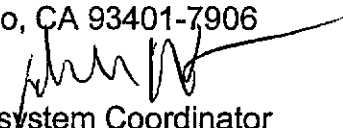


**M e m o r a n d u m**

**To :** Mr. Roger W. Briggs, Executive Officer  
California Regional Water Quality Control Board  
Central Coast Region  
895 Aerovista Place, Suite 101  
San Luis Obispo, CA 93401-7906

**Date :** April 13, 2005

**From :** John Ugoretz   
Nearshore Ecosystem Coordinator  
Central Marine Region Manager  
Department of Fish and Game

**Subject :** Revised Draft Report on Mitigation Recommendations for Cooling Water Impacts Associated with the Diablo Canyon Power Plant Cooling Water System Report, dated January 20, 2005, prepared by the Technical Work Group (TWG)

The Department of Fish and Game (Department) has reviewed the revised draft report on mitigation recommendations for cooling water impacts associated with the Diablo Canyon Power Plant (DCPP) Cooling Water System, dated January 20, 2005, prepared by the Technical Work Group (TWG). Department staff also attended the February 1, 2005, workshop on the revised TWG report at Moss Landing Marine Laboratories. We appreciate the opportunity to participate in the TWG meetings and review process.

The Department previously commented on the original draft TWG report in a memo dated July 14, 2004, to the Central Coast Regional Board Executive Officer. The revised TWG draft report continues to identify several alternatives for mitigation. It is our understanding that the major change from the previous draft entails a much broader discussion of, and support for artificial reefs to primarily mitigate for entrainment impacts and to a lesser extent impingement impacts. The revised TWG report continues to support the establishment of marine protected areas (MPAs) as mitigation for these impacts. The revised TWG report also continues to discount several of the alternatives the Department identified in our previous correspondence, including funding for abalone enhancement. The revised TWG draft report indicates that the conservation easement and a State Parks docent program would be appropriate mitigation for intertidal impacts associated with the thermal discharge component of the (DCPP) operations.

As Department staff indicated at the February 1, 2005, workshop, we have remaining concerns regarding some of the proposed TWG recommendations. However, we do find some of the proposed TWG recommended mitigation measures appropriate. The Department believes that the proposed abalone enhancement alternative needs to be brought forward by the Central Coast Regional Board staff as a viable candidate for mitigation. Abalone enhancement would primarily address thermal impacts. It should be noted that the Department plans to bring an Abalone Restoration Management Plan (ARMP) before the Fish

Roger W. Briggs, Executive Officer  
Page Two  
April 13, 2005

and Game Commission in May 2005. The Department strongly urges the Regional Board and TWG to include abalone enhancement as an important component of the mitigation proposal. We have attached a preliminary abalone enhancement proposal for your review. The Department will be developing a final proposal for this enhancement once the ARMP is adopted by the Fish and Game Commission.

The Department supports the artificial reef creation mitigation proposal brought forward by the TWG. The Department will work with the TWG, the Central Coast Regional Board staff, the DCPD and other interested parties to ensure that an appropriate artificial reef design is developed. However, the Department is concerned that cost estimates for development of such a reef provided in the revised TWG report may be low. We realize the draft TWG report is a preliminary document to identify mitigation recommendations and that details regarding size, location, coverage, etc., of any created artificial reef will be thoroughly investigated prior to approval. The Department requests that we be included in the continuing artificial reef proposal development process.

As indicated in our memo dated July 14, 2004 the Department does not believe that the development and implementation of MPAs should be the primary mitigation measure associated with the operation of the DCPD cooling system. MPAs have been established for a variety of reasons in California but never as mitigation for direct or indirect damage caused by power plants which use sea water for cooling. However we do believe that MPAs could be an integral part of the overall mitigation package. MPAs are recognized as a means to preserve and conserve biodiversity; protect threatened, endangered, or overfished species; provide areas free from human extractive activities in order to conduct scientific research; and for their potential use as indicators with which to gauge relative effects on marine fish populations from natural and anthropogenic impacts.

The Department, by means of a cooperative agreement with the Resources Agency and the Resources Legacy Fund Foundation, has restarted the Marine Life Protection Act (MLPA) implementation process. The MLPA will be implemented in phases throughout the State, with the first phase being a study region along the central coast. Diablo Canyon and the surrounding areas are included in this study region which runs from Pigeon Pt. to Pt. Conception. As a part of the implementation process, a stakeholder working group and scientific advisory team has been formed to discuss the central coast as a whole. The process will be completed by November 2006, when a decision on MPAs within the central coast is expected to be made by the Fish and Game Commission. Any proposals for MPAs will need to be incorporated into this process.

