COMMERCE

Administration

UNITED STATES DEPARTMENT OF

National Oceanic and Atmospheric

NATIONAL OCEAN SERVICE
Special Projects Office
Silver Spring, Maryland 20910

MEMORANDUM FOR: Pacific Fishery Management Council
SSC Marine Reserves Subcommittee

FROM: Dr. Vernon R. (Bob) Leeworthy
Peter C. Wiley
NOAA/NOS/Special Projects

SUBJECT: Responses to questions and comments on "Socioeconomic Impact Analysis of Marine Reserve Alternatives for the Channel Islands National Marine Sanctuary", April 29, 2002.

A. Questions and Responses

Question 1. In the Net Assessment, where did the $8 million commercial fishing consumer's surplus estimate came from?.

Response 1. See pg. 108 "Commercial Fishing and Kelp".

Question 2. Were there specific studies that the $3, $5, and $10 in non-use values came from or were they a range of estimates from the Desvouges and Carson papers?.

Response 2. See pg. 102 "What we know about nonuse economic values".

Question 3. What were the source(s) of the multipliers used in the recreation industry analyses?

Response 3. They were simply a range of multipliers taken from our experience. They are Keynesian type multipliers, which are not the same as sectoral multipliers that would be found in the U.S. Department of Commerce's Regional Information Management System (RIMS) or in the IMPLAN input-output models. The counties of Los Angeles, Ventura and Santa Barbara are relatively large and diverse economies and the multipliers used are at the upper range of County Keynesian type of multipliers from our experience. The range of multipliers is also important (See Appendix H) because of the lack of more detailed estimates on the amount of activity by residents of each county versus nonresidents of each county relative to the County of access.

Question 4. Were commercial fishing logbooks used?

Response 4. Generally the answer is no. In the beginning of the project, we attempted to obtain logbooks for the commercial fisheries. We found out that not all the fisheries had a logbook requirement and for those that did, the California Department of Fish and Game (CDFG) neither had a master list of who maintains which logbooks, but also that there were no standards for how information was maintained. Some maintained electronic databases others simply had information in paper files (not necessarily organized in any fashion for public consumption). Our contractor, Dr. Craig Barilotti, did obtain urchin

logbooks and the information contained in them was used to check the data against what we obtained from the fishermen directly with respect to distribution of catch. The squid logbook forms were shown to us by the squid fishermen early in the project, but they were not yet implemented.
Question 5. How were the consumer's surplus estimates for recreation derived?

Response 5. Sent to you by e-mail from Pete Wiley early on Friday 6/14/2002. The question was how the person trip estimates in Wegge et. al. were translated to person days estimates. The answer is that they were divided by the mean number of days per trip found on page 30 (third paragraph up from the bottom).

B. Comments and Responses

Comment 1. It is wrong to use price elasticity of demand as a proxy for quality elasticities of value as was done for the Step 2 analysis of non-consumptive recreation. This coupled with the fact that the estimates of quality elasticity are arbitrary made these benefits meaningless.

Response to Comment 1. We know it is not technically correct to use price elasticities of demand for quality elasticities of demand. The former represent movements along a demand curve and the latter represent shifts in the demand curve. In our application, the quality elasticities are not technically quality elasticities of demand, but instead quality elasticities of consumer's surplus. We should have cited Freeman (1995). What we found was that the range of price elasticities from the literature on recreation demand was not different from the quality elasticities found in Freeman (1995).

The Freeman (1995) study covered marine recreation. Most were fishing studies with a few beach, boating or swimming studies, and the quality parameters were mostly catch rate or water quality. (See A. Myrick Freeman III, 1995, The Benefits of Water Quality Improvements for Marine Recreation: A Review of the Empirical Evidence. Marine Resource Economics, Volume 10, pp 385-406.). We should have cited this study instead of the study on price elasticities.

There are few studies available with quality elasticities but we would argue that our estimated range of quality elasticities is not arbitrary. They do reflect a reasonable range of values for policy simulation and do provide useful information about the possible magnitude of potential benefits to a particular user group.

Comment 2. The non-use value estimates found in the net assessment table (Table 3.29 on page 109 of your report) are not based on proper benefits transfer techniques. The studies in Desvouges were not marine resources and Carson has said that a change in the resource being valued or even the way the question is stated may have large impacts on the estimate.

Response to Comment 2. First, your comments on proper benefits transfer techniques. You are going to have to back that up. I have organized two National Workshops on the topic of "Benefits Transfer" with the Association of Environmental and Resource Economists (AERE). The latter one was a formal follow-up to the first. "Benefits Transfer: Procedures, Problems, and Research Needs", 1992 Association of Environmental and Resource Economics Workshop, Snowbird, Utah, June 3-5, 1992. I have also assisted the U.S. Forest Service by teaching "Benefits Transfer" procedures to Forest managers (National Workshop on Obtaining Recreation Values and Economic Impacts, Chattanooga, TN, March 10-12, 1998). Our workshops both preceded and followed the special issue of Water Resources Research, Volume 28, Number 3, March 1992 devoted to benefits transfer. The conclusion from these workshops is that the profession is divided and could not come to consensus on a set of protocols and procedures. Several authors have presented sets of protocols and procedures, but they were not generally accepted. Most still fall back on professional judgement.

There are issues such as transferring values of functions (no consensus) or calibration (adjusting for various methods—direction and scale of adjustment coming from meta analyses). Again, no consensus. And, an important point is that these issues dealt with studies where use values were at issue. There has been very little attention given to transfer of nonuse values.

Second, you say the studies in Desvouges were not marine resources. What evidence do you have that nonuse values for marine resources, especially the range from the lowest end of the distribution of values, would be any different from those from non-marine resources. There is none. In fact, we say there are no known studies of nonuse or passive economic use value for marine reserves (see pg. 101, Nonuse of Passive Use Economic Value).
Third, you cite Richard Carson as saying that a change in the resource being valued or even the way the question is stated may have large impacts on the estimate. The statement is completely irrelevant. It is the same tact that the panel hired by Exxon used in attacking the estimates for nonuse value lost by the Exxon-Valdez Oil Spill. That panel attacked the contingent valuation method in general and especially it's use in estimating nonuse values. The NOAA Blue Ribbon Panel countered their findings. However, what you are implying is that any estimate that has wide variance is not useable. Many economists have found that the demand for any good or service can have wide variation depending upon functional form of the estimating equation or a host of other econometric issues. This doesn't make econometric estimates unusable. Many have found that prices for the same goods and services in the same markets have wide variation. Your point about the possibility of wide variation in any estimates of value are irrelevant, it applies in almost all cases.

Our choice of $3, $5, and $10 was taken from the low end of the distribution of values from 19 studies of nonuse value in the literature. We argue that this biases the analysis against nonusers and we call these "conservative" estimates (see explanation on pg. 102 "What we know about nonuse economic values). We also use a very "conservative" (i.e., lower bound) estimate of the percent of U.S. households that might be willing to pay these amounts. We use some National Surveys that would lend some support to our contention, as well as the fact that the Exxon-Valdez number were applied to 90 percent of the U.S. households and we were only applying the estimates to one (1) percent of U.S. households.

Our nonuse value estimates again apply a reasonable lower bound range of values for policy simulation and in our application, we find that even when biasing values upwards in favor of consumptive uses and downwards for nonusers and non-consumptive users, there would be Net National Benefits for marine reserves in the Channel Islands National Marine Sanctuary. We stand by that conclusion.

Comment 3. In your Step 2 analyses, you use the terms likelihood and low/high probability without statistical basis to back these claims up.

Response to Comment 3. We don't believe either of these two terms are in anyway restricted for use to only when one has a specific quantitative estimate based on a particular statistical procedure. All our statements in Step 2 analysis are based on our judgement bringing together quantitative information and qualitative information. Our judgements may not find consensus among all on the Socioeconomic Panel. When speculating on the future (short or long run) there is uncertainty and different judgements cannot either be proved or disproved. See our discussion in the Introduction to our report (page 1).

C. Suggestions and Responses

Suggestion 1. On page 5 of the report, last paragraph under the heading "Commercial Fishing and Kelp Harvesting", you say "It is not always true that there will even be short-term losses (Leeworthy, 2001a)". Put in example from Tortugas.

Response to Suggestion 1. We cite the report with the findings for the Tortugas. If someone wants to go check out the details they can access the report.

Suggestion 2. Speculate about what other activities (i.e., other fisheries) that displaced fishermen might engage if displaced.

Response to Suggestion 2. We showed that the commercial fishing in the Channel Islands National Marine Sanctuary can be characterized as a multi-species fishery. We have no idea how fishermen will reallocate effort across either species or space after being displaced. This is the noted weakness in the current state-

of-the-art in modeling (i.e., empirical applications of the Sanchirico and Wilen models and beyond). The only approaches available would be direct interview approaches asking the fishermen to say how they think they would change their behavior with respect to each of the proposed alternatives. Without some kind of additional research, we would not have any basis for such speculation.

Suggestion 3. Estimate percent dependence on the Channel Islands for the population of fishermen in addition to your sample.

Response to Suggestion 3. As we have noted in the report, our sample is not a representative sample of all fishermen. It is biased towards the fishermen that account for most of the catch and value of catch. One cannot extrapolate to the general population of fishermen on the issue of dependence with this sample data. One can only get an idea of the extent of potential impact based on dependence with our sample. See tables 2.26 to 2.29.

Suggestion 4. Estimate the potential loss of effort in addition to loss of ex vessel value. Look into PacFIN data to see if it would support it.

Response to Suggestion 4. This would require implementation of the Sanchirico and Wilen type models. We don't think this is possible at this time. We have reviewed all the fishery management plans and the literature on implementing such models and we find very little in the way of bioeconomic models or reliable catch-effort relationships for any fishery in the Channel Islands or elsewhere in California. The real issue is what will happen to displaced effort. See response to Suggestion 2 above. We attended the North American Fishery Economists meeting in New Orleans April 2001. Jim Wilen gave a presentation on the bioeconomic spatial model for predicting effort allocation as a result of hypothetical marine reserves for red urchins in Northern California. Jim concluded that even in the simple case of red urchins in Northern California (simple oceanography characterized by north to south current flow) model could only yield qualitative results about what happens to total effort and how effort would be reallocated. Quantitative estimates thought not to be reliable (current state-of-the-art). The Channel Islands have a much more complex oceanography. Also, the dominant fishery in the Channel Islands is for market squid. The latest report we reviewed with attempts to estimate fishery stocks from catch statistics were not very successful. This is an area that needs a lot of research and is certainly beyond the scope of our effort.

EXCERPTS FROM

SOCIOECONOMIC IMPACT ANALYSIS OF MARINE RESERVE ALTERNATIVES FOR THE CHANNEL ISLANDS NATIONAL MARINE SANCTUARY

APRIL 29, 2002
DR. VERNON R. LEEWORTHY AND
PETER C. WILEY

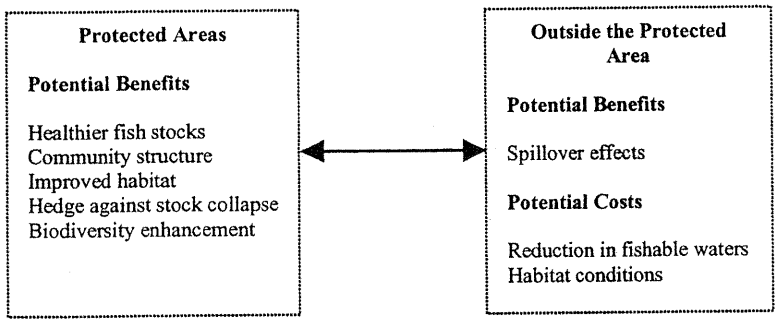
CITED IN JUNE 14, 2002 LETTER
FROM
LEEWORTHY AND WILEY
TO
SSC MARINE RESERVES SUBCOMMITTEE

The information and analyses presented here provide critical baseline information to contribute to the adaptive management of the Channel Islands National Marine Sanctuary. The use of ***monitoring*** to address uncertainty is fundamental to the practice of ***adaptive management.*** We regard the information and analyses presented here as a first step in the adaptive management process.

Benefits and Costs of Marine Reserves (no take areas)

There are two perspectives on identifying the benefits and costs of marine reserves. The first focuses on the potential biophysical benefits and costs. Sanchirico (2000) has provided a simple summary of these benefits and costs (Figure 1). These are issues for which the Science Panel for the Marine Reserves of the CINMS has summarized the literature supporting the biophysical benefits and costs. A key distinction is the closed areas themselves versus the areas outside the closed areas, and the linkages between the areas. As Sanchirico and Wilen (2001) have shown, the biophysical benefits and costs are contingent on socioeconomic behavioral responses. So even though socioeconomic benefits and costs are dependent on the biophysical benefits and costs, the biophysical benefits and costs are predicated on socioeconomic behavioral responses. The determination of final outcomes is dependent upon both how both the natural environment and humans respond to the protection strategy.

Figure 1. Potential Ecological/Biological Benefits and Costs of Marine Reserves



The boundaries of the two areas are drawn with dashed lines to symbolize the openness of the marine ecosystem. The link between the two areas is formally defined by the migration/dispersal patterns of fish stocks residing within and outside the protected areas along with the geographic or oceanographic characteristics of the marine environment. In general, fish migration patters depend upon currents, temperatures, prevailing winds, and behavioral characteristics. The term "community structure" refers to the potential benefits in age/size structure of the fish stock and in trophic levels present in the protected area.

Source: Sanchirico (2000)

The second perspective on benefits and costs of marine reserves is the socioeconomic benefits and costs. As stated above, they are both contingent on the biophysical benefits and costs and on socioeconomic behavioral responses. In addition, there is a time dimension to benefits and costs. For purposes of our analyses, the short-term is defined as one to five years and the long-term, beyond five years. Below we list each potential benefit and cost along with each user group that would receive each benefit and/or cost and what measurement we would use to quantify or describe qualitatively the benefit and/or cost.

Table 1.20 Economic Parameters for Recreation Activities

Study[1]	Valuation Method	Valuation Estimate	Activity	Geographic Coverage
NMFS, 1980	Travel Cost	None given[2]	Fishing	Mexican Border up to and including San Francisco Bay, except the Monterey, Santa Cruz area.
Rowe, et. al. 1985	Multinomial Logit Travel Cost	Santa Barbara County: $6.90 Ventura: $4.74 San Luis Obispo: $7.29	Fishing	California, Oregon, and Washington by coastal county
Wegge, et. al. 1983	Travel Cost & Contingent Valuation	TC:Charter/ Party boat: $5.33 Private boat: $17.92 CV: Charter Party:$5.45 Rental Boat: $15.00 Private Boat: $30.00[4]	Fishing	Northern border of San Luis Obispo County to Mexican border and 40 miles inland (by zip code).
Thomson and Crooke, 1991	Contingent Valuation	None Given[5]	Fishing	Coastal counties from San Luis Obispo to the Mexican Borders
Hanemann et. al. 1991	Travel Cost	[6]	Fishing	MRFSS Southern California Region (Santa Barbara County Southward).
Gemmar, et. al. 2001	n/a	Expenditure Profiles (See Table 1.19)	Fishing	Pacific Coast

1. See the References section for full citations.
2. The travel cost model was estimated, but valuation estimates were not calculated.
3. The way the CS estimates were calculated is by using the probability that an individual will take a trip to each available site/mode alternative under alternative resource price and quality conditions. The study gives a matrix of CS estimates by destination county, county of origin and mode of fishing. According to the explanation of the estimation method, "Expected consumer's surplus decreases for fishermen from counties further away from the site. This reflects that they have a lower probability of visiting the site on any one visit and , by being further away they have higher expenditures and lower CS associated with the site." For this reason I've included here only estimates for the same county of origin and the destination. Also, I only included boat modes. Amounts are per person per trip estimates in 1981 dollars.
4. Travel cost values given in the report were person-trip estimates. The CV estimates are person-day values, except for charter/party boat estimate which is person-trip. The estimates shown here are all person-day estimates. The estimates which were given as per-trip in the report were translated into person-day estimates by dividing the per-trip estimates by the average trip length of 4.13.
5. Contingent valuation questions were asked and a series of tables with answers were presented, however no benefits estimates were developed from the CV answers.
6. The only CS estimates published were aggregate annual figures. There was insufficient information in the report to break these figures down to per-person-per-day figures.

Table 1.21 Baseline Consumptive Recreation Activity

	Charter/Party Boat Fishing	Charter/Party Boat Diving	Private Boat Fishing	Private Boat Diving
Person-days	158,768	17,934	214,015	47,190
Market Impact				
Direct Sales	$ 20,638,407	$ 3,008,782	$ 8,888,043	$ 2,595,450
Direct Wages and Salaries	$ 9,475,042	$ 1,449,065	$ 2,499,255	$ 683,447
Direct Employment	279	48	85	24
Total Income				
Upper Bound	$ 16,581,324	$ 2,535,864	$ 4,373,697	$ 1,196,032
Lower Bound	$ 14,212,564	$ 2,173,598	$ 3,748,883	$ 1,025,171
Total Employment				
Upper Bound	418	72	127	37
Lower Bound	348	60	106	31
Non-Market Impact				
Consumer's Surplus[1]	$ 1,838,358	$ 207,642	$ 2,478,026	$ 545,243
Profit[2]	$ 376,295	$ 44,004	n/a	n/a

1. Consumer's Surplus is calculated by multiplying the average consumer's surplus per person per day from the the studies on the attached reference list (11.58) by the number of person days in this table.
2. Profit is used as a proxy for producer's surplus.

- Provides controlled natural areas for assessing anthropogenic impacts, including fishing and other impacts

Education

- Provides sites for enhanced primary and adult education
- Provides sites for high-level graduate education

B. Potential Costs

1. Commercial Fishing and Kelp Harvesting

As mentioned above, commercial fishing is one of the displaced activities from marine reserves. Sanchirico and Wilen (2001) discuss the biophysical and socioeconomic conditions under which commercial fisheries might benefit or suffer costs from marine reserves. There are sets of conditions under which they predict would result in short-term and/or long-term costs.

- Lost harvest revenue and income to fishermen and processors.
- Secondary losses in output/sales, income, jobs and tax revenues in local economies (through economic multiplier process).
- No loss in harvest but increased cost of harvesting resulting in lost income to fishermen.
- Losses in Consumer's Surplus to consumers of commercial seafood products (if prices rise for fishery products due to reductions in harvests).
- Overcrowding, User conflicts, Possible Overfishing or Habitat destruction in remaining open areas due to displacement. This could raise costs and/or lower harvests.
- With displacement, loss of site-specific harvest knowledge that supports sustainable fishing practices.
- Social disruptions from losses in incomes and jobs.

The extent to which these costs are realized in the short-term or long-term depends greatly on the off-site impacts of the protected areas as listed in Figure 1, but also on the status of the fish stocks fishery management regulations (are current harvest levels sustainable?), and the behavioral responses and economic conditions of the fishing industry. It is not always true that there will even be short-term losses (Leeworthy, 2001a).

2. Recreational Fishing and Consumptive Diving

As mentioned above, recreational fishing and consumptive diving would be displaced from marine reserves. Sanchirico and Wilen (2001) discuss the biophysical and socioeconomic conditions under which these user groups might benefit or suffer costs from marine reserves. There are sets of conditions under which they predict would result in short-term and/or long-term costs.

- Lost sales revenue and income to businesses that directly provide goods and services to recreational fishermen and consumptive divers.
- Secondary losses in output/sales, income, jobs and tax revenues in local economies (through economic multiplier impacts).
- Losses in Consumer's Surplus (if consumptive users are forced to substitute to less valued locations or if they are crowded into remaining open areas where they experience congestion effects or if it costs more to relocate to other areas).
- Losses in Economic Rent (may or may not exist in open access environment).

As with the commercial fisheries, whether any of the above costs are short-term or long-term depends greatly on the off-site impacts of the protected areas as listed in Figure 1, but also status of the fish stocks fishery management regulations (are current harvest levels sustainable?), and on the behavioral responses

we also obtained the percent of their incomes that come from fishing. We were thus able to calculate the percent of a fisherman's total income from all sources that would be potentially impacted by each alternative. The results for the Barilotti sample are in Table 2.26 and the results for the Pomeroy sample in Table 2.27.

Table 2.26 Summary of Ranges of Potential Losses of Income to Individual Fishermen: Barilotti Sample - Step 1 Analysis

Percent of Revenue Derived from Fishing In CINMS [1]	Percent of Income Loss					
	Alternatives					
	1	2	3	4	5	Preferred
80 - 100 (N=30)	0.87 - 20.92	2.36 - 19.93	0.87 - 20.92	4.37 - 27.90	6.88 - 30.69	2.36 - 23.71
60 - 80 (N=6)	5.15 - 15.53	7.73 - 18.63	5.15 - 18.63	10.13 - 24.84	12.88 - 31.05	9.02 - 18.63
40 - 60 (N=7)	0.00 - 8.43	0.00 - 9.08	0.00 - 8.43	0.00 - 10.37	3.27 - 14.27	1.09 - 11.68
20 - 40 (N=4)	0.00 - 5.84	2.41 - 6.57	0.00 - 5.84	2.41 - 6.80	1.81 - 10.22	1.20 - 6.01
0 - 20 (N=7)	0.05 - 2.19	0.06 - 2.99	0.05 - 2.04	0.09 - 3.86	0.11 - 4.08	0.06 - 2.99
All (N=54)	0.00 - 20.92	0.00 - 19.93	0.00 - 20.92	0.00 - 27.90	0.11 - 31.05	0.06 - 23.71

1. Percents of fishing revenues show dependency on CINMS. The N-value in parentheses is the number of fishermen from the Barilotti Sample that earn the range of percent of revenues from fishing in the CINMS.
2. Income is total income from all sources.

Table 2.27 Summary of Ranges of Potential Losses of Income to Individual Squid/Wefish Fishermen - Step 1 Analysis

Percent of Revenue Derived from Fishing In CINMS [1]	Percent of Income Loss					
	Alternatives					
	1	2	3	4	5	Preferred
80 - 100 (N=9)	1.88 - 6.76	6.04 - 14.88	2.81 - 7.44	6.62 - 14.81	9.64 - 17.35	6.62 - 14.52
60 - 80 (N=7)	0.65 - 7.02	1.15 - 16.24	0.94 - 7.61	1.44 - 15.43	1.94 - 21.03	1.66 - 15.83
40 - 60 (N=3)	2.84 - 5.30	6.98 - 11.83	5.23 - 9.54	1.31 - 10.52	8.13 - 14.84	6.66 - 11.83
20 - 40 (N=8)	0.19 - 7.33	0.42 - 9.70	0.16 - 8.09	0.47 - 11.29	0.87 - 13.38	0.87 - 10.22
0 - 20 (N=6)	0.02 - 0.60	0.09 - 1.00	0.03 - 0.63	0.11 - 1.02	0.16 - 1.98	0.12 - 1.06
All (N=33)	0.02 - 7.33	0.09 - 16.24	0.03 - 9.54	0.11 - 15.43	0.16 - 21.03	0.12 - 15.83

1. Percents of fishing revenues show dependency on CINMS. The N-value in parentheses is the number of sampled squid/wetfish fishermen in the sample that earn the range of percent of revenues from fishing in the CINMS.
2. Income is total income from all sources.

The Barilotti sample appears to be highly dependent on the CINMS for their catch with 30 of 54 fishermen or 55.55% deriving 80 to 100 percent of their fishing revenue from the CINMS. The range of potential impacts for this most dependent group rank identically to total ex vessel revenue as discussed in our more aggregate analysis. The same patterns hold for the group that depends on the CINMS for 60 to 80 percent of their fishing revenue. Generally, one can see as the level of dependency on the CINMS for fishing revenues falls, the ranges of percent of income potentially impacted declines as expected. The maximum impact on an individual fisherman's income is 31 percent for Alternative 5, followed by 27.9 percent for Alternative 4 and 23.7 percent for the Preferred Alternative. The maximum was 20.92 for both Alternative 3 and Alternative 1, while the maximum for alternative 2 was 19.9 percent.

The Pomeroy sample (squid/wetfish fishermen) showed less dependency than the Barilotti sample on the CINMS for their total fishing revenue and the maximum impacts on their incomes was only about half that of the Barilotti sample. Nine (9) of the 33 (27%) purse seine and light boat operators that reported full information depended on Channel Islands fisheries for 80 to 100 percent of their fishing revenue. The ranking across alternatives was somewhat different from that of our more aggregated analysis for this group, who are most dependent on Channel Islands fisheries. Alternative 5 had the greatest impact followed by Alternative 2, Alternative 4, the Preferred Alternative, Alternative 3 and Alternative 1. Seven (7) or 21 percent of the Pomeroy sample depend on Channel Islands fisheries for 60 to 80 percent of their fishing revenues. The ranking here was again different for this group across alternatives. Alternatives 5 and 2 still had the greatest impact on this group, whereas the Preferred Alternative had a slightly higher, but not significantly different impact than Alternative 4. Alternatives 3 and 1 had the lowest impact for this group.

In Tables 2.28 and 2.29, we organized the Barilotti and Pomeroy sample according to the ranges of potentially lost income. In these displays, one can see the relative impacts across alternatives. Alternatives 5 and 4 are the only alternative for which any one in either the Barilotti or Pomeroy samples would potentially lose more than 25 percent of their income. Except for Alternative 5, very few fishermen would lose more than 20 percent of their incomes. 57 percent of the Barilotti sample and two-thirds of the Pomeroy sample would potentially lose 10 percent or less of their income under the Preferred Alternative.

Table 2.28 Summary Impact on Income of Individual Fishermen: Barilotti Sample - Step 1 Analysis

	Number of Fishermen in Sample [1]					
Percent of Income Potentially Lost	Alternatives 1	2	3	4	5	Preferred
0 - 1.0	9	6	9	5	3	5
1.01 - 5.0	10	9	10	9	6	9
5.01 - 10.0	16	16	16	9	9	17
10.01 - 15.0	11	12	11	14	10	10
15.01 - 20.0	7	11	7	11	8	10
20.01 - 25.0	1	0	1	5	12	3
25.01 - 31.05	0	0	0	1	6	0

1. 54 Fishermen form the Barilotti Sample with reported revenues and household income.

Table 2.29 Summary Impact on Income of Individual Squid/Wefish Fishermen - Step 1 Analysis

Percent of Income Potentially Lost	Number of Fishermen in Sample [1]					
	Alternatives					
	1	2	3	4	5	Preferred
0 - 1.0	9	7	9	5	5	5
1.01 - 5.0	17	3	14	7	5	5
5.01 - 10.0	7	12	10	8	5	12
10.01 - 15.0	0	10	0	12	12	10
15.01 - 17.35	0	1	0	1	6	1

1. 33 Squid/Wetfish fishermen with reported reveneues.

What we know about nonuse economic values. We searched the literature and found 19 studies in which nonuse economic values were estimated. Desvouges et al (1992) contained summaries of 18 of the 19 studies. The remaining study was by Carson et al (1992) on the Exxon Valdez Oil Spill. Sixteen (16) of the 18 studies found in Desvouges et al (1992) reported values (not adjusted for inflation) of $10 or more per household per year for a broad variety of natural resource protection efforts. Of the two studies that reported values less than $10/household/year, one reported $3.80/household/year for adding one park in Australia and $5.20/household per year for a second park (these estimates were from a National sample of Australians). The other study that estimated nonuse economic values less than $10/household/year was a study of Wisconsin resident's willingness to pay for protecting bald eagles and striped shiners in the State of Wisconsin. For the bald eagle, nonuse economic values had an estimated range of $4.92 to $28.38/household/year, while for striped shiners the values ranged from $1.00 to $5.66/household/year. Total value ranged from $6.50 to $75.31/household/year.

Only two of the 18 studies summarized in Desvouges et al (1992) used National samples of U.S. households, the others were limited to state or region populations. The Exxon Valdez Oil Spill Study (Carson et al, 1992) used a National sample of U.S. households. An important caveat is that the sample included only English speaking households and eliminated Alaskan residents. Alaskan residents were eliminated to limit the sample to primarily nonusers of Prince William Sound (site of the oil spill) and non-English speaking households were eliminated because the researchers were not able to convert their questionnaires to other languages. The impact was that the sample represented only 90 percent of U.S. households.

Carson et al (1992) reported a median willingness to pay of $31 per household. The payment was a lump sum payment through income taxes and covered a ten-year period. The funds would go into a trust fund to pay for equipment and other costs necessary to prevent a future accident like the Exxon Valdez in Prince William Sound. After 10 years, double hull tankers would be fully implemented and the need for the protection program would expire. Mean willingness to pay was higher and more variable to model specification than the median willingness to pay, so the authors argued that the median value was a conservative estimate. Applying the $31/household to only 90 percent of the U.S. population of households was also considered conservative since non English speaking people probably have positive nonuse economic values as do Alaskans.

Estimation of Nonuse Economic Values. Given what we know about nonuse economic values, we can develop a range of "conservative" (i.e., lower bound) estimates of nonuse or passive use economic values for the marine reserves in the CINMS. To do this requires the following assumptions and facts:

Assumptions:

1. One (1) percent of U.S. households would have some positive nonuse or passive economic use values for a network of marine reserves in the CINMS.
2. The one (1) percent of U.S. households would be, on average, willing to pay either $3/household/year, $5/household/year, or $10/houshold/year for marine reserves in the CINMS.

Fact:

1. As of July 1, 1999, there were 103.9 million households in the U.S.

Using the above assumptions and the number of U.S. households in 1999, we can estimate a probable lower bound set of estimates for the nonuse or passive use economic values for the network of marine reserves in the CINMS.

	$3/household/year	$5/household/year	$10/household/year
1999 Annual Amount	$3.12 million	$5.19 million	$10.39 million

The 1999 annual willingness to pay for marine reserves in the CINMS would range between $3.12 million and $10.39 million, depending on the assumed willingness to pay per household. We would expect that nonuse economic values would be greater the larger the area protected. But as described earlier, we would also expect willingness to pay to be positively related to both the characteristics of those valuing the reserve and the characteristics of what they are asked to value. Since our estimates of nonuse economic values are based on an assumed range of values (at the lowest end of the distribution of values estimated in other studies), we are not able to compare the values of the different alternatives in dollar terms. However, following the suggestions of Spurgeon, we demonstrate the characteristics of the U.S. population that would support our statement that the above estimates would likely be lower bound estimates.

Factors Supporting Positive Nonuse Economic Value. We reviewed four studies based on National surveys of U.S. households that evaluated adult's perceptions and concerns about the environment. In addition, one of the studies focused specifically on ocean related issues (SeaWeb, 1996) and found strong support for marine protected areas. One more recent study (SeaWeb, 2001) directly addressed the issue of marine protected areas and fully protected marine reserves. Each of the surveys demonstrated that U.S. citizens have a high level of concern about the environment and believe the environment is threatened and requires action and overwhelming support the creation of marine reserves. One recent study based on a survey of Californians (SeaWeb, 2002) found support for the California MLPA and for marine reserves in the CINMS. Also, our assumption that only one (1) percent of U.S. households would be willing to pay for marine reserves in the CINMS would appear to be a conservative lower bound estimate since the Roper survey (Roper, 1990) indicated that in 1990 eight (8) percent of U.S. households made financial contributions to environmental organizations. Selected results from the five studies are summarized below.

Environmental Opinion Study, Inc. National sample of 804 households conducted May 18-26, 1991.

Identification with Environmental Label

	%
Strong Environmentalist	31
Weak Environmentalist	29
Lean Towards Environmentalism	30
Neutral	6
Anti-Environmentalist	4

Roper 1989 and 1990 National Surveys

1. Things the Nation Should Make a Major Effort on Now

	1989 (%)	1990 (%)
a. Trying to solve the problem of crime and drugs	78	88
b. Taking steps to contain the cost of health care	70	80
c. **Trying to improve the quality of the environment**	**56**	**78**
d. Trying to improve the quality of public school education	N//A	77
2. Contribute money to environmental groups	7	8

SeaWeb 1996. National Sample of 900 U.S. Households (May 1-15, 1996)

1. Condition of the ocean	49% very important	38% somewhat important
2. Destruction of the ocean on Quality of Life		
a. Today	52% very serious	35% somewhat serious
b. 10 years from now	63% very serious	23% somewhat serious
3. Oceans threatened by human activity		82% agree
4. The federal government needs to do more to help protect the oceans		85% agree to strongly agree
5. Destruction of ocean plants/ animals		56% very serious problem
6. Overfishing by commercial fishermen		45% very serious problem
7. Deterioration of coral reefs		43% very serious problem
8. Protect sanctuaries where fishing, boating, etc, prohibited		62% strongly agree
9. Support efforts to set up Marine Sanctuaries		24% say they are almost certain to take this action
10. Marine sanctuaries where no human activity is permitted		19% say they are almost certain to take this action

SeaWeb 2001, A combination of two studies.

1. **Attitudes Toward Marine Reserves, National Sample of 1,000 Adult Americans Nationwide, February 9-11, 2001**

2. **Public Attitudes Toward Protected Areas in the Ocean, National Sample of 802 Adult Americans Nationwide, September 25, 1999 to October 3, 1999**

Summary of Key findings:

- **Most Americans have a fairly Negative View of the Overall Health of the Oceans** (44% - Only Fair, and 15% - Poor for a total of 59% with Negative ratings)
- **Nearly Two-thirds believe that regulations protecting the ocean are too lax** (63% - regulations are not strict enough)
- **Pollution, Contaminated Seafood, and Dirty Beaches Top the list of ocean concerns. Recreation-related concerns are seen as less serious.**
- **Large majorities find the condition of both "Coastal" and "Deep Sea" Waters Important**
  "How important is the condition of _____ to you personally?"
  Coastal Waters (69% very important and 23% somewhat important)
  Deep Sea (53% very important, 30% somewhat important)
- **Americans believe a far greater percentage of our ocean waters are fully protected than actually are.**
  "As you may know, there are different kinds of protected areas in American oceans – some are fully protected and allow no human activities that could harm the ocean environment at all. Other kinds of protected areas have lower levels of protected areas and ban only certain activities. What percentage of U.S. waters do you think are fully protected – that is, allow no human activities that could harm the ocean environment at all?"
  On average, Americans believe 22% of the oceans is fully protected.
- **Only one-third of Americans are even dimly aware of the existence of Marine Sanctuaries.**
  "Do you happen to know whether or not the federal government has established certain areas of the ocean as marine sanctuaries – or don't you happen to know?"
  (Yes-do know, 33%, No-don't know, 17% and Don't Know, 50%)

- **Most Americans think there are too few Marine Sanctuaries.**
  "Currently there are 12 areas of the ocean in US territorial waters that are designated as marine sanctuaries. Do you think that is too many, about the right number, or too few?"
  (Too Few-60%, About Right-19%, Too Many-3%, Don't Know-18%)
- **Support for Strengthening Protections in the 12 Marine Sanctuaries is Overwhelming.**
  "There are currently 12 marine sanctuaries in United States territorial waters which total about 1% of US waters and there are few restrictions on recreational or commercial activities within the sanctuaries. Do you think that we should increase protections that restrict human activities within the sanctuaries or do you think we should not increase protections that restrict human activities within marine sanctuaries in U.S. waters or don't you have an opinion on this?"
  (Increase Protections-75%, Do not Increase Protections-10%, Don't Know-15%)
- **A plurality think of the ocean as a habitat for marine creatures. Only a minority thinks of the ocean in purely instrumental terms.**
  "Which of the best describes how you mainly think of the ocean?"
  - *As a habitat for the fish, marine creatures and plants that live in the ocean (41%)*
  - *As a spiritual place important to human life on earth (13%)*
  - *As a place for recreation such as swimming, boating, fishing, and vacationing (17%)*
  - *As an important source of food (15%)*
  - *As an important resource for oil and transportation (6%)*
  - *Other or don't know (8%)*
- **At the same time, People are not sure exactly how ocean systems work. Most, but far from all, think fish breeding grounds and coral reefs are found only in particular places.**
  "As far as you know, do most species of fish breed all throughout the ocean or do various species of fish breed in particular places within the ocean or don't you have an opinion on this?"
  (All Over-14%, Particular Places-63%, Don't Know-24%)
  "As far as you know, are coral reefs only found in certain areas of the ocean or are they found all throughout the ocean or don't you have an opinion on this?"
  (Throughout-26%, Certain areas-56%, Don't Know-18%)
- **On the other hand, most feel that pollution in one area affects the whole ocean.....**
  "As far as you know, does pollution entering on area of the ocean affect the entire ocean, or does it mostly affect the area of the ocean near the source, or don't you have an opinion on this?"
  (Entire Ocean-58%, Area Near Source-34%, Don't Know-8%)

- **...Which results in division on whether the ocean has unique areas that can be protected.**
  "Which of the following statements comes closest to your own view: the ocean, like the land, has certain areas that are unique and can be protected from pollution or overfishing <u>OR</u> The ocean is one giant body of water and protecting one particular area of it from pollution or overfishing is useless since anything that is done in one part of the ocean will affect every other part or don't you have an opinion on this?"
  (Unique Areas-47%, One Giant Body-43%, Don't Know-10%)
- **Yet, when these areas are described, support for protected areas is broad and strong.**
  "Do you favor or oppose the United States having certain areas of the ocean within U.S. territorial waters as ocean protected areas in which activities that can result in pollution, seriously deplete fish or marine life, or damage important underwater habitat such as coral reefs and other special places are limited, or don't you have an opinion on this?"
  (Favor-75%, Oppose-10%, Don't Know-15%)
- **Overwhelming public support for the Clinton Executive Order on marine reserves (from Feb., 2001 Survey)**
  "Last May, former President Clinton signed an executive order calling on states, local governments and non-governmental organizations to create a system of protected areas in the oceans off the U.S. coasts. Do you favor or oppose this executive order to establish a system of marine protected areas in U.S. waters?"
  (Favor-83%, Oppose-16%, Don't Know-2%)
- **Top goals for ocean protected areas focus on dumping and pollution, followed by protection of sea life and habitats. Middle tear goals focus on management of commercial enterprise.**

- **Americans see a value in fully protected marine reserves with no exceptions for even recreational activities.**
  "We need some areas that are fully protected, even from recreational activities" (63%)
  "It is not right to prohibit individual recreational use of the ocean" (16%)
  "Don't Know" (21%)
- **The public finds scientific consensus to be a compelling reason to support fully protected marine areas.**
  "Leading marine scientists issued a statement recently saying that we need fully protected ocean areas that prohibit all invasive and extractive human activities, both recreational and commercial. These scientists say that the research shows that full protection in these areas leads to more robust and diverse marine life within the area, and also provides greater benefits to ocean habitat and marine life outside the protected area. How convincing is this as a reason to support fully protected ocean areas?"
  (Convincing-77%, Not Convincing-21%, Not Sure-2%)
- **A simple statement that we protect less than 1% of our ocean waters is very compelling to the public.**
  "Currently, we only protect less than 1% of US waters. To preserve this beautiful resource, we need to protect more. How convincing is this as a reason to support fully protected ocean areas?"
  (Convincing-88%, Not Convincing-9%, Not sure-3%)

SeaWeb 2002. Survey of 1,000 likely voters in California (January 8-16, 2002)

Summary of key findings:

- **64% say overall health of California's ocean is fair-to-poor**
- **62% say health of marine life, fish and mammals that live in California's ocean waters is only fair-to-poor**
- **56% say the abundance of marine life in state ocean waters is fair-to-poor**
- **22% believe their state's ocean waters are fully protected from all human activities that can harm the ocean environment.**
- **There is strong support for establishing fully-protected areas in the ocean in which all extractive activities are prohibited, including oil drilling, mining and all commercial and recreational fishing. 71% support establishing such areas in California's ocean waters, and 55% strongly support their establishment, while 15% are opposed.**
- **Even when respondents are told they might loose personal access to parts of the ocean, 69% continue to support full protected areas, while 16% are opposed.**
- **When told that the Marine Life Protection Act "provides for the establishment of a range of protected areas from fully protected with no commercial or recreational activities to those that allow all recreational and most commercial activities," 85% say it is important that the MLPA result in at least some percentage of California's ocean being fully protected from all commercial and recreational activities.**
- **65% say that the long-term benefits of a healthier and more abundant resources, including fish populations and increased tourism to restored ocean places is more important than the short-term costs in jobs, higher prices for goods and services and impacts on people whose incomes depend on ocean resources. Only 14% feel that short-term costs should take precedence.**
- **83% agree with the statement, "I am willing to give up personal access to certain places in the ocean just so there can be some places that are fully protected from all human use (59% strongly agree)**
- **89% agree that, "Individuals and businesses that use ocean resources have a responsibility to leave critically important habitat and nursery grounds for fish and marine mammals untouched" (66% strongly agree)**
- **80% agree that, "Protecting less than 1% of California's ocean from all commercial and extractive activities is not enough *55% strongly agree)**

The U.S. population is certainly a high income and highly educated population and, as the results above predictably show, the U.S. and California population has high environmental concern and overwhelmingly supports the creation of marine reserves. Characteristics of the people valuing the reserve would be constant (U.S. Households) across different proposed marine reserve boundary alternatives. To differentiate among alternatives would require that we compare some measurements that would serve as indicators of the relative quality, condition and uniqueness of the proposed reserves across alternatives. We have some information compiled on 15 habitat types protected by each alternative.

