Appendix 3: Ocean Enhancement Validation Holder Survey

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Ocean Enhancement Validation Holder Survey

Project no. P2170016

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Table of contents

Executive Summary

The 2017 Ocean Resources Enhancement and Hatchery Program (OREHP) Evaluation revealed successes in improving understanding of marine finfish biology and hatchery science, but highlighted challenges such as low contribution to wild stocks and limited integration with fisheries management. In 2020, California Legislature passed AB 1949 which mandated reform of the Program with an evaluation to be completed by 2028, in part based on stakeholder input. California Sea Grant was contracted in 2022 to obtain the stakeholder input for this reform process consisting of an initial situation assessment that informed a stakeholder focus group and a stakeholder (Ocean Enhancement Validation holder) survey. This report presents the methods and findings of that survey.

An online stakeholder survey was conducted of Ocean Enhancement Validation holders, namely recreational and commercial fishers and charter fishing operators in Southern California. The survey revealed that Ocean Enhancement Validation holders on average believed that OREHP was at least somewhat successful. When asked to rate the importance of different success criteria, respondents judged a broad range of criteria to be important. Of high importance were a variety of criteria related to research on both hatchery operations and the ecology of wild fish, fisheries and ocean management that support fisheries, and population enhancement (e.g., an increase in the White Seabass population). Criteria related to education and volunteer participation were also rated as important.

The fact that stakeholders identified a broad range of criteria for program success was notable because it implies that achieving population enhancement (e.g., a particular level of increase) does not make or break the program in their minds. The strong and consistent support for broad ecology and conservation efforts associated with the Program was evidenced by responses throughout the survey that favored not only criteria, but also management strategies, and programs that prioritize these efforts. Respondents favored broadening the OREHP in a variety of ways including contributing to assessments of fish stocks to inform associated fishery and environmental management, integrating the Program into target-species fisheries management, discussing new species to stock in addition to or instead of White Seabass, and improving communication through more effective and transparent outreach.

The findings of this survey, in addition to those of the situation assessment and focus group, were synthesized and used to craft recommendations for setting and achieving short-term (achievable by 2027) and longer-term success criteria. This information can be found in the final report, *Developing a vision, criteria and options for the future of the Ocean Resources Enhancement and Hatchery Program.*

Ocean Enhancement Validation Holder Survey Report

Introduction

The California Department of Fish and Wildlife (CDFW) has contracted California Sea Grant (CASG) to gather stakeholder input to inform the development of a vision, goals and criteria for the future of the Ocean Resources Enhancement and Hatchery Program (OREHP). The stakeholder input process consisted of three components: 1) an initial situation analysis conducted through an interview study; 2) a focus group involving key stakeholders, and 3) a survey of Ocean Enhancement Validation holders. **This report presents the results of the Ocean Enhancement Validation holder survey.**

Goal of the Ocean Enhancement Validation holder survey

The OREHP is funded in large part by the sales of Ocean Enhancement Validations (also known as Ocean Enhancement stamps) which are required for both recreational anglers and commercial fishermen fishing in coastal waters of Southern California. The purpose of the survey was to obtain quantitative information on characteristics, experiences, attitudes and preferences of validation stamp holders with respect to the OREHP. The survey was developed by the project team with input from the stakeholder focus group.

Methods

Survey design

The survey was designed to collect information on validation holder demographics, awareness and perceptions of the OREHP, attitudes toward fisheries management including stock enhancement, fishing behavior and motivations, fisheries and conservation program preferences, willingness to pay for the OREHP as a stock enhancement program, etc. The survey started with a brief description of the OREHP including a link to the CDFW OREHP web page which provides access to detailed information including the 2017 evaluation report. The survey was approved as exempt by the UCSD and UF Institutional Review Boards.

Ocean Enhancement Validations

A validation is purchased along with annual recreational fishing licenses and commercial fishing permits. In 2023, recreational anglers who purchased a fishing license and fished in ocean waters south of Point Arguello (Santa Barbara County) were required to buy an Ocean Enhancement Validation for $6.30. The Ocean Enhancement Validation was not required when fishing under the authority of a one or two-day sport fishing license. In 2024, this fee increased to $7.05. The purchase of a Commercial Ocean Enhancement Stamp was required for both commercial passenger fishing vessels or charter boats (hereafter “charters”) operating south of Point Arguello (Santa Barbara County), and any commercial fisher who takes, possesses aboard a commercial fishing vessel or lands any White Seabass south of Point Arguello. A commercial fishing validation was $68 in 2023 and is $67.21 in 2024.

