



Results of the 2018 Town Hall Meetings for the Ocean Resources Enhancement and Hatchery Program

Submitted to:
Marine Region
California Department of Fish and Wildlife
Los Alamitos, California
Project no. P1770013

Submitted By:
California Sea Grant Extension Program
Scripps Institution of Oceanography
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19 December 2018

Publication No. CASG-18-027

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Project Summary



One of three OREHP town hall meetings held in June 2018. Port of San Diego Administration Building, San Diego, CA.

Following the recently completed Ocean Resources Enhancement and Hatchery Program (OREHP) Evaluation Report (hereafter “Evaluation”; California Sea Grant 2017), input from public stakeholders of the OREHP was needed to inform recommendations and decisions to be made by the California Department of Fish and Wildlife (CDFW) with advice from a 10-member Ocean Resources Enhancement Advisory Panel (OREAP) regarding the future of the program. The goal of this project was, therefore, to gather public opinion on the social values and future direction of the OREHP from a diversity of stakeholder groups in Southern California.

This goal was met by (1) developing materials for soliciting and collecting informed public input; (2) gathering public input from a diversity of stakeholder groups throughout Southern California by (a) administering anonymous surveys and (b) encouraging public comment at three town hall meetings, and (c) issuing a call for post-town hall public comment for stakeholders who could not attend the meetings; and (3) summarizing public input (this report).

Three town hall meetings, conducted in June 2018 in Goleta, San Pedro and San Diego, California, hosted 118 attendees, of which 46 provided verbal public comment and 101 completed anonymous surveys. An additional 77 people submitted post-town hall comments by phone, mail and email throughout June and July 2018. Since the people who attended the town hall meetings were generally different than those who provided post-town hall comments, information from surveys completed during the town halls and post-town hall comments was combined and used quantitatively when feasible (n=178 participants). The open-ended public comments delivered verbally by participants at town hall meetings and post-town hall comments were used qualitatively to provide a deeper understanding of the motivations and opinions underlying responses (n=123 participants who provided sets of open-ended comments).

All responses and comments were organized into seven major stakeholder groups. Over half of the responses (n=178) were from the recreational fishing stakeholder group, which is reflective of the proportionally large financial and social contributions of group to the OREHP. One third of responses were from the K-12 education group, the main benefactor of the OREHP's educational efforts (e.g., Seabass in the Classroom). The rest of the responses came from the other five groups, including commercial fishing (6%), environmental and/or educational non-profits (3%), academic science (3%), non-consumptive recreation (0.5%), and aquaculture industry (0.5%).

The specific preferences for the future of the OREHP and likely motivations varied among the stakeholder groups. Recreational fishing, K-12 education, and academic science participants were overwhelmingly in support of continuing the OREHP's White Seabass (*Atractoscion nobilis*) enhancement program and/or adding another enhancement species, usually California Halibut (*Paralichthys californicus*). Most people in these groups were not driven by concerns about personal income, but rather had personal connections to the OREHP due to direct involvement, and valued the hands-on education experiences, scientific discoveries, and stewardship opportunities the OREHP provided. The recreational fishing group additionally valued the opportunities for leisure and recreation provided by the OREHP, and harbored skepticism about the recent Evaluation (California Sea Grant 2017), which found a 0.25% average contribution of cultured White Seabass to commercial and recreational catches in California.

Discontinuation of the OREHP was favored by the commercial fishing group and was suggested by 7-20% of participants in the non-profit, K-12 education and recreational fishing groups. Most who preferred discontinuation called for continued collection of Ocean Enhancement Stamp funds to support other efforts that benefit fisheries and the ocean, including research on wild stock dynamics and the efficacy of management actions (e.g., gear bans, updated quotas), stock assessments, and regional fishery management efforts (e.g., collaboration with Mexico). Many who preferred discontinuation valued the scientific discoveries and stewardship opportunities that the OREHP has provided. Consistent with this, the commercial fishing group suggested using funds to collaborate with fishing communities to collect needed fisheries and environmental data, improve management effectiveness, address other ocean-related issues and/or, if an enhancement program continues, help assess hatchery fish contribution rates.

Although the scientific discoveries of the OREHP were valued by all groups, there was a disconnect between the population enhancement science, or the scientific concepts and approaches underlying the Evaluation, and both the K-12 science education and community involvement in growout and other operations. Largely lacking was public exposure to fisheries and population biology, the sampling designs and approaches needed to address various research questions, and the interpretation of scientific results. These concepts and their applications seemed to underlie many of the concerns expressed about the Evaluation results.

An underlying distrust of the CDFW also emerged, which was likely fueled by the skepticism surrounding the Evaluation data and findings, the need for strengthened communication between CDFW, program partners and the public, and a clearer definition of program leadership. Therefore, this report recommends the development and implementation of an inclusive, open process for making decisions about the OREHP's future.

**Ocean Resources Enhancement and Hatchery Program
Results of the 2018 Town Hall Meetings**

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Ocean Resources Enhancement and Hatchery Program Results of the 2018 Town Hall Meetings

Introduction

The Ocean Resources Enhancement and Hatchery Program (OREHP) was established in 1983 as a California statute in response to depressed landings of certain recreationally- and commercially-valuable fish species. The goal of the legislation is to investigate the economic and ecological feasibility of using cultured fish to enhance wild populations. Funding for the OREHP comes from the California Ocean Enhancement Stamp and the Federal Sportfish Restoration Act. The California Department of Fish and Wildlife (CDFW) administers the OREHP with the advice and assistance of the 10-member Ocean Resources Enhancement Advisory Panel (OREAP). The focus of the OREHP has mostly been on the enhancement of wild populations of White Seabass (*Atractoscion nobilis*) through culture and growout. Hubbs-SeaWorld Research Institute (HSWRI) has been the main contractor since 1984.

There was no formal assessment of the OREHP until the 2015-2017 independent evaluation (Evaluation), facilitated by California Sea Grant (CASG). The Evaluation was conducted by an independent Science Advisory Committee (SAC) made up of experts in fish pathology, fish genetics, fish population biology, aquaculture, environmental quality, marine stocking, as well as representatives from the California Coastal Commission, CDFW and the OREAP. The SAC was assisted by two expert sub-panels, one to help assess the genetics and, the other, the population enhancement aspects of the Evaluation. Both CDFW and HSWRI provided the information and data that was analyzed and interpreted by the SAC and sub-panels. Report drafts were reviewed by CDFW and HSWRI (for factual accuracy), and the final report was released on 01 February 2018.

The final decision about the future of the OREHP is the responsibility of CDFW, with advice and assistance from the OREAP. In addition to the Evaluation (California Sea Grant 2017), CDFW wanted input on the public's preferences for the future of the OREHP to inform discussions and decisions. In response, CDFW contracted and worked with CASG to coordinate a series of town hall meetings, to collect information via anonymous survey and public comment, and to solicit public input via post-town hall correspondence (for those who could not attend the meetings).

These meetings recapped the main conclusions of the Evaluation, namely that while the OREHP has contributed greatly to our understanding of marine enhancement science and techniques, it has not made significant contributions to the White Seabass fisheries. The OREHP's contributions include research discoveries, development (and constant improvements) of hatchery infrastructure and methods, development of tagging methods, and collection of enough data to evaluate the OREHP. There have also been substantial education and outreach benefits, and no adverse environmental impacts under production levels to date. The Evaluation concludes that the OREHP has resulted in a low, 0.25% average contribution of

cultured White Seabass to commercial and recreational catches in California. This contribution was calculated independent of sampling effort (Table 1).

Table 1. The values and formulas associated with the White Seabass enhancement variables discussed in the OREHP Evaluation Report (California Sea Grant 2017). WSB= White Seabass.

Variable	Value	Formula
Proportional contribution of stocked fish to the fishery catch (observed)	0.26%	= # tagged (stocked) legal-sized WSB detected / total # of legal-sized WSB scanned (Averaged across 2000-2011)
Proportional contribution of stocked fish to the fishery catch (predicted)	0.25%	= Contribution of stocked fish to the total catch in the fisheries enhancement model (See Evaluation Section 4.6.1 for details)
Recapture ratio (observed)	0.036%	= # stocked WSB landed in the fishery (2004-2015) / # hatchery WSB stocked (2000-2011). The four year offset accounts for the fact that stocked fish need about four years to enter the fishery
# stocked WSB landed in the fishery	Variable between years, average 53 for 2004-2015	= Proportional contribution of stocked fish to the catch * (Total weight of California landings of WSB [pounds] / 20 pounds average weight per WSB landed)
Recapture ratio of stocked juveniles in research gill nets (observed)	~0.02%	= # hatchery WSB caught in research gillnets / # hatchery WSB released (See Evaluation Fig. 4.2)
Proportional contribution of stocked juveniles in research gill nets (observed)	Variable between years, 7.5 - 27.7% for 2012-2016	= # hatchery WSB caught in research gillnets / total # of WSB caught in gillnets (See Evaluation Table 4.4)

Low hatchery contribution rates likely reflect low post-release survival rates, which are thought to be due to a number of factors, including fish health and fitness issues, and uncertainty about optimal release strategies. Other challenges with the OREHP include a need to strengthen communication and transparency among CDFW, the OREAP, the OREHP contractors, the OREHP stakeholders, and the public; static base funding levels that have not covered costs; and a focus on a species whose population responds strongly to environmental and management influences and therefore may not be the ideal candidate for enhancement.

The Evaluation Report provides three general alternatives for the future of the OREHP and recommendations about how to choose an alternative. The first recommended step was to engage the public in the decision process, which was the focus of this effort. Also recommended was an assessment of the ecological, economic and social trade-offs between enhancement and no enhancement (influences of conventional fishery management and influences of the environment) for White Seabass and other candidate species. Information solicited from the public, therefore, centered around the public's involvement with the OREHP, the value of OREHP to them, and preferences for the three future alternatives: continue the OREHP with White Seabass, continue the OREHP with another species, or discontinue the OREHP.

Project Goal and Objectives

The goal of this project was to gather public opinion on the social values and potential direction of the OREHP from a diversity of stakeholder groups.

This goal was met by accomplishing **three specific objectives**:

Objective 1. Recruitment, informational and solicitation materials were prepared for distribution to the public and for use at town hall meetings to aid in collection of informed public insights.

Objective 2. Public feedback was gathered from a diversity of stakeholder groups throughout Southern California by (a) conducting one town hall meeting each in Goleta/Santa Barbara, San Pedro/Los Angeles, and San Diego, and (b) issuing a call for public comment via CDFW blog and website, email and telephone calls for stakeholders who could not attend the meetings.

Objective 3. The information gathered from town hall meetings and post-town hall correspondence was compiled and synthesized.

Approaches

Objective 1. Materials for collecting informed public input. Between 01 April - 30 May 2018, CASG prepared a presentation (Appendix 1) and finalized an open-access book chapter (Talley et al. *In press*) that provided an overview of the OREHP Evaluation process and key findings of the OREHP Evaluation in order to aid the public in informed decision making. In preparation for the town hall meetings, CASG developed (1) recruitment materials, including a meeting poster, event website, and social media kit (Appendix 2); (2) meeting materials, including sign-in sheets which were used to create a stakeholder contact list, and public comment cards; and (3) information gathering materials, including a written survey (Appendix 3), a set of discussion questions for facilitation, and a draft comment request message to solicit feedback from stakeholders who could not attend the town hall meetings.

Objective 2. Gathering public input. Throughout 01 June - 31 July 2018, CASG facilitated three CDFW-hosted town hall meetings that were held in the Santa Barbara (Goleta), Los Angeles (San Pedro) and San Diego areas. CASG secured accessible venues and developed and printed meeting materials (e.g., agenda, sign-in sheets, list of meeting rules, speaker request cards). CASG recruited a diversity of public stakeholder groups (e.g., recreational fishing, commercial fishing, commercial passenger fishing vessel businesses, environmental groups, industry-related organizations such as bait and tackle shops, etc.). CASG used direct communication with known interested groups, and notified the broader public via electronic notification using interested groups' networks, harbor and port networks, local media, and CASG networks.

During the town hall meetings, CASG presented an overview of the Evaluation process and findings; distributed, gathered and organized speaker request cards; moderated timed public speaker comments; moderated the open discussion; and distributed anonymous written surveys. After completion of the three town hall meetings, input was solicited from those who were unable to attend the meetings, and was received by letter, email message or by phone. All verbal discussions and timed public comments at the workshops were documented by five staff members from CASG and CDFW who were present at the town hall meetings.

These approaches allowed public input to be gathered in three ways: (i) anonymous surveys completed during the town hall meetings (Appendix 3); (ii) timed public comments during the town hall meetings; and (iii) post-town hall correspondence, such as letters, email messages, and phone calls, from those who could not attend the meetings. The types of information collected by each method are described in the next section (**Objective 3**).

Objective 3: Summarizing public input from across Southern California.

Information from the (i) anonymous surveys were entered verbatim into a database. The (ii) timed public comments were recorded into a database after combining and summarizing, by speaker name, five sets of notes that were taken by CASG and CDFW staff at the town hall meetings. The (iii) post-town hall correspondence was summarized, by participant name, and entered into a database.

