

WA Survey COMPILATION (8 Surveys)					
GEAR INNOVATION					
	Cost to Fishery (HIGH/LOW)	IS IT DOABLE?	LIKELY TO MAKE A DIFFERENCE TO WHALES? YES/NO/MAYBE	TESTABILITY (GOOD PROSPECT FOR TESTING?) YES/NO/MAYBE	Comments
Sinking or neutral lines	Low Low Low Medium High	Yes Yes Yes Yes Yes  Yes	Maybe Sometimes/ Maybe Maybe No Assumed yes? Maybe	Yes Yes Maybe Easy/Yes  Maybe Yes	Required in AK, could look to ADFG for information about how this works  Best option in my opinion Top shots We already use sinkers and neutral lines  I think this is a good best practice
Change length of trailer lines	Low Low Low Low Low Low	Yes Yes Yes Yes Yes Yes	Maybe Sometimes/ Maybe Yes No Assumed yes? Maybe	Yes Yes Maybe Easy/Yes  Maybe Yes	Seems interesting due to humpback playfulness   Goal is to shorten trailer length Would this make a difference? Not sure if has a verified purpose; different regional and seasonal needs Share best practices
Keep gear tighter	Low Low Low Low Low Low	Yes Yes Yes Yes Yes Yes	Maybe Sometimes/ Maybe Yes Yes Assumed Yes? Maybe	Yes Yes Maybe Easy/Yes  Maybe Yes	Perfect dovetail with sinking line Use scope appropriate to depth and current WA currents would keep buoys underwater at times Is it practical in areas with opposing currents (top vrs bottom current flows) Share best practices
Breakaway gear (weak links, "finger traps")	High Med? Low High High High High	No W more research? Yes No No Yes	Maybe Yes Maybe No Not clear? Maybe	Yes Yes Maybe Maybe Yes No	Need to research viability WA pots get stuck and need to be pulled out without breaking Very dangerous Based on presenter feedback unsure of the effectiveness of this type of change
Whale-friendly buoys	Low Med? Med High	Yes W more research N Yes	Maybe Maybe Maybe Maybe	Maybe Yes Maybe Easy/Yes Yes	Do not know effectiveness

	High		unknown		I don't know what this is What is this? Would need research and development ?
Time-release line cutter tool	High Moderate ? High High High High  High	W more research ? Yes Not at this time No No	Maybe Yes Maybe No  ? Maybe but line would have to come off	Yes Yes Maybe No Yes No Yes	I think this should be a higher research priority and could be an effective tool Would increase gear loss  Too expensive for fishermen Too expensive  R&D and added cost to the user makes this less feasible
Pool noodle deflection sleeve below buoy	Low Low ? Low  High	Yes Yes  Yes  No Maybe  No	Maybe No No Maybe  ? Maybe but line would have to come off	Maybe No Maybe  Maybe Yes	These wear out extremely fast and will need to be constantly replaced.
Line visibility Colored lines or lights	Low Low High Medium Low High  Low	Yes Yes Medium Yes Yes Yes Yes Yes	Maybe Maybe Maybe No Unknown ? Maybe	Yes Yes Maybe Maybe Yes Maybe Yes	Visual cues are important to whales, could LED light be embedded in rope?  High cost to fishermen Needs more scientific research Changing color is easy. Would lights attract prey and increase encounters with whales?
Multiple traps on line (less vertical lines)	High Low  Low Low High High High	No No  ? Yes No No No No	Maybe Sometimes/ Maybe  Yes No Unknown ? Could make it worse	No No  Maybe No No No Challenging	Impossible or very difficult to enforce pot limits. Gear set on top of other gear creating a mess. Also would more pots on a line make entanglements heavier and therefore deadly to whales  It would decrease vertical lines, but lines remaining would be more damaging Cost is high to fleet in management (pot limits), increased gear entanglement High cost to fishermen and pot limit unenforceable Dangerous most months, possible in summer?
Sampson line (stronger, thinner rope)	High Low High High  High High	Yes Yes Yes  No No	Maybe? Maybe No  No Could make it worse	No Maybe No  No	This was mentioned since N. B.C. uses Sampson—not really a suggestion  Poor idea due to how it would damage mammals and poor chaffing qualities of line would cause gear loss  High cost to fishermen and would slice up whales Dangerous to people and whales, likely to cut Likely not to perform well in the block end and cut the whale!
Elimination, where possible,	Low Low	Yes Yes	Maybe Maybe		

