAR	Meeting with captains and trawl manufacturers - discuss results and research plan
	APR	Workshop - Further discussions of potential regulations and enforcement
	JUN	Pilot research on crab mortality - Develop crab mortality methods and pilot test recapture nets (F/V Pacific Explorer)
	JUN/JUL	Experiment to measure effects on benthos over day, week, month, year—video / sonar sled (F/V Pacific Explorer—R/V Oscar Dyson)
	OCT	Meeting with captains and trawl manufacturers - discuss results and research plan
2008	JAN	Presentation of results at annual captains meeting
	MAR	Tests of sweep clearance achieved with alternative bobbin spacing and height (F/V Unimak)
	MAY	Tests of sweep clearance achieved with alternative bobbin spacing and height (F/V Arica)
	JUN	Presented results of sweep clearance tests to Council
	AUG	Crab mortality research—Modifications reduce mortality of Tanner and snow crabs (F/V Pacific Explorer)
2009	SEPT	Workshop at net shed with captains, gear manufacturers, scientists, enforcement and council regional staff on regs and enforcement
	JAN	Presentation of results at annual captains' meeting
	JAN	Onboard meeting with enforcement, Council and regional staff to clarify regulations and enforcement issues
	JUN	Twin trawl tests of fish capture with thinner cables (F/V Cape Horn)
	FEB	Council presentation on crab mortality research
	AUG	Crab mortality research - Modifications reduce mortality of king crab (F/V Pacific Explorer)
	OCT	Presentation to Council - research update
	OCT	Council recommends regulations
	NOV	Two workshops explaining draft regulations and discussing enforcement
	ALL YEAR	Regulations drafted, discussed, reviewed and finalized
2010	OCT	Fleet and gear manufacturers pretest specific devices, handling and attachment alternatives—comment on draft regulations
	OCT	Final Rule published (Amendment 94)
2011	JAN	Requirement goes into effect



Trawl sweeps with bobbins installed to provide seafloor clearance

The Concept:

Trawl sweeps, long cables connecting spreading devices (doors) to the trawl net, herd flatfish into the path of the trawl net. They sweep across most of (80 – 90%) the area fished by Bering Sea flatfish trawls. In conventional use these cables had continuous seafloor contact over their entire length. Because the Bering Sea flatfish fishery operates on flat, sand/mud substrates, raising them off of the seafloor could substantially reduce effects on crab and benthos as long as flatfish were still herded.

Cooperative participation of the fleet in all project stages:

- concept development and research planning,
- field research, gear development and testing
- review and presentation of results to management, and
- preparation for implementation (concepts and review for regulations and enforcement)

“While the fleet had considerable apprehension about the practicality of the gear, particularly around handling, maintenance and enforcement issues, the solutions worked out seem to have made the sweep requirement workable and far less problematic than was anticipated. With most of a year under their belts, captains have this year accommodated the sweep modifications as just another part of their routine fishing gear.”

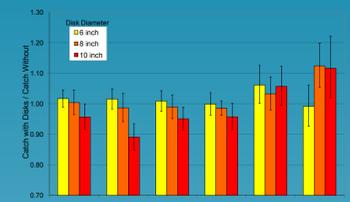
— John Gauvin, Research Program Director for the Alaska Seafood Cooperative, following a recent fleet meeting

Testing methods:

Flatfish herding Twin trawling – Identical trawls were fished side-by-side with conventional and modified sweeps and catches were compared.

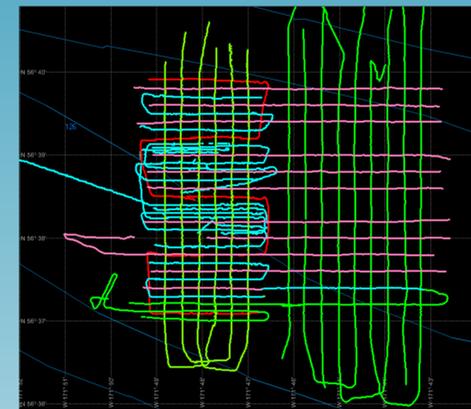


Twin trawls (left) fished with modified and control sweeps (right)



Minimal loss of flatfish catch with small and medium bobbins

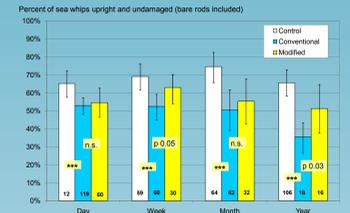
Effects on structure-forming benthos Parallel trawl tracks were crossed by a sled equipped with camera and sonar to evaluate condition of benthic fauna



Tracks of trawl tows (green) and sled tows (2006 blue, 2007 pink)



Benthic sled with video camera and DIDSON sonar



More sea whips upright and undamaged in tracks of modified sweeps

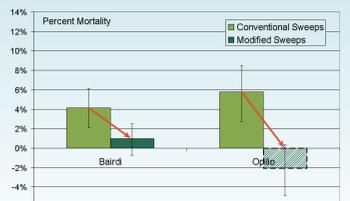
Crab mortality Condition and mortality rates of crabs captured after sweep contact were compared to control crabs captured without gear contact



Crabs collected after sweep contact (control, unmodified and modified)



Reflex assessments of affected crabs were validated for mortality prediction



Tanner and snow crab mortality reduced with modified sweeps



Result: a practical gear regulation to reduce effects of trawling, successfully implemented throughout a major fishery