Information from the (i) anonymous surveys was used quantitatively, such as for calculations of percent of participants from each stakeholder group or percent personally involved with the OREHP. Information from the (ii) timed public comments was used qualitatively, such as to understand the motivations underlying the stated preferences for the future of the OREHP, and opinions about the Evaluation findings. The information from the (iii) post-town hall correspondence was used both quantitatively, when it could be combined with the anonymous survey responses (e.g., to calculate percent of participants from each stakeholder group, and percent preferring continuation of the program), and qualitatively when it revealed motivations and opinions underlying preferences.

Since people who attended the town hall meetings did not submit post-town hall comments (with two exceptions), information from the (i) anonymous surveys (n=101 surveys) and (iii) post-town hall correspondence (n=77 sets of comments) was combined to increase sample size (n=178) for quantitative data analyses. Similarly, different people usually provided (ii) public comment at each of the three town hall meetings (n=46 sets of comments) and in (iii) post-town hall correspondence (verified since these methods were not anonymous; n=77 sets of comments), so these types of information were combined to increase amounts of qualitative information (n=123 sets of qualitative comments). The exception was that three people each contributed multiple sets of public and/or post-town hall comments; in these cases, all sets of comments were combined under that person's name and counted only once.

Preferences for the future of the OREHP, involvement in the OREHP, and level of trust in the science underlying the recent Evaluation were assessed for the whole community by calculating

percent response rates for each stakeholder group and then averaging the response rates across the seven groups. Within-group assessments used the percent response rates for each group. Because not all people responded to all of the anonymous survey questions or provided complete information in post-town hall comments, the numbers of samples (responses) for any given analysis may be lower than expected (i.e., $n < 178$). Similarly, some questions had multiple answers (e.g., most valued aspects of the program to the participant) resulting in higher numbers of replicates (responses) than expected (i.e., $n > 178$).

Results and Discussion

Participants

A total of 118 people came to the three town hall meetings in June 2018, with 27 attendees in Goleta, 39 attendees in San Pedro and 52 attendees in San Diego. Of the 118 attendees, 46 people provided verbal public comment, and 101 completed anonymous surveys. An additional 77 people submitted post-town hall comments by phone, mail and email throughout June and July 2018.

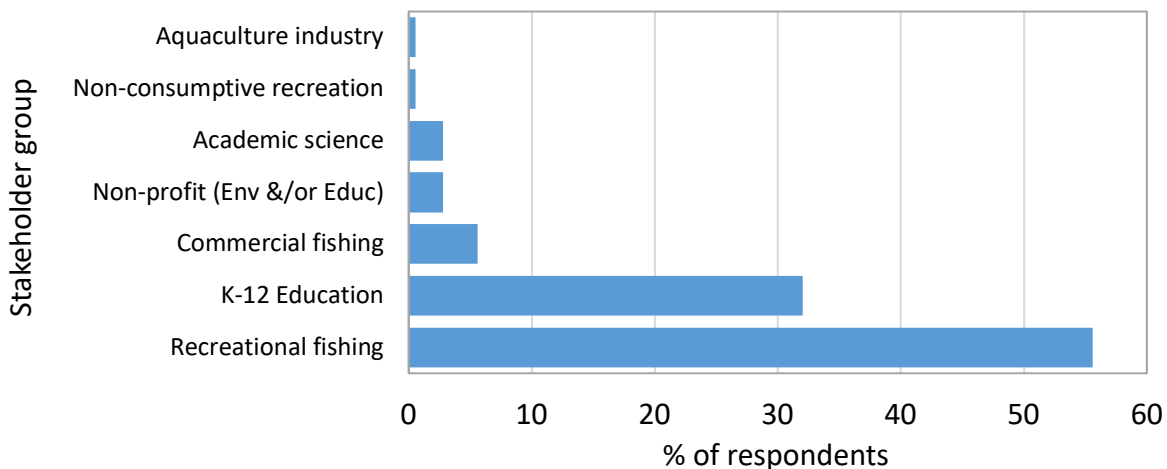


Fig. 1. Percent of all people providing comments on the future of the OREHP by stakeholder group (n=178 people).

Over half of the 178 respondents, defined as those who completed anonymous surveys at the town hall meetings (101 people) or who submitted comments via mail or phone (77 people), were from the recreational fishing stakeholder group (Fig. 1), including recreational anglers, CPFV owners, staff and customers, and related businesses (e.g., bait and tackle). This is reflective of this group's proportionally large social and financial contributions to the OREHP, with 95% of Ocean Enhancement Stamp funds coming from recreational purchases in 2018. Another third of respondents were from K-12 education (Fig. 1), including high school teachers, students and parents of students who have participated in the Seabass in the Classroom program and other OREHP-related educational activities accessed through school. People from the other five stakeholder groups made up the remaining ~12% of respondents, with 6% from the commercial fishing industry, 3% from environmental and/or educational non-profits,

another 3% from academic science, and 0.5% each from non-consumptive recreation and the aquaculture industry (one person each) (Fig. 1).

Although there was representation from the major stakeholder groups of the OREHP, there was a general lack of representation from *within* each group. Town hall meetings and solicitations of comments rely on people voluntarily taking time and effort to attend meetings and craft statements, usually biasing input toward those who have the strongest connections and/or the biggest stake in an issue (Lauber et al. 2012). While input from these people is important, it is also important to receive feedback from a relatively large proportion *and* a representative cross-section of each stakeholder group, in this case those who pay into the OREHP but who may have lacked the time or ability to participate in this public feedback process. For example, 99 people from the recreational fishing industry participated while there were 211,035 Recreational Ocean Enhancement Stamp holders in 2018 (~0.05% participation); and 10 people from commercial fishing participated while there were 978 Commercial Ocean Enhancement Stamp holders in 2018 (~1% participation).

Future of the OREHP: A whole community perspective

Out of the seven stakeholder groups, the most common preference (34% average response rate) was for continuation of the OREHP with White Seabass and the addition of a second enhancement species (Fig. 2), usually California Halibut (*Paralichthys californicus*). Discontinuation of the OREHP was the second most common choice (21% average response rate), with a preference for funds being applied to other management efforts that may help marine fisheries and ocean health, such as stock assessments.

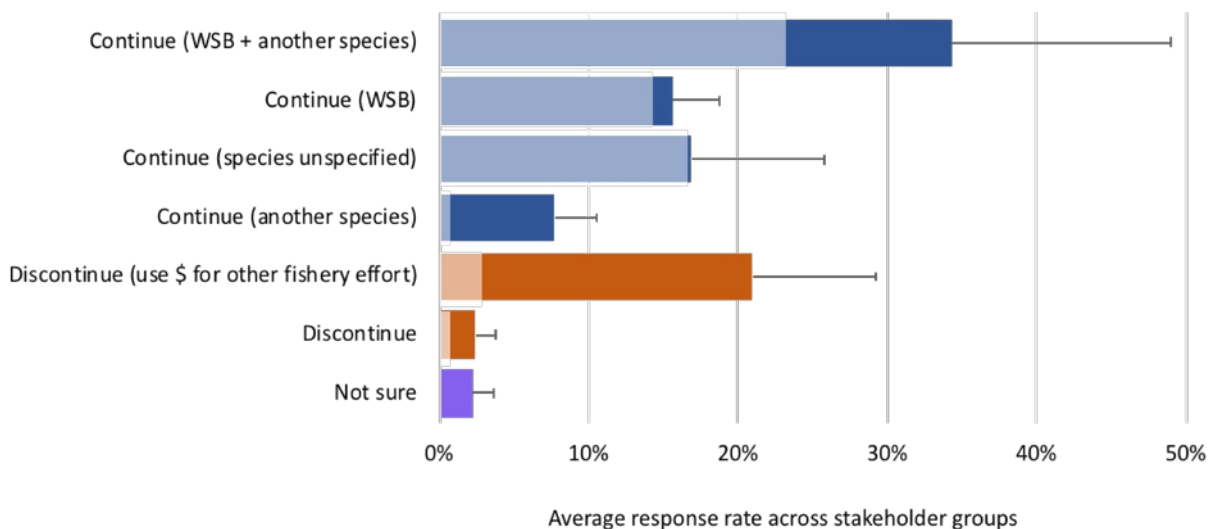


Fig. 2. Average (± 1 standard error) of stakeholder group response rates reflecting preferences for the future of the OREHP. The white overlay on bars indicate the average proportion of respondents who made that program choice *and* who were personally involved in the OREHP. N=5 stakeholder groups. Only groups with ≥ 5 responses were included in averages; aquaculture and non-consumptive groups, each with 1 participant who favored continuation, were not included in these averages.

Continuation with no species specified (17%), only White Seabass (16%), and only another species (7%; most often California Halibut) were also common choices (Fig. 2). About 2% of responses each were for discontinuation of the OREHP or expressed uncertainty (Fig. 2). The desire to continue with the OREHP tended to be, at least in part, related to the extent that the people directly participated in OREHP activities (Fig. 2). Collectively, 54% of responses were from people who had been personally involved with the OREHP and who favored continuation with White Seabass and/or another species (blue bars, Fig. 2). In comparison, 6% of responses were from people who had been personally involved with the OREHP and who favored discontinuation or expressed uncertainty (orange and purple bars, Fig. 2).

Opinions about the future of enhancement were also associated with whether the respondent trusted the science (i.e., the data, sampling methods, and/or analyses) underlying the Evaluation of the OREHP and subsequent conclusion of ineffectiveness of White Seabass enhancement efforts (Fig 3). Of 123 public comments and post-town hall comments, 64 contained information about both the perceived credibility of the science *and* a preference for the future of the enhancement program (i.e., were usable for this assessment). It should be noted that another 46 of the 123 comments were from the education group (teachers, students, parents of students) and, while they unanimously expressed interest in continuing an enhancement program, 0% of the comments stated anything about the perceived validity of the science, so are not included in this analysis (e.g., Fig. 3).

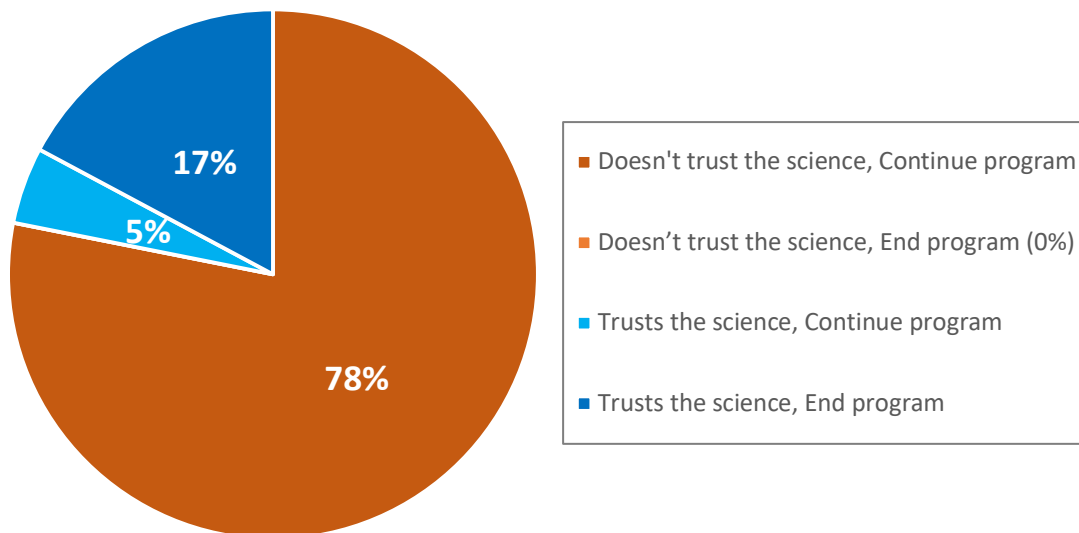


Fig. 3. Proportion of public and post-town hall comments that expressed a trust or distrust of the science underlying the OREHP Evaluation, and a desire to continue or discontinue enhancement efforts. N=64 public and post-town hall comments that contained statements about both the science *and* the future of enhancement.

Over three-quarters of the usable comments (i.e., 50 of the 64) stated a distrust of the science *and* called for the continuation of the OREHP (Fig. 3), citing a belief that the OREHP has been successful at enhancement despite Evaluation findings, and emphasizing the value in being involved in a regional stewardship effort. While this was a whole community assessment, it is important to note that all 50 of these comments came from the recreational fishing group.

Distrust stemmed from skepticism about the validity of the population enhancement analyses and, mostly, the quality and completeness of data used in the enhancement analyses, other Evaluation analyses, and/or the White Seabass stock assessment (Valero and Waterhouse 2016). None of the comments expressed both skepticism of the science and a preference for the discontinuation of the OREHP (Fig. 3). Another 5% of comments expressed trust in the science (Evaluation conclusions) and still called for continuation of the OREHP (Fig. 3), citing the great scientific and education value of the OREHP and hopes for successful enhancement of other species. Finally, 17% expressed trust in the science and a desire to end the OREHP to enable support of other efforts that would be beneficial to marine fisheries and the ocean (Fig. 3), such as testing fishery management efforts and conducting stock assessments for other species.

