Research Activity	Approach & Purpose/Benefit	Feasibility	Cost
Continue telemetry studies	Assess FKW movements relative to fishing activity	Possible, but requires significant search effort as FKW densities are low	High: tags alone cost ~$4000 ea. Need several tags deployed on a number of groups to assess population movements
Evaluate acoustic differences between insular vs. pelagic animals	Allows alternative method for identifying individuals during surveys or interacting with fishing activities	Possible with existing data, better with more data	Low- hydrophones already available to researchers & analysis methods are defined
Distinguish FKW calls from other odontocete species	Allows alternative method for identifying individuals during surveys or interacting with fishing activities	Possible with existing data, better with more data, particularly from pilot whales	Low- hydrophones already available to researchers & analysis methods are defined. Can be done as piggy-back project
Evaluate acoustic behavior near longlines using recorders on fishing gear	Understand the dynamics of how false killer whales are interacting with gear and how animals are attracted to the gear. Also provides acoustic ID following depredation.	Project to begin this year with specific vessels and through the observer program. Will take significant effort to adequately assess interactions given low interaction rate and length of sets	High start-up cost: recorders expensive (>$10K ea.) and many sets will need to be recorded.
Understand foraging and acoustic behavior using acoustic tags	Understand how animals how animals capture prey and how they communicate with conspecifics	Possible, but requires significant search effort as FKW densities are low, must get close to the animal to apply suction-cup tags, specific training required	High start-up cost: suction-cup acoustic tags are expensive (>$15K ea.)
Study adaptive learning, particularly by young FKW	Evaluate how young animals learn to depredate gear, and if hook-up of an individual in the group deters depredation in the future	Very difficult: not clear how this study would be done given no young captive animals	Undetermined
Determine range at which a hook in a fish can be detected by FKW	Tank experiment to evaluate detection ability with different prey species	Easy: Kina already trained to do echolocation experiments	Low
Assess impact of hook density on FKW ability to follow line	Would help understand whether FKW are actively searching for fishing vessels, and could evaluate impact of moving fishing effort elsewhere	Two ways to assess: 1. Use logbook data, but limited info on interactions on trips without observers- initial evaluation feasible, 2. Use satellite tagged individuals versus VMS data- very difficult to locate pelagic animals for tagging	Observer data- Low Satellite tagging-High
Carry out underwater observations of foraging behavior	Use audio & video to understand the mechanism of depredation- how are they removing fish, when are they near gear, what are the group dynamics (calm vs. frenzy)	Doable if targeted in areas with high rates of interactions	High start-up cost: video and audio recorders expensive (>$10K ea.) and will need several to assure recordings in a given set. May require chartering contracts.
Test visual acuity using different types of lights	tank experiment with Kina	Possible, will require some retraining	Moderate- additional cost of re-training and acquiring testing objects
Evaluate FKW capability to see floats, as well as monofilament line of different colors and width	tank experiment with Kina	Possible, will require some retraining	Moderate- additional cost of re-training and acquiring testing objects
Mine existing acoustic data from Cross Seamount and elsewhere	Use moored acoustic devices to assess level of fishing at Cross and frequency of false killer whale occurrence	Easy: data are already available	Low
Conduct vessel sound playbacks	At what distance to false killer whale react to fishing vessels? Do insular animals react?	Possible, but need permits, which will take up to a year to obtain	High: tags alone cost ~$4000 ea. Need several tags deployed.
Assess FKW response to compounds found in oil fish and other fish species that FKWs do not depredate from the line	Purpose is to determine if this is a potential deterrent with commercial applications; tank experiment with Kina	Possible, will require some retraining, may need to assess Kina's taste sensitivity relative to wild FKWs first	Moderate- additional cost of re-training
Evaluate where animals are caught within a set and why	Initial analysis of observer data suggest higher interaction rate in the middle of a basket. Need to understand if this is an artifact of small sample size or if there is a higher probability of hooking in the middle of the set.	Difficult to evaluate given low interaction rates. The why could be assessed using other techniques already listed- acoustic and video recordings, etc.	Likely high given equipment required for conducting observations

