Addressing MRIP Recommendations for the Puget Sound Recreational Fishery Monitoring Program

FY 2011 Proposal

Corey Niles

Created: 05/13/2015

1. Overview

1.1. Sponsor

1.2. Focus Group

Survey Design and Evaluation

1.3. Background

Comprehensive and sound management of recreational finfish fisheries in Washington State requires critically-needed information on catch, effort, and stock-specific fishery impacts required to meet established conservation and allocation mandates. Without these data, recreational fisheries could not be opened and managed, especially considering the need to limit and monitor impacts to threatened species. For the Marine Catch Areas of Puget Sound (Areas 5-13), these critical fishery information needs are met through the Washington Department of Fish and Wildlife (WDFW) Puget Sound Sampling Unit's (PSSU) recreational fishery monitoring program. To produce estimates of marine fish catch and effort in Puget Sound Marine Catch Areas (i.e., for the "private boat" mode), WDFW employs a procedure based on data collected by two independent surveys -- i) the access point intercept survey and ii) the telephone survey (see Lee et al.'s draft 2010 document). The WDFW Puget Sound Sampling Program conducts the access point intercept survey, providing data to estimate the catch-per-unit-effort (CPUE) and the proportion of anglers without fishing licenses (primarily juveniles that are 14 years of age and younger and exempt from the fishing license requirement). A telephone survey based on the Washington Interactive Licensing Database (WILD) provides data for estimating fishing effort made by licensed anglers. The combined results from the two surveys are used to generate estimates of total catch and effort by Marine Catch Area in two-month increments ("waves"), and these estimates are provided to the Recreational Fishery Information Network (RecFIN, www.recfin.org). Our proposed project will focus on implementing improvements to the intercept survey portion of the WDFW marine fish catch estimation design.

1.4. Project Description

We propose a project to implement the strategies and recommended actions resulting from the Marine Recreational Information Program's (MRIP) recent review of WDFW PSSU's recreational fishery monitoring program. During their November 2010 review, the MRIP consultants (experts in sampling design, statistics, and estimation methods) recommended specific actions that PSSU could implement to improve the statistical rigor of our monitoring designs and estimation approaches. Our proposed project requests funds to implement several of the MRIP consultants' recommendations, as detailed below.Currently, the PSSU conducts both "Intensive" and "Baseline" sampling designs. Intensive Sampling is limited to special studies (e.g., in-season catch and effort estimates for mark-selective Chinook salmon fisheries in specific areas), while Baseline Sampling is conducted year-round. Intensive designs incorporate comprehensive and complementary sampling components such as dockside angler interviews with catch sampling (two sites selected per sample day using randomized probability-proportional-to-size [PPS] methods; 5 sample days/week with all-day sampler coverage; i.e., the Murthy Estimator method) to produce catch and effort estimates, as well as on-water effort surveys, test fishing to acquire fish encounter rate data by species (and by size/mark status for Chinook and coho salmon), and angler-completed voluntary trip reports. In contrast, Baseline Sampling incorporates an opportunistic approach to dockside sampling in which samplers strive to sample maximum angler effort per sampling event (site-day assignment), and samplers make sure to employ a random approach to sample anglers/boats when at a site. With the Baseline design, samplers are not required to stay all day at the same site, in contrast to the Intensive design. Rather, samplers are staffed at access sites based on the PSSU's veteran sampling supervisors' knowledge of fisheries and anticipated effort trends, as well as tidal patterns and other variables on a given sample day. We are able to provide more detailed information on the PSSU's current procedures for conducting Baseline versus Intensive Sampling is provided.Several of the MRIP consultants' recommendations for PSSU revolved around improving the scientific rigor of the Baseline Sampling design. The consultants recommended incorporating a site selection approach for the Baseline design that is scientifically defensible and repeatable rather than the current approach based on the sampling supervisors' discretion; i.e., a randomized, formalized probability-proportional-to-size (PPS) approach could be designed for selecting Baseline sampling sites, similar to the approach PSSU currently uses for selecting Intensive sampling sites. Also, the consultants recommended refining PSSU's database structure to enable distinguishing Baseline versus Intensive records in the recreational fishery database. In addition, they recommended adding a field to the recreational database that would contain the probability value (site "size measure") used for selecting Baseline and Intensive sampling sites.Thus, based on the MRIP consultants' recommendations, we would use the requested funds to achieve the following objectives and supporting activities: 1) Develop and implement a randomized, formalized site selection procedure for the PSSU's Baseline Sampling design, modeled after our probability-proportional-to-size (PPS) approach for selecting sites during Intensive Sampling studies. 2) Refine PSSU's database structure to address the MRIP consultants' recommendations – i.e., create a method to distinguish Baseline versus Intensive sampling records in the recreational database, and create a new field in the database to contain probabilities of site selection.

