False Killer Whale Take Reduction Team
Meeting #2, April 6-9, 2010
Maui, HI

KEY OUTCOMES MEMORANDUM

I. OVERVIEW

The National Marine Fisheries Service (NMFS) held the second meeting of the False Killer Whale Take Reduction Team on April 6-9, 2010, at the Sheraton Maui in Lahaina, Hawaii. (See **Attachment 1** for a copy of the agenda.) The meeting focused on the following objectives:

- Provide updates on recent activities
- Consider results and implications of interim work on observer data mining/analysis, potential solutions, and efforts of other work groups
- Begin identifying promising candidate measures; consider data inputs and conceptual elements of predictive models
- Discuss Take Reduction Plan (TRP) structure and drafting process needs
- Continue deliberations on long-term research and outreach needs

This meeting summary is presented in five main sections: Overview, Participants, Meeting Materials, Key Outcomes, and Next Steps. The Key Outcomes section is further segmented into the following:

- ***Welcome, Introduction and Updates.*** This section provides a brief overview of meeting purpose, agenda overview and relevant updates.
- ***Background Briefings and Presentations.*** This section summarizes the various briefings presented at the meeting outset.
- ***Overarching Themes.*** This section summarizes the results of the team's brainstorming and deliberations over the three-day meeting. Any recommendations or actions agreed to by the Team are called out in this section.

Additionally, a number of meeting materials are included as attachments.

II. PARTICIPANTS

The meeting was attended by the entire Team (either primary members or alternates). Participants included the following: William Aila, Robin Baird, Hannah Bernard, Brendan Cummings, Paul Dalzell (with his alternate, Asuka Ishizaki, attending on his behalf April 6-7), Roger Dang, Clint Funderburg, Eric Gilman (for Steve Beverly), John Hall, John LaGrange (for Jerry Ray), Kristy Long, Kris Lynch, Paul Nachtigall, David Nichols, Tory O'Connell, Andy Read, Ryan Steen, Lisa Van Atta (for Lance Smith) and Sharon Young.

Nancy Young, with the NMFS Pacific Islands Regional Office (PIRO), and Erin Oleson and Karin Forney, with the NMFS Pacific Islands and Southwest Fisheries Science Centers,

respectively, also joined in Team deliberations. Scott McCreary and Bennett Brooks from CONCUR, an environmental dispute resolution firm specializing in marine resource and water issues, served as the neutral facilitators. As well, about 15 people, including staff from NMFS, NOAA Office of Law Enforcement, the U.S. Coast Guard, and members of the public, attended all or part of the meeting.

III. MEETING MATERIALS

Meeting materials were provided to support the group's deliberations. As possible, meeting materials were sent out ahead of time. However, some documents and nearly all presentation materials were distributed as handouts. (A detailed listing is included as **Attachment 2.)** All materials are available on the web at http://www.nmfs.noaa.gov/pr/interactions/fkwtrt/).

IV. KEY OUTCOMES

Below is a summary of the main topics and issues discussed. This summary is not intended to be a meeting transcript. Rather, it provides an overview of the main topics covered, the primary points and options raised in the discussions, and areas of full or emerging consensus.

A. Welcome and Introductions

The meeting began with a welcome by Lisa Van Atta, PIRO Assistant Regional Administrator for Protected Resources, who thanked participants for their participation and commitment. This was followed by a brief overview of the meeting purpose, self-introductions, and a review of the meeting agenda. It also included brief updates on the following topics:

- ***Team Membership.*** B. Brooks informed the Team that Eric Gilman has been appointed as Steve Beverly's alternate. He also noted that, based on various constraints, alternates Lisa Van Atta and John LaGrange are expected to attend all future meetings rather than Lance Smith and Jerry Ray, respectively.

- ***Team Scope.*** N. Young noted that the Agency had reviewed all comments received on the draft scope and has opted to maintain the Team's scope, as originally framed in the Federal Register Notice.

- ***2010 Stock Assessment Report.*** K. Forney noted that the Draft 2010 Stock Assessment Report (SAR) is not yet finalized but is expected to be available for distribution to the Team prior to its next meeting.

- ***2002 Abundance Estimates.*** Following up on a discussion from the Team's first meeting, K. Forney informed participants that – based on the MMPA and existing guidance – the SARs will have valid abundance estimates and PBRs (based on the 2002 survey) through at least the 2010 SAR. Barring new and compelling evidence, this information is the best available science and serves as the basis for TRT deliberations until new abundance estimates can be generated (which would likely occur after the Team's initial deliberations have been completed).

Other updates included a brief review of recent press coverage.

B. Background Briefings and Presentations

The meeting included focused updates on a number of topics. Below is a quick synopsis of the topics covered. (Broader discussion themes based on these presentations are captured in Section C below.) As noted earlier, copies of nearly all presentations are available on-line. (Only the presentation by D. Curran is not posted as that material is not yet finalized.)

- ***Circle Hook Catch Efficacy.*** Dan Curran with the NMFS Pacific Island Fisheries Science Center presented an overview of the Center's work to assess the catch efficacy of large circle hooks in the Hawaii-based tuna longline fishery. As well, he presented several lessons for the Team to consider when undertaking future field trials of various gear fixes. The bottom line results: no significant different in the catch rates for bigeye tuna; likely reduced catch of other non-target incidental species.

- ***Data Analysis Efforts.*** K. Forney provided findings based on her review of observer data, noting that – other than fishing effort – no single variable (soak time, vessel effect, time of year, hook types, distance traveled between depredation events, etc.) carried much explanatory weight in understanding the variance in depredation rates. A. Read summarized Work Group discussions based on K. Forney's findings, which centered on the following main points: (1) confirming K. Forney's assessment of "no obvious smoking gun;" (2) noting the varying depredation patterns between deep- and shallow-set longlines; and (3) suggesting specific topics (hook type, spatio-temporal analysis) for future near-term study.

- ***"What If" Analysis.*** K. Forney presented to the Team a draft "what if" spreadsheet to be used as a tool to help invent options for potential solutions. The tool forecasts potential reductions in false killer whale serious injuries and mortalities based on given changes in four different categories: (1) overlap of false killer whales and fishing effort; (2) depredation rates; (3) catch probability when depredation occurs; and (4) serious injury and mortality probability. The model is intended to support the Team's brainstorming on the potential efficacy of different suites of actions, but is not intended as a strict tool to gauge the predicted success of the measures. The model (provided in **Attachment 3**) generated significant interest and discussion. (See discussion summary below.)

- ***False Killer Whale Echolocation.*** Team member and University of Hawaii Professor Paul Nachtigall presented to the Team the results of studies on false killer whale echolocation. The presentation summarized findings related to: (1) distance detection; (2) echolocation discrimination and high frequency hearing loss; (3) active hearing control; (4) hearing directionality and sound paths; and (5) acoustic characteristics. P. Nachtigall also offered several suggestions for future research efforts. (See section below on research recommendations.)

