Request for an exempted fishing permit (EFP) to assist Amendment 80's efforts to understand the selectivity tradeoffs from a "hallway-style" halibut excluder

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What is the project about ?

- Alaska Seafood Cooperative (AKSC) recently reviewed member vessel data from 2018 and 2019 for hauls with and w/o excluders. Our analysis suggested rates of loss of target fish are higher than generally thought, rates of reduction in halibut bycatch are lower than expected, and overall tradeoffs of using the "hallway" halibut excluder designs, the designs the sector has been relying on, could be marginal.
- Fishery data examined were "far from ideal" (reflecting selection bias and observer sampling variance) and therefore our findings could be misleading. Currently there is no better source of performance data on hallway excluders for BS flatfish fisheries.

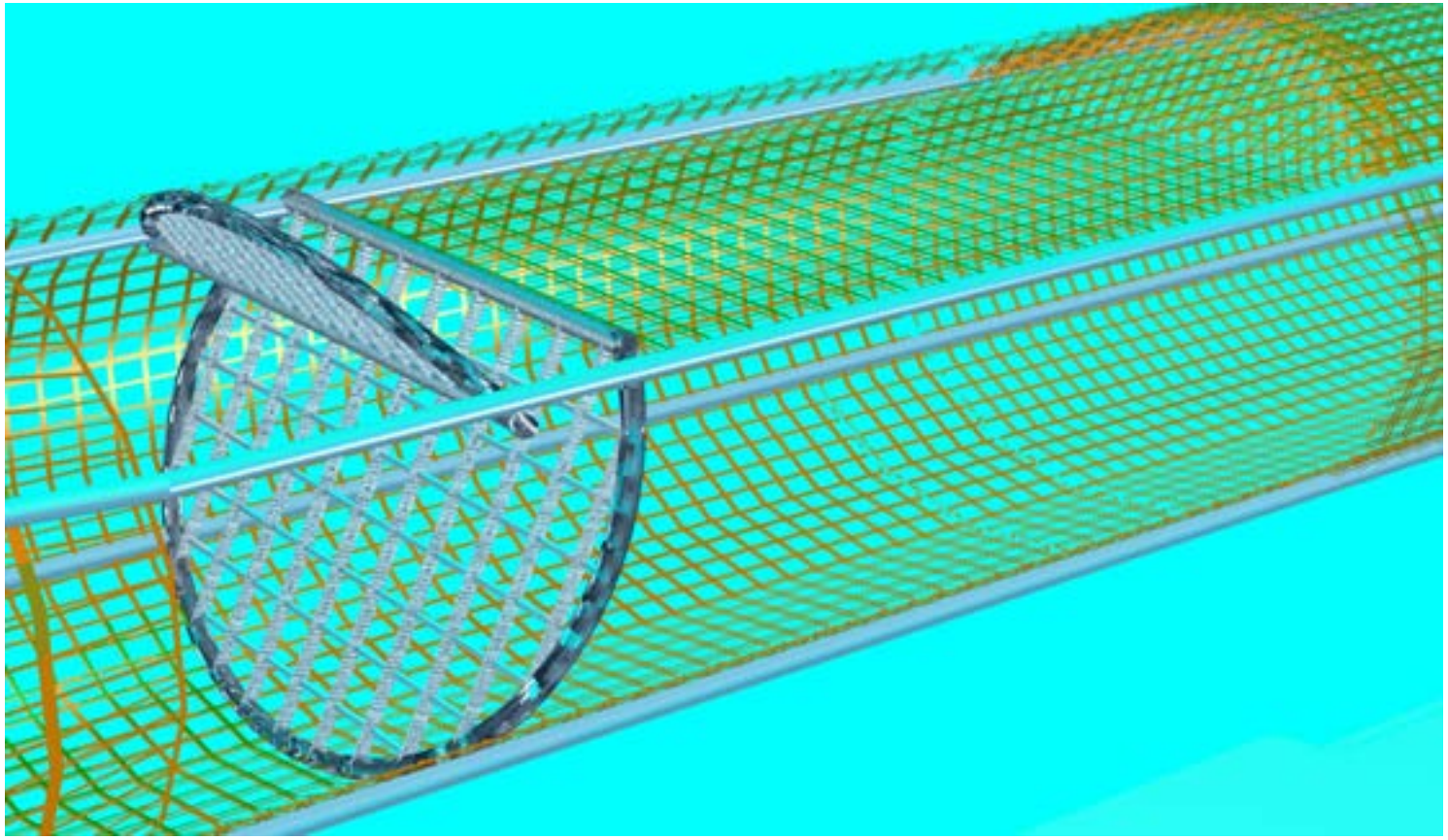
What is the project about? (continued)

- To provide sound information about the performance of hallway excluders, AKSC wants to conduct rigorous, controlled testing of a hallway excluder design. The excluder tested would be one that A80 captains feel best represents what they are using today. Testing would be done under conditions reflecting what A 80 fishermen commonly face for excluder usage.
- AKSC feels the EFP will help inform the sector on where/when/whether excluders are useful to their halibut bycatch avoidance efforts. The EFP may also inform next steps in terms of future work to improve excluder performance (if necessary).