As indicated by the responses across groups, the preferences for the future of the OREHP, and the motivations behind these preferences, varied by stakeholder group.

The preferences and motivators of stakeholders

Recreational fishing. Almost 75% of the responses from people in the recreational fishing stakeholder group (101 total responses from 99 people who provided information) indicated the desire to continue the OREHP with both White Seabass and the phasing in of California Halibut (*Paralichthys californicus*); 14% wanted to see the OREHP continue with White Seabass only, 5% wanted White Seabass phased out and California Halibut phased in, and 1% requested the continuation but did not specify a focal species. About 7% of recreational fishing responses called for the discontinuation of the OREHP, with 5% suggesting that funds continue to be collected but applied to other ocean- or marine fishery-related management efforts (and the other 2% calling for the end of the OREHP entirely). Motivations for decisions may have included levels of personal involvement, personal valuation of the OREHP, income, and skepticism about the science underlying the Evaluation’s findings of low enhancement rates.

Most (68%) of the 99 people from the recreational fishing group said that they had been personally involved with the OREHP in one or more ways, including volunteering at growout and/or hatchery facilities (26% of all responses), helping with tag retrieval efforts (18%), participating in education, outreach and/or research (14%), donating boat time, gear, money and/or other in-kind resources (11%), and being directly employed within the OREHP (4%). This involvement may be linked with the many values this group associated with the OREHP.

There is a feeling of giving back associated with this program that is not reflected in the report. Not just for the people doing it, but also the people who witness it. The spirit of giving back is really important – everything in the world is less and less, and this program makes it more and more.

– Paraphrased public comment given by a San Pedro area recreational fisherman

The recreational fishing group (143 total responses from 99 people) most commonly selected the OREHP’s contribution to recreational and leisure activities as the aspect they valued most about the OREHP (41% of responses; Fig. 4). Nearly one-quarter (22%) of the responses revealed that recreational fishing stakeholders most valued the scientific discoveries associated

with the OREHP. The stewardship aspects of the OREHP were also valued, as contributions to the health of the ocean and its inhabitants (13% of responses) and contributing to a greater good (10% of responses) were both commonly cited (Fig. 4). Also important to the recreational fishing group – though to a lesser extent – were the OREHP’s contributions to the coastal economy (7% of responses), education (4%), and personal livelihoods (3% of responses; Fig. 4).

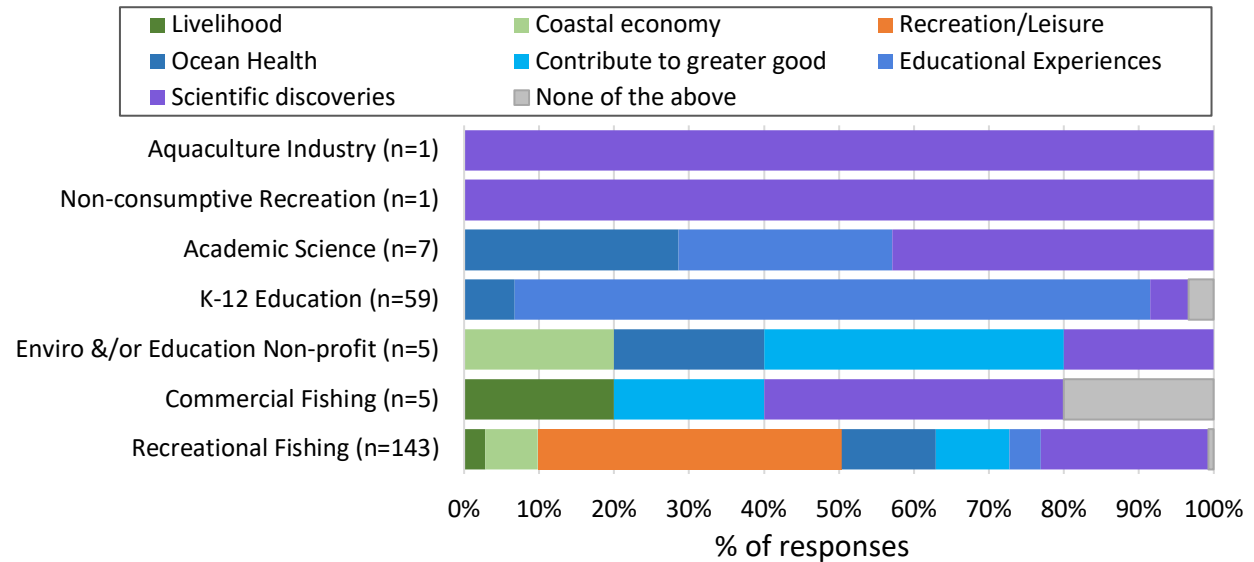


Fig. 4. The proportion of responses from each group stating the most valued aspects of the OREHP. N=223 responses from 164 people; in many cases people chose more than one value.

Despite “personal livelihood” only accounting for 3% of responses about the OREHP’s value, over one third (34 people) of the recreational fishing group had earnings associated with White Seabass (Fig. 5). While most (94%) of these 34 earners called for continuation of the OREHP, most (92%) of the 37 people who earned nothing from White Seabass also called for continuation. These results indicate that money may not be a main driver in the overarching desire of this group to continue the OREHP.

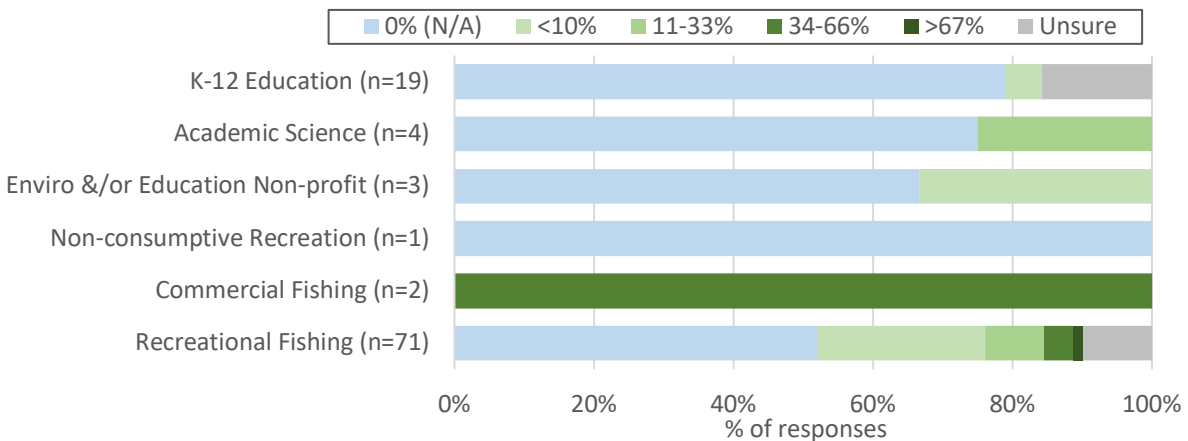


Fig. 5. The proportion of responses from each group stating the percent of their annual income related to White Seabass. N=100 responses from 100 people.

Skepticism surrounding the low enhancement rate findings of the recent OREHP Evaluation, may also be related to the desire to see the OREHP continued despite these findings. Of the 60 public and post-town hall comments provided by the recreational fishing group, 83% (50 comments) stated a mistrust of the science, 7% (4 comments) were confident in the science, and 10% did not comment either way. This group was the only one to be broadly skeptical about the science with 50 of the 51 comments expressing concern about the science coming from this community (out of a total of 123 comments from all groups). Three of the four recreational fishing group comments that stated confidence in the Evaluation's findings also suggested using OREHP funds to eliminate gillnets in order to increase fish stocks. Two of the four stated that if the OREHP had to continue with enhancement, then California Halibut or Black Sea Bass (*Stereolepis gigas*) would be preferred species.

"We don't believe the stock assessment or tag study are in any way accurate to reflect what is out on the water today. The math may be correct, but the data is flawed as well as the conclusions being reached. WSB [White Seabass] are being caught from Washington to Baja and out to Tanner and Cortez banks. You are not accounting for any of the environmental conditions or release improvements made in the last 5 years."

-Excerpt from a letter submitted by 20 people from the recreational fishing community

There were a number of concerns about the quality and completeness of data being used in the Evaluation's analyses and in the stock assessment. The most common of these included:

1. Geographic and temporal limitations of the gillnet survey efforts. In particular, the gaps in gillnet efforts through time and across the sampling sites because of budgetary constraints (Table 4.1, California Sea Grant 2017) were of concern. Criticism included gillnets not being placed more extensively throughout the Southern California survey area, and lack of sampling in Northern California where increased occurrences of White Seabass have been observed by this group (and one commercial fisherman) over the past decade. The omission of more distant sampling sites was presented by the public as evidence that there are more tagged fish out there than have been caught.
2. Exclusion of the relatively high Catalina Island juvenile fish contribution rates from the population enhancement analyses.
3. Worries about high rates of CWT (coded wire tag, hereafter "tag") loss in released White Seabass that would result in lower tag return rates and therefore overestimates of mortality.
4. Use of adult White Seabass heads as an indicator of fishery tag return rates. There was a concern that adult tag return rates (and therefore mortality rates) were based on the low return rates of adult White Seabass heads for scanning. Many recreational fishermen stated that they did not return heads because it was inconvenient or because they preferred to sell or give away heads for the otoliths, which are used in jewelry making. Others commented that heads were picked up too infrequently by the CDFW and so were often thrown away for need of the freezer space.
5. No consideration of tagged White Seabass reproduction in analyses, and consequent underestimation of contribution to the wild stock because offspring of hatchery fish would not have tags.

6. Doubt that domestication effects were a potential source of mortality. In particular, those who work at growout facilities have seen the hatchery White Seabass capture live prey in captivity and were skeptical about the claim that fish might not be able to hunt well in the wild.
7. No consideration of the mortality effects of avian and marine mammal predators in the population enhancement analyses.
8. No consideration of recent release strategies in the analyses. Recent release strategy trials have resulted in initially higher juvenile contribution rates, but mortality rates used in the Evaluation were from 2000-2011 data, before recent strategies were tested.

These concerns were often based in misunderstandings about the quality and appropriateness of the data and analyses, and the scientific concepts and approaches underlying the assessment of the OREHP. Even though the OREHP's scientific advancements were a stated value of all groups, the public at large likely has little exposure to the scientific topics associated with assessing stock or population enhancement, including fisheries and/or population biology, sampling design and approaches (e.g., random vs. non-random sampling, replication and statistical power, basic statistics, covariance, anecdotal vs. qualitative vs. quantitative data, manipulative vs. observational studies), and the interpretation and communication of scientific results. Participants who were personally involved with the OREHP usually experienced focused scientific concepts, such as the knowledge needed to perform the day-to-day tasks related to captive animal care, fish releases, and water quality monitoring. Increasing the public's direct exposure to stock enhancement assessments was not feasible within the framework of the OREHP. Based on the Evaluation Report (California Sea Grant 2017) and personal communication with the SAC members, each of the recreational fishing group's common concerns is addressed here:

"I had a professor once who used to say 'lies, damn lies, and statistics' – you can manipulate anything to have different messages – not saying that this is the case here, but if you don't have the data, then you can't tell an accurate story."

– Public comment from a Santa Barbara area recreational fisherman

1. Geographic and temporal limitations of the gillnet data. The Evaluation's analysis of recaptures in research gillnets accounts for dispersal of fish from release sites, including dispersal to outside of the sampling area, and for the spatial and temporal patterns of gillnet sampling (Hervas et al. 2010). This was done by first estimating dispersal rates from the release sites. Results showed that fish disperse from release sites rapidly after release, but that 50% of fish remain within 47 km, and 95% within 135 km, of the release site at the end their third year at large (see Hervas et al. 2010 and Section 4.4.3.1, California Sea Grant 2017). Growth (in body length) of released fish was also analyzed. Dispersal and growth information, combined with information on the size selectivity of research gill nets and the spatial and temporal patterns of gillnet sampling, allowed the recapture analysis to account for these factors when estimating post-release survival. Therefore, dispersal of fish to areas outside the sampling region was also accounted for (using the measured dispersal rates) and does not bias the results.

The analysis by Hervas et al. (2010), used in the Evaluations analyses of post-release survival, was conducted using data for 1999-2004 (a period of high and consistent gillnet sampling effort). The dispersal patterns used in the estimation of survival rates are based on the same data and are correct for this time period. The conclusions are not affected by any subsequent population shifts.

2. Exclusion of the relatively high Catalina Island juvenile fish contribution rates from the population enhancement analyses. The data were excluded due to the different dispersal patterns of fish around the island, where they tend to cluster in association with the island's isolated, generally smaller, nearshore habitat, compared with along the mainland, where the fish are able to disperse more readily along the coast in association with the contiguous, larger, nearshore habitat. The variable, but often higher, contribution rates at Catalina Island are consistent with the effect of lower dispersal at Catalina, where fish are kept more concentrated and therefore more catchable (i.e., biased data; see Section 4.4.1.2, California Sea Grant 2017).