1.5. Public Description

1.6. Objectives

To improve the scientific rigor of monitoring and estimation aproaches within the Washington Department of Fish and Wildlife's Puget Sound Recreational Fishery Monitoring Program

1.7. References

2. Methodology

2.1. Methodology

1) Develop and implement a randomized, formalized site selection procedure for the PSSU's Baseline Sampling design, modeled after our probability-proportional-to-size (PPS) approach for selecting sites during Intensive Sampling studies. Activities: (a) Obtain the staff time (two months, to work on both Objectives 1 and 2) of one existing WDFW permanent Information Technology Specialist IV position to work on the necessary programming in "R" to create a probability- proportional-to-size (PPS) site selection program for use in implementing the Baseline Sampling design; (b) Incorporate the PSSU Database Manager's time to develop Baseline site probabilities for each two-month "wave" period in the current year, based on the previous year's proportions of site-days sampled (i.e., "site size measures" to reflect sampling supervisors' probabilities of site selections the previous year) per Marine Catch Area and per corresponding two-month wave; and(c) Implement training sessions for PSSU's 4 Sampling Supervisors (North Sound, Central Sound, South Sound, and Peninsula/Strait Juan de Fuca) to train the supervisors on how to use the in PPS-based computer program to select Baseline sampling sites each week and schedule their sampling staff accordingly.2) Refine PSSU's database structure to address the MRIP consultants' recommendations – i.e., create a method to distinguish Baseline versus Intensive sampling records in the recreational database, and create a new field in the database to contain probabilities of site selection. Activities: (a) Obtain the staff time (two months, to work on both Objectives 1 and 2) of one existing WDFW permanent Information Technology Specialist IV position. This position will work with the PSSU Database Manager to refine and improve the recreational database structure so that Baseline versus Intensive sampling records can be distinguished in the database. Additional improvements to the database will be implemented to further refine the marine fish estimation procedure, such as setting up a relational database platform using Structured Query Language. (b) Incorporate the PSSU Database Manager's time, in collaboration with the ITS4 position as needed, to develop and populate a new field in the recreational fishery database to house the probability of site selection value for both Baseline and Intensive Sampling records; these site selection probability data will be incorporated into later estimation steps (i.e., see Lee et al. 2010) to generate total effort and catch estimates (by Area, species, mode, etc.) that are ultimately available via the PSMFC's online RecFin database.

2.2. Region

Pacific

2.3. Geographic Coverage

Puget Sound, Washington

2.4. Temporal Coverage

Year-round

2.5. Frequency

Described above in the Project description

2.6. Unit of Analysis

Described in sampling methodology.

2.7. Collection Mode

Intercept/access site

3. Communication

3.1. Internal Communication

Internal communications will consist of monthly meetings (in-person and/or conference calls) to share information, discuss accomplishments to date, and ensure that we are on track for completing key project milestones and objectives per the timeline shown in section 8.1. Additionally, a monthly summary report will be distributed via email to the project team detailing the weekly site selection results along with associated probability values (site "weights"), for both baseline and intensive sampling designs. The internal project team will also receive a copy of the bi-monthly marine fish catch estimates that are provided externally as well as the detailed final report (described below).

3.2. External Communication

Periodic reporting to the MRIP Operations Team will occur through emailing of monthly progress reports (using the MRIP monthly report template) that will summarize progress made to date on the project. In addition, catch estimates for two-month

wave periods will be provided to the Pacific States Marine Fisheries Commission for incorporation into the RecFIN database; these estimates will be provided within 30 days of the end of each two-month wave period (by November 30, 2011, January 30, 2012, March 30, 2012, and May 30, 2012). We will submit a detailed final report to the MRIP Operations Team by September 30, 2012.

4. Assumptions/Constraints

4.1. New Data Collection

N

4.2. Is funding needed for this project?

4.3. Funding Vehicle

4.4. Data Resources

Only WDFW data resources will be required.

