Appendix H. Proposed Amendment to Alternative 1 in the ARMP as submitted by Abalone Commercial Constituents to the Fish and Game Commission

H.1 An Amendment to the Abalone Recovery and Management Plan's Alternative 1

H.1.1 Introduction

California Department of Fish and Game (CDFG) biologists have the responsibility of managing the state's spatially complex abalone populations. Due to minimal financial resources, collecting the data necessary for successful management makes their task impossible. Other than by continued closure, the framework for management proposed in the Abalone Recovery and Management Plan (ARMP) will be unable to address the challenge of assessing and managing Southern California's spatially intricate renewable abalone resource.

There is an opportunity to manage red abalone stocks at San Miguel Island (SMI) with an experimental fishery modeled after a successful program in Australia. In Western Australia, Cape Leeuwin abalone divers rehabilitated an area of approximately 1,500 hectares and have raised their Total Allowable Catch (TAC) from 7 tons to 30 tons. This program shows what can be done by fishers if proper incentives for the fishers are in place. This program is described by Dr. Jeremy Prince in *Proceedings of the North Pacific Symposium on Invertebrate Stock Assessment and Management* 1998, and *The Bare-foot Ecologist's Toolbox*, 2001.

Prince's published findings on the Western Australian success show what might be done at San Miguel Island in the Northern Channel Islands. He refers to "Tyranny of Scale" in his papers on optimizing Australia's abalone management. This term describes the mistake of managing discrete stocks sometimes comprised of less than a square mile with management strategies applied over a scale of hundreds of miles. A "Tyranny of Scale" operates in California's abalone management today with continued area depletions occurring within a management zone comprising half the state. Unfortunately, the Abalone Recovery and Management Plan (ARMP) and a lack of funding will perpetuate this "tyranny."

The information to micro-manage the Channel Island abalone stocks is available and can be gathered from and by the fisher/divers who formerly harvested abalone in this area. These fishers, many of whom are still diving the area for sea urchins, have intimate knowledge of SMI; the reefs, habitats and habits of red abalone, including biology, spawning, and the effects of temperature and food availability. This information has not been accessed and made available to managers.

As has been shown at Cape Leeuwin, it is economically feasible to manage abalone populations intensively. While the intensive assessment needed to manage SMI is beyond the level of resources available to CDFG biologists, the infrastructure (boats, equipment, and divers) required for such assessment is already in place and used daily by the diver/fishers.

H.1.2 Proposal

Initially, the index sites called for in the Abalone Recovery and Management Plan (ARMP) would be placed at SMI. The monitoring sites at SMI would be installed by the California Abalone Association (CAA) using Abalone Resources Restoration and Enhancement Program funds administered by the Director's Abalone Advisory Committee (DAAC). These sites would conform to National Park Service Kelp Forest Monitoring (NPS KFM) and CAA site already in place and follow the KFM Handbook data gathering protocols. Sites would be chosen by CAA divers to reflect areas of good abalone habitat. Additionally, these sites would be chosen from areas that were formally "heavily fished." Such "heavily fished" sites are currently being used by CDFG in Northern California to monitor and manage abalone populations. While in Southern California, other than the one SMI CAA site, there are no sites placed specifically for monitoring red abalone.

Data has been gathered at the existing CAA SMI Tyler Bight site as a joint effort between NPS and CAA. Future data gathering efforts for red abalone at SMI from CAA sites would involve collaboration between CDFG biologists and possibly university biologists.

It is proposed that the installation of these monitoring sites be initiated using DAAC funds. In the future, such monitoring sites could also be installed at Santa Rosa Island (SRI) and Santa Cruz Island (SCI). As discussed below in the section on MPAs, these sites would also aid in tracking the efficacy of proposed MPAs and could be placed inside or outside of MPAs to augment existing monitoring sites.

When data indicates that red abalone densities and size frequencies warrant and while continued protection remains in place for all species in all other areas, an experimental Total Allowable Catch (TAC) harvest would be allowed for Red Abalone at SMI.

H.1.3 Discussion

The harvest of red abalone at SMI was consistent over time (Figure 1).

