Northwest Sardine Survey
12 Bellwether Way
Bellingham, Washington 98225

Mr. Don Hansen, Chair &
Dr. Don McIsaac, Executive Director
Pacific Fishery Management Council
7700 NE Ambassador Place, Suite 101
Portland, OR 97220-1384

Exempted Fishing Permit for Sardine Survey 2010

The 2009 Sardine Exempted Fishing Permit was applied and used successfully by the West Coast Aerial Survey. Valuable scientific data was attained which was ultimately used in the assessment model to determine an estimate of sardine abundance. It is now essential that a continuation of data collection occur in 2010. From this, an even more accurate sardine assessment is possible.

Industry expresses thanks to NOAA and the Pacific Fishery Management Council. Without assistance of all parties it would not have been possible to create a second index of abundance. The Aerial Survey methods have now been developed and approved by Star Panels appointed by the Pacific Fisheries Management Council and included as part of the 2009 assessment update for 2010. This resulted in a substantial quota increase over the quota without the Aerial Survey.
Point Sets taken with fish provided by the EFP are still needed to add statistical confidence in the survey. The larger the number of qualifying point set estimates, the greater the confidence in the survey data and its usage in the SS-3 assessment model. Industry would like to substantially add to this database during the 2010 survey season.

The Northwest Sardine Survey participants requests that the Pacific Fisheries Management Council set aside 5000 M/T of the 2010 quota allocation as an EFP to be used under the direction of the Principal Investigator, Tom Jagielo. The plan is to increase the point set database and perform photographic documentation of the Sardine population during the summer of 2010. In order to ensure the proper use of the EFP the Principal Investigator must have control over assigning locations and times for point set captures. This will guarantee that the data produced is scientifically valid for use in the assessment model. Any fish from the EFP not used for the collection of scientific data should be reallocated to the September 15th quota.

Attached are the necessary protocols for the scientific validation of the point sets that require fish from the EFP.

Regards,

Jerry Thon
Northwest Sardine Survey
Aerial Survey Point Set Protocol  
(Draft 10-6-2009)

1) Sardine schools to be captured for point sets will first be selected by the spotter pilot and photographed at the nominal survey altitude of 4,000 ft. After selection, the pilot may descend to a lower altitude to continue photographing the school and setting the fishing vessel.

2) A continuous series of photographs will be taken before and during the vessels approach to the school to document changes in school surface area before and during the process of point set capture. The photographs will be collected with a time interval of no greater than 30 seconds between photograph.

3) Each school selected by the spotter pilot and photographed for a potential point set will be logged on the spotter pilots’ Point Set Flight Log Form. The species identification of the selected school will be verified by the Captain of the purse seine vessel conducting the point set, and will be logged on the Fishermans’ Log Form. These records will be used to determine the rate of school mis-identification by spotter pilots in the field and by analysts viewing photographs taken at the nominal survey altitude of 4,000 ft.

4) The purse seine vessel will wrap and fully capture the school selected by the spotter pilot for the point set. Any schools not “fully” captured will not be considered a valid point set for analysis.

5) If a school is judged to be “nearly completely” captured (i.e. over 90% captured), it will be noted as such and will be included for analysis. Both the spotter pilot and the purse seine vessel captain will independently make note of the “percent captured” on their survey log forms for this purpose.

6) Upon capture, sardine point sets will be held in separate holds for separate weighing and biological sampling at the dock.

7) Biological samples of individual point sets will be collected at fish processing plants upon landing. Samples will be collected from the unsorted catch while being pumped from the vessels. Fish will be systematically taken at the start, middle, and end of delivery as it is pumped. The three samples will then be combined and a random subsample of fish will be taken. The sample size will be \( n = 50 \) fish for each point set haul.

8) Length, weight, maturity, and age structures will be sampled for each point set haul and will be documented on the Biological Sampling Form. Sardine weights will be taken using an electronic scale accurate to 0.5 gm. Sardine lengths will be taken using a millimeter length strip provided attached to a measuring board. Standard length will be determined by measuring from sardine snout to the last vertebrae. Sardine maturity will be established by referencing maturity codes (female- 4 point scale, male- 3 point scale). Otolith samples will be collected from \( n = 25 \) fish selected at random from each \( n = 50 \) fish point set sample for future age reading analysis.

9) School height will be measured for each point set. This may be obtained by using either the purse seine or other participating research vessels’ hydroacoustic gear. The school height measurements to be recorded on the Fishermans’ Log Form are: 1) depth in the water column of the top of the school, and 2) depth in the water column of the bottom of the school. Simrad ES-60 sounders will be installed on three purse seine vessels. Data collected by the ES-60 sounders will be backed-up daily and archived onshore.
10) Point sets will be conducted for a range of school sizes. Each day, the spotter pilot will operate with an updated list of remaining school sizes needed for analysis. The spotter pilot will use his experience to judge the surface area of sardine schools from the air, and will direct the purse seine vessel to capture schools of the appropriate size. Following landing of the point sets at the dock, the actual school weights will be determined and the list of remaining school sizes needed will be updated accordingly for the next day of fishing. If schools are not available in the designated size range, point sets will be conducted on schools as close to the designated range as possible.

11) The field technician will oversee the gathering of point set landing data and will update the list of point sets needed (by size) daily for use by the spotter pilot.

12) Photographs and FMCdatalogs of point sets will be forwarded from the field for lab analysis daily.

13) The total landed weight of point sets sampled will not exceed the EPF allotment per area.
Proposed Point Set Sampling for 2010

Draft 9-24-2009

In considering the number of point set samples needed for the aerial sardine survey in 2010, consideration was given to obtaining more data points for the area-biomass regression in the region between 2,000 and 10,000 m² (Figure 1). The purpose of getting more data points in this size range is to better determine the asymptote of the relationship and thus to better estimate the biomass of the largest schools observed. In order to distribute the samples across the full range of size categories, and to sample the larger schools with an adequate sample size (e.g. n = 32 for the 2,000-10,000 m² size range), an overall sample size of n=56 point sets is proposed. This sampling schedule would require a catch allowance of 2,100 mt per area (north and south), and thus a total EFP set-aside of 4,200 mt coastwide.

The September, 2009 Sardine STAR Panel has identified the need to reduce the variance of the area-biomass relationship in order to reduce the estimate of total biomass from the aerial sardine survey. The addition of 56 new data points per region (assuming that any new data points obtained for 2010 could be pooled with the 2008-2009 dataset) should help to reduce the overall uncertainty of the area-biomass relationship.

Another consideration for 2010 point set sampling is the number of vessels to be permitted in the EFP fishery. The aerial survey team found that being limited to two vessels per region had the effect of constraining the project such that it was difficult to complete the project effectively in the time available for the EFP fishery. We recommend that 4 vessels per region be granted EFP permits in 2010.

Figure 1. Relationship of surface area (m²) (x axis) vs. density (y axis) determined from point sets sampled in 2008 and 2009.
Table 1. Distribution of point set sizes proposed for each region (north and south) for the 2010 Aerial Sardine Survey.

<table>
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<th>Number of Point Sets</th>
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