Further, the dispersal model in the analysis assumed dispersal along the coast in nearshore habitat and was not appropriate for use in an island setting without connectivity of nearshore habitat to the coast or to other islands. There was not enough data to create an island-specific model so these data could not be analyzed. An improved understanding of sampling design, population biology and spatial ecology would improve community data collections and understanding of outcomes, and potentially reduce skepticism.

3. High rates of tag loss. HSWRI implements pre-release tag retention procedures that call for re-tagging of fish if $\geq 10\%$ of tags are lost (Drawbridge et al. 2007) and application of tag retention rates per batch to estimates of how many White Seabass will be identifiable in the future (Drawbridge and Okihiro 2007). Further, the Evaluation's tag-recapture model included a tag loss estimate of 4% between tagging and release, and then negligible tag loss after release. Previous tag-retention work by Dr. Ray Buckley and HSWRI found that tag loss is most likely to occur within the first one to two weeks after initial tag insertion, and is usually caused by improper needle penetration (Drawbridge and Okihiro 2007; Kent and Ford 1990). HSWRI experiments found that tag retention over a period of more than 300 days is high, with more than 90% of White Seabass keeping their tags. These trials were consistent with tag loss rates reported in other studies which were also low, generally below 5%-10% per year (Solomon and Vander Haegen 2017).

The observed decline ($>90\%$) in the abundance of tagged fish over the first-year post release (illustrated in the rapid decline of recaptures, Fig. 4.6, California Sea Grant 2017) is far greater than any tag loss rates reported ($<5\%$ to 10% per year). It is therefore unlikely that the observed decline can be explained by tag loss; it must be attributed mostly to natural mortality.

It was unclear the extent to which tag loss concerns existed because there was a general lack of awareness about tag-retention studies and the consideration of tag loss in the analyses, or because the protocols have not been followed (e.g., improper or insufficient training, lack of oversight), or whether concerns exist despite knowledge of studies and adherence to protocols. The OREHP Evaluation (Section 4.3.3, California Sea Grant 2017) recommended that a new tag retention assessment be performed to determine tag retention rates under current conditions (e.g., current operators, holding and tagging conditions). As requested by the recreational fishing community, assessments over longer time periods (years instead of months) may also be valuable.

4. Use of adult White Seabass heads as an indicator of fishery tag return rates. Recaptures of stocked fish in the fishery were estimated as follows: (1) Proportional contribution of stocked fish to the catch was calculated from the samples of scanned heads (% contribution = $100 * (\# \text{ of tagged WSB} / \# \text{ of WSB scanned})$); (2) This proportional contribution was applied to the total landings of White Seabass in California to estimate the number of stocked fish landed. Since landings are reported in pounds, these were converted to numbers of fish by dividing by an average weight of 20 pounds/fish. The fact that only a sample of heads (rather than all landed heads) have been scanned does not lead to a bias in return rates estimated using this approach.
5. No consideration of tagged White Seabass reproduction rates. The White Seabass fisheries population model used to predict enhancement contributions to the stock does account for reproduction by stocked hatchery fish (Section 4.6.1.1., California Sea Grant 2017). Since the contribution of stocked hatchery fish to the spawning stock were very low (0.26%), the contribution of these fish to spawning output and future recruitment is also very low.
6. Doubt that domestication effects were a potential source of mortality. The impact of domestication processes on the behavior, ecology and survival of cultured fish in the wild is well documented (Lorenzen et al. 2012). Domestication effects include genetic changes occurring over generations (e.g., loss of genetic variation due to drift and inbreeding), and also developmental effects (phenotypic plasticity) recurring during each generation (Price 2002) in response to a captive environment. Unlike a natural environment, captive environments tend to be densely populated, low complexity, confined spaces where food is readily provided and predation pressure low. These captive conditions favor traits that are not beneficial, and even detrimental, in the wild, including reduced behavioral complexity, accelerated development (shorter life spans), and a simplified life history (e.g., lower reproductive rates) in captive compared to wild individuals. Lifetime survival of hatchery-reared fish in the wild is often a small proportion (<10%) of that of their wild conspecifics. Some stocking programs are successful despite low post-release survival, for example when fish are recaptured quickly after release (as in many trout stocking programs) and/or when hatchery fish can be produced very cheaply so as to offset the economic costs of low survival.

However, White Seabass must survive for at least 3-4 years after release to enter the fishery, and they are expensive to produce.

7. No consideration of the mortality effects of avian and marine mammal predators in the population enhancement analyses. Mortality rates in the analyses were estimated directly from tag returns (Hervas et al. 2010) and implicitly account for all sources of mortality including avian and mammal predation.
8. No consideration of recent release strategies in the analyses. Release strategies were addressed in the Evaluation (Sections 4.4.1 and 4.4.1.5, California Sea Grant 2017), but data from the post-2011 time period (with reduced gillnet sampling effort) were judged to be insufficient to allow a comprehensive re-analysis (which would require re-estimating dispersal and growth models, among other things). As recommended in the Evaluation, release strategies should continue to be modified and tested in a comprehensive but systematic fashion (Section 4.4.3, California Sea Grant 2017) and should include explicit consideration of predation.

“Follow the money. Why is DFW doing this? How much money is being put up for these meetings, when the NGOs [non-governmental organizations] are the ones who are going to make the decision in the end, and not the people who care about this? The [Evaluation] report is beyond flawed, it is a disaster. The Department will use it as excuse to get rid of the White seabass program.”

–Public comment given by a Santa Barbara area recreational fishing representative

Finally, there was a sense of distrust of CDFW that was

“I am aware of using different scientific models to present whatever outcome that you’re looking for in a program.”

– Public comment from a San Diego area recreational fisherman

expressed by the recreational fishing group. Comments included concerns about the Evaluation being biased, intentionally flawed, and/or created or used as a way for the CDFW to achieve the pre-determined outcome of cancelling the OREHP.

Commercial fishing. Most (70%) of the responses from commercial fishing called for the discontinuation of the OREHP, with 60% asking to use the funds for other ocean or marine fishery related management efforts and 10% requesting the total discontinuation of the OREHP. One person (10% of responses) requested continuation with White Seabass and one person (10% of responses) requested continuation with California Halibut.

None of the ten people in the commercial fishing group who participated were personally involved with OREHP activities. Only half of the commercial fishermen answered the question

The program hasn’t helped the White Seabass population— They trend strongly with ocean conditions, and fisheries management can help. There is a gillnet fishery in northern Baja and they set 1000s of nets per day. By June 15th when the California fishery opens, the numbers are already low. The gillnets have a huge impact; we saw an increase after the California gillnet ban in the early 1990s. Money and effort should be put into better understanding this and other fish populations.

– Paraphrase of comments from a San Diego commercial fisherman

about the most valued aspects of the OREHP. Scientific discoveries associated with the OREHP was the most commonly cited value (40% of responses), while 20% of responses (i.e., one person) revealed that personal livelihood and contributing to a greater good were the most important values. The final 20% (one person) stated that none of the aspects listed were of value to them.

I'd like the program to continue with California Halibut. Even though White Seabass have not responded well to the program, it would be worth trying another species. You know, I'd rather try to enhance commercial fisheries than do nothing, even if the contributions end up being small

-Paraphrase of comments from a San Diego commercial fisherman

Only two people from the ten in the commercial fishing group provided information on income and both stated that one-third to two-thirds of their annual income was related to White Seabass (Fig. 5). One of those earners wanted discontinuation of the OREHP and the other wanted continuation of the OREHP with White Seabass.

Nine people from the commercial fishing group provided public or post-town hall comments. Of these nine, 89% (eight people) stated confidence in the science and only one expressed skepticism because of the sighting of

increasing numbers of White Seabass north of the surveyed Southern California range over the past decade.

K-12 Education. All of the responses from the K-12 education group indicated the desire to continue the OREHP, with 63% wanting continuation with no species specified, 19% wanting continuation with White Seabass and phasing in of a second species, usually California Halibut, 14% wanting continuation with White Seabass only, and 4% wanting continuation with another species, with California Halibut being the only one mentioned. As with the recreational fishing group, the desire of those in the education group to continue the OREHP with enhancement may be an outcome of direct involvement in the OREHP.

Almost all (93%) of the people from the education group were involved in one or more ways with the OREHP, mostly (81% of all responses) through Seabass in the Classroom. Other involvement of this group was through experiences at growout facilities (6%), with research (3%),

"The opportunities that you have provided... not only shaped us into better scientists, but also better humans ourselves. The faith and the trust that you have in us really means a lot for all of us, not only did you all play a part in our education path, you have supported us in walking down our path of humanity as well."

- A Huntington Beach high school student commenting on the Seabass in the Classroom program

with collection of broodstock (1%), and with tag retrieval efforts (fishing

competitions, 1%). As noted above, none of the 46 public and post-town hall comments received from the education group stated anything about the perceived validity of the science or the success (or lack of success) of the OREHP. The strong preference of this group for continuing the OREHP stems from the hands-on, diverse science experiences associated with the OREHP, and related values.

"Whether it be in aquaculture or marine biology, OREHP serves as a catalyst for my generation to find a career, [and] the motive to not only protect our local waters, but our planet as a whole."

- A Los Alamitos High School student and SITC participant

The educational opportunities and experiences that the OREHP provides, in particular the Seabass in the Classroom program, were most highly valued by the education group (85% of responses). This group also valued the OREHP’s contributions to the health of the ocean and its inhabitants (7% of responses) and scientific discoveries (5% of responses); and 3% of responses revealed that none of the aspects listed were valuable. The most valued educational aspects of the OREHP included experiential learning of environmental stewardship, career skills, and STEM (Science, Technology, Engineering and Mathematics) topics, such as water quality; fish biology, health and husbandry; aquaculture; fisheries biology; and marine ecology and conservation.

“It’s something that’s special – every kid that works with White Seabass comes away different after they release them.”

– A San Diego high school science teacher commenting on the value of the Seabass in the Classroom program

Also of note were the group-skills lessons and personal growth of students associated with the hands-on fish rearing and release experiences. Students and teachers commented on lessons of collaboration and team work as students learned to work together to take care of the fish and solve problems as they arose. These experiences also fostered confidence related to the students’ sense of ownership, responsibility and accomplishment in the OREHP. Most (79%; Fig. 5) of the responses from the education group stated that no income was related to White Seabass, yet this group was overwhelmingly in support of the OREHP.

Environmental and/or Education Non-profits. Four of five responses (80%) from people in the non-profits group requested continuation of the OREHP in some form. Continuation of the OREHP with White Seabass and phasing in of another species was requested by two of the five (40%) responses; another one response each (20% each) wanted continuation with White Seabass only, and continuation with California Halibut only, and one respondent suggested discontinuing the OREHP and applying funds to other fishery or ocean efforts, such as

“Based on [the Evaluation] results, and the fact that other species hatchery programs would likely be accompanied by similar problems, setbacks, and risks to healthy wild populations, we strongly believe that the OREHP should evolve beyond a hatchery program and that OREHP funds would be better spent on broader fishery management strategies”

– Leadership of an environmental non-profit in Southern California

“In the face of climate change and other non-climate stressors, we believe the continuation of OREHP with California Halibut provides an opportunity to explore solutions to rebuild and increase the resilience of the California Halibut population, and to generate EFI [Essential Fishery Information] to inform the management of the commercial and recreational fisheries under the MLMA [Marine Life Management Act].”

– Scientist from an environmental non-profit

stock assessments, assessment of management actions (e.g., driftnet and gillnet bans, updating catch quotas and/or size limits), regional fisheries management efforts (e.g., collaboration with Mexico), and continued educational and outreach programs.

Three of five (60%) of the people from non-profit organizations indicated that they had not been personally involved with the OREHP, and two (40%) stated that they had volunteered at growout facilities. Of the five public and post-town hall comments, one (20%) stated

confidence in the science (and recommended discontinuing the OREHP, citing continued risk associated with enhancement). The other four made no mention of their confidence in the science and asked for continuation of the OREHP citing the value to education (60% or 3 comments) and community engagement (20% or 1 comment), and the potential to collect scientific data to benefit California Halibut fisheries and management (20% or 1 comment).

Most (40%) responses from the non-profit group indicated that the aspect they valued most about the OREHP was contributing to a greater good (i.e., a regional stewardship effort). The OREHP's contributions to scientific discoveries, health of the ocean and its inhabitants, and the coastal economy were also valued (20% of responses each). According to the three responses received, little (<10%) to none of the income of environmental and/or education non-profit groups was related to White Seabass (Fig. 5).

"I am not an angler and I don't eat fish, but I am 100% in support of the WSB [White Seabass] program. ... I have introduced thousands of kids each year on field trips to the program including... kids from across the country; ... kids from 22 countries; at-risk students...; Boys and Girls clubs; and busloads of other students from throughout Southern California. The funding for these experiences serves as an indicator of community, foundation, philanthropic, government, and corporate support of the value of the learning experience."