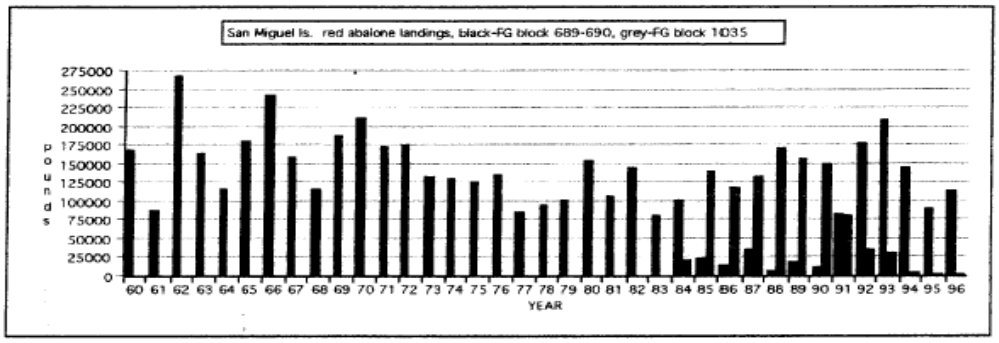
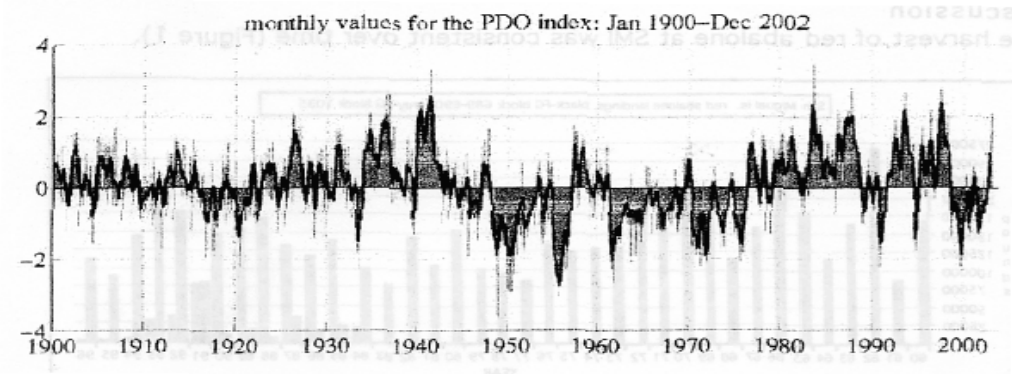


Figure 1

It is postulated that the slower growing abalone at SMI were successfully protected by the 7 ¾ inches (197 mm) commercial size restriction and the exploitation rate which was influenced by many factors. Red abalone

populations at islands to the east of SMI exhibit faster growing characteristics which effectively shortened the time available for breeding opportunities of individual abalone (Prince, personal communication). The remoteness of SMI inhibited added detriment of a large sport take as occurred at the Channel Islands further to the east. SMI was affected less by the onset of Withering Syndrome (WS) which was a major factor in the declines at the eastern Channel Island abalone populations. Those eastern islands experienced warmer water in the 1980's and 1990's which caused subsequent greater loss of food sources for abalone increasing stress, reproductive dysfunction and the occurrence of WS (Tegner et al., 2001).

The Pacific Decadal Oscillation Index, an index of ocean temperature, (Figure 2) correlates with the failure of red abalone stocks at SCI, which occurred after the onset of much warmer ocean temperatures after 1977.



The red abalone population decline at SCI is indicated here in graph of commercial red abalone landings from SCI (Figure 3). These figures demonstrate the inability of red abalone stocks to recover from unrelenting sport and commercial harvest compounded by warm water perturbations.

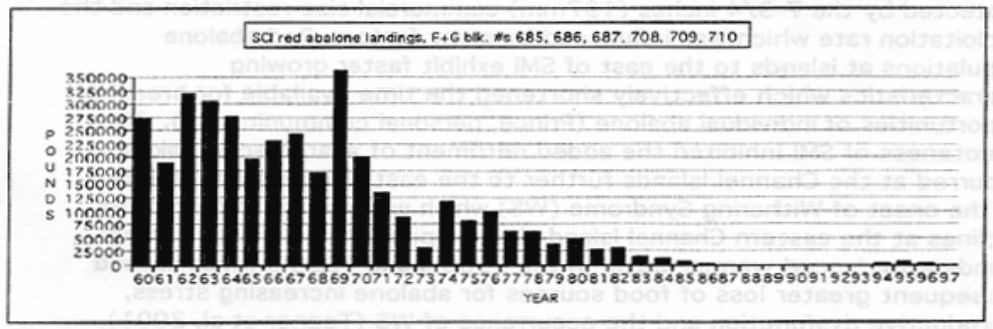


Figure 3

The conditions that drove the failure of stocks at SCI did not occur at SMI. At the time of the closure in 1997, there were still abundant populations of red abalone at SMI and harvest continued until the day the fishery was closed. Colder ocean temperatures since the 1997-1998 El Nino have facilitated recruitment and growth there. The ARMP deems management changes

