Design effort surveys for shoreline fishing in HMRFS

FY 2013 Proposal

Hongguang Ma

Created: 05/13/2015

1. Overview

1.1. Sponsor
Joshua DeMello

1.2. Focus Group
Survey Design and Evaluation

1.3. Background
An MRIP project was funded in 2012 to review current Hawaii Marine Recreational Fishing Survey (HMRFS) methodologies and evaluate alternative data collection designs. As part of the project, a workshop was held in Honolulu on July 16-19, 2012. Attendees include MRIP statistical consultants, NMFS staff (from Office of Science and Technology (OST), Pacific Islands Fisheries Science Center (PIFSC), Pacific Islands Regional Office (PIRO)), HMRFS staff (project manager and all field staff), and a Council staff. The MRIP statistical consultants completed a draft report in late September (2012) based on presentations/discussion at the workshop. The draft report was reviewed and commented upon by workshop attendees and the report was finalized in late November (2012). During the workshop, a total of 10 presentations were given. OST members gave presentations on 1) HMRFS initial implementation in 2001 and subsequent developments, 2) the implementation of the new MRIP estimation methods (i.e., incorporating sampling weights/inclusion probabilities into catch estimation), 3) review of the new access point survey sampling design recently tested in North Carolina, and 4) MRIP efforts in developing license-frame surveys. The HMRFS project manager gave an overview of current HMRFS protocols, reviewed problems with the current shoreline survey methodology, and discussed the unique characteristics of shoreline fishing activities in Hawaii such as extensive natural coastlines, indistinct site boundaries, multiple access points, and remote site access areas. The Council staff discussed the Hawaii-specific data needs for the Western Pacific Regional Fishery Management Council. A PIFSC survey statistician presented results from HMRFS data analyses (2003-2010) using Hawaii specific information (e.g. Hawaii fishing methods and fishermen categories) and outlined potential overlaps between HMRFS catch estimates and the catch totals from the Hawaii commercial fishing reports. In a parallel MRIP pilot study, PIRO staff presented an approach for collecting fishing effort information from the private boat mode. The proposed methodology would utilize the Hawaii Division of Boating and Ocean Recreation's (DBOR) vessel registry to conduct a mail-based survey. Effort data from the mail survey will be compared with data currently collected using the coastal household telephone survey (CHTS). The PIFSC Fisheries Monitoring Branch Chief reviewed how creel surveys are currently conducted in Guam, American Samoa, and CNMI via the Western Pacific Fisheries Information Network (WPacFIN). In these territories, both commercial and non-commercial fishing catch and effort data are collected from on-site surveys. In the report provided by the MRIP statistical consultants, recommendations for possible extensions/improvements to HMRFS as well as suggestions for further study were outlined. The consultants indicated that survey design improvements should focus on the private boat and shore fishing modes. For private boat mode, the consultants supported the use of the vessel registry as a sampling frame for collecting boat-based fishing effort which is currently being tested. For shore mode, the consultants recommended developing and testing a survey design to obtain on-site effort estimates using instantaneous counts of shore anglers (Breidt et al., 2012). We propose to develop a data collection design for estimating shore fishing effort that is consistent with the consultants' recommendations.

1.4. Project Description
This project will focus on shore fishing mode. The MRIP statistical consultants recommended considering the redeployment of some sampling activity to effort counts instead of intercept and interviews only (Breidt et al., 2012). The effort information obtained via on-site methods can reduce recall errors and non-response errors relative to off-site approaches. The on-site effort counts will need to be supplemented by off-site methods to capture areas or periods that are not accessible to on-site surveyors such as private or military sites. The consultants expect that a hybrid methodology that combines on-site and off-site methods might enhance efficiency of data collection and they suggested that methods for combining on-site and off-site effort data be investigated. For this project, the MRIP consultants will help develop the data collection design. They may need to have a meeting with NMFS and HMRFS field staff to discuss the initial design for on-site effort counts. The initial design will be evaluated by HMRFS and NMFS staff for its feasibility. Other topics to be discussed at the meeting can include the technical challenges in combining per-hour data from the on-site counts with per-trip data from the off-site counts and in expanding the on-site effort data to the spatial scale that can be compared with CHTS estimates. These challenges and other questions related to variance estimates will be investigated after the meeting. The consultants can then finalize the design for data collection based on the meeting discussion and their own investigations. This project will result in specifications for a data collection design that can be tested in a future pilot study.

1.5. Public Description

1.6. Objectives
The objectives of the project are to: 1) design an appropriate onsite effort survey for shore fishing and 2) investigate the hybrid methodology that combines on-site and off-site methods. The future/current off-site effort survey will need to be considered when the onsite effort survey is designed.

1.7. References
Breidt, F.J., V. Lesser, and J.D. Opsomer. 2012. Consultant's Report: Preliminary Review of Hawaii Marine Recreational Fishing Survey. Oram, R. et al. (in revision). American Samoa , Guam, and CNMI shore-based creel survey documentation.