What is a “hallway” excluder design, the excluder we want to test?

Why has this style of excluder become the one in use in Amendment 80 flatfish fisheries?

Early efforts to develop halibut excluders for the Bering Sea flatfish fisheries showed some promise for reducing halibut bycatch rates. But those rigid devices were impractical for regular use in the fishery



- Metal grids achieved ~60%-80% reduction in halibut bycatch (by weight); Rose and Gauvin, 2000
- Being perpendicular to the flow often pinned fish on the panel (e.g. skates) creating clogs and fish piled ahead of the excluder
- Devices could not be rolled onto the net reel. Removal from the net during haulback required ~60 min, (reinstall takes another ~60 min)
- A work-around was to use hooks and winches to pull the excluder off to the side of the trawl alley. This allowed catches to be dumped into below deck tanks. But also time-consuming and created safety issues

Semi-rigid grid excluders

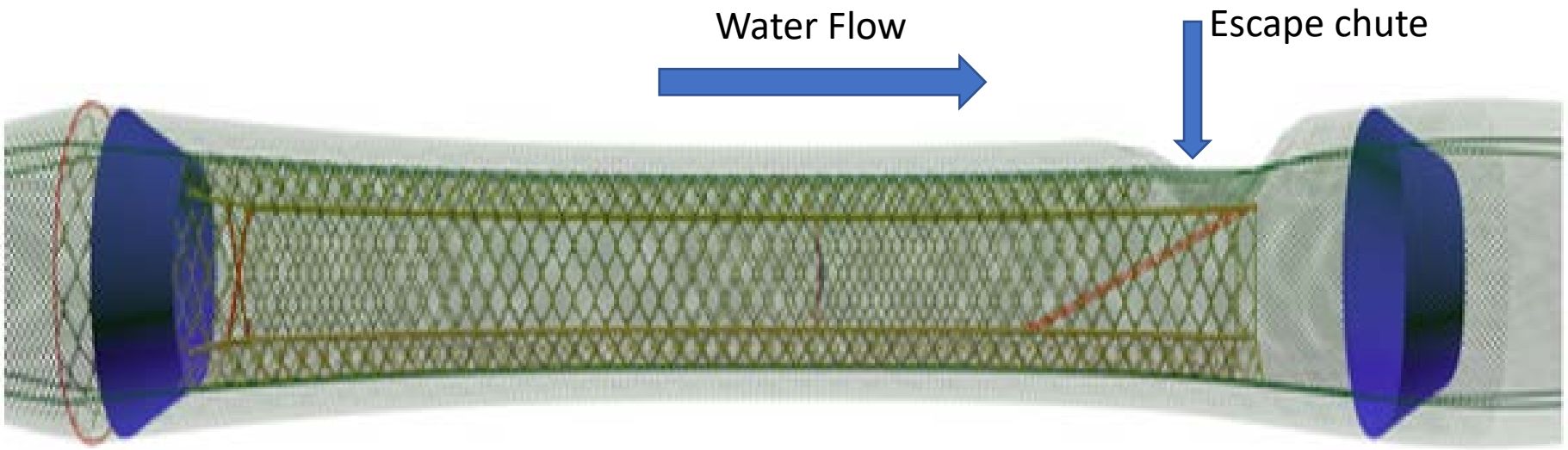
Gear manufacturers then came up with semi-rigid plastic panels (still perpendicular to the flow) that could be rolled onto the net reel.

Fishermen using these found that net reel tension stretched and distorted semi-rigid panels and problem of tendency to pin fish and clog was perhaps worse.

Electrical conduit material and other materials are placed over a square mesh panel. UHMW bars are used to spread the panel to help maintain a flat grid shape

Fishermen then came up with the idea of a “hallway” excluder

- Second web panel inside intermediate section separated by kites attached to outside netting
- As the inside panel narrows target fish are incentivized to swim through the inner panel; so they go back to the codend
- Halibut (larger than target species) can’t swim through the inner panel and thus exit through and escape chute at the aft end ahead of the codend



Schematic of hallway excluder in a flatfish net

Hallway excluders a “game-changer” for regular use of excluders in A 80 flatfish fisheries. Excluder can go on net reel and design avoids clogging (no panel perpendicular to the flow) **BUT….**