predicted by population density and size frequency; however at this time there is insufficient data available to manage with confidence, other than with fishery closure.

FG Code 5522(6)(C) stipulates that the ARMP shall contain, "*The reproductive importance of the entire ecosystem of those areas proposed for reopening to harvest and the potential impact of each reopening on the recovery of abalone populations in adjacent areas.*"

The question, "How far can larvae travel?" is of interest to biogeographers and others interested in colonization occurring on geologic time scales. Fishery managers, who should be interested in time scales approximating human life, might better ask, "Where will most of the recruitment occur?" Should a fishery be managed for the minority of individuals and larvae that might travel record distance or should it be managed for the majority that don't travel far at all (Prince 1989)?

The exact reproductive importance of a proposed harvest of 15,000 individuals from an estimated population of 3 million emergent abalone at SMI is difficult to assess. The areas to remain closed adjacent to SMI are a minimum of 3 miles from the island. Prince et al. (1987, 1988) measured larval dispersal of *H. rubra* at less than 50 meters. McShane et al. (1988) concluded recruitment must derive principally from local parents. In a review of abalone ecology (McShane, 1992) considered that wider dispersal was possible. Shepherd et al (1992a) concluded larval transport of *H. laevigata* of hundreds of meters was possible. Tegner (1992) concluded that *H. fulgens* larvae were transported hundreds of meters to kilometers. All of these studies implied local recruitment (Shepherd and Brown, 1993).

Considering the literature cited above and the small percentage of the estimated population harvested, the risk to recruitment and impact on stocks at Santa Rosa Island, Santa Cruz Island, and mainland areas from such a harvest at SMI would be low.

H.1.3.1 San Miguel Island Experimental Red Abalone Fishery

Monitoring

It is proposed that DAAC funds be used to set up permanent abalone monitoring sites at Adams Cover, Castle Rock, and Crook Point. These sites would be consistent with the CAA site at Tyler Bight which was constructed to conform with the NPS Kelp Forest Monitoring sites. While CAA's concern is with abalone, the protocols exist in the NPS KFM Handbook to monitor many species from such sites. Since an MPA has been established at Adams Cove a monitoring site there would be an experimental control that would supply data from an unfished area.

The NPS monitoring site at Hare Rock is within the MPA on the east side of SMI. A monitoring site was proposed for the east side in an area of similar habitat outside MPA boundaries. However, the east side reserve at SMI has taken the whole area so this is not feasible.

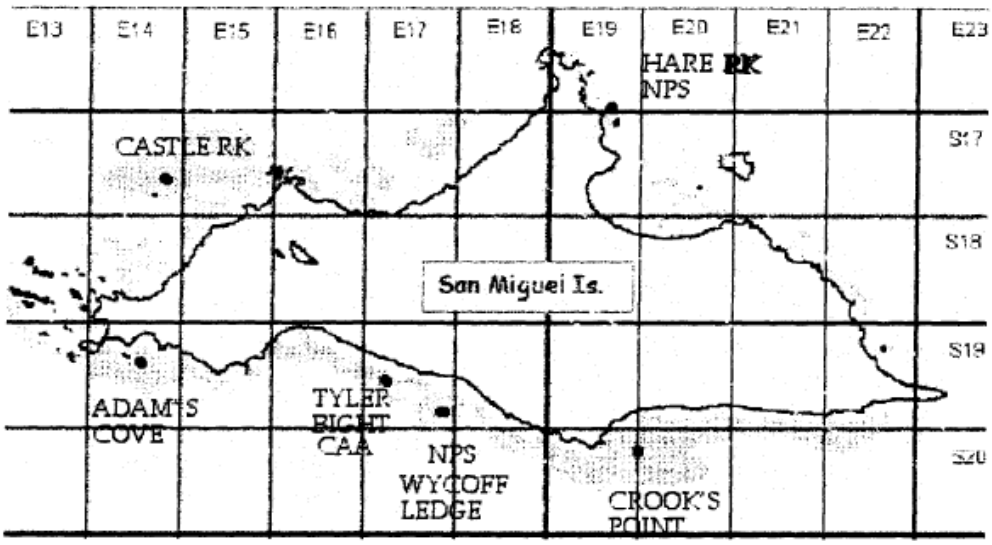


Figure 4. SMI showing maximal extent of surface kelp canopy(stippled area) and existing and proposed monitoring sites. Grid is one nautical mile.