2. Methodology
2.1. Methodology
The design for obtaining on-site effort estimates will be conducted by a team of survey statisticians who have been hired by MRIP under contract as consultants. HMRFS and NMFS staff will provide field information in Hawaii and survey design documentation for U.S. island territories in the Western Pacific region. When the consultants have the initial design ideas, they may need to have a meeting with HMRFS surveyors and NMFS staff to present the design, get feedback and input, and ask questions. The on-site survey will be supplemented by off-site methods in order to capture areas that are not covered by on-site survey. The consultants will help investigate methods for combining on-site and off-site effort data.

2.2. Region
Western Pacific Islands

2.3. Geographic Coverage
The Main Hawaiian Islands

2.4. Temporal Coverage

2.5. Frequency

2.6. Unit of Analysis

2.7. Collection Mode

3. Communication
3.1. Internal Communication
Bimonthly (or as needed) conference calls and more frequent email communications will be made among project team members. Documents /data will be distributed/shared via email and will be posted to MRIP Collaboration Tool as well.

3.2. External Communication
Monthly updates of the project will be reported to MRIP and a project report will be submitted

4. Assumptions/Constraints
4.1. New Data Collection
N

4.2. Is funding needed for this project?

4.3. Funding Vehicle
To PIFSC or through HMRFS grant with the Hawaii Division of Aquatic Resources

4.4. Data Resources

4.5. Other Resources
The consultant labor (and travel) will be needed to help design the improved surveys.Travel for the surveyor staff to attend the meeting will be needed.

4.6. Regulations

4.7. Other

5. Final Deliverables

5.1. Additional Reports

5.2. New Data Set(s)

5.3. New System(s)

6. Project Leadership

6.1. Project Leader and Members

First Name	Last Name	Title	Role	Organization	Email	Phone 1	Phone 2
Kimberly	Lowe	Insular Fisheries Monitoring Program Manager	Team Member	PIFSC			
Hongguang	Ma	Statistician	Team Leader	NMFS PIFSC	Hongguang.Ma@noaa.gov	808-983-2963	
Tom	Ogawa	HMRFS project manager	Team Leader	HDAR			
Tom	Sminkey	Statistician	Team Member	NMFS S&T			
MRIP	statistical consultants		Team Member				

7. Project Estimates

7.1. Project Schedule

Task #	Schedule Description	Prerequisite	Schedule Start Date	Schedule Finish Date	Milestone
1	Prepare documents and compile necessary data that may be needed by the consultants		05/01/2013	05/31/2013	
3	Meeting with field staff	2	07/02/2013	07/05/2013	
4	Revise the design for onsite survey and investigate the methodology that combines off-site data	3	07/08/2013	08/31/2013	
2	Initial design for onsite effort survey	1	06/01/2013	06/30/2013	
5	Draft a report	1,2,3,4	09/01/2013	10/31/2013	Y

7.2. Cost Estimates

Cost Name	Cost Description	Cost Amount	Date Needed
Consultant labor and support	For survey design, attending meeting(s), and other support	$52000.00	05/01/2013
Travel for field staff	For HMRFS surveyors to attend the meeting with consultants and NMFS staff	$5000.00	07/01/2013
Meeting venues and logistics	Meeting room, parking, equipment renting, and other logistics.	$5000.00	07/01/2013
TOTAL COST		$62000.00	

8. Risk

8.1. Project Risk

Risk Description	Risk Impact	Risk Probability	Risk Mitigation Approach
The meeting may not be held in the month planned due to schedule conflicts.	May delay the completion of the project	Medium	Some participants may attend the meeting remotely

9. Supporting Documents

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Design effort surveys for shoreline fishing in HMRFS

FY13 MRIP Project Report (Executive Summary)

January 2014

This report was prepared by HMRFS project team. Hongguang Ma (Pacific Islands Fisheries Science Center (PIFSC), NOAA Fisheries) and Tom Ogawa (Hawaii Division of Aquatic Resources) were the proposal authors. Statistical consultants Jay Breidt (Colorado State University), Virginia Lesser (Oregon State University), and Jean Opsomer (Colorado State University) were contracted by MRIP to work with the project team. Other project team members include Dave Van Voorhees (Office of Science and Technology (OST), NOAA Fisheries), Tom Sminkey (OST), April Bagwill (OST), Michael Quach (PIFSC), Chris Hawkins (Pacific Island Regional Office (PIRO), NOAA Fisheries), David Itano (PIRO), Joshua Demello (Western Pacific Regional Fishery Management Council), and Walter Ikehara (PIRO).

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Executive Summary

The objectives of the project were to: 1) design an appropriate onsite effort survey for shore fishing in Hawaii Marine Recreational Fishing Survey (HMRFS) and 2) investigate the hybrid methodology that combines on-site and off-site methods. As the result of a previous FY12 MRIP project on HMRFS review, MRIP statistical consultants provided recommendations (Breidt et al, 2012; Ma et al, 2013). The current approach to estimate fishing effort in HMRFS with the Coastal Household Telephone Survey (CHTS) is no longer considered appropriate due to reduced coverage of the landline telephones and increasing nonresponse rates. A pilot study to obtain shore fishing effort estimates with on-site surveys or/and other approaches was suggested (Breidt et al, 2012). A FY13 MRIP proposal was subsequently submitted to MRIP and was approved for designing appropriate HMRFS survey options.