- ***Historical Experience of False Killer Whale Depredation in the Northwest Coral Sea, and Mitigation of Depredation Behaviour by Toothed Whales on Tuna Longlines.*** Geoff McPherson from James Cook University of North Townsville, Australia, presented a historical look at the Japanese longline fishery's experiences with depredation and mitigation strategies in the Northwest Coral Sea since 1986, and work done in Australia,

Japan, Seychelles, and elsewhere on toothed whale depredation mitigation. The presentation summarized findings related to radio buoys, pingers, and passive acoustics and biosonar interference. Additionally, the presentation noted several promising areas for future mitigation efforts, including (1) modified radio direction-finding buoys to detect and avoid false killer whales; (2) next-generation pingers; and (3) sonar reflective equipment to discourage whales from taking fish from lines.

- ***Experimental Gear Modifications.*** Team members C. Funderburg and J. Hall provided brief overviews of possible gear modifications to reduce depredation rates on deep-set longline gear. The first effort, currently being tested on C. Funderburg's vessels, focuses on using wire loops placed over the bait to reduce bait depredation by increasing the acoustic reflection. The second modification, still under development by J. Hall, also focuses on changing bait acoustic reflections through the use of plastic beads with embedded microspheres placed on the wire loops described above[1].

- ***Spatio-Temporal Patterns of Effort and False Killer Whales.*** Michael Marsik with the NMFS Observer Program presented monthly summaries of logbook data for 2008-2009 highlighting the spatio-temporal patterns of longline fishing effort, as well as spatio-temporal data on false killer whale sightings and takes, along with marine mammal-caused depredation. Team members expressed strong interest in seeing additional years of data presented that more fully meld spatio-temporal patterns of effort with false killer whale sightings, takes, and depredation, along with sea surface temperature and sea surface height maps.

C. Overarching Themes

The Team's deliberations over the course of the three-day meeting generated a number of overarching themes. These themes aggregated around three primary categories: (1) identifying potential management strategies; (2) analyzing the impact of potential actions; and (3) clarifying the Potential Biological Removal (PBR) target. Below is a synthesis of the Team's key discussion points.

<u>Identifying Potential Management Strategies</u>

The bulk of the Team's initial deliberations centered on discussions – both during plenary and in informal caucuses within and across different interest groups – to identify candidate measures to include in a possible Take Reduction Plan (TRP). Though the conversations were very preliminary in nature, the discussions generated important concepts and approaches to consider at future Team meetings. Below is a summary of the primary themes.

- ***Core ideas emerging.*** Team members deepened their discussion – begun at the first meeting – regarding possible actions to include in a TRP. The Team's deliberations generated a substantial number of ideas. It also began to segment the concepts into ideas ready for implementation and those requiring additional experimentation to confirm the

[1] The approach to this experimental gear modification was revised somewhat based on Geoff McPherson's presentation.

viability of the fix, both in terms of limiting bycatch and minimizing impact to the fleet's target species catch rates. Below is a table summarizing the Team's discussion.

Most Frequently Discussed Candidate Actions and Nature of Team Interest		
Measure	**Status Relative to Implementation-Readiness (ready/not ready)**	**Status Relative to Empirical Findings of Effectiveness (no research needed/research needed)**
Circle hooks (size 14/0, 15/0, 16/0)	Ready	No significant new research needed; observer data might indicate potential for reducing M&SI, but sample sizes are too small to be conclusive.
Captain training on marine mammal handling/release from gear to reduce severity of injuries	Ready	No significant new research needed; however, discussions indicated that many fishermen are unaware that the release of animals can potentially reduce M&SI takes
Time/area closures or effort reductions, triggered if other measures are not effective	Mixed views	Additional data mining needed to identify candidate areas, seasons or effort reduction strategies
Weak hooks	Mixed views	Near-term research needed – impact on target species catch rates Long-term research needed - impact on FKW interactions
Gear modifications to reduce bait depredation	Not ready	Need to confirm design and usefulness
Acoustic buoys/listening devices to identify FKW presence and/or depredation	Mixed assessment of readiness	Information needed on how to test and implement
Bait/discard/offal retention	Ready	Storage/disposal considerations
Fleet communications (FKW sightings, possible use of VMS)	Ready unless changes to VMS required	Information needed on how to test and implement; changes to VMS would require development
Set-splitting/gaps between baskets	Ready	Information needed on how to test and implement; effectiveness unknown
Other Actions Discussed and Nature of Team Interest		
Vessel light/noise characteristics	Potential, but additional information from fleet needed	
Line changes – color, coating, diameter, snaps	Potential, but additional research/data mining needed	
Eliminating hook in center of basket	Potential, but additional research/data mining needed	
Spotters (air or vessel-based)	Limited effectiveness; significant implementation barriers	
Noise deterrents	Not currently promising based on past research results; interest in tracking potential of "next generation" pingers	
Center basket illumination	Not seen as promising based on past research results	
Taste deterrent	Not seen as promising based on past research results	
FKW sedation (to foster gear removal)	Not seen as promising based on past experience and practicality concerns	

- ***Possible TRP Framework Outlined for Deep-Set Fishery.*** Team members discussed a possible framework for structuring a Take Reduction Plan for the deep-set longline fishery that would evolve over time based on plan effectiveness. The approach, proposed as a starting point by a subset of conservation interests with input from other Team members, draws on the following key aspects:

- Phased Approach. The TRP would center on a plan that relies on a series of regulatory and non-regulatory actions, pre-determined triggers, and pre-approved consequences to reduce the number of false killer whale mortalities and serious injuries to the target level. Further deliberations are needed to confirm triggers but initial discussions centered around an agreed-upon number of observed false killer whale M&SI. (The precise number would depend on the target reduction necessary and the level of observer coverage).

- Early Actions. The TRP would move forward initially with a set of gear modifications and training to help reduce false killer whale M&SI. This approach is seen as an incentive for fleet-wide participation, as it avoids upfront closures, effort reductions or similar measures. Possible candidate actions include circle hooks, weak (circle) hooks, acoustic buoys/listening devices, bait depredation gear fixes, leaving an area when depredation has occurred, and captain training on marine mammal handling/release from gear. Possible secondary actions focused on offal retention, set-splitting/gaps, and fleet communication. Additional discussion is needed to determine the viability of near-term actions (*i.e.*, whether there is enough information on effectiveness to support inclusion in the plan), as well as to determine which actions would be regulatory versus non-regulatory.

- Triggers and consequences. Based on this approach, if observed M&SI were below the target level, the current TRP measures would continue. If M&SI were to exceed the pre-determined target level after the TRP goes into effect, the TRP would include a trigger that immediately implements a pre-determined time/area closure or some other type of agreed-upon effort reduction/other management measure. The consequence would then be maintained through the end of the calendar year or other appropriate period until emerging gear modifications or other fixes are ready for implementation. The Team would likely need to be reconvened to discuss and confirm the appropriateness of any additional proposed follow-on actions.