Alternative 1. This alternative is the smallest in size at approximately 186.5 nautical square miles and overall protects 12 percent of CINMS waters. Only three of the 15 habitats receive 20 percent or more of protection and only two habitats receive more than 30 percent protection. This alternative should have the lowest nonuse or passive economic use value.

Alternative 2. This alternative is the second smallest in size at approximately 213.1 nautical square miles and overall protects 14 percent of CINMS waters. Only four of the 15 habitats receive 20 percent or more of protection and only one habitat receives more than 30 percent protection. People may not be able to distinguish this alternative from alternative 1 without more information.

Alternative 3. This alternative is the third smallest in size at approximately 306.5 nautical square miles and overall protects 21 percent of CINMS waters. Only six of the 15 habitats receive 20 percent or more of protection and only two habitats receive more than 30 percent protection. This alternative would be expected to have higher nonuse or passive use economic value than alternatives 1 and 2.

Alternative 4. This alternative is the second largest in size at approximately 450.1 nautical square miles and overall protects 29 percent of CINMS waters. 14 of the 15 habitats receive 20 percent or more of protection and six habitats receive more than 30 percent protection. This alternative would be expected to have higher nonuse or passive economic use value than alternatives 1,2, 3 and the preferred alternative.

Alternative 5. This alternative is the largest in size at approximately 516.4 nautical square miles and overall protects 34 percent of CINMS waters. All 15 habitats receive 24 percent or more of protection and nine habitats receive more than 30 percent protection. This alternative would be expected to have the highest nonuse or passive use economic value among all alternatives.

Preferred Alternative. This alternative is mid-range in size at approximately 369.6 nautical square miles and overall protects 25 percent of CINMS waters. All 15 habitats receive 21 percent or more of protection and eight habitats receive more than 30 percent protection. This alternative would be expected to have nonuse or passive use economic value somewhere between that between alternatives 3 and 4.

Scientific and Education Values. Marine reserves provide a multitude of benefits. Sobel (1996) provides a long list of these benefits. Most of those benefits have been covered in Chapter 1 and 2 and in our discussion of nonuse economic benefits above. Scientific and education values were categorized by Sobel into those things a reserves provides that increase knowledge and understanding of marine systems. Sobel provides the following lists of benefits:

Scientific

- Provides long-term monitoring sites
- Provides focus for study
- Provides continuity of knowledge in undisturbed site
- Provides opportunity to restore or maintain natural behaviors
- Reduces risks to long-term experiments
- Provides controlled natural areas for assessing anthropogenic impacts, including fishing and other impacts

Education

- Provides sites for enhanced primary and adult education
- Provides sites for high-level graduate education

We cannot quantify these benefits, but they are extremely important.

Net Assessment

Here we provide a net assessment using the National Net Benefits Approach. Under this approach, only consumer's surplus and economic rent values are appropriate for consideration, as in a formal benefit-cost analysis. We are not able to quantify all the costs and benefits, especially not across all alternatives, as with the nonuse or passive economic use values. But with certain assumptions designed to bias the result in favor of the consumptive activities, we show that the nonuse or passive economic use values would likely exceed all consumptive use values. ***Thus, there would be net national benefits to adopting any of the alternatives for the proposed marine reserves in the CINMS.***

Commercial Fishing and Kelp. We concluded in Chapter 1 that the supplies of CINMS caught commercial fish were not a high enough proportion of total supply to affect prices, except possibly if you eliminated the entire supply of squid and urchins caught in the CINMS. The proportions of supply impacted by each marine reserve alternative would be far too small to impact prices and consumer's surplus impacts from each alternative would be zero. Also, we have found no evidence that economic rents exist in the CINMS fisheries. For the largest commercial fishery, squid, there appears to be economic overfishing and possibly negative economic rents. However, we decided that without definitive analysis, we would assume $8 million in consumer's surplus and economic rents for the CINMS commercial fisheries. This is a little higher than what we estimated for the Florida Keys National Marine Sanctuary for the entire Tortugas area. We then assume if you remove the amounts displaced in Step 1 analyses (Chapter 2) for each alternative and simply take the percent of ex vessel revenue lost times $8 million, we arrive at estimates for a rough comparison with nonuse or passive economic use values. This procedure is not technically correct and overstates the commercial fishing values and so biases the comparison in favor to the commercial fisheries.

Recreation Consumptive Activities. We use our Step 1 analysis estimates and ignore the offsetting factors discussed at the beginning of this chapter that indicate much of the losses in Step 1 would not likely occur. Again, the effect here will be to bias the analysis towards the consumptive users.

Nonconsumptive Recreation Activities. We simulated a range of potential benefits for a portion of the group that we were able to include in our analyses, i.e., those doing nonconsumptive activities using the for hire or charter/party/guide boat businesses. We were not able to find any information to estimate the amount of nonconsumptive use from private household/rental boats in the CINMS. We include a mid-range and upper range of values estimated for the charter/party/guide boat nonconsumptive users. Because the nonconsumptive private household boat use is not included, again our estimates are biased towards the consumptive users.

Table 3.29 summarizes the results of our National Net Benefits Assessment. The "+" at the bottom of the table means that, when comparing only the nonuse or passive economic use values with the sum of the consumptive use values, the nonuse or passive economic use values are always higher. This is true whether one compares consumptive use values with either the lowest, mid-range or highest nonuse or passive use economic values. ***Thus, we can conclude there would be net national benefits from adopting any of the marine reserve alternatives for the CINMS, even when estimates for consumptive users are biased upwards and we compare them with the lowest potential nonuse or passive use economic values.***

Table 3.29. Net Assessment: National Net Benefits of Marine Reserves in the CINMS

Use	Alternatives 1	2	3	4	5	Preferred
Costs						
Recreation Consumptive	$ 471,006	$ 832,222	$ 535,789	$ 1,024,276	$ 1,209,945	$ 902,077
Commercial Fisheries and Kelp	$ 615,200	$ 632,000	$ 674,400	$ 1,179,200	$ 1,462,400	$ 924,000
Total Consumptive	$ 1,086,206	$ 1,464,222	$ 1,210,189	$ 2,203,476	$ 2,672,345	$ 1,826,077
Benefits						
Recreation Non-consumptive						
Mid-range (50% quality increase, elasticity 1.0)	$ 15,553	$ 41,431	$ 15,555	$ 50,355	$ 61,542	$ 41,441
Highest (100% quality increase, elasticity 4.5)	$ 139,977	$ 372,875	$ 139,995	$ 453,195	$ 553,874	$ 372,969
Nonuse/Passive Economic Use						
Lowest ($3.12 million)	+	+	+	+	+	+
Mid-range ($5.19 million)	+	+	+	+	+	+
Highest ($10.39 million)	+	+	+	+	+	+

1. "+" means nonuse values higher than consumptive use values.

Net National Benefits Approach versus Local Income and Employment

Economists for years have been trying to explain cost-benefit analysis or the net national benefits approach. Even though cost-benefit analysis has been widely excepted in public policy and management many still don't understand the concepts of consumer's surplus, producer's surplus or economic rent used by economists in cost-benefit analysis. Many understand sales, income and employment numbers and how this relates to their local economies. But, generally these measures are not appropriate inputs into the cost-benefit calculation. They enter the analysis indirectly when one of the major assumptions of cost-benefit analysis is violated i.e., that the economy is at full employment and any displaced capital or labor can easily find employment. When the economy is not at full employment or capital and labor cannot simply find alternative employment, this leads to real economic costs that must included. There are also issues of equity or fairness that are not addressed in cost-benefit analysis. To address this issue some public agencies have asked that the distribution of costs and benefits be included in analyses.

The net national benefits approach versus the local income and employment approach partially addresses this question of the distribution of benefits and costs. As we showed above in the net national benefits exercise, the main benefits of marine reserves came from national sources that are highly dispersed across the country. Nonuse or passive economic use values will be dispersed widely across people throughout the country. There is no income and employment impacts associated with nonuse or passive use values, except the media sources, which are the basis for people finding out about the resources they value. Consumer's surplus values from changes in supply of commercial fishing products are also widely dispersed and, for many CINMS species, consumers would include foreign consumers. The potential income and employment impacts are largely concentrated in the local communities adjacent to the CINMS. If there are trade-offs, they might entail distributions of national benefits with most of the costs born locally. This is true for many goods and services where there might be high net national benefits, but the costs are concentrated (e.g. pollution and undesirable industrial development) in local areas. Oil and gas development is certainly one of these types of issues. Benefits are often small per individual dispersed across the whole country, while costs are high per a small number of individuals concentrated in local areas.

Why don't economists want to include income and employment impacts in cost-benefit analysis? The general answer is that is people don't spend their money on one thing they will spend it on something else. So, one person's loss is another person's gain. This is the issue of substitution we discussed in our Step 2 analysis, but on a broader scale. If someone is displaced from their favorite recreational fishing spot and decide to not go fishing, but instead go to out to a restaurant and see a movie. This too has sales, income and employment impacts that would partially or even fully off set the sales, income and employment impacts in the local economy of the lost fishing day. If people don't go fishing or diving, they will do something else and that something else will generally involve some activity which requires some spending. That spending will partially or fully off set the impacts on sales, income and employment. There may be different patterns of spending. And, it may be an issue of one person's loss is another person's gain. The

net effect could be zero, in terms of total local sales, income and employment, or it could be lower sales, income and employment locally, but no difference from a State, Region or National perspective. The same is not true for the net national benefits approach. The concepts of consumer's surplus, producer's surplus and economic rents are net benefits and costs. They may have different distributions, but they are by definition net benefits and costs and do not cancel each other out. This is why economists don't include income and employment in cost-benefit analyses.

Exhibit E.1.b
Draft Letter
September 2002

PACIFIC FISHERY MANAGEMENT COUNCIL
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DATE

Mr. Robert Treanor
Executive Director
California Fish and Game Commission
PO Box 944209
Sacramento, CA 94244-2090

RE: Marine Reserves in Channel Islands National Marine Sanctuary

Dear Mr. Treanor:

The Council appreciates the opportunity to work with the California Fish and Game Commission (Commission), the California Department of Fish and Game (Department), and the Channel Islands National Marine Sanctuary (CINMS) on issues associated with the potential development of marine reserves in California's Channel Islands. As we noted in our letter of July 15 to the Department, the Council would like to provide comments for the Commission's December 2002 deliberations on this matter. On August 14-15, 2002, the Council's ad hoc committee on marine reserves policy met in El Segundo, California to discuss the Council's involvement in the Channel Islands marine reserves process. The full Council considered the committee's recommendations, as well as those of its advisory bodies and the public, at its recent meeting in Portland, Oregon. The Council has developed the following comments.

First, three reports from our Scientific and Statistical Committee (SSC) are attached for your consideration. The first, which was also sent to you on November 29, 2001, is a critique of the scientific basis for evaluating the size of the marine reserves. The second report addresses shortcomings in the California Environmental Quality Act (CEQA) document, and was submitted to the Department during the CEQA comment period. The third report takes into account an explanation provided by Dr. Vernon Leeworthy in a letter received June 14, 2002 regarding the SSC's comments on the CEQA economic analysis. We are also attaching the comments of all of our advisory bodies, which were presented to the Council in June and September.

Regarding the eight alternatives before you, we offer the following.

Guiding philosophy. The Council primarily manages fisheries in federal waters, and supports the rights of states to make decisions pertaining to state waters without substantial Council involvement unless those decisions pose major problems or benefits to federal management. In this situation, where the Council will be asked by the Marine Sanctuary Program to take specific actions—the scope of which will depend on actions taken by the State of California—it is

important for the Council and its advisory bodies to review the proposed State actions before they are finalized. This provides the Council an opportunity to identify its concerns, thereby increasing the probability that federal implementation will go smoothly and reducing the possibility of conflict between the state and federal levels. Having reviewed the analysis available at this time, we do not find the marine reserve proposals, taken by themselves, pose major problems or promise substantial, coast-wide benefits to marine fisheries in Council-managed areas.

Consistency with the Groundfish Strategic Plan. The Council is concerned state actions that affect federal waters be consistent with the Council's Groundfish Strategic Plan. The Plan's goal regarding marine reserves is "to use marine reserves as a fishery management tool that contributes to groundfish conservation and management goals, has measurable effects, and is integrated with other fishery management approaches" (Groundfish Strategic Plan 2000:10). Marine reserves must be integrated with other state and federal fishery management approaches and must be complemented with thorough monitoring and evaluation. Monitoring and evaluation is vital to the success of marine reserves and will offer valuable information that can be used in future state and federal considerations. As the Strategic Plan notes, "Good baseline information collected before or at the time the reserve is implemented and post-implementation studies of reserves are necessary... It may take many years or decades to see effects. There is substantial risk in improperly evaluating reserve effectiveness, which could have costly policy implications. Negative impacts could ensue if inadequate monitoring and evaluation found that reserves are effective when they actually are ineffective, or finding reserves are ineffective when they are actually effective" (Groundfish Strategic Plan 2000:38-39).

Precedence. The Council is aware marine reserves are gaining momentum in California, Oregon, and Washington and views marine reserves as a potential management tool. The Council fully expects to see more proposals for marine reserves along the West Coast and regards the potential reserves in the Channel Islands as a precedent for the future.

Interaction with fishery management plans. The Council is concerned about the interaction of the proposed marine reserves with existing and future fishery management plans. At this point, the six alternatives proposed in the CEQA document appear to offer no substantial impairments or benefits in regard to stock productivity and total harvest opportunities in Council-managed fisheries. This is because Council management is determined by the optimum yield (OY), which takes into account maximum sustained yield (MSY) and rebuilding plans. However, the Council recognizes there will be notable local effects on resident species, as well as on harvest opportunities in the Channel Islands area. In addition, the importance of marine reserves in the Channel Islands may increase if a broader network of marine reserves is developed.

Essential fish habitat. The six marine reserve alternatives would contribute to meeting the Council's federal mandate to protect essential fish habitat for Council-managed species.

Cumulative impacts. Should marine reserves be established in the Channel Islands, there are likely to be substantial cumulative impacts for both commercial and recreational fisheries when the effects of the reserves are combined with closures on the continental shelf recently enacted by the Council, the closure of the Cowcod Conservation Areas, and possible future state actions to establish additional closures. Seasonal fishing area closures to protect birds are also under consideration for the Channel Islands. These combined impacts will undoubtedly result in shifts

in fishing effort, resulting in negative interactions with nearshore fish stocks in the remaining open fishing areas. It is possible the OY for some fisheries may need to be reconsidered. The Council urges the Commission to consider the cumulative impacts of these actions, particularly the closures on the shelf and the Cowcod Conservation Areas, as they may exacerbate the concentration of effort in the remaining open areas, as well as in other fisheries. The Council understands the Commission is unlikely to reopen part of the Cowcod Conservation Area, as recommended under the proposed project, and would like to reiterate the need to keep that area closed in order to protect overfished groundfish stocks, particularly cowcod and bocaccio.

Public policy decision. The Council views the choice of a specific alternative as a public policy decision on the part of the State of California and offers no recommendation for a particular alternative. Because the alternatives do not appear to substantially harm or benefit Council interests in the long term, we defer to the state to select the optimal alternative. We would, however, observe that the significance of these reserves for Council-managed fisheries might increase if a network of reserves is created along the coast. While a single reserve within a network might have a small effect, the collective impacts of multiple reserves on federal fisheries could be significant. Incremental consideration of marine reserves should not lose sight of synergistic impacts, either adverse or beneficial.

Although we defer to the state to select the optimal alternative, we must also note that due to the analytical shortcomings in the CEQA document identified by the SSC and other Council advisory bodies, we cannot definitively evaluate the suite of proposals to develop a preferred alternative for the federal water areas from 3-6 miles and beyond. It is possible a National Environmental Policy Act (NEPA) analysis may identify impacts not covered in the CEQA analysis. Therefore, while we cannot currently identify any shortcomings for federal fisheries with respect to the listed alternatives, we cannot state with certainty that if the state implements marine reserves in state waters, that we will recommend implementing the same closure areas in federal waters as those identified in the CEQA analysis.

Finally, we would like to outline two options regarding the staged implementation of reserves in this area for your consideration. Under both, marine reserves would be implemented in a two-step process, in which the first step would be for the state to implement marine reserves in the 0-3 mile zone. In the first option, we recommend conducting a thorough monitoring, research and evaluation program for five years after state implementation is completed, then proceeding to full implementation guided by the knowledge gained during the first phase of the process.

The second option is to the approach recommended in the CEQA document. Like the first option, this approach would start with state waters only, as mapped in the CEQA document (using straight lines to facilitate enforcement), or including all state water areas (or only those that are primarily seated in state waters) in the proposals. Marine reserves in federal waters would follow immediately, a process that would take approximately two years. The Council would work with the Channel Islands National Marine Sanctuary on the second federal phase of this project

From the Council's perspective (outlined in the Groundfish Strategic Plan and the Marine Reserves Phase I Document), monitoring, evaluation, and enforcement are critical aspects of both of these alternatives, and of marine reserve efforts in general. Only through monitoring and evaluation will we understand the effects of marine reserves on fish populations and fisheries. Clearly, these efforts will require sufficient funding and staffing. This knowledge is vital if marine reserves are to gain momentum and acceptance as a fisheries management tool.

Sincerely,

Hans Radtke
Chairman

JDD:kla

Enclosures

Note: The following paragraph was suggested by an ad hoc marine reserves policy committee member, but was not circulated to the other committee members due to time constraints. This paragraph would be appended to "Interaction with Fishery Management Plans."

In the proposed alternative outlined by the CEQA document, recreational fisheries for pelagic species are allowed in some areas. The CEQA document defines pelagic finfish as northern anchovy, barracudas, billfishes, dolphinfish, Pacific herring, jack mackerel, Pacific mackerel, salmon, Pacific sardine, blue shark, salmon shark, shortfin mako shark, thresher shark, swordfish, tunas, and yellowtail (p. 5-23). Many of these species are currently managed under Council fishery management plans (FMPs). The Council feels marine reserves that exempt these species for recreational fisheries should include other finfish species managed by the Council in its FMPs for highly migratory species, salmon, and coastal pelagic species.

Exhibit E.1.b
Supplemental NOAA Letter
September 2002

UNITED STATES DEPARTMENT OF COMMERCE
Office of the Assistant Secretary for Oceans and Atmosphere
Washington, D.C. 20230

AUG 29 2002

Mr. Robert C. Hight
Director, California Department of Fish and Game
1416 Ninth Street
Sacramento, California 95814

Dear Mr. Hight:

This letter forwards the National Oceanic and Atmospheric Administration's (NOAA) comments on California's Draft 2002 Environmental Document for Marine Protected Areas in NOAA's Channel Islands National Marine Sanctuary. The rich oceanic environment within the Channel Islands National Marine Sanctuary (Sanctuary) is home to an unprecedented array of marine mammals, seabirds, fishes, invertebrates, marine plants, and habitats. This biodiversity is recognized locally, regionally, nationally and internationally and afforded protection at all levels of government. Additionally, many marine resources are important to both commercial and recreational user groups. The creation of Marine Protected Areas (MPAs) within State waters of the Sanctuary is especially important at this time given the recent emergency groundfish closure on the shelf by the National Marine Fisheries Service (NOAA Fisheries) in response to the Pacific Fishery Management Council's (Pacific Council) recommendation. Based on available information and the draft environmental document, and in order to ensure the long-term protection and biodiversity of Sanctuary resources, NOAA supports the jointly developed alternative, i.e., the State's proposed action, to establish a network of ten State Marine Reserves and two State Marine Conservation Areas in the State waters of the Sanctuary within which commercial and recreational take would be prohibited or limited.

The need for and benefits of a network of reserves in general was stated clearly by the community-based Marine Reserves Working Group Problem Statement:

> *To protect, maintain, restore, and enhance living marine resources, it is necessary to develop new management strategies that encompass an ecosystem perspective and promote collaboration between competing interests. One strategy is to develop reserves where all harvest is prohibited. Reserves provide a precautionary measure against the possible impacts of an expanding human population and management uncertainties, offer education and research opportunities, and provide reference areas to measure non-harvesting impacts.*

An ecosystem management approach requires managers to protect the full spectrum of marine life and habitats that are essential components to a healthy marine ecosystem. Also important is consideration of the diversity of uses and values of all constituents, including, but not limited to commercial fishermen, recreational anglers, educators, researchers, wildlife viewers and environmentalists. Recognizing the importance of the Sanctuary to all Americans, NOAA views the State's proposed action as an important proactive measure for the long-term health of the Sanctuary and the economies dependent on this ecosystem.

In the multi-jurisdiction setting of the Sanctuary, open communication and collaboration among agencies and with the public is fundamental. The proposed action represents the culmination of more than two years of concentrated community-based discussions and deliberation among a variety of interest groups. The Channel Islands Marine Reserves Process has been one of the most exhaustive, intensive, data rich and comprehensive community, scientific, and economic processes undertaken. The foundation of the process has been the State and Federal agency partnership that brought the Department of Fish and Game (DFG), NOAA and Channel Islands National Park (CINP) staffs and budgets together. This same partnership will serve the public well in administering and implementing an effective MPA network in the Sanctuary.

Resource Management Concerns

As you know, the West Coast groundfish fisheries are in a state of crisis. The emergency groundfish closure, mentioned above, closes groundfish fisheries in continental shelf waters between 20 and 150 fathoms deep to protect rockfish stocks. In 2003, the Pacific Council will consider whether to continue these restrictions or impose other measures. In addition, the State of California is considering constraints on other State-managed fisheries that take overfished rockfish. These measures may result in shifts of fishing effort to nearshore waters off California, including waters within the Sanctuary boundary. NOAA recommends that the final CEQA document acknowledge this change in fishery management so the impacts of the proposed action can be evaluated with full consideration of current management issues and conditions. This evaluation should include a discussion of how harvest management strategies and fishery management plans would address congestion issues should they arise due to groundfish closures or the State MPA designations. Another

specific issue is the need to consider whether the proposal to reopen a portion of the Cowcod Conservation Area in the northeast sector of Santa Barbara Island is consistent with the conservation and management measures being taken to protect rockfish (especially bocaccio) under the broader groundfish management program. Another resource management concern is the Endangered Species Act-listed and candidate species and rare species of marine birds that utilize the Sanctuary for breeding, roosting and feeding, notably the California Brown Pelican, Xantus' Murrelet, Ashy Storm Petrel and Cassin's Auklet. The proposed action (particularly the Harris Pt. State Marine Reserve and the West Anacapa Island State Marine Conservation Area) would provide some level of protection to seabirds. We are concerned about the lack of protection for seabirds in other critical breeding and roosting areas (especially Sutil Island at Santa Barbara Island, Castle Rock at San Miguel Island and the north side of Santa Cruz Island) from potential disturbances caused by fishing and recreational activities in the Sanctuary. NOAA is committed to working with the DFG, CINP and U.S. Fish and Wildlife Service to address potential human threats in these areas and develop strategies to protect seabirds.

Monitoring

We would appreciate further discussion in the CEQA document of existing and/or plans for biological and economic monitoring and plans for enforcement of the MPA network. Monitoring will provide real data from which to gauge the reality and potential positive or negative biological and economic impacts of MPA establishment. Monitoring may also provide information to enlighten current fishery management practices. To address the administrative challenges of instituting an MPA network and to engage affected parties in planning, the Sanctuary in partnership with fishermen, environmentalists, researchers, educators, the CINP, DFG, NOAA Fisheries, and the Coast Guard, is developing MPA implementation plans. Specifically, the Sanctuary Advisory Council has created four working groups focussed on cooperative enforcement, biological monitoring, social and economic monitoring, and education and outreach; please see the attached Working Group membership, missions and timelines. NOAA recommends the DFG actively participate in this process and develop similar constituent based MPA implementation processes to engage constituents, particularly disaffected parties.

Complementary Federal Regulatory Action to Designate Reserves

In coordination with NOAA Fisheries and the Pacific Council, the Sanctuary intends to initiate an environmental review process to complement the State's action in the Sanctuary. This federal environmental process would begin in January 2003 and be guided by the National Marine Sanctuaries Act and the National Environmental Policy Act. It is estimated that it will take a year to complete. This will afford time for constituents to adjust to State MPAs in the Sanctuary, and will permit time to begin gauging the initial biological, social and economic effects of groundfish closures and other on-going marine management initiatives, e.g., fishery management plan development.

We appreciate your consideration of NOAA's comments and once again commend the State of California for moving forward on this historic decision to create MPAs in the Sanctuary. Please contact Matt Pickett, Sanctuary Manager, at (805) 966-7107 if you have any questions.

Sincerely,

James P. Burgess, III
NEPA Coordinator

Enclosure

cc:
Patricia Wolf, Department of Fish and Game
John Ugoretz, Department of Fish and Game
Robert Treanor, California Fish and Game Commission
California Fish and Game Commissioners
Rod McInnis, NMFS Southwest Region
Don McIsaac, PFMC
Matthew Pickett, CINMS
Dianne Meester, Chair, Sanctuary Advisory Council

Channel Islands National Marine Sanctuary Advisory Council
Work Priorities for 2002

At the January and March 2002 meetings of the Channel Islands National Marine Sanctuary Advisory Council (SAC), the following work tasks were adopted as priority actions. Agreements were also made on the initial approach the SAC should take in pursuing these tasks.

MARINE RESERVES IMPLEMENTATION

Task	*Approach (Working Group, Subcommittee, Workshop, other)*	*Target Dates*	*Key Contacts*
Assist CINMS and partners with development of an education plan/program for marine reserves	SAC's Sanctuary Education Team (SET) will take the lead in developing recommendations on a suite of education strategies, specific actions and draft products. SET will be responsive to MRWG education recommendations, and will participate in a Workshop on MPA Management (see below); SAC will advise CINMS with written product.	End of 2002: recommend draft plan and strategies.	SET Chair - Kathy deWet-Oleson (kdooean@earthlink.net) Sanctuary staff: Julie Bursek (julie.bursek@noaa.gov) Michael Smith (Michael.h.smith@noaa.gov)
Develop a biological monitoring program for marine reserves	SAC Ad Hoc Group on Biological Monitoring of Marine Reserves to make initial recommendations on how CINMS and the SAC should pursue monitoring program development. Ad Hoc Group also to suggest individuals to be appointed to a technical task force. Task force would help in development of the framework for a biological monitoring program that responds to MRWG implementation recommendations. SAC may also form a Working Group to assist with future program oversight.	Early 2003 - Draft plan or framework complete	Chair of Ad Hoc Group on Biological Monitoring of Marine Reserves: Dr. Robert Warner (warner@lifesci.ucsb.edu) Sanctuary staff: Sarah Fangman sarah.fangman@noaa.gov
Develop a socio-economic monitoring program for marine reserves	SAC Ad Hoc Group on Socio-Economic Monitoring of Marine Reserves to make initial recommendations on program development and role of the SAC. SAC to form an independent task force to work with NOAA economists on recommending the framework for a socio-economic monitoring program that responds to MRWG implementation recommendations. Task force will also participate in Workshop on building a socio-economic workshop.	Early 2003 - Draft plan or framework complete	Chair of Ad Hoc Group on Socio-Economic Monitoring of Marine Reserves: Lyn Krieger (lyn.krieger@mail.co.ventura.ca.us) Sanctuary staff: Sean Hastings (sean.hastings@noaa.gov)
Assist CINMS and Partners in development of an Enforcement Program for Marine Reserves	SAC Ad Hoc Group on Marine Reserves Enforcement to make initial recommendations on program development and role of the SAC. Agencies to coordinate, then consult with the Ad Hoc group to collect additional input. Ad Hoc Group and SAC to then support sharing of draft ideas in a public forum setting designed to collect additional community input on specific enforcement program aspects.	Nov. 13: Draft strategies to SAC; share with public	Chair of Ad Hoc Group on Marine Reserves Enforcement: Robert Duncan (RCDUNCAN88@cs.com) Sanctuary staff: Michael Murray (michael.murray@noaa.gov)
Host and Sponsor a CINMS Marine Reserve Management Workshop (monitoring, enforcement, education)	SAC to form a planning subcommittee to help with organizing the event, which will be co-sponsored by the SAC and CINMS. Working Groups and Ad Hoc groups to present work to date and use the workshop to refine marine reserve management recommendations with experts and the public.	Early 2003: Co-host event	SAC Chair: Dianne Meester (dianne@co.santa-barbara.ca.us) Sanctuary Staff: Sean Hastings (sean.hastings@noaa.gov) Michael Murray (michael.murray@noaa.gov)

SUMMARY OF RECENT ACTIONS OF THE CALIFORNIA FISH AND GAME COMMISSION REGARDING FEDERAL GROUNDFISH REGULATIONS[1/]

Channel Islands - CFGC has decided to take final action on this issue in late October in the Santa Barbara area. We are looking forward to the Council comments on this initiative, which, I understand, will be finalized tomorrow.

I have brought with me background documents for most of the above items for your records.

PFMC
09/11/02

1/ Prepared by Mr. Robert Treanor for presentation to the Council on September 10, 2002.

Jim Seger

Exhibit E.1.c
Supplemental CPSAS Report
September 2002

COASTAL PELAGIC SPECIES ADVISORY SUBPANEL REPORT ON MARINE RESERVE PROPOSALS FOR CHANNEL ISLANDS NATIONAL MARINE SANCTUARY

The Coastal Pelagic Species Advisory Subpanel (CPSAS) reviewed the draft letter to the California Fish and Game Commission (CFGC) regarding marine reserves in state waters of the Channel Islands National Marine Sanctuary (CINMS; Exhibit E.1.b, Draft Letter, September 2002). The CPSAS discussed the contents of the letter, and CPSAS representatives who attended the Ad Hoc Marine Reserves Policy Review Committee provided their perspective on that meeting. A majority (7 of 8) of the CPSAS cannot endorse the draft letter, because it does not address the concerns raised by the CPSAS in June 2002, nor mention the analytical shortcomings noted by the Scientific and Statistical Committee. Moreover, a majority of the CPSAS is concerned about the Council endorsing the flawed process undertaken by the State of California (i.e, the Marine Reserve Working Group process).

A minority (1 of 8) of the CPSAS supports the guiding philosophy in the draft letter, because it is appropriate for the Council to defer to the state on management issues within state waters, as it has done in the past. The minority is generally supportive of the use of marine reserves as a way to both conserve biodiversity and provide insurance for management mistakes in unassessed fisheries such as the market squid fishery, which is monitored under the coastal pelagic species fishery management plan.

PFMC
09/11/02

GROUNDFISH ADVISORY SUBPANEL STATEMENT ON MARINE RESERVE PROPOSALS FOR CHANNEL ISLANDS NATIONAL MARINE SANCTUARY

The Groundfish Advisory Subpanel (GAP) received an update from Mr. Jim Seger of the Council staff on activities surrounding proposals for establishing marine reserves in the Channel Islands National Marine Sanctuary (CINMS). Additional information was provided by GAP member Ms. Kathy Fosmark, who represented the GAP at recent CINMS meetings.

The GAP continues to express its concern about the process and proposals involved in the CINMS marine reserve. The GAP notes the Scientific and Statistical Committee (SSC) has expressed concern with the California Environmental Quality Act (CEQA) document, which was prepared to analyze reserve proposals, and recommends the Council closely consider the SSC's comments.

The GAP observes that there appears to be little information presented on current fishery levels and fishery impacts in the proposed reserve area, as well as levels and impacts that would result in areas outside the reserve if it were established. It appears that little baseline analysis has been done; this should be a prerequisite for establishment of reserves. The Council also needs to consider the impact of reserve designation on various optimum yield (OY) levels; such analysis has not been provided.

Some GAP members questioned a statement that appeared in the draft Council letter included in the briefing material which appears to support pelagic recreational fishing in portions of the reserve, but not pelagic commercial fishing. If pelagic fishing is considered compatible with the reserve, then it should make no difference whether such fishing is for private recreational, commercial recreational, or commercial sale reasons.

Finally, the GAP notes, as it has in the past, that agreement amongst all constituent groups on a marine protected area comprising approximately 13% of CINMS was reached some time ago and that core area should be considered before expansion is contemplated.

PFMC
09/11/02

Chuck Tracy

Exhibit E.1.c
Supplemental HC Report
September 2002

HABITAT COMMITTEE REPORT ON
MARINE RESERVE PROPOSALS FOR CHANNEL ISLANDS NATIONAL MARINE SANCTUARY

The Habitat Committee (HC) would like to restate its comments from the June 2002 Council meeting (attached). The HC would also like to emphasize that the six marine reserve alternatives would contribute to meeting the Council's federal mandate to protect essential fish habitat (EFH) for the purpose of improving sustainability of fisheries, rebuilding fish stocks, and contributing to ecosystem health.

The HC believes that deleting the word "recreational" from the last (optional) paragraph in the letter, if it is included, would be appropriate.

The HC encourages the Council to recommend that the California Fish and Game Commission move forward with implementation of marine reserves in the Channel Islands. The HC also recommends that evaluation and monitoring be conducted, and adaptive management be an integral part of the process, including the development and implementation of an adaptive management plan by the State of California.

PFMC
09/11/02

Bob Fletcher

Exhibit E.1.c
Supplemental HMSAS Report
September 2002

HIGHLY MIGRATORY SPECIES ADVISORY SUBPANEL REPORT ON MARINE RESERVE PROPOSALS FOR CHANNEL ISLANDS NATIONAL MARINE SANCTUARY

The Highly Migratory Species Advisory Subpanel (HMSAS) reviewed the draft letter to the California Fish and Game Commission (CFGC) regarding marine reserves in state waters of the Channel Islands National Marine Sanctuary (Exhibit E.1.b, Draft Letter, September 2002). The HMSAS commends the Ad Hoc Marine Reserves Policy Review Committee for their thorough consideration of the issues. The draft letter effectively expresses the findings of the review committee and should be considered by the Council in developing their recommendations to the CFGC. The HMSAS discussed the suggested additional paragraph appended to the end of the draft letter. The HMSAS is uncertain of the intent of this paragraph. Is the intent of the paragraph to provide consistency in how "pelagic fish" are defined or is it proposing to exempt recreational fisheries for pelagic species? If this paragraph is incorporated into the letter to CFGC, the HMSAS encourages the Council to revise the paragraph such that its intent is clear.