For the FY13 project, a workshop was held in Honolulu from July 25-26, 2013 (see Appendix 1 for the agenda). MRIP statistical consultants and other attendees from NOAA Fisheries, Hawaii Division of Aquatic Resources, and the Western Pacific Regional Fishery Management Council met to discuss the design of a pilot survey. On the first day of the workshop, four presentations were given regarding surveys in Hawaii and in the Western Pacific US territories. The first presentation was given by the HMRFS project manager who provided an overview of current HMRFS survey limitations emphasizing the large spatial coverage and remoteness of most of the shoreline sites in Hawaiʻi. Images of various shoreline sites throughout the islands were provided to demonstrate the inherent variability in shoreline characteristics as well as the multitude of access points for many of the more remote areas. The second presentation was given by two PIFSC (Pacific Island Fisheries Science Center) staff members. They provided a joint overview of the sampling methods used by the Western Pacific Fisheries Information Network in American Samoa, Guam, and the Commonwealth of the Northern Mariana Islands (Saipan). Roving surveys are used in the territories to collect both catch and effort information for shore-based fishing. However, due to variations in the geographic size and distribution of fishers on the different islands, each jurisdiction employs slightly differing methods to collect catch and fishing effort information. The last two presentations provided updates on other two MRIP projects in the Western Pacific Regions. A PIRO (Pacific Islands Regional Office) staff member presented initial results of the mail-in survey for private boat owners in Hawaii and had indicated an initially promising response rate of about 40% as well as positive feedback from the survey participants. The Council staff member outlined the goals of the Guam project (on Navy base fishery data collection). If the project was successful, similar methods could potentially be used to address similar coverage issues in Hawai'i's military zones and other private coastal areas.

After the presentations, the MRIP statistical consultants led a brainstorming session to identify key areas of need for designing a new survey method: spatial extent, temporal extent, measurement issues, gaps, funding costs, project and method logistics, comparison and validation methods, and potential design options (Table 1 in the meeting notes, Appendix 2). The subsequent discussions covered some specific survey options. For instance, the feasibility of using a circuit route or dividing each island into segments for fishing gear or fisher counts for a roving survey was elaborated. A circuit route used for the

roving survey in Guam may be applicable for Oahu due to its size (relatively smaller than the Big Island and Maui) and the number of samplers available. For other larger islands in Hawaii with private or inaccessible lands (e.g. military use sites), dividing the island into survey segments is more practical. Aerial surveys were discussed as a method to assess fishing effort in inaccessible and remote locations and to validate on-site effort counts. Aerial surveys are already conducted in Guam, with samplers collaborating with other groups to collect more data and offset costs of flights. Towards the end of discussions, a mail survey (off-site effort counts) was suggested and deliberated. It was decided that this could be a viable and efficient method as well and will be considered for the final pilot design. All these will provide better understanding of fishing effort estimates and the estimates from the three surveys discussed above and from the current CHTS can be compared and evaluated.

Following the workshop, a meeting summary was compiled by an OST staff (Appendix 2) and the summary was supplemented with a meeting report from the consultants (Breidt et al, 2013). A FY14 MRIP proposal was submitted to test the feasibility of the survey options discussed above (Ogawa and Ma, 2013). The proposal has been approved by MRIP for funding. Three pilot surveys will be tested on Oahu for the FY14 project. An onsite roving survey will be tested to collect both catch rate and fishing effort information. The number of fishing gears will be counted for fishing effort estimation and the catch rate will be measured as catch per gear hour. An aerial survey will be explored to get a snapshot of shoreline fishing activity over a broader spatial scale, including remote and private/restricted areas that are inaccessible to the ground-based surveyors. Finally an address-based mail survey will be used to cover fishing activity from all shoreline areas and from night-time fishing. The sampling frame for the proposed mail survey is still not efficient (similar to current CHTS) due to the lack of non-commercial fishing permits or licenses in Hawaii to construct a more efficient sampling frame. However, the mail survey would provide coverage for the gaps in the on-site roving survey (e.g., sites not viewable from publically accessible viewpoints) and aerial survey (night fishing). Currently the project team is working on the project plan and the proposed pilot surveys will be carried out in the summer of 2014.

References

Breidt, F. J., Lesser, V., and J. D. Opsomer. 2012. Consultant's report: Preliminary review of Hawaii Marine Recreational Fishing Survey.

Breidt, F.J., V. Lesser, and J.D. Opsomer. 2013. HMRFS Pilot Study Design Meeting Report (see Appendix 3).