Other aspects of the proposed approach discussed by the Team include the following: use of M&SI determinations (and *not* takes) as triggers; periodic triggers to assess ongoing effectiveness; need for timely determination of whether takes are classified as serious injuries; importance of fostering creativity; and, early adoption/testing of potential fixes. Additionally, the proposed approach does not focus on the shallow set, shortline or kaka line fisheries, though the Team would consider the applicability of gear modifications and other relevant actions to these fisheries.

The proposed approach generated significant deliberations over the course of the meeting. Many Team members representing different constituencies voiced interest in the conceptual ideas embedded in the strategy, saying it incentivized fishermen to take upfront steps that would, hopefully, obviate the need for harsher actions (i.e., time/area closures or effort reductions) later on. Several participants also noted the importance of making sure that all measures (i.e., gear modifications or other changes) applied evenly

across all deep-set fishermen. Still, many TRT members were reluctant to delve too deeply at the meeting into the specifics of any consequences[2]. For one, a number of Team members emphasized the importance of having better metrics drive the drafting of any specific consequence area or management action. There were also concerns raised whether time/area closures – as opposed to across-the-board effort reductions – would be effective given false killer whales' wide distribution. Finally, while fisheries interests characterized the proposal as "something we're open to," they also noted that "the devil is in the details" and they made clear that they needed to have further within-caucus discussions before the fisheries could meaningfully address any time/area closures or effort reduction issues. Fisheries interests did not agree during the meeting to any specific triggers or consequences.

- ***Additional information needed to support Team consideration.*** As noted above, aspects of the proposed approach generated preliminary interest among many Team members and across interest groups. At the same time, Team members acknowledged the early-on nature of the discussion and the many uncertainties and details yet to be fully discussed. Below is a listing of the key issues and concerns to be fleshed out in future discussions.

    - Defining consequence actions. Team members agreed that significant work and discussion will be needed to identify potential consequence actions that can be expected to reduce false killer whale interactions and still garner widespread support. Among the most important considerations cited in identifying potential time/area closures as a potential consequence included the following: demonstrated benefit; potential impact on fleet catch rates; fleet-wide acceptance and enforceability. There is also the need to assess the effectiveness of specific closure areas versus more cross-cutting effort reductions. Fisheries interests also underscored the inevitably controversial nature of any closure and, while not agreeing to any specific time/area closure concepts, stressed the need for industry to meet as a caucus to consider effort reduction issues. NMFS staff are to further develop analyses and spatio-temporal plots to support these discussions.

    - Additional research needs. As noted above, Team members have divergent views regarding the implementation-readiness of some proposed actions. Most critically, while all Team members see weak hooks as a promising potential mitigation measure, there are divergent views among participants regarding the viability of including weak hooks as a core near-term TRP measure. Team members agreed that very near-term testing is essential. NMFS staff will be

[2] The initial concept put forward by the conservationists included a "consequence box" – drawn to capture the majority of false killer whale takes – with coordinates between 168- and 151-degrees west and 12-degrees and 26-degrees north. That iteration of a potential consequence area was later tightened to 162- and 151-degrees west and 12-degrees and 26-degrees north. A third iteration included only the waters inside the Hawaiian Islands EEZ east of 162-degrees west. These areas were presented for discussion purposes only; no support from Team members was sought or offered. Team members largely agreed that any "consequence box" should be empirically driven (*i.e.*, tied to FKW bycatch rates, depredation frequency, etc.), and evaluated via simulations. Team members also expressed strong interest in seeing other options and concepts generated by fisheries interests.

exploring the viability of procuring weak hooks from its facility in Pascagoula[3]; Team members also discussed the importance of identifying other funding sources, as possible, to support near-term trials. Other research needs focused on gear modifications to reduce bait depredation, acoustic listening devices, and, as noted above, potential consequence actions.

- Regulatory versus non-regulatory. Future Team deliberations need to sharpen discussions regarding regulatory vs. non-regulatory measures – in other words, those measures that would be required for all vessels and those measures that are recommended but not mandatory. In general, Team members agreed that measures such as circle hooks and captains' training should be required.

- Other. The discussion generated numerous other information needs and requests, including: identifying possible false killer whale hot spots; strategies to make weak hooks readily identifiable to law enforcement; identifying fishermen willing to test weak hooks; confirming the availability of observers to cover weak hook trials; and assessing impact of possible consequence areas on fleet economics.

Team members are to continue deliberations on this approach prior to Meeting #3. Likely actions are to include the following: vetting of the basic approach to broader constituencies; further research into the viability of circle hooks; data mining and predictive modeling to identify and evaluate effectiveness of possible consequence area(s); and both Work Group and informal cross-interest group caucus discussions. (Several Team members are considering an informal in-person meeting on the West Coast in late May.)

Clarifying Take Reduction Target Level

The Team engaged in an extensive discussion intended to clarify the take reduction target level, with stakeholders strongly contesting NMFS's proposed approach to determining that target.

NMFS put forward a proposal that would define the Team's target take reduction level by the U.S. fleet both within and outside the Hawaii EEZ. (NMFS proposed approach is provided as **Attachment 4**.) The key aspects of the proposal are summarized below.

- Calculate the target reduction rate for false killer whales within the Hawaii EEZ using current PBR and M&SI rates. This results in the need to reduce average annual M&SI within the EEZ by 4.8 animals, a 65.8 percent reduction from the current M&SI level of 7.3 animals to the current PBR of 2.5.
- Since complete bycatch and abundance data are not available on the high seas, apply the same proportional reduction – 65.8 percent – to the combined number of Hawaii EEZ and high seas M&SI (12.6 animals per year) in the deep-set and shallow-set fisheries. This results in the need to reduce total M&SI by US fisheries to no more than an average of 4.3 animals per year (2.5 inside the Hawaii EEZ and 1.8 on the high seas).

[3] Subsequent to the meeting, NMFS determined that the Pascagoula facility did not have additional weak hooks to make available for tests in the Hawaii longline fleet.

- Given current 20 percent observer coverage levels, this corresponds roughly to an average annual limit of one observed false killer whale M&SI for the Hawaii EEZ and high seas combined.

NMFS staff explained that the rationale is based on the MMPA's mandate to reduce bycatch for a stock throughout its range. As Agency staff explained, NMFS must ensure that M&SI of the Pelagic stock – distributed within the Hawaii EEZ as well as on the high seas – is addressed throughout that range; it would not be consistent with the MMPA to reduce M&SI only within the Hawaii EEZ if fishing effort is simply displaced to the high seas where the stock would still be at risk. NMFS staff noted that its approach is consistent with the MMPA's requirement to use the "best available information" to protect the stock. NMFS staff also noted that failure to adequately address M&SI of Pelagic stock false killer whales occurring on the high seas now will likely result in the need to reconvene the Team and develop additional take reduction measures at a later date.