PFMC
09/11/02

Cindy Thomson

SCIENTIFIC AND STATISTICAL COMMITTEE REPORT ON MARINE RESERVE PROPOSALS FOR CHANNEL ISLANDS NATIONAL MARINE SANCTUARY

The Scientific and Statistical Committee's (SSC's) Marine Reserves Subcommittee met on June 10-11, 2002 in Portland, Oregon to review a Draft Environmental Document (DED) prepared by the California Department of Fish and Game that evaluated the effects of alternative marine reserve options at the Channel Islands National Marine Sanctuary (CINMS). The socioeconomic analysis contained in the DED was taken largely from a separate document prepared by Dr. Vernon Leeworthy and Mr. Peter Wiley (National Ocean Service). Mr. Wiley, who attended the Marine Reserves Subcommittee's June 10-11 meeting, was able to answer some of the Subcommittee's questions regarding the socioeconomic analysis. He also agreed to ask Dr. Leeworthy (who was not at the meeting) to respond to the SSC at a later date regarding SSC questions that Mr. Wiley could not address. On June 14, the Subcommittee received a memo from Dr. Leeworthy and Mr. Wiley (Exhibit E.1.a, Attachment 1). The Subcommittee shared that memo with the entire SSC at a June 16 meeting in San Francisco at which the results of the Subcommittee's review of the DED were discussed.

On August 14-15, the Council's Ad Hoc Marine Reserves Policy Committee met in El Segundo, California. At that time, the Committee requested the SSC prepare a response to the Leeworthy/Wiley memo. The SSC's response is attached to this statement. The response takes the form of specific comments that are embedded at appropriate points in the memo and are boldfaced and italicized to distinguish them from the original text of the memo.

The SSC's response to the Leeworthy/Wiley memo can be summarized as follows:

1. Information provided in the memo regarding the derivation of consumer surplus estimates for recreational activities at CINMS did not address the concerns expressed by the SSC Marine Reserve Subcommittee at our June 10-11 meeting. The SSC concludes that six of the eight consumer surplus estimates used in the socioeconomic analysis represent misinterpretations of the literature or errors in converting estimates from per-trip to per-day values. All six of these erroneous numbers underestimate the value of recreational fishing at CINMS.

2. In response to SSC concerns regarding the inappropriate use of price elasticities to predict increases in non-consumptive recreation associated with reserves at CINMS, the memo cites quality elasticities purportedly provided by Freeman (1995) as an alternative justification for their predictions regarding non-consumptive recreation. The SSC notes that this alternative justification is based on a misinterpretation of Freeman's results, that Freeman's numbers are not quality elasticities nor do they pertain to quality increases associated with marine reserves.

3. The memo does not provide any substantiation for the non-use benefits claimed for reserves at CINMS. The benefits transfer literature does not support the approach to non-use benefits taken in the socioeconomic analysis.

4. The socioeconomic analysis characterizes each of the marine reserve options in terms of whether the probability of relocating effort is "high," "medium," or "low" and whether the probability of crowding/congestion is "low" or "high." The memo does not address SSC concerns regarding the lack of data (particularly the lack of commercial fishing effort data) and analysis to support these conclusions. The statement in the memo that "We have no idea how fishermen will reallocate effort either across species or space after being displaced" confirms the uncertainties noted by the SSC in predicting the effects of effort relocation and crowding/congestion.

To summarize, the Leeworthy/Wiley memo does not address SSC concerns regarding the shortcomings of the socioeconomic analysis. In order to improve the analysis, it will be important that errors and misinterpretations of the literature be corrected, that sources of uncertainty in the analysis be explicitly identified, that all conclusions be carefully substantiated, and that monitoring, evaluation and enforcement costs be estimated.

In addition to preparing a response to the Leeworthy/Wiley memo, the SSC also reviewed the draft letter prepared by the Council's Ad Hoc Marine Reserves Policy Committee to the California Fish and Game Commission (Exhibit E.1.b). The SSC supports the Council's commitment to obtaining a complete regulatory analysis prior to making recommendations regarding reserves in federal waters at CINMS. Given the significant uncertainties that exist regarding the effects of reserves, the SSC also agrees with the Council regarding the need for long term monitoring and evaluation, as well as the need for effective enforcement. In addition, the SSC notes the importance of identifying specific criteria for evaluating progress toward meeting reserve objectives, developing a monitoring and evaluation program that provides a statistically valid basis for evaluating whether these criteria are being met, and incorporating monitoring requirements into reserve design. All of these tasks should be accomplished prior to the establishment of reserves.

PFMC
09/11/02

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL OCEAN SERVICE
Special Projects Office
Silver Spring, Maryland 20910

MEMORANDUM FOR: Pacific Fishery Management Council
SSC Marine Reserves Subcommittee

FROM: Dr. Vernon R. (Bob) Leeworthy
Peter C. Wiley
NOAA/NOS/Special Projects

SUBJECT: Responses to questions and comments on "Socioeconomic Impact Analysis of Marine Reserve Alternatives for the Channel Islands National Marine Sanctuary", April 29, 2002.

A. **Questions and Responses**

Question 1. In the Net Assessment, where did the $8 million commercial fishing consumer's surplus estimate came from?.

Response 1. See pg. 108 "Commercial Fishing and Kelp".

The SSC is aware (as indicated on p. 108) that the Net Assessment assumes the value of the commercial fishery at Channel Islands to be similar to the value of the commercial fishery at the Tortugas Ecological Reserve at the Florida Keys National Marine Sanctuary. What the SSC is requesting is documentation regarding similarities between the Channel Islands and Tortugas fisheries that justify this assumption.

Question 2. Were there specific studies that the $3, $5, and $10 in non-use values came from or were they a range of estimates from the Desvouges and Carson papers?.

Response 2. See pg. 102 "What we know about nonuse economic values".

The SSC is aware of the source of the $3, $5 and $10 estimates. What the SSC is requesting is a substantive rationale for assuming that $3, $5 and $10 accurately reflect the non-use value of reserves at Channel Islands. (See SSC comments under Response to Comment 2 for further elaboration of our concerns regarding this issue.)

Question 3. What were the source(s) of the multipliers used in the recreation industry analyses?

Response 3. They were simply a range of multipliers taken from our experience. They are Keynesian type multipliers, which are not the same as sectoral multipliers that would be found in the U.S. Department of Commerce's Regional Information Management System (RIMS) or in the IMPLAN input-output models. The counties of Los Angeles, Ventura and Santa Barbara are relatively large and diverse economies and the multipliers used are at the upper range of County Keynesian type of multipliers from our experience. The range of multipliers is also important (See Appendix H) because of the lack of more detailed estimates on the amount of activity by residents of each county versus nonresidents of each county relative to the County of access.

The SSC agrees with the analysts regarding the importance of distinguishing expenditures by residents and nonresidents when estimating multiplier effects. However, based on the information provided in Response 3 ("They were simply a range of multipliers taken from our experience" and"...the multipliers used are at the upper range of County Keynesian type of multipliers from our experience"), the source of the multipliers is still not clear to the SSC.

Question 4. Were commercial fishing logbooks used?

Response 4. Generally the answer is no. In the beginning of the project, we attempted to obtain logbooks for the commercial fisheries. We found out that not all the fisheries had a logbook requirement and for those that did, the California Department of Fish and Game (CDFG) neither had a master list of who maintains which logbooks, but also that there were no standards for how information was maintained. Some maintained electronic databases others simply had information in paper files (not necessarily organized in any fashion for public consumption). Our contractor, Dr. Craig Barilotti, did obtain urchin logbooks and the information contained in them was used to check the data against what we obtained from the fishermen directly with respect to distribution of catch. The squid logbook forms were shown to us by the squid fishermen early in the project, but they were not yet implemented.

The SSC appreciates this clarification.

Question 5. How were the consumer's surplus estimates for recreation derived?

Response 5. Sent to you by e-mail from Pete Wiley early on Friday 6/14/2002. The question was how the person trip estimates in Wegge et. al. were translated to person days estimates. The answer is that they were divided by the mean number of days per trip found on page 30 (third paragraph up from the bottom).

The SSC's question regarding how Wegge's estimates were converted from a per-trip to a per-day basis reflects a number of larger concerns regarding the consumer surplus estimates contained in the Net Assessment.

The estimates of consumer surplus included in Table 1.20 (p. 30) of the Net Assessment include three multinomial logit estimates from Rowe et al. (1985), two travel cost estimates from Wegge et al. (1986) and three contingent valuation estimates from Wegge et al. (1986). These eight estimates (reproduced below from Table 1.20) are characterized in the Net Assessment as estimates of consumer surplus per person day. The average of these estimates ($11.58) was used as the basis for the consumer surplus estimates for recreational fishing and non-consumptive recreation provided in the Net Assessment (p. 28).

Rowe et al. (1985) multinomial logit estimates	*$ 6.90*	*Santa Barbara county, boat modes*
	$ 4.74	*Ventura county, boat modes*
	$ 7.29	*San Luis Obispo county, boat modes*
Wegge et al. (1986) travel cost estimates	*$ 5.33*	*Party/charter boat*
	$17.92	*Private boat*
Wegge et al. (1986) contingent valuation estimates	*$ 5.45*	*Party/charter boat*
	$15.00	*Rental boat*
	$30.00	*Private boat*
Average	*$11.58*	

The SSC's concerns regarding the above estimates are as follows:

1. The $6.90 estimate of consumer surplus is taken from Table 5.2 (p. 5-5) of Rowe's report and represents the expected loss of consumer surplus per trip associated with elimination of all boat modes in Santa Barbara county for anglers who reside and fish in Santa Barbara county. The $4.74 and $7.29 estimates are defined in a similar manner for anglers who reside and fish in Ventura and San Luis Obispo counties respectively. In order to properly interpret these numbers, it is important to note that Rowe's multinomial logit model predicts the choices made by anglers residing in each county regarding fishing mode and site on each choice occasion (i.e., occasions when they have already made the decision

to go fishing). In other words, Rowe's Table 5.2 consumer surplus estimates do not reflect the value per trip for trips associated with a particular mode, county of residence and fishing county, but rather the value per choice occasion for anglers residing in each county. As Rowe himself indicates on p. 1-9 of his report, "The values ... apply to all trips [emphasis his] from each origin county." Due to this misinterpretation of Rowe's results, the SSC concludes that the $6.90, $4.74 and $7.29 estimates - as used in the Net Assessment - underestimate the per trip value of recreational fishing.

2. The $5.33 and $17.92 estimates were derived by converting two of Wegge's original consumer surplus estimates from a per-trip to a per-day basis. Based on the statement on p. 30 of Wegge's report that "The mean length of party/charter boat trips greater than 1 day was 4.13 days," the Net Assessment analysts derived the $5.33 estimate by taking one of the party/charter consumer surplus estimates ($22) from Table 16 (p. 38) of Wegge's report and dividing it by 4.13. The SSC notes that the $22 estimate should not have been adjusted downward, given Wegge's explicit characterization of the $22 as an estimate of consumer surplus per trip for party/charter boat trips of one day or less. Additionally, the analysts derived the $17.92 estimate by taking one of Wegge's private boat consumer surplus estimates ($74) and dividing that by 4.13. The SSC notes that the $74 estimate should not have been adjusted downward either, given the statement on p. 30 of Wegge's report that "the mean length of private/rental boat trips greater than 12 hours was 22 hours." In addition to the $22 and $74 estimates, Wegge's Table 16 provides three other estimates of consumer surplus for party/charter boat trips of one day or less ($40, $91, $185) and two other estimates of consumer surplus for private boat trips ($61, $272). The SSC notes that, in addition to making inappropriate downward adjustments to Wegge's original $22 and $74 consumer surplus estimates, the Net Assessment provides no justification for why the $22 and $74 estimates were selected over the other consumer surplus estimates provided by Wegge for inclusion in the Net Assessment.

3. The $15 and $30 contingent valuation estimates are described in the Net Assessment as estimates of median consumer surplus per person day for rental and private boat mode; this characterization is consistent with Table 17 (p. 40) of Wegge's report. However, the SSC questions the $5.45 contingent valuation estimate, which represents Wegge's median consumer surplus estimate per party/charter boat trip ($22.50) divided by 4.13 days per trip. Given that (a) Wegge's $22.50 estimate pertains to all party/charter boat trips, regardless of length and (b) 4.13 is the average trip length for party/charter trips that are longer than one day (not all trips), the $5.45 obtained by dividing $22.50 by 4.13 underestimates value per angler day.

In addition to our concerns regarding six of the eight consumer surplus estimates used in the Net Assessment, the SSC notes the following:

1. The Rowe and Wegge consumer surplus estimates are based on surveys regarding fishing activity in 1981 and 1984 respectively. The SSC requests that these estimates be corrected for inflation to the 1999 base year used in the Net Assessment.

2. Given that Wegge's sample was drawn from subscribers to a sportfishing magazine, the SSC requests that the Net Assessment address the issue of whether Wegge's consumer surplus estimates are representative of the angling population as a whole.

Based on the above concerns, the SSC does not find the consumer surplus estimates for recreational fishing and non-consumptive recreation used in the Net Assessment to be adequately substantiated.

1. **Comments and Responses**

Comment 1. It is wrong to use price elasticity of demand as a proxy for quality elasticities of value as was done for the Step 2 analysis of non-consumptive recreation. This coupled with the fact that the estimates of quality elasticity are arbitrary made these benefits meaningless.

Response to Comment 1. We know it is not technically correct to use price elasticities of demand for quality elasticities of demand. The former represent movements along a demand curve and the latter represent shifts in the demand curve. In our application, the quality elasticities are not technically quality elasticities of demand, but instead quality elasticities of consumer's surplus. We should have cited Freeman (1995). What we found was that the range of price elasticities from the literature on recreation demand was not different from the quality elasticities found in Freeman (1995).

The Freeman (1995) study covered marine recreation. Most were fishing studies with a few beach, boating or swimming studies, and the quality parameters were mostly catch rate or water quality. (See A. Myrick Freeman III, 1995, The Benefits of Water Quality Improvements for Marine Recreation: A Review of the Empirical Evidence. Marine Resource Economics, Volume 10, pp 385-406.). We should have cited this study instead of the study on price elasticities.

There are few studies available with quality elasticities but we would argue that our estimated range of quality elasticities is not arbitrary. They do reflect a reasonable range of values for policy simulation and do provide useful information about the possible magnitude of potential benefits to a particular user group.

The Appendix to Smith and Kaoru's 1990 paper describes price elasticities from a number of travel cost demand studies involving a variety of recreational activities. In addition to being concerned regarding the manner in which the Smith/Kaoru's price elasticities are interpreted in the Net Assessment (which we discussed at the June 10-11 meeting), the SSC is additionally concerned regarding the manner in which the Freeman paper is interpreted in Response to Comment 1. The SSC's reservations are as follows:

1. The analysts' reference to "the quality elasticities found in Freeman" indicates that they are misinterpreting Freeman. Freeman's Table 5 provides estimates of value per trip associated with various percentage and absolute changes in catch rates; these estimates would have to take the form of percentage changes in value associated with percentage changes in catch rates in order to be characterized as elasticities. Moreover, while the SSC agrees with Freeman's characterization of catch rates as a qualitative attribute of the fishing experience, it is not clear why catch rates are relevant to the "quality" of non-consumptive recreation at Channel Islands.

2. The analysts defend their use of price elasticities as a proxy for what they assume to be quality elasticities in Freeman by stating that "What we found was that the range of price elasticities from the literature on recreation demand was not different from the quality elasticities found in Freeman (1995)." Even if Freeman's numbers were quality elasticities (which they aren't), there is no basis for claiming an association between price elasticities and Freeman's numbers. Just because the range of estimates for a specific parameter obtained from one set of studies is "not different" from the range of estimates for a different parameter obtained from a different set of studies does not imply that these two parameters can be used as proxies for each other. There is no <u>a priori</u> reason to surmise that these two parameters have anything to do with each other.

In addition to questioning the basis of the quality elasticities used in the Net Assessment, the SSC considers the changes in "quality" of non-consumptive recreation (10%, 50%, 100%) attributed to reserves to be <u>ad hoc</u> and not substantiated and also questions the plausibility of applying these "quality" changes to all nonconsumptive recreational activities. According to Table 1.17 (p. 26) of the Net Assessment, the baseline distribution of non-consumptive recreational effort at Channel Islands is 62% whale watching, 26% non-consumptive diving, 10% sailing and 3% kayaking/island sightseeing. While an increase in "quality" associated with reserves may provide non-consumptive divers with better underwater viewing opportunities, it is not clear why whale watchers, sailors and kayakers would also benefit from such changes. The SSC requests that the Net Assessment either substantiate the assumption that changes in quality associated with reserves at Channel Islands would benefit all non-consumptive uses or restrict their claims regarding such benefits to non-consumptive diving.

Comment 2. The non-use value estimates found in the net assessment table (Table 3.29 on page 109 of your report) are not based on proper benefits transfer techniques. The studies in Desvouges were not marine resources and Carson has said that a change in the resource being valued or even the way the question is stated may have large impacts on the estimate.

Response to Comment 2. First, your comments on proper benefits transfer techniques. You are going to have to back that up. I have organized two National Workshops on the topic of "Benefits Transfer" with the Association of Environmental and Resource Economists (AERE). The latter one was a formal follow-up to the first. "Benefits Transfer: Procedures, Problems, and Research Needs", 1992

Association of Environmental and Resource Economics Workshop, Snowbird, Utah, June 3-5, 1992. I have also assisted the U.S. Forest Service by teaching "Benefits Transfer" procedures to Forest managers (National Workshop on Obtaining Recreation Values and Economic Impacts, Chattanooga, TN, March 10-12, 1998). Our workshops both preceded and followed the special issue of Water Resources Research, Volume 28, Number 3, March 1992 devoted to benefits transfer. The conclusion from these workshops is that the profession is divided and could not come to consensus on a set of protocols and procedures. Several authors have presented sets of protocols and procedures, but they were not generally accepted. Most still fall back on professional judgement.

There are issues such as transferring values of functions (no consensus) or calibration (adjusting for various methods—direction and scale of adjustment coming from meta analyses). Again, no consensus. And, an important point is that these issues dealt with studies where use values were at issue. There has been very little attention given to transfer of nonuse values.

The benefit transfer literature (including the papers presented at the 1992 AERE Workshop and the papers in the March 1992 issue of Water Resources Research) demonstrates the thoughtful and methodical manner in which the benefits of an amenity are transferred from an original study site to a policy site. The literature reflects a careful attention to detail that the SSC considers highly appropriate, given the policy implications that often underlie the use of benefit transfer. The SSC agrees that there are no hard-and-fast rules for how to conduct benefit transfer. However, while different papers approach benefit transfer in somewhat different ways (transferring values, transferring functions, calibration), all make serious attempts to justify the benefit transfer by addressing the following issues:

1. whether the benefit estimates for the study site are technically sound and the data and analysis are adequately documented to provide a basis for benefit transfer;

2. whether the study and policy sites are similar - e.g., in terms of their characteristics and location, the nature of the amenity being valued at each site, the baseline level and change in the amenity, the availability of substitutes for the amenity; and

3. whether the human populations expected to accrue benefits from the amenity at the study and policy sites are similar - e.g., in terms of their area of residence, site use, demographic and attitudinal characteristics.

It is this type of care and documentation that the SSC was looking for and did not find in the Net Assessment.

The SSC agrees with the analysts' statement that "there has been very little attention given to transfer of nonuse values." As indicated by Desvousges, Dunford and Mathews (p. 9 of their 1992 AERE Workshop paper "Natural resource damages valuation: Arthur Kill oil spill"), "Even in a full-blown analysis, nonuse values are extremely difficult to estimate. Economists have used contingent valuation to estimate nonuse values, and disagreement exists about its validity for this use. The difficulty of the situation is amplified in a transfer study." The SSC notes that the difficulties associated with transferring nonuse values are all the more reason to proceed cautiously and with full awareness of the limitations of current knowledge in this area.

Second, you say the studies in Desvouges were not marine resources. What evidence do you have that nonuse values for marine resources, especially the range from the lowest end of the distribution of values, would be any different from those from non-marine resources. There is none. In fact, we say there are no known studies of nonuse or passive economic use value for marine reserves (see pg. 101, Nonuse of Passive Use Economic Value).

With regard to the question - "What evidence do you have that nonuse value for marine resources...would be any different from those from non-marine resources" - the SSC is not aware of any evidence demonstrating similarities or differences in non-use values for marine and non-marine resources. Moreover, the burden of proof does not lie with the SSC. It is up to the Net Assessment analysts to clearly and methodically substantiate why it is reasonable to transfer benefit estimates from other valuation studies (marine or otherwise) to the Channel Islands. To simply assert that they can do it because the existing literature does not tell them that they can't is to provide no

substantiation at all. The fact that "there are no known studies of nonuse or passive economic use value for marine reserves" merely points up the lack of information on which to base quantitative estimates of non-use value at Channel Islands.

Third, you cite Richard Carson as saying that a change in the resource being valued or even the way the question is stated may have large impacts on the estimate. The statement is completely irrelevant. It is the same tact that the panel hired by Exxon used in attacking the estimates for nonuse value lost by the Exxon-Valdez Oil Spill. That panel attacked the contingent valuation method in general and especially it's use in estimating nonuse values. The NOAA Blue Ribbon Panel countered their findings. However, what you are implying is that any estimate that has wide variance is not useable. Many economists have found that the demand for any good or service can have wide variation depending upon functional form of the estimating equation or a host of other econometric issues. This doesn't make econometric estimates unusable. Many have found that prices for the same goods and services in the same markets have wide variation. Your point about the possibility of wide variation in any estimates of value are irrelevant, it applies in almost all cases.

The SSC is incorrectly characterized as using "the same tact that the panel hired by Exxon used in attacking the estimates for nonuse value lost by the Exxon-Valdez Oil Spill". The SSC made very clear at the June 10-11 meeting that our concerns pertained to the specific non-use value estimates applied to Channel Islands, not the concept of non-use value. Moreover, our June 2002 statement to the Council explicitly states that "...the SSC considers non-use value to be an essential component of cost-benefit analysis of MPAs at CINMS". SSC concerns regarding the non-use value estimates pertain to the methodology used in the Net Assessment to derive such estimates and should not be construed to mean anything more than that.

At the June 10-11 meeting, the SSC mentioned Richard Carson's work as a model for what good contingent valuation studies provide in terms of explaining the variation in value expressed by survey respondents. To surmise that the SSC concludes that "any estimate that has wide variance is not useable" is incorrect.

Our choice of $3, $5, and $10 was taken from the low end of the distribution of values from 19 studies of nonuse value in the literature. We argue that this biases the analysis against nonusers and we call these "conservative" estimates (see explanation on pg. 102 "What we know about nonuse economic values). We also use a very "conservative" (i.e., lower bound) estimate of the percent of U.S. households that might be willing to pay these amounts. We use some National Surveys that would lend some support to our contention, as well as the fact that the Exxon-Valdez number were applied to 90 percent of the U.S. households and we were only applying the estimates to one (1) percent of U.S. households.

Our nonuse value estimates again apply a reasonable lower bound range of values for policy simulation and in our application, we find that even when biasing values upwards in favor of consumptive uses and downwards for nonusers and non-consumptive users, there would be Net National Benefits for marine reserves in the Channel Islands National Marine Sanctuary. We stand by that conclusion.

The SSC agrees that $3, $5 and $10 can be accurately characterized as "the low end" of non-use values for the particular survey populations and amenities covered by the 19 studies cited by Desvousges. However, it does not necessarily follow that $3, $5 and $10 are also "conservative" estimates of non-use value for reserves at Channel Islands. As indicated by our comments regarding benefit transfer (under Response to Comment 2), the Net Assessment provides no substantive basis for assuming any relationship between non-use value associated with reserves at Channel Islands and the non-use values associated with the studies cited by Desvousges, which pertain to such disparate amenities as bald eagles, whooping cranes, visibility at Grand Canyon, and water quality. Based on Carson's Exxon-Valdez work, the SSC agrees that 1% would be a "very conservative (i.e., lower bound)" estimate of the percent of U.S. households who comprise the extent of the market in terms of willingness to pay to avoid another Exxon-Valdez spill. However, the Net Assessment provides no substantive basis for assuming that the extent of the market for reserves at Channel Islands is 1% of U.S. households. As indicated in the SSC's June statement to the Council, the percentage used in

the Net Assessment is arbitrary; the "true" percentage could just as well be 0.1%, 2% or any number of other percentages. In summary, the SSC can find no convincing basis for the analysts' conclusion that their non-use value estimates represent a "reasonable lower bound" for reserves at Channel Islands.

Comment 3. In your Step 2 analyses, you use the terms likelihood and low/high probability without statistical basis to back these claims up.

Response to Comment 3. We don't believe either of these two terms are in anyway restricted for use to only when one has a specific quantitative estimate based on a particular statistical procedure. All our statements in Step 2 analysis are based on our judgement bringing together quantitative information and qualitative information. Our judgements may not find consensus among all on the Socioeconomic Panel. When speculating on the future (short or long run) there is uncertainty and different judgements cannot either be proved or disproved. See our discussion in the Introduction to our report (page 1).

The Net Assessment evaluates the effects of the preferred option and the five other reserve options on the commercial fishery in terms of (1) whether the probability of relocating effort is "high", "medium" or "low", (2) whether the probability of crowding/congestion effects is "low" or "high", and (3) whether the likelihood of replenishment effects is "minimal", "medium" or "high" (pp. 81-83). For each reserve option, the Net Assessment also evaluates net benefits to consumptive recreational users in terms of whether they are "not likely", "likely" or "highly likely" (pp. 85-88). The SSC is not requiring (as suggested in Comment 3) that the terms "likelihood" and "probability", as used in the Net Assessment, have a statistical basis. However, the SSC is requesting clarification regarding the basis or thresholds that were used for classifying reserve options as high/medium/low or not likely/likely/highly likely under the various evaluation criteria. The analysts' Response to Comment 3 - "All our statements in Step 2 analysis are based on our judgment bringing together quantitative information and qualitative information" - does not provide the clarification requested by the SSC. Furthermore, with regard to the analysts' comment that "When speculating on the future (short or long run) there is uncertainty and different judgments cannot either be proved or disproved", the SSC notes that uncertainty regarding the future does not relieve the analysts of the responsibility to provide a substantive rationale for their conclusions balanced by appropriate caveats regarding sources of uncertainty. Given the absence of such a rationale, the SSC considers the conclusions in the Net Assessment regarding the effects of effort displacement and the effects of replenishment outside reserves to be unsubstantiated.

1. **Suggestions and Responses**

Suggestion 1. On page 5 of the report, last paragraph under the heading "Commercial Fishing and Kelp Harvesting", you say "It is not always true that there will even be short-term losses (Leeworthy, 2001a)". Put in example from Tortugas.

Response to Suggestion 1. We cite the report with the findings for the Tortugas. If someone wants to go check out the details they can access the report.

As pointed out by the analysts, the conclusion that "It is not always true that there will even be short-term losses" is drawn from the analysts' experience at the Tortugas. What the SSC wishes to know is whether this conclusion is intended to apply to Channel Islands and, if so, the basis for assuming a similar outcome for fisheries at Channel Islands and Tortugas.

Suggestion 2. Speculate about what other activities (i.e., other fisheries) that displaced fishermen might engage if displaced.

Response to Suggestion 2. We showed that the commercial fishing in the Channel Islands National Marine Sanctuary can be characterized as a multi-species fishery. We have no idea how fishermen will reallocate effort across either species or space after being displaced. This is the noted weakness in the current state-of-the-art in modeling (i.e., empirical applications of the Sanchirico and Wilen models

and beyond). The only approaches available would be direct interview approaches asking the fishermen to say how they think they would change their behavior with respect to each of the proposed alternatives. Without some kind of additional research, we would not have any basis for such speculation.

The Net Assessment characterizes each of the reserve options in terms of whether the probability of relocating effort is "high", "medium" or "low" and whether the probability of crowding/congestion effects is "low" or "high" (pp. 81-83). It is not clear to the SSC how the analysts are able to draw such conclusions if, as indicated in their Response to Suggestion 2, "We have no idea how fishermen will reallocate effort either across species or space after being displaced."

The SSC is not asking the analysts to "speculate" about what displaced fishermen would do once reserves are established, estimate models that predict effort displacement or conduct additional interviews. The SSC appreciates the difficulty of predicting how displaced effort is likely to be distributed across fisheries and is not suggesting that the analysts make quantitative predictions in this regard. However, given the policy implications of effort displacement in terms of management of fisheries outside reserves, the SSC is suggesting that additional analysis of existing data be conducted to facilitate understanding of these implications.

The SSC suggests the following: According to the Net Assessment (p. 17), 737 commercial vessels participated in Channel Islands fisheries in 1999. The fish ticket data used to identify these vessels can also be used to identify the range of west coast fisheries in which these vessels participate, as well as the extent of their participation. Such information would provide a useful indicator of the fisheries that are likely to be considered viable alternatives by displaced vessels once reserves are established at Channel Islands. While the SSC recognizes the challenges associated with attributing fishing trips to specific fisheries, this can be done in a reasonable way by defining individual fisheries in terms of gear type and species composition of catch. Information on alternative fishing opportunities would be useful for alerting fishery managers to which fisheries outside Channel Islands may warrant closer monitoring or regulation as a result of effort displacement, as well as alleviating management concerns regarding fisheries that are not likely to be affected by effort displacement.

Suggestion 3. Estimate percent dependence on the Channel Islands for the population of fishermen in addition to your sample.

Response to Suggestion 3. As we have noted in the report, our sample is not a representative sample of all fishermen. It is biased towards the fishermen that account for most of the catch and value of catch. One cannot extrapolate to the general population of fishermen on the issue of dependence with this sample data. One can only get an idea of the extent of potential impact based on dependence with our sample. See tables 2.26 to 2.29.

Suggestion 3 is an abbreviated version of what the SSC recommended at the June 10-11 with regard to estimating dependence of commercial fishing vessels on Channel Island fisheries. Our specific recommendations are as follows:

1. The SSC suggests that the Net Assessment provide information not only on the extent of commercial fishing activity at Channel Islands (which is described to some extent in Table C.2) but also the extent to which the 737 boats that fish at Channel Islands depend on fisheries both outside and inside Channel Islands. This type of information is available from fish ticket data.

2. While the Net Assessment includes information regarding aggregate ex-vessel revenue potentially lost under each reserve option (Tables 2.1, 2.5, 2.9, 2.13, 2.17 and 2.21), it provides very little information regarding the effects of each option on the fishing fleet. As indicated by the analysts in their Response to Suggestion 3, Tables 2.26-2.29 (pp. 53-55) provide information on the percentage of income potentially lost under each of the reserve options by fishermen who participated in the Barilotti and Pomeroy surveys. The analysts note that these samples are biased toward high-revenue vessels and further state that "...without sample weighting, extrapolating sample means (averages) to derive population totals would not be advisable. We are also evaluating

the impact this might have on socioeconomic profiles" (p. C.3). Given the importance of the socioeconomic profiles for evaluating the effect of the reserve options on the commercial fishing fleet, the SSC requests that the analysts apply the sample weighting procedures needed to make these profiles representative of the population.

Suggestion 4. Estimate the potential loss of effort in addition to loss of ex vessel value. Look into PacFIN data to see if it would support it.

Response to Suggestion 4. This would require implementation of the Sanchirico and Wilen type models. We don't think this is possible at this time. We have reviewed all the fishery management plans and the literature on implementing such models and we find very little in the way of bioeconomic models or reliable catch-effort relationships for any fishery in the Channel Islands or elsewhere in California. The real issue is what will happen to displaced effort. See response to Suggestion 2 above. We attended the North American Fishery Economists meeting in New Orleans April 2001. Jim Wilen gave a presentation on the bioeconomic spatial model for predicting effort allocation as a result of hypothetical marine reserves for red urchins in Northern California. Jim concluded that even in the simple case of red urchins in Northern California (simple oceanography characterized by north to south current flow) model could only yield qualitative results about what happens to total effort and how effort would be reallocated. Quantitative estimates thought not to be reliable (current state-of-the-art). The Channel Islands have a much more complex oceanography. Also, the dominant fishery in the Channel Islands is for market squid. The latest report we reviewed with attempts to estimate fishery stocks from catch statistics were not very successful. This is an area that needs a lot of research and is certainly beyond the scope of our effort.

As indicated in our comments under Suggestion 2, the SSC is not asking the Net Assessment analysts to quantitatively predict how displaced effort is likely to be distributed across fisheries. However, given that the Net Assessment characterizes commercial fishing activity in terms of ex-vessel revenue rather than effort (e.g., Table 1.5, p. 13), it is not clear to the SSC how the analysts can conclude that crowding/congestion effects are "low" or "high" (as done on pp. 81-83) without even knowing how much effort might potentially be displaced. Given the potential implications of crowding/congestion outside the reserve in terms of gear effects on habitat, fishing costs and social conflict among fishermen, the SSC considers it important that the Net Assessment at least document the extent of existing fishing effort at Channel Islands. Such effort estimates can be derived from fish ticket data, using number of deliveries originating from the 22 area-of-catch blocks surrounding Channel Islands (p. C.34) as a proxy for number of Channel Islands trips.

Additionally, just as the Net Assessment analysts estimated displaced revenue associated with each reserve option by calibrating the relative distributions of fishing activity reported in the Barilotti and Pomeroy samples to aggregate ex-vessel revenue at Channel Islands reported on fish tickets, it should also be possible to obtain estimates of displaced effort for each reserve option by calibrating the Pomeroy sample distribution to aggregate squid/wetfish effort at Channel Islands and calibrating the Barilotti sample distribution to aggregate effort associated with other fisheries at Channel Islands. This can be accomplished by using information on gear type and species composition of catch reported on the fish tickets to distinguish squid/wetfish trips from other trips.

Finally, it is important to note that estimates of the total number of commercial vessels that fish at Channel Islands and the aggregate revenue earned by these vessels from Channel Islands fisheries - as reported in the Net Assessment (Table C.2) - are contingent on the reliability of the block data reported on the fish tickets. The estimates of displaced revenue associated with each of the reserve options (pp. C.1-C.2) - which were derived by calibrating the relative distributions of fishing activity reported in the Barilotti and Pomeroy samples to total revenue attributable to the blocks surrounding Channel Islands (pp. B.3-B.7) - are also contingent on the reliability of the block data. The SSC notes that the block data reported on the fish tickets may not be fully reliable, as fish ticket information is provided by dealers who may or may not know where the fish that they receive were actually caught. Given the extent to which the Net Assessment relies on the block data, it is

important that the reliability of the block data be identified as a source of uncertainty in the Net Assessment.

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August 28, 2002

Hans Radtke, Chairman
Pacific Fishery Management Council
770 NE Ambassador Place, Suite 200
Portland, OR 97220

Subject: SAC Comments on Proposed Marine Reserves for Channel Islands (Agenda E.1.d).

Dear Chairman Radtke and Members:

As President of the Sportfishing Association of California (SAC), I sat on the Marine Reserves Working Group (MRWG) for the Channel Islands for nearly two years, attempting to reach consensus on marine reserves (MRs) for these islands within the Channel Islands National Marine Sanctuary (CINMS). We failed in that process, mainly because the MRWG's science advisory panel produced a recommendation that far exceeded any 'advice' requested by the MRWG. During that process, I repeatedly urged the science advisory panel to incorporate management actions implemented outside the CINMS, such as the Cowcod Conservation Area, into their deliberations, but all attempts towards that line of reasoning fell on deaf ears. I also encouraged the MRWG to give consideration to 'integrating' any MRs at the Channel Islands into other state and federal actions so as to coordinate the use of all the tools available to fisheries managers, as well as to minimize the economic pain inflicted on recreational fishermen. Guess what? I failed again. The smoke had barely cleared when the 'preferred alternative' surfaced!

As you know, the "preferred alternative", offered by the Department and the CINMS, which recreational fishermen certainly don't 'prefer', closes large areas of prime fishing grounds to all take. SAC has recommended that the Fish & Game Commission 'defer' action on the Channel Islands, both because there was no consensus on the MRWG for any alternative set of MRs, and because of the fact that recreational anglers will face double jeopardy with closures through this process followed by possibly additional closures through the MLPA process. Finally, SAC is very concerned that any large network of MRs will simply be a "feel good" action in deference to environmental concerns, with no clear financial commitment to ensure adequate research, monitoring or enforcement.

Now that I have provided the background, I want to talk briefly about the letter that you will be sending to the Fish & Game Commission regarding issues connected to the adoption of MRs at the Channel Islands. You should have in front of you two SSC reports given to you in November 2001 (Exhibit F.1.c.) and June 2002 (F.1.c.). In November 2001, the SSC pointed out..."the Science Panel's size recommendation was based on results from studies that largely assumed that existing management measures are ineffective or non-existent." They concluded their report with the statement that, "Integration of reserves with traditional fishery management will require innovative thinking and careful consideration of costs and benefits."

In June 2002 the SSC report (Regarding the DED) commented that, "...due to the relatively small scale of the CINMS relative to the full distribution of the most of the fishery resources that inhabit CINMS, any substantial fisheries benefits on a stock-wide scale are unlikely to result under any of the MPA alternatives at CINMS. More specifically, the SSC notes that arguments for expected fisheries benefits are technically weak and not compelling." I won't quote the June paper again, but in addition to these earlier concerns, the SSC clearly had some problems with the treatment of socioeconomic impacts by the DED.

I attended the Ad Hoc Marine Reserve Policy Committee meeting in August in El Segundo, and one problem brought to the Committee from the SSC was their concern with the lack of information on costs of monitoring, administration and enforcement in the DED. Your letter to the Fish & Game Commission should reflect that concern. Committee member L.B. Boydstun also felt strongly that monitoring, evaluation and enforcement were critical elements of any MR plan.

In light of the problems outlined in the SSC reports and at the Ad Hoc Policy meeting, and because of the opposition from sport and commercial fishermen in California, SAC encourages the Council to recommend a 'go-slow' approach on MRs. If not a straight deferral to the MLPA, then adopt a few reserves and then give the state and federal agencies time to prove that sufficient money can be committed to appropriately monitor, research, administer and enforce the areas closed.

In a nutshell, the use of any large magnitude of reserves will have a devastating effect on the fishermen I represent, and while traditional fisheries management is flexible and can be temporary, MRs are totally inflexible and their impact is permanent! Please consider the cumulative impact of all regulations on the sportfishing industry, and then recommend the 'go-slow' approach to the Commission. Thank you for your consideration.