Ma, H., T. Ogawa, J. DeMello, J. Breidt, V. Lesser, J. Opsomer, D. Van Voorhees, D. Hamm, T. Sminkey, C. Hawkins, W. Ikehara, and W. Van Buskirk. 2013. A review of the current sampling and estimation methods of the Hawaii Marine Recreational Fishing Survey (HMRFS). FY12 MRIP Project Report (Executive Summary).

Ogawa, T and H. Ma. 2013. Pilot surveys of shoreline fishing effort for HMRFS. FY14 MRIP Proposal.

Appendix 1: Workshop Agenda

HMRFS Shoreline Pilot Survey Workshop Agenda

July 24-26, 2013
8:30AM – 5:00 PM
NOAA Fisheries PIR Main Conference Room (11th Floor)
1601 Kapiolani Blvd
Honolulu, HI 96814

Wednesday July 24, 2013 8:30AM (site visit for statistical consultants)

1. Meet in the lobby of the Pacific Beach Hotel at 8:30AM (Hongguang Ma, Tom Ogawa, Tom Sminkey, April Bagwill, Ginny Lesser, and Jay Breidt)

2. Visit selected survey sites in Honolulu and West Oahu (Waianae)

Thursday July 25, 2013 8:30AM

1. Out-of-state attendees may want to meet in the lobby of the Pacific Beach Hotel by 7:45AM and leave no later than 8:00AM (Waikiki traffic can be heavy in the AM)

2. Introductions (Hongguang Ma /Tom Ogawa)

3. Presentations from the Western Pacific group

   a) HMRFS Review – overview, problems/limitations — Tom Ogawa

   b) WPacFIN creel surveys — Michael Quach/Hongguang Ma

   c) Updates on other MRIP projects — Chris Hawkins/Josh DeMello

4. Discussion

   a) Initial design ideas for effort surveys for shoreline fishing in HMRFS

   b) Discussion/feedback on the initial designs

Friday July 26, 2013 8:30AM

1. Continue pilot survey design discussion of shoreline fishing effort in HMRFS

2. Review the discussion/recommendations

Appendix 2: Meeting Notes (compiled by April Bagwill)

Hawaii Marine Recreational Fishing Survey Shoreline Pilot Survey Workshop

July 24-26, 2013

NOAA Fisheries Pacific Islands Region Conference Room

Honolulu, Hawai'i

Wednesday July 24

Oahu Site Visit

A tour of the south and west shores of Oahu were conducted by Hongguang Ma and Tom Ogawa for the consultants (Virginia Lesser and Jay Breidt) as well as for NOAA S&T staff (Tom Sminkey and April Bagwill). The first sites visited were Magic Island and Kakaako Waterfront Park. These two sites demonstrated man-made sites that were subject to heavy traffic (especially during rush hour) and general use by beach-goers. The next sites visited were located on the western shore where natural coastline and intermittent residential neighborhoods predominate. Some of the observed sites were Yokohama Bay (last site on the northwest corner), Waianae Boat Harbor, Pokai Bay, Maili Beach Park, Ulehawa Beach Park, and Piliokahe Point. Two other beach parks on the southwest corner, Chicken Creek (Oneula Beach Park) and Ewa Beach Park, were also visited on the return drive. These sites are isolated natural coastal areas within residential communities and were visited mostly to provide the consultants with perspective to the geographic spread of the shoreline sites, the time required to visit each site, and other areas not in Honolulu that are subject to heavy traffic at least during rush hour.

Thursday July 25

Morning Session

The first day of the workshop started off with three presentations: 1) an overview of the current HMRFS problems and limitations, 2) an overview of the western Pacific current survey methods, and 3) updates on other two ongoing MRIP funded projects in Hawai'i.

Tom Ogawa gave an overview of the current HMRFS problems and limitations, focusing on the large spatial coverage and remoteness of most sites. He presented images of sites throughout the islands to visualize the variable access points for shorefishing. Ogawa then answered several questions about current status of tournament data, gear hours, and geographic coverage completeness in the site register. Avidity bias was also discussed, and determined that if using a roving creel survey this should not be an issue because it assesses angler trips, not singular anglers. However, there is a length of stay bias.

Michael Quach and Hongguang Ma gave a joint overview of the Western Pacific sampling methods and also outlined the specific details of shore-based surveys. Because of the geographic size and number of anglers on the different islands, Guam, American Samoa, and Saipan have slightly different methods for estimating catch and fishing effort. HMRFS could adopt/modify the roving creel survey methods used in the Western Pacific territories.. In the western Pacific territories, because some gear types (or species) are rare,

it is difficult to get precise estimates of catch and effort per gear type for all gear types; currently pooling method (borrowing data from other strata or time periods) is used when the sample size is not adequate for some gear types or species.

The final two presentations provided updates for ongoing MRIP projects: “A Hawaii Regional Survey Pilot Project: Testing a Mail Survey to Obtain Effort and Other Data from Boat-based Noncommercial Fishermen in Hawaii” and “Pilot surveys at unsampled ports and shoreline to calibrate adjustment factors in the expansion of catch, effort and CPUE from the existing creel survey in Guam.” Josh DeMello outlined the goals of the Guam project and suggested that if the project was successful, similar methods could potentially be used to address coverage issues in Hawai’i military zones. Chris Hawkins provided initial results of the mail survey project, which show a response rate of around 40% and positive feedback from participants.