The Department has also undertaken a preliminary review of the draft proposal for rearing rockfish as developed by the Central Coast Salmon

Roger W. Briggs, Executive Officer  
Page Three  
April 13, 2005

Enhancement (CCSE) group. Although the rearing of rockfish may serve to further the scientific knowledge of these species, the Department does not feel this proposal is appropriate as a form of mitigation for power plant impacts.

The Department appreciates the opportunity to participate in the development of an appropriate mitigation program for the impacts associated with the DCPD cooling water system. We look forward to working with the Central Coast Regional Board staff and the TWG to ensure that adequate and appropriate mitigation is developed and implemented.

As always, Department personnel are available to discuss our comments, concerns and recommendations in greater detail. To arrange for discussion, please contact Mr. William Paznokas, Staff Environmental Scientist, California Department of Fish and Game, 4949 Viewridge Avenue, San Diego, CA 92123, telephone (858) 467-4218.

Attachment(s)

cc: Sonke Mastrup  
Deputy Director  
Department of Fish and Game  
Sacramento, California

Bill Paznokas  
CDFG-San Diego

File

## **Proposal for Diablo Canyon Mitigation Package Abalone Enhancement Project**

### **Introduction**

Abalone enhancement activities play a pivotal role in the recovery of five abalone species under the Department's Abalone Recovery and Management Plan (ARMP). Virtually all of the seven species of abalone that occur in central and southern California are currently at very low populations levels and are in need of some type of recovery effort. Some species, such as black and white abalones, are severely depleted and will need more effort, time, and funding to recover their populations. Other species (red, pink, green abalones) are more abundant but are still in need of recovery to historic abundances and active enhancement would benefit their recovery process.

The ARMP identifies enhancement activities that boost the recovery process for these species. These activities include; 1) translocation or aggregation of adult abalone in the wild, 2) out-planting of medium (40 mm- 50 mm) or large (80 – 100 mm) size cultured abalone, and 3) larval out-planting of cultured larval abalone. Each of these recovery techniques has advantages and disadvantages, but the common thread in all of the techniques is that none has proven to be successful in enhancing wild populations on a large scale. Thus, the ARMP outlines a process to test each one of these techniques in small scale feasibility studies, to see if they are worthwhile to apply on a larger scale of recovery.

This proposal will focus on the development of the second and third enhancement activities of culturing and out-planting post larvae and medium/large abalone. Diablo Canyon power plant (DCPP) mitigation funding could be applied at two separate stages of this proposal; the initial culturing and development phase and the implementation of a full enhancement program.

The Department does not possess the facilities or expertise to spawn and raise abalone in an aquaculture setting. Thus the Department will have to rely on supporting outside entities to culture and raise abalone for these enhancement activities. Red abalone and possibly black abalone will be used in this project because they are the species that are most likely directly impacted by the DCPP operations. Red abalone is the most common species used in aquaculture and thus obtaining post larvae for the out plant study will be simple. Black abalone will be used in the abalone out planting study because of the ease in out planting and monitoring in the intertidal habitat as opposed to a subtidal out plant study where diving is involved. If this project is successful, the enhancement program could expand to encompass other abalone species (pink, green) in other regions at a later date.

## **Project description**

The project is divided into three major tasks; culturing, out plant feasibility studies, and expansion of the technique to large scale out planting if deemed feasible. The majority of the work will vary between the two proposed enhancement techniques. For the post larval out planting, most of the work is directed towards the feasibility study to determine if post larval out planting is a successful and worthwhile enhancement strategy. The medium/large abalone out planting will hinge on the successful culture of black abalone since previous culturing attempts for this species have had very limited success.

### Culture of Abalone

The first step is selecting existing aquaculture facilities to culture abalone for the project. There are several parameters that must be met for this step of the project. First, the selected facility must have a sabellid free certification from the Department. A list of current certified facilities is available from the Department. The second parameter, for red abalone, is that the culture facility should have extensive experience in culturing the species. Selecting a facility for black abalone will be more difficult since culturing of this species has had limited success. An academic institution is likely the appropriate venue for black abalone culture development because past successes have occurred there.

After the selection of appropriate culture facilities the broodstock for the study must be collected from the wild. Department biologists would likely collect the broodstock from within the abalone moratorium area (from SF bay to the Mexican border). Red abalone broodstock will most likely come from the Channel Islands and the black abalone will come from the central coast around Carmel.

The final step in the culture process is spawning and rearing. For the post larval out planting project this process will be fairly brief since the development to post larval stage will be short once spawning has been induced. For the medium/large abalone out planting project the obstacle will be developing the conditioning and spawning techniques for black abalone. Once this process is developed and documented then rearing of offspring to medium (40 – 50 mm) or large (approximately 80 – 100 mm) size can occur. Rearing of black abalone to a large size may take several years. If the spawning technique is developed and completed at an academic institution then rearing may have to occur at another culture facility that can accommodate the large number of offspring for grow out.