of lead and line splices	? Low/Medium  Low  Low	? Yes  Yes Yes Yes	Maybe Yes  ? Less hang ups unknown	   ?cooperating whales	Line weights would not be need if neutral line is used  More research
Buoyless gear (line free gear, remote release)	High Unknown, likely H High High High High High	Yes Yes w research No No No No No	Yes Yes Yes No  ?  ?	Yes Maybe No  No Impractical	I think this should be a higher research priority  Massive gear loss would result  High cost to fishermen. Potential loss of gear Too many other fisheries going on, would create gear conflicts
Acoustic deterrence	High Likely High High High ? High ?	Yes Yes with research Yes Yes  Yes Maybe	Maybe Yes Maybe Maybe Maybe ? Maybe	Yes Yes Maybe Yes Yes Maybe	Increase ocean noise  With all the gear in the water the ocean would be a noisy place Filling ocean with more noise! Maybe seasonally, but not a fan of -

OTHER?  
Marking gear better—help id source when on whale (tags) (going to need a pod of cooperating whales!)  
Testing gear and adding new technology is likely to be expensive, decrease fishing efficiency, and produce incomplete data on its effectiveness. Instead I think 1). Management of the fishery 2).pot recovery and 3). Incident response are the appropriate methods to mitigate risk.

**LOST GEAR RETRIEVAL**

	Cost to Fishery (HIGH/LOW)	IS IT DOABLE	LIKELY TO MAKE A DIFFERENCE TO WHALES? YES/NO/MAYBE	TESTABILITY (GOOD PROSPECT FOR TESTING?) YES/NO/MAYBE	Comments
Expand/change in-season gear retrieval program (e.g. allow for in-season or earlier gear recovery—e.g. in April)	Low  Low Low Low Low Low ? *	Yes  Yes Yes Yes Yes Yes	Yes  Maybe Maybe Yes Maybe Maybe Probably	Yes  No, April is too early Yes Yes  Yes Yes	Need good communication between fleet members & management/enforcement. Could be helpful. I've been involved in gear removal in season and they can get very complicated/contentious if people aren't communicating  Helps get the gear out Earlier in the season * likely to result in cost savings as a result of recovering more pots due to increasing recovery activities

Expand/change in-season gear retrieval program	Low Low Low Low Low Low ?	Yes Maybe* Yes Yes Yes Yes Yes	Yes Maybe Maybe No Maybe Maybe Probably		Needs good communication between fleet members & management/enforcement. Devil in the details. Helps get the gear out Rules and strategies to help for in-season recovery  Promote pots in the water when it's time to fish. Get pots out when not fishing.
Other? State regulations. Add incentives					
<b>SEASONAL CHANGES</b>					
	<b>Cost to Fishery (HIGH/LOW)</b>	<b>IS IT DOABLE</b>	<b>LIKELY TO MAKE A DIFFERENCE TO WHALES? YES/NO/MAYBE</b>	<b>TESTABILITY (GOOD PROSPECT FOR TESTING?) YES/NO/MAYBE</b>	<b>Comments</b>
Close or decrease fishing effort in spring (reduced pot limits, earlier closure, other mechanisms?) (requires state level action)	L for some, H for others For some Very High Low High High Mid Depends* Positive*	Yes Yes Yes Yes Yes Yes Yes	Yes Yes* Yes Yes Yes Probably Yes	Yes Not at this time Yes Yes Yes Yes Yes	This seems like the most comprehensive solution to me. Also reduces soft-shell handling and other issues * if whale migration timing doesn't change Best option  Before moving in this direction need to better understand how much Would hurt fishermen who rely on the summer fishery * depends on price and condition of crab. This may be the most effective tool of all. * I believe any decrease in fishing when crab are soft will result in 1) an increase in yield of crab the next season by reduction in mortality from handling when they are weak (molting). 2) Positive market results by not putting soft-crab on the market.
Change contour lines in response to specific oceanographic conditions; prey type/ conditions; predicted whale presence	Low or High Moderate Low High  Low	Yes Yes Maybe Yes Yes Yes, by researchers	Maybe Yes Yes Maybe Maybe Maybe ?	Maybe Yes Yes Yes  Sure Yes	I would be more confident in this if the story from Maine was more positive.  Gear is already removed by dynamics of fishery in spring and summer Give it a shot If the ocean conditions are a determination of how whales move this could be <u>critical</u> .
Seasonal gear changes	High Moderate Low High  High High initially	Yes Yes Yes Yes  Yes Yes	Maybe Maybe Maybe No  Maybe Possibly	Maybe Yes Yes Yes  Yes	Depends on results from gear innovation ideas  Initial high cost and hard to enforce