Afternoon Session

In the afternoon, the consultants led a brainstorming session to identify key areas of need for designing a new survey method: spatial extent, temporal extent, measurement issues, gaps, funding costs, project and method logistics, comparison and validation methods, and potential design options (Table 1). The initial plan of scope was determined to be a one year pilot study, with two representative islands (Oahu and Hawai’i), measuring gear hours to estimate fishing effort. However, it was noted that a cost analysis needs to be completed prior to finalizing the decision.

The discussion revolved around how much information this pilot survey will collect and the difficulties of determining gear effort and separating the number of anglers per each gear type. Due to the nature of fishing sites in the islands, challenges of implementing instantaneous versus progressive effort counts were thoroughly discussed. One suggestion was to attempt a circuit route, similar to Guam methods. However, because of the linear nature of shoreline sites in Hawai’i a circuit method may not be possible, and utilizing similar methods could result in temporal bias among sites. One possibility presented to remove this bias was to split the islands into numerous two hour segments. Another option that was extensively discussed among the group was to do aerial effort counts, which could be more cost efficient.

The first day was successful, full of valuable comments and participation among the group. The meeting adjourned with the three statistical consultants continuing discussion and planning for the new method design throughout the evening.

Friday July 26

The second day of the workshop began with samplers and project leaders outlining the feasibility of dividing each island into two-hour segments for a potential effort count route. This was followed by a discussion of the feasibility and sampler hours necessary to provide instantaneous or progressive effort counts. For the circuit route, Oahu would be the most feasible due to size and number of samplers available. Many of the other islands have private or inaccessible lands (e.g. military use sites) that prohibit a continuous circuit route.

Aerial surveys were thoroughly discussed again and everyone seemed to believe they may be the most efficient method for assessing effort in inaccessible and remote locations, and that they could be used to validate on site effort counts. Aerial surveys are already conducted in Guam, with samplers collaborating with other groups to collect more data and offset costs of flights. It was proposed that the same could be done in Hawai'i by providing counts of turtles, monk seals, whales, marine debris, etc. One final issue that would need to be resolved for conducting aerial surveys is acquiring permission to fly over military no-fly zones.

Towards the end of discussions, a mail survey for off-site effort counts was suggested and deliberated. It was decided that this could be a viable and efficient method as well and will be considered for the final pilot design. By utilizing the current phone survey, an angler database could be created by recording contact information from identified fishing households to be later used as a survey frame.

After much discussion throughout the morning, it was impressed upon the group that this pilot project must consider the long-term potential of the method and what is expected with the final product. Because the final design may be certified and used in the MRIP toolbox, it will be well thought out, focusing on the best method to be used in a unique area such as Hawai'i.

What is the outcome expectation of the pilot?

- Better understanding of effort estimates
- Comparison on different methods for estimating catch and effort
- Feasibility of different methods and costs for each method

The final four survey options are as follows (effort—catch):

1. roving—roving
2. aerial—roving
3. aerial/roving—roving
4. mail—roving

The entire group agreed that a roving creel survey is the best method for Hawai'i. The four effort options represent three different methods that could be utilized, potentially pilot testing more than one.

After the new method is designed and finalized, the project team will submit a proposal for FY14 MRIP funds to implement the method in a pilot project. The workshop ended with a list of next steps (Table 2) and action items (Table 3) for the consultants and project team.

Table 1. HMRFS Design Workshop Brainstorming Table

SPATIAL EXTENT	TEMPORAL EXTENT	MEASURMENT ISSUES
• Access issues (military, private, dangerous) • Uniqueness of islands -pick 2 that represent (Hawai'i and Oahu) -number of surveyors • Different habitat types • Further spatial restrictions to specific sites • Stratify geographically -allocate sampling weighted by stratum -quantify by habitat types	• Night fishing—not currently covered -useful to learn something new and determine day vs night trips, but not a test of design since there would not be a comparison -some species more prevalent in certain months -night access to parks is an issue (gates shut, no way to use cars), people stay -need multiple samplers for safety • Stay overnight--where would a sampler park • Seasonal fisheries • Seasonal weather variations: Shore may not be accessible during winter due to surf • Moon phase (spear fishing etc) • What is the minimum?--Daytime interval, representative months (skip some months as go along) • Get complete yearly coverage to see what is going on	• How do we measure EFFORT? • How will we measure catch (catch/gear effort?) - Gear hour vs angler hour? • Catch rate and effort surveys: if composition of gear types is similar, probably ok to use angler hours • In survey, get different habitat types (gear types and species composition will fall out) -don't want pilot to have limited targets, geography, gear • What does MRIP need? • How to make valid comparisons • Parsing out number anglers vs number of gear, plus multiple types of gears -eg easily get 5 people with 20+ gear (multiple types per angler) • Checking feasibility in many cases
GAPS	**FUNDING COSTS**	**LOGISTICS**
• Night -could catch anglers very early in morning, just before dawn when packing up to go • Tournaments	• Need to have independent samplers, not current staff? Or use some of staff as dedicated to pilot? • Need multiple samplers at night for safety • Need to do a cost comparison for number of months/sites/etc to determine the best comparison	• Money, traffic, parking, staff time, etc • If trying to determine new routes and areas, need GIS support/capabilities • How to define sites (how much detail), for determining sites to stop at during randomly selected routes • Need multiple samplers at night for safety • Don't try to do too much—focus on

