Consultant's Report: Review of Washington's Puget Sound Catch Record Card Study

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1 Introduction

The authors of this report met in Montesano, Washington, on November 8-9, 2010 with Washington Department of Fish and Wildlife (WDFW) to discuss WDFW's Ocean Sampling Program and the Puget Sound Sampling Program. Reports have previously been provided to MRIP and WDFW summarizing these reviews. During this meeting, WDFW staff mentioned the use of catch record cards to estimate salmon harvest in Puget Sound. Along with the intercept survey, catch record cards are used to obtain estimates of salmon harvest. Catch record cards have been used to estimate salmon harvest in Puget Sound marine waters since 1964.

Following the November meeting, WDFW confirmed that the Puget Sound catch record cards are a necessary component to consider in the Puget Sound review. A seven page document provided by WDFW in January 2011 summarized briefly the catch card methodology used to estimate Puget Sound salmon harvest. A conference call on February 7 with WDFW and MRIP consultants addressed some preliminary questions on this document and the catch card study. An additional document titled *Northwest Fishery Resource Bulletin - Estimating the Harvest of Salmon by the Marine Sport Fishery in Puget Sound: Evaluation and Record Cards* was provided, giving background on the catch record cards methodology. This document provides details of a thorough study conducted between 1985-1990 to assess the biases of estimates that are produced from the intercept survey and estimates produced from the catch record cards. Based on the results of this study, bias factors were developed and are currently applied to the estimates of salmon

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harvest from the catch cards. The report by Conrad and Alexandersdottir (1993) also provides details of the history of the catch record cards used in Washington, the methodology used to collect data for the bias study, and the development of the estimators used to produce the bias factors.

The seven page summary provided in January 2011 also provided additional details on the catch cards issued from the Washington Interactive Licensing Database (WILD) system. Unique identifiers are assigned to each angler in the licensing database. Temporary licenses issued by charter boats, and anglers that purchase "Hot Key" licenses, are not entered in the database.

Response rates in most surveys conducted nationally have been declining over the past 10 years. The procedures outlined in the catch card study adopt well established survey methodology approaches, such as reminder mailings, that are among the best strategies available to improve response rates. Here we provide our initial review of the catch card procedures.

2 Current Data Collection Methodology and Estimation

2.1 Data Collection

Anglers are required to have a catch record card to record salmon harvested during a "license year," currently defined as April-March. This provides a documentary record of salmon catch and is an excellent tool to record catch for the angler over the year. For example, it reduces recall error when the angler is asked to report catch for the license year. While anglers are legally required to turn in their catch cards, there is no penalty for not doing so, resulting in the low return rates for the catch cards. There is a $10 penalty for late return of crab cards.

WDFW randomly selects 25% of the cards issued each year for use in generating salmon catch estimates based on the catch cards. This group is referred to as the "in-sample group." Anglers from the in-sample group who have not voluntarily returned catch cards are then contacted to request their catch information. An initial postcard with instructions requesting the catch record card is sent. Two months later a letter is sent with a form to enter the catch data. In the early years of the survey an additional letter was sent, but this was discontinued due to cost constraints. Multiple contacts are one of the best survey approaches to improve response rates in mail surveys.

Data are entered and verified for the in-sample catch cards. Data collected and entered include the catch area, date, salmon species, and clip type.

2.2 Estimation and Development of Bias Correction Factors

The total number of catch cards issued is not known and has to be estimated. While the number of cards issues through the WILD system is known, there is an unknown number of catch cards distributed by charter boats and the number of "hot key" licenses that are issued is also unknown. The latter categories of catch cards are approximately 5% of the total catch card issued.

A five-year intensive study was conducted by WDFW in the late 1980's to compare harvest estimates based on the different methodologies. Estimates of harvest based on the intercept survey were treated as a "gold standard" in a detailed comparison for the same areas for data collected from the catch card study. This provided data to estimate relative bias. The Conrad and Alexandersdottir report (1993) also described a comparison of a ratio-of-means method and an error-in-variables method to estimate catch card bias. In addition, a comparison of three variance estimators was also presented in this report.

3 Concerns on the Current Approach

The intensive study conducted in the late 1980's provided the data needed to estimate catch card bias. This was an important and critical study. However, we note the following with regard to the current approach.

- The intensive study was conducted nearly 25 years ago. Fishing patterns may have changed over this time, because of changes in the population of anglers residing around Puget Sound, changes in the salmon population itself, etc. For example, areas with low harvest in the late 1980's that did not provide data to estimate catch card bias with adequate precision may now have much larger catches.

- Response rates to all surveys are declining. A conclusion in the Conrad and Alexandersdottir report stated that a minimum 70% response rate is needed or the estimates of salmon harvest from catch cards will be compromised. It is unclear how this minimum response rate was determined, but it is clear that a low response rate will negatively impact the characteristics of estimates based on this survey. The response rate for the 2009 survey was about 56%.

- The number of catch cards issued used to be unknown, which introduced some variability for this value. More recently, with the introduction of the WILD licensing system, this situation is significantly improved. As noted above, there are still charter/hotkey cards where the number is not known, but these make up less than

5% of total cards issued (3.2% in 2009). Hence, this source of additional variability is potentially small enough to be ignored.

- Recommendations in the last intensive study comparing intercept and catch card estimates of harvest stated that if nonresponse remains high, intercept survey estimates of bias will be necessary on a periodic basis to detect changes in the bias factors currently adopted in Washington. Nonresponse remains high in the most recent surveys.

- Given that only 25% of returned catch cards are included in the in-sample, additional "voluntary" cards that are returned would be out-of-sample. Only out-of-sample catch cards returned with steelhead catch are processed but are not used for salmon estimation. Since data from "volunteer" surveys are not generally considered statistically representative, they cannot be directly combined with the in-sample data to create estimates.

