RPWG
M

MEMORANDUM STATE OF ALASKA

TO: Stan Senner
Restoration Specialists
Oil Spill Impact Assessment
and Restoration
Anchorage

DATE: October 10, 1990

FROM: Charles P. Meacham
Fishery Program Manager
Oil Spill Impact Assessment
and Restoration
Anchorage

Subject: Restoration--
Fish Ideas

Below are current Damage Assessment projects for salmon, clams, and rockfish that could logically be considered for transition to restoration funding. Of particular value to the expedited restoration process is that these three projects can be implemented immediately with a high probability of success. Approximate costs associated with these projects are detailed in Table 1.

SALMON:

Restoration of salmon stocks affected by oil will be a difficult task since some wild stocks and hatchery stocks were oiled and others were not. From a practical standpoint there will be a commercial salmon fishery within PWS. My feeling is that a complete closure of the commercial fishery is not practical nor would it really benefit the resource as a whole, the State, or Nation. The challenge of restoring oiled salmon stocks in the face of a commercial fishery then becomes one of differentiating between stocks. Broad stock units would include the following:

Oiled wild stocks
Oiled hatchery stocks
Un-oiled wild stocks
Un-oiled wild stocks

Production from hatchery stock groups can be controlled reasonably well by hatchery practices. Production from wild stocks is a function of escapement levels (controlled by the commercial fishery) and environmental factors. Environmental factors are beyond our control. However, one can differentially harvest salmon stocks if able to distinguish between them. The first task of restoration then becomes one of stock identification. Stock identification can be accomplished in a variety of ways, including identifying natural markers (such as through scale pattern analysis, electrophoresis, nuclear DNA analysis) associated with a given stock of fish or by applying marks to juveniles (coded wire tags, otolith mass marking, etc).

I would suggest a two pronged approach; first, use existing technology to implant coded wire tags in juvenile fish in 1991, and second, enter into a small scale feasibility study to more economically mass mark hatchery fish such as through otolith mass marking.

ROCKFISH:

We know that there were lethal effects to rockfish, as shown by the recovery of dead and dying rockfish immediately after the spill; and, that there were sub-lethal effects, based on bile samples taken later in 1989. The results of the 1990 field studies will help in determining the long term persistence of the sub-lethal effects and to what extent the shallow reef habitats and food sources were affected. Restoration efforts for rockfish are dependent on the results of the 1990 study.

If (1) the presence of hydrocarbons is detected in the tissue, food samples, or sediment samples collected in 1990, or (2) the histopathological examination or enzyme activity indicates persistent sub-lethal effects of the oil, then studies similar to Fish/Shellfish Study 17 conducted in 1990 would be warranted under restoration in order to determine the long term persistence of these sub-lethal effects to appropriately design directed restoration efforts.

Current data indicate that stocks of bottom fish, including rockfish, are depressed. Rockfish are long lived fish (with maximum age approaching 100 years) and exhibit relatively slow recruitment making restoration a long term, very difficult process; thus, restoration efforts may need to take the form of compensation for lost or damaged resources. This project should logically transition toward continued evaluation of stocks of rockfish with emphasis on stock status and population dynamics of these fish.

An examination of historical commercial fisheries data coupled with a port sampling program evaluating sport and commercial harvests would provide a database of harvest levels and the basic age and size composition information for these fish providing a basis for assessing sustainable yields of these stocks. In addition, the age structure data would permit cohort analysis to determine if specific age groups are weak. It is also necessary to assess the distribution and abundance of these stocks within the area affected by the spill in order to manage these stocks geographically. A stock inventory program could be initiated to determine the distribution and species composition of these species. This would be accomplished by divers, hook and line or trawl type surveys. Diving techniques are preferred in order to avoid mortality associated with destructive sampling techniques in areas of low stock density. These studies will also serve to expand our database in preparation for future spills and compensate somewhat for the uncertainty from the Exxon Valdez spill.

CLAMS:

Many controlled studies and the results of several oil spills have shown that
spills can have long term effects on clam populations. This is both because clams are sedentary, inhabiting the intertidal regions and sediments which are most susceptible to accumulation of oil, and because clams are unable to metabolize hydrocarbons and tend to bioaccumulate hydrocarbons in tissues. In addition to the effects hydrocarbons may have had on Prince William Sound clam populations, it is hypothesized that both the mechanical and biological cleanup activities in PWS may have especially impacted young-of-the-year clams.

Although the current clam damage assessment project has collected data on clams at scattered sites around Prince William Sound, little is currently known about the actual distribution and density of clams. This clam study should now transition toward an inventory of clam populations across various habitat and identify suitable habitats for clam population enhancements through restorative transplants or seeding projects.

Once suitable enhancement locations have been identified, there are at least two methods of restoring clam populations to a healthy condition. The first restoration project alternative would be to transplant adult clams into the spill area from unaffected locations. A pilot transplant experiment was successfully conducted as part of the current damage assessment study. A second restoration project alternative would be to restore clam populations through a seeding project. Under this alternative, clams would be taken from healthy areas and spawned under controlled laboratory conditions. Clams grown to the juvenile stage under controlled conditions would be introduced into substrate which had been heavily impacted by oil or by cleaning efforts. The advantages of spawning and rearing clams to a juvenile stage in a controlled environment are twofold. First, adult clams can be induced to spawn several times during a growing season, and second, survival of the larval stage is greatly enhanced under protected conditions.