CAA has installed one monitoring site at Tyler Bight (California Abalone Association, 2002). That project showed the ability of fisher/divers to construct such sites at reduced cost and work with NPS divers to collect data over time. The CAA recently assisted in the construction of sites modeled after NPS KFM sites at San Clemente Island for the Navy's environmental monitoring program.

Collaborative Abalone Research Program (CARP)

Index sites at Castle Rock, Adams Cove, Tyler Bight (in place), and Crook Point would be installed by CAA. These sites would anchor the CARP's activities. Monitoring of size frequency and density would be augmented with Artificial Recruitment Modules and other experiments to help answer basic questions concerning aspects of red abalone population structure, habits, and limits.

Experiments including growth/tagging, settlement tracking, and basic oceanographic condition monitoring could be accomplished. Government agencies and academia could use the monitoring sites for their research and would be encouraged to do so. The CAA/DAAC could provide basic logistics and In-Kind support for a wide range of projects.

The CAA has already installed a site at Tyler Bight on SMI. This site is being monitored by the NPS Kelp Forest Monitoring team in conjunction with CAA divers. They recently acquired data for the second year from the site.

It is proposed that the installation of these monitoring sites be initiated using DAAC funds regardless of the decision concerning the proposed experimental fishery. Such monitoring sites should also be installed at Chickasaw Wreck, Santa Rosa Island and Forney's Cove, Santa Cruz Island. As discussed in the section on MPAs, such sites would also aid in tracking the efficacy of MPAs and could be placed inside or outside of MPAs to augment existing monitoring sites.

Management Plan

When densities warrant and while continued protection remains in place for all species in all other areas, a Total Allowable Catch (TAC) harvest would be allowed for Red Abalone at SMI. SMI has been shown to have a viable population able to withstand continued commercial and recreational harvest for *forty-five years*. The commercial fishery at SMI consisted of 125,000 pounds of approximately 32,000 red abalone per year (CDFG conversion rate of 3.75 pounds per red abalone). In the five years since closure an estimated 600,000 pounds or 160,000 abalone have remained unharvested at SMI (see Figure 1).

Size frequency data from SMI indicate 2.5% - 5% of emergent abalone are harvestable using a slot limit of 197mm-203mm (CDFG cruise reports, CAA San Miguel Island Red Abalone Project). A biomass estimate of 3 million emergent abalone indicate a harvestable population of 75,000 to 150,000 abalone in the slot size range of 197mm-203mm.

This alternative would allow a harvest to occur at SMI when data indicates sufficient density. The harvest would be restricted by a TAC. A slot size would be used, i.e. maximum as well as minimum size restriction. Position indicating transponders would be used on all vessels participating in the harvest. Trip plans would be telephonically recorded and logbooks detailing fishing effort would be kept. A method of recording and keeping track of individual fishermen and their contribution to filing the TAC would be styled after the abalone fishery plan for Tasmania where such methods have been in use for many years (Review of the Management Plan of the Tasmanian Abalone Fishery, 1999). A "resource rent" of 10% would be levied on the ex-vessel value of the harvest. These funds would pay not only for the maintenance of the fishery but also for a program of collaborative monitoring and research involving the harvesters.

A portion of the harvest at SMI could be allocated to the sport sector. It could be administered with a special tag sale and reporting system. The sport size limit would be the same as the commercial.

Restarting the fishery will serve to maintain the fishing community, which can help in increasing understanding of the fishery through data collected during harvest and collaborative research sponsored by the "resource rent." The incentive of a restarted fishery will encourage fishermen's participation in the program and invest them with a stake in the outcome of successful abalone fishery management. A restarted fishery will also provide funds to operate the research program necessary to sustainably harvest this valuable resource.