Team members across all interest groups strongly contested the proposed approach. For one, several members said that there are not sufficiently robust data to generate a target for international waters, and they challenged the underlying assumptions NMFS is using to calculate such figures (for example, similar depredation/bycatch rates within and outside the Hawaii EEZ). Some team members also said that NMFS' approach was not consistent with the MMPA or the manner in which NMFS has addressed the pelagic false killer whale stock in its annual Stock Assessment Reports.. Moreover, stakeholders said that such an approach unfairly penalizes the fishery and undermines the Team's ability to craft a viable and potentially consensus-supported plan within the Hawaii EEZ by folding in a new and difficult-to-reach target in a process already challenged by a tight timeframe. Finally, there were suggestions that NMFS distinguish between the formal determination for meeting PBR (within Hawaii EEZ only) and a determination used to assess effectiveness (looking at M&SI more broadly). Team members asked that the topic be kept open for further discussion and consideration.

NMFS staff acknowledged the difficult and unprecedented challenge – no TRT has ever had to deal with a fleet that takes the same stock both within and outside the EEZ – and they agreed to consider additional comments and perspectives from Team members. R. Steen, B. Cummings and NMFS counsel are expected to discuss this issue further before the next TRT meeting.

Analyzing Impact of Potential Actions

K. Forney engaged the Team in two discussions intended to foster consideration and assessment of possible management actions: (1) review of a draft "what if" spreadsheet structured to help Team members assess the impacts of addressing differing areas of concern; and (2) need for and structure of a predictive model to assess the likely impacts of any proposed suite of management actions. Below is a summary of key discussion highlights.

- ***"What If" analysis.*** Team deliberations to-date have focused on identifying possible management actions intended to address one of four areas of concern: (1) reduce false killer whale chances of finding vessels; (2) minimize active depredation; (3) minimize hookings; and (4) minimize serious injuries and mortalities. The "what if" tool is a

spreadsheet intended to enable Team members to evaluate – at a very crude level – the impact of different changes in each of the four areas of concern noted above, using the observer data from 2003-2009. For example, Team members may plug in different combinations of values for the variables – say, significant reductions of depredation events and number of false killer whale hookings but no change to effort – and assess the overall impact on the expected reduction of false killer whale M&SI.

Team members offered the following comments based on the discussion:

- Useful tool. Team members considered the spreadsheet to be quite helpful, as it concretely highlights the potential impacts of and trade-offs between different approaches. (For example, K. Forney demonstrated that even aggressive and successful efforts to nearly eliminate depredation would not bring M&SI below PBR.) It also, they said, helps identify further information and research needs.

- Strategies to improve. Team members suggested the spreadsheet be revised to incorporate the following refinements: (1) calculate distinct depredation/bycatch rates for within and outside the Hawaii EEZ, and by calendar quarter to allow seasonality; (2) restructure bycatch rate for sets without depredation as a variable (rather than as a given); (3) allow for effort to shift from the deep-set fishery to the shallow-set fishery; and (4) make clear distinctions between "givens" (firm sideboards associated with statute, regulation, or adopted protocols) and "assumptions" explicitly chosen by Team members for solution-finding purposes.

- Caveats. Though appreciative of the model, Team members identified several caveats regarding the model that may make it too simplistic. Below is a listing of the primary caveats noted.

    - As configured, the model does not take into account nonlinear effects;
    - Assumption that take rates on sets with and without depredation are independent variables;
    - Inclusion of serious injury and mortality rates as a given (rather than an assumption that can be adjusted depending on factors such as the adoption of weak hooks or adoption of safe handling and release procedures);
    - Need to consider impact of management actions in other arenas on underlying assumptions;
    - Impact of foreign fleet activity;
    - Whether effort should be tied to hooks rather than sets; and,
    - Need to consider whether per-set depredation rates are likely to increase as the amount of gear in the water decreases.

K. Forney will take the Team's comments into consideration and distribute a third iteration of the model via email for the Team members' use. (A second version of the model, developed based on the Team's feedback, was already distributed at the meeting.)

- ***Predictive Model Development.*** While the "what if" model is helpful in assessing the impact of different areas of focus, a more nuanced model is needed to predict the expected impacts of specific management actions. To address this need, K. Forney proposed developing a simulation model to calculate likely impacts on M&SI of various suites of measures. Some Team members recommended K. Forney incorporate lessons learned from other similar exercises, including work undertaken by both Debra Palka and Don Kobayashi of NMFS and Marine Protected Area (MPA) site selection algorithms intended to optimize possible closure locations relative to bycatch reduction potential and minimization of economic impacts. Team members also cautioned that the model, while helpful, should not drive the Team's decisions. Some Team members strongly supported the development of such a model and a work group was established to support K. Forney's work on the model. Fishermen input into the effort is considered critical.

Research Activities

Team members continued to expand the list of research needs developed at the first TRT meeting. Deliberations over the four-day meeting identified numerous research areas, with the greatest interest focused around research related to (1) further mining of observer data to identify trends related to depredation and/or false killer whale M&SI; (2) potential gear modifications, particularly as it relates to the impact of weak hooks on catch rates; and (3) improving the precision of false killer whale abundance estimates (broadening platforms used – longline vessels, Navy vessels and planes, others – to gather data). Team members representing the fishing industry noted that obtaining an accurate and current abundance estimate for Hawaiian pelagic false killer whales is the fisheries' top research priority. Additionally, Team members voice support for cooperative research efforts, and several speakers reiterated interest in research targeting the shortline and kaka line fisheries. Below is a table summarizing research ideas generated over the first two meetings. (Please note: Short-term research needs identified at Meeting #1 and already completed are not listed.)