- Many captains report high escapement rates for target fish (20-30%)
- We don’t really know halibut bycatch reduction rates
- No data from systematic trials of hallway excluders in Bering Sea flatfish fisheries available (note: Lomeli 2013-2017 trials done on small west coast trawlers with 2-seam nets)
- A80 fleet is mostly relying on *ad-hoc* testing and information reported by other fishermen or video of halibut escapes in promotional materials
- Several similar designs of hallway excluders in use with different construction and materials (especially kiting to separate inner and outer panels)

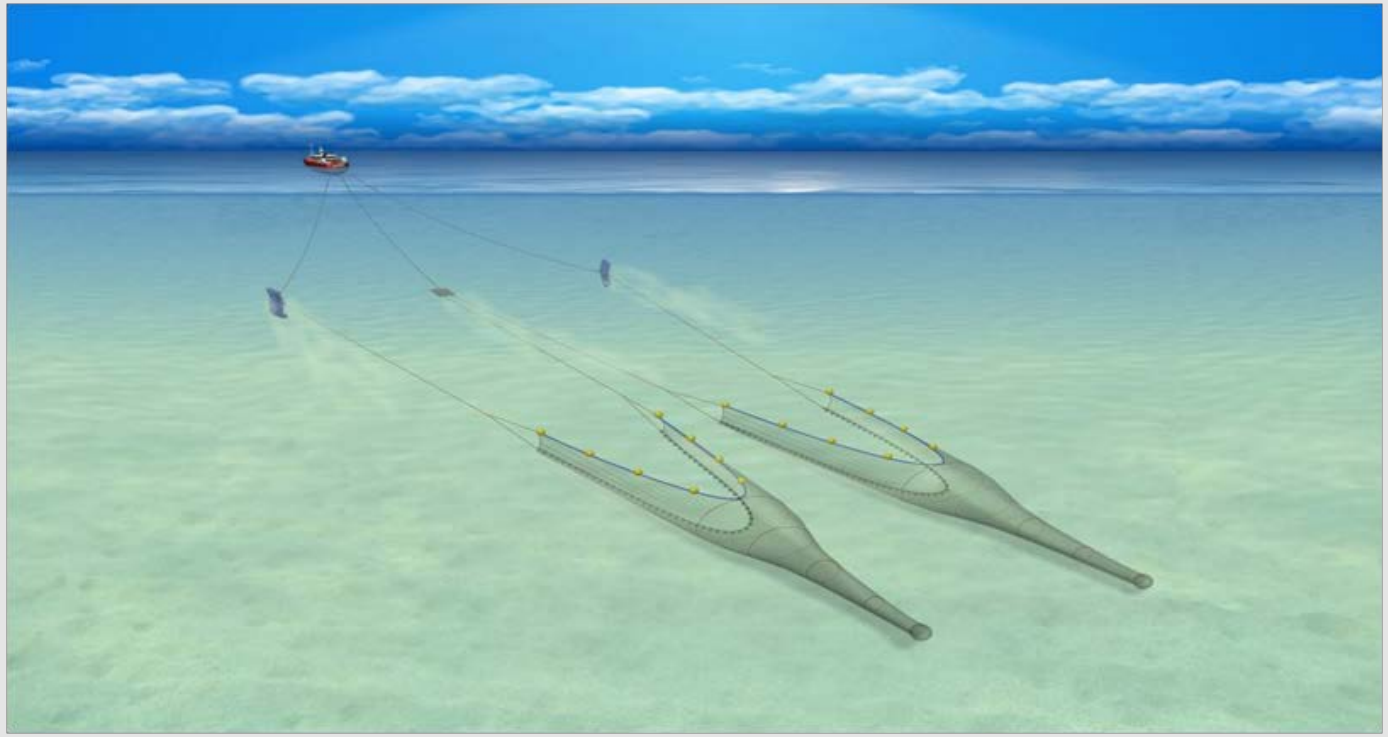
Our data analysis suggests hallway excluders in use may only be reducing halibut bycatch slightly more than target catches (Table 1) and lost target fish may be larger, higher-value fish.

Having a solid understanding of selectivity from this excluder is important for sector's halibut management and consideration of possible future development efforts for excluders.