Marine Protected Areas (MPAs)

MPAs for the Channel Islands have been implemented by the Fish and Game Commission. There are two MPAs that will effect abalone populations at SMI. The Judith Rock MPA will enclose the area from Judith Rock to near Point Bennett. This area, which includes Adams Cove, contains prime abalone habitat and former harvest ground. It figured large in the former fishery and continues to show large populations of red abalone. An MPA in this location will meet the MPA objective of protecting representative southern shore SMI habitat and inshore species such as red abalone.

The other MPA at SMI is on the Eastern side. The area of this MPA, while containing some abalone does not enclose large red abalone populations and was not a large factor in the former fishery. NPS Kelp Forest Monitoring data for Hare Rock, a monitoring site which lies within the boundary of the MPA, has never shown emergent red abalone (David Kushner, personal communication).

One of the stated purposes of MPAs is fisheries management. In the case of abalone fishery management the efficacy of no-take areas is questionable. Benthic, sedentary species such as abalone that have little larval dispersal are good candidates for achieving near virgin biomass levels inside reserves. However, they are not likely species for improvement of fishery yields outside reserves through reserve or closed-area management (Parrish, 1999). Nonetheless, these reserves can provide needed data from an unfished area and assurance against population collapse should overfishing occur outside of reserves in a restarted fishery.

Management Measures

Harvesting only the zone comprised of SMI would be assured by the installation of a Position Indicating Transponder (PIT) aboard vessels participating in the fishery. The cost of PITs, their installation and monitoring would be borne by the participants.

Species-specific Considerations

Only red abalone at SMI would be harvested under this plan.

Gear Restriction

Hookah gear would be used by the commercial sector and SCUBA or breath hold by recreationalists. Former restrictions on abalone picking bars would remain.

Size Limits

For both commercial and sport sectors the minimum size would be 7 ¾ inches (197 mm) while the maximum size would be 8 inches (203 mm). Such a "slot size limit" would ensure conservation of both small and large individuals within aggregations, while still allowing harvest.

The reproductive capacity of large abalone is well known. While there may be an issue of fecundity of such large, old abalone it is believed that the presence of large individuals helps create conditions conducive for settlement and recruitment.

Another option for determining harvest size is "concept fishing" as practiced by ab divers in the Cape Leeuwin area of Western Australia. These fishers only harvest abalone that have finished their rapid growth phase (in terms of both shell length and volume), which is judged by shell depth and roundness. The use of such a size index allows more breeding time for individual abalones. The "concept fishers" only harvest an area once a year and refrain from harvesting if the aggregation has not rebuilt since the previous year. They also harvest no more than 30% of an aggregation. They harvest abalone from across

the size range available rather than just taking the largest. These concepts were developed by the fishers themselves and demonstrate the sophistication possible from such home-grown ideas (Prince, 1988).

Seasonal Closures

A three month season in the summer (July, August, and September) would allow for ample time to fill the TAC, facilitate monitoring of the TAC, and allow for an orderly fishery.

Total Allowable Catch, San Miguel Island

There are 3.57 square nautical miles of macrocystis kelp canopy during maximum coverage at SMI. Using maximum kelp canopy as a proxy for rocky substrate and adding another square mile of rocky substrate not covered with *macrocystis* gives 4.57 square nautical miles of red abalone habitat at SMI.