Sincerely,

Bob Fletcher

Bob Fletcher, President

COMMERCIAL FISHERMEN of SANTA BARBARA INC.
6 HARBOR WAY
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August 31, 2002

John Ugoretz
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Re: Comments Draft Environmental Document for Marine Reserves for CINMS

Background

Commercial Fishermen of Santa Barbara Inc (CFSB) has been representing the commercial fishing community in the Santa Barbara Harbor since 1971. Our organization has a long history of being proactive on fishery management issues and protection of the resources we depend for our livelihoods. Officers and members of CFSB were directly involved with the MRWG process. CFSB could not support the proposed project so an alternative proposal was developed by local fishermen and submitted to the California Fish and Game Commission for inclusion in the range of alternatives, this proposal is alternative 2. The general membership of CFSB was split over submitting an alternative or supporting alternative 6 that defers the decision to the MLPA process.

Scope of Alternatives

The project area is described as having three bio regions; Oregonian, Transition, and Californian. From a fisheries or economic standpoint the project area also contains three distinct fishing regions that have similar boundaries as the bioregions and are primarily fished from the Ports of Santa Barbara, Ventura, Channel Islands, Port Hueneme and San Pedro. It is questionable if there was adequate community involvement to include Santa Barbara Island in the range of alternatives, since Santa Barbara Island is primarily fished from the Los Angles and Ventura regions and there were no community meetings held in the Los Angles region. The range of alternatives is inadequate because the lower end of the scope, alternatives 1 and 3 has large reserves in the western portion of the project area and little to no reserve area in the Eastern portion of the project area. Alternatives one and three disproportionately impact the port of Santa Barbara and fail to protect any coastal habitat in the Californian bio region. Alternatives one and three fail to meet the MRWG Socio Economic Goal of minimizing short term impacts equally amongst all users and fails to meet Science Advisory Panel (SAP) recommendation of protecting representative habitat in all three bio regions.

Alternative 1 is known as areas of overlap, *"The best effort that each representative could propose and remain true to their constituencies" (p2-13).* This is the **most** area that could be agreed upon.
What is the Departments rationale for using this map for the lower scope of alternatives?
Why does the scope of alternative start with most area fishing representatives could agree upon, why are there no smaller alternatives?

CFSB expressed concern over the range of alternatives when the DFG announced the Notice of Preparation (NOP), this is described in the following paragraph.
On November 9, 2001 the DFG announced the NOP and requested comments on the range of alternatives. CFSB submitted a letter dated December 10, 2001 (exhibit 1) to the California Fish and Game Commission expressing concern over the range of alternatives.
CFSB submitted comments for the NOP to the Department of Fish and Game, letter dated January 16, 2002 (exhibit 2); expressing concern that the range of alternatives was inadequate, specifically alternatives 1 and 3 and concern over any of the alternatives meeting the MRWG Socio Economic Goals of minimizing short term impacts equally amongst all users or as significant impacts under the Regulatory Flexibility Act (RFA) as described in "Stewardship and Analysis: Preserving Nature and Communities" (Bracken Hendricks, NOAA/OSDIA, January 6, 2000).
At the February 8, 2002 California Fish and Game Commission meeting in Sacramento CFSB formally requested that alternatives 1 or 3 be changed because of disproportionate impacts to Santa Barbara harbor and failure to meet the Science Advisory Panel recommendation of protecting habitat in all three bioregions. The request to modify alternative one or three was followed up with a letter dated March 6, 2002 (exhibit 3) from CFSB to the Fish and Game Commission.
No action was taken by the Department or the Fish and Game Commission.

<u>Effects on the Environment (p.E-2)</u>

The DED states "The proposed project would have a net positive effect on the environment because it would eliminate consumptive uses of marine resources within the proposed project boundaries".
The DED should address the potential negative impacts of displaced consumptive uses to the remaining open areas from the proposed project and alternatives 1-5, especially in light of no fleet or effort reduction plans with the Proposed Project and alternatives. It should be noted in the DED that the Science Advisory Panel (SAP) recommended that harvest levels should not increase outside reserve areas. **How does the Department propose to follow the SAP recommendation that effort should not increase in the remaining open areas?**
The DED does not discuss fish behavior and mobility in relation to residence time within a marine reserve and how this will affect the benefits of marine reserves for different species. (Parrish 1999).

The DED should list or rank the local species and habitats that may or may not receive benefits from marine reserves. For example it has been noted that Urchin harvesting has helped stabilize and enhance kelp forests (Tegner and Dayton 1991) and (Kalvass and Rodgers-Bennet 2001).

Spillover (p1-7)

Spillover benefits listed in the DED are primarily supported from studies of fish species that are not found in the Channel Islands. Fish behavior and movement pattern for local species should be cited and a ranking of local species and fisheries that may or may not benefit from spillover should be developed to allow adequate assessment of marine reserves and fisheries benefits.
Studies of marine reserves or protected areas cited in this section to support spillover benefits for fisheries should include any management changes and fleet reduction plans that complemented the creation of the marine reserves or protected areas.

The Proposed Project (p 3.1)

The Proposed project has no support from any of the fishing community due to adverse economic impacts and excessive displacement for several fisheries. The DED and Proposed Project do not address the fishing communities concerns for displacement and capacity reduction to allow the proper integration of marine reserves with existing or future Fishery Management Plans.
"The Socioeconomic Panel noted that they were not able to conclude that there would or would not be significant impacts on certain individuals or groups. The Panel had no basis for judging significance at the personal scale." (DED 5-43)
How did the Department determine levels of significance for economic impacts in developing the Proposed Project?

Site specific comments and concerns

The following comments and concerns are for specific reserves sites that should be noted or addressed in the DED. Many of the site specific concerns can be addressed in a variety of ways while establishing large no take and conservation areas that still achieve a high level of habitat and species protection and minimize short term impacts.
Programs that would allow smoother integration of marine reserves are discussed in the conclusion of these comments.
The DED should also all note potential area closures under the Endangered Species Act (ESA) for threatened bird populations. All areas that may be considered for closure should be identified to address potential cumulative impacts.

Santa Barbara Island State Marine Reserve

The commercial fishing representative for the MRWG expressed concerns for adequate community process for establishing a marine reserve at Santa Barbara

Island because Santa Barbara Island is primarily fished from Ventura and Los Angles ports. No community or MRWG meetings were held were held in the Los Angles region to allow adequate community input for this region. The DED should also all note potential area closures under the Endangered Species Act (ESA) for threatened bird populations that may be considered for Santa Barbara Island.

Anacapa Island State Marine Reserve and Conservation Area

The Anacapa Marine Reserve will result in excessive displacement of Lobster fishing in the opening month when coupled with existing current seasonal bird closures.
The DED should also note potential additional area closures under the Endangered Species Act (ESA) for threatened bird populations that may be considered for Anacapa Island and existing regulations currently in place should be identified to address potential cumulative impacts.

Scorpion Anchorage, Santa Cruz Island, State Marine Reserve

This site coupled with Painted Cave will lead to excessive displacement of squid and Lobster fishing.

Painted Cave Conservation Area

Commercial representatives were agreeable to this site or the Scorpion anchorage site, but expressed concern that both sites would be excessive for this area and result in congestion of Lobster and Squid fishing.
What is the Departments rationale for creating a recreational take only for this site when specific congestion concerns were raised from the commercial sector?
What are the biological benefits of recreational take only for this site?

Gull Island, Santa Cruz Island, State Marine Reserve

Concerns were raised regarding displacement and impacts to Prawn trap fishing and pelagic fishing such as swordfish and Sea Bass for this site. It should also be noted that the Northwestern boundary for this site runs parallel and offshore of the island and will be difficult to enforce.

Carrington Point, Santa Rosa Island, State Marine Reserve

Concerns were raised over the displacement of the Halibut Set Gillnet Fishery and White Sea Bass Drift net fishery for this site outside one mile.The Halibut Set Gillnet fishery and White Sea Bass Driftnet are spatially sensitive fisheries due to existing regulations that limit these fisheries to areas outside one mile. Economic impacts for the Halibut Set Gillnet and White Sea Bass fishery should be gear specific rather than the aggregates (p 5-54).

By having economic impacts in species aggregates the economic impacts do not adequately represent the potential impacts to specific gear types. This proposed site outside one mile has the strong possibility of putting Halibut Set net fishermen and White Sea Bass Drift fishermen who fish this area out of business.

Skunk Point, Santa Rosa Island

This site coupled with the Eastern portion of the Harris Point, San Miguel Island and Carrington Point, Santa Rosa Island will lead to excessive displacement and congestion of the Crab fishery and the Halibut hook and line for both sport and commercial fishing.

Harris Point, San Miguel Island, State Marine Reserve

Commercial Fishery representatives for the MRWG process raised concerns over the displacement of Crab Fishing from the Eastern two miles of the Harris point State Marine Reserve. The combined displacement of Crab fishing from this site and the Carrington Point site will result in excessive displacement and congestion of the Crab fishery.
How does the Department propose to deal with displaced effort from the Crab Fishery; a fishery that does not even have a basic limited access program developed?
The Harris Point State Marine Reserve captures over 90% of the North facing coast and habitat for San Miguel Island, **What is the department's rationale for taking over 90% of the North facing habitat of San Miguel Island?**

South Point, Santa Rosa Island, State Marine Reserve

The Proposed Project moves the western boundary about a quarter of a mile further west from where the boundary was originally drawn in the public process. The original boundary was placed off the western end of a distinct reef that is bordered by a large sand ally. The western boundary in the Proposed Project runs through the middle of another distinct reef. By splitting this reef accidental encroachment by fishermen will be much more likely. The sand ally in the original boundary will act as a natural boundary.
What is the Departments Rationale for moving the western boundary from its original position that was agreed upon in the public process?

Alternatives (p.E-2)

Alternatives 1 and 3 are incomplete draft maps produced by the MRWG and are a poor representation of a 12 and 21 percent reserve network for the CINMS. Alternatives 1 and 3 do not meet either the Science Advisory Panel (SAP) recommendation of representative habitat in all three bioregions or the socio economic goal of minimizing economic impact equitably amongst all users. Alternatives one and three do not allow for an adequate comparison of potential

economic impacts and potential habitat protection through out the entire project area for reserve networks of this scale.
What is the rationale for including two alternatives that have the majority of reserve habitat representation in the Oregonian and Transition province and minimal habitat representation in the California province and creates a disproportionate economic impact to Santa Barbara harbor?

The DED states that certain boundaries in alternatives 1, 2 and 4 would be confusing and difficult to enforce. The DED should describe why and what specific reserve boundaries would be confusing or difficult to enforce.
Alternatives 1 and 4 were chosen by the agencies for inclusion in the range of alternatives. **Why does the DED include alternatives that have boundaries that are confusing and difficult to enforce?**
It should also be noted that the Northwestern boundary of the Gull Island reserve in the Proposed Project runs Parallel and offshore of the coast and this will be a difficult boundary to enforce.
The DED discus's alternatives 1-5 and the Department's reasoning of why alternatives 1-5 are either inadequate in habitat representation or have excessive economic impacts. For alternatives 4 and 5 the Department states its preference for establishing a reserve network with lower economic impacts.
"The Socioeconomic Panel noted that they were not able to conclude that there would or would not be significant impacts on certain individuals or groups. The Panel had no basis for judging significance at the personal scale." (DED 5-43)
How did the Department determine it's preference to establish a network that has lower economic impacts?

Alternative 2 (p3-12)

The DED does not adequately describe alternative 2, "The Proactive Fishermen's Plan" September 12, 2001, (exhibit 4). Alternative 2 has phasing sub options; that are intended to minimize short term impacts to consumptive users and the potential to ensure administrative accountability through administrative performance options. Alternative 2 also recommends the establishment of additional monitoring sites at Judith Rock, San Miguel Island and South Point, Santa Rosa Island. Additional monitoring sites will be necessary for any of the proposed alternatives to adequately monitor the effects of marine reserves and fished areas. The DED also fails to acknowledge that Alternative 2 recommends that Santa Barbara Island be deferred to the State MLPA process for reserve siting. Alternative 2 should include an additional area and habitat representation table and biological evaluation adjusted excluding Santa Barbara Island to allow a proper evaluation of habitat representation for the northern islands. It should also be noted that a future reserve recommendation for Santa Barbara Island would also increase habitat representation and economic impacts in the CINMS.

Alternatives 4 and 5

Alternatives 4 and 5 are examples of a larger reserve network that allows a comparison of potential economic impacts and potential habitat protection through out the entire project area.

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6.6 Defer Decision (6-64)

The Departments Rationale for rejecting this alternative is very questionable. In honor of the public process the DED should note that almost the entire sport and recreation community and the majority of the commercial sector support this alternative. The reasons this alternative has strong support is the MLPA is a statewide process that will allow overall impacts of marine reserves to be assessed and this process will utilize conservation areas. The use of conservation areas in the community process for CINMS was not allowed and this should be noted in the DED. Had the use of conservation areas been allowed in the public process much more common ground could have been achieved. Further the agencies use of conservation areas; an option that was not allowed in the public process, to develop the Proposed Project is evidence of a flawed process.
The overall economic impacts to fisheries and ports can not be fully assessed until completion of the MLPA process. The DED states that biological and economic monitoring will contribute more information for future decisions such as the MLPA. **The DED and Proposed Project do not include any additional monitoring plans that will contribute to future decisions.** It is assumed that additional monitoring will take place when reserves are put in place. However when the take of Red Abalone fishery was closed South of San Francisco in 1997 the Department and Commission spoke of much additional monitoring work to be done for abalone. Five years later no additional repeatable data has been gathered from any of the traditional Red Abalone fishing grounds, and this is for one single species that can't swim.
How do the lead agencies propose to gather economic and biological data for use in future decisions such as the MLPA?

Potential for Congestion (p5-17)

California's traditional management policy of Maximum Sustained Yield and Open Access has allowed most of the states fisheries to become fully or overcapitalized within the existing amount of harvest grounds available. The following statement is cited from the California Fish and Game Commissions Restricted Access Policy and clearly illustrates current capacity problems with many of the states fisheries.

The California context. Because California historically did not restrict the number or amount of fishing effort allowed to harvest fish, the State's commercial fisheries generally are overcapitalized: they have the physical capacity to exert more fishing pressure than the resources are able to sustain. Loss and degradation of marine and anadromous habitats and other ecological changes have aggravated this condition of excess fishing

capacity.
Since the early 1980s, various programs have been implemented, through statute or regulation, to limit the number of commercial vessels or fishermen allowed to use specific types of fishing gear or to harvest specific species or species groups of fishes. These programs have seldom resulted in adequate reduction in the overall fishing capacity for those species.

They sometimes have been effective in capping the number of fishery participants; however, an unintended consequence has been a shift in effort from restricted fisheries to open access fisheries that were already fully developed.
The lack of consistent policies for guiding the development of restricted access fisheries has resulted in a myriad of laws and regulations. These are confusing to the industry, difficult for the Department to interpret and administer, and, in some cases, of questionable benefit to the fishery or the resource they were intended to protect. (CA Fish and Game Commission Restricted Access Policy 06/18/99)

Further, the DED describes Fisheries Access (P4-158) and concludes "*all fisheries in the proposed project area can currently be characterized as open access fisheries".*
The SAP recommended that effort should not increase outside marine reserves.
How does the Department propose to address fleet reduction for fisheries that are fully exploited, overcapitalized, displacement and congestion from the establishment of marine protected areas?

The DED should list the fisheries that are currently at optimum capacity and will not need reduction plans with the implementation of the Proposed Project.
The DED should list any fisheries that are considered fully exploited or overcapitalized and explain what the capacity goals are in light of the Proposed Project and expected target dates that these fisheries will meet their capacity goals.
The DED (p 5-18) also states long term management plans to reduce fleet size combined with short term harvest reductions as ways of limiting congestion. The Near Shore Fishery Management Plan and Squid Fishery Management Plan are used as examples as ways to reduce effort. Both of these plans only suggest reduction of effort and capacity.
Short term harvest reductions on top of area closures with out proper overall fleet reduction in place combined with reserves on the scale of the Proposed Project will lead to excessive congestion, over fishing and unsustainable fisheries.

The DED states "the net effect of reducing effort, while closing some areas to fishing should limit the possibility for congestion outside MPA's" (p5-18). The DED needs to explain how this will be done for each fishery in the project area.

The DED does not adequately address the potential for congestion for effected fisheries in the project area, studies cited in the Potential for Congestion of the DED may not be an appropriate comparison for the affected fisheries in the CINMS because the studies cited are in different parts of the world with different

management, different climates, and the species may have different behavior and movement patterns.

The DED should explain how the species and fisheries in the studies cited relate to the CINMS region also any changes in management or capacity reduction plans in the areas of the cited studies should also be discussed in the DED. The DED should cite any local or regional studies of marine reserves for spillover benefits for offsetting congestion.

Thresholds of Significance –Socioeconomic impacts (p5-43)

The DED states that "The threshold of significance under CEQA is established by the lead agency." Economic impacts from the proposed project on Ex Vessel value by Species Group range from 5.55% to 21.42%. **How did the lead agency determine thresholds of significance for economic impacts for the Proposed Project for each species group?**
The DED states that the Socioeconomic Panel could not conclude that there would or would not be significant impacts on individuals or groups and The Panel had no basis for judging significance at the personal scale and context. Socioeconomic Profiles of Fishermen (p4-150) were done for this project and captured 79% of the ex-vessel value for the project area.
The DED should explain what additional information would be required to allow proper socio economic analysis to under the Regulatory Flexibility Act determine if significant impacts would occur.
How do the lead agencies propose to determine if there would or would not be significant impacts under the RFA, RIR and NEPA for the Federal phase of the Proposed Project?

Habitat Representation

For alternatives 1-5 the DED states "little is known about the distribution of hard sediments on the deep continental shelf and slope in the Sanctuary". This statement is not made in the Habitat Representation section (p5-19) for the Proposed Project. For consistency this statement should be added to the habitat representation section of the Proposed Project or removed from the habitat representation sections for the alternatives 1-5.

4.2.5.1 Importance of El Nino Events

The DED fails to describe potential effects of kelp loss from El Nino's for abalone (Tegner and Haaker 2001) and Sea Urchin quality (Kalvass and Rodgers-Bennet 2001). It should be noted that during El Nino events when standing kelp stocks are depressed fisheries that are dependant on kelp availability may experience additional congestion from additional loss of fishing grounds due to limited kelp abundance.

Conclusion and recommendations

The range of alternatives are biased in scope and do not allow for a fair assessment of habitat protection benefits and economic impacts through out the entire project area. Cumulative impacts such as future closures from MLPA, Shelf, Cow cod and possible bird closures are not addressed in the DED. Recommendation: Defer decision to MLPA or adopt a plan that utilizes phasing to allow assessment of cumulative impacts.

Socio economic work was not completed to allow conclusive evaluation of economic impacts to individual fisheries. Recommendation: Obtain any additional essential fishery information that is needed to finalize a socio economic analysis that is designed to assess spatial impacts to individual fisheries. Establish economic thresholds of significance for individual fisheries.

Socio economic impacts are not minimized in the Proposed Project and alternatives1, 3, 4 and 5. Economic impacts will be further aggravated by displacement and congestion. If additional harvest reductions are implemented with the reduction of harvest grounds without overall fleet reduction some fisheries will become economically unviable. Alternative 2 does attempt to minimize short term economic impacts through phasing.
Recommendation: Defer decision to MLPA or adopt alternative 2 with phasing, develop and implement fleet reduction plans that will address congestion and displacement issues prior to implementing any additional reserves. Reevaluate phase 2 with MLPA and other closures and any data gathered from existing reserves and make appropriate changes.

Displacement and congestion are not adequately addressed and the potential negative biological impacts on the remaining open areas due to increased fishing effort are not addressed in the DED. Recommendation: Develop an adaptive plan that establishes a minimum set of reserves that will not adversely impact remaining open areas from displaced fishing effort and minimizes short term economic impacts. Data should be gathered from these initial sites to develop a ranking of fisheries that do receive benefits from reserves and those that don't. This data is necessary to allow integration of marine reserves and fishery management plans and adequately design future reserve networks.

Accountability for monitoring and enforcement is not addressed in the DED and there is no description or plan in the DED to develop and fund adequate long term monitoring and enforcement programs within the proposed project area. Recommendation: Develop monitoring and enforcement programs with secured funding. Require baseline data for selected sites prior to reserve implementation.

Concerns for specific sites could be addressed through phasing, fleet reduction plans, limited conservation areas within the reserve sites, grand fathering of permits and boundary modifications.

The commission may want to make a policy decision regarding potential size parameters for an initial set of reserves statewide and potential time lime for implementation. This would give guidance for the MLPA process and allow

individual fisheries to develop proper fleet reduction plans for proper integration of marine reserves and management plans. Future reserve networks should be developed using information obtained from initial reserve networks.

Sincerely,

Harry Liquornik
President
Commercial Fishermen of Santa Barbara Inc.

cc: Robert Treanor, California Fish and Game Commission
Don Mc Issaac, Pacific Fisheries Management Council
Virginia Strom-Martin, Joint Committee on Fisheries and Aquaculture

Attachments: Exhibits 1-4 and Citations

Citations

Hendricks, 2000. Stewardship and Analysis: Preserving Nature and Communities. A report to the Secretary of Commerce's Policy Office. 18 pp.

Parrish.1999. Marine Reserves for Fisheries Management: Why Not. CalCOFI Rep.,Vol 40, 77-85 pp.

Tegner, Dayton. 1991. Sea Urchins, El Ninos, and long term stability of Southern California's Kelp Forest Communities. Mar. Ecol. Prog. Ser. 77: 49-63 pp.

Kalvas, Rogers Bennett. 2001. California's Living Marine Resources: A Status Report. 102 pp.

Tegner, Haaker, Riser and Vilchis. 2001. Climate Variability, Kelp Forests, and The Southern California Red Abalone Fishery. Journal of Shellfish Research, Vol. 20 No.2, 755-763 pp.

Exhibits

Letter from CFSB, Harry Liquornik to Robert Treanor, Cal. Fish and Game Commission dated December 10, 2001. (Exhibit 1 Attachment 1).

Letter from CFSB, Harry Liquornik to John Urgoretz, Cal. Dept of Fish and Game dated January 16, 2002. (Exhibit 2, Attachment 2).

Letter from CFSB, Harry Liquornik to Robert Treanor, Cal. Fish and Game Commission dated March 6, 2002. (Exhibit 3, Attachment 3).

Proactive Fishermen's Plan, September 12, 2002. (Exhibit 4, Attachment 4)

August 27, 2002

The Draft Environmental Document for a Network of Reserves Santa Barbara Channel Islands Analysis

By Chris Miller, Channel Islands Lobster Fisherman

A Dissenting Opinion and The Alternative Scientific Perspective on Marine Reserves.

Preconceived ideas "become a danger only if (an experimenter) transforms them into fixed ideas...The greatest derangement of the mind is to believe in something because one wishes it to be so." Louis Pasteur (in Rene Dubos, 1950, p.376)

Reviewing the draft environmental document, I draw from 25 years of fishing the Channel Islands along with my experience in representing fishermen in the Community process to develop goals and objectives for Reserves, working to organize the Fisherman's Data Review Committee and as a liaison with the scientific community and fishing community. That experience was translated into developing an alternative design that was accepted as the Pro-Active Fisherman's Plan by the State Fish and Game Commission. This plan now has a place in the range of alternatives contained in the draft environmental document (DED) in an abbreviated form labeled alternative 2. that has been modified by the department. The DED is a serious distortion of the community involvement and consensus that form the basis of the project objectives.

- There is no support from the fishing community for any reserve designs that do not include explicit provisions for integrating them with existing fishery management. The DED is the final chapter in the saga of a failed attempt to coerce the stakeholders into accepting scale of reserve designs that is based in the theory of reserves as replenishment areas that will replace our existing strategy for fishery management. It makes a case for a preferred alternative reserve network without support from the fishing community. The scientific support is very weak and has not been presented objectively.

- The scientific references for the project are the most telling indicator of the DED bias, there is no scientific papers referenced on spatial management issues that deal with the problems of congestion externality and zonal management issues relative to resource management. There is no social geography, cartography, anthropology, community based management, ecosystem management, societal and ethical values, etc. The entire scope of this project is completely stunted in regard to the broader field of the humanities.

- The community process that was directed by the state Fish and Game Commission to develop goals and objectives for reserves was successful in that consensus was achieved on the objectives and a mission statement. The community process also was very successful in providing the public with a process to expose the theories on marine reserves to critical thinking and subject them to a degree of verification in the real world. We also have a very large amount of experience in the dynamics of stakeholder involvement process to evaluate and draw from. The interests I represented viewed the MRWG as a pilot project for Marine Reserves we see a substantial benefit will come from reviewing and developing the methodologies for evaluating reserves that were initiated in this project.

- One point that should receive special focus is the experience we had in applying science in a public process. This was the area that was the most controversial and created the most conflict, an objective evaluation of this is imperative to insure our efforts to bridge the cultural divide between science and the public is built on. The community support for reserve programs to come requires that we do not continue to cover up conflict, but take steps to resolve it.

- The conflict over the science. There are multiple working hypotheses for reserves. All of them have a scientific basis. The multiple working hypothesis approach in science is the foundation of modern science and the experimental approach. It is the foundation of the policy framework for reserve design under MLPA and the

adaptive management policy of the MLMA. It follows that for the purposes of achieving the Sustainable Fisheries Goal: integrating marine reserves into existing fisheries management as a project objective, the multiple working hypothesis framework is the appropriate method for evaluation of reserve design options. The central conflict of the science was over the appropriate scale and starting place for no-take fishing areas in existing fishery management. Multiple Working Hypothesis & the DED. The DED provides one hypothesis theory for assessing the relative benefits and impacts of the various design options. That is the assumptions and theory that supports a large scale management experiments with reserves, where they are utilized for stock rebuilding in collapsed fisheries, or as a primary basis for sustaining recruitment, in situations where there is no effective fisheries management.

- The DED does not support a connection between the theory and CINMS as a distinct region where it should be applied. It fails to provide a clear explanation of the methodology it uses to evaluate the relative benefits of the reserve alternatives. It's liberal interpretation of theories and extrapolation of collapsed stocks and failed fisheries management to all species in CINMS fished and even unfished is completely arbitrary. There is no reasonable supporting calculations of a threat of extinction and the "scorched earth" scenario outside the reserves which the DED science uses as a theoretical foundation for assessing reserves based on percentages of habitat that insure sustainability.

" ...We should trust more the observations than the theory, and we should hold good the latter only if facts support it". Aristotle

The scientific literature is very clear that there is no one size fits all approach to marine reserve planning, that the objectives for reserves must fit the specific region and its needs.

The DED does not identify the alternatives of achieving the project objectives with a combination of management strategies, as the scope of the project based on the Natural History of the region:

1. Capacity reductions under the restricted access policy and, Total Allowable Catch (TAC) under MLMA
2. Capacity reductions, TACs and Marine Conservation zones for specific stocks.
3. Capacity reductions, TACs, Marine Conservation zones, and no take zones.

In combination: This is why the initial revue of the supporting science for the alternatives by the Science and Statistical Committee of the PFMC point out that this is not scientific but policy driven. In layman's terms the DED is claiming that there is only one way to meet the objectives with large no-take reserves. The DED does not provide for a full scope of design alternatives because it discards any information that was brought into the process that it sees as competing with the one theory approach, it also makes liberal use of misquoting its own scientific references. The DED does not give adequate scope to considering the various combinations of progressive fishery management with reserves as a whole management framework. It segments the project with rhetoric about failed management in the past. It does not identify the root causes of the failures and explicitly make the connection to reserves addressing the failure. Instead it proposes a theory of reserves that is based in a scenario of complete management failure and stock collapse.

"Interesting theory but lacks proof", Miller

The DED approach is to distill the theory of percentages by a simplistic method of averaging them. The DED ignores the factual information of its own scientific references in a blatant fashion this way. Even if we accept the percentage approach of habitat becoming a proxy for populations with all the generic assumptions that are untested in that concept, it still does not support the DED range of alternatives. In all the scientific literature on reserves that use percentages as a reference point, They are tied to specific objectives in management that are relative to the performance of existing fishery management outside the reserves. There is no credible basis presented for simply blending the objectives by their percent and then averaging them to prescribe "the" universal reserve criteria for sustainability as a one hypothesis. Percentages of habitat are only reference points that serve to guide an approach to designing a reserve network for specific habitats and their fisheries as a whole ecological unit.

"The effort is to bring up into view every rational explanation of new phenomena, and to develop every tenable hypothesis respecting their cause and history. The investigator thus becomes the parent of a family of hypothesis and, by his parental relationship to all, he is forbidden to fasten his affections unduly upon the one." Thomas Chrowder Chamberlin

The generally accepted range of percentages for specific objectives vary, based on the biases of the interest that develop them. However there is a general common ground between science and stakeholders that seek to work with each other:

1. Monitoring reserves 1-10 %
2. Added precaution in fishery management 10-20%
3. Alternative fishery management & stock rebuilding 20-50%

The DED does not make the connection between its recommendation for a 25% network as the preferred alternative and the status of the stocks at CINMS. It does not make the case for reserves as an alternative strategy for sustaining the stocks as the bar to meet for achieving the project objectives.

- The DED does not provide a reserve option that is specifically designed for the monitoring objective, 0-10%. What really has confounded the development of common ground on reserves is the methodology used in this percent approach, is has became apparent in examining the science that the biology and life history of different harvested populations have distinctly different thresholds for maintaining successful recruitment. When modeling the population dynamics of different species there are different parameters for considering their relative contribution to sustainability. For example, variable density dependence for recruitment success in species larval life span. (Parrish)

- The DED fails to provide an alternative that specifies stock rebuilding with MPAs to meet the objectives. It fabricates a policy of no-takes. The DED fails to supply a systematic evaluation of the population dynamics of the various species in relationship to supporting its evaluation of benefits and costs. In failing to do this it does not provide any reference for the utility of the theory in application to the practice of fishery management in the project setting. The DED contains a long list Biological Resources and species of interest (section 4.3.3), but, provides no evaluation of their individual benefit from reserves. It is not possible to apply with any degree of accuracy the generic formula of the DED to the real world without the missing information of larval dispersal and specifics of species behavior in relationship to reserves. Different species have different behavior in regard to mobility for example the pelagic species would never become resident species in a reserve. There is also great diversity in the range of their population's distribution as the DED notes but it fails to assess which species ranges make them candidates for being self sustaining in CINMS. The variability of larval life of different species and their density dependence for recruitment have very diverse biological life cycles. Recruitment episodes are also variable based on the frequency of climatic change.

- The DED does not support the premise that the wide variety of species will be self sustaining in the CINMS reserve system. The range of their distribution make that impossible. When you begin to try and make a mathematical calculation for sustainability for all the species as an aggregate you are actually repeating a problem that led to the failure of the stock assessments for groundfish and caused the problems we now propose to solve with reserves. The assumptions of the scientific advisory panel in utilizing habitat as a proxy for populations do not recognize the variability that is present in the natural world of the CINMS. The DED preferred alternative is based in assumptions that cannot be tested just like the failed stock assessments for Groundfish were. The DED seems to be making a case for trying to initiate implementation of reserves based on uncertainty about fisheries management without a systematic evaluation of the level of uncertainty in regard to reserves.

- The DED fails to provide an alternative that meets the minimum requirements of MLPA with representative habitat as the objective. The DED fails to also consider the relationship between population dynamics and fleet dynamics spatially. They do not provide discussion the viability of the plan based on the institutional framework and methodology for adjusting fishing effort in relation to the scale of the design.

- There is no clear approach for applying the restricted access policy to this area as a management unit.

In summary the DED scope of alternatives is really several versions of incomplete designs which it evaluates with an arbitrary thresholds for percentage. The DED should include supporting analysis based on the status of the resources and essential fishery information and be accompanied by realistic milestones for implementation by phasing them in incrementally as recommended by the National Research Councils published synthesis of reserve science that considers ecology in a holistic approach. This is the real scope of alternatives to meet the project's goals.

1. The no project alternative, as a capacity reduction plan tied to fishery management tactics of a Total allowable catch with added escapement if needed. Seasonal & size limit adjustments.
2. Capacity reduction and a TAC in combination with Minimum MLPA requirements for monitoring and representative habitat preserves.
3. Capacity reduction in combination with MLPA requirements plus MPAs for harvest controls under the Nearshore FMP and federal groundfish MPAs
4. Capacity reductions with the preferred alternative.
5. The preferred alternative as is. 6. The "science panel" large scale design which assumes capacity reduction and CINMS as a discreet management unit where effort remains constant.

- The DED does not provide a complete scope in the designs alternatives and fails to evaluate them based on the appropriate criteria for their objectives.

The lack of objectivity in presentation of the diversity of reserve prospects masks the potential for significant negative environmental impacts from this project. That these impacts have the potential for cumulative damage to the habitats and ecosystem of the Santa Barbara Channel and the ecology of the entire California Bight as a bio-region. The DED could benefit greatly from a review of: Marine Reserves to Supplement Management in West Coast Groundfish Resources.

Phase 1 Technical Analysis,(Parrish, Seger, Yakolavich, 2000) The methodology of the supporting science for the DED is flawed and fails to meet the objectives stated in section 1.3 the project objectives. The DED omits essential fishery information necessary for evaluating the objectives and fails to provide adequate scope to its range of alternatives for consistency with the states Marine Life management Act (MLMA) and the states Marine Life Protection Act (MLPA).

- The DED also fails to give adequate perspective on integrating state and federal management for rockfish and pelagic species. The design alternatives require explicit explanation of the management needed outside the reserves to compliment them for scale. The thresholds of impact for the project are not given a diligent evaluation based on the projects objectives there is no mention of the trade off between fisheries management and reserves in regard to the level of uncertainty for the various designs. The DED also ignores the cumulative impact of regulatory activity that has taken place recently to limit harvest and that will be enacted in the foreseeable future. It projects a no negative impact evaluation from reference points that are too limited it ignores the potential spatial problems of congestion of fishing effort and its potential for negative impacts to surrounding habitats. It achieves a no negative impact evaluation by segmentation of the analysis. The CINMS is not a designated fisheries management unit where effort can be controlled. " I cannot give any scientist of any age better advice than this; the intensity of conviction that a hypothesis is true has no bearing in whether it is true or not" Peter Medawar

In reviewing the DED it is apparent that what the document has omitted is far more serious than the numerous flaws and inaccurate use of scientific references for its evaluation. It does not supply the alternative perspective on reserves that were developed by scientific committees that digested the science on reserves and published their findings:

1.The National Research Council report, 2001
2. Marine Harvest Refugia for West Coast Groundfish: A workshop, NMFS, 1998.

Both these documents support proceeding with reserve design based on habitat quality and careful implementation planning to integrate reserves into existing fisheries management so specific objectives are met

and essential prerequisite fisheries information is developed for an experiment with marine reserves. They both discuss the social issues of spatial management. The DED Summary is an outline of its flaws and omissions. It can be surmised from even a casual read of the DED that in relationship to the project's objectives, there is a conspicuous lack of distinction between facts and their interpretation. The woven web of guesses that is presented in the chapter one summary illustrate the most significant omission of the DED in accurately making an exposition of the information on marine reserves. The summary does not expose the fact that.

- Marine reserves are essentially an adaptive management experiment in marine resource management. It fails to give the explicit monitoring designs necessary for assessing the project alternatives In proceeding to provide us supporting information with the documented success of reserves and examples the DED fails to provide the context of those examples. That they are all small scale experiments in using reserves outside the context of a fisheries management experiment.

- The DED omits any reference to the documented failures of reserves due to lack of funding and community support. It neglects to discuss inconclusive results from poor design and inadequate baseline data. The DED attempts to establish its basic premise for reserve benefits. Increasing reproductive and recruitment of fished species and spillover. Right here in the section, I would label speculative benefits we see the beginning of the internal inconsistency of the DED. The scientific documentation of reserves as spawning biomass centers is evaluated independently of spillover, and done on a small scale. The layman asks how can they do both on the scale we are talking about at CINMS?. How do they mitigate the lost area when you are compressing fishing effort at the same time? And what about coastal MPA's to come and bird closures, and all the other closures!

" Those who have excessive faith in their theories or ideas are not only ill prepared for making discoveries; they also make very poor observations." Claude Bernard

In referencing the work the DED draws from a paper titled, Fisheries Benefits for Optimal Design of Marine Reserves. This is a classic example of the pitfalls of using hybrids of theory on percentages based in modeling. "Our models include detailed life history data. They also included the assumptions that adults did not cross reserve boundaries, while larvae mixed thoroughly across the boundary but were retained sufficiently to produce stock-recruitment relationship for the management area." (Nowlis, Roberts) The assumptions and context of this paper is for a hypothetical theory of reserves it does not really apply to CINMS as a rule. The DED does not make any connection to this theory's assumptions and the species in CINMS. This is a sample that represents much of the modeling for percentages. In reality you can make the model say anything you want about percentages by adjusting the parameters. Reserve models have a range of 5-70% closures in the literature.

"...it is the greatest weakness to attribute infinite credit to particular authors...they who have presumed to dogmatize on nature...have inflicted the greatest injury on philosophy and learning. For they have tended to stifle and interrupt inquiry." Francis Bacon

The DED references the one fisheries based reserve experiment which is a large MPA put in place due to stock collapse of cod on the Georges Bank (Murawski et. al. 2000) In the discussion which forms the summary of the one fisheries management experiment that we have to go on it states: "Several factors seem crucial to the efficacy closed areas for reducing fishing mortality rates, protecting juvenile or under sized animals, and enhancing productivity: (1) the degree of fish movement across closed area boundaries, (2) the spatial distribution and quantity of displaced fishing effort, (3) the relative catchability (CPUE) of the target stock out side the closures, and (4) the level of protection afforded to undersized animals taken by the fishery. In the case of severely overfished species that are widely distributed, or which make extensive movements, closed areas may not be effective as a primary management tool, unless extensive portions of the range of the stock can be closed (Lauck et. al., 1998)- much more than 20% being advocated generally. In these cases, complementary management regulations controlling exploitation outside the area may be as important as the closed areas themselves in reducing fishing mortality."