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		what we can measure effectively and accurately for better comparison • Restrict attention in estimation to more common gear types • Night access to parks is an issue (gates shut, no way to use cars), people stay
COMPARISONS/VALIDATION	**DESIGN OPTIONS**	
• What can we compare this to? • Scope of pilot should allow effective comparison with existing method -small geographic area with heavy sampling or a broader geographic scope, total sample size needs to be sufficient? • Aerial surveys biased by weather, but could be effective (better than boat due to sea conditions and distance from shore) -could be difficult to determine if people are fishing from a private or open access site • Satellite imagery • Professional anglers/diary approach: pay someone to keep detailed account and get validated catch rate • Focus on what we can measure effectively and accurately for better comparison - to strengthen comparisons, can modify the current sample (eg extra questions, etc) • Special purpose estimation runs (eg by island) to allow comparison	• Hybrid on and offsite methods • Roving/roving • Aerial/roving • P and I: how many reps? Different for different islands • Angler hours v gear hours v 'trips' • Brief, instantaneous counts v progressive counts (used in territories) -pros and cons of each • Restrict attention in estimation to more common gear types • Try and count both gear and angler? Angler difficult to do	

Table 2. Next Steps identified for the project team and statistical consultants

Put in proposal for FY14 RFP	Consultant report with recommendations for pilot design
• AERIAL COST • TEMPORAL SCOPE • SPATIAL SCOPE • SPATIO-TEMPORAL RESOLUTION • STAFF COST • P AND I ASSIGNMENTS • MAIL SURVEY COST (include web version?) • OUTREACH COST • MEASUREMENT PROTOCOL • Logistical issues: - Need to determine what avenue to disperse funds for staffing - Steps for proposal and involvement: same project team, Hongguang project lead - Consultant support included in Budget - Temporal: based on budget allocation timing, potentially fall transition months to start	• To be completed by Jay Breidt, Virginia Lesser, and Jean Opsomer

Table 3. Action items identified at HMRFS workshop (in no particular order)

1. Investigate aerial survey options	2. New Frame	3. Frame of overlapping segments = potential assignments
• Costs, staff on plane vs digital video	• GIS and local knowledge • inventory coastline for selected islands (viewpoints: public and private access viewable from public access) • Set aside current site lists and think of a census of entire coastline • Think about constraints: travel time, traffic, seasonal variation	• Think of segments that have different/overlapping starting points: will help aid in randomizing the start points • Would avoid time biases of always having the middle sites sampled at same time in day
4. Stratification	**5. Temporal Scope**	**6. Special estimation runs for comparison with current HMRFS**
	• Ideal to have 1 year, but if not have a period that matches with current HMRFS or a representative 4-6 month • Shoulder season to have both high and lower effort months • Want to include pulse fishery and major holiday • 2-3 HMRFS waves	• Wave by island level estimates from revised estimation methodology (properly weighted and appropriate variance estimates) • Focus on specific estimates that would be best to compare (e.g. catch for major spp., % by gear type, etc.)
7. New staff	**8. Redesign of catch measurement protocol**	**9. Develop measurement protocol for roving effort survey**
• Would need new staff, but there could be difficulties with angler interactions due to no previous report; some concern that this could be detrimental if not properly trained • Existing samplers will help train new hires • Potentially funnel funds thorough an NGO to hire current samplers to get	• Catch by gear type per hour • Revising the survey form	• Viewpoints, binoculars, digital photos • Need precise parameters and standardized procedures • Collect auxiliary info (e.g. tide, wind, swell, precipitation, moon phase, meteorological data, etc.), again standardized options

around overtime constraints		
10. Outreach	**11. Identify spatio-temporal resolution and source for meteorological data, etc.**	**12. Identify costs associated with participation and interview assignments**
		• Budget allocation • Allocation for pilot • Cost analysis for actual implementation
13. Spatial scope	**14. Add off-site mail survey**	
• Pilot: 1 vs 2 islands (Oahu and Hawai'i) • Only Oahu (could compare aerial vs ground)	• Account for night fishing • Can compare with on-site effort survey • Need OMB approval; could tack on to current mail surveys by widening scope and coverage to speed up approval process	