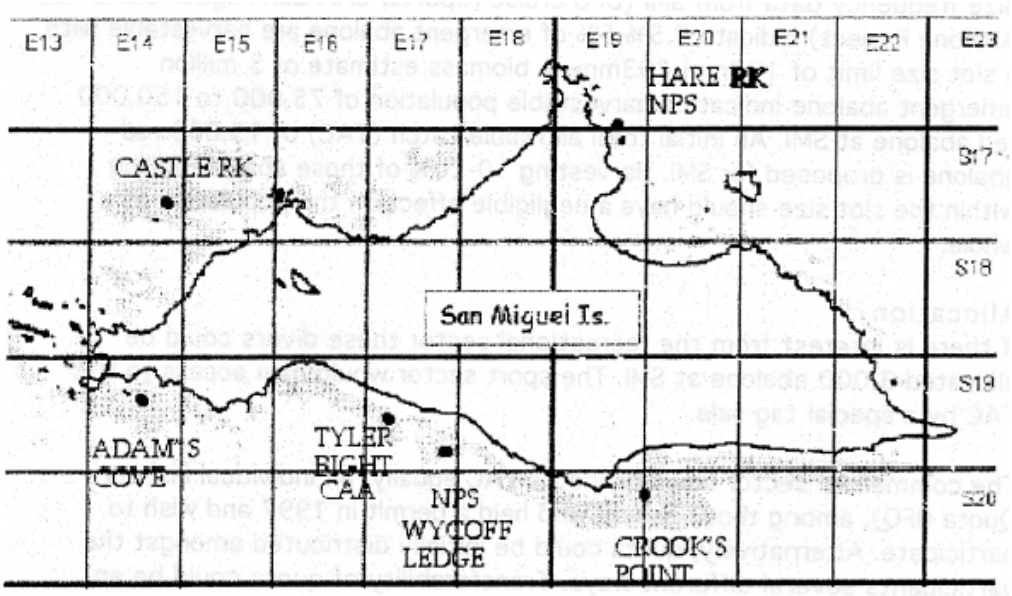


Figure 4. SMI showing maximal extent of surface kelp canopy(stippled area).

The former fishery harvested 20,000 to 35,000 red abalone per year from this area. Data from fishery independent research (CDFG cruise reports, 97-M-5 and 97-M-1) shows 1% of red abalone at SMI were of legal size (193 mm) in early 1997 at the end of the fishery. Landings from SMI in the three months (March, April and May) that were fished in 1997 were 113,000 pounds or 30,000 (3.75 pounds per red abalone, CDFG conversion rate). It should be noted that the assessment cruises made by CDFG in 1997 were accompanied by CAA members and that the areas surveyed were all heavily-fished areas.

The landing records and size frequency data indicate there were 3,000,000 emergent red abalone at SMI in 1997. In the five years since closure approximately 120,000 individual abalone were not harvested. Data from CDFG cruise report, 99-M-5, and Artificial Recruitment Modules at the Tyler Bight monitoring site indicate that recruitment has been occurring. Today 11.6% of

emergent red abalone at SMI are commercial legal size (197 mm) or greater (CDFG cruise report, 01-M-3).

Size frequency data from SMI (CDFG cruise reports, CAA San Miguel Island Red Abalone Project) indicate 2.5%-5% of emergent abalone are harvestable with a slot size limit of 197 – 203 mm. A biomass estimate of 3 million emergent abalone indicate a harvestable population of 75,000 to 150,000 red abalone at SMI. An initial total allowable catch (TAC) of 15,000 red abalone is proposed for SMI. Harvesting 10-20% of those abalone falling within the slot size should have a negligible effect on the population as a whole.

Allocation

If there is interest from the recreational sector these divers could be allocated 3,000 abalone at SMI. The sport sector would gain access to the TAC by a special tag sale.

The commercial sector could divide its TAC equally, an Individual Fishery Quota (IFQ), among those fishers who held a permit in 1997 and wish to participate. Alternatively, quota could be initially distributed amongst the participants several different ways. Transferability of quota could be an added mechanism to reduce the number of participants by allowing consolidation of quota shares if desirable. Harvest rights of some form would be decisive in the success of any future fishery plan by providing the incentives necessary to invest the fishers with a stake in the outcome of successful fishery management. Such issues should be decided by the fishers themselves with government oversight and approval.

Abalone Take Reporting System

Commercial participants would notify CDFG to lodge a recorded phone message of intention to fish before leaving on a fishing trip. Fishers would also report 1-2 hours prior to reaching port/unloading, giving estimated weights and estimated time of arrival. This would make fishers subject to spot checks and would encourage a higher degree of compliance. Logbooks containing information on specific location fished, conditions encountered and time spent diving would be sent to fishery managers within one week. Normal CDFG fish landing tickets, including price paid, would also be required. All red abalone taken commercially at SMI would be landed at Santa Barbara Harbor.

All abalone harvested would have a plastic tag (Scan Systems, Canada) attached upon harvest. Different color tags would be used for commercial and sport catches. The tags would carry a tracking number relating to fisher information. This tag would be attached to the gill hole apertures of the abalone when boated. The tracking number of each tag would be recorded on the commercial fish landing receipt, commercial logbook and sport catch report slips.

Sport sector participants would return report slips issued for each tag detailing area fished, conditions encountered, and time spent making catch within one week.