– Vice President of a non-profit education organization and manager of a growout pen who has secured over \$1.1 million in grants for their education program

Academic science. Four of the five responses from the academic science group called for the continuation of the OREHP, with 20% wanting continuation with White Seabass, 40% also wanting California Halibut to be phased in, and 20% wanting continuation with no focal species specified. The fifth response (20%) called for discontinuation with funds applied to other efforts that would benefit marine fisheries and the ocean.

Four of the five academic scientists were involved in the OREHP. In particular, they participated in scientific research (33% of responses), education activities (22% of responses), broodstock collections (11%), or tag retrieval efforts (11%), and/or were employed by the OREHP (11%). Of the three public or post-town hall comments from the academic community, only one commented on having confidence in the science underlying the Evaluation, while the other two did not comment either way. Yet, all commented on the value of the scientific data generated from the OREHP, including data on ocean chemistry, fish biology, and topics related to aquaculture (fish health).

Most of responses from the academic group reflected that this group greatly valued the educational aspects of the OREHP. Nearly 17% of responses (1 response) expressed value in the OREHP's contributions to a greater good, and its scientific discoveries. According to the four responses received, under one-third to none of the income of individuals in the academic science group was related to White Seabass (Fig. 5), yet this group was overwhelmingly in support of the OREHP.

Non-consumptive recreation and the aquaculture industry. The one non-consumptive recreation response was from a diver who asked for the continuation of the OREHP with both White Seabass and Black Sea Bass. The diver indicated that he/she volunteered at a growout facility. The one aquaculture industry response was for continuation of the OREHP with both White Seabass and California Halibut, citing the scientific achievements of the OREHP in the field of marine finfish aquaculture. This representative did not mention direct involvement in the OREHP. Neither mentioned a level of confidence in the science underlying the Evaluation.

The one non-consumptive recreation response and the one aquaculture industry response both stated that the scientific contributions of the OREHP were most valued. The diver stated that none of his/her income was related to White Seabass, while the representative from the aquaculture industry did not provide income information.

Support of program options for the future

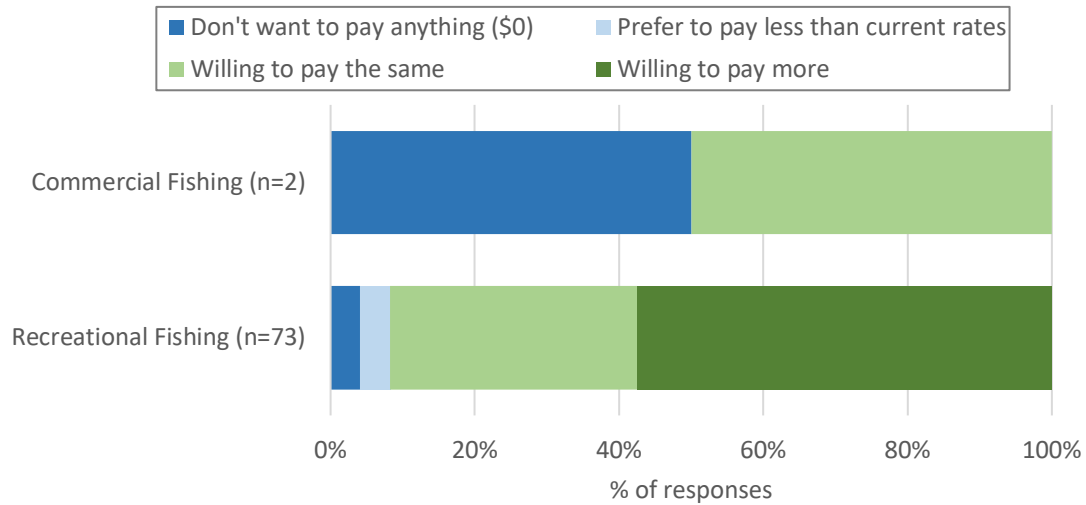
Respondents from the recreational and commercial fishing community pay into the Ocean Enhancement Stamp with their permit fees. The fee provides dedicated funding for the OREHP and supports a portion of total program costs. Currently, the Ocean Enhancement Stamp costs \$5.66 when purchased with a \$49.94 resident sport fishing permit, and \$52.27 when purchased with a \$141.11 commercial fishing permit (CDFW 2018). The permit holders were asked about willingness to continue to pay into the Ocean Enhancement Stamp funds if the OREHP was to continue. All groups were asked for their preference of whether funds should continue to be collected if the OREHP was discontinued and, if so, how they would like to see the funds spent.

Recreational fishing. Most of the recreational fishing group was willing to pay the same or even more for continuation of the OREHP with enhancement of White Seabass and/or another species (Fig.6 A, B). Responses from the recreational fishing group were split when asked whether OREHP funds should continue to fund other efforts to improve fisheries if enhancement should be discontinued. About 60% of responses said that “it depends” or “yes” as long as funds go to benefit the recreational and commercial fishing industries.

Several themes emerged from suggestions about how money should be spent if the OREHP were discontinued. The recreational fishing group called for funds to be used for additional and improved fisheries-related education, in formal and informal settings, and research, including more transparent and “better” data to assess enhancement effects and other influences (e.g., effects of avian and marine mammal predators). Improved communications with the fishing community was another common request, including “better announcements to the fishermen” and holding frequent, regular meetings with the fishing community to provide updates and gather feedback. More enforcement (e.g., more Fish and Wildlife officers) was requested by multiple people. Also requested was greater transparency in how money is being spent in proportion to those groups paying into the fund (e.g., funds should prioritize recreational fishermen interests if recreational fishermen contribute most of the OREHP’s funds). Finally, multiple people were in support of using funds for fisheries and habitat management, including

consideration of increased size limits or slot limits, buying out drift gillnets and long line commercial fishermen, and habitat enhancement.

A. Continuation with White seabass



B. Continuation with another species

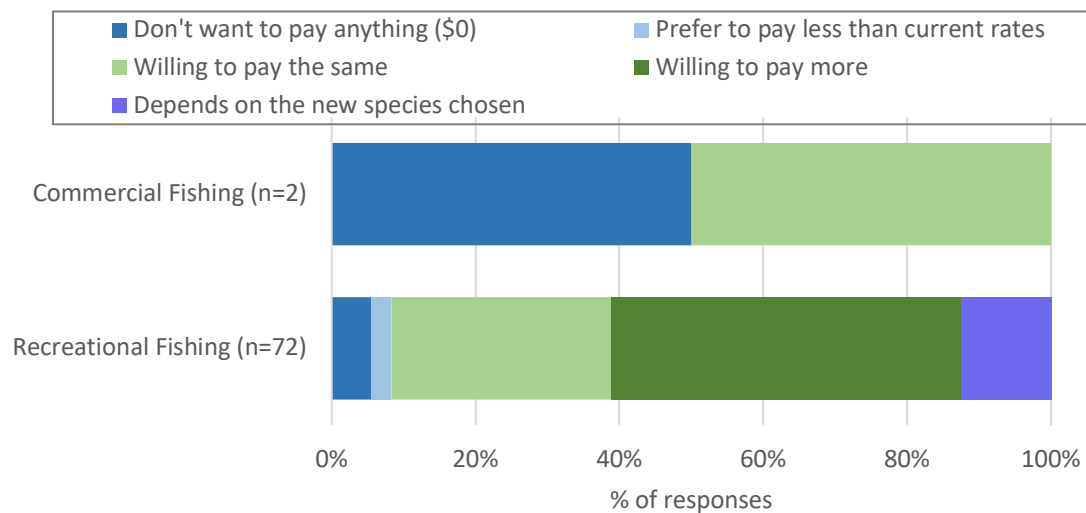


Fig. 6. The proportion of responses from each fishing group when asked about willingness to continue paying into the Ocean Enhancement Stamp fund if enhancement of (A) White seabass or (B) another species was continued. N=75 responses from 75 people for A, and 74 responses from 74 people for B.

Commercial fishing. The two commercial fishermen who answered the question about willingness to pay for the Ocean Enhancement Stamp if the OREHP was continued were split on paying the same amount and not paying anything if the OREHP were to continue, no matter which species was chosen. These two both also called for continuation of the OREHP. No input on willingness to pay was received from those who preferred discontinuation of the OREHP in lieu of funding other efforts to strengthen fisheries and the ocean.

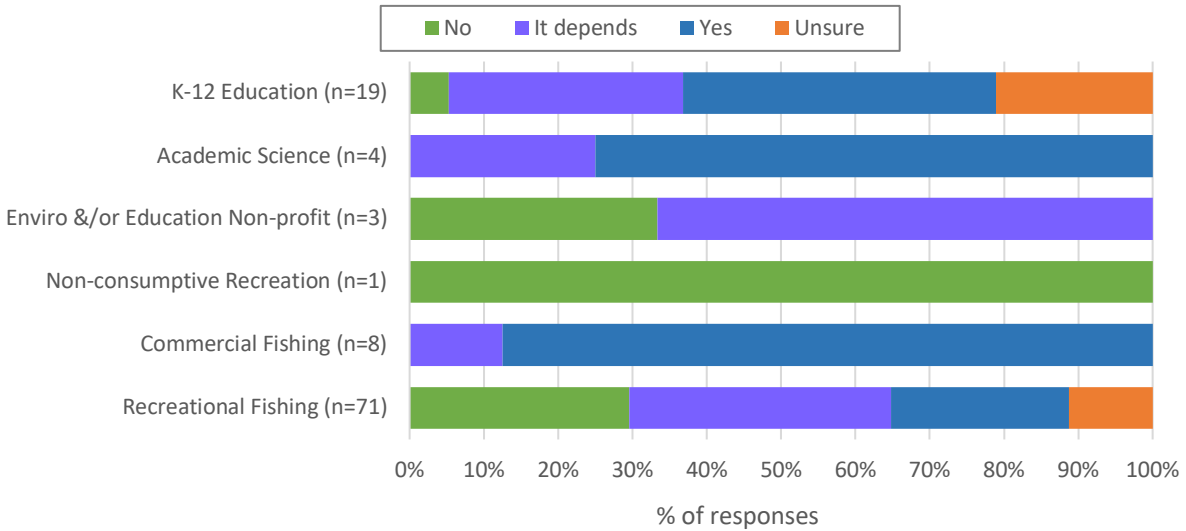


Fig. 7. The proportion of responses from each group when asked whether Ocean Enhancement Stamp funds should continue to be collected and applied to other efforts to enhance fisheries if the OREHP is discontinued. N=106 responses from 106 people.

When asked about whether funds should continue to be collected if the OREHP was discontinued, 13% (1 of 8) of comments from the commercial fishing group stated that continued use of funds “depends,” (Fig. 7) but did not include further explanation. The other 88% (7 of 8) answered “yes” in favor of continuing to collect funds (Fig. 7) if they were applied to marine fisheries-related management and research, such as conducting

“I think that the program funds should be used for other methods of strengthening our fisheries, such as stock assessments for more species, research to better understand wild stock dynamics and what influences them and testing of the effectiveness of fishery management strategies.”

– A San Diego commercial fisherman

“The fund should be directed to address management poverty in all forms with a new generation of collaborative fisheries research into improving management and the conflicts of marine spatial planning management”

– A Santa Barbara commercial fisherman

stock assessments for more species, collecting fishery dependent and independent data for target and non-target species, researching wild stock dynamics and the environmental influences, and testing the effects of management actions on fisheries (e.g., outcomes of driftnet and gillnet bans, updated catch quotas and/or size limits). This group also suggested using some of the funds as incentives to engage the fishing community in collaborative fisheries research to help collect these data and also address other ocean-related issues, such as achieving ecosystem monitoring and helping to address conflicts within marine spatial planning.

K-12 Education. Responses from the K-12 education group were also split when asked whether OREHP funds should continue to fund other efforts to improve fisheries if enhancement should be discontinued, but only 5% said “no” (Fig. 7). This group wanted funds to be applied to continuing and expanding formal (in school) and informal education efforts, and increasing

community engagement. Suggestions for expanding education included aquaculture training and outreach to fishermen about the basis for management decisions, such as how and why size limits are set, to increase knowledge and adherence to regulations.

Environmental and/or Education Non-profits. One of the three respondents (33%) said no to continuing to collect Ocean Enhancement Stamp funds, and two (66%) said that collection of funds depends on whether supported efforts would be integrated into fisheries management efforts (e.g., Fishery Management Plans) or with the Marine Life Management Act Master Plan being developed by CDFW, which includes some of the OREHP species as high priority species.

Academic Science. Three quarters of respondents (three of four) said yes, that funds should continue to be collected, and 25% of respondents (one of four) said that it depends on whether funds would still be dedicated to hands-on education programs in schools.

Non-consumptive, aquaculture. The response from the one diver was “no,” that funds should not continue to be collected for other fisheries efforts. The single aquaculture industry comment did not mention anything about future funding options.