An additional step for black abalone is the determination of genetic resistance to Withering Syndrome (WS). This research will be completed by the Department's marine invertebrate pathologist and other researchers. If genetic resistance is found in the existing wild population, then broodstock from the Channel Islands will be collected for the enhancement program. This research would be conducted simultaneously to the culture and rearing development process for this species.

## Feasibility Studies

The feasibility studies will determine the efficacy of these techniques for enhancing abalone populations during recovery. The Department will conduct these studies and develop an out planting protocol if the techniques prove to be worthwhile. Since the Department will conduct these studies separately from the DCPP funded portion of this proposal, only a brief description is provided.

The post larval out planting feasibility study will test how successful post larval out planting might be as an enhancement tool. The following steps will be taken to conduct the study:

- Develop methodology incorporating past research on larval out planting (Heasman et al. 2004, Preece et al. 1997, Schiel 1992).
- Select sites for out planting at the northern Channel Islands
- Conduct pre-out plant survey to determine baseline data of abalone abundance there
- Conduct out planting
- Conduct post-out plant surveys to determine survivorship

After development of the culture techniques and grow out of black abalone, the feasibility study can be conducted. The abalone out planting feasibility study will follow these steps:

- Develop methodology for systematic out planting and tracking of abalone
- Mark abalone for out planting
- Select out plant sites at the Channel Islands and the central coast
- Conduct pre-out plant survey
- Out plant adult animals to sites
- Conduct post-out plant surveys to determine survivorship

## Large Scale Enhancement

If the feasibility studies show that the enhancement techniques are viable, then the next step is to apply them on a larger scale of enhancing populations. The Department will develop an out planting protocol based on the information learned from the feasibility studies. Any enhancement activity would follow established protocols. At this stage the DCPP mitigation funds could be directed towards a full scale enhancement program for abalone.

## **Cost**

Table 1 shows the approximate cost for culture and rearing for one year. Total cost for one year of culture is approximately \$268,000. This cost would be for culture and rearing of approximately 10,000 abalone (80 – 100 mm) for out planting per year and assumes that the facility is starting from scratch and is leasing land and purchasing all equipment. The cost for post larval out planting

would be substantially lower since the only cost would be in maintaining broodstock and generating larvae for out planting. An approximate estimate for cost per year for larval out planting would be \$150,000. The cost could be considerably reduced if an existing culture facility is used to generate the larvae for seeding.

The initial task of determining the culture parameters for black abalone will take approximately two to three years. Grow out of abalone for out planting to a size of 40 – 50 mm will take an additional three to four years. Thus at least seven years is required to establish abalone large enough to complete the medium size out planting feasibility study. To produce black abalone of larger size (80 -100 mm) will take an additional six to seven years. The approximate cost of running a culture facility for growing black abalone for 14 years is \$3,752,000.

The collection of broodstock and spawning of red abalone for the larvae would take one to two years at which time post larval enhancement feasibility studies could begin. The post larval out plant feasibility study will take approximately five years. The estimated cost of culture for red abalone post larval seeding for seven years is \$2,100,000.

The culture costs outlined above are the minimum for completing the feasibility studies. Culture costs for expansion to larger scale enhancement are not included.

Table 1. Approximate cost of culture of abalone for one year.

<u>Cost of Production for culture for one year</u>	
SALARIES (manager 100%, 4 assistants 50%)	\$191,928.37
Kelp	\$5,459.01
Electricity	\$5,415.96
Total Occupancy (lease etc.)	\$54,000.00
Telephone	\$600.00
Water/sewer/refuse	\$600.00
Maintenance	\$2,588.21
Total Insurance	\$3,000.00
Licenses & Permits	\$520.00
Transportation	\$2,500.00
Meals & Lodging	\$500.00
Other (incl. misc farm tools)	\$1,000.00
<b>Total Cost of Production</b>	<b>\$268,111.56</b>

## References

- Heasman, MP; Chick, R; Savva, N; Worthington, D; Brand, C; Gibson, P; Diemar, J. 2004. Enhancement of populations of abalone in NSW using hatchery-produced seed. NSW fisheries final report series [N.S.W. Fish. Final Rep. Ser.]. no. 62, 265 pp.
- Preece, P.A., Shepherd, S.A., Clarke, S.M., & Keesing, J.K. 1997. Abalone stock enhancement by larval seeding: effect of larval density on settlement and survival. *Molluscan Research*. 18, pp. 265-273.
- Schiel, D.R. 1992. The enhancement of paua (*Haliotis iris* Martyn) populations in New Zealand. In: S.A. Shepherd, M.J. Tegner & S.A.E. Guzman del Proo (eds) *Abalone of the World: Biology, Fisheries and Culture: Proceedings of the 1<sup>st</sup> International Symposium on Abalone*. Fishing News Books.