4.5. Other Resources

Project time for existing WDFW staff.

4.6. Regulations

No regulatory changes are required.

4.7. Other

The primary assumptions of this project are related to key steps that must be taken to achieve the project objectives of: 1) develop and implement a randomized, formalized site selection procedure for the PSSU's Baseline Sampling design, modeled after our probability-proportional-to-size (PPS) approach for selecting sites during Intensive Sampling (Murthy design) studies; and 2) refine and improve the PSSU's recreational fishery database structure to include an additional field for distinguishing between Baseline versus Intensive records, and another new field to specify the probability value used for site selection. We foresee that the following assumptions will be successfully met to achieve the project objectives:1) The PPS site selection program currently used for intensive selective fishery studies can be successfully adapted for the year-round baseline sampling program via applying the expertise and time of our database programmer (Information Technology Specialist) and data manager positions; 2) Existing data management structures will be modified successfully to include an additional field specifying whether a given data record is from the Baseline or Intensive sampling study design, along with a second additional field specifying the probability value associated with site selection; and 3) Field sampling supervisors will be trained successfully to implement the new PPS site selection program as part of their weekly or bi-weekly scheduling of samplers to assigned sites for the baseline sampling program. The expected schedule for completing key tasks and milestones of the project is shown in section 8.1 below. Drawing on the proven experience of our existing, long-term sampling programs and data management systems, and by employing a collaborative approach with our WDFW Information Technology Specialist and Fisheries Biometrician, we foresee that our proposed project will involve minimal risks and that the above assumptions will be successfully met.

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
Mark	Baltzell	Puget Sound Sampling Unit Supervisor	Team Member	WDFW	Mark.Baltzell@dfw.wa.gov	360-902-2807	

First Name	Last Name	Title	Role	Organization	Email	Phone 1	Phone 2
Karen	Kloempken	Puget Sound Sampling Data Manager	Team Member		Karen.Kloempken@dfw.wa.gov	360-902-2730	
Doug	Milward	Ocean & Puget Sound Sampling Manager	Team Leader	WDFW	Douglas.Milward@dfw.wa.gov	360-902-2739	
Laurie	Peterson	Fisheries Planning, Modeling, Verification Unit Leader	Team Member	WDFW	Laurie.Peterson@dfw.wa.gov	360-902-2790	
Kristen	Ryding	Fisheries Biometrician	Team Member	WDFW	Kristen.Ryding@dfw.wa.gov	360-902-2187	
Are	Strom	Information Technology Specialist	Team Member	WDFW	Are.Strom@dfw.wa.gov	360-902-2642	

7. Project Estimates

7.1. Project Schedule

Task #	Schedule Description	Prerequisite	Schedule Start Date	Schedule Finish Date	Milestone
6	Final project report submitted	1,2,3,4,5	07/01/2012	09/30/2012	Y
3	Implement site selection procedures - ongoing	2	10/01/2011	10/01/2011	Y
2	Hold training sessions for PSSU's 4 Sampling Supervisors	1	09/01/2011	09/30/2011	
4	Develop and implement changes to database structure	1	10/01/2011	06/30/2012	
5	Statistical review of site selection procedures and implementation	3	10/01/2011	06/30/2012	
1	Develop randomized, formalized site selection procedures		07/01/2011	08/31/2011	

7.2. Cost Estimates

Cost Name	Cost Description	Cost Amount	Date Needed
Goods & Services/Travel	Computer lease costs (2 months) and travel/supplies/ materials for sampling supervisor training	$1644.00	
Biometrician support	One staff month for WDFW biometrician or consultant for statistical analysis	$10000.00	
WDFW indirect costs (23.32%)		$7789.58	
WDFW staff time	Two staff months for IT Specialist IV and one staff months for F&W Bio 3	$21759.00	
TOTAL COST		$41192.58	

8. Risk

8.1. Project Risk

Risk Description	Risk Impact	Risk Probability	Risk Mitigation Approach
Slight risk that programming and testing of the newly-developed baseline site selection program could take longer than expected, and/or associated database modifications could take longer than expected, compared to the timeline shown under item 8.1.	If development of the new site selection program is delayed slightly, there would also be commensurate short delays in training the sampling supervisors on the new site selection protocol, thus causing temporary delays in full implementation of the new site selection procedure and associated updates to our data management systems.	Medium	Design individualized work plans with the computer programming and database management staff on the project's team, to effectively schedule their time and expertise toward achieving key milestones and objectives of the project per the timeline shown in section 8.1.
Possible technological difficulties for sampling supervisors in using the new site selection program.	Slight delays in full implementation of new baseline site selection procedures.	Low	After the new site selection program is developed, as an initial step, we will conduct brief user-testing exercises to identify and rectify potential problems before full implementation of the new procedure. After this testing phase is complete, we will organize and implement training workshops to fully train sampling supervisors on the new protocols for site selection. In addition, we will provide sampling supervisors with documentation explaining proper use of the new site selection program.