Next steps: OREHP reform consultation and planning process

The OREHP, as with other public-private programs that benefit natural resources and encourage stewardship, hold great potential as a platform for facilitating communication and relationship building between the State and its communities. The community members reap the many personal benefits expressed by participants of this study, while the State leverages the public’s enthusiasm and willingness to provide social and financial capital to perform tasks and provide data that can ultimately improve the State’s fisheries, ocean and communities. However, the stakeholder feedback received during these town hall meetings have revealed divergent views among stakeholders regarding the Evaluation of the OREHP and its future. The OREHP Evaluation results (Chapter 7, California Sea Grant 2017) and town hall findings indicate the need for a stakeholder-participatory and science-based process to foster shared understanding of the OREHP outcomes, strategic goals, and options for future development (Lorenzen et al. 2010, NWFSC 2017). Implementing such a planning and reform process likely requires effort and expertise that exceeds the capacity of the routine OREAP meetings. It is therefore suggested to conduct this process as a separate activity, leading up to a set of stakeholder-supported recommendations for consideration by the OREAP and CDFW.

Goals and intended outputs of the reform and planning process. The goal of this recommended reform process is to create a shared management vision and implementation strategy for the future of the OREHP. This goal can be met by combining stakeholder input with scientific information from both the Evaluation and additional enhancement analyses to develop a consolidated set of management objectives with implementation options that include concise evaluations of likely outcomes and acceptability to different stakeholder groups

(Lorenzen et al. 2010). The management vision, objectives, and options should be developed with broad stakeholder input through a transparent and open process.

Approaches. Overall guidance a reform process can be found in the Updated Responsible Approach to Marine Fisheries Enhancement (Lorenzen et al. 2010) and in the Hatchery Reform processes implemented for several salmon hatchery programs in the Pacific Northwest (NWFSC 2017). A two-year process for the OREHP would include (1) conducting an initial Situation Assessment to inform the formation of a decision process and an advisory committee (i.e., the OREAP) composed of stakeholders, managers and technical experts who will provide continuous input to the process and vetting of outputs; (2) compiling the best available scientific information from a review of existing scientific literature and additional enhancement feasibility analyses; and (3) developing a structured planning process that combines stakeholder and scientific information to develop a vision, criteria and options for the future of the OREHP.

1. **An initial Situation Analysis** based on individual stakeholder interviews would be conducted to provide a broad characterization of stakeholders and their values and attitudes with respect to fisheries management and conservation, and the role of the OREHP program. Stakeholders include recreational and commercial fishers, participants in the OREHP activities such as growout and K-12 education, non-consumptive users of marine resources (e.g. non-fishing divers), conservationists, management agency staff, etc. The Situation Analysis would inform the design of workshops, surveys, and decision processes, and the composition of the advisory committee. The advisory committee of stakeholders, managers, and technical experts would provide continuous input to the process and vetting of outputs. Stakeholders at large would be engaged in the process through multiple means, including workshops, interviews, surveys, presentations to local fishing, diving and conservation organizations, a web portal, email and mail contact. Surveys would be designed to obtain quantitative, representative and specific information on desired outcomes and attitudes toward development options by different stakeholder groups.
2. **Scientific information** could be derived from the OREHP Evaluation (California Sea Grant 2017) and additional analyses, such as quantitative modeling of likely outcomes of enhancing different stocks (e.g. California Halibut) and of the efficacy of different management measures (e.g., fishing regulations, stocking, habitat enhancements) for achieving desired outcomes. Scientific uncertainty surrounding potential options would be characterized and any scientific information or data gaps would be identified. All scientific information would be reviewed and discussed with stakeholder input in order to establish shared understanding of the information, its reliability and its implications.
3. **A structured planning process** would be developed using information from the Situation Analysis, and used to combine stakeholder input with scientific information (Lorenzen, et al. 2010, NWFSC 2017). The outcome will be a consolidated set of well-supported management objectives and implementation options that include concise evaluations of their likely outcomes and acceptability to different stakeholder groups. Outcomes

would be submitted to CDFW and the OREAP for consideration in their decision making with regards to the future development of the program. The planning process itself will also be a useful tool for future decision making by CDFW and the OREAP.

Acknowledgements

We thank Kai Lorenzen for his guidance throughout this project, including help with the preparation of public informational materials, and contributions to this report. Kai, along with OREHP Evaluation SAC members, Ken Cain, Lorenz Hauser, and Ken Leber graciously contributed their time and expertise to answer questions of the CDFW and OREAP pertaining to the OREHP Evaluation findings. We appreciate the generosity of the three groups who provided venues for the Town Hall Meetings free of charge or at reduced rates, namely the Port of San Diego, Cabrillo Marine Aquarium in San Pedro, and the Goleta Valley Community Center. We would like to express much gratitude to those members of the public who took the time to attend the Town Hall Meetings and contribute comments.

We are grateful to our CDFW partners, Valerie Taylor and Kathryn Johnson, for their project oversight and collaboration. Funding for this project was provided by CDFW, Agreement number P1770013.

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Appendix 1: The OREHP Town Hall Meeting Presentation



Ocean Resources Enhancement and Hatchery Program Town Hall Meeting

California Sea Grant
California Department of Fish and Wildlife



- 
- ## Meeting Goals
- Review the evaluation process & findings
 - Gather public input for CDFW that will help inform decisions about the future of the OREHP.



Exchange of information



1. Presentation of evaluation findings
2. Question and answer
3. Hand-out surveys
4. Public comments



Ground rules



- Listen with an open mind
- Only one person speaks at a time
- Stay on topic and within time limits
- Respect others and their points of view



Evaluation of the Ocean Resources Enhancement and Hatchery Program (OREHP)



California Sea Grant (CASG)
California Department of Fish and Wildlife (CDFW)



Evaluation Roadmap

- Background
- Findings
- Recommendations





OREHP

- A 1983 California statute in response to depressed landings of certain fish
- Goal: Investigate the economic and ecological feasibility of using cultured fish to enhance wild populations



OREHP

- Funding: State Ocean Enhancement Stamp & Federal Sportfish Restoration Act
- Management: CDFW with guidance of the Advisory Panel





Lauren Bartels

OREHP

- Focus: Enhancement of wild populations of white seabass through culture and grow-out
- Main contractor: Hubbs-SeaWorld Research Institute



COASTAL SCIENCE SERVING CALIFORNIA



OREHP

- No formal assessment until 2015-2017
- CDFW contracted CASG to facilitate an independent evaluation





OREHP Evaluation

Conducted by an Independent
Science Advisory Committee

1. Kenneth Cain, fish pathology
2. Lorenz Hauser, fish genetics
3. Kenneth Leber, fish population biology
4. Christopher Myrick, aquaculture
5. Martha Sutula, environmental quality
6. Robert Vega, marine stocking
7. Cassidy Teufel, CA Coastal Commission
8. Chuck Valle, CA DFW
9. Dallas Weaver, OREAP



OREHP Evaluation

Assisted by two expert sub-panels

- Genetics
 - John Gold
 - Kerry Naish
 - Penny Swanson
 - Robin Waples
- Population Enhancement
 - Kai Lorenzen





Evaluation of the Ocean Resources Enhancement and Hatchery Program

Submitted to:
Marine Region
California Department of Fish and Wildlife
Los Alamitos, California
Project no. P1470005

12 December 2017

Submitted By:
California Sea Grant Extension Program
Scripps Institution of Oceanography
University of California, San Diego

Publication No. CASG-17-010.

OREHP Evaluation

Evaluation report

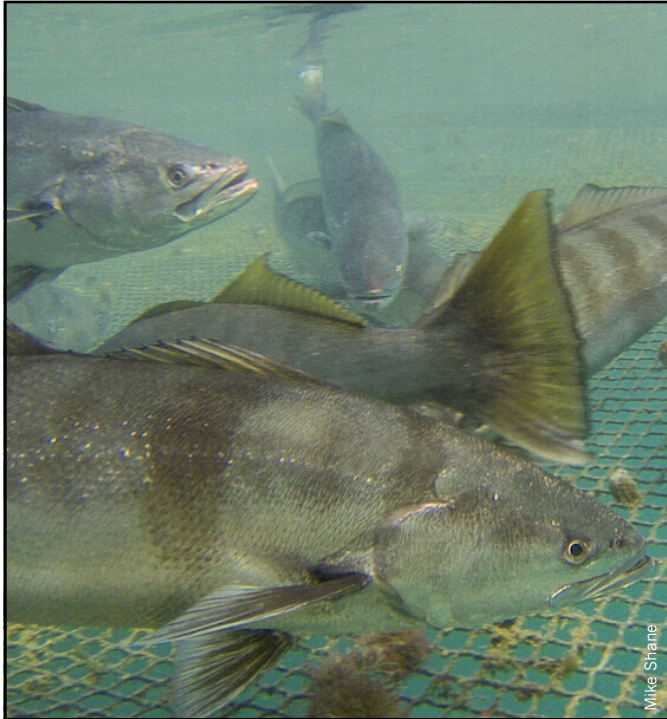
- CDFW & HSWRI provided information & data to be analyzed and interpreted
- Report drafts reviewed by CDFW, and HSWRI (for factual accuracy)
- Released 01 February 2018



OREHP Evaluation

- No decisions about the program have been made
- Report & town hall meetings will inform discussions of the CDFW & the Advisory Panel to shape the future of the Program.





Evaluation Roadmap

- Background
- **Findings**
- Recommendations



High-level Conclusions

The program:

- Has contributed greatly to our understanding of enhancement science and practice
- Has not made significant contributions to the White Seabass fishery





Program Contributions

- Research discoveries
- Development and constant improvements of hatchery infrastructure and methods



Program Contributions

- Development of effective tagging methods
- Collection of enough data to evaluate program effectiveness





HSWRI

Program Contributions

- Substantial education and outreach, for example:
 - Seabass in the classroom
 - Informal conservation education
 - Engagement of groups in growout process



Sea Grant
California



HSWRI

Program Contributions

- No adverse environmental impacts under production levels to date



Sea Grant
California



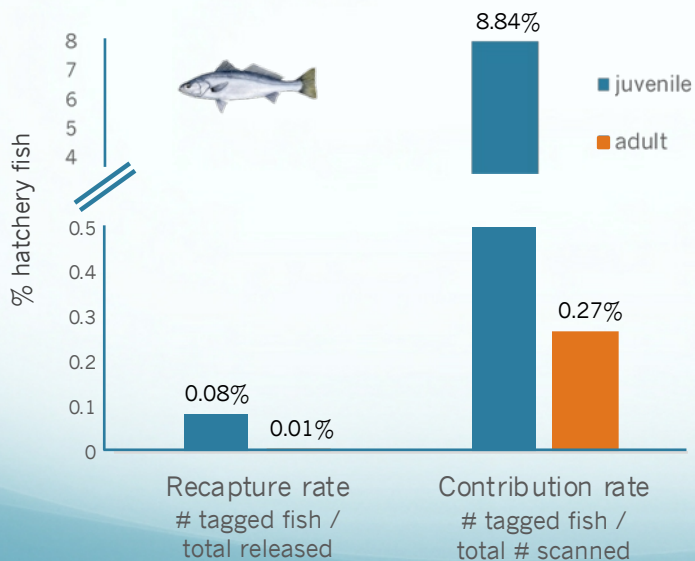
Program Challenges

- Low *enhancement rate*
 - Model* estimate: Stocked fish contributed 0.26% to California White Seabass catches 2000-2011
 - Actual adult contribution rate 2000-2011: 0.25% (#tagged adults/#adults scanned)



*Model used 1999-2004 gillnet data to calculate mortality rate and the proportion of hatchery fish in the fishery

Rates for 1996-2016*



Program Challenges

- Low recapture rates for White Seabass
 - Low post-release survival
 - Gillnets lose smallest tagged juveniles
 - Inconsistent juvenile surveys
 - Broad dispersal
 - Range spans border



*Includes Catalina Island data

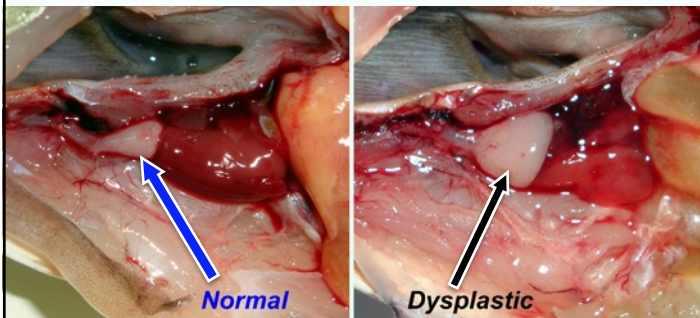


Program Challenges

- High short-term post-release mortality
- If mortality rate was lowered to wild rates, then current stocking levels could increase catches by 18%.