My apologies for such a lengthy quote but this is a key bit of scientific work that is used to support a concept that is imbedded in the actual science behind reserves but is distorted and papered over in the DED. That is that the fisheries management objectives for reserves require evaluating
a range of factors that are not covered by the DED these factors are listed in the above discussion quotation.

So the key factors as they apply to our CINMS project would be:

1. Which specific fished species will benefit?
2. What is the actual amount of displaced effort in terms of fleet capacity?
3. What is the actual reduction of harvest grounds that sustain yield?
4. What portion of the stock(s) is protected with existing regulations?
5. Which stocks are now suffering from recruitment overfishing at CINMS?

* These fundamental questions need to be answered by the DED in the form of a spatial analysis to factors in the real dimension of fleet fishing fleet dynamics and displacing effort combined with existing regulations at the CINMS
* The relationship of these factors needs to be made explicit in terms of the actual habitats to assess potential impacts and their thresholds of significance in regard to congestion and potential overfishing outside the reserves.

The DED then proceeds to take us through their evaluation of Benefits and Costs on page 1-10 in which they state that "the science panel for the Marine Reserves has summarized the marine reserve literature supporting the ecological/biological benefits and costs." Which is also qualified by reference to Sanchirico and Wilen (2001) which puts it very simply that benefits and costs are "contingent on social and economic behavioral responses. We are now starting to get a glimmer of the flaws in this document in regard to the methodology and the lack of it. The science panel has built in its own scope by its selection of the literature.

* No design in this range of alternatives is complete without a complimentary management plan for what is necessary for implementation with existing fishery management outside the reserves
* It is impossible to assess the designs for monitoring their performance in sustaining fisheries, it is a hypothesis that is untestable. The reserve experiment is not scientific in its approach. There is no identified controls or alternative hypothesis.
* Their efficacy of reserves is identified as contingent on social responses and there is no supporting summary of literature from the social science perspective that describes the institutional framework and social context of reserves relevant to the situation of the study area CINMS and the scale of their design.
* The layman's question voiced at every stakeholder meeting held is not answered how will we know these things will work. What is the real price tag, What about all the existing closures and regulations how are they considered in this plan. How can you apply the groundfish declines to all the other fisheries?

The context of the summary, in Murawski et al., 2000 needs to be included. It concludes that the initial case for MPA's indicates that the MPA may be very useful as rotational closures and that " Displacement of fishing effort to other species and other areas might have increased fishing to other areas or species may have increased fishing mortality elsewhere and reduce potential the potential effectiveness of measures designed to rebuild other stocks. The extent to which these externalities have occurred reinforces the general premise that closed areas alone can not compensate for grossly excess fleet capacity."

* The science used by the DED is distorted by the constraints placed on the discourse of the community process. It was limited in its scope by process. The Executive Summary and summary do not make any note of the constraints placed on the process to consider reserves at CINMS by the Sanctuary Advisory Council (SAC) as being the driving influence for the context of the scientific references.

"A scientist who habitually deceives himself is well on the way to deceiving others" Peter Medawar

The SAC, which is controlled by CINMS manager under its bylaws, instituted a framework for considering reserves that limited the discourse to only complete no-take reserves. If we take a quick jump forward to look into Chapter 2 the Environmental document, you can easily see the section 2.6.1 does not explain this constraint in its documentation of the Marine Reserve Working Group. We now have a clue to the elements of the massive social conflict that was initiated by the process itself due to the unscientific methodology. No one has been able to break the strangle hold of the agencies in asking the fundamental question.

* Is there scientific evidence to support only no-take marine reserves as sustaining fisheries at CINMS?
* Can a combination of reserves and added fishery management better accomplish the objectives?

* What are the tradeoffs between existing fishery management and the proposed reserve designs relative to scale and congestion externalities?

As we finish the opening summary we are given a conclusion in section 1.5 the department "feels will help address the issues raised during the channel islands reserve process" and then qualifies that with its intent to meet the goals and objectives and problem statement, and of the community forum of the MLPA, and the requirements of the MLPA. This is the point where we need to take a deep breath and consider more factual information than the departments feelings, all the basic elements of the DED need examination before they are extended into the document as manifold problems all the methodology need to be reviewed and supported. The DED does not make a case for connecting the theoretical science to the CINMS and actually increasing or sustaining yield. So far all they really support is that the larger the reserves the better protection for biodiversity. But this is in some respects a specious argument, where do our fisheries go? They are subject to market demand, will simply importing more fish protect diversity better?

1. The preferred alternative is based in a theoretical extrapolation of reserve science that is presented in a vacuum outside the societal and ethical values of the real world.
2. The methodology for developing the alternatives could not pass an independent fisheries science review, there is in fact no published product that makes a connection to the theory of benefits without adverse impacts at CINMS, the only analysis concludes they cannot determine an impact, " It is not expected". Which is very different from determining there is no impact.
3. The criteria for evaluating the alternatives for their contribution to sustainability has no scientific basis there is no scientific support for stating that reserves will sustain yield to any of the harvested species in CINMS or that the reserves will mitigate the lost area and harvest.

"Saupere aude! Have courage to use your own reason - that is the motto of enlightenment." Immanuel Kant

The DED builds the perspective that no-take reserves are the answer for several hundred pages it projects from the flawed assumptions of its scientific panels, lack of expertise in the real setting at CINMS, and reserve science that does not have a reference point of progressive fishery management practice and method.

- Reserves are the answer!. The layman still wants to know, "What is the question?"

To summarize "the science" as context for the discussion of the problems I state in my thesis of negative environmental impact: its real foundation is antique deterministic models of population growth based in the logistics equation, it only makes sense for studying parameclum in a petri-dish which is its origin. This is then tied to MSY, fifty year old assumptions that have already failed us . Then it is tied to habitat modeling as a proxy for populations based in an experimental computer modeling program which extrapolates habitats from sediment samples conducted by the minerals management service surveys and a few basic habitat maps a very dangerous abstraction for estimating population structure. This is posed in conjunction with a bio-geographic provinces theory that is fabricated, and contradicted by the DED's own references. The species of concern list is the third biological leg of the science, the species we propose to save with reserves? The list is characterized by it being dominated by species that are not fished or have had massive regulatory controls placed on them in the interim since the MRWG science panel issued its assumptions. This linchpin the species of concern list is what the scientific advisors point out forced them to make their recommendation of 30-50%! It is beyond most people's ability it seems, to unlock this black box of science that is enshrined now in the media as the" best available science", and has been speculated as the basis legal action if we do not "honor the science" by the environmental seats on numerous occasions in the community group on the public record. That is because it is purposely opaque and slippery, the apex of open-ended hypothesis. The "draft" science recommendation is really a never-ending ad-hoc hypothesis fortifying the flaws.

"Intellectuals all over the world take it for granted that their models will be more intelligent, make better suggestions, have a better grasp of reality of humans than these humans themselves. What has this situation got to do me?" Paul Feyerabend

I will devote a special section to unlocking the black box of the science panel in detail. But back to simple facts, the scientific advisers failed to work with the community group and communicate with us or help us. They became a rogue panel of stakeholders, by negotiating their own deal with the agency staff to "sign off" on our product and then reinterpreting our goals and objectives to fit their theories that establish minimum percentages. It was in violation of the process that was agreed to, there is no corresponding agreement with the social and economic panels modeling of impact thresholds to balance this in the DED. The DED should give a full account of this as a negative impact.

* The science on reserves is very clear in stating that community support and trust are essential elements of a successful reserve program. Resolving the science panels conflict with the stakeholder group requires a rigorous peer review of their work.

The Alternative Science & The True Consensus of The Community: The community goals and objectives along with the mission statement are really a mandate for reserves that are established in a balanced fashion that considers an equitable approach to precautionary management of living marine resources. The objectives are the key part that which is measurable. At one point the Data management recommendations were actually objectives. They still are for the fishing fleet, they were scuttled to the implementation recommendations in a movement directed by the Sanctuary manager.

The precautionary approach as a concept for intergenerational equity strives for both the habitats being protected for future generations in all their diversity along with the fishing community achieving the same protection. A future generation of the fisheries and the integrity of our working harbors and our Maritime Cultural Heritage.

To achieve this balance we voted by true consensus not to weight any of the goals and objectives for reserves over the others. In that respect the controversy about the science is really a matter for a very rigorous review of it as a final product with all the scientists signing on. It should pass muster in both a fisheries science journal and a marine biology journal. This should happen before any reserves are implemented that pose a significant negative impact to any families fishing business. That's what we are talking about here in CINMS and California family operated independent small businesses.

The integrated management perspective: a laundry list.

The DED fails to give a realistic assessment of the potential for negative cumulative impacts from this project. The project does not address the combination of federal management with state management that had already taken place or occurred in the time the plan was being developed. Listed below are the management measures that have occurred without being factored into the proposed impact the Department of Fish and Game needs to answer the specifics of how these closures and restrictions are factored into their supporting science and give us the method in which they have been incorporated into the math models they are using as a foundation:

1. The state gillnet closure one mile around the CINMS
2. The state abalone closure from San Francisco to Mexico
3. The state interim regulations closed days on Nearshore Rockfish and control date. Along with a total allowable catch adjusted for precaution and option for reserves as added precaution in harvest control
4. The federal trip limits for groundfish
5. The two month federal closure on groundfish
6. The federal cow cod MPA
7. The federal shelf closure for boccacio and canary rock fish
8. Squid fishery closure for days

In the foreseeable future we have:

1. Designs for additional federal closures to protect nesting birds at CINMS.
2. State reserves planned for the coast
3. MLMA management plans and restricted access planning with further limits on harvest.
4. Nearshore FMP harvest control with MPA's

The assumption of the science for reserves based on loose or nonexistent management control can not be supported in the case of CINMS or California.

These combined measures have the potential to shift markets for California seafood to Baja California. This is a trend that was already established inthe gillnet closure. It has grown with recent closures with California Sheephead now being imported from Baja live. The DED does not factor in the potential for this to happen under NAFTA or the possible cumulative impact of this accelerating competition and transferring effort to another region of the same ecosystem.

The California Bight in Mexican waters.

* American fishermen having to fish harder for less market, in less area. With increased effort on source populations in Mexico as a potential cumulative negative impact on habitats and coastal communities. The DED fails to provide any analysis of the CalCOFI larval surveys to explain source and sink population dynamics in relationship to species range for the whole bioregion of the California Bight. While the DED makes larval transport a key argument it does not connect it to any real data on larval surveys. It does not identify the status of larval life history information for the species in relationship to the area being a transition zone.
* Many of the species are at the edge of their range in this region, California Lobster for example at CINMS are a sink population, coming from central Baja. The lobster larvae from CINMS are carried North into the cold waters north of point conception by the prevailing currents where they die.

Specific Impacts from Congestion and the Hidden cost of the preferred alternative.

The DED makes a broad statement that there will be no negative impact. The DED masks this issue by disconnecting the impact analysis from its spatial dimension and calculating it as a function of yield lost then averaging it over the total area spatially. It then averages the impact out over seven counties. This is a flawed method, all habitats are not equal they do not provide equal productivity and persistence of harvest. Similarly not all counties have the same level of connection to the CINMS habitats for their economic viability spatially for assessing congestion. Since the DED does not even address the real world of habitats and fishing ports as a whole ecological unit conceptually it is no wonder that they do not provide any realistic mitigation. By stating a no negative impact declaration the DED asserts that reserves will mitigate impacts of themselves This perspective is not balanced with the alternative perspective of reserve science that has evolved in Bio-economic modeling and joint fisheries and scientists modeling. They show that reserves cause net loss of sustainable harvest. (Anderson, Parrish, Hilborn) They also show that congestion of fishing effort is inevitable. In essence it is like adding permits it is contrary to the present restricted access policy. In our region we have had extensive experience with having our fishing effort displaced by oil development on our fishing grounds. It took many years in court but we established that displacing fishermen required mitigation. This is documented by ongoing social studies of our region by the University of Utah. The DED completely discards the joint fisheries and scientists modeling that took place in the Fisherman's Data review Committee for the CINMS social and Economic study with Bob LeeWorthy and Pete Wiley. That advisory panel to the MRWG invested a great deal of effort making the connection between habitats and yield spatially. They developed a threshold of maximum impact for the project, which as reference point for the reserve theories. It is an essential ground truthing of the theory that tests it. Those findings and the ecological information of the veteran fishermen who worked with the scientists has been ignored in the DED. There is no evaluation of factors that would contribute to spatial compression of fishing effort in the DED, those factors are multipliers of impact that are present in the project area.

1. Existing fishery management that has spatial gear-restrictions.

2. Spatial restriction of fishing grounds from natural factors
   a. Limited harvestable area or catchability as a proportion of similar habitat.
   b. Temporal limits of seasonal fish migrations and natural aggregations.
   c. Weather and exposure limiting access to smaller boats, "the mosquito fleet"

The DED does not apply any realistic appraisal of the Natural History of the region and its elements. For example the high level of reserve area designated for the north face of Anacapa and Santa Cruz Island on the eastern end will compress lobster fishing into the lee sides of the Island in that region which is already at its maximum level of

fishing effort. The transfer of effort will not be uniform through out the Islands because of weather distance from port and capability of the boats. The Northern side of the Islands is a distinct facet of the fishery that produces during Northwest swells. This distinct component of the catch can not be duplicated. It is an integral part of the seasonal opener, which is what most fishermen rely on to have a successful season. Most lobster fishermen have to achieve the majority of their production in the first two months unless they are highly capitalized in their vessel and gear and can cover farther distances from port with more traps. The preferred alternative actually will have the greatest impact on the small boats that tread the lightest on the resource. Forcing them to abandon traditional small-scale fishing for lobster by increasing their investment to be more competitive.

* Because the preferred alternative fails to consider fleet dynamics in relationship to habitats and the Natural History of the Islands, it puts small business at risk and the habitats that are fished at risk.

Another example is the Red Crab fishery; it only takes place in a very limited area where CPUE makes it economically viable. The two places are the Santa Cruz Channel between Beechers Bay at Santa Rosa Island, and the West end of Santa Cruz and The North side of San Miguel Island. The preferred alternative takes a disproportionate amount of area from this spatially restricted fishery. It completely eliminates the fishery at San Miguel, which is a distinct facet of the fishery. We have repeatedly suggested minor alterations of this plan with a variety of options. The most extreme case is the Gillnet fisheries for Sea Bass and Halibut. They have already been displaced from some where between 80-90% of their original area by the gillnet closure. Our agency people who have crafted the preferred alternative insist that the remaining 20% be restricted 25% more with out mitigation. The sea urchin fishery is naturally restricted by the availability of kelp, urchin populations are harvested for their roe quality which is proportionate in quality to the amount of kelp they consume. Their growth rate is also naturally related to the available forage. The recent decade of stronger and more frequent El Nino events with their storms and warm water have greatly reduced the available area for urchin harvest. The preferred alternative takes a very significant portion of the stable kelp beds and puts a disproportionate impact on the individual fishermen economically. This could be easily minimized but is not. It is another case of the project failing to meet its objectives.

These examples are repeated in the other fisheries to varying degrees they all are subject to further multipliers of impending reserves on the coast and bird closures at the islands. San Miguel Island itself will have a disproportionate amount of area closed under the preferred alternative with half the Island being closed along with the majority of the off shore reef plus Adams Cove and the existing seal rookery closure accompanied by a proposed closure of Castle Rock for birds! The prospects for enforcement and monitoring at this site are very remote.

There is no analysis of the potential costs of enforcing the proposed reserves and monitoring them that are site specific in the DED. With no established and budgeted infrastructure for reserve monitoring.

There are many issues that need to be evaluated and the modeling of the impacts is all based in experimental computer simulations to assess impact with generic assumptions of the science panel for species evenness forming the basis for the methodology of evaluation. The failure to ground truth the experimental models with the Natural History of CINMS is a major problem that is now built into the DED rather than explained. Poor information and flawed assumptions are fortified.

The Phasing Alternative, precaution for fishing communities and fishery habitats:

"Design of experimental policies and monitoring programs for evaluation of
MPAs should proceed from careful modeling to define likely spatial, temporal and trophic scales for both ecological and fishing responses" Walters. Even the modelers call for more modeling! The primary flaw in the DED analysis is the no negative impact projection. It fails to assess the loss of space and yield to fishermen as having potential for having a multiplied impact, loss of space X loss of yield. The missing element in this, is the need to look at the dynamics of compressing fishing effort with a variety of scales for reference to understand potential problems. There is a common sense understanding of the people who actually fish in the region that you can not simply place 25% more fishing the 75% remaining area with out potential problems. Some fisheries are specific to distance from various ports or seasons. The port itself is a distinct economic unit that is part of a fishery. The diversity of the ports and their fisheries should be characterized just as the biological species for

protection. For example Santa Barbara harbor takes a disproportionate impact in the preferred alternative. How will this impact the diversity of the fleet, what is the linkage between diversity of economies and conservation as a whole? Will individual fishermen take a much higher impacts to their small business and be forced into increased capitalization in fewer fisheries?

* The only group who prefers the preferred alternative will not suffer any negative impact if it fails.

The DED ignores the question of scale for the particular regions and habitat. Will some Islands now have distinct regional fisheries that are made economically not viable? Where will they go and what impact will it have on the habitats. What about the issue of areas that have higher density of sport and commercial fishing, will this spark added allocation battles that impair conservation based management and add burden on the management infrastructure.? The level of uncertainty for the reserve designs impact is really illustrated by the fact that the DED states that it can not identify it. The biggest issue perhaps is the unknown factor of the shelf closure creating a massive MPA between 20 and 150 fathom around the whole CINMS region. The Alternative scales for evaluation. A much more appropriate scale for examining reserve placement would be based on relative density of effort in relationship to the degree of weather exposure. The gradient of the prevailing winds and swells would make three regions for evaluation. In layman's terms the weather gets tougher as you go west. There is less density of sport and commercial combined.

1. The Eastern end of CINMS covering Anacapa, the Anacapa Passage Reef complex, and the Eastern End of Santa Cruz Island
2. The Western End of Santa Cruz Island, The Santa Cruz Passage Reef Complex and the Eastern End of Santa Rosa Island.
3. The Western End of Santa Rosa Island, the San Miguel Passage and San Miguel Island.

The preferred alternative does not consider the impact of placing higher density of reserves at the Anacapa Passage end and doing the same at the San Miguel end. It also ignores the relative scale of those Islands for size they are much smaller with proportionally higher density of use to size.

Alternative habitat scale. The various Islands have distinct combinations of reef systems that are connected to soft bottom habitats. This is the logical natural scale of representative habitat, where combinations of habitat types form marine communities. The way to assess a reserve representation of habitats is by its heterogeneity of ecological features. In simple terms it is the proportion of habitat types relative to each other in a reserve that forms the distinction of a whole community.

The islands themselves have distinct reefs of different size and different resilience to harvest. There is a hierarchy of the reefs from large reefs that are systems of connected together to smaller more discreet reefs. On Santa Cruz Island you have:

1. Large reefs: Yellow Banks reef, Fraser Point reef, Gull Island, Chinese Bay.
2. Medium reefs: Scorpion reef, potato harbor reef, Cuevo Valdez reef, Blue banks reef, Cochise anchorage reef.
3. Small reefs: Sandstone Point reef, willows anchorage reef, Kinton point, plats harbor reef, Diablo anchorage reef, Pedro Point reef.
4. Connective Coastal reef, that is extensions of the land strata, in between these reefs.

Habitat quality concepts: The larger reefs are better candidates for a large bio-diversity representative habitat reserve to meet MLPA and broad application of the objectives. The medium or small reefs better meet specific Nearshore FMP reserves for experimentation with reserves as harvest control and rotational closure for nearshore rockfish. The area where these reefs are situated in regard to landing facilities and the degree of weather exposure are factors for considering multiple objective reserves with high value for public access, research access, enforcement and restoring habitat. The success of design is based on the quality of the reef in proportion to the other reefs and Island Natural History rather that the artificial evaluation of the DED.

Taking a large reef system like Gull Island in proportion is of much higher cost and value than its percentage of hard bottom in the abstract relation to sediment samples. It is one of four comparably sized reef systems on Santa Cruz. It is one of three on the South side. It is one of two in the leeward side of the Island. It is situated on a

distinct wind line for the purposes of looking at weather gradients. The DED fails to mention the relative qualities of any of the habitats it gives us only a laundry list tied to percentages.

Phasing framework:
The pro-active fisherman's plan has an option for phasing in marine reserves for the purpose of being adaptive and integrating the project with existing management to meet the project goals.

* The preferred alternative fails to support placing the highest density of fishery closures on the west coast in the CINMS based on biological criteria or sustaining yield.

The concept of phasing is based in the precautionary approach and developing support for reserves from local communities based on administrative performance of the agencies. While both CINMS and the department of Fish & Game assert they will enforce and monitor these reserves they do not have any budget to do this for the next year. The biological performance of the reserves is another standard for phasing in reserves, taking an initial trial run with reserves will allow for them to support the notions about reserve performance. The viability of reserves as a management tool require time for integration of the MLPA and Nearshore FMP with the CINMS project. The community support will increase when it is shown that their welfare is being considered. In reality the authoritarian approach to reserve implementation, proposed by the DED is counter-intuitive to ecosystem management.

* Phasing reserves could be blown up into a complex matrix of alternatives. It could easily become problematic and as controversial. Phasing could be used as a reactionary approach to the extremist viewpoints of the reserve advocates media campaigns.

All these plans are based in considering shelf closures for Rockfish as large MPA zone. All plans consider Nearshore harvest controls and existing fishery management.

Simple Phasing Alternatives for Pro-active fisherman's plan
Integration of MLPA& NSFMP focused alternative

1. Phase 1 three reserves using one reserve for each Island passage region to achieve representative habitat under MLPA.

   Option:
   a. Anacapa Reserve, Gull Island Reserve, Prince Islands San Miguel
   Option:
   b. Scorpion Reserve, South point reserve, Prince Island San Miguel
2. Incorporate Coastal Representative habitat reserves Three sites that complement island sites.

Timeline: base line surveys and regulatory process two years for Islands to be in place. Direct stakeholders to bring in options of three sites comparable to Island sites for coast. At final channel island decision, ask for design alternatives from coast. Abandon failed consensus design approach where any interest can veto the consensus and go with the common senses design that is explained best.

Administrative performance to proceed: Restricted Access capacity goals, and regional data management program.
Essential fisheries information baseline:

Phase 2. Implement the remaining reserves after peer review of monitoring products.

Timed sequential phasing.

Alternative A
Phase 1. One reserve on each Island, Maintain Ecological Preserve at San Miguel as one-large conservation zone for restricted access program framework.

Timeline: as soon as base line surveys are complete
Options
b. Anacapa Reserve, Gull Island reserve, Carrington Point Reserve, Adams Cove Reserve.
c. Scorpion Reserve, Gull Island reserve, South Point reserve, Prince Island reserve.

Administrative performance: baseline monitoring of all reserve sites
Phase one and two run concurrent, with fisheries impact research from start.

Phase 2. Add the rest of the reserves in 10 years regardless of MLPA or other closures.

Alternative B
Phase in two reserves every five years. Start with Gull Island reserve at Santa Cruz and Prince Island reserve at San Miguel immediately.

In five years add Anacapa Island Reserve and South point reserve.

Five years later add Scorpion Anchorage Reserve, Carrington Point reserve and Adams Cove reserve
No conditions, time mitigates the blind faith approach.

Balance between Reserves and Effort phasing alternative

Alternative A
Phase 1. Implement 5% reserves reduce effort 10% before step 2
Administrative performance: Joint Fisheries & Scientist modeling of fleets and habitats. Restricted access policy monitoring program.
Phase 2. Add 5% reserves reduce effort 10% before step 3
Administrative performance: Complete peer review of program by panel of the top fisheries scientists at every step.

Phase 3. Add 5%

Sunset Clause Based Phasing
Rigorous Accountability Phasing tied to sunset clauses
Reserves are implemented with a complete budget for monitoring and enforcement with cooperative research infrastructure, community oversight panel staff position, data management plan and base line monitoring. If the budget is not secured the reserves are taken out (sunset clause). Criteria for reserve failure are agreed too before hand, (sunset-clause). Milestones set for Data synthesis and explicit protocols for interagency roles and responsibilities. Tied to (sunset clause.) Designated funded position for wardens and field biologists, (sunset-clause). Fuel Allotment and man-hours for patrol budgeted. Tied to sunset clause.

Administrative performance: Secure long-term funding through legislation.
Financial aid to fishermen for collective marketing infrastructure and retiring permits (buyouts). Establishment of fisheries commissions within Department of Food and Agriculture. So fishermen can self tax to maintain data management under restricted access policy. All permits become restricted access.
Transferable permits for all fishermen with restricted access permits

Economic Impact Phasing:
Alternative A
A threshold of acceptable economic impact established. The existing CINMS social and economic study funded to be completed with minimum sampling for each fishery established in the design. The economic work is integrated with NMFS expertise. Phasing is then tied to maximum economic impact threshold at a time interval. At every "X" amount of years reserves with "X" amount of economic impact threshold are placed.

Administrative performance: Advanced Bio-economic modeling with Social Geographers and Fisheries Economists. Optimum yield harvest planning for each fleet in project region.

Alternative B
Best available information of Social & Economic Panel utilizes maximum of 10% economic reduction to fishermen as threshold. Mitigated by time frame for regulatory action. The existing Pro-Active fisherman's plan that has been modified by the Department.

Full mitigation strategy.
Preferred alternative with a social conscious, permits are bought out.
Fishermen are grandfathered into fishing grounds until buy out.
Local Ports have federal exemption from department of commerce for dredging funds tied to fish landings.
Legislated budget for monitoring and buyouts through Congress for experiment. CINMS becomes designated Experimental Management Zone through Cal F&G Commission and PFMC.

Natural History and Peoples Eco-Park phasing.
The sites that have adjacent landing facilities or observation infrastructure are placed first for maximum cost efficiency in monitoring and enforcement.

Phase 1. Anacapa Reserve at Anacapa Island, Scorpion Reserve at Santa Cruz, Beechers Bay at Santa Rosa, South Point at Santa Rosa and Adams Cove at San Miguel.

Administrative performance: Full implementation of the MRWG recommendations, and community education and monitoring programs, with intrinsic value as performance goal.

Phase 2. New sites with observation infrastructure where public use is most viable based on historic Chumash sites and ranch houses in existence. The natural places man has dwelt on Islands.

Criteria for placement: High quality habitats for under water experience, Aesthetics of land and sea interface, public safety, ease of monitoring, diversity of habitats as natural places, Access for public , National Park camp ground development, building community support for reserves. Existing roads and structures, proximity to historic village, Island surf spots, beautiful beeches and Island hikes. Relative protection from extreme weather of Channel Islands

Suggested Sites for evaluation.
1. Prisoners Harbor Pier, adjacent Pelican Anchorage at Santa Cruz.
2. Forney's Cove, Christies Ranch house at Santa Cruz.
3. Valley Anchorage, Stanton Ranch House at Santa Cruz.
4. Gull Island, Morse Point lobster camp at Santa Cruz.
5. Cluster point, China Camp Line house at Santa Rosa.
6. Cuylers Anchorage, San Miguel Ranch house at San Miguel

I will end my draft comments with this Natural History example, of phasing it is my favorite because it has the soundest scientific support it is based on the following scientific references. Marine Reserves for New Zealand by Bill Ballentine, University of Aukland Liegh laboratory bulletine no.25 1991

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Date 8-18-2002

To The Fish and Game Commission
From The Ventura County Commercial Fishermen's Association:

Re: Proposed CINMS Increase of Marine Protected Areas Draft Environmental Document Or CEQA Equivalent Document.

Gentlemen:
This is to submit comments regarding the adequacy of the Draft Environmental Document DED, and request that these comments be made part of the administrative record for the above matter.

Respectfully Submitted,

Chris Hoeflinger

Date 8-18-2002
Department of Fish and Game
Channel Islands ED
1933 Cliff Drive, Suite 9
Santa Barbara, CA 93109
Attn: Mr. John Ugoretz

Dear Mr. Ugoretz,

Thank you for the opportunity to review the draft Environmental Impact Report (DED) proposing to establish marine reserves (MPAs) in the Channel Islands National Marine Sanctuary (CINMS). As you may know, I have been working with the Ventura County Commercial Fishermen's Association (VCCFA) during the environmental review of this project proposed for the CINMS.

The VCCFA is obviously gravely concerned about the impact that the proposed project would have, both on the viability of their fishing businesses and on the very real potential for adverse impacts to the environment in areas beyond and adjacent to the proposed MPAs. They also believe historical ocean-dependent industries, communities and cultural resources will suffer from unnecessarily high and unmitigated impacts caused by the preferred alternative described in the DED. While the Association appreciates that the Department of Fish and Game (DFG) has attempted to design the project to minimize adverse impacts, after reviewing the DED, serious concerns remain. This letter commenting on the DED will address many of the Association's concerns.

Please note that these comments are submitted on behalf of the VCCFA with the expectation that they will be made part of the administrative record. CEQA requires that parties raising objections to an EIR do so during the public comment period or before the close of public hearings on the project and before issuance of a notice of determination. Having so complied, a party may bring an action raising any alleged grounds for non-compliance with CEQA. (Cal.Code Regs. Title 14, sec.15089(b)). This document shall serve as notice to the DFG and the Fish and Game Commission (FGC) of the Association's objections to the proposed project, and specifically the preferred alternative, for purposes of complying with the above outlined CEQA provisions.

On January 15, 2002, I submitted comments to the DFG on the notice of preparation of a CEQA equivalent document for MPAs in the CINMS. I submitted this statement on behalf of the VCCFA with the intent that the DFG would incorporate our extensive comments on quantity and quality of fishermen's ecological knowledge relative to spatial fishing effort, adverse and detrimental effect on the environment due to congestion or crowding, phasing, mitigation and expected vs. theoretical benefits of MPAs, along with other concerns. See attachment.

After reviewing the DED, it appears to us that our comments were arbitrarily dismissed; in any case they were omitted from the DED. The VCCFA is concerned that the DED selectively includes information that supports the proposed project and excludes from consideration the negative aspects associated with the placement of large marine reserves in the absence of mitigating measures.

We appreciate the value of MPAs in the context of an integrated fishery management strategy, but the proposed project amounts to a large reserve experiment in the CINMS with the real potential for negative social and environmental impacts. These negative impacts must be addressed in the DED if the document is to serve it's intended purpose.

1. California Environmental Quality Act (CEQA)

A. <u>The DFG's DED impermissibly segments the proposed project</u>

The project the DFG is truly attempting to implement is a cohesive network of marine protected areas for the ocean waters off the California coast. This project is outlined in the Marine Life Protection Act (MLPA) and was added by statutes 1999 ch 1015 . CEQA mandates that the proposed project EIR must consider the project in its entirety; certainly theDED must consider the impacts of the project as defined in the MLPA for at least the area contained within the Southern region , from Point Arguello to the Mexican border. In failing to consider these impacts, the DFG has segmented the project in violation of CEQA sec. 15165.

On March 4, 1999 , The Fish and Game Commission endorsed a pilot project to consider the use, need, and placement of marine reserves at the Channel Islands National Marine Sanctuary (CINMS). An advisory panel to the CINMS, the Sanctuary Advisory Council (SAC), empaneled a group of stakeholders called the Marine Reserves Working Group (MRWG) to discuss issues surrounding the potential establishment of new MPAs at the CINMS. The MRWG failed to reach a specific recommendation for the placement of MPAs in the CINMS . Following the termination of the MRWG, the DFG and CINMS staff developed the proposed project's preferred alternative without additional public input and in a non-transparent process. Due to this lack of public participation and oversight in designing the DGF/CINMS preferred alternative, it is difficult to understand what specific goals have been achieved.

Page 1-5 of the DED states, "The proposed project is intended to meet the following goals described in the Marine Life Protection Act [Fish and Game Code Section 28539(b)]". However the DED makes no attempt to consider the impact of the larger MLPA project: the statewide network of reserves.

The principal issue determining whether the DED should have considered the larger project (or expansion) is "foreseeability". In Laurel Height Improvement Association of San Francisco v. Regents of the University of California, 47 Cal.3d 376 (1988), the California Supreme Court created a two part test to determine when an EIR has failed to address the impacts of a reasonably foreseeable future expansion of a proposed project. The Court held; "an EIR must include analysis of the environmental effects of future expansion or other action if : (1) it is a reasonably foreseeable consequence of the initial project; and (2) the future expansion or action will be significant in that it will likely change the scope or nature of the initial project or its environmental consequences." (Laurel Heights, 47 Cal .3d 376 at 396).

The Project Objectives portion of the DED (p 1-5) clearly states, " the proposed project attempts to address the goals and requirements of the MLPA within the Channel Islands". Under Alternatives (p E-3) the DED postulates that a " timely decision will provide needed insight and experience in the implementation of reserves before the MLPA suggests MPAs for the entire State". Considering that the obvious aim of the DGF eventually is to implement a network of MPAs in state waters and that the DED is intended to cover only the state waters portion of the proposed project, with possible implementation of the federal waters portion at some future date (p 3-3), it seems reasonable to conclude that the implementation of the MLPA project is foreseeable and should have been the project reviewed in the DED.

As to the second part of the legal test, that the expansion will change the environmental effects, clearly going from 114 square Nautical miles of permanent closures to more than 800 square nautical miles of closures (as proposed in the MLPA Master Plan maps released to the public) will result in additional adverse environmental impacts. These impacts will result from the fact that every unit of fishing effort that is currently distributed over the area contained within the Southern region, will be concentrated onto the remaining open areas once the new MPAs are placed. The ultimate impact on the environment in the CINMS is that excessive effort resulting from congestion that may have been relocated to other areas on the coast and other Islands will be trapped within the project area. It is logical to conclude that, absent mitigation to offset congestion, concentrating the fishing effort displaced from the project into areas immediately outside and adjacent to the new MPAs will result in forced overfishing and ultimately cause an adverse environmental impact.

The DFG has chosen not to review the impacts of the MLPA, the Cow Cod Conservation Zone or the pending shelf closure in the southern region because these projects would unavoidably have significant environmental impacts when viewed as a cohesive fishery management strategy, due to congestion externality. By "piece-mealing" the project, the DFG avoids having to address such large environmental impacts. In fact the DFG has proposed to reduce the size of the Cow Cod Conservation Zone for precisely the same reason that it has

chosen not to undertake a review of the entire scope of MPA closures for the Southern region, including the MLPA, Cow Cod Zone and the shelf closures. Perhaps the DFG believes the department can avoid noting the significant impacts to the areas and fisheries outside of the existing and future closures if it implements these closures 'one at a time'.

B) The DED fails to include the MLPA, Cow Cod and Shelf Closures in a cumulative impact analysis.

A draft EIR must consider cumulative impacts when they are significant. (CEQA sec. 15130a). Projects, which must be included in the cumulative impact analysis section, include all past, present, and reasonably foreseeable projects where a synergistic or cumulative impact may result from the additional impacts of the proposed project (CEQA sec.15130b). The DED does not consider the MLPA, cow cod, or shelf closures in its future or past projects list.

The standard, which applies to "reasonably foreseeable", is more broadly applied in the context of cumulative impact analysis than in the scope of the project analysis discussed in heading A. The courts have found a number of EIRs inadequate for failing to consider future projects' impacts. For example, the courts have found that projects may be foreseeable and require inclusion in the cumulative impact analysis, though they may never be built. (City of Antioch v. City Council, 187 Cal. App.3d 1325 at 1337). The lack of specific detail in a future project does not allow the agency to disregard it. (Terminal Plaza Corp. v. City and County of San Francisco, 177 Cal. App. 3d 892). Therefore, the DFG should have considered the impacts of the MLPA , cow cod, and shelf closures in the cumulative analysis section.

The DFG's principal position on cumulative impacts analysis is to consider only the federal waters phase of the CINMS project as a cumulative impact. It is interesting to note that the federal waters portion of the project is not part of the decision before the Fish and Game Commission (FGC) but the MLPA project, which is a decision before the FGC, is excluded from the cumulative impact analysis. Also of concern is the fact that the MLPA project is targeted for implementation before the federal waters portion of the CINMS, if the federal waters portion is implemented at all.

The DFG is using the CINMS project as a first step in the larger MLPA marine reserve network Master Plan. Although the community involvement process of the MRWG failed to recommend a series of reserves for the CINMS, the DFG has maintained a somewhat duplicitous position with respect to the need to go forward with the project. In part the DFG argues that the amount of time and effort expended on the project to date warrants moving forward because " It is unlikely that new information would become available in the MLPA process that would change the Proposed Project"(p 6-62)." The DFG then states that " the impacts and benefits of this project (CINMS project) could be addressed and

analyzed in the broader MLPA process". The DFG also concludes that "local economic and environmental impacts may be underestimated by combining them with those of the entire State". All of the above statements support the reasoning that the proposed project is in fact a first step in the larger MLPA process. The net additive effect of the MLPA process, cow cod closure and shelf closure should therefore be considered and analyzed in the cumulative impact statement.

Explaining how the DFG reached and supports the conclusion that "It is unlikely that new information would become available that would change the proposed project" is of the utmost importance. This statement clearly violates the principles of scientific research and deductive reasoning, which the DFG is attempting to use in support of the theory that the project may enhance fisheries in the CINMS. The unwillingness of the DFG to consider parallel processes, such as the shelf and cow cod closures, as new information that could change the size and scope of the proposed project is disturbing. Most striking is the fact that the George's Bank cod closure is the primary reason the SAP recommended such large reserves for the project area (Murawski et.al. 2000), yet the SAP and the DFG have ignored the sustainable fisheries contributions of the large Cow Cod and Shelf Closures.

Clearly, the DFG recognized new information when DFG Director Robert Hight scrapped the exhaustive 18 month MLPA process and the proposed reserve site maps, declaring, " These maps are off the table". Our organization can't understand why the DFG recognized a problem with the MLPA maps and their "best available science", but insists that the science supporting the proposed project is sound. Most disturbing is the fact that both projects used the same scientific foundation developed by many of the same volunteer ecological scientists.