9. Supporting Documents

"Consultant's Final Report", page 1

Consultant's Report: Review of Washington's Puget Sound Sampling Program

F. Jay Breidt* and Jean D. Opsomer†
Colorado State University

Virginia Lesser‡
Oregon State University

February 7, 2011

1 Introduction

During the two-day meeting in Montesano, Washington, on November 8–9, 2010, we met with Washington Department of Fish and Wildlife (WDFW) staff to discuss WDFW's Ocean Sampling Program and its Puget Sound Sampling Program (abbreviated as PSSP in what follows). In this document, we will provide our initial reaction to the design and estimation procedures for the PSSP.

The PSSP collects large amounts of information on the characteristics of both catch and effort in Puget Sound, in a very challenging survey environment (as further detailed below). Data collection is done by several complementary surveys with designs of varying complexity, and those design features are currently not explicitly accounted for in estimation. While the resulting estimates of catch volume and characteristics certainly appear reasonable, the fact that they do not reflect the sampling design makes it difficult to fully justify them statistically, potentially making WDFW vulnerable to criticism about its estimates. An associated problem is that the

*jbreidt@stat.colostate.edu.
†jopsomer@stat.colostate.edu.
‡lesser@science.oregonstate.edu.

measures of precision such as confidence intervals and coefficients of variation are almost surely too optimistic.

The components of the PSSP form an excellent basis from which to start designing a survey program that is more statistically justifiable. Doing so will definitely require a more in-depth look at the PSSP, but we will provide some initial ideas in that direction later in this document.

2 A Challenging Survey Environment

Estimating characteristics of the catch and, to a lesser extent, the fishing effort in Puget Sound is clearly extremely challenging. Even a somewhat cursory list illustrates the range and magnitude of the problems faced by the PSSP:

- Unlike in the case of the OSP, access to Puget Sound is not restricted to a small number of ports. Instead, fishing boats can depart from a large number of ports of varying sizes, and a possibly large amount of shore fishing takes place as well. Not all of this angling activity is captured well in the PSSP. For example, a substantial fraction of the ports are not available for sampling (private ramps/marinas), and shore sampling is rare or non-existent. This leads to concerns about potential bias, since fishing behavior is likely to vary by public versus private and boat modes versus shore modes.

- Fishing behavior appears to display a component of "flash fishing" (a term we made up for lack of a better one), with heavy fishing activity concentrated in a specific place for a short time in a way that is difficult to predict ahead of time.

- WDFW is required to sample a large fraction ($> 20\%$) of the salmon catch, which limits the overall flexibility of the sampling program.

- Puget Sound fisheries are surveyed by three different entities (WDFW, Canadian fisheries agencies, US tribal agencies), making estimation of overall catch and effort characteristics for the region more difficult.

3 Some Highlights of the Current Approach

The PSSP is an intensive survey program and has many good features, which clearly reflect the fact that WDFW is committed to producing high quality and reliable estimates of the total catch and its characteristics in Puget Sound, at fine spatial and temporal scales. During our meeting in November, we noted the following:

- The core of the PSSP consists of the intercept surveys at public boat ramps, which are conducted year-round ("baseline sampling") and augmented with more intense sampling during the peak seasons ("intensive creel surveys"). This gives good temporal resolution throughout the year and captures a large fraction of the fishing activity.

- Interviewing for the two types of intercept surveys uses a uniform data collection method, allowing the data to be readily combined. Interviewing covers all or most of the fishing day and includes counting of all anglers/boats, resulting in high quality information at the site level.

- The intercept surveys are complemented by two additional data sources related to catch: the on-water surveys and the test fishing program. The on-water surveys make it possible to estimate the fraction of fishing activity that occurs from out-of-frame launch sites. This is an important element of the overall estimation procedure for what appears to be an unavoidable undercoverage issue. The test fishing program provides insights into some of the detailed characteristics of the catch, which is valuable as an external validation for the intercept survey data.