Research Needs to Support False Killer Whale Take Reduction Team			
Short-Term – General (by June meeting)	**Short-Term – Observer Program Data (by June meeting)**	**Mid-Term – General (over next three months)**	**Long-Term – General (six months to two years)**
• Determine extent to which FKW are able to drag gear & catch to surface if hooked at deepest part of set • Understand which vessel characteristics serve as proxy for noise profile • Determine which vessels are using various light types and configurations (*fleet input needed*) • Elicit fisherman input into depredation avoidance techniques • Examine habitat maps for first quarter 2010 and 2009 to assess possible differences to explain high take rate in 2009 • Review fishing data to determine number of boats depredated at same time to provide sense of FKW population range and size • Continue efforts to understand why FKW more likely to be hooked in middle of basket • Assess impact of C. Funderburg tests of bait gear modification to reduce depredation • Develop predictive model of potential measures (take rate, depredation rate, target catch, fleet movements)	• Assess individual vessel effects (light, sound) • Assess relationship between depredation and spacing of fishing vessels • Supplement observer data with vessel logbook or VMS data, if possible • Examine relative hook positions for bigeye • Simulate hookings v. hook number to see if significant pattern • Plot sets, takes and depredation versus eddies, sea temperatures and monthly spatio-temporal composite • Determine appropriate scale (2°x2° or 5°x5°) for examining variance patterns • Assess bigeye catch rate and FKW/blackfish M&SI rates on small circle v. tuna hooks • Assess impact of various line colors and widths • Assess data by both captain and code group *(fleet would need to provided vessel IDs for respective code groups)* • Review mouth hookings to assess hook-type trends • Assess extent to which depredation is distributed evenly between floats	• Develop photo database of pelagic-zone animals, including scars & disfigurements • Continue satellite tagging of FKWs (April) • Evaluate acoustic differences between insular vs. pelagic animals • Evaluate feasibility of mooring listening stations (FADs, NOAA weather buoys) • Begin data collection of shortline and kaka line fisheries (where and how fishing) • Develop methods for fleet to use acoustic recorders to determine FKW presence prior to setting • Begin weak hook experiments • Survey all longline vessels to identify commonalities among those with high depredation rates • Understand impact of weak hooks on target species catch rates *(may need to be longer-term effort)*	• Conduct FKW-targeted research on the R/V Sette, September 2010[4] • Begin longline acoustic monitoring • Understand foraging and acoustic behavior using acoustic tags • Develop methods for pro-rating "blackfish" bycatch • Record acoustic profile of individual longline vessels • Undertake HICEAS II-Hawaii EEZ survey 2011[5] • Develop predictive habitat models of FKW density • Understand mechanism of hooking • Study adaptive learning, particularly by young FKW • Evaluate alternative methods for estimating abundance, with emphasis on improving precision • Begin photo-ID from fishing vessels with industry support • Consider ways for Team members and their constituents to generate funding/support for future abundance surveys • Assess range at which hook in fish can be detected by FKW • Assess impact of hook density on FKW ability to follow line • Assess potential for hooks be modified (foam coating, etc.) to increase detection range • Carry out underwater observations of foraging behavior • Test visual acuity using different types of lights • Evaluate FKW capability to

[4] Based on an update from NMFS received after the meeting, the HICEAS II- Hawaii EEZ survey, originally planned for September 2011, will now occur in 2010. Targeted research on FKW will be folded, as possible, into the HICEAS 2010 effort and not conducted as a separate September 2010 effort.

			see floats, as well as monofilament line of different colors and width • Assess whistling and echolocation using Dtags • Evaluate potential to use killer whale/other playbacks as deterrent • Continue satellite tagging of FKWs • Have observers collect samples from bow-riding FKW • Playback of various vessel noise to assess FKW reactions

A work group is to meet via teleconference before Meeting #3 to begin prioritizing potential research activities by focus area (gear, false killer whale biology and shortline/kaka line). Issues to consider when prioritizing within focus areas include likelihood of success, importance and timeframe.

Other Relevant Issues

Team deliberations raised numerous other issues not yet captured in the summary above. Below is a listing of some of the other issues and themes that emerged during the discussion.

- ***Serious Injury and Mortality.*** The Team's discussions triggered questions for some participants pertaining to the Agency's policy regarding determination of serious injury and mortality in false killer whales. In particular, some Team members questioned the Agency's assumptions about serious injury and mortality and whether those assumptions must be taken as a "given" when calculating the expected impacts of various management actions. NMFS staff explained that the criteria for making determinations were outlined after extensive discussion, consensus seeking, and concurrence among a wide range of experts, including leading veterinarians, who attended a series of Agency-sponsored workshops. Importantly, NMFS also clarified that a hooking is not automatically classified as a serious injury; rather, Agency staff explained that the classification is based on the location of the hooking (lip vs. jaw vs. body); the extent to which the animal struggles during the hooking; and the nature and amount of the gear remaining on the animal at the time of release (whether hook was removed, type and length of trailing gear). Based on the discussion, Team members offered several suggestions for the Agency's consideration:

    - Add a "lip only" designation to data fields in observer forms, to enable observers to provide a more detailed description of the hooking;
    - Provide better training to captains on handling and gear removal, so they understand the value – *i.e.,* the potential to impact whether a take is classified as a serious injury or a non-serious injury – of careful dehooking/gear removal;
    - Review observer program data – and any other applicable information – to better understand any trends associated with hook type and mouth hookings; and,

- Consider the need and/or opportunity to redesign dehookers kept on longline vessels

The discussion was considered critical to Team members, as it pointed out the very real potential for education among captains to have a significant impact on the severity of false killer whale injuries– a factor that would directly and significantly impact the fleet's ability to keep M&SI rates below PBR.

- ***TRP Drafting.*** The Team discussed strategies for preparing draft sections of the TRP, agreeing that many of the upfront sections are essentially boilerplate in nature and appropriately drafted by NMFS staff for review and comment by the Team. The Team further agreed that the Pelagic Longline TRP table of contents offers a reasonable starting point for its plan, but recommended discussion of several additional topics: false killer whale interaction with international fisheries; kaka and shortline fisheries; and recreational fisheries. N. Young is to take the lead in drafting early sections for review; P. Dalzell is to provide relevant Council-generated materials. A first draft is to be distributed prior to Meeting #3 to foster Team input.

- ***Meeting #3 Focus.*** Based on the Team's deliberations, participants highlighted several areas necessitating further discussion at the third meeting. The bulk of the meeting is expected to focus on ongoing discussions related to identifying an emerging suite of measures to include in the TRP. Additionally, Team members identified possible candidate topics for more in-depth briefings: (1) observer training on release of hooked or entangled animals; (2) serious injury determinations; (3) weak hook status and effectiveness; (4) Magnuson-Stevens Fishery Conservation and Management Act and MMPA provisions intended to improve foreign fleet compliance with U.S. fleet standards; and (5) updates on the 2010 SARs[5] and the FKWTRT's take reduction target. Progress at Meeting #3 is considered essential if the Team is to stay on track for meeting its July 19 deadline.

- ***Future Meeting Timeframe and Location.*** Given various Team members' scheduling constraints, the Team opted to revise its meeting schedule to hold Meeting #3 June 15-18 and Meeting #4 July 13-16. The fourth meeting is to be held in Honolulu, but the location of the third meeting has not yet been determined. (Several participants suggested holding the third meeting in Honolulu to foster attendance by fishermen; others, including the facilitators, voiced concern that a Honolulu-based location might impede the informal, after-hours discussions considered crucial to identifying common ground.) Team members acknowledged that the shift in schedule – canceling the May meeting and pushing Meeting #4 back to mid-July – has several implications:

    - The importance of maintaining momentum generated at Meeting #2 through timely convening of work groups;
    - Taking advantage of the time interval between Meetings #2 and #3 to conduct additional modeling and analysis;

[5] The 2010 SARs will be provided to the Team prior to the June meeting if it is available.

  - The need for ongoing vetting both before and after Meeting #3 to confirm the acceptability of any evolving package of TRP measures; and
  - The imperative to prepare final drafts of the TRP at Meeting #4.