C) <u>The CINMS DED should have included projects occurring prior to the proposed project in the cumulative impact analysis.</u>

The DFG takes into consideration as part of its cumulative impacts analysis only the State and Federal phases of the proposed project because the theoretical modeling supporting the project assumes that the environmental setting of the project area is isolated form the Southern region (Point Arguello to the Mexican border). By theoretically isolating the project area from the Southern region, the Science Advisory Panel (SAP) concluded that the conservation benefits accrued by the Cow Cod Conservation Zone attributed no conservation benefits to the project area (Questions to the SAP 2001), even though geological and biotic connectivity exist within the entire southern region, including the project area (DED p 4.3.3). Also excluded from consideration was the cumulative effect of congestion resulting from the displacement of fishing effort from the cow cod closure into adjacent areas, and the inability of this large closure to absorb displaced effort from the proposed project or the MLPA project. The successful

management of renewable or sustainable resources is achieved when harvest levels are distributed spatially at a density at or below maximum sustainable yield of the harvested resource. The DFG's proposed project relies only on an unproven theoretical model that increased larval transport and species spill-over from MPAs "will" out perform the natural production of areas left open to fishing. While this may be true for certain (albeit not all) stocks, the DFG has included no explanation of how this enhancement will compensate for the lost fishery yield of the 25% set aside and the failure of the project to reduce effort outside reserves commensurate to these lost yields. In fact, this theory is questioned by a number of independent fishery scientists.

The cumulative effect of closing large areas to fishing without reducing current levels of effort is that open areas are forced to absorb the high concentrations of displaced effort. Top DFG managers are currently working with the Pacific Fishery Management Council in an attempt to adjust harvest levels of nearshore minor rockfish, in waters less than 120 feet deep. This effort is being undertaken by the DFG to prevent an anticipated effort shift caused by the shelf closure from adversely impacting resources in the remaining open areas. Effort shifts directly result in negative environmental impacts.

The fact that the DFG chose to limit its cumulative impact analysis to only the proposed project, without considering major management changes and closures in the immediate vicinity of the project area, ignores the purpose of doing cumulative impact analysis. The purpose of requiring agencies to perform a cumulative impact analysis is to ensure that the agency does not analyze environmental impacts in such a limited time-frame that there are no identified cumulative impacts. The DFG should have considered the impacts of the cow cod closure, MLPA, and the shelf closure along with integrating these closures into existing fishery management plans.

D) <u>DFG failed to adequately consider the NO Action Alternative</u>

The DED dedicates two paragraphs to the No Action Alternative (p 6-64). It fails to mention the benefits the Sanctuary offers to fishing by the inherent protections of the Sanctuary, such as the prohibition on trawling, habitat protection and the one-mile ecological reserve surrounding San Miguel Island. Also excluded from the document is any mention of the current array of fishery management measures that regulate the fisheries in the project area or any analysis of how they have failed (if, indeed, they have. Currently, the CINMS harbors numerous healthy fishery resources; the DED makes no mention of these abundant stocks.

The DED suggests that "negative economic impacts could occur from decreased fishery sustainability and more variable catch rate" If the project is not implemented. But it fails to support this opinion with any evidence of decreased

catch rates or other empirical data demonstrating that fishing is occurring at levels above maximum sustainable yield. The DED identifies an increased number of people visiting the coastal zone as an indicator of resource decline but fails to identify declining resources in the project area. The DFG assumes that resources in the project area are being unnaturally reduced due primarily to the impact of past human actions, and that these resources are likely to be further reduced with attendant losses of commercial and recreational opportunities. No scientific data is offered to support this conclusion, which is curious in that such a conclusion must be accepted for the proposed project to make sense. The DED is inadequate in that much more analysis should have been included of the current state of the fisheries, as well as scientific support for the theory that large "no take" reserves would actually benefit the fisheries of the CINMS. The DFG has not presented any convincing evidence that the current fishery management measures are inadequately protecting the resources in the project area. The DFG failed to adequately consider the No Action Alternative.

E) The DFG DED does not propose adequate monitoring of the project

The DFG's monitoring program is inadequate because it fails to provide any pre-project monitoring. In fact, the proposed monitoring does not appear to be any more in-depth than the existing kelp forest monitoring already conducted within the CINMS. Without any "before" project reference points, specifically with respect to catch per unit of effort data at established reference sites, there is no way to accurately gauge the impact of the proposed project. The DED relies heavily on reserve theory with little or no data to support the theoretical models that suggest large reserves benefit the harvested species in the project area, particularly in the absence of effort reduction.

If the DFG cannot establish a baseline because there has not been accurate, monitoring prior to the implementation of the project, it can not know what changes have been the results of the factors attributed to the proposed project. With the real possibility of having to mitigate unforeseen impacts of the project, there is the potential for the Department to argue that such impacts are not, in fact, the result of congestion but are due to external factors. In such a scenario, the Department might argue that no mitigation is required. The result is that any adverse effects to the environment would remain unmitigated. The pre-project monitoring is inadequate.

Worst yet is the possibility that post-project assessments of catch per unit of effort surveys are misinterpreted to indicate that reserves are working according to theory, when in fact they are not. In this scenario, abundance within

reserves is compared to post-project cpue in open areas that have been impacted by a forced 33.5% effort increase that was displaced from the 25% no-take reserve (25/75 = 33.5% increased effort). Not only will adverse effects on the environment remain unmitigated, but the possibility exists that the Department will argue the need to increase the use of no-take reserves, based on the false assumption that they are performing correctly. This will result in additional unmitigated environmental impacts . The pre-project monitoring is inadequate.

The DED states "The potential benefits and costs of MPAs can only be determined if sufficient monitoring effort follows their establishment". (p 6-3) Without knowing the current condition of the resources in the project area, it is not possible to assess " the potential benefits".

In addition, the monitoring that the Department proposes after the project is completed is too general in nature and will not provide an accurate assessment of the impact of the project, particularly with respect to the majority of the harvested species in the project area. The DED suggest that the existing, annual, National Park Service kelp monitoring sites data is adequate to measure the potential benefits and impacts of the proposed project. It is unclear how the Department determined it could accurately measure increases or decreases in the population size of species that do not inhabit the kelp forest by using these existing monitoring sites. Clearly, the red crab, halibut, and white seabass fisheries occur on sandy bottom in the project area, mainly in the 80-150 foot depth range. Spot prawns must be harvested in waters deeper than 300 feet, and the squid fishery is well out side the kelp monitoring sites. Since the existing kelp monitoring uses the visual diver survey method to calculate density, it is unlikely that cryptic species are accurately assessed. Additionally the visual survey method is incompatible with cpue data. In order to effectively quantify the impacts of the proposed project on the harvested species and varying habitats, the DED must provide a more comprehensive monitoring plan. The level of detail with respect to the proposed monitoring in the DED is inadequate. Based on this lack of detail it appears that the Department does not have a formal monitoring proposal, but released the DED anyway.

Lastly, the lack of a formal monitoring plan, in combination with the Department's position that one of the proposed project's purposes is to gain additional knowledge about marine reserve function and the theoretical modeling that the project is based on, is especially troubling. The Department proposes the project in part to gain knowledge on marine reserve function for the MLPA process, without doing any significant monitoring. This approach will very seriously diminish the value of any information gleaned as a result of implementing the proposed project as well as precluding the accurate assessment of the proposed project's environmental impacts.

F) <u>The DFG proposed mitigation is inadequate.</u>

The Department's lack of a mitigation proposal is inadequate in that it fails to identify what measures the Department might employ if the proposed project proves to have adverse impacts on fish populations in the remaining open areas . For instance, in the red crab fishery at San Miguel Island, the amount of essential fishery habitat that is consumed by closures is more than 75% of the total essential fishery habitat for that Island. The Department speculates that harvesters can relocate to other areas, but anyone familiar with the dynamics of this fishery knows that the only other productive location is at Santa Rosa Island. Santa Rosa Island will also be subjected to substantial losses of essential fishery habitat due to three large closures.

The Department suggests that current fishery management plans will offset congestion through ongoing capacity reduction, but the crab fishery is an open access fishery with no limitations on the number of permits issued.

The Department's position that the proposed project is "self mitigating" and that "no mitigating measures are needed because no significant adverse environmental impacts would result from the proposed project" (p 5-57) is wholly inadequate.. A complete and accurate evaluation of the impact of the project on each fishery can only be developed by including the spatial harvest information of the fishery participants in the project area. The fact that the DFG determined that no mitigation is necessary is not acceptable. Proposals for mitigation should have been arrived at beforehand for each fishery so that the public comments could be as meaningful as possible. The way that the DFG proposes to arrive at monitoring and mitigating measures precludes the possibility of any public review.

G) <u>The Proposed Project DED makes numerous assumptions on reserve theory, which are not supported by substantial evidence in the record.</u>

1) The SAP has created a theoretical model for complete not take reserves at CINMS, based on averaging the size of temporary species specific rebuilding closures. They have concluded that since large closures are effective in rebuilding collapsed cod and scallop stocks off George's banks, large closures should be the primary tool for managing 119 species at CINMS. The SSC peer review of the project stated: "The marine reserve papers from the literature that were *pivotal* to the Science Panel's size recommendation consist largely of *theoretical* studies and limited numbers of empirical studies; *very few pertain* to the U.S. West Coast. Any assertions that marine reserves provide similar benefits on the West Coast as they do elsewhere should be viewed with *caution* and subject to *verification*."? (Italics added)

2) The SAP and DFG are using a percentage-based approach in determining reserve size at CINMS. The NRC report clearly objects to this method (NRC 2001).

3) The SAP has used habitat as a proxy for species distribution in the project area. This has resulted in hidden environmental and economic impacts due to the actual distribution and concentration of harvested species being much more compressed than assumed (source fishermen's data review committee)

4) The SAP has concluded that Three separate bio geographical regions are contained within the project area based on the distortion of three scientific papers on algae and invertebrates and the misinterpretation of the importance of water temperature variations in the transition zone and how these variations effect species distributions. The SAP then proposes that a percentage of the habitat and an arbitrary number of reserves be made into complete no take MPAs for each of the three bio geographical region. The DED contradicts this theory that the distribution of the species in the project area is dependant on the presence of three boiregions, when it describes the environmental settings and range of the 119 species it is attempting to protect (p 4.3.3). NONE of the 119 species emanates from or exhibits characteristics unique to the transition bioregion. In fact, all of the 119 species of concern exhibit characteristics of either the Oregonian or the Californian biogeographic regions (see DED p 4.3.3). By substituting biogeographic region as a proxy for species range, the SAP unnecessarily increases the total number of MPAs by protecting a seasonal latitudinal water temperature variation.

5) The SAP incorrectly concluded that 119 species were in need of and would receive additional protection from their 30-50% reserve size recommendation. Of this list of species, 57 are fully protected by state and federal laws. When the shelf and nearshore rockfish are subtracted from the remaining 62 species list, only 33 species remain. Additionally the protected species on this list may be adversely effected because the flexibility for fishermen to relocate fishing activities, in the presence of marine mammals or sea birds is diminished due to the large reserve closures.

6) The SAP has assumed that fishery management at the CINMS is poor or nonexistent by proposing a 30-50% reserve size recommendation (SSC review stated: "The Science Panel's reserve size recommendation is derived largely from studies that assume poor to non-existent fishery management"). The DED fails to explain how this determination was reached.

The generally accepted range of percentage for reserve size is as follows.

a) Monitoring reserves 1-10%
b) Added precaution in fishery management 10-20%
c) Alternative fishery management and stock rebuilding 20-50%

In light of the ground fish closures, stock rebuilding appears unnecessary and redundant.

H) The DED fails to provide a complete range of alternatives

The range of alternatives considered by the DFG is incomplete. The alternatives presented in the DED consist of several versions of incomplete designs. All of the designs are flawed due to the arbitrary constants placed on the designers by the CINMS manager and the SAC. These constraints are not mentioned in the DED and have never been adequately explained to the public or the SSC.

a) *The SAC forced the SAP and the MRWG to consider only complete no-take reserves. Why?* Clearly, the use of conservation zones reduces economic and environmental impacts to healthy fisheries in the project area.
b) *The SAP was instructed to assume that fishery management in the project area had failed or was poor to non-*existent. *Why?* Had the SAP reviewed the existing fishery management measures in the project area for effectiveness in meeting sustainable fishery goals, alternatives in the 1-10% size range would be included in the range of alternatives.
c) *The SAP was instructed to assumed that the project area and all its biotic organisms were isolated at the CINMS from the larger Southern California Bight and that the larger Bight did not contribute significantly to sustainability in the project area. Why?* This flawed assumption forced the reserve designers to consider only very large reserve designs that would insure successful recruitment of the "*assumed*" isolated species in the project area. Had this assumption not been forced on the reserve designers, alternatives in the 1-10% size range would be included in the range of alternatives.
d) *The reserve designers were forced to design reserves for 119 species of concern that were selected in an arbitrary method. Why?* No evaluation of the benefits accrued to these 119 species by complete no take reserves was ever performed. In the absence of this critical information, the reserve designers were forced to consider only large no-take reserves.

Due to these constraints. The DED fails to provide an alternative that meets the minimum requirements of the MLPA with representative habitat as the objective. The final EIR should include a full range of alternatives including a design that meets the minimum requirements of the MLPA.

II) CONCLUTION

The DFG has failed to incorporate its own adaptive management policy to the Proposed project. Extensive closures and management changes have occurred that render the SAP recommendation and the project's goals and objectives obsolete, yet the DFG has failed the modify its recommendation.

The DFG failed to consider the limited peer review of the project. In fact, this review (SSC) found major flaws with the scientific method used to arrive at the reserve size recommendation. Instead of utilizing the peer review as a tool to improve the project, the DFG has ignored the review in violation of its own policies: The Marine Life Management Act (and MLMA), FGC Sec.2858 and 7062, the Marine Life Protection Act (MLPA), Fundamental Scientific Principles of Analysis, Deduction, Conclusion, Reasoning Principles and Axioms, Etc.
All of the above-delineated processes and elements, including specific statutes, *require* that fishery management decisions be based upon the *best available science* and *peer review* in most instances, especially of scientific resource management proposals, plans and documents.

Due to the deficiencies mentioned above, The Proposed Project has NO support from any Sport or Commercial fishing organization. This unanimous disapproval with the project seriously degrades the probability of the project achieving its intended objectives (NRC report 2001). The VCCFA does not support any of the reserve-sitting alternatives presented in the DED. We believe that the range of alternatives is incomplete and should have included a minimum impact alternative that could be used to study the usefulness of marine reserves in fishery management. The VCCFA supports Alternative six.

Again thank you for the opportunity to comment on the DED. The Ventura County Commercial Fishermen's Association hopes that the DFG and the FGC finds these comments instructive. Please direct any agency response to Mr. Chris Hoeflinger. The address is given below.

The VCCFA looks forward to reviewing the DFG final EIR and contributing to the on-going process.

Respectfully, Chris Hoeflinger
197 Timber rd,
Newbury Park, Ca. 91320

COMMERCIAL FISHERMEN of SANTA BARBARA INC.
6 HARBOR WAY, BOX 155
SANTA BARBARA, CALIFORNIA 93109

March 6, 2002

Robert Treanor
California Fish and Game Commission
1416 Ninth Street
Sacramento, CA 95814

Subject: Range of Alternatives for CINMS reserves

Mr. Treanor,

We have requested that an alternative that reflects the MRWG Goals and Objective of minimizing significant economic impacts to all users be considered in the range of alternatives for the CINMS. At the February Commission meeting in Sacramento we submitted a map that is an example of minimizing socio economic impacts. We want be clear that the map submitted is only an example and that there are several possible approaches to developing a map that minimizes economic impact to all users if the commission desires to include an alternative that reflects the goal of minimizing economic impacts.

The current range of alternatives does not reflect the Socio-Economic Goal of minimizing economic impacts equitably amongst all users. Alternatives one and three are incomplete maps as the majority of the closed areas are in the Western portion of the Channel Island and only a small amount of closed area in the eastern portion of the islands. These two alternatives have significantly greater impacts to Santa Barbara Harbor that relies on the western portion of the Channel Islands because of the harbors westerly location. The economic impacts to CINMS commercial fisheries by port for alternative one and three are as follows and clearly illustrates a bias in the scope of Alternative for the CINMS.

Alternative 1
Santa Barbara 9.8%
Ventura 1.14%
Channel Island 2.3%
Port Hueneme 3.8%

Alternative 3
Santa Barbara 10.2%
Ventura 1.21%
Channel Islands 2.37%
Port Hueneme 4.05%

National Marine Fisheries Service guidelines suggest an economic impact is significant under the Regulatory Flexibility Act, if at least 20% of business's within an effected fishery lose 5% of there annual gross revenue or 2% or more of the effected parties are driven out of business". The Department should review this document and others such as the NRC report on MPA and craft an approach that is appropriate and equitable for the proposed MPA actions at CINMS.

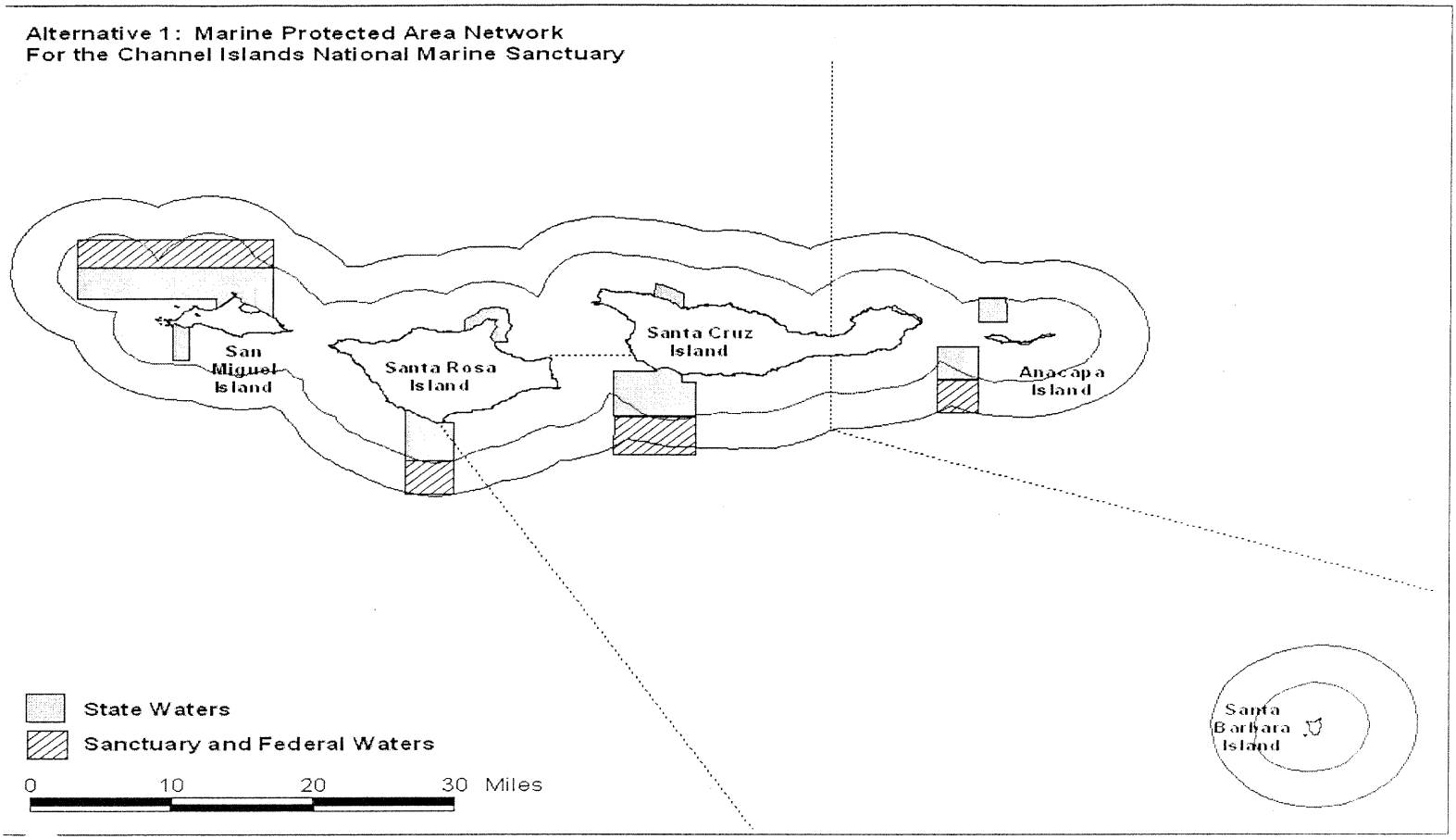
During the MRWG process a Socio-Economic workshop was held that involved members of the Socio-Economic Team, fishermen, and members of the conservation community.. The workshop focused on designing a reserve network that did not impact any individual fisheries over 10%. The workshop was very successful in producing several concepts that minimized economic impact amongst the commercial fisheries in the CINMS. This work should be considered for the CINMS scope covered by the NOP. A similar workshop should be held to consider CINMS alternatives that have minimal impact on the fisheries as part of the process.

The use of Phasing in any of the reserve networks is proven method that can be used to minimize short term economic impacts to fisheries and allow and time to develop capacity reduction plans and Fishery Management plans that will allow fisheries to properly adjust to the decrease in fishing grounds, yet this time tested method is not being considered in the CINMS process except for Alternative 2 "The Proactive Fishermen's Plan", however even with phasing alternative 2 still impacts some individual fisheries over 10%.
Phasing will also allow for the consideration of additional economic impacts of additional reserves proposed by the MLPA and an adaptive strategy of implementation of both CINMS and MLPA reserves.

Sincerely,

Harry Liquornik
President
Commercial Fisherman of Santa Barbara Inc.

Cc: Patty Wolf, Regional Manager- Marine Region
Matt Pickett, CINMS
John Ugoretz, Marine Region - Santa Barbara



ALTERNATIVE 1

Table 2.6.1 Commercial Fishing: Summary of Impacts on Ex Vessel Value by Species Group

Species Group	Phase 1 $ Value	%	Phase 2 - State Value	%	Phase 2 - Fed Value	%
Squid	636,109	4.88	25,614	0.20	51,227	0.39
Kelp	265,568	4.43	-	0.00	-	0.00
Urchins	735,214	13.96	-	0.00	-	0.00
Spiny Lobster	77,829	8.44	3,798	0.41	-	0.00
Prawn	25,602	3.64	68,568	9.75	80,095	11.39
Rockfish	70,862	12.90	2,102	0.38	-	0.00
Crab	26,157	7.61	174	0.05	-	0.00
Tuna	1,765	0.58	3,242	1.06	9,382	3.07
Wetfish	3,641	1.21	6,353	2.11	4,800	1.59
CA Sheepshead	23,432	9.93	592	0.25	-	0.00
Flatfishes	7,987	4.34	1,575	0.86	600	0.33
Sea Cucumbers	21,406	12.76	-	0.00	-	0.00
Sculpin & Bass	2,797	4.64	1,638	2.72	624	1.03
Shark	2,680	7.71	378	1.09	144	0.41
Total	1,901,049	6.76	14,034	0.41	146,873	0.52

Table 2.6.2 Commercial Fishing: Impacts of Alternative 1 on Ex Vessel Value by Port

	$	%	$	%	$	%
Santa Barbara	842,468	9.81	9,939	0	125,116	0.06
Ventura Harbor	61,703	1.14	8,706	0.16	10,287	0.19
Channel Islands	112,579	2.30	57,648	1.18	65,863	1.35
Port Hueneme	524,227	3.84	29,592	0.22	49,954	0.37

ALTERNATIVE 3

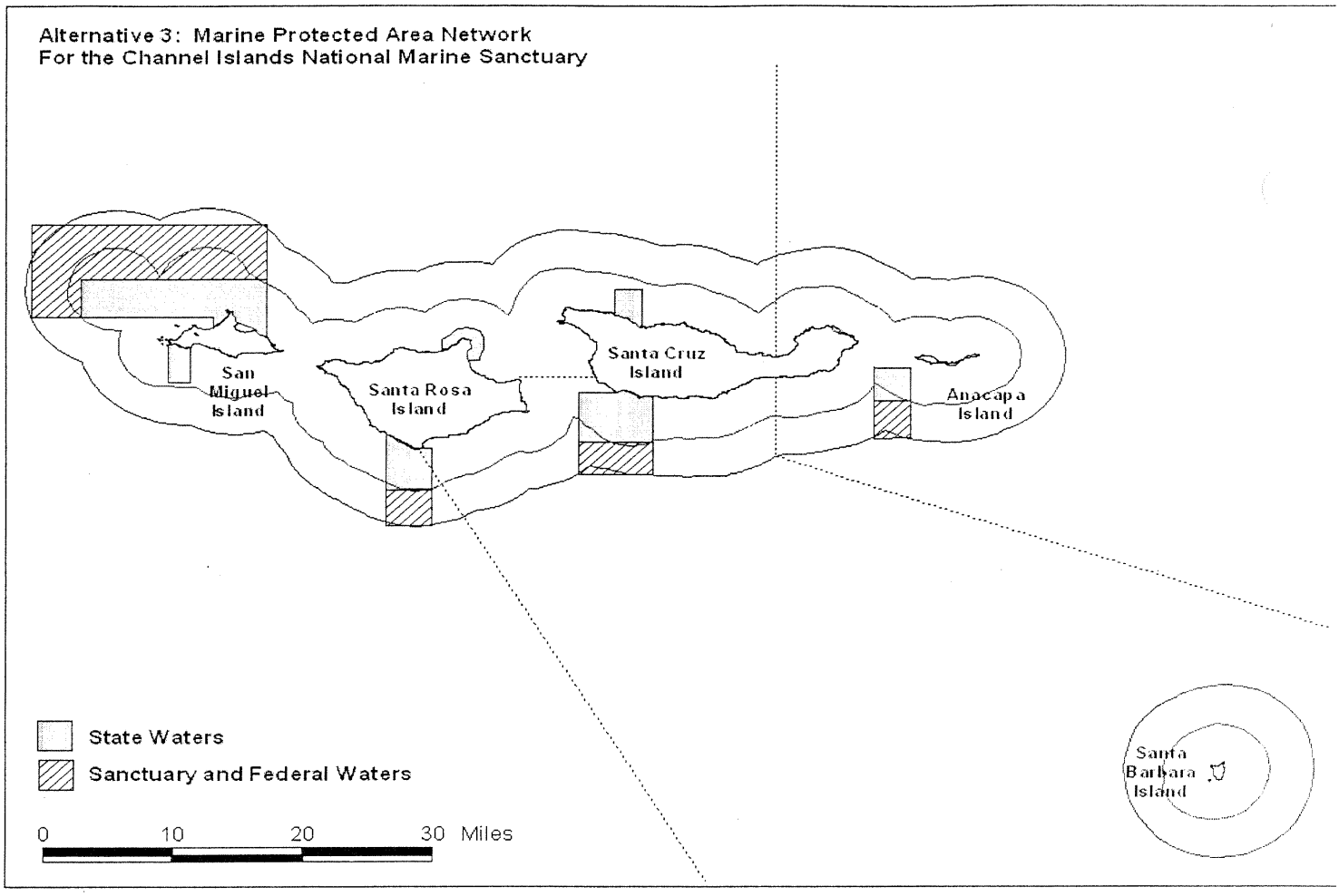


Table 2.6.1 Commercial Fishing: Summary of Impacts on Ex Vessel Value by Species Group

Species Group	Phase 1 $ Value	Phase 1 %	Phase 2 - State $ Value	Phase 2 - State %	Phase 2 -Fed Value	Phase 2 -Fed %
Squid	670,263	5.14	25,614	0.20	42,689	0.33
Kelp	298,241	4.98	-	0.00	-	0.00
Urchins	753,956	14.32	-	0.00	-	0.00
Spiny Lobster	93,605	10.15	3,798	0.41	-	0.00
Prawn	25,602	3.64	68,568	9.75	112,927	16.06
Rockfish	71,256	12.97	16,966	3.09	44,542	8.11
Crab	26,104	7.60	174	0.05	-	0.00
Tuna	1,956	0.64	3,856	1.26	19,206	6.28
Wetfish	3,725	1.24	6,353	2.11	4,800	1.59
CA Sheepshead	25,582	10.84	592	0.25	-	0.00
Flatfishes	7,987	4.34	1,575	0.86	3,675	2.00
Sea Cucumbers	23,361	13.93	0.00	0.00	-	
Sculpin & Bass	2,933	4.86	1,638	2.72	3,822	6.34
Shark	2,528	7.27	378	1.09	882	2.54
Total	2,007,099	7.14	129,512	0.46	232,544	0.83

Table 2.6.2 Commercial Fishing: Impacts of Alternative 3 on Ex Vessel Value by Port

	$	%	$	%	$	%
Santa Barbara	$ 876,007	10.20	$ 22,415	0.26	44,472	0.52
Ventura Harbor	$ 65,477	1.21	$ 8,783	0.16	14,607	0.27
Channel Islands	$ 116,156	2.37	$ 58,196	1.19	97,396	1.99
Port Hueneme	$ 552,219	4.05	$ 29,611	0.22	44,824	0.33

COMMERCIAL FISHERMEN of SANTA BARBARA INC.
6 HARBOR WAY, BOX 155
SANTA BARBARA, CALIFORNIA 93109

January 16, 2002

John Ugoretz
California Dept. of Fish and Game
1933 Cliff Drive, Suite 9
Santa Barbara, CA 93109

NOP Draft CEQA for CINMS Marine Protected Areas

Mr. Ugoretz,

The language in the Notice of Preparation (NOP) illustrates the bias of not establishing a process that minimizes the socioeconomic impacts to fisheries and reduces problems of fishermen being displaced and creating areas of congestion and the problems that will interfere with sustainable fishery management as required under the Marine Life Management Act. This bias arose in the CINMS process when the agencies took over the process from the Marine Reserves Working Group (MRWG) and used an unreasonable time line to prevent an agreement from being reached on the spatial design of marine protected areas. The NOP description of "The Plan" states" The Plan objectives are to protect, maintain, restore, enhance, and manage living marine resources by developing a reserve network in the CINMS." The MRWG process did reach agreement on Goals and Objectives, the Goals and Objectives also included minimizing short term loss's to all users. The Plan objectives that are stated in the NOP are inconsistent with the scope of the Goals and Objectives agreed upon in the MRWG. None of the alternatives reflect the Socio-Economic Goal of minimizing economic impacts equitably amongst all users, therefore the range of alternatives are clearly biased against the Socio-Economic Goals and Objectives. The Department needs to completely overhaul the process and reissue the NOP to show that the bias mentioned above has been resolved.

Although it is not possible to comment on the alternatives in depth without proper socioeconomic data being used in a manner consistent with MRWG Goals and Objectives, some generalities can be noted at this time. Alternatives one and three represent the low end of the scope for both reserve size and economic impacts to individual fisheries and ports. Alternatives one and three are incomplete maps as the majority of the closed areas are in the Western portion of the Channel Island and only a small amount of closed area in the eastern portion of the islands. These two alternatives have significantly greater impacts to Santa Barbara Harbor that relies on the western portion of the Channel Islands because of the harbors westerly location.

The economic impacts to CINMS commercial fisheries by port for alternative one and three are as follows and clearly illustrates a bias in the scope of Alternative for the CINMS.

Alternative 1	Alternative 3
Santa Barbara 9.8%	Santa Barbara 10.2%
Ventura 1.14%	Ventura 1.21%
Channel Island 2.3%	Channel Islands 2.37%
Port Hueneme 3.8%	Port Hueneme 4.05%

Alternatives one and three do not minimize economic impacts equitably amongst all users. The impacts to the Sea urchin fishery are 13.9% and 14.3% while impact to the other primary fisheries in the CINMS such as Kelp, Squid and Lobster are well below 10%, therefore these alternative do not meet the Goals and Objective of minimizing economic impacts equitably amongst all users. Note that the Sea Urchin fishery is one of the top three fisheries in the CINMS and California.

A report to the Secretary of Commerce's Policy Office authored by Bracken Hendricks titled "Stewardship and Analysis: Preserving Nature and Communities" states " According to National Marine Fisheries Service guidelines an economic impact is significant under the Regulatory Flexibility Act, if at least 20% of business within an effected fishery lose 5% of there annual gross revenue or 2% or more of the effected parties are driven out of business". The Department should review this document and others such as the NRC report on MPA and craft an approach and process that can be published in the NOP so myself and other can provide knowledgeable comments on the scope, process appropriatness and equitability of the proposed MPA actions at CINMS. Currrently the NOP and supporting reports are biased against minimizing economic impact amongst all users and therefore the entire process is flawed from the beginning..

During the MRWG process a Socio-Economic workshop was held that involved members of the Socio-Economic Team, fishermen, and members of the conservation community.. The workshop focused on designing a reserve network that did not impact any individual fisheries over 10%. The workshop was very successful in producing several concepts that minimized economic impact amongst the commercial fisheries in the CINMS. This work should be considered for the CINMS scope covered by the NOP. A similar workshop should be held to consider CINMS alternatives that have minimal impact on the fisheries as part of the process.

The use of Phasing in any of the reserve networks is proven method that can be used to minimize short term economic impacts to fisheries and allow and time to develop capacity reduction plans, yet this time tested method is not being considered in the CINMS process except for Alternative 2 "The Proactive Fishermen's Plan", however even with phasing alternative 2 still impacts some individual fisheries over 10%.
None of the alternative's being proposed that would have major socioeconomic and

fishery management impacts have any recommendations for phasing. Phasing in marine reserves implementation significantly help to minimize the social and economic disruption of coastal communities by allowing time for harvesters, buyers, processors, retailers and consumers of locally-caught seafood to adapt to the reduction in fishing effort that will ultimately accompany the implementation of a science-based and well-designed marine reserve system within the CINMS. The process for the CINMS should have this important procedure added to it.

Sincerly,

Harry Liquornik
President
Commercial Fisherman of Santa Barbara Inc.

COMMERCIAL FISHERMEN of SANTA BARBARA INC.
6 HARBOR WAY, BOX 155
SANTA BARBARA, CALIFORNIA 93109

December 10, 2001

Robert Treanor
California Fish and Game Commission
1416 Ninth Street
Sacramento, CA 95814

Subject: Range of Alternatives for CINMS reserves

Mr Treanor:

We are sending this letter regarding the range of alternatives before the commission for the CINMS as requested by Commissioner Chrisman at the December 5, 2001 Marine Sub-Committee meeting.

The CINMS Advisory Council recently submitted a letter to the Commission requesting that the range of alternatives reflect the community process, the letter requests the commission to include an option between 30-50% of Sanctuary waters.
In making this request the Advisory Council neglected to consider that the range of options should also include an option that meets the MRWG Socio-Economic Goals and Objectives of minimizing economic impacts to all users.

We would like to bring to the Commissions attention that we believe current range of alternatives does not include an option designed to minimize significant economic impacts to all users.
We have requested time at the next Sanctuary Advisory Council meeting to discuss this issue and ensure that the range of alternatives for the environmental review reflect a fair community process and we would like to have this issue on the next commission agenda.

Sincerely,

Harry Liquornik
President
Commercial Fisherman of Santa Barbara Inc.

Cc: Patty Wolf, Regional Manager- Marine Region
Matt Pickett, CINMS
John Ugoretz, Marine Region - Santa Barbara

PHASING IN MARINE RESERVES AT THE CHANNEL ISLANDS NATIONAL MARINE SANCTUARY (CINMS) -FOLLOWING THE MARINE RESERVES WORKING GROUP (MRWG) -CONSENSUS GOALS AND OBJECTIVES

Meeting Goals and Objectives

The consideration of placing, implementing and enforcing marine no-take zones at CINMS by MRWG made significant progress toward a consensus solution. In looking forward to how best to achieve the goals and objectives the MRWG adopted, an issue has been raised but generally overlooked that will need to be addressed to achieve a recommendation for marine reserves that the fisheries can support.
The recommendation should be cognizant of and sensitive to the concept of minimizing the short-term economic impacts to community segments that depend on access to CINMS resources for their livelihoods. In order to balance these goals and achieve them simultaneously, implementing a reserve network/system a portion at a time, rather than all at once, has much to offer. The following information supports the phasing concept.

At its core, the procedure of phasing in marine reserves will help significantly to minimize the social and economic disruption of coastal communities by allowing time for harvesters, buyers, processors, retailers and consumers of locally-caught seafood to adapt to the reduction in fishing effort that will ultimately accompany the implementation of a science-based and well-designed marine reserve system within the Channel Islands National Marine Sanctuary (CINMS). It will also have the added benefit of enhanced support and participation from the commercial and sport-commercial fisheries at the Islands, because they will be able to better respond in changing their business plans to accommodate the increased restrictions on access to traditional harvest areas.

Phasing in marine no-take zones will minimize the necessity of intervention by government in massive social engineering programs such as permit or vessel buybacks for harvest capacity reduction, retraining, and other similar programs like that used in implementing the Marine Life Protection Act of 1990. Proposition 132 (the gillnet initiative), which had the inadvertent effect of relocating many of the remaining gillnet vessels to the Channel Islands and/or Mexico, allocated nearly one million dollars for gillnet equipment compensation in a buyout program. Absent phasing, ample precedent is available statewide, nationally and internationally to initiate a discussion of such buyback or retraining programs as an integral part of implementation of marine no-take zones at CINMS.

Consistency with Marine Life Management Act and Marine Life Protection Act

Phasing of marine reserves would allow the Department of Fish and Game and the Commission to optimally integrate both the Marine Life Management Act (MLMA) and Marine Life Protection Act (MLPA) goals with this CINMS-DFG joint effort, by allowing time for MLMA Fishery Management Plans (FMPs) to be developed, which will most certainly include capacity reduction programs. Early illustration of this capacity reduction inherent in new management plans is clearly evident in the Draft Nearshore

Fishery Management Plan, the Draft White Seabass Management Plan, and the Draft Squid Management Plan currently under consideration by the Commission.