Workshop Participant List

PARTICIPANT	AFFILIATION
Hongguang Ma	Project Lead, NMFS Pacific Islands Fisheries Science Center
Tom Ogawa	Project Lead, Hawaii Division of Aquatic Resources
Jay Breidt	Statistical Consultant, Colorado State University
Virginia Lesser	Statistical Consultant, Oregon State University
Jean Opsomer	Statistical Consultant, Colorado State University
April Bagwill	NMFS, Office of Science and Technology
Richard Beebe	Hawaii Division of Aquatic Resources
Gary Boteilho	Hawaii Division of Aquatic Resources
Jason Chang	Hawaii Division of Aquatic Resources
Patrick Conley	Hawaii Division of Aquatic Resources
Josh DeMello	Western Pacific Regional Fishery Management Council
John Dill	Hawaii Division of Aquatic Resources
Matthew Dill	Hawaii Division of Aquatic Resources
Genesis Enos	Hawaii Division of Aquatic Resources
Chris Hawkins	NMFS Pacific Islands Regional Office
Walter Ikehara	NMFS Pacific Islands Regional Office
David Itano	NMFS Pacific Islands Regional Office
Steve Kaneko	Hawaii Division of Aquatic Resources
Roy Morioka	Western Pacific Regional Fishery Management Council
Michael Quach	NMFS Pacific Islands Fisheries Science Center
Tom Sminkey	NMFS, Office of Science and Technology
Larry Spalding	Hawaii Division of Aquatic Resources
Paul Tao	NMFS Pacific Islands Fisheries Science Center
Dave Van Voorhees	NMFS, Office of Science and Technology
Ivor Williams	NMFS Pacific Islands Fisheries Science Center

Appendix 3: Meeting Report from the Statistical Consultants

HMRFS Pilot Study Design Meeting Report

Jay Breidt, Ginny Lesser, Jean Opsomer
Colorado State University, Oregon State University

August 29, 2013

1. Background

On July 24-26, a team of federal and state fisheries agency personnel met with us to discuss the design of a pilot project for a possible new approach to estimate recreational fishing effort and catch for Hawaii. The impetus for this project is the fact that the current approach to estimate effort, the Coastal Household Telephone Survey, is no longer considered appropriate in the face of reduced coverage of landline telephones, increasing nonresponse rates and rising costs.

The main alternative considered during the meeting was an on-site creel survey, with the feasibility and accuracy to be evaluated during a planned pilot survey.

A summary of the workshop, entitled *Hawaii Marine Recreational Fishing Survey Shoreline Pilot Survey Workshop,* has been produced by April Bagwill of NMFS, Office of Science and Technology. Her summary includes detailed meeting notes and a list of participants. This document supplements her summary, in particular expanding upon the table of action items in that summary.

2. Overview of pilot survey

There was a consensus that two main options for the effort survey should be investigated: one based on aerial counts and another based on roving shore-based counts. While aerial surveying is quite expensive, aerial counts might actually be more precise and more cost-effective than ground visits, due to the remoteness of some of the fishing sites. For the purpose of the pilot, both methods for measuring efforts would be implemented in parallel on sites that are not necessarily remote, as a way to compare both approaches. A third option that could also be investigated at the same time, using a mail survey to record effort information, was also discussed and might represent a relatively inexpensive measure to assess possible undercoverage of the other two approaches (e.g. due to night fishing, inaccessible sites, etc).

There was also a consensus that the effort counts would record fishing gear hours by major gear type rather than fishing hours, since the former is easier to capture through either the roving shore-based or the aerial counts. In the current catch survey, the effort is counted in fishing trips, so this new measure of effort will require changes to the catch survey protocols as well.

The remainder of this document lists the action items for the pilot study discussed during the meeting. Progress on these action items would be needed in order to prepare for an anticipated request for MRIP proposals.

3. Action Items

1. AERIAL SURVEY OPTIONS: the costs associated with this data collection mode, including staffing, equipment, digital capture of images and processing need to be investigated. The possibility of tying aerial surveys into other important scientific questions (gray whales, turtles, marine debris, etc.) was discussed as a possible way to share costs.

2. NEW FRAME: the current site list (i.e. the sampling frame to be used for the effort survey) was built around relatively accessible, public access sites, while the telephone survey in principle captured all sites, public and private, regardless of accessibility. There is therefore a need to set aside the current site list and develop a new census of public and private access sites that are viewable from public access points, along with detailed information on viewpoints from which to count all or most of the site's activity. This census should be based on GIS and local knowledge, subtracting areas that are truly unsuitable for fishing. The list should also include information on traffic and travel times, and how these vary across seasons.

3. OVERLAPPING UNITS: It should also be noted that the sites do not need to be non-overlapping and in fact, a frame of overlapping segments corresponding to potential assignments might be the best approach to avoid potential biases due to non-probability sampling (for example, if segments are forced to be non-overlapping, then the middle site in a long linear segment may have zero probability of selection in the morning or afternoon, since it could only be reached around midday when approached from either randomly-selected endpoint.) The feasibility of completing the assignment by an interviewer in a day should also be considered.