- ***Other.*** The Team's deliberations generated several additional points:

  - ***Defining Success.*** Team members briefly discussed different measures to determine plan success. These include levels of M&SI relative to PBR; tracking declines in depredation; and reducing uncertainty in bycatch and abundance data. Further Team discussions are needed.
  - ***Outreach Efforts.*** The Outreach Work Group reported back on its efforts to increase awareness of and input into Team deliberations. The Work Group's efforts to-date have focused primarily on: (1) publicizing Team meetings; and (2) convening an April 20 informal meeting with longline fishermen.
  - ***Fishermen Survey.*** Team members voiced interest in a survey of fishermen to identify, among other things: (1) possible mitigation strategies; (2) vessels willing to participate in gear experiments; (3) unique vessel characteristics (including light/vessel effects) that may increase or decreased the likelihood of depredation; and (4) willingness of vessel captains to carry cameras and obtain dorsal fin photos to support a mark-recapture abundance assessment.
  - ***Observer Program Costs.*** Some Team members expressed interest in expanding observer coverage in the deep-set fishery to reduce uncertainty of bycatch estimates.

V. NEXT STEPS

Team deliberations over the course of the four-day meeting stepped out a number of next steps. Below is a summary of the follow-on tasks identified.

A. Meeting Timeline

The Team's meeting schedule was revised based on participant availability. The new meeting schedule is as follows:

- Meeting #3: June 15-18 [four full days; location not yet determined]
- Meeting #4: July 13-16 [half-day on the 13th followed by three full days; Honolulu]

Additionally, work groups will be convened between meetings to further develop ideas.

B. Work Groups

Given the extensive work to be completed in the next few months, and the interest in maintaining the momentum gained in the meeting, Team members agreed to establish several work groups to push at several topics under discussion. As before, the work groups – open to all interested Team members – will be convened by teleconference between now and the June meeting; all materials developed as part of work group discussions will be shared with the Team for its full deliberation. Below is an overview of work group focus and participants.

- **Predictive Model Work Group:** J. Hall, R. Baird, T. O'Connell, A. Read, E. Gilman, R. Steen, J. LaGrange, R. Dang
- **TRP Strategy Work Group:** B. Cummings, R. Steen, K. Lynch, T. O'Connell, J. LaGrange, S. Young, W. Aila, C. Funderburg, H. Bernard, R. Baird
- **Fisheries Survey Work Group:** R. Dang, H. Bernard, D. Nichols, R. Steen, K. Lynch
- **Research Needs:** P. Nachtigall, T. O'Connell, R. Baird, K. Lynch, J. Hall, E. Gilman, A. Read, R. Steen, C. Funderburg

The Research and Predictive Model work groups are expected to meet the week of May 3. The TRP Strategy Work Group is not expected to meet until mid- to late-May so its deliberations can be informed by modeling undertaken earlier in the month. The Fisheries Survey Work Group was to have met the week of April 12 to offer quick input into a survey for use at the planned April 20 informal longline fishermen's meeting. However, that effort has now been deferred in order to give NMFS staff, HLA and interested Team members more time to define survey focus, needs and approach.

C. Follow-on Tasks

Based on the meeting, participants agreed to a series of follow-on tasks to be completed prior to Meeting #3 in June. The table below summarizes these activities.

False Killer Whale Take Reduction Team Primary Next Steps	
Interim Deliberations	• Convene work groups focused on Research and Predictive Modeling (week of May 3), TRP Strategy (by mid- to late May), and Fisheries Survey (timing to be determined); all Work Teams expected to convene via teleconference • A subset of Team members may meet informally on the West Coast in May to continue talks related to the possible structure and elements to be included in a TRP; the results of any deliberations will be shared with all Team members and discussed at the June meeting
Information-Related	• NMFS to confirm appropriate take reduction target level; update Team members on approach • M. Marsik to expand spatio-temporal effort plots to include, as possible, false killer whale sightings, takes and depredation, along with sea surface temperatures and heights; as possible, generate for six-year period 2003-2009 • K. Forney to update and distribute "what if" spreadsheet based on Team input • NMFS/Team members to consider opportunity to support near-term weak hook testing; includes exploring possible funding source to procure hooks and determining the feasibility of observer coverage for weak hook trials • D. Curran to provide information on hook type related to two marine mammal takes during circle hook testing • NMFS to provide weak hook powerpoint from the NMFS Pascagoula Lab staff • NMFS to distribute updated list of research needs based on Team discussion (*see above listing*); Team to provide feedback on completeness
Logistics	• Finalize meeting locations for Meetings #3 and #4 • Identify alternate for William Aila (Meting #3) and Roger Dang (Meeting #4)
Other	• NMFS to work with HLA regarding focus for April 20 meeting with longline fishermen • NMFS to post copies of meeting presentations on Team website (as possible) • CONCUR to provide draft Key Outcomes by late April for Team review • NMFS to work with Council to identify existing materials to use in drafting TRP

Questions or comments regarding this summary should be directed to Bennett Brooks (212-678-0078 or *bennett@concurinc.net*) or Scott McCreary (510-649-8008 or *scott@concurinc.net*).

ATTACHMENT 1

False Killer Whale Take Reduction Team Meeting
April 6-9, 2010: Wailuku Room, Sheraton Maui, Lahaina, Hawaii

PROVISIONAL AGENDA

(as of 3/18/10; subject to revision prior to meeting)

MEETING OBJECTIVES

- Provide updates on recent activities
- Consider results and implications of interim work on observer data mining/analysis, potential solutions, and efforts of other work groups
- Begin identifying promising candidate measures; consider data inputs and conceptual elements of predictive models
- Discuss Take Reduction Plan (TRP) structure and drafting process needs
- Continue deliberations on long-term research and outreach needs

DAY ONE, APRIL 6: AFTERNOON

Arrival and Greetings **12:45 PM**

Welcome and Introductions **1:00 PM**

- Welcome and Meeting Purpose *(Van Atta)*
- Self-Introductions
- Agenda Review *(Facilitation Team)*

Updates **1:15 PM**

- Team Membership - Members and Alternates *(Facilitation Team)*
- Team Scope - Fisheries and Species *(N. Young)*
- Recent Press Coverage *(Facilitation Team)*
- Follow-up on Meeting #1 Requests *(Facilitation Team)*
- 2010 SAR status *(Karin/Erin)*
- Other

Report Out: Outreach Work Group **1:45 PM**

- Summary of Work Group discussion and proposed next steps
- Team discussion

Discussion Focus: Data Analysis/Mining **2:15 PM**

- Report out from Data Analysis/Mining Work Group
- Presentations (*K. Forney introduces*)
  - Spatio-temporal patterns of effort, depredation and takes *(M. Marsik)*
  - Examination of hook types used during mixed v. single type set *(J. Marchetti)*
  - Updates on observer data analysis/data mining findings *(K. Forney)*
  - Fishery Biology and Stock Assessment Division hook experiments *(D. Curran)*