Start the season early if market sizes met in November	Low No  Low Low  Low	Maybe No  Yes Yes No Yes	Maybe Maybe  Maybe Maybe  Yes	Yes No  Yes Maybe  Sure	There is a lot that goes into this type of change In WA our state/tribal co-management is based on tribal fisheries starting in Nov. Not possible to include state fisheries at the same time.  Would be beneficial to fleet Cannot be done in WA because of tribal sharing agreements We already do this!
Other? Trip limits					

## RESEARCH QUESTIONS

Economic effects on fleet from spring/summer closures
Better analysis of whale distributions and seasonality
How do whales interact with gear and get entangled
What proportion of whales survive entanglement
Incidence of entanglements –spatially and seasonally
Are entanglement rates higher in Monterey Bay or just better reporting?
Habitat of effected whales so fishermen can have more info
When do the whales arrive in our area? How exactly are they getting stuck in the gear?
What is the fishing effort per month in each area/region?
Whale behavior—do some entanglements result from whales playing with lines?
Line color, how whales interact with gear, are ocean conditions part of why whales are in gear, where in the water column are the whales entangled, more necropsy data, understand late-season fishery dynamics.
Need better understanding of fisheries behavior by month and ocean conditions (productivity). Economic story is part of this!

## WHAT HAS ALREADY DONE? (what things have already been done that have helped to reduce entanglements)

Don't underestimate the lost gear efforts/ Lost gear begets lost gear... Active pots get entangled in lost pot lines. More lost removed lowers lost gear at a great than 1:1 ratio.
Lost and abandoned gear programs in place, incentives
Significant decrease in gear in the ocean as season progresses.* (see info below). Some years fishery closed outside 4 miles on July 1 (when soft crab are more prevalent on the outside area).
Area closures during high whale activity time (late spring, summer)
Reduction of spring and summer fishery already occurs (less vertical lines)
Very little crab bear in deeper waters after march (nature of fishery)
Time area closures
CA has described "Best Practices". Adopting those generally is expected helpful. WA has little evidence of entanglement. Rate of entanglement is below 1 per year. For humpbacks less than .5/year
Lines are generally tight because of environmental conditions, strong tide and current influence
Line modifications

\*Number of vessels by month (per WDFW):

December	78	S. Coast only gear due to state/tribal agreements
January	177	
February	154	
March	121	
April	75	
May	51	
June	34	
July	30	
Aug	21	
Sept	34	Closes 9/15

**NEEDS: Education and Outreach strategy**

Economic cooperation—keep low quality crab in the water

**OTHER INPUT/COMMENTS:**

- From what I think I heard, of all the options/techniques presented to us, there is no proof any of them actually work
  
- Having the east coast guests at the meeting to discuss efforts and results was very helpful to frame the conversation around the most feasible actions. (e.g. sinking lines were used resulting in:
  - 1) Increase in fishing expense from lost gear.
  - 2) Decrease in effectiveness
  - 3) Inconclusive results in regards to effectiveness
  
- The information overlay of whale migration, entanglement incidence and fishing seasons was particularly useful. This is good framework for making management decisions and prioritizing effective means to mitigate whale mortality/entanglements.