4. STRATIFICATION: The units would need to be stratified spatially, to account for different topography and fishing behavior in different parts of the island, and to accommodate logistic considerations like location of field staff. Temporal stratification should also be considered, including how to efficiently break up assignment days, in terms of times within the day, and how to stratify days within the week and during the year.

5. TEMPORAL SCOPE: the main goal is to observe a range of conditions during the pilot study. That could be done by conducting the study during a whole year, but that implies an expensive study and a long time lag before any results can be analyzed. As an alternative, one could consider a "shoulder" season, e.g., Spring, to have representation of both high and lower effort

months. Further, the study period would ideally capture a pulse fishery and a major holiday. By choosing the period so that it matches 2-3 HMRFS waves, creating comparable estimates from the current design would be significantly simplified (see below).

6. CONDUCT STATISTICAL ANALYSES ACCOUNTING FOR DESIGN FEATURES IN THE EXISTING SURVEY: the current estimates for effort and catch do not properly account for the unequal probability design. This will need to be corrected first, after which it should be possible to compute properly weighted estimates and appropriate variance estimates for the pilot study waves and island(s). Possible estimates that could be compared are catch for major species and percent of anglers by gear type.

7. NEW STAFF: even if Oahu (which has a relatively large field staff) is chosen for the pilot, it seems likely that new staff will need to be hired for this study or current staff will need overtime hours. Ideally, the current interview staff would be closely involved in this pilot study, to make sure that the local knowledge is integrated into the pilot development, and that the new methods being developed and evaluated are relevant to the local circumstances. A potential concern is that current staff have established rapport with anglers, and new survey efforts and new staff could be detrimental to those efforts. At a minimum, existing staff will need to help train new hires and substantial outreach to anglers will be necessary.

8. REDESIGN OF CATCH MEASUREMENT PROTOCOL: as noted above, the effort will be measured in fishing gear hours by gear type. In order to estimate total catch, this implies that catch now also needs to be recorded as catch per gear hour by gear type. The on-site intercept survey questionnaires and protocols need to be revised to record this new information.

9. MEASUREMENT PROTOCOL FOR ROVING EFFORT: for the shore-based roving count option, the measurement protocol needs to be fully developed. This will include the development of the site frame described above, which should include a description of viewpoints and required equipment (e.g., binoculars, digital cameras, etc.). Other items needed are modified questionnaire forms and standardized protocols for the count: when and where to stop, for how long, how many photos in each direction, how far offshore to look, how far on shore, etc. Consideration should be given to recording auxiliary information at (or close to) the sampling sites such as wind, tide data, swell, precipitation, lunar phase, etc., to be matched with external ancillary data; see below.

10. OUTREACH: outreach activities that explain the importance of this pilot study and, more generally, the estimation of shore-based catch and effort

should be planned to occur in conjunction with this pilot study. This is particularly important, as noted above, because anglers will be experiencing the burden of increased sampling effort, with two surveys in the field simultaneously.

11. ANCILLARY DATA: Identify sources and spatio-temporal for external data on wind, tide data, swell, precipitation, lunar phase, etc., and ensure that field-collected ancillary data can be matched to these external, population-level ancillary data. These data can be used to construct model-assisted survey estimates of effort, building on predictive relationships fitted to the sample data (as a simple example, if few anglers are observed during sampled days with high winds and big swells, then predict low effort on un-sampled days with high winds and big swells.) These data should be obtained from weather stations located near the sampling sites on the same day of the visit.

12. IDENTIFY COSTS ASSOCIATED WITH PARTICIPATION AND INTERVIEW PARTS OF THE ASSIGNMENTS: this includes estimating the cost for the pilot study (differentiating between costs for the roving counts and costs for the angler interviews) and thus determining the sample size that can be allocated in the pilot study, given the available budget. This also includes using the pilot study to estimate the cost for implementing the methodology full-scale, to replace the CHTS effort estimation.

13. SPATIAL SCOPE: while it would be useful to be able to implement the pilot in a wide range of field circumstances (arguing for more than one island), focusing on a single island and implementing both the roving shore-based and the aerial counts was felt to be more beneficial, so that both counts can be compared. Oahu is an obvious choice in this respect, because it has a large existing interview field staff, so that it might be easier to integrate the extra effort of the pilot into an expanded workforce (see below). If the mail option is also under consideration, these estimates would also be compared with the shore-based and aerial counts.

14. MAIL SURVEY: some further thoughts should be given to fielding a mail effort survey, to be conducted in parallel to the aerial and roving on-site effort surveys. The success of the mail survey of Hawaii's registered boat owners indicates that a mail survey of Hawaii residents would capture the data needed for estimation. The mail survey would provide coverage for remaining gaps, such as night fishing and private access sites not viewable from publically accessible viewpoints.

15. TOURNAMENTS: While we did not discuss the tournaments very much as part of a pilot study, it was clear that they are an important part of recreational angling in Hawaii. It might be worthwhile to consider making efforts to account for tournament catch as part of the pilot study.