Table 1: Vessel and Year Specific Excluder Performance in Halibut kg/hr; Groundfish mt/hr; and Halibut kg/mt Groundfish

Vessel	Year	Tows with Excluder	N	Mean Hal kg/hr	% Reduction	Mean Grndfish mt/hr	% Reduction	Mean Hal kg / Grndfish mt	% Reduction
Vessel A		No	258	106.6		6.9		21.2	
	2018				-53%		-14%		-44%
		Yes	15	49.7		5.9		11.9	
		No	456	82.6		7.8		14.5	
	2019				-31%		-30%		-11%
		Yes	147	56.8		5.5		13.0	
		Tows with Excluder	**N**	**Mean Hal kg/hr**	**% Reduction**	**Mean Grndfish mt/hr**	**% Reduction**	**Mean Hal kg/Grndfish mt**	**% Reduction**
Vessel B		No	505	130.5		9.5		20.0	
	2018				-64%		-48%		-27%
		Yes	368	45.9		4.9		14.7	
		No	661	76.6		6.4		16.3	
	2019				-23%		-15%		-12%
		Yes	148	58.8		5.4		14.3	
		Tows with Excluder	**N**	**Mean Hal kg/hr**	**% Reduction**	**Mean Grndfish mt/hr**	**% Reduction**	**Mean Hal kg/Grndfish mt**	**% Reduction**
Vessel C		No	182	260.8		8.7		31.5	
	2019				-54%		-26%		-24%
		Yes	241	113.7		6.4		24.0	

Our proposed methods for systematic testing to avoid selection bias



- We feel most effective method for ensuring results are accurate/meaningful is a test on a vessel with a twin trawl system.
- This involves comparisons of catches from the two sides (otherwise identical nets) deployed simultaneously.
- The excluder is on one side and other side has no excluder. Periodic switching excluder to other side needed
- Avoids selection bias because each side is exposed to the same fishing conditions.

Why an EFP is needed?

- Modifications to A 80 catch handling rules are needed to account for catches of halibut and target species from the two nets in each haul separately.

- Exemptions also needed for crew to census halibut in the factory (those not accounted for through deck sorting). This will reduce sampling variance on haul-specific accounting of halibut catches from each net.

Why an EFP is needed? (continued)

- The EFP would exempt the test vessel with the twin trawl (F/T North Star) from some A 80 catch handing regulations for purposes of collecting the EFP catch data.
- Systematic testing during an EFP trip (~60-70 twin trawl hauls); an amount of testing expected to provide sufficient data for statistically appropriate analysis of effects of the excluder on catch rates of halibut and selected target species.
- Data on how excluder affects size of halibut and target fish compared to the control net will also be collected.

EFP application contains:

- Background on motivation for EFP and information on evolution of halibut excluders, how they work, and why “hallway” excluders became the “go to” design for practicality reasons (pages 2-6)
- Explanation of AKSC’s analysis of available excluder performance data and recognized limitations to the data used for our analysis (pages 6-9)
- List of objectives for this EFP (pages 9-10)

EFP application contains (continued):

- Explanation of proposed methods to conduct systematic testing with steps to minimize observer sampling variance (pages 10-16)
- Exploratory statistical power analysis to look whether amount of testing is sufficient to provide reasonable expectation of making statistically sound conclusions for excluder's effects on halibut and target groundfish catch rates (and effects on size of fish retained). Page 16 and more details in Appendix 1
- Description of pilot project to evaluate feasibility etc. of collection of samples for potential future project to evaluate sex ratios of halibut taken as bycatch in A 80 fisheries (page 16)

Pilot project to evaluate feasibility of collecting sex ratios of halibut taken as bycatch in A 80 and possibly other bycatch fisheries

- Assess feasibility of collecting and preserving for analysis (small portion of) caudle fins of bycatch halibut on deck and in factory
- Evaluate workload and costs of processing samples
- Target is to collect ~100 samples through randomized sampling procedures
- Sampling and sample extraction not expected to increase chances of mortality or otherwise negatively affect halibut from which samples are taken
- Goal is to evaluate data collection and sample handling procedures
- IPHC feedback on pilot is sought and actual inclusion/execution of pilot subject to IPHC input

Other important elements to this project detailed in our EFP application:

Explanation of where FMA will work with us on data collections to account for catches from two nets separately with minimal disruption to the observer data collections and A 80 data streams (pages 13-16)

A list of expected catches in the EFP (funded through A 80 catch allowances; no additional catch authorizations are requested for EFP) (page 19)

A list of tasks and organizational timeline; description of reports and informational meetings to inform industry of the results (pages 20-21)

Additional components and analytical approaches

- Analytical team proposes paired tests (ANCOVA) for evaluating catch rate differences and Kolmogorov-Smirnov tests and selectivity ratios (Kotwicki et al.) to look at effects of excluder on size of retained catches of halibut and target species of interest
- Sample size requirements for statistical power considered in Appendix 1. Analysis suggests that experimental pairs from single trip on F/T North Star (60-70 pairs) is sufficient based on fishery data used for AKSC analysis –but also with recognition that methods in the EFP to reduce sampling variance and selection bias should improve statistical power. Despite this, we recognize that that methods should work but like all applied science, we might learn that adjustments to methods and number of replicates are needed