- Catch record cards are also collected for sturgeon, steelhead, halibut and crab, with different approaches to bias correction applied to them over time, ranging from carefully developed bias corrections to no correction at all. Even if each of them might make sense on its own (i.e. the bias correction for each survey is appropriate given the current knowledge about the survey), this is potentially inefficient in terms of departmental resources and confusing to communicate to the public. It is also an open question whether each approach *is*, in fact, currently appropriate for each survey.

4 Considerations for Updating the Contribution of the Catch Card Data in Estimating Salmon Harvest

The following are some suggestions to consider for the catch card study. The amount of money, staff time and other resources required to implement each suggestion varies, and would need to be evaluated to determine what may be possible given these constraints. We begin by listing several immediate possible improvements to the current catch card program:

- There is a pressing need to revisit the bias adjustments calculated in the late 1980's. In the most recent year that data were finalized in Washington, 2007, 55% of the Puget Sound salmon catch was obtained by the catch card harvest estimates (Van Buskirk, email communication, March 21, 2011). Given that these bias adjustments

were derived over 20 years ago, the necessary bias corrections could now be quite different. It may not be reasonable to assume that the relationships of the catch card harvest estimates to the intercept harvest estimates for the late 1980's and 2011 are identical, so that applying the old adjustments to the current data might be inappropriate. Given the diversity of surveys (salmon, sturgeon, halibut, crab, etc), we would recommend investigating bias correction methodologies that are applicable to all these card programs, and develop uniform protocols for this across all of them.

- In order to obtain a more complete list of anglers, consider obtaining and entering names and addresses, telephone numbers, and/or email addresses for those anglers who purchased temporary licenses outside of the WILD system into the database. This would expand the Washington Interactive Licensing Database to include the subset of anglers with contact information which could be used in future surveys of anglers to obtain representative samples. Not including some subgroups would not provide a complete list of anglers..

- Currently, the voluntary catch card returns are not used in general estimation (although they appear to be used for steelhead estimation, to detect rare events and for smooth the catch estimates for areas with low catch). However, because the domain of voluntary returns can be identified from the sample, it seems conceptually possible to use the voluntary returns more fully to estimate characteristics of the "voluntary-return domain", potentially yielding a more precise estimate of the population total. Of course, this would require processing all of the voluntary returns, or a random sample of the voluntary returns, in order to be implemented. Another possibility worth investigating is to allow internet reporting, which would consist of a third respondent domain. These possibilities would need to be carefully evaluated for feasibility and statistical validity.

The previous three items are suggestions for improvements to the catch card data collection and estimation procedures. A more ambitious and long-term suggestion is to consider a redesign of Puget Sound recreational fishery survey programs as a whole, taking advantage of the strengths of different potential sampling frames and sampling methods to develop a more integrated survey approach. Possible surveys include: general population through random digit dialing telephone surveys using landline and cell phone lists or through the U.S. Postal Service address-based list, license frame samples, intercept surveys, and catch cards (both voluntary returns and those sampled and returned). Each of these has its own strengths and weaknesses in terms of costs, timeliness, data quality, and coverage properties. For instance, the intercept survey yields high quality data at a fine temporal and spatial scale, but suffers from potentially serious under-coverage due to the

lack of access to private fishing sites. It is also expensive. In contrast, the catch cards are inexpensive and have nearly complete coverage, but the data are only available at the end of the season, from sampled respondents and from volunteers. At least conceptually, these various sources of data might be combined to yield estimators with better accuracy and precision than estimators that use only one of the sources.

- Initially, a more formal program of comparisons of estimates obtained using catch cards and alternative sources such as the intercept surveys should be developed, in addition to repeating the bias evaluation from the original study as recommended above. Since both surveys (and possibly others, see above) at least partly overlap in scope, it would be possible and useful to obtain a more detailed understanding of both surveys, including costs, coverage issues, differences in respondent characteristics, bias/variance of the estimates, etc.

- The catch cards only provide data on a single species and a single (annual) point in time. Another use of the cards can be as a complement to a license-based survey, which was described in the report for the Puget Sound Sampling Program. The catch cards could still be used by each angler to record salmon catch over the license year. Once the sample of anglers is selected, a questionnaire could be sent using repeated mailings as currently used. This would provide an opportunity to ask the angler catch information as well as additional questions that are not covered on the catch cards. A cost comparison of this approach to the current method can evaluate the most cost efficient design.

- If the catch card study is reexamined, consider the use of focus groups with a group of anglers to determine their attitudes about the catch card survey. For example, it would be helpful to determine what might motivate an angler to complete the catch card survey. The focus group could address if a mandatory program that denies a future license to nonrespondents is an approach to consider. Once issues important to anglers and issues that may improve the catch card study are identified, a probability survey of license holders may be worthwhile to quantify angler interest on the proposed changes. This information would be useful to support changes that WDFW may propose in a redesign of the catch card study.

- More generally, some combination of license-based, general population (through random digit dialing telephone surveys using landline and cell phone lists or through the U.S. Postal Service address-based list), intercept and catch card surveys might be constructed to provide high quality and cost-effective data suitable for a range of uses, including in-season and between-season management of individual

species, and state-level and national reporting of recreational catch and angler behavior. Surveys using a combination of methods could be examined initially to assess bias associated with the different methods, such as the self-reporting estimates from the catch cards. Development of such a comprehensive multi-frame, multi-mode approach would clearly take significant time and effort.

Survey Review Final Status
Marine Recreational Information Program

Provider Name: **Cory Niles**
Survey: **Washington Puget Sound Catch Record Card Study**
Date of Review: **4/7/11**
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.