Bulbus Arteriosus Dysplasia



Microcephaly

Normal



Severe microcephaly



Program Challenges

- Fish health and fitness issues
 - Gas supersaturation
 - Inconsistent morphology diagnoses & responses
 - Links between morphology & fitness uncertain
 - Domestication effects





Program Challenges

- Uncertainty about optimal release strategies



Program Challenges

- Need to strengthen public communication & transparency



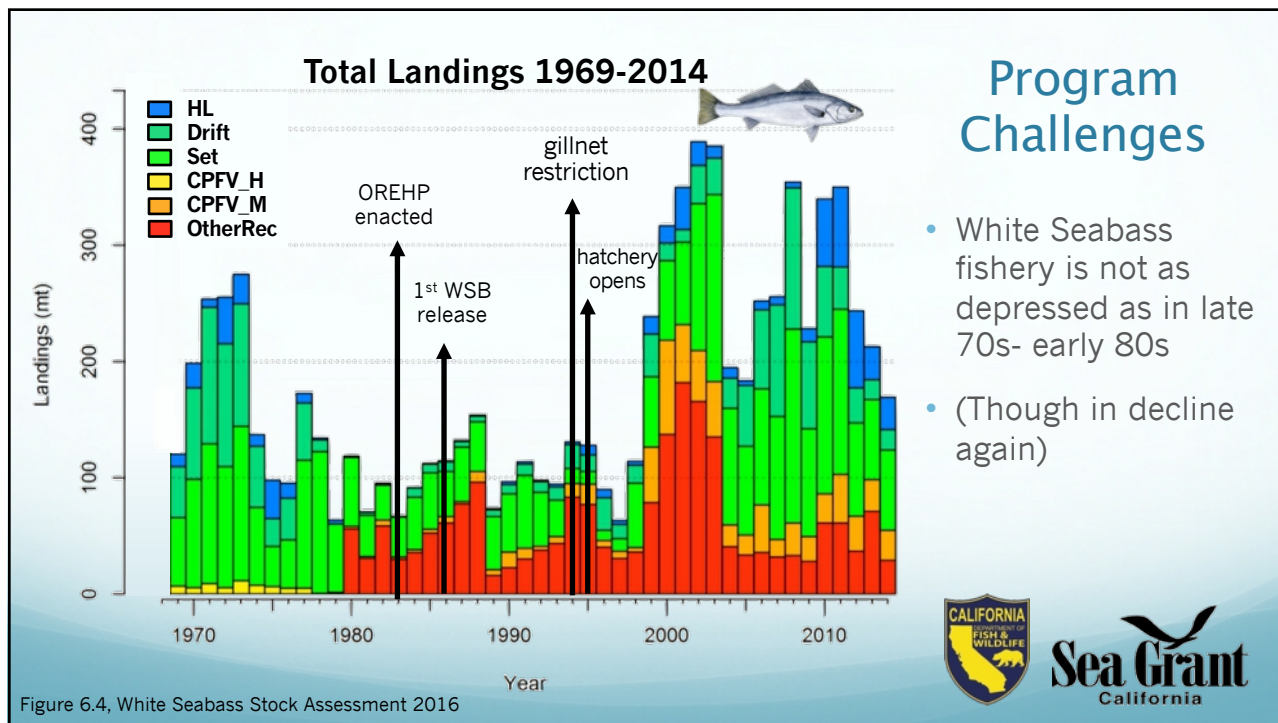
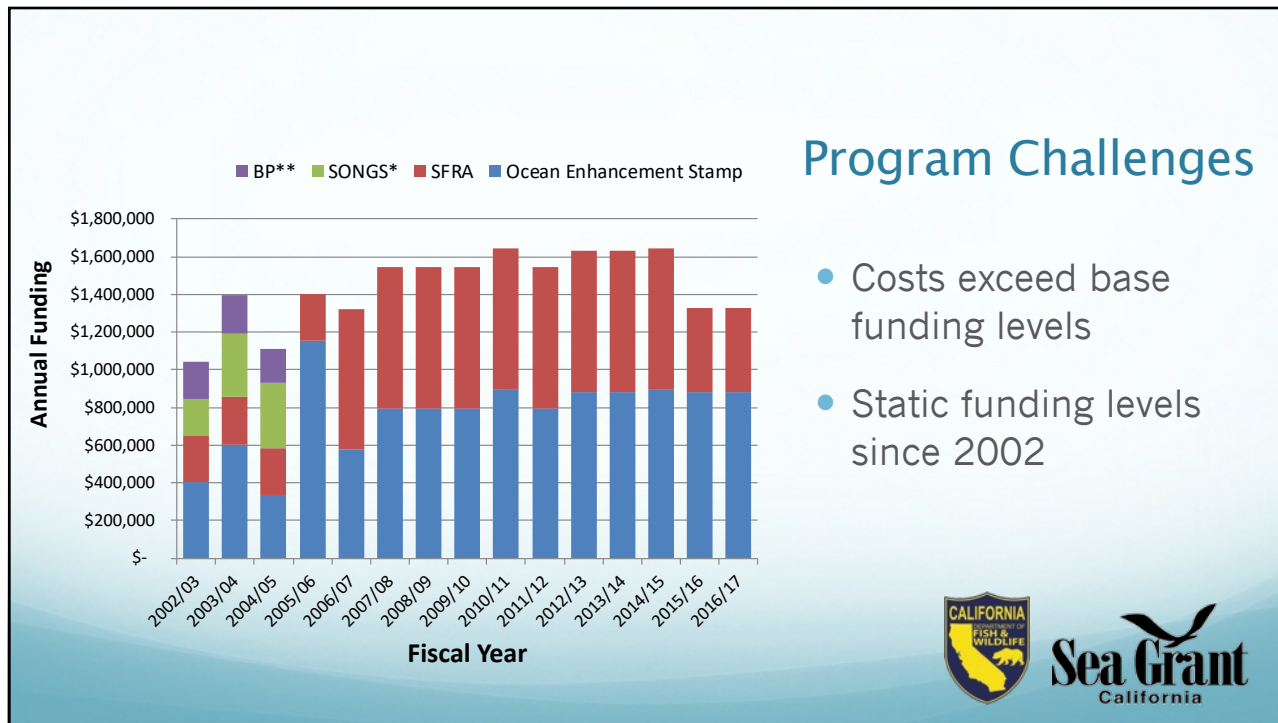
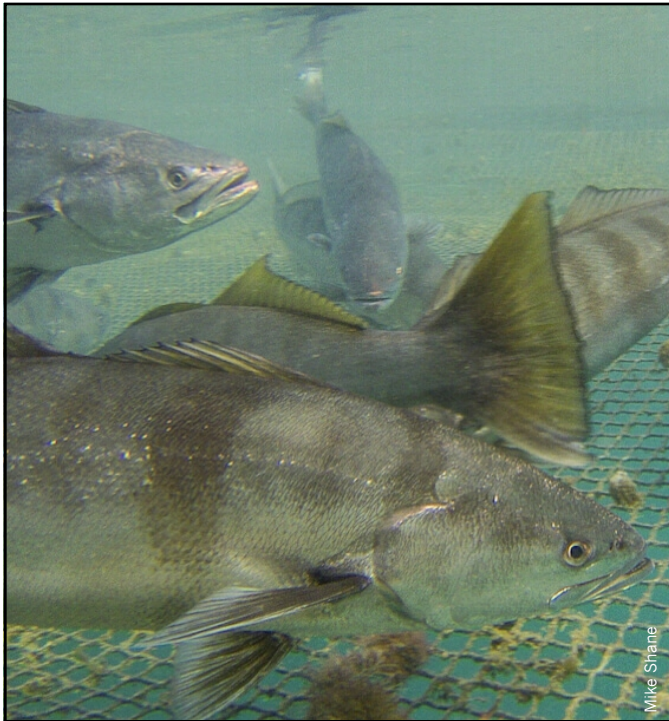


Figure 6.4, White Seabass Stock Assessment 2016

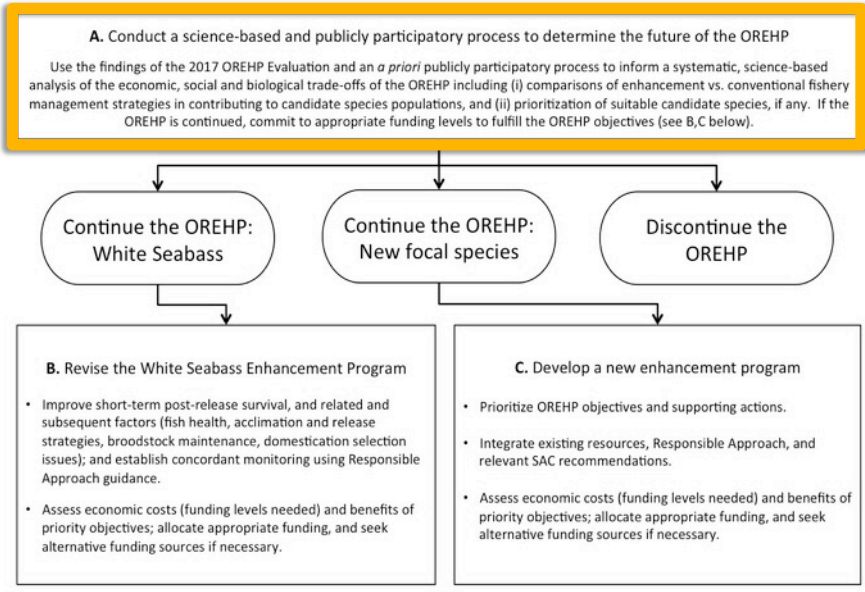


Evaluation Roadmap

- Background
- Findings
- Recommendations



OREHP Action and Decision Tree



Recommendations

- Put forth by the independent review committee
- No options have been assessed and no decisions have been made






Common name	Scientific name
California Halibut*	<i>Paralichthys californicus</i>
Yellowtail	<i>Seriola lalandi</i>
Kelp (Calico) Bass	<i>Paralabrax clathratus</i>
Giant (Black) Sea Bass	<i>Stereolepis gigas</i>
Spotted Sand Bass	<i>Paralabrax maculatofasciatus</i>
Corbina	<i>Menticirrhus undulatus</i>
California Sheephead*	<i>Semicossyphus pulcher</i>
Barred Sand Bass	<i>Paralabrax nebulifer</i>
Cabezon	<i>Scorpaenichthys marmoratus</i>
Other Rockfish	<i>Sebastes spp.</i>
Scorpionfish	<i>Scorpaena guttata</i>
Spotfin Croaker	<i>Roncador stearnsii</i>
Brown, Gopher or Grass Rockfish	<i>Sebastes auriculatus, S. carnatus, S. rastrelliger</i>
Red, Pink, Green or White Abalone	<i>Haliotis rufescens, H. corrugata, H. fulgens, H. sorenseni</i>

Recommendations

A-1. Engage the public in the decision process

A-2. Assess the trade-offs of the program for White Seabass & other candidate species



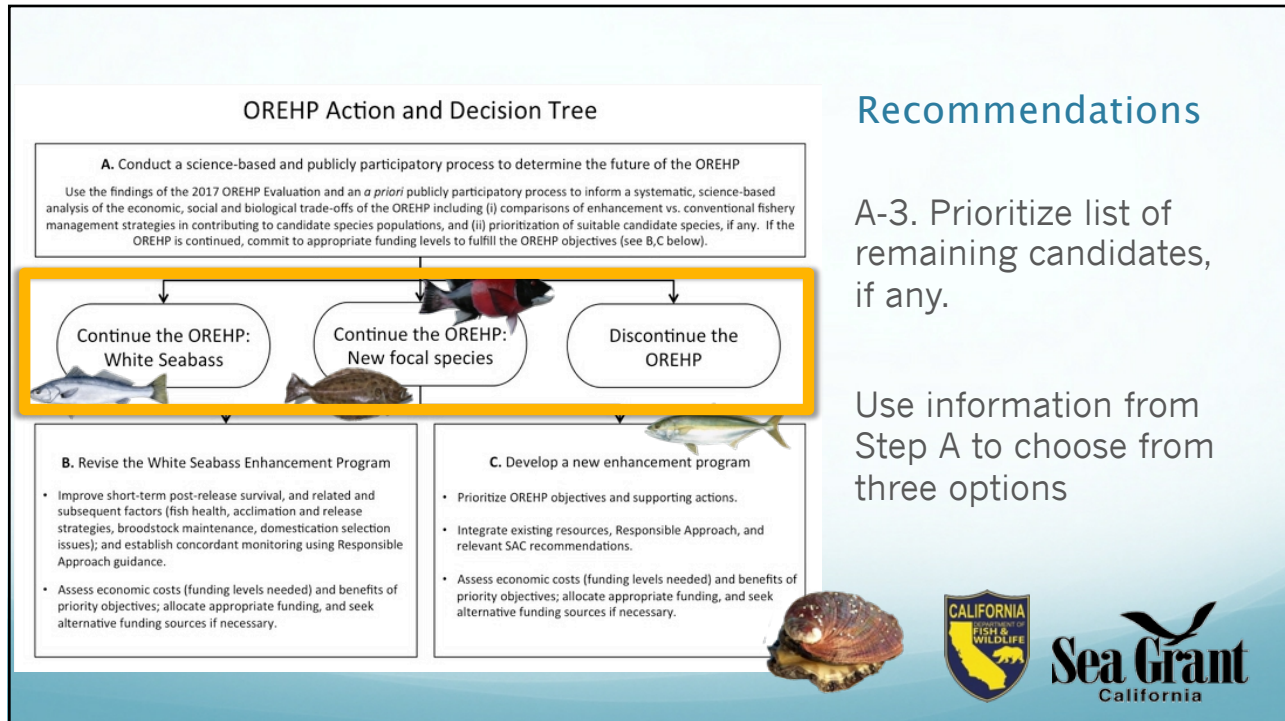


Recommendations

A-2. Assess trade-offs
Enhancement vs.