Research Activity	Approach & Purpose/Benefit	Feasibility	Cost
Develop methods for fleet to use acoustic recorders to determine FKW presence prior to setting	Use radio buoys to alert to FKW presence prior to and during setting	Development already underway (G. McPherson), still testing. Doable over the long-term.	Reasonable given fisherman already purchase radio buoys
Survey all longline vessels to identify commonalities among those with high depredation rates	Is there a common feature of vessels that are commonly whaled or that have higher rates of bycatch?	Difficult given confidentiality restrictions	Low
Understand impact of weak hooks on target species catch rates	Conduct experiment of catch rates given weak hooks versus other typical hook types	Very feasible- existing circle hooks may prove weak enough	High cost for experiment (vessel contracts, hook purchases). Low for opportunistic effort or gradual adoption by fisherman
Evaluate impact of weak hooks on FKW bycatch rates	Long-term evaluation of bycatch rates using the observer data	High, but will take time	Low given gradual adoption of hooks by fisherman.
Record individual sound profile of longline vessels.	Attempt to understand the link between vessel noise and FKW interactions. Could start simply with recorder on a buoy outside the harbor and later expand to more precise measures using more sophisticated equipment.	Relatively easy to install hydrophone on buoy, more difficult to do more sophisticated measurements. Vessel cooperation unclear.	Moderate- cost of hydrophone and maintenance on the buoy.
Assess potential for hooks to be modified (foam coating, etc.) to increase or decrease detection range	1. Are hooks easy to modify, 2. do modified hooks increase or decrease detection range, and 3. does this change in range reduce depredation or bycatch	Easy to test detection range with Kina	Hook modification may be high. Experimental cost is low.
Record acoustic profile during setting, soaking, and hauling to assess potential cues to FKWs	evaluate whether there are specific acoustic cues that may attract animals to the gear.	Project to begin this year with specific vessels and through the observer pgroam	High start-up cost: recorders expensive (>$10K ea.) and many sets will need to be recorded.
Evaluate potential to use killer whale/other playbacks as deterrents	Evaluate if killer whale sounds are a deterrent to FKWs. Would need to use tropical transient killer whale calls.	May be difficult to identify appropriate sounds as little is known on killer whale ecology in the tropics. Need research permits (up to 1 yr to obtain).	Probably low.
Evaluate feasibility of using moored listening stations (FADs, NOAA weather buoys, etc.) to determine FKW occurrence before a fishing trip	Would provide advanced notice to the fleet on FKW presence in specific areas.	Likely relatively easy to set up, but may not provide adequate information as buoys are few and far between.	Expensive given cost of transmitting data from the buoys
Evaluate effectiveness of wire loops on circle hooks as a method to reduce depredation on bait, catch and incidental takes of false killer whales	Is bait and/or catch depredation rate lower with wire loops on the hooks? Should be formally assessed using NMFS observer program.	Feasible, some experimentation already underway. May take considerable time to assess impact on false killer whale catch rates, and would require large scale study with well-defined experimental methods.	High cost for experiment approach (vessel contracts, hook purchases). Low for opportunistic effort or gradual adoption by fisherman

Research Activity	Approach & Purpose/Benefit	Feasibility	Cost
Determine number of vessels use shortline & kaka line gear	Currently no good measure of number of vessels using this gear type or how often.	Doable, but will require on-the-ground effort and cooperation with the State	Moderate
Begin data collection on when and how fishing	Work with the State to evaluate logbook data for these fisheries- not clear that the data are available.	May be difficult to acquire the data and present results given confidentiality restrictions.	Unknown
Form an observer program to assess level of FKW and other cetacean bycatch	Develop a program using independent vessels to assess fisheries interactions.	Unclear, unlikely to gain cooperation from fisherman being observed.	High

Research Activity	Approach & Purpose/Benefit	Feasibility	Cost
Hawaiian EEZ survey	Conduct large-scale (2 ships, 175 days-at-sea) covering the entire Hawaiian EEZ with visual and acoustic observing. Survey is intended to update abundance estimates for all cetaceans, but FKW will be priority for auxiliary projects.	Is happening in collaboration with SWFSC	High
Develop methods to pro-rate blackfish bycatch	Bycatch is currently underestimated as a sizeable number of takes are identified only as pilot whales or FKWs.	Several methods proposed, but require careful consideration.	Low
Develop predictive habitat models of FKW density	Incorporate *in situ* and remotely -sensed oceanographic data to develop models of FKW habitat which can be applied to unsurveyed areas	Currently under development, but will require more FKW data to build a robust model	At-sea data collection cost is high, but collected as part of cetacean survey. Low cost for remotely-sensed data.
Continue research into FKW abundance using towed and stationary acoustics	Detection rates are higher acoustically than visually so this may provide an alternative means of estimating abundance. Many questions need to be addressed.	Research in ongoing	High
Evaluate alternative methods for estimating abundance, with emphasis on improving precision	Consider alternatives that may provide a means for 1) surveying populations, and 2) modellling density. New methods for surveying may include fishery-dependant data evaluation, acoustic gliders, etc.	Survey and analysis methods must be developed. Long-term research goal.	High
Collect additional genetic samples to assess population structure	Collect biopsy samples using observers biopsying from bow of fishing boats, or during dedicated cetacean surveys	Feasible, but may not have many opportunities	Low- collection,, Moderate- analysis
Evaluate degree of genetic differentiation between insular and pelagic stocks	Requires additional effort to obtain samples to the west and north of Hawaii	Difficult	High
Consider ways for the Team members and their constituents to generate funding/support for future abundance surveys			