Phasing will also respond to both MLMA and MLPA goals and objectives *per se*, in particular, the provisions of MLMA Secs. 90.1, 7056 (j)-(m), 7059(a), especially (1) and (3), 7072(c), and 7074(a), as well as the provisions of MLPA Secs. 2853 c. (4) and (5), 2855 (c.) (1) – (4), and Sec. 2857 (a) and, most particularly, Sec. 2857 (e), which speaks directly to the ability of the Department to phase in marine protected areas. These sections are cited, below, for reference.

MLMA Sec. 90.1.
"Adaptive Management," in regard to a marine fishery, means a scientific policy that seeks to improve management of biological resources, particularly in areas of scientific uncertainty, by viewing program actions as tools for learning. Actions shall be designed so that even if they fail, they will provide useful information for future actions. Monitoring and evaluation shall be emphasized so that the interaction of different elements within the system can be better understood.

MLMA Sec. 7056.
In order to achieve the primary fishery management goal of sustainability, every sport and commercial marine fishery under the jurisdiction of the state shall be managed under a system whose objectives include all of the following...
(j) The adverse impacts of fishery management on small-scale fisheries, coastal communities and local economies are minimized.
(k) Collaborative and cooperative approaches to management, involving fishery participants, marine scientists, and other interested parties are strongly encouraged, and appropriate mechanisms are in place to resolve disputes such as access, allocation, and gear conflicts.
(l) The management system is proactive and responds quickly to changing environmental conditions and market or other socioeconomic factors and to the concerns of fishery participants.
(m) The management system is periodically reviewed for effectiveness in achieving sustainability goals and for fairness and reasonableness in its interaction with people affected by management.

MLMA Sec. 7059
(a) The Legislature finds and declares all of the following:
(1) Successful fishery management is a collaborative process that requires a high degree of ongoing communication and participation of all those involved in the management process, particularly the commission, the department, and those who represent the people and resources that will be most affected by fishery management decisions, especially fishery participants and other interested parties...
(3) the benefits of the collaborative process required by this section apply to most fishery management activities including, but not limited to, the development and implementation of research plans, fishery management plans, and plan amendments, and the preparation of fishery status reports such as those required by Section 7065...

MLMA Sec. 7072.
(c.) To the extent that conservation and management measures in a fishery management plan either increase or restrict the overall harvest in a fishery, fishery management plans shall allocate those increases or restrictions fairly among recreational and commercial sectors participating in the fishery.

MLMA Sec. 7074
(a) the department shall prepare interim fishery research protocols for at least the three highest priority fisheries identified pursuant to paragraph (4) of subdivision (b) of Section 7073. *[this includes nearshore rockfish]* An interim fishery protocol shall be used by the department until a fishery management plan is implemented for that fishery.

MLPA Sec. 2853
(c.) The program may include areas with various levels of protection, and shall include all of the following elements...
(4) Provisions for educating the public about MPAs, and for administering and enforcing MPAs in a manner that encourages public participation.

(5) A process for the establishment, modification, or abolishment of existing MPAs or new MPAs established pursuant to this program that involves interested parties, consistent with paragraph (7) of subdivision (b) of Section 7050, and that facilitates the designation of MPAs consistent with the master plan adopted pursuant to Section 2855.

MLPA Sec. 2855
(c.) The department and team, in carrying out this chapter, shall take into account relevant information from local communities, and shall solicit comments and advice for the master plan from interested parties on issues including, but not necessarily limited to, each of the following:
(1) practical information on the marine environment and the relevant history of fishing and other resources use, areas where fishing is currently prohibited, and water pollution in the state's coastal waters.
(2) Socioeconomic and environmental impacts of various alternatives.
(3) Design of monitoring and evaluation activities.
(4) Methods to encourage public participation in the stewardship of the state's MPAs.

MLPA Sec. 2857
(a) [in part]...The department and team shall develop a preferred siting alternative that incorporates information and views provided by people who live in the area and other interested parties, including economic information, to the extent possible while maintaining consistency with the goals of Section 2853 and guidelines in subdivision (c) of this section.

2857 (e) The department and team may provide recommendations for phasing in the new MPAs in the preferred siting alternative.

Integrated Coastal and Ocean Management

Phasing can help the Commission deal with all three programs (CINMS-MRWG, MLMA, MLPA) in an integrated fashion, providing for a more rational and information-based decision-making process, and allows the Commission to address and minimize social and economic upheaval caused in coastal fishing communities by establishment of reserves, per the mandates of MLMA and MLPA. In addition, the Commission may wish to understand how these previously mentioned closures accumulate impacts with the recent PFMC cowcod stock rebuilding plan and its concomitant closure of over 4,000 square miles of the Southern California Bight.

Phasing in marine reserves eases the short-term pain of loss of income to fishermen, and provides industry members both advance warning and the time to seek other forms of employment, and/or better plan for economic changes.

Avoiding increased fishing pressure resulting from large no-fishing zones

Very importantly, phasing in marine reserves reduces the impact to the fish and shellfish resources, of the suddenly increased fishing pressure outside reserves caused by the simultaneous start-date of multiple, large no-take reserves. For example, if one third of the CINMS area were set aside without immediate concomitant reductions in harvest capacity, the instantaneous effect would be that the displaced one-third of the fishing effort would end up fishing congested alongside the remaining two-thirds of the fleet. This is equivalent to an instantaneous increase in fishing pressure of 50% (one-third divided by two-thirds) on fish and shellfish resources outside the reserves. It is not a condition that a competent resource manager would knowingly endorse.

A recent presentation by the Science Panel to the MRWG noted that one of the most fundamental assumptions regarding the efficacy of marine reserves for conservation purposes is that there should be no change in fishing effort outside the reserve boundaries (assuming effort is at or below r/2 to start with [r = intrinsic rate of growth of a fish stock]). The Georges Bank cod closures were accompanied by massive fleet capacity reduction efforts (vessel buybacks), and we learned from the Science Panel that these de-facto reserves for the scallop fishery on the Georges Bank have been effective in restoring scallop resources and, apparently, improving the fishery as well.
Reserve implementation without phasing and capacity reduction over the long-term essentially mandates an instant violation of this basic assumption about the status quo in fishing effort outside the reserve area in the current Agency Preferred Alternative.

Practicing Adaptive Management

From both the scientific and management perspectives, phasing allows better feedback/control information for adaptive management in monitoring, evaluation and assessment. As data is amassed from monitoring and assessment programs on the first-implemented phase of marine reserves, scientists and managers will have improved information on which to base specific siting and implementation protocols in subsequent phases. This is, at its core, the intent of the term "adaptive management" as defined in both the MLMA and MLPA. Ultimately, phasing promotes improved designs in subsequent reserve phases while improving the potential for "buy-in" by the harvest sector.

Addressing Concerns About Commitment to Science-Based Recommendations

In order to address the potential concerns of the scientific, management and conservation community, some of whom may view phasing as an extractive user's way out of implementing a large network of marine reserves, the Department and Commission should arrive at consensus on a commitment to the entire "package." This will assure all participants that the conservation goals and objectives of the various stakeholders will ultimately be met in a way that also simultaneously achieves the MRWG consensus goal of minimizing short-term economic dislocations. Phasing will also avoid the resource depletion certain to occur without a phased design that also lacks a harvest capacity reduction component.

In short, implementing a network of marine reserves into the existing resource management framework a portion at a time accomplishes conservation goals, minimizes short-term economic losses, allows time for catch-up of the Marine Life Management Act and Marine Life Protection Act to achieve consistency with those new ocean mandates, offers a way for the California Fish and Game Department and Commission to achieve integration of at least three different ocean resource management efforts over the next three to five years, provides a mechanism to improve the feedback necessary for practicing adaptive management, and increases the likelihood of buy-in from those most likely to be negatively impacted in the trade-off game of benefits and impacts resulting from establishing marine reserves at CINMS. Phasing in marine reserves should be given serious consideration.

Phasing Options For The Fishermen's Plan

Option A
Contingent Phasing based on administrative performance

Proposed Marine Reserves and Conservation Areas would be adopted and implemented in three phases. Phase I core Marine Reserves would be adopted and be implemented in State waters. Phase II implementation of additional Marine Reserve Areas is contingent on administrative performance. The Department and Commission should develop management plans for proposed Conservation Areas in the MLPA process and integrate with reserves proposed in the MLPA coastal plan and additional Phase II areas. If administrative and monitoring performance is not achieved, Phase II areas should be implemented as Conservation Areas. Phase III is a natural progression due to separate

managing bodies for federal waters. Phase III will be the implementation of Marine Reserves and Conservation Areas in Federal waters based on review and recommendations from the Pacific Fisheries Management Council.

Administrative Performance
After implementation of the Phase I network and the five years that elapse after actual closure, all the agencies that have regulatory or enforcement roles within the CINMS shall have demonstrated their commitment to enforcement, monitoring, assessment, evaluation, and administration of these Phase I marine reserves, including adequate funding and staff to do the requisite tasks.

Monitoring Performance
Establish additional monitoring sites at Judith Rock, South Point, and Carrington Point reserve sites. These additional monitoring sites should be added to Channel Islands National Park Kelp Forest Monitoring Program and annual monitoring. Adequate baseline data gathered at all near shore reserve sites prior to reserve establishment.

Biological Performance
After five years of total closure in the no-take zones, monitoring and evaluation of the information gained should begin to show evidence that the kinds of benefits touted for marine reserves worldwide (i.e., increases in biodiversity, maximum size of fish, population density and total biomass) are appearing in the selected reserve sites, at least for the species that have shorter times to maturity and more rapid growth rate than the long-lived, slow-reproducing rockfish assemblage. Absent evidence of beneficial results, the Department and Commission, together with the Sanctuary and any scientific advisors appropriate, should re-evaluate the placement of these reserves and modify them adaptively in an attempt to improve their performance.

Option A is the Fisheries preferred option because it gives fishermen time to adjust to reduced fishing grounds. It allows managers time to adjust and develop Fisheries Management Plans, Capacity Reduction Plans, and integrate the CINMS reserves in to the MLPA and MLMA. It will allow for the further development of management strategies in the proposed Conservation Areas. Option A also insures accountability by mandating administrative and monitoring performance. Accountability and monitoring was major issue in all the public forums held throughout the MRWG process.

Option B
Timed Phasing
Proposed areas would be adopted and implemented in two phases on a predetermined timetable without administrative or monitoring performance contingencies.
Phase I Marine Reserves would be adopted and implemented.
Phase II areas would be implemented five years after Phase I

Option B is not a preferred option because it does not insure agency accountability. It does not require monitoring performance or additional monitoring sites to evaluate reserve performance. Without agency accountability and some measurement of the efficacy of these reserves, this entire exercise will be merely another example of the politics of political correctness driving marine resource management. Adaptive management as a new paradigm will simply have been given lip service without any substance whatsoever.

No Phasing
Under this option proposed areas would be adopted and implemented with no time for fisheries to develop a Capacity Reduction Plan and use an incremental approach to allow fisheries to adjust to reduction of fishing grounds. This plan has significantly less conservation areas since additional time needed to fully explore possible management options within the conservation areas with fishermen would not be available.

If the option of phasing is not used in the Fisheries Alternative the agencies should prepare a large scale buy out program. Any future reserve recommendation that has economic impacts over five percent economic impacts should be phased to allow Fisheries to adjust to the reduction in harvest grounds.

This option is not preferred because it does not allow for the use of adaptive management strategies in Conservation Areas and does not allow time for fisheries to adjust to reduced fishing grounds and develop capacity reduction plans.

Proposed Phase I areas

Richardson Rock
Entire proposed area.

Harris Point
Harris Point to Orin Peak

Judith Rock
Entire Proposed area.

Carrington Point
Beacon Reef to Pier in Bechers Bay

South Point
South Point to Chickasaw

Gull Island
Morse Point to Laguna Canyon

Scorpion
Entire proposed area

Anacapa Island
Middle Reef to East end

Proposed Phase II Marine Reserves and Conservation Areas

Harris Point
Harris point to Marker Poles in Simonton Cove

Carrington Point
Additional Western area at Carrington Point

South Point
Additional Western area at South Point

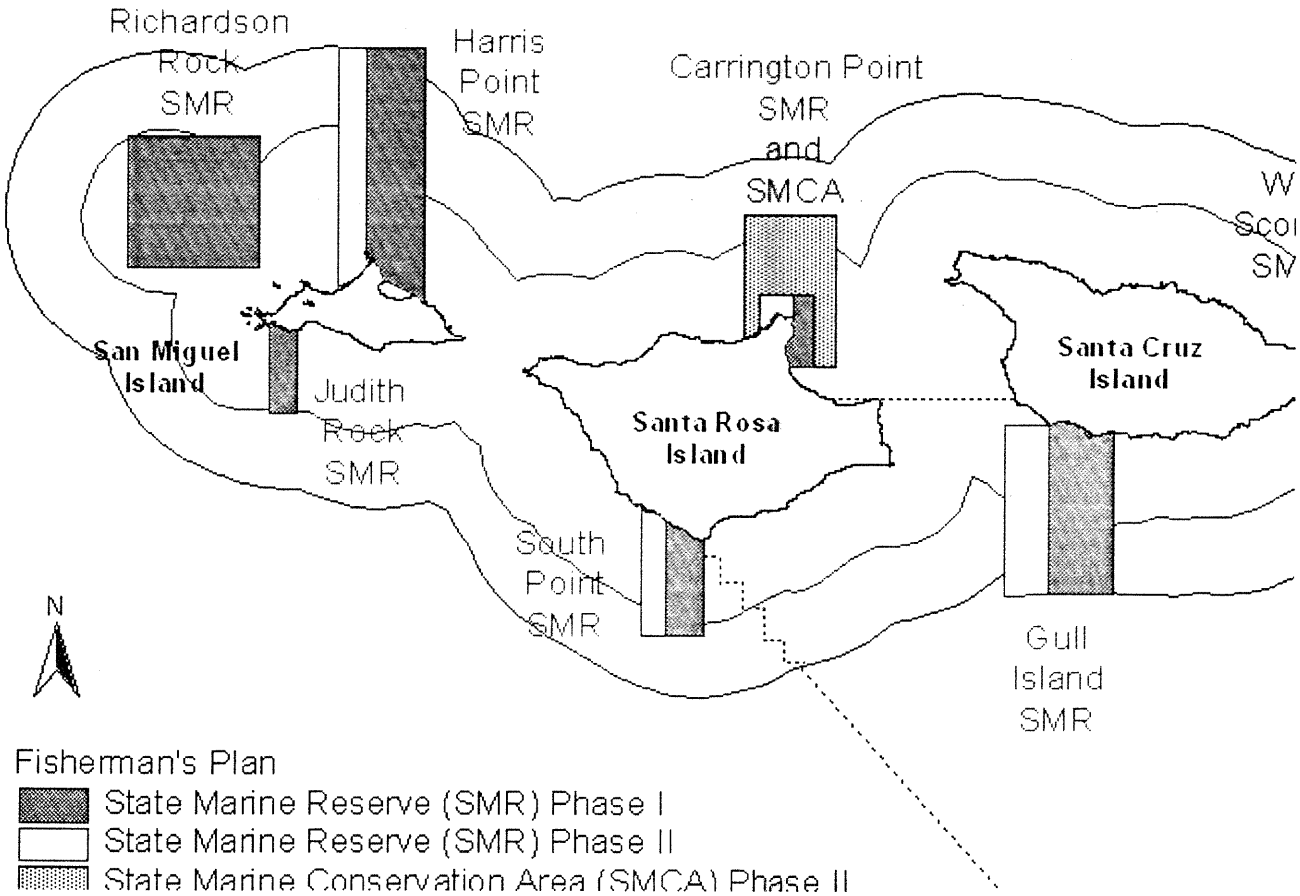
Gull Island
Additional Western area at Gull Island

Carrington Point Conservation area

Conservation areas East and West of Scorpion Marine Reserve

Anacapa Island Conservation area

The Fisherman's Plan for a Marine Protected Area Network for the Channel Islands National Marine Sanctuary



The Ocean Conservancy

NRDC
THE EARTH'S BEST DEFENSE

September 6, 2002

Dr. Donald McIsaac
Executive Director
Pacific Fishery Management Council
2130 SW Fifth Avenue, Suite 224
Portland, OR 97201

Dear Dr. McIsaac and Council members,

Thank you for taking the time to consider the California Fish & Game Commission's request for input on the Channel Islands marine reserve process. The timely responses of the SSC and other Council advisory bodies will give the California Department of Fish & Game ample opportunity to amend the CEQA document before the Commission's decision. The letter you drafted reflects the unique perspective of the Council as federal fishery managers. We recognize and support the Council's policy of deferring to states for actions in state waters, including designating MPAs. We continue to recommend that the Council support the Preferred Alternative for MPAs in the Channel Islands. There are several sections in the letter we would like to highlight.

First, we strongly approve of the guiding philosophy that recognizes both the sovereignty and responsibility of states to make decisions for resources in state waters. This reflects the approach the Council has taken in the past, where the Council does not intercede on decisions by the state that are consistent or more protective than those taken by the Council itself. Sound marine management requires consideration of both large and small scale processes, from protection of local spawning sites to a species' distribution across an ocean basin. It is appropriate that the Council consider the impact of the Channel Islands reserves in the context of their ability to provide "coast-wide benefits" since that is the scale at which the Council operates. In that context, these protected areas are extremely small compared to the Cowcod Conservation Area or the groundfish closures. But, within the Channel Islands National Marine Sanctuary these areas are very important; they help conserve biodiversity and may help sustain local fisheries.

Second, the letter notes the importance of monitoring and enforcement under both "Consistency with the groundfish strategic plan" and "Public policy decision". We agree with the importance of monitoring and enforcement, and that is one reason why the Channel Islands make an excellent candidate for a network of MPAs. Not only were these locations based on habitat features, but they also took into account existing monitoring sites and the enforcement capabilities of the

National Park, National Marine Sanctuary, and the Department of Fish & Game. Very few, if any, places on the west coast currently have the combination of federal, state and private resources that are available at the Channel Islands. Monitoring proposals are in development now for peer-review, and we expect them to include collaborative research with fishermen. We look forward to the data from these marine protected areas as it can only improve our understanding of ocean processes.

Third, as far as the interaction of the reserves with other FMPs and any cumulative impacts, we reiterate our point that on the scale of west coast fisheries, these handful of reserves are small compared to the Council's recent shelf closures to protect overfished groundfish stocks. Attached is a map showing both the areas in the state's "preferred alternative" and the groundfish closures. You can see that the majority of the reserve areas are already closed to most bottom fishing under the Council's regulations. Through implementation of its Nearshore FMP, California is already taking steps to manage effort in areas closer to shore; the recently adopted Nearshore FMP includes MPAs as one of its framework management options. By creating reserves that include nearshore areas, the state will add to its protection in the event that there is a shift of effort from the Council's shelf closure. These reserves are also critical for protecting unassessed or emerging fisheries and providing baseline information on those species.

Finally, much of the letter deals with how the requirements of CEQA differ from those of NEPA. The socioeconomic data provided by the state is not required by CEQA, yet it has been included in order to allow the public and other agencies to make a more informed decision about the designation of marine reserves in state waters of the Sanctuary. We believe there is ample data, both scientific and economic, to justify creating the preferred alternative. We believe that when NOAA decides to proceed with MPAs in federal waters of the Sanctuary, the NEPA analysis will be more than satisfactory. We encourage the SSC and Council to work closely with NOAA on this analysis.

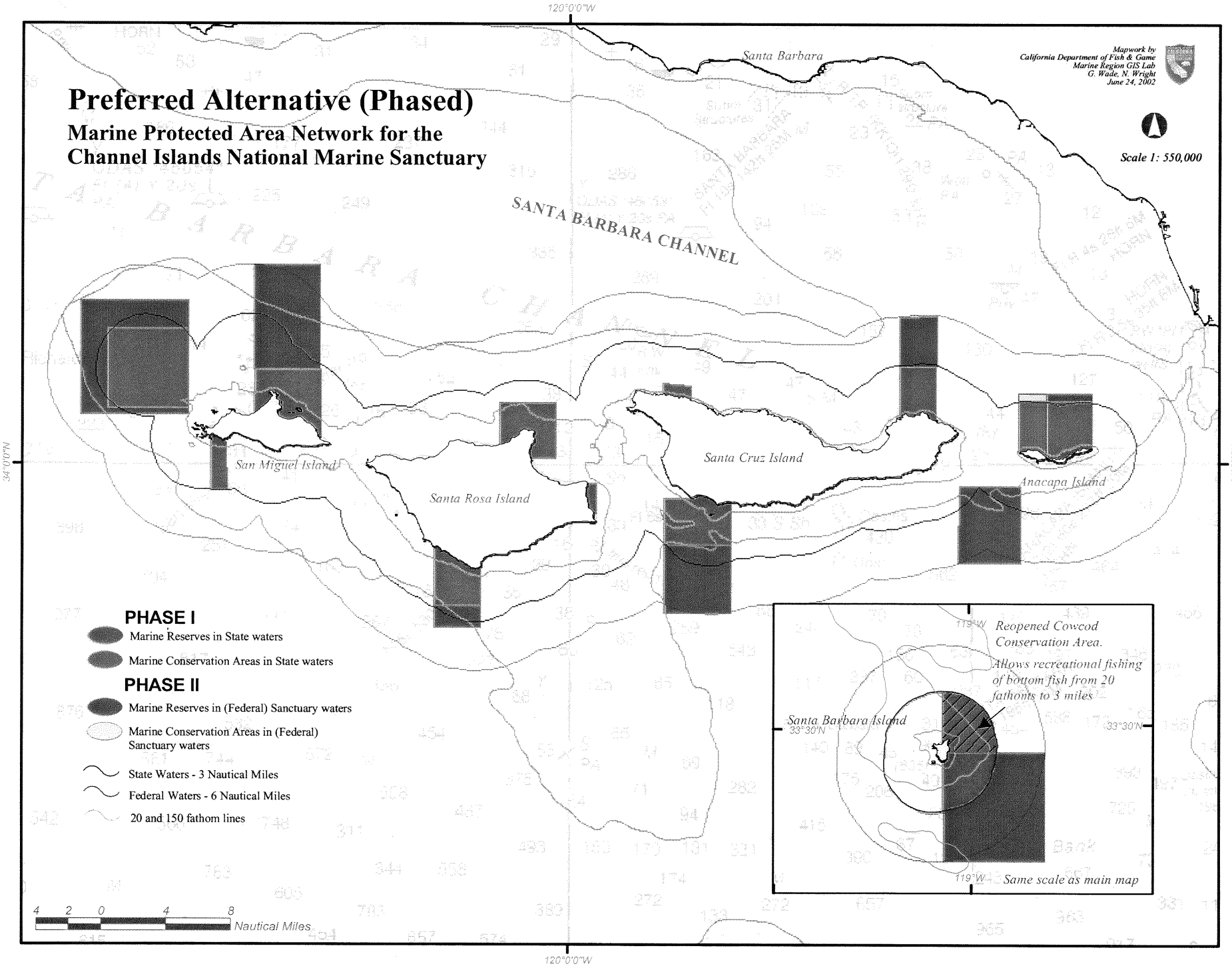
Thank you for consideration of our view. We look forward to continuing to work with you in the years to come.

Sincerely,

Kate Wing
Natural Resources Defense Council

Doug Obegi
The Ocean Conservancy

cc: Mr. Robert Treanor
Mr. Matt Pickett
Ms. Patty Wolf


120°0'0"W
Santa Barbara
Mapwork by
California Department of Fish & Game
Marine Region GIS Lab
G. Wade, N. Wright
June 24, 2002
Preferred Alternative (Phased)
Marine Protected Area Network for the
Channel Islands National Marine Sanctuary
Scale 1: 550,000
SANTA BARBARA CHANNEL
San Miguel Island
Santa Rosa Island
Santa Cruz Island
Anacapa Island
34°0'0"N
PHASE I
Marine Reserves in State waters
Marine Conservation Areas in State waters
PHASE II
Marine Reserves in (Federal) Sanctuary waters
Marine Conservation Areas in (Federal) Sanctuary waters
State Waters - 3 Nautical Miles
Federal Waters - 6 Nautical Miles
20 and 150 fathom lines
4 2 0 4 8
Nautical Miles
119°W
Reopened Cowcod Conservation Area.
Allows recreational fishing of bottom fish from 20 fathoms to 3 miles
Santa Barbara Island
33°30'N
Same scale as main map

MARINE RESERVE PROPOSALS FOR CHANNEL ISLANDS NATIONAL MARINE SANCTUARY

Situation: At its June 2002 meeting, the Council approved Scientific and Statistical Committee (SSC) comments on technical aspects of the draft California Environmental Quality Act (CEQA) analysis on the creation of no-take marine reserves in state waters of the Channel Islands National Marine Sanctuary (CINMS). These comments were forwarded to California Department of Fish and Game (CDFG) for its consideration. The Council also appointed an Ad Hoc Marine Reserves Policy Committee to develop a draft letter to the California Fish and Game Commission (CFGC) with Council comments on CINMS marine reserve alternatives being considered by the CFGC. The ad hoc committee met in El Segundo, California on August 14 and 15, 2002 and :

- developed a draft letter (Exhibit E.1.b, Draft Letter),
- requested that the SSC develop a response to a letter from Leeworthy and Wiley (NOAA/National Ocean Service) (Exhibit E.1.a, Attachment 1; Exhibit E.1.c, Supplemental SSC Report).

Representatives from each of the Council advisory panels and the SSC were invited to attend the meeting and provided comments to the ad hoc committee.

The CEQA document analyzes eight alternatives pertaining to marine reserves for the CINMS, including a status quo alternative and an alternative that would defer action and take the issue up as part of the consideration of marine reserves under the state's Marine Life Protection Act process. The draft letter provides Council perspective on the effects of the alternatives, but does not recommend a specific alternative. The draft letter offers two implementation options for consideration (see second and third to last paragraphs of the draft letter). At or prior to the September 2002 Council meeting, each advisory panel will have an opportunity to review the draft letter and provide additional comments to the Council.

Appended to the end of the draft letter is an additional paragraph proposed by an ad hoc committee member to reflect a portion of the discussion from the meeting that was not covered in the initial draft circulated to the committee after the El Segundo meeting. There was not enough time prior to the briefing book deadline to solicit comment on the proposed paragraph from the ad hoc committee.

The CFGC will be making a final decision on December 6, 2002.

Council Action:

1. **Review the SSC response to Leeworthy and Wiley letter and determine whether or not to include it as an attachment to the draft letter to CFGC.**
2. **Finalize the draft letter to CFGC with recommendations on marine reserves for the CINMS.**

Reference Materials:

1. Letter from Vernon Leeworthy and Peter Wiley to SSC Marine Reserves Subcommittee (Exhibit E.1.a, Attachment 1).
2. Draft letter from Council to CFGC (Exhibit E.1.b, Draft Letter). **Note**: The attachments referred to in the letter are not included, as they have already been reviewed by the Council or will be developed at the meeting. Some copies are available in the Council Secretariat.

Groundfish Fishery Strategic Plan (GFSP) Consistency Analysis

The GFSP calls for the Council to "use marine reserves as a fishery management tool that contributes to groundfish conservation and management goals, has measurable effects, and is integrated with other fishery management approaches."

Agenda Order:

a. Agendum Overview — Jim Seger
b. Ad Hoc Marine Reserves Policy Committee Report
c. Reports and Comments of Advisory Bodies
d. Public Comment
e. **Council Action:** Develop Recommendations to the California Fish and Game Commission

PFMC
08/26/02

ADF&G's Marine Protected Areas Program

Recommendations to the Board of Fisheries

The Alaska Department of Fish and Game issued a report on July 18, 2002 with a set of recommendations for a public process for establishing marine protected areas (MPAs) in Alaska. These recommendations were developed by a ten-member task force of Department of Fish and Game personnel as guidance for development of an MPA policy by the Alaska Board of Fisheries.

DEADLINE FOR COMMENTS EXTENDED TO OCTOBER 2, 2002.

MPA Task Force Report:
(Adobe Acrobat PDF files*)

Task force members are:

Commercial Fisheries Division
Earl Krygier, Denby Lloyd,
Kristin Mabry, Tory O'Connell, Charlie Trowbridge,
Doug Woodby (chair)

Habitat and Restoration Division
Janet Hall Schempf

Sport Fish Division
Scott Meyer

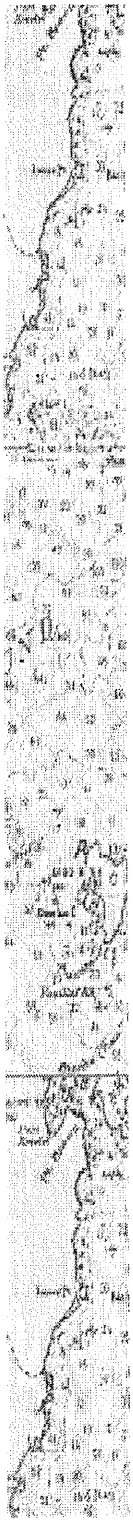
Wildlife Conservation
Bob Small

Commissioner's Office
Rob Bosworth

Because of the large size of this document, we are making it available as a full document (2.4MB) or, for easier downloading over slower connections, in 4 smaller parts:

- Part 1: Introduction – Appendix Table E1: pages 1–72† (PDF file* — 557K)

- Part 2: Appendix Table E2, Figures E1–E7 : pages 73–81† (PDF file* — 611K)



- Part 3: Figures E8 & E9: pages 82–83† (PDF file* — 777K)

- Part 4: Figure E10–E13, End: pages 84–94† (PDF file* — 589K)

† **PLEASE NOTE:** Figures E1–E13 show only a subset of marine protected areas in Alaska, and serve as examples only. A complete inventory and mapping is in preparation for publication later in 2002.

We request your comments on all aspects of the report. Comments should be sent to:

MPA Task Force
attn: Doug Woodby
Alaska Department of Fish and Game
Division of Commercial Fisheries
P.O. Box 25526
Juneau, AK 99801

or:

MPA_program@fishgame.state.ak.us

DEADLINE FOR COMMENTS EXTENDED TO OCTOBER 2, 2002.

Comments will be compiled, summarized, and submitted to the Alaska Board of Fisheries for review prior to their October, 2002 work session in Anchorage.

It is anticipated that the Board will make decisions regarding a public process in the fall or winter of 2002/03.

Powerpoint presentations made by the task force:

- January 22, 2002 (Anchorage) - EVOS/GEM workshop
  Versions: Flash** (1,217K) • PowerPoint*** (6,165K)

- February 4, 2002 (Anchorage) - Joint meeting of the NPFMC and Alaska Board of Fisheries
  Versions: Flash** (182K) • PowerPoint*** (715K)

- March 14, 2002 (Anchorage) - Alaska Board of Fisheries
  Versions: Flash** (147K) • PowerPoint*** (88K)

*Viewer for Adobe Acrobat *PDF* files available here.
**Player for Macromedia *Flash* files available here.
***Viewer for PowerPoint available here.

Date: Tue, 25 Jun 2002 21:23:54 -0700
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Ann_Bull@mms.gov
CC: Rebecca Lent <rebecca.lent@noaa.gov>

Colleagues:

In the past few years, marine protected areas (MPAs) have risen to the top of the ocean conservation policy agenda on the west coast. New or revised marine protected areas are being considered by at least a dozen federal and state agencies along the Pacific coast from California to Washington. In California alone, ongoing governmental MPA planning processes include: four national marine sanctuaries; the state-wide Marine Life Protection ActÆs (MLPA) effort to create a comprehensive network of MPAs including no take reserves; and, a growing interest in marine reserves by the Pacific Fisheries Management Council (PFMC). Similar efforts are underway in Oregon and Washington as well.

Combined, these governmental MPA planning processes have the potential to significantly enhance marine conservation throughout this portion of the U.S. Pacific EEZ, especially if they are well integrated with existing resource management approaches. Their ultimate success, however, will depend largely upon our collectively improving the the status quo in two ways: (a) creating more effective avenues for meaningful engagement in MPA planning by all stakeholders; and (b) facilitating more strategic coordination among federal and state MPA agencies from local to regional scales.

To this end, the National Marine Protected Areas Center (NMPAC) and the Communication Partnership for Science and the Sea (COMPASS) are working together to build upon the initial COMPASS meeting in August 2000, in which MPA practitioners, scientists and policy makers from California, Oregon and Washington identified key information needs for MPA planning in the Pacific. This email is intended to give you an overview of the goals of this new NMPAC-COMPASS initiative, and to solicit your input on two key components that relate to your agencyÆs efforts.

1. Pacific MPA Clearinghouse

The plethora of MPA planning efforts is extremely complex and confusing to many observers. We are currently developing a new web site (PacificMPA.org) that will provide ôone-stop-shoppingö for comprehensive information on all ongoing federal and state MPA planning processes from California to Washington. This site, which will be widely advertised among all stakeholders, will provide up-to-date information to all interested parties about the goals and objectives of planned MPAs, key public events,

ongoing reviews of environmental and management plan documents, etc. The site will focus solely on governmental MPA efforts, and will rely heavily on links to existing MPA agency web sites. It will present strictly factual data on key steps and opportunities for public engagement in these processes, such as dates, times, locations, etc. It will not address underlying policy issues or advocate particular positions on MPAs. We expect this site to be of great interest to all MPA stakeholders who currently face a growing challenge in trying to effectively track and engage in the tremendous variety of MPA events throughout the Pacific region.

2. Pacific MPA Agency Coordination

In addition to providing this basic information on MPA happenings to the public via the new web site, the NMPAC-COMPASSS partnership will also convene periodic meetings of key policy and program staff of all the federal, state and tribal agencies actively engaged in MPA planning on the west coast. These informal gatherings will combine basic information sharing and updates about programmatic plans, with more strategic considerations about how best to coordinate and integrate MPA planning on a coast-wide basis to maximize the conservation benefit of any new MPAs, while minimizing adverse impacts û both real and perceived û among user groups. We hope to hold the first Pacific MPA æroundtableÆ meeting Monterey, California this fall.

Requested Actions

For both of these efforts to succeed, we need your active cooperation and involvement. To that end, we request that you send an email to Sarah Lyons, of the NMPACÆs Science Institute in Santa Cruz (sarah.lyons@noaa.gov) that provides two pieces of information:

* Identifies a key point of contact for your agencyÆs programmatic information about ongoing MPA planning processes for the clearinghouse web site, PacificMPA.org. This person will be contacted soon by Sarah to review the draft web site, and to develop a reliable means to regularly update its contents to ensure that it accurately reflects your plans.
* Identifies one or two key people from your agencyÆs MPA program who would have the time, inclination and programmatic knowledge to comprehensively discuss your MPA plans and activities throughout the region during one or two coast-wide coordination meetings a year. These individuals will receive a formal invitation from the NMPAC and COMPASS soon.

We would very much appreciate your providing this initial information to Sarah Lyons by Tuesday, July 2, 2002.

We appreciate your interest in MPAs and look forward to working with you on this important ocean conservation endeavor.

Charles Wahle, Ph.D.
Ph.D.
National MPA Center
Phone: 831-420-3956

George H. Leonard,

COMPASS
Phone: 831-647-6830

HABITAT COMMITTEE REPORT ON
UPDATE ON OTHER MARINE RESERVES PROCESSES

Oregon Ocean Policy Advisory Council (OPAC) has submitted a recommendation to Governor Kitzhaber stating:

"After nearly two years of study of marine reserves and protected areas in the U.S. and worldwide, the Oregon Ocean Policy Advisory Council (OPAC) has found that sufficient evidence exists to recommend that:

a. Oregon establish a limited system of marine reserves in order to test and evaluate their effectiveness in meeting marine resource conservation objectives; and

b. Before designating any specific marine reserves, Oregon must acquire additional information and conduct additional study, analysis, and deliberation through an open, public process with extensive stakeholder involvement."

The executive summary of the OPAC report is attached. The Habitat Committee encourages the Council to endorse OPAC's recommendation to proceed with planning, including full community involvement in the process.

PFMC
09/11/02

Oregon Ocean Policy Advisory Council

Report and Recommendation to the Governor
Oregon and Marine Reserves

August 16, 2002

Executive Summary

Overall Recommendation

After nearly two years of study of marine reserves and protected areas in the U. S. and worldwide, the Oregon Ocean Policy Advisory Council (OPAC) finds that sufficient evidence exists to RECOMMEND that:

a. Oregon establish a limited system of marine reserves in order to test and evaluate their effectiveness in meeting marine resource conservation objectives; and

b. before designating any specific marine reserves, Oregon must acquire additional information and conduct additional study, analysis, and deliberation through an open, public process with extensive stakeholder involvement.

The OPAC makes NO recommendation at this time about either

- a specific system of reserves or area locations;
  or
- the use of marine reserves for fishery management.

The OPAC finds credible policy and scientific evidence that marine reserves can help Oregon to meet marine conservation objectives in Statewide Planning Goal 19, Ocean Resources, and may assist in reaching other state objectives such as fisheries enhancement and management, pollution control, recreation, tourism, and education. This evidence suggests that a carefully designed system of reserves, even if limited, can provide both conservation and research information benefits. Substantial evidence also exists that a careful public planning and assessment process involving all stakeholders is critical to the eventual acceptance and success of such reserves.

Goals and Objectives

The goal of such a system and process is to help Oregon to meet the conservation objectives of Statewide Planning Goal 19, Ocean Resources, which include maintaining the long-term benefits of renewable marine resources and protecting marine biodiversity, important marine habitats, and areas important to marine fisheries.

Objectives of the planning and evaluation process are to:

1. establish ecological reference areas as part of an integrated management strategy in significant rocky shore and marine habitats in the territorial sea and on the continental shelf;

2. test the effectiveness of these reserves in maintaining and restoring ecological integrity;
3. provide a strategic framework for appropriate research funding; and
4. increase understanding and awareness of Oregon's marine resources.

Specific long-term goals and objectives of the system will be developed during the planning and evaluation process.

Recommended Process for Public Stakeholder Participation
The Ocean Policy Advisory Council RECOMMENDS an open, participatory two-phase process involving all stakeholders to plan and evaluate a system of reserves along the Oregon coast that will meet conservation objectives, provide valuable information, and maximize other public benefits, while avoiding or minimizing adverse effects on fisheries, other ocean users, and coastal communities.