- Washington has an on-going licensing program, which provides a frame for a telephone survey to estimate fishing effort. This makes it possible to conduct a much more efficient and cost-effective survey of anglers than a random-digit dialing survey.

- We noted with appreciation the current efforts to interpret, re-code, and document the estimation methodology. This is extremely important for producing a system that can be continuously updated and improved over time, even with changes in staffing.

4 Some Issues

The following is a list of the major issues we identified related to the PSSP.

- The current intercept surveys (baseline and intensive creel) are clearly set up to cover most of the fishing activity, with an emphasis on sites and times with higher fishing pressure. It appears that significant components of the overall design are informal, with sampling supervisors making the assignments based on local knowledge and occasionally adjusting them "on the fly" when fishing activity is known to congregate in certain areas. Allowing this level of independence to sampling supervisors has the advantage of flexibility and makes it possible to maximize the number of interviews ("headhunting"), but lack of an overall formal sampling design opens the door for criticisms of subjectivity. It also makes the system heavily reliant on the experience and expertise of the sampling supervisors, which is not easily transferred to future WDFW staff unless it can be converted into formal protocols.

- In addition to the issues associated with subjectivity in site selection, a key problem with the lack of a formal sampling design is that it is difficult to create sampling weights that account for the fact that some sites are selected more often than others and to estimate the true sampling variability of the estimators. The lack of weighting can result in bias in the estimates, and the lack of recognition of the fact that the observations are clustered by site-day means that the estimated measures of precision (CV, confidence intervals) are too optimistic.

- There are clearly issues with undercoverage in the current intercept surveys. The issue of private boat ramps and marinas is something that is unlikely to be fixed, and the on-water intercepts seem like a good way to estimate (at least) the fraction of fishing activity launched from those inaccessible sites. The current intercept surveys seem to completely miss shore fishing, which might be a significant issue unless it is a trivial fraction of the total catch. It is possible that shore fishing targets a different mix of species, so that using a "ratio-ing" solution might not work in this case.

- The PSSP appears to have some components that are more closely related to convenience sampling. This includes the ability of sampling

supervisors to send interviewers to fishing sites that are "hot" because of short-term presence of large numbers of fish, and the Voluntary Trip Reports (VTR) card program. The former can most likely be formalized and incorporated in an overall intercept survey sampling design (see below). But because the latter is completely voluntary and lacks any controls on response quality, it cannot be viewed as a survey data source and hence should not be combined with the intercept data in making overall estimates of the catch characteristics.

- The effort estimates are based on a telephone survey of licensed anglers. There are some issues associated with this frame, including the fact that some licenses can be obtained from boat captains and are not available for sampling, the telephone number information is incomplete on the other licenses, and not all anglers are licensed.

5 Suggestions for Possible Improvements

The following are some suggestions for improvements to the PSSP. These are based on our initial understanding of the features of the PSSP. Of course, these suggestions would need to be investigated carefully to determine their statistical efficiency, logistical feasibility, and cost effectiveness.

- The baseline and intensive creel surveys already use a frame of access sites and partly apply a formal procedure to select sampling site-days, using the Murthy two-per-stratum PPS design. Extending the sampling design so that all or most (see the next point) of the interview assignments are determined by a formal mechanism would put the program on a much stronger statistical footing. Such a design could use some of features of the new MRIP design currently being field-tested in North Carolina, including assigning fishing pressures to sites and periodically updating them, and combining multiple low-pressure sites into "super-sites" for the purpose of making interviewing assignments. The key component of the sampling design would continue to be spatial and temporal stratification with PPS by pressure within the strata. Note that sampling supervisors' experience and expertise are ideally used in the construction of strata and pressure matrices, as an example of the kind of formal protocols noted under "Issues" above.

- If it is desired to continue allowing sampling supervisors to deploy interviewers to areas with very high short-term fishing activity, there are a number of ways to incorporate such a feature in a formal sampling design. One way is to update the fishing pressures prior to drawing samples to reflect the new information, so that samples are drawn in light of the most recent information and will contain a larger number of the newly more "interesting" sites. Another way is to hold back a fraction of the total assignments when drawing the samples, and then deploy them as needed to "hot spots." If the latter is done, then these assignments do not follow the overall design, and the way to incorporate those data into the overall sample is to make them "self-representing." An example of this in a different context might be a sample of companies, in which a few very large ones are thought to be so important that they must be part of the sample and are drawn with certainty. These companies become self-representing, which means they receive a weight of one.