- Conventional fishery management
- Responses to the environment



Recommendations

A-3. Prioritize list of remaining candidates, if any.

Use information from Step A to choose from three options



Recommendations

The option to discontinue the OREHP

- Requires an act of the Legislature
- Determine the legal and practical feasibility of various alternatives




OREHP Action and Decision Tree


A. Conduct a science-based and publicly participatory process to determine the future of the OREHP

Use the findings of the 2017 OREHP Evaluation and an *a priori* publicly participatory process to inform a systematic, science-based analysis of the economic, social and biological trade-offs of the OREHP including (i) comparisons of enhancement vs. conventional fishery management strategies in contributing to candidate species populations, and (ii) prioritization of suitable candidate species, if any. If the OREHP is continued, commit to appropriate funding levels to fulfill the OREHP objectives (see B,C below).


Continue the OREHP:
White Seabass



Continue the OREHP:
New focal species



Discontinue the
OREHP



B. Revise the White Seabass Enhancement Program

- Improve short-term post-release survival, and related and subsequent factors (fish health, acclimation and release strategies, broodstock maintenance, domestication selection issues); and establish concordant monitoring using Responsible Approach guidance.
- Assess economic costs (funding levels needed) and benefits of priority objectives; allocate appropriate funding, and seek alternative funding sources if necessary.

C. Develop a new enhancement program

- Prioritize OREHP objectives and supporting actions.
- Integrate existing resources, Responsible Approach, and relevant SAC recommendations.
- Assess economic costs (funding levels needed) and benefits of priority objectives; allocate appropriate funding, and seek alternative funding sources if necessary.

Recommendations

If suitable candidates are identified, then consider continuation

- Determine & allocate appropriate funding
- Establish an independent STAC



Recommendations

B. Modify the White Seabass Enhancement Program

- Improve short-term post release mortality (including related and subsequent factors)
- Establish concordant monitoring





Tuna Harbor Dockside Market

Recommendations

C. Develop an enhancement program for a new species

- Integrate existing resources and relevant recommendations
- Identify new challenges, establish new goals & objectives



Evaluation Acknowledgements

- OREHP Evaluation Science Advisory Committee
- OREHP Science Review Panels
- Various scientists willing to answer questions about their research and enhancement/stocking programs
- Hubbs-SeaWorld Research Institute
- Funding for evaluation provided by CDFW from the OREHP funds



Appendix 2: The OREHP Town Hall Meeting Social Media Kit

TOWN HALL MEETING

DISCUSSION OF THE FUTURE OF THE OCEAN RESOURCES ENHANCEMENT AND HATCHERY PROGRAM (OREHP)



JUNE 4, 2018 — GOLETA, CALIFORNIA

Time: 5:30-7:30 pm

Location: Goleta Valley Community Center,
Classrooms 1 & 2

5679 Hollister Avenue, Goleta, CA 93117

Parking: Free parking available in the
Community Center's lots

JUNE 7, 2018 — SAN DIEGO, CALIFORNIA

Time: 5:30-7:30 pm

Location: Port of San Diego Administration
Building, Board Room

3165 Pacific Highway, San Diego, CA 92101

Parking: Free parking available in the Port of
San Diego's lots

JUNE 11, 2018 — SAN PEDRO, CALIFORNIA

Time: 5:30-7:30 pm

Location: Cabrillo Marine Aquarium,
Auditorium

3720 Stephen M. White Drive, San Pedro, CA
90731

Parking: \$1/hour metered parking available in
the Aquarium's lot. Parking will be pre-paid for
the first 70 people; park and retrieve your
pre-paid ticket in the Auditorium

The California Department of Fish and Wildlife (Department) invites interested members of the public to a discussion of the results of the Evaluation of the Ocean Resources Enhancement and Hatchery Program (OREHP). The Town Hall, facilitated by California Sea Grant, will include a short presentation on the results of the recent evaluation, and opportunities to provide feedback to the Department about potential future directions for the OREHP.

Participants will have the chance to provide input in three ways: 1) informal discussion, 2) short written surveys, and/or 3) three minute verbal public comment (note that participants may cede their three minutes to other participants, for a maximum speaking time of nine minutes per individual).

Contact: Theresa Talley at tstalley@ucsd.edu or 858-200-6975





Social Media Kit: OREHP Town Hall

Background

The California Department of Fish and Wildlife is inviting interested members of the public to a discussion of the evaluation results and the future of the Ocean Resources Enhancement and Hatchery Program (OREHP). The Town Hall, facilitated by California Sea Grant, will include a short presentation on the results of the recent evaluation, and opportunities to provide feedback to the Department about potential future directions for the OREHP.

In addition to posting this information locally, the town hall announcement will be shared on social media channels.

The posts below are provided for convenience or feel free to share your own.

Event webpage:

CA Sea Grant: <https://caseagrants.ucsd.edu/events/>

Tweets:

Are you a saltwater angler? Curious about [#whiteseabass](#)? @CaliforniaDFW invites the public to a town hall discussion about Ocean Resources Enhancement and Hatchery Program (OREHP), facilitated by @CASeaGrant <https://caseagrants.ucsd.edu/events/>

Join @CaliforniaDFW for a discussion about the future of Ocean Resources Enhancement and Hatchery Program (OREHP), facilitated by @CASeaGrant <https://caseagrants.ucsd.edu/events/#whiteseabass>

Facebook/Instagram:

The [California Department of Fish and Wildlife](#) invites you to join the discussion of the future of the Ocean Resources Enhancement and Hatchery Program (OREHP), facilitated by [California Sea Grant](#), at a town hall near you [#whiteseabass](#)

June 4, 2018 – Goleta

June 7, 2018 – San Diego

June 11, 2018 – San Pedro

<https://caseagrants.ucsd.edu/events/>

Images (for use with any channel)

TOWN HALL MEETING

Join the discussion of the future of the Ocean Resources Enhancement and Hatchery Program (OREHP) at a town hall near you

June 4, 2018 - Goleta
June 7, 2018 - San Diego
June 11, 2018 - San Pedro




SALTWATER ANGLERS...

Join the discussion of the future of the Ocean Resources Enhancement and Hatchery Program (OREHP) at 3 town hall locations in Southern California

June 4, 2018 - Goleta
June 7, 2018 - San Diego
June 11, 2018 - San Pedro

DO YOU FISH IN SOUTHERN CALIFORNIA?

The California Department of Fish and Wildlife invites the public to a discussion of the future of the Ocean Resources Enhancement and Hatchery Program (OREHP) at a town hall near you

June 4, 2018 - Goleta
June 7, 2018 - San Diego
June 11, 2018 - San Pedro




SALTWATER ANGLERS...

The California Department of Fish and Wildlife invites you to join the discussion of the future of the Ocean Resources Enhancement and Hatchery Program (OREHP) at a town hall near you

June 4, 2018 - Goleta
June 7, 2018 - San Diego
June 11, 2018 - San Pedro

Appendix 3: The OREHP Town Hall Meeting Anonymous Survey

Date: ____ June 2018 (please fill in the date)

Participant Survey OREHP Town Hall Meetings

Welcome to the Ocean Resources Enhancement and Hatchery Program (OREHP) Town Hall Meetings. The purpose of these Town Hall Meetings, and this survey, is to gather public ideas about the results of the recent evaluation of OREHP, as presented in the December 2017 report: "Evaluation of the Ocean Resources Enhancement and Hatchery Program." A summary of the evaluation will be presented at the Town Hall Meetings, and the full report can be accessed at: caseagrants.ucsd.edu/project/orehp-evaluation

The California Department of Fish and Wildlife is interested in your thoughts about the current status and future direction of the OREHP program. This 11-question survey is intended to complement the input opportunities you will have at the Town Hall Meetings. The survey should take 10-15 min to complete. The information you provide using this survey (and verbal comments throughout the meeting) will be compiled and provided to CDFW to help inform the future of the OREHP.

Survey Instructions

1. This survey is anonymous and completely voluntary; you may decline to answer any or all questions by simply skipping them.
2. For the multiple-choice questions below, please "X" or check-off the most appropriate answers; for open-ended questions, please neatly write a brief answer in the space provided.
3. If you have questions or need help completing the survey, please ask a California Sea Grant or California Department of Fish and Wildlife staff member for assistance.
4. Please leave this survey in the designated location once it is completed.

Survey Questions

1. Which of the following stakeholder groups do you **most** identify with? (Choose more than one, if needed.)
 - Recreational anglers - beach/bank/pier anglers
 - Recreational anglers - private vessel anglers (including kayak fishers)
 - Commercial fishermen
 - Sportfishing business (CPFV vessels)
 - Other commercial passenger vessel (CPV) business (e.g., whale watching, dive/snorkel, kayak fishing guides/rentals)
 - Non-consumptive recreational outdoor enthusiasts (e.g., diver, kayaker, photographer)
 - Coastal business (other than CPV-business)
 - Conservation or environmental group
 - Academic Scientist
 - Resource manager/member of a management agency
 - Other (explain) _____
2. If you are a recreational or commercial fisherman, how long is your boat and what is/are your primary gear type(s) (for all species, not only White Seabass?). Leave blank if you are not a fisherman.
 - A. Boat length(s):
 - B. Primary gear type(s):
3. In which Port, Harbor or city/town is your business, organization or main activity based?

4. Have you been personally involved with the OREHP? If so, in what capacity? (Choose all that apply.)
- No, I am not personally involved with the OREHP
 - Employed all or in part through the OREHP
 - Volunteered at the Carlsbad hatchery or Mission Bay facility
 - Volunteered at growout facilities
 - Supplied White Seabass heads for tag identification
 - Participated in White Seabass fishing competitions to find tagged fish
 - Assisted in the collection of White Seabass for broodstock
 - Donated truck or boat time to help with White Seabass transfers
 - Participated in education activities (e.g., seabass in the Classroom)
 - Conducted or participated in OREHP-related research
 - Other (explain):
5. What do you **most value** about the OREHP? (Choose one.)
The OREHP contributes to:
- My livelihood (directly or indirectly)
 - The recreational or leisure activities that I care about
 - The coastal economy
 - The health of the ocean and its inhabitants
 - Educational opportunities or experiences
 - My ability to contribute to a greater good (e.g., strengthening a resource or environmental stewardship)
 - Scientific discoveries surrounding the biology and culture of wild fishes
 - None of these things
 - Other (explain):
6. What would you estimate is the percentage of your annual income that is related to White Seabass (e.g., catching and selling White Seabass, hosting anglers on your boat to catch White Seabass, etc.)? Choose one.
- 0% (Not Applicable)
 - <10%
 - 11-33%
 - 34-66%
 - >67%
 - Unsure
7. Given the findings of the OREHP Review Committee, in your opinion, should the OREHP be continued and, if so, in what form? (Choose one.)
- Yes, continue with White Seabass
 - Yes, continue with White Seabass and phase in another species
 - Yes, but phase out White Seabass and continue with another species
 - No, but seek to continue the funding sources, and apply funds to other fishery or ocean related management efforts
 - No, discontinue it all together
 - Not sure/undecided

8. The Ocean Enhancement Stamp provides dedicated funding for the OREHP and supports a portion of total program costs. Currently, the Ocean Enhancement stamp costs:
- \$5.40 when purchased with a \$48.34 recreational fishing permit
 - \$52.27 when purchased with a \$141.11 commercial fishing permit
- A. If the OREHP *continues with White Seabass*, what would you be willing to pay into the California Ocean Enhancement fund? (Choose one.)
- I don't want to pay anything (\$0)
 - I would prefer to pay less than the current rates
 - I would be willing to pay the same
 - I would be willing to pay more
- B. If the OREHP *continues with another species*, what would you be willing to pay into the California Ocean Enhancement fund? (Choose one.)
- I don't want to pay anything (\$0)
 - I would prefer to pay less than the current rates
 - I would be willing to pay the same
 - I would be willing to pay more
 - It depends on the new species chosen
9. If you think funding levels for the OREHP should increase, what other funding mechanisms should the project partners explore?
10. If the OREHP does not continue, do you support continuation of the Ocean Enhancement Stamp to fund other related efforts to enhance fisheries?
- No
 - It depends*
 - Yes*
 - Unsure

* If it depends or if yes, state what efforts you would like to see (better) funded (e.g., management, education...)?

11. Do you have any other comments or suggestions? Please write them here.