Resource Rent

Commercial sector - In addition to the 0.0125 cents and 19.5 cents per pound already required on commercial abalone landings (FG Code 8051 and 8051.3), an additional "resource rent" of ten percent of the landed value will be collected. This money would first be used to administer the commercial segment of the fishery. Any funds left over would be deposited in the Fish and Game Preservation Fund and be used in the Abalone Resources Restoration and Enhancement Program defined by FG Code 8051.4.

The estimated ex-vessel price of $60 per abalone would yield $6 per abalone. A commercial catch of 12,000 abs at SMI would produce $72,000 in "rent."

Sport Sector - For any sport sector a flat fee for each tag purchased would be assessed. Any participant would also possess a sport fishing license with abalone stamp. Proceeds from sport sector tag sales would be used to administer the fishery. Funds left after administration costs would be deposited in the Abalone Restoration and Preservation Account within the Fish and Game Preservation Fund and used as defined by FG Code 7149.9.

A similar charge of $6 per abalone would yield $18,000 for administration of tag sale for 3,000 sport-caught red abalone from SMI.

Appendix H – Literature Cited

California Abalone Association, *Installation of a monitoring transect and artificial recruitment modules, and collection of data for Red Abalone (Haliotis rufescens) at Tyler Bight, San Miguel Island.* 2002. Jim Marshall, jmarsh@silcom.com Report available at www.cisanctuary.org/cmrp/pdf/marshall2.pdf

California Department of Fish and Game, *Cruise Reports, Nearshore Invertebrates*, 1993-2001.

McShane, P., Black, K., and Smith, M. 1988. *Recruitment processes in Haliotis rubra and regional hydrodynamics in southeastern Australia imply localized dispersal of larvae.* J. Exp. Mar. Biol. Ecol. 124; 175-203

McShane, P, 1992. *The early life history of abalone, a review.* p. 120-138. *In* Shepherd, Tegner, and Guzman del proo [eds.] Abalone of the World: biology, fisheries, and culture. Blackwell Scientific Pubs. Ltd., U.K. 608 p.

Parrish R., 1999. *Marine Reserves for Fisheries Management: Why Not?* CalCOFI Rep., Vol. 40, 1999

Prince, J., Sellers, T., Ford, W., and Talbot, S. 1988. *Confirmation of a relationship between the localized abundance of breeding stock and recruitment for Haliotis rubra.* J. Exp. Mar. Biol. Ecol. 122; 91-104.

Appendix H – Literature Cited, cont.

Prince, Jeremy, 1989 *The fisheries biology of the Tasmanian stocks of Haliotis rubra.* Ph.d. thesis, University of Tasmania, Hobart, Australia. 174 p.

Prince, J., Walters, C., Ruiz-Avila, R. and Sluczanowski, P. 1998. *Territorial user's rights and the Australian abalone fishery. In* Proceedings of the North Pacific Symposium on Invertebrate Stock Assessment and Management. Can. Spec. Publ. Fish. Aquat. Sci. 125. pp. 367-375.

Prince, Jeremy D. *The Bare-foot Ecologist's Toolbox.* 2001 Biospherics P/L PO Box 168, Southe Fremantle, WA 6162, Australia

Review of the Management Plan of the Tasmanian Abalone Fishery, 1999. Department of Primary Industries, Water and Environment GPO Box 44A, Hobart TAS 7001.

Shepherd, S., Lowe, D., and Partington, D. 1992. *Studies on southern Australian abalone.* XIII. Larval dispersal and recruitment. J. Exp. Mar. Biol. Ecol. 164; 247-260.

Shepherd and Brown, 1993. *What is an Abalone Stock: Implications for the Role of Refugia in Conservation*, Can. J. Fish. Aquat. Sci., Vol 50,

Tegner, M. 1992. *Brood stock transplants as an approach to abalone stock enhancement.* p. 461-473 *In* Shepherd, Tegner, and Guzman del proo [eds.] *Abalone of the World: biology, fisheries, and culture*. Blackwell Scientific Pubs. Ltd., UK. 608 p.

Tegner, M., Haaker, P., Riser, K., Vilchis, I., 2001. *Climate variability, kelp forests, and the southern California abalone fishery.* Journal of Shellfish Research, Vol. 20, No. 2, pp. 755-763.

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