- The license-based frame provides a cost-effective way to collect the data used for estimating fishing effort. However, like almost all such frames, it suffers from undercoverage, and it might be useful to investigate a dual frame approach, in which the license frame sample is supplemented by a general-population sample. The latter can either be used to make combined estimates across both frames, or can be used to determine the adequacy of the license frame. A separate issue concerns the fact that some people might have licenses but their contact information is either not available for sampling or is incomplete. Dual frame approaches typically cannot correct for this type of problem, so that efforts should be undertaken to ensure that the contact information is available for license holders.

- Because the ultimate goal of the PSSP is to estimate characteristics of the catch of anglers in Puget Sound, it seems important to coordinate data collection and estimation procedures across the different agencies responsible for Puget Sound fisheries (WDFW, Canadian fishery authorities, tribal fishing authorities). Of course, this point is broader than the PSSP and might not be something that WDFW has any control over.

Survey Review Final Status
Marine Recreational Information Program

Provider Name: **Cory Niles**
Survey: **Washington Puget Sound Sampling Program (PSSP)**
Date of Review: **2/7/11**
Date of Final Response: **5/13/11**

Provider Instructions: Read the review and provide feedback if desired. Feedback includes accuracy, usefulness, and potential to implement recommendations. Comments on the review process are also welcome.

1. Accept final report: ☒ Yes ☐ No

2. Submitted MRIP proposal(s) in response to review: ☒ Yes ☐ No

3. Formal Feedback Provided: ☐ Yes ☒ No

   3a. Type of formal feedback provided: ☐ Corrections ☐ Comments

   3b. Corrections incorporated in final report: ☐ Yes ☐ No

   3c. Comments attached: ☐ Yes ☐ No

Notes:
We would again like to thank MRIP for supporting this review. As you will see, we have found the comments very helpful and are already moving to implement certain recommendations.

"Consultant's Final Report", page 8

WDFW Response: May 12, 2011

WDFW Comments on:
Consultant's Report: Preliminary Review of Washington's Puget Sound Sampling Program (dated 2/7/11)

We very much appreciated the opportunity to work with the MRIP consultants during the review of Washington Department of Fish and Wildlife's (WDFW) Puget Sound Sampling Program, conducted November 8-9 in Montesano, Washington. After thoroughly reviewing the MRIP consultants' document titled "*Consultant's Report: Preliminary Review of Washington's Puget Sound Sampling Program*" (dated February 7, 2011), we at WDFW are in full agreement with the consultants' analysis of our sampling program, issues raised, and recommendations made for possible improvements. We do not see any flaws in the review or misunderstandings of program, and we do not anticipate asking for revisions or re-visitation of any major issues.

The WDFW Puget Sound Sampling Unit (PSSU) is eager to address several of the MRIP consultants' recommendations for improving the intercept survey in particular, as exemplified in our submission of a proposal for MRIP funds that was submitted in late January 2011 (project concept attached). Specifically, our proposal focuses on work we can start immediately to improve the scientific rigor of the Baseline Sampling design. The consultants recommended incorporating a formalized site selection approach for the Baseline design that is scientifically defensible and repeatable rather than the current approach based on the sampling supervisors' discretion; i.e., a randomized, formalized probability-proportional-to-size (PPS) approach designed for selecting Baseline sampling sites, similar to the approach PSSU currently uses for selecting Intensive sampling sites. Also, the consultants recommended refining PSSU's database structure to enable distinguishing Baseline versus Intensive records in the recreational fishery database. In addition, they recommended adding a field to the recreational database that would contain the probability value (site "size measure") used for selecting Baseline and Intensive sampling sites. These probabilities would then be incorporated into subsequent catch estimation steps in our computer program. Each of these deliverables would be accomplished as part of fulfilling the objectives of our recently-submitted MRIP proposal.

Once again, we thank MRIP/NOAA and the expert consultants who worked with us for the objective, helpful reviews, clear communications, sharing of knowledge and expertise, and recommendations offered for our Puget Sound Sampling Program. We intend to carry forward with continued improvements to our sampling program in the years to come.