INTERNATIONAL DOLPHIN CONSERVATION PROGRAM

SCIENTIFIC ADVISORY BOARD

1ST MEETING

LIMA (PERU)
12 JUNE 2004

DOCUMENT SAB-01-06

POTENTIAL RESEARCH PROGRAMS FOR THE IATTC

At the 10th Meeting of the Parties in June 2003, a Plan of Action for enhancing the success of the Agreement was adopted, and the terms of reference for the Scientific Advisory Board (SAB) were approved.

It was agreed that a meeting of the SAB would be convened as soon a practical to consider the following general issues, annotated below:

1. Prevalence and significance of cow-calf separation;
2. Stress effects;
3. Review of currently available estimates of abundance for dolphin stocks;
4. Ecosystem effects;
5. Mortality estimates;
6. Life history studies;
7. Stock assessment of coastal spotted dolphins;
8. Population modeling;
9. Developments in gear technology and fishing techniques to improve dolphin release;
10. Capture of mature tunas not in association with dolphins;
11. Any other research the SAB believes is important to enhance the Agreement.

These potential research programs were described in Document IRP-33-11a. These topics are expanded upon below.

1. COW-CALF SEPARATION

It has been shown that there may be unobserved mortality of calves which were associated with females which were killed in sets (see papers by Archer *et al*., 2001; 2004).

Currently mortality levels are so low that even with the additional 14% mortality estimated by Archer *et al*., the total mortality would still be sustainable and well below the U.S. Potential Biological Removal limits,. However, concern has been expressed that additional cow-calf separation may occur during the chase of the dolphins and tunas prior to setting of the net (NMFS, 2001). Recent information on cow-calf swimming dynamics (Weihs, 2004) describe the hydrodynamics of how calves can "draft" alongside the mother (getting a virtually free ride), but this added assistance by the mother may only function up to a certain speed. If this speed is exceeded for a long enough time, and if the mother is willing to abandon the calf rather than slow down herself, then the mother-calf bond could be broken.

Evidence about cow-calf separation during the chase is meager. Capture-recapture studies of three female spotted dolphins with calves showed that the mother-calf bond remained intact, even after up to seven sets over seven days (Chivers and Scott, 2002); these calves, however, were about the size of one-year-olds and not neonates. Thirty years of short chases and encirclement of bottlenose dolphins in Florida have not resulted in any permanent separations of mothers and calves; even when one member of the pair was temporarily encircled and the other was not, the free dolphin remained just outside the net until the encircled one was released. In general, mammalian mothers are known to go to extreme lengths

to stay with and protect their young, even while being chased by predators. Whalers used the protective behavior of mothers toward their calves to increase their catches (Caldwell and Caldwell, 1966). Adult dolphins have been observed defending young calves against sharks, despite the risk to themselves (Springer, 1967).

The SAB could help evaluate whether a study to determine whether permanent separation of mothers and calves does occur should be undertaken and could provide assistance in designing the field study and assessing its significance.

2. STRESS EFFECTS

The SAB should consider the value of repeating the NMFS CHESS study, that was conducted in cooperation with the IATTC, to increase the sample size of blood analyses and other indicators of stress from repeatedly captured dolphins (Forney *et al*., 2002). Only two spotted dolphins were sampled both in an initial capture and a recapture, so the data are meager. Repeating the CHESS cruise however, would be extremely resource-intensive.

3. ECOSYSTEM EFFECTS

It is not known whether the environmental changes during the history of the fishery have had significant effects on the carrying capacity of dolphin populations. The SAB, or a workshop of technical experts, could:

1. Examine population trends of other EPO cetaceans;
2. Model effects of population increases of potential competitors and predators on the populations of northeastern spotted and eastern spinner dolphins;
3. Examine in detail the effects on trends in dolphin populations of large-scale ecosystem changes that occurred in the mid-1970s;
4. Examine the issues of the carrying capacities and maximum growth rates of dolphin populations.

4. MORTALITY ESTIMATES

Much of the modeling of dolphin populations has depended heavily on estimates of mortality from the early years of the purse-seine fishery on dolphins that are based on a small sample size of observed trips. The SAB should review these estimates and decide whether they are reliable enough to be used as a basis for conclusions regarding population recovery; this should include a review of the estimation of the type of set in cases where the set type was not recorded in the vessel logbook.

Potential sources of unobserved mortality include intentional or inadvertent non-reporting by observers, smaller purse seiners that do not carry observers, and other fisheries. The SAB should review comparisons of IATTC and national observer programs, and help design studies or monitoring techniques, using new technology, to estimate any mortality by Class-5 and smaller purse seiners, and identify other fisheries that operate in the EPO that could cause dolphin mortality.

5. LIFE HISTORY STUDIES

Observers from the IATTC, Mexican, and US programs have collected life-history samples for various studies over the years, although none are being collected now for dolphins. Identification of age and reproductive status are prerequisites for many other studies and for monitoring trends in vital rates. Examination of food habits could help detect changes in carrying capacity. Genetic analyses might help determine the extent of potential unobserved mortality of calves. The SAB should discuss the potential contribution of life history data to assessing the status of dolphin stocks.

6. STOCK ASSESSMENT OF COASTAL SPOTTED DOLPHINS

The status and structure of the stock of coastal spotted dolphins requires further study. The SAB could examine new genetics data (Escorza-Trevino *et al*., 2002) and make recommendations for a revised stock structure (if needed), use the revised stock structure to examine trends in abundance, and assess the status

of the stock.

7. POPULATION MODELING

Two techniques would be useful for modeling dolphin populations: the first relies on more traditional single-species models, and the second on ecosystem models similar to those developed for the eastern Pacific using *Ecosim* software. The SAB should review previous applications of these techniques and propose any refinements it considers useful both in the techniques used and the data to be analyzed.

The ecosystem technique is useful for identifying potential interaction effects, but it is in the early stages of development and acceptance in the scientific community. It is too much to expect that it will lead to definitive or even strongly probabilistic statements about dolphin abundance and the causes and consequences of interactions with other populations in the eastern Pacific. However, it may provide further insight into possible interactions and may guide other research.

Both types of population modeling are useful for characterizing potential shifts in the carrying capacity of dolphin populations. Unfortunately, historical data of sufficient reliability on population abundance and changes in productivity are not available, and hence conclusions about such shifts cannot be definitive.

The SAB should consider possible time lags for the population to respond to changes in its environment or the fishery.

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