- Phase One: The OPAC proposes that a reserve planning committee be established with members from stakeholder groups, agencies, scientists, and others to prepare a coastwide framework plan. A separate scientific advisory panel would provide independent information and advice to the reserve planning committee and OPAC to ensure separation of policy development from scientific analysis. As part of this process, focus on the Rocky Shores Management Strategy will be supported by staff from affected state agencies. The OPAC would approve the coastwide framework plan after public review and assessment of such factors as the potential economic, management, and ecosystem effects, costs, benefits, funding needs, and implementation.

- Phase Two: The coastwide framework plan would be carried out over time, resources permitting, through a locally-oriented public process that would result in a plan for each reserve. No reserve would be implemented until an analysis of the ecological, economic, and social effects was completed. Reserves might be implemented through a variety of means such as local advisory committees; state agency programs such as those of the Oregon Department of Fish and Wildlife, Parks and Recreation Department, and Division of State Lands; or legislative action. Reserves would be reviewed at intervals to assess performance and determine whether continuation, modification, or termination is warranted.

The OPAC intends a broad interpretation of the term "stakeholder" to include all affected or interested parties, groups and individuals because all have important contributions to make in carrying out this proposal. An open, participatory, step-wise planning and evaluation process will enable all interested parties to be involved in all phases of this process.

Terminology:
The OPAC concludes that Oregon's Territorial Sea is, in effect, a *marine protected area* because it is a distinct ocean area identified in state law for management through an integrated set of laws and regulations for multiple uses and purposes. The OPAC therefore focused its study and recommendation on *marine reserves*, which refers to a highly regulated ocean or estuarine area designated to meet specific goals and to protect resources or uses from activities that may conflict with these goals. While Oregon has a number of marine areas that are specially managed or protected along the ocean shore, none are "fully-protected."

Public Participation
All OPAC and Working Group meetings were open to the public. Several were well-attended. A special website (http://oregonocean.org) was launched to enable public access to all study materials, meeting notes, and other information about marine protected areas and reserves.

An initial draft of this recommendation was widely reviewed by the public in late spring 2002 and received a wide range of comments from many people. Comments ranged from outright rejection of the idea that marine reserves should be considered, to assertions of the need to enact reserves immediately. The Ocean Policy Advisory Council acknowledges the concerns raised, questions asked, and comments made and concurs that more information, discussion, and step-wise planning and evaluation are needed prior to the designation of specific reserves.

Funding
The OPAC acknowledges that funding will be a significant factor in carrying out this recommendation. The proposed public process will require staff, logistical, and information support. The OPAC RECOMMENDS that the Governor and Legislature provide core funding from state sources in order to leverage additional funds from other sources.

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Council members:

Thanks for taking the time to meet down in El Segundo. Since there were a number of comments
made regarding the use of marine reserves for fisheries management, I wanted to pass on to you
a recent article in Nature that discusses the issue. I would ask that Don, in his capacity as executive
director, provide this to the Council at the September meeting, if not prior to in electronic format. It
is extremely readable, especially for a scientific article.

Thank you, Kate

<<Pauly et al Nature article 8 August 2002.pdf>>20

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Towards sustainability in world fisheries

Daniel Pauly, Villy Christensen, Sylvie Guénette, Tony J. Pitcher, U. Rashid Sumaila, Carl J. Walters, R. Watson & Dirk Zeller

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Fisheries have rarely been 'sustainable'. Rather, fishing has induced serial depletions, long masked by improved technology, geographic expansion and exploitation of previously spurned species lower in the food web. With global catches declining since the late 1980s, continuation of present trends will lead to supply shortfall, for which aquaculture cannot be expected to compensate, and may well exacerbate. Reducing fishing capacity to appropriate levels will require strong reductions of subsidies. Zoning the oceans into unfished marine reserves and areas with limited levels of fishing effort would allow sustainable fisheries, based on resources embedded in functional, diverse ecosystems.

Fishing is the catching of aquatic wildlife, the equivalent of hunting bison, deer and rabbits on land. Thus, it is not surprising that industrial-scale fishing should generally not be sustainable: industrial-scale hunting, on land, would not be, either. What is surprising rather, is how entrenched the notion is that unspecified 'environmental change' caused, and continues to cause, the collapse of exploited fish populations. Examining the history of fishing and fisheries makes it abundantly clear that humans have had for thousands of years a major impact on target species and their supporting ecosystems[1]. Indeed, the archaeological literature contains many examples of ancient human fishing associated with gradual shifts, through time, to smaller sizes and the serial depletion of species that we now recognize as the symptoms of overfishing[1,2].

This literature supports the claim that, historically, fisheries have tended to be non-sustainable, although not unexpectedly there is a debate about the cause for this[3], and the exceptions[4]. The few uncontested historical examples of sustainable fisheries seem to occur where a superabundance of fish supported small human populations in challenging climates[5]. Sustainability occurred where fish populations were naturally protected by having a large part of their distribution outside of the range of fishing operations. Hence, many large old fecund females, which contribute overwhelmingly to the egg production that renews fish populations, remained untouched. How important such females can be is illustrated by the example of a single ripe female red snapper, *Lutjanus campechanus*, of 61 cm and 12.5 kg, which contains the same number of eggs (9,300,000) as 212 females of 42 cm and 1.1 kg each[6]. Where such natural protection was absent, that is, where the entire population was accessible to fishing gears, depletion ensued, even if the gear used seems inefficient in retrospect[7,8]. This was usually masked, however, by the availability of other species to target, leading to early instances of depletions observable in the changing size and species composition of fish remains, for example, in middens[9].

The fishing process became industrialized in the early nineteenth century when English fishers started operating steam trawlers, soon rendered more effective by power winches and, after the First World War, diesel engines[10]. The aftermath of the Second World War added another 'peace dividend' to the industrialization of fishing: freezer trawlers, radar and acoustic fish finders. The fleets of the Northern Hemisphere were ready to take on the world.

Fisheries science advanced over this time as well: the two world wars had shown that strongly exploited fish populations, such as those of the North Sea, would recover most, if not all, of their previous abundance when released from fishing[11]. This allowed the construction of models of single-species fish populations whose size is affected only by fishing pressure, expressed either as a fishing mortality rate (F, or catch/biomass ratio), or by a measure of fishing effort (f, for example, trawling hours per year) related to F through a catchability coefficient[12,13] (q): $F = qf$. Here, q represents the fraction of a population caught by one unit of effort, directly expressing the effectiveness of a gear. Thus, q should be monitored as closely as fishing effort itself, if the impact of fishing on a given stock, as expressed by F, is to be evaluated. Technology changes tend to increase q, leading to increases referred to as 'technology coefficient'[14], which quickly renders meaningless any attempts to limit fishing mortality by limiting only fishing effort.

The conclusion of these models, still in use even now (although in greatly modified forms; Box 1), is that adjusting fishing effort to some optimum level should generate 'maximum sustainable' yield, a notion that the fishing industry and the regulatory agencies eagerly adopted — if only in theory[15]. In practice, optimum effort levels were very rarely implemented (the Pacific halibut fishery is one exception[16]). Rather the fisheries expanded their reach, both offshore, by fishing deeper waters and remote sea mounts[17], and by moving onto the then untapped resources of West Africa[18], southeast Asia[19], and other low-latitude and Southern Hemispheric regions[20].

Fisheries go global

In 1950, the newly founded Food and Agriculture Organization (FAO) of the United Nations began collection of global statistics. Fisheries in the early 1950s were at the onset of a period of extremely rapid growth, both in the Northern Hemisphere and along the coast of the countries of what is now known as the developing world. Everywhere that industrial-scale fishing (mainly trawling, but also purse seining

and long-lining) was introduced, it competed with small-scale, or artisanal fisheries. This is especially true for tropical shallow waters (10–100 m), where artisanal fisheries targeting food fish for local consumption, and trawlers targeting shrimps for export, and discarding the associated by-catch, compete for the same resource[21].

Box 1
Single-species stock assessments

Single-species assessments have been performed since the early 1950s, when the founders of modern fisheries science[12,13] attempted to equate the concept of sustainability with the notion of optimum fishing mortality, leading to some form of maximum sustainable yield. Most of these models, now much evolved from their original versions (some to baroque complexity, involving hundreds of free parameters), require catch-at-age data. Hence government laboratories, at least in developed countries, spend a large part of their budget on the routine acquisition and interpretation of catch and age-composition data.

Yet, single-species assessment models and the related policies have not served us particularly well, due to at least four broad problems. First, assessment results, although implying limitation on levels of fishing mortality which would have helped maintain stocks if implemented, have often been ignored, on the excuse that they were not 'precise enough' to use as evidence for economically painful restriction of fishing (the 'burden of proof' problem[86]).

Second, the assessment methods have failed badly in a few important cases involving rapid stock declines, and in particular have led us to grossly underestimate the severity of the decline and the increasing ('depensatory') impacts of fishing during the decline[87].

Third, there has been insufficient attention in some cases to regulatory tactics: the assessments and models have provided reasonable overall targets for management (estimates of long-term sustainable harvest), but we have failed to implement and even develop effective short-term regulatory systems for achieving those targets[88].

Fourth, we have seen apparently severe violation of the assumptions usually made about 'compensatory responses' in recruitment to reduction in spawning population size. We have usually assumed that decreasing egg production will result in improving juvenile survival (compensation) so that recruitment (eggs × survival) will not fall off rapidly during a stock decline and will hence tend to stop the decline. Some stocks have shown recruitment failure after severe decline, possibly associated with changes in feeding interactions that are becoming known as 'cultivation/depensation' effects[89]. According to this phenomenon, adult predatory fish (such as cod) can control the abundance of potential predators and competitors of their juvenile offspring, but this control lost when these predatory fish become scarce. This may well lead to alternate stable states of ecosystems, which has severe implications for fisheries management[90].

Jointly, these four broad problems imply a need to complement our single-species assessments by elements drawn from ecology, that is, to move towards ecosystem-based management. What this will consist of is not clearly established, although it is likely that, while retaining single-species models at its core, it will have to explicitly include trophic interaction between species[91], habitat impacts of various gears[50], and a theory for dealing with the optimum placement and size of marine reserves (see main text). Ecosystem-based management will have to rely on the principles of, and lessons learnt from, single-species stock assessments, especially regarding the need to limit fishing mortality. It will certainly not be applicable in areas where effort or catch limits derived from single-species approaches cannot be implemented in the first place.

Throughout the 1950s and 1960s, this huge increase of global fishing effort led to an increase in catches (Fig. 1) so rapid that their trend exceeded human population growth, encouraging an entire generation of managers and politicians to believe that launching more boats would automatically lead to higher catches.

The first collapse with global repercussions was that of the Peruvian anchoveta in 1971–1972, which is often perceived as having been caused by an El Niño event. However, much of the available evidence, including actual catches (about 18 million tonnes[22]) exceeding officially reported catches (12 million tonnes), suggest that overfishing was implicated as well. But attributing the collapse of the Peruvian anchoveta to 'environmental effects' allowed business as usual to continue and, in the mid-1970s, this led to the beginning of a decline in total catches from the North Atlantic. The declining trend accelerated in the late 1980s and early 1990s when most of the cod stocks off New England and eastern Canada collapsed, ending fishing traditions reaching back for centuries[23].

Despite these collapses, the global expansion of effort continued[14] and trade in fish products intensified to the extent that they have now become some of the most globalized commodities, whose price increased much faster than the cost of living index[24]. In 1996, FAO published a chronicle of global fisheries showing that a rapidly increasing fraction of world catches originate from stocks that are depleted or collapsed, that is, 'senescent' in FAO's parlance[25]. Yet,

Box 2
Trophic levels as indicators of fisheries impacts

There are many ways ecosystems can be described, for example in terms of the information that is exchanged as their components interact, or in terms of size spectra. But perhaps the most straightforward way to describe ecosystems is in terms of the feeding interactions among their component species, which can be done by studying their stomach contents. A vast historical database of such published studies exists[27], which has enabled a number of useful generalizations to be made for ecosystem-based management of fisheries. One of these is that marine systems have herbivores (zooplankton) that are usually much smaller than the first-order carnivores (small fishes), which are themselves consumed by much larger piscivorous fishes, and so on. This is a significant difference from terrestrial systems, where, for example, wolves are smaller than the moose they prey on. Another generalization is that the organisms we have so far extracted from marine food webs have tended to play therein roles very different from those played by the terrestrial animals we consume. This can be shown in terms of their 'trophic level' (TL), defined as 1 + the mean TL of their prey.

Thus, in marine systems we have: algae at the bottom of the food web (TL = 1, by definition); herbivorous zooplankton feeding on the algae (TL = 2); large zooplankton or small fishes, feeding on the herbivorous zooplankton (TL = 3); large fishes (for example, cod, tuna and groupers) whose food tends to be a mixture of low- and high-TL organisms (TL = 3.5–4.5).

The mean TL of fisheries landings can be used as an index of sustainability in exploited marine ecosystems. Fisheries tend at first to remove large, slower-growing fishes, and thus reduce the mean TL of the fish remaining in an ecosystem. This eventually leads to declining trends of mean TL in the catches extracted from that ecosystem, a process now known as 'fishing down marine food webs'[29].

Declining TL is an effect that occurs within species as well as between species. Most fishes are hatched as tiny larvae that feed on herbivorous zooplankton. At this stage they have a TL of about 3, but this value increases with size, especially in piscivorous species. Because fisheries tend to reduce the size of the fish in an exploited stock, they also reduce their TL.

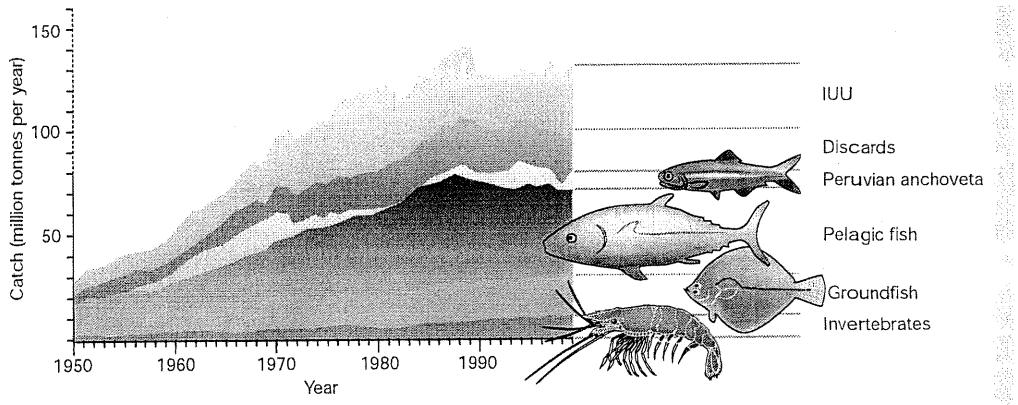

Figure 1 Estimated global fish landings 1950–1999. Figures for invertebrates, groundfish, pelagic fish and Peruvian anchoveta are from FAO catch statistics, with adjustment for over-reporting from China[26]. Fish caught but then discarded were not included in the FAO landings; data relate to the early 1990s[83] were made proportional to the FAO landings for other periods. Other illegal, unreported or unregulated (IUU) catches[65] were estimated by identifying, for each 5-year block, the dominant jurisdiction and gear use (and hence incentive for IUU)[84]; reported catches were then raised by the percentage of IUU in major fisheries for each 5-year block. The resulting estimates of IUU are very tentative (note dotted *y*-axis), and we consider that complementing landings statistics with more reliable estimates of discards and IUU is crucial for a transition to ecosystem-based management.

global catches seemed to continue, increasing through the 1990s according to official catch statistics. This surprising result was explained recently when massive over-reporting of marine fisheries catches by one single country, the People's Republic of China, was uncovered[26]. Correcting for this showed that reported world fisheries landings have in fact been declining slowly since the late 1980s, by about 0.7 million tonnes per year.

Fisheries impact on ecosystem and biodiversity

The position within ecosystems of the fishes and invertebrates landed by fisheries can be expressed by their trophic levels, expressing the number of steps they are removed from the algae (occupying a trophic level of 1) that fuel marine food webs (Box 2). Most food fishes have trophic levels ranging from 3.0 to 4.5, that is, from sardines feeding on zooplankton to large cod or tuna feeding on miscellaneous fishes[27]. Thus, the observed global decline of 0.05–0.10 trophic levels per decade in global fisheries landings (Fig. 2) is extremely worrisome, as it implies the gradual removal of large, long-lived fishes from the ecosystems of the world oceans. This is perhaps most clearly illustrated by a recent study in the North Atlantic showing that the biomass of predatory fishes (with a trophic level of 3.75 or more) declined by two-thirds through the second half to the twentieth century, even though this area was already severely depleted before the start of this time period[28].

It may be argued that so-called 'fishing down marine food webs' is both a good and an unavoidable thing, given a growing demand for fish[29]. Indeed, the initial ecosystem reaction to the process may be a release from predation, where cascading effects may lead to increased catches[30]. Such effects are, however, seldom observed in marine ecosystems[31,32], mainly because they do not function simply as a number of unconnected food chains. Rather, predators operate within finely meshed food webs, whose structure (which they help maintain) tends to support the production of their prey. Hence the concept of 'beneficial predation', where a predator may have a direct negative impact on its prey, but also an indirect positive effect, by consuming other predators and competitors of the prey[33] (and see Box 1). Thus, removing predators does not necessarily lead to more of their prey becoming available for humans. Instead, it leads to increases or outbursts of previously suppressed species, often invertebrates[30,34,35], some of which may be exploited (for example, squid or jellyfish, the latter a relatively new resource, exported to east Asia), and some outright noxious[36].

The principal, direct impact of fishing is that it reduces the abundance of target species. It has often been assumed that this does not impose any direct threat of species extinction as marine fish generally are very fecund and the ocean expanse is wide[37]. But the past few decades have witnessed a growing awareness that fishes can not only be severely depleted, but also be threatened with extinction through overexploitation[38]. Among commercially important species, those particularly at risk are species that are highly valued, large and slow to mature, have limited geographical range, and/or have sporadic recruitment[39]. There is actually little support, though, for the general assumption that the most highly fecund marine fish species are less susceptible to overexploitation; rather it seems that this perception is flawed[40]. Fisheries may also change the evolutionary characteristics of populations by selectively removing the larger, fast-growing individuals, and one important research question is whether this induces irreversible changes in the gene pool[41]. Overall, this has implications for research, monitoring and management, and it points to the need for incorporating ecological consideration in fisheries management[42,43], as exemplified by the development of quantitative guidelines to avoid local extinctions[44].

Another worrisome aspect of fishing down marine food webs is that it involves a reduction of the number and length of pathways linking food fishes to the primary producers, and hence a simplification of the food webs. Diversified food webs allow predators to switch between prey as their abundance fluctuates[45], and hence to compensate for prey fluctuations induced by environmental fluctuations[46]. Fisheries-induced food-web simplification, combined with the drastic fisheries-induced reduction in the number of year classes in predator populations[47,48], makes their reduced biomass strongly dependent of annual recruitment. This leads to increasing variability, and to lack of predictability in population sizes, and hence in predicted catches. The net effect is that it will increasingly look like environmental fluctuations impact strongly on fisheries resources, even where they originally did not. This resolves, if in a perverse way, the question of the relative importance of fisheries and environmental variability as the major driver for changes in the abundance of fisheries resources[49] (Fig. 3).

It seems unbelievable in retrospect, but there was a time when it was believed that bottom trawling had little detrimental impact, or even a beneficial impact, on the sea bottom that it 'ploughed'. Recent research shows that the ploughing analogy is inappropriate and that if an analogy is required, it should be that of clear cutting forests in the course of hunting deer. Indeed, the productivity of the benthic organisms at the base of food webs leading to food fishes is seriously impacted by bottom trawling[50], as is the survival of their juveniles when deprived of the biogenic bottom structure destroyed by that

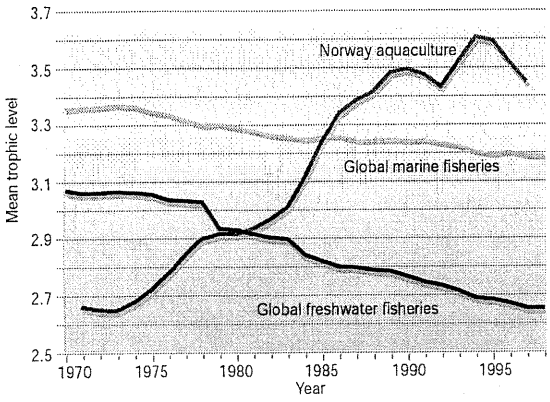

Figure 2 Fisheries, both marine and freshwater, are characterized by a decline of the mean trophic level in the landings, implying an increased reliance on organisms low in food webs (data from FishBase[27], with Peru/Chile excluded owing to the dominance of Peruvian anchoveta; see also Fig. 1). Freshwater fisheries have lower trophic level values overall, indicating an earlier onset of the 'fishing down' phenomenon[29]. The trend is inverted in non-Asian aquaculture, whose production consists increasingly of piscivorous organisms, as illustrated here for Norway (a major producer, yet representative country)[85].

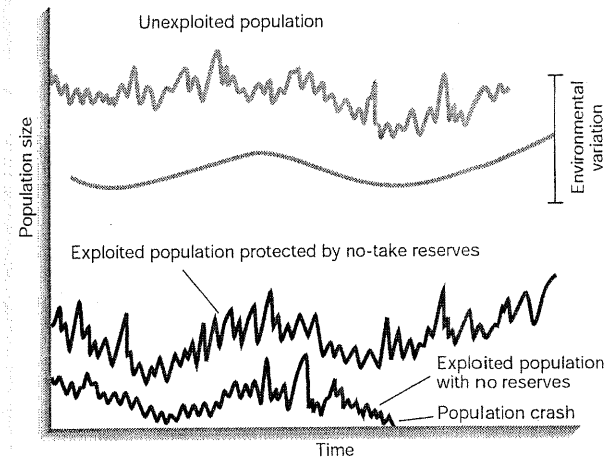

Figure 3 Schematic representation of the effects of some environmental variation on an unexploited, exploited but protected, and exploited but unprotected fish population. This illustrates how protection through a marine reserve (and/or stock rebuilding) can mitigate the effects of environmental fluctuations, including 'regime shifts'[49]. (Graph from J. Jackson, personal communication.)

form of fishing[51]. Hence, given the extensive coverage of the world's shelf ecosystems by bottom trawling[52], it is not surprising that generally longer-lived, demersal (bottom) fishes have tended to decline faster than shorter-lived, pelagic (open water) fishes, a trend also indicated by changes in the ratio of piscivorous (mainly demersal) to zooplanktivorous (mainly pelagic) fishes[53].

It is difficult to fully appreciate the extent of the changes to ecosystems that fishing has wrought, given shifting baselines as to what is considered a pristine ecosystem[1,54] and continued reliance on single-species models (Box 1). These changes, often involving reductions of commercial fish biomasses to a few per cent of their pre-exploitation levels, prevent us taking much guidance from the concept of sustainability, understood as aiming to maintain what we have[3,8]. Rather, the challenge is rebuilding the stocks in question.

Reducing fishing capacity

There is widespread awareness that increases in fishing-fleet capacity represent one of the main threats to the long-term survival of marine capture-fishery resources, and to the fisheries themselves[55,56]. Reasons advanced for the overcapitalization of the world's fisheries include: the open-access nature of many fisheries[57]; common-pool fisheries that are managed non-cooperatively[58,59]; sole-ownership fisheries with high discount rates and/or high price-to-cost ratios[60]; the increasing replacement of small-scale fishing vessels with larger ones[55]; and the payment of subsidies by governments to fishers[61], which generate 'profits' even when resources are overfished.

This literature shows that fishing overcapacity is likely to build up not only under open access[62], but also under all forms of property regimes. Subsidies, which amount to US$2.5 billion for the North Atlantic alone, exacerbate the problems arising from the open access and/or 'common pool' aspects of capture fisheries, including fisheries with full-fledged property rights[61,63].

Even subsidies used for vessel decommissioning schemes can have negative effects. In fact, decommissioning schemes can lead to the intended reduction in fleet size only if vessel owners are consistently caught by surprise by those offering this form of subsidy. As this is an unlikely proposition, decommissioning schemes often end up providing the collaterals that banks require to underwrite fleet modernizations. Additionally, in most cases, it is not the actual vessel that is retired, but its licence. This means that 'retired' vessels can still be used to catch species without quota (so-called 'under-utilized resources', which are often the prey of species for which there is a quota), or deployed along the coast of some developing country, the access to which may also be subsidized[18]. Clearly, the decommissioning schemes that will have to be implemented if we are ever to reduce overcapacity will have to address these deficiencies if they are not to end up, as most have so far, in fleet modernization and increased fishing mortality.

It is clear that a real, drastic reduction of overcapacity will have to occur if fisheries are to acquire some semblance of sustainability. The required reductions will have to be strong enough to reduce F by a factor of two or three in some areas, and even more in others. This must involve even greater decreases in f, because catches can be maintained in the face of dwindling biomasses by increasing q (and hence F; see definitions above), even when nominal effort is constant. Indeed, this is the very reason behind the incessant technological innovation in fisheries, which now relies on global positioning systems and detailed maps of the sea bottom to seek out residual fish concentrations previously protected by rough terrain. This technological race, and the resulting increase in q, is also the reason why fishers often remain unaware of their own impacts on the resource they exploit and object so strongly to scientists' claims of reductions in biomass.

If fleet reduction is done properly, it should result in an increase in net benefits ('rent') from the resources, as predicted by the basic theory of bioeconomics[62]. This can be used, via taxation of the rent gained by the remaining fishers, to ease the transition of those who had to stop fishing. This would contrast with the present situation, where taxes from outside the fisheries sector are used, in form of subsidies, to maintain fishing at levels that are biologically unsustainable, and which ultimately lead to the depletion and collapse of the underlying resources.

Biological constraints to fisheries and aquaculture

Perhaps the strongest factor behind the politicians' use of tax money to subsidize non-sustainable, even destructive fisheries, and its tacit support by the public at large, is the notion that, somehow, the oceans will yield what we need — just because we need it. Indeed,

demand projections generated by national and international agencies largely reflect present consumption patterns, which by some means the oceans ought to help us maintain, even if the global human population were to double again. Although much of the deep ocean is indeed unexplored and 'mysterious', we know enough about ocean processes to realize that its productive capacity cannot keep up with an ever-increasing demand for fish.

Just as a tropical scientist might look at the impressive expanse of Canada and assume that this country has boundless potential for agricultural production, unaware that in reality only the thin sliver of land along its southern border (5%) is arable, we terrestrial aliens have assumed that the expanse and depths of the world's oceans will provide for us in the ways that its more familiar coastal fringes have. But this assumption is very wrong. Of the 363 million square kilometres of ocean on this planet, less than 7% — the continental shelves — are shallower than 200 m, and some of this shelf area is covered by ice. Shelves generate the biological production supporting over 90% of global fish catches, the rest consisting of tuna and other oceanic organisms that gather their food from the vast, desert-like expanse of the open oceans.

The overwhelming majority of shelves are now 'sheltered' within the exclusive economic zones (EEZ) of maritime countries, which also include all coral reefs and their fisheries (Box 3). According to the 1982 United Nations Convention on the Law of the Sea[64], any country that cannot fully utilize the fisheries resource of its EEZ must make this surplus available to the fleet of other countries. This, along with eagerness for foreign exchange, political pressure[18] and illegal fishing[65], has led to all of the world's shelves being trawled for bottom fish, purse-seined for pelagic fishes and illuminated to attract and catch squid (to the extent that satellites can map the night time location of fishing fleets as well as that of cities). Overall, about 35% of the primary production on the world's shelves is required to sustain the fisheries[66], a figure similar to the human appropriation of terrestrial primary production[67].

The constraints to fisheries expansion that this implies, combined with the declining catches alluded to above, have led to suggestions that aquaculture should be able to bridge the gap between supply and demand. Indeed, the impressive recent growth of reported aquaculture is often cited as evidence of the potential of that sector to meet the growing demand for fish, or even to 'feed the world'.

Three lines of argument suggest that this is unlikely. The first is that the rapidly growing global production figures underlying this documented growth are driven to a large extent by the People's Republic of China, which reported 63% of world aquaculture production in 1998. But it is now known that China not only over-reports its marine fisheries catches, but also the production of many other sectors of its economy[68]. Thus, there is no reason to believe that global aquaculture production in the past decades has risen as much as officially reported.

Second, modern aquaculture practices are largely unsustainable: they consume natural resources at a high rate and, because of their intensity, they are extremely vulnerable to the pollution and disease outbreaks they induce. Thus, shrimp aquaculture ventures are in many cases operated as slash-and-burn operations, leaving devastated coastal habitats and human communities in their wake[69,70].

Third, much of what is described as aquaculture, at least in Europe, North America and other parts of the developed world, consists of feedlot operations in which carnivorous fish (mainly salmon, but also various sea bass and other species) are fattened on a diet rich in fish meal and oil. The idea makes commercial sense, as the farmed fish fetch a much higher market price than the fish ground up for fish meal (even though they may consist of species that are consumed by people, such as herring, sardine or mackerels, forming the bulk of the pelagic fishes in Fig. 1). The point is that operations of this type, which are directed to wealthy consumers, use up much more fish flesh than they produce, and hence cannot replace capture fisheries, especially in developing countries, where very few can afford imported smoked salmon. Indeed, this form of aquaculture represents another source of pressure on wild fish populations[71].

Box 3

Sustainable coral reef fisheries: an oxymoron?

Globally, 75% of coral reefs occur in developing countries where human populations are still increasing rapidly. Although coral reefs account for only 0.1% of the world's ocean, their fisheries resources provide tens of millions of people with food and livelihood[92]. Yet, their food security, as well as other ecosystem functions they provide, is threatened by various human activities, many of which, including forest and land management, are unrelated to fishing[93].

It has often been assumed that the high levels of primary productivity reported for coral reefs imply high fisheries yields[94]. However, the long-held notion that coral reef fishes are 'fast turnover' species, capable of high productivity, is being increasingly challenged[95]. Yield estimates for coral reefs vary widely, ranging from 0.2 to over 40 tonnes km^{-2} yr^{-1} (ref. 96), depending on what is defined as coral reef area, and as coral reef fishes[96,97]. Taking yields from the central part of this range (5–15 tonnes km^{-2} yr^{-1}) and the most comprehensive reef-area estimate available[92], we derive an estimate for total global annual yield of 1.4–4.2 million tonnes. Although these estimates represent only 2–5% of global fisheries catches, they provide an important, almost irreplaceable, source of animal protein to the populations of many developing countries[96].

Clearly, maintaining the biodiversity that is a characteristic of healthy reefs is the key to maintaining sustainable reef fisheries. Yet coral reefs throughout the world are being degraded rapidly, especially in developing countries[93]. Concerns regarding overexploitation of reef fisheries are widespread[1,75,98]. The entry of new, non-traditional fishers into reef fisheries has led to intense competition and the use of destructive fishing implements, such as explosives and poisons, a process known as 'malthusian overfishing'[21].

Another major problem is the growing international trade for live reef fish[99], often associated with mobile fleets using cyanide fishing, and targeting species that often have limited ranges of movements[100]. This leads to serial depletion of large coral reef fishes, notably the humphead wrasse (*Cheilinus undulatus* Labridae), groupers (Serranidae) and snappers (Lutjanidae), and to reefs devastated by the cyanide applications.

These fisheries, which destroy the habitat of the species upon which they rely, are inherently unsustainable. It can be expected that they will have to cease operating within a few decades, that is, before warm surface waters and sea-level rise overcome what may be left of the world's coral reefs.

Perspectives

We believe the concept of sustainability upon which most quantitative fisheries management is based[72] to be flawed, because there is little point in sustaining stocks whose biomass is but a small fraction of its value at the onset of industrial-scale fishing. Rebuilding of marine systems is needed, and we foresee a practical restoration ecology for the oceans that can take place alongside the extraction of marine resources for human food. Reconciling these apparently dissonant goals provides a major challenge for fisheries ecologists, for the public, for management agencies and for the fishing industry[73]. It is important here to realize that there is no reason to expect marine resources to keep pace with the demand that will result from our growing population, and hopefully, growing incomes in now impoverished parts of the world, although we note that fisheries designed to be sustainable in a world of scarcity may be profitable.

We argued in the beginning of this review that whatever semblance of sustainability fisheries in the past might have had was due

to their inability to cover the entire range inhabited by the wildlife species that were exploited, which thus had natural reserves. We further argued that the models used traditionally to assess fisheries, and to set catch limits, tend to require explicit knowledge on stock status and total withdrawal from stocks, that is, knowledge that will inherently remain imprecise and error prone. We also showed that generally overcapitalized fisheries are leading, globally, to the gradual elimination of large, long-lived fishes from marine ecosystems, and their replacement by shorter-lived fishes and invertebrates, operating within food webs that are much simplified and lack their former 'buffering' capacity.

If these trends are to be reversed, a huge reduction of fishing effort involving effective decommissioning of a large fraction of the world's fishing fleet will have to be implemented, along with fisheries regulations incorporating a strong form of the precautionary principle. The conceptual elements required for this are in place, for example, in form of the FAO Code of Conduct for Responsible Fisheries[74], but the required political will has been lacking so far, an absence that is becoming more glaring as increasing numbers of fisheries collapse throughout the world, and catches continue to decline.

Given the high level of uncertainty facing the management of fisheries, which induced several collapses, it has been suggested by numerous authors that closing a part of the fishing grounds would prevent overexploitation by setting an upper limit on fishing mortality. Marine protected areas (MPAs), with no-take reserves at their core, combined with a strongly limited effort in the remaining fishable areas, have been shown to have positive effects in helping to rebuild depleted stocks[75–77]. In most cases, the successful MPAs were used to protect rather sedentary species, rebuild their biomass, and eventually sustain the fishery outside the reserves by exporting juveniles or adults[75]. Although migrating species would not benefit from the local reduction in fishing mortality caused by an MPA[78,79], the MPA would still help some of these species by rebuilding the complexity of their habitat destroyed by trawling, and thus decrease mortality of their juveniles[80]. Enforcement of the no-take zones within MPAs would benefit from the application of high technology (for example, satellite monitoring of fishing vessels), presently used mainly to increase fishing pressure.

There is still much fear among fisheries scientists, especially in extra-tropical areas, that the export of fish from such reserves would not be sufficient to compensate for the loss of fishing ground[81]. Although we agree that marine reserves are no panacea, the present trends in fisheries, combined with the low degree of protection presently afforded (only 0.01% of the world's ocean is effectively protected), virtually guarantee that more fish stocks will collapse, and that these collapses will be attributed to environmental fluctuations or climate change (Fig. 3). Moreover, many exploited fish populations and eventually fish species will become extinct. MPAs that cover a representative set of marine habitats should help prevent this, just like forest and other natural terrestrial habitats have enabled the survival of wildlife species which agriculture would have otherwise rendered extinct.

Focused studies on the appropriate size and location of marine reserves and their combination into networks, given locale-specific oceanographic conditions, should therefore be supported. This will lead to the identification of reserve designs that would optimize export to adjacent fished areas, and which could thus be offered to the affected coastal and fisher communities, whose consent and support will be required to establish marine reserves and restructure the fisheries[8]. The general public could also be involved, through eco-labelling and other market-driven schemes, and through support for conservation-orientated non-government organizations, which can complement the activities of governmental regulatory agencies.

In conclusion, we think that the restoration of marine ecosystems to some state that existed in the past is a logical policy goal[82]. There is still time to achieve this, and for our fisheries to be put on a path towards sustainability. □

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UPDATE ON OTHER MARINE RESERVES PROCESSES

Situation: State level processes for considering marine reserves in ocean areas are ongoing in Oregon and California. The Oregon process is proceeding through Oregon's Ocean Policy Advisory Council and the current phase will culminate with a set of recommendations to the Governor. The California process is proceeding under California's Marine Life Protection Act. To date, processes in Washington have focused primarily on Puget Sound. Alaska has also begun a marine protected area (MPA) planning process (Exhibit E.2.a, Attachment 1). The National Marine Sanctuary Program is continuing its review of the sanctuary management plans for Cordell Bank, Gulf of the Farallones, and Monterey Bay National Marine Sanctuaries. The Olympic Coast National Marine Sanctuary (OCNMS) intends to review its sanctuary management plan, however, the OCNMS staff indicates their review will lag the California sanctuary processes by a few years. The National Marine Protected Areas Center (a NOAA interagency coordinating body created under the Executive Order 13158 on MPAs) is cosponsoring a Pacific MPA Clearing house [PacificMPA.org] and will be convening periodic meetings of federal, state, and tribal agency program staff engaged in MPA planning on the West Coast (Exhibit E.2.a, Attachment 2).

Last year, the Council requested approximately $1.5 million per year over three years to support Council led consideration of marine reserves for the West Coast. The Executive Director is continuing to pursue funding to support a more active role for the Council in processes for considering marine reserves and is in ongoing discussion with the NOAA National Ocean Service and NOAA Fisheries on this issue.

Council Task:

1. Discussion and direction to staff as appropriate.

Reference Materials:

1. Alaska Department of Fish and Game Marine Protected Area Program web page on their Marine Protected Area Task Force Report (Exhibit E.2.a, Attachment 1).
2. E-mail message on Pacific MPA Clearing House from Charlie Wahle and George Leonard, June 25, 2002 (Exhibit E.2.a, Attachment 2).
3. Public Comment (Exhibit E.2.c, Public Comment)

Agenda Order:

a. Agendum Overview — Jim Seger
b. Reports and Comments of Advisory Bodies
c. Public Comment
d. Council Discussion

Groundfish Fishery Strategic Plan (GFSP) Consistency Analysis

The GFSP calls for the Council to "use marine reserves as a fishery management tool that contributes to groundfish conservation and management goals, has measurable effects, and is integrated with other fishery management approaches."

PFMC
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