Break **3:00 PM**

Discussion Focus (continued): Data Analysis/Mining **3:20 PM**

- Continue presentations, as needed
- Team discussion on ramifications/next steps
  - May include need for breakout sessions or caucuses

Public Comment **4:40 PM**

Wrap-Up and Preview of Day Two **4:50 PM**

Adjourn **5:00 PM**

Happy Hour *(Location TBD)* **5:30 PM**

DAY TWO, APRIL 7: FULL DAY

Arrival and Greetings **8:45 AM**

Welcome and Overview **9:00 AM**

- Overview of Day Two Agenda and Focus *(Facilitation Team)*
- Questions and Comments from Day One *(Facilitation Team, PIRO)*

Discussion Focus: Potential Solutions **9:15 AM**

- Report out from Potential Solutions Work Group
- Presentations
  - Echolocation Findings and Implications *(TBD)*
  - G. McPherson's work on depredation/bycatch mitigation *(McPherson)*
  - Possible gear modifications
    - Modifying bait acoustic reflection – Alternative #1 (*C. Funderburg*)
    - Modifying bait acoustic reflection – Alternative #2 (*J. Hall*)

Break **10:15 AM**

Discussion Focus (continued): Potential Solutions **10:30 AM**

- Continue presentations, as needed
- Discuss process and protocols for testing near-term gear modifications
- Team discussion on ramifications/next steps
  - May include need for breakout sessions or caucuses

Lunch **Noon**

Discussion Focus: Identifying Promising TRP Measures **1:15 PM**

- Background Briefings *(K. Long)*
  - Revisit key lessons learned/measures from other TRTs
  - Review distinctions between regulatory and non-regulatory measures
- Begin brainstorming initial set of candidate TRP measures
  - May include need for breakout sessions or caucuses

Break **3:00 PM**

Discussion Focus (continued): Identifying Promising TRP Measures **3:15 PM**

- Continue brainstorming initial set of candidate TRP measures
  - May include need for breakout sessions or caucuses

Public Comment **4:40 PM**

Wrap-Up and Preview of Day Three **4:50 PM**

Adjourn **5:00 PM**

DAY THREE, APRIL 8: FULL DAY

Arrival and Greetings **8:45 AM**

Welcome and Overview **9:00 AM**

- Overview of Day Three Agenda and Focus *(Facilitation Team)*
- Questions and Comments from Day Two *(Facilitation Team, PIRO)*

Discussion Focus (continued): Identifying Promising TRP Measures **9:15 AM**

- Continue brainstorming initial set of candidate TRP measures
  - May include need for breakout sessions or caucuses

Break **10:15 AM**

Discussion Focus (continued): Identifying Promising TRP Measures **10:30 AM**

- Continue brainstorming initial set of candidate TRP measures
  - May include need for breakout sessions or caucuses
- Discuss how Team recommendations can achieve Plan goals
  - Need/format of predictive model given TRP measures under consideration
  - NMFS rule-making process
  - Other

Lunch **Noon**

Discussion Focus: TRP Research Recommendations **1:15 PM**

- Report out from Research Needs Work Group (*E. Oleson introduces*)
- Begin developing list of potential research needs to include as TRP recommendations (gear-, false killer whale- and fisheries-related)
  - May include need for breakout sessions or caucuses

Break **3:00 PM**

Discussion Focus (continued): TRP Research Recommendations **3:15 PM**

- Continue developing list of potential research needs
  - May include need for breakout sessions or caucuses
- Identify next steps

Public Comment **4:40 PM**

Wrap-Up and Preview of Day Four **4:50 PM**

Adjourn **5:00 PM**

DAY FOUR, APRIL 9: HALF DAY

Arrival and Greetings **8:45 AM**

Welcome and Overview **9:00 AM**

- Overview of Day Four Agenda and Focus (Facilitation Team)
- Questions, Comments and Reflections from Day Three (Facilitation Team, PIRO)

Discussion Focus: Drafting Take Reduction Plans **9:45 AM**

- Review and consider TRP structure, Table of Contents
  - Include discussion of format for organizing research recommendations
- Map strategy and initial assignments for drafting standard elements of TRP
  - MMPA context; FKW distribution, stock structure and abundance; serious injury and mortality data; FKW biology; longline fishery description
- Consider outreach needs as TRP elements begin to get defined
  - Vetting process – Extent to which Team members shop around and seek feedback (formal or informal) from respective constituencies on evolving draft Plan
- Team discussion on ramifications/next steps

Break **10:45 AM**

Next Steps **11:00 AM**

- Confirm remaining FKWTRT meeting schedule
  - Discuss upcoming meeting focus and logistics
  - Revisit outreach opportunities and needs
- Outline Work Group Activities
  - Review and confirm Work Group activities
  - Identify near-term tasks
  - Likely schedule for interim conf calls/analysis
- Next Steps

Public Comments **11:45 AM**

Adjourn **Noon**

ATTACHMENT 2

Presentation Materials

Day 1: April 6, 2010

- Meeting Purpose and Agenda - CONCUR
- Best available data requirements - Forney
- Catch Efficacy of Large Circle Hooks in the Hawaii-based Tuna Longline Fishery - Curran *(presentation not available)*
- Data Work Group Intro - Forney
- Data Work Group Summary - Read
- Data Work Group New Analyses - Forney
- False Killer Whale Spatio-temporal Plots - Marsik
    - HI Deep-set Longline Effort Monthly 2008-2009 - Marsik
    - HI Deep-set Longline Effort Monthly 2008-2009 (Zoomed in, resequenced) - Marsik
    - HI Deep-set Longline Effort Monthly with interactions 2008-2009 - Marsik
    - HI Deep-set Longline Effort Monthly 2003-2007 - Marsik
    - HI Deep-set Longline Effort Monthly 2003-2007 (resequenced) - Marsik
    - False killer whale and blackfish takes, sightings, and depredation - Marsik
- Draft What-If Tool - Forney

Day 2: April 7, 2010

- Overview of Day 2 agenda - CONCUR
- False Killer Whale Echolocation - Nachtigall
- Historical Depredation and Mitigation - McPherson
- Measures in other TRPs - Long

Day 3: April 8, 2010

- Overview of Day 3 agenda - CONCUR

Day 4: April 9, 2010

- Overview of Day 4 agenda - CONCUR
- Research Needs Work Group Summary - Oleson

Background Documents

- Draft Atlantic Pelagic Longline TRP: Table of Contents
- Gilman, E.L., P. Dalzell, and S. Martin. 2006. Fleet communication to abate fisheries bycatch. Marine Policy 30: 360-366
- Curran, D. and K. Bigelow. 2010. Catch and bycatch effects of large circle hooks in a tuna longline fishery.
- Gilman, E., N. Brothers, G. McPherson, and P. Dalzell. 2006. A review of cetacean interactions with longline gear. Journal of Cetacean Research and Management

8(2): 315-223.
McPherson, G.R., C.I Clague, C.R. McPherson, A. Madry, I. Bedwell, P. Turner, D.H. Cato, and D. Kreutz. 2003. Reduction of interactions by toothed whales with fishing gear. Phase 1. Development and assessment of depredation mitigation devices around longlines. FRDC Project No. 2003/016.
Summary of Clint Funderburg and John Hall's gear modification research

DRAFT 4/8/2010 -- provided to facilitate TRT member evaluation of the usefulness of such a spreadsheet, and to make suggestions for improvement during the coming days at the TRT meeting. We expect that a revised version will be available for broader distribution at a later date, but for now, please consider this spreadsheet 'for team member use only' during the meeting.

ATTACHMENT 3

"What if..." calculations for deep-set longline fishery based on 2003-2009 observer data (excluding vessels involved in research during and after research trips), to examine potential reductions in false killer whale (FKW) mortality and serious injury (M&SI) with changes in each of 4 potential parameters:

From Key Outcomes Memorandum First TRT Meeting	
Need to consider solutions at four different conceptual levels:	**Potential mechanisms (examples)**
1) avoid overlap between FKW and the fishery (in time and space):	Time/area restrictions, reduce total effort
2) avoid interaction (if FKW and longliners are in the same areas):	Reduce depredation rate
3) avoid hookings and entanglements (if interactions occur):	Reduce FKW catch probability
4) avoid serious injuries (if hookings or entanglements result):	Reduce M&SI probability

The purpose of this draft worksheet is to help TRT members test 'ballpark' calculations that will 1) help identify potential suites of options for take reduction efforts and 2) form the basis for discussions and further analyses.
(Please see caveats below)

Background information and PBR goals:				Source
Average annual HI EEZ mortality and serious injury estimate, 2004-2008:			7.3	*1*
PBR for HI EEZ from Final 2009 SAR (= target annual M&SI level):			2.5	*2*
Target reduction in M&SI level for deep-set fishery:			**65.8%**	
Serious injury rate (all observer data)			**89.0%**	*1*
Logbook effort (Deep-set, all areas)	# Trips	# Sets	# Hooks	*3*
2006	1380	16397	34,486,898	
2007	1426	17809	38,825,977	
2008	1380	17881	40,078,613	
2009	1241	16749	37,630,802	
Average 2006-2009	**1357**	**17209**		

Sources	**Reference**
1	*McCracken and Forney PIFSC Working Paper 2010-01*
2	*Final 2009 SAR (Carretta et al. 2009; NOAA-TM-NMFS-SWFSC-453)*
3	PIFSC IMS, Longline Logbook Data

CALCULATIONS BASED ON RATES IN 2003-2009 FLEET-WIDE OBSERVER DATA			
Assumptions (can play around with these):	***'Current'***	*Reduce Catch Depredation by 99%*	*[Enter your own parameters here]*
Deep-set (DSLL) effort (Total sets/yr)	**17209**	17209	
DSLL Depredation Rate (% sets w/ depr.)	**5.69%**	**0.06%**	
DSLL FKW catch rate in sets without depredation	**0.05%**	0.05%	
DSLL FKW catch probability (relative to current)	**100%**	100%	
DSLL FKW serious injury probability if caught	**89%**	89%	
Shallow-set (SSLL) effort (Total sets/yr)	1200	1200	
SSLL FKW catch probability (relative to current)	0.02%	0.02%	
SSLL FKW serious injury probability if caught	89%	89%	

PROJECTED OUTCOMES USING ABOVE INPUT VALUES

Observed DSLL sets (2003-09)	**20724**			
Sets with depredation	1179	979	10	
% with depredation	5.7%			
FKW takes with depredation	19	15.8	0.2	
FKW take rate with depredation	1.61%			
Sets without depredation	19545	16230	17199	
% w/o depredation	94.3%			
FKW takes w/o depredation	9	7.5	7.9	
FKW take rate w/o depredation	0.05%			
TOTAL DSLL FKW TAKES/YR		23.3	8.1	
TOTAL FKW M&SI IN DSLL		20.7	7.2	
Observed SSLL sets (2003-09)				
Sets	**6228**			
FKW takes	1	0.2	0.2	
FKW take rate	0.02%			
TOTAL SSLL FKW TAKES/YR		0.2	0.2	
TOTAL FKW M&SI IN SSLL		0.2	0.2	

Total FKW M&SI (per year)	**20.8**	**7.3**	
Target (reduce M&SI by 65.8%):	**7.1**	**7.1**	

CAVEATS:
The overall analysis gives an indication of fleet-wide activities and rates, but it does not explicitly take into account spatial or temporal heterogeneity. For simplicity, it also assumes sets are independent and within-year observer coverage is constant (or there is a lack of seasonality). The average 2003-2009 annual bycatch estimate in the above table (23.3/yr) is a bit higher than the 2004-2008 average estimate of 15.5 animals/yr presented in McCracken and Forney (2010), based on more sophisticated trip-based methods that take into account uneven sampling probabilities. The difference could be caused by the inclusion of data for 2009 (when a greater number of FKW takes were reported) in the above calculations, or it could be a reflection of one or more unmet assumptions.

Prepared 4/6/2010 by Karin Forney, for discussion at 2nd TRT meeting

ATTACHMENT 4

(As presented by K. Forney at FKWTRT team discussion during April 6-9, 2010, meeting.)

Rationale for TRT target take reduction level

For transboundary stocks such as pelagic false killer whales, where complete bycatch and abundance information is not available on the high seas, stock status is assessed based information for U.S. EEZ waters, i.e., mortality and serious injury (M&SI) within the U.S. EEZ is compared to the PBR calculated for the U.S. EEZ.

Therefore, the target reduction rate for false killer whale M&SI is derived from the U.S. EEZ portion of the stock's range. The most recent estimate of M&SI for pelagic stock false killer whales in HI EEZ waters is 7.3, and the PBR for the HI EEZ is 2.5, so the total Hawaiian Islands EEZ M&SI must be reduced by 4.8 animals/year, or 65.8% of the current level.

Applying this same proportional reduction to the entire HI EEZ and high seas fishing area:

Total M&SI of pelagic stock false killer whales in deep-set and shallow-set fisheries (HI EEZ and high seas; McCracken and Forney, PIFSC working paper):
7.3+5.3 = **12.6 animals/year**

Reducing the above number by 65.8%, the target M&SI for HI EEZ and high seas combined is **4.3/year** (2.5 inside the HI EEZ and 1.8 on the high seas)

At 20% coverage, this would roughly be equivalent to **one** observed false killer whale M&SI for HI EEZ and high seas waters combined.

NOTE: Palmyra Atoll and insular stocks are currently below PBR, and the above calculations assume they remain below PBR.