Data collection

The online survey was designed and distributed via email using Qualtrics software. Participants were sampled in different ways. Recreational anglers and commercial fishers who fish ocean waters south of Point Arguello are required to purchase an Ocean Enhancement Validation when they buy their fishing license (recreational) or permit (commercial). Licenses and permits are sold by the California Department of Fish and Wildlife, the contracting party of this survey. Therefore, surveys were distributed to the people in the license and permit holder database between November 15, 2022 and November 14, 2023 who, upon purchase of their license or permit, also bought an Ocean Enhancement Validation and provided an optional email address. This option explicitly indicated consent to receive messages about CDFW business. Charter operators are required to purchase an Ocean Enhancement Validation for their vessels but not a fishing license or permit (CDFW 2023, FGC §7850.5[1]). Therefore a list of charter boats was obtained from the CDFW which did not include email addresses, and contact information for vessel operators was gathered from the internet.

From a list of more than two million recreational licenses, 271,194 were Enhancement Validation holders. Of these, 116,810 had registered their emails at the time of purchase. From this total, a random sample of 60,000 was selected. The list of commercial Enhancement Validation holders was 1,531 and only 1,375 contained emails, therefore the survey was sent to the whole population to ensure a sufficient sample. The list of charter operators contained only 76 emails. All respondents were contacted between January 22, 2023 and February 2, 2023 using personalized emails with links to the survey and two additional reminders.

Data analysis

Descriptive statistics (e.g., average, frequency) and confidence intervals were calculated to summarize survey data. Summary data were then graphed for visualization and interpretation. All data analyses were performed using Microsoft Excel. Confidence intervals (95%) were used to visually compare groups (recreational, commercial, and charter). However, those with smaller sample sizes (commercial and charter) had much larger confidence intervals. So, even though those help quantify uncertainty and compare results, the large differences in sample sizes call for caution when making inferences regarding significant differences between the groups.

Further caution should be taken when making inferences about the wider charter population, since the sampling for that group was done through an online search, whereas the sampling for recreational and commercial fishing groups could be randomized since it was done using CDFW's permit lists with email addresses. This means that the charter data is not considered a representative sample in the same way as the other two groups.

Results & Discussion

Survey participants

Response rates

Of 60,000 email invitations sent to recreational anglers, 1,325 emails bounced. Of the remaining 58,675 invitations, 8.4% of anglers (4,905) at least opened or started the survey, and 74% of

[1] CDFW (California Department of Fish and Wildlife). 2023. Commercial Fishing License Requirements: Commercial fishing license exemptions (FGC §7850.5). p. 13 in *2023 Commercial Fishing Digest*. https://wildlife.ca.gov/Fishing/Commercial

those (3,648/4,905) completed the survey. This translates to a 6.2% adjusted response rate for recreational anglers. From the 1,375 email invitations sent to commercial fishers, 35 emails bounced. Of the remaining 1,340 invitations, 15.1% (203/1340) of those at least started the survey and 74.4% of those (151/203) completed the survey. This translates to an 11.1% adjusted response rate for commercial fishers. This percentage was very similar for charter operators, meaning only seven people opened and finished the survey (Table 1).

Some people have multiple roles in fishing. For example, commercial fishers and charter boat operators may also hold recreational fishing permits, and charter operators can hold commercial permits. Respondents were, therefore, asked to self-assess their identity so that they could participate in the survey in the sole role that was most relevant or important to them. This explains why the number of *surveys finished* and *respondent self-identification* vary per sector. For example, the number of respondents who self-identified as charter operators were 99 but there were only 76 emails sent to charter operators. Out of these, only 9 surveys were finished from that email list. This is possible if people from the commercial and/or recreational list identified primarily as a charter operator. In the end, 3,479 respondents (91.4%) identified as recreational anglers, 127 (3.3%) identified as commercial fishers, 99 (2.6%) identified as charter operators, and 101 (2.7%) identified as neither of those identities or chose not to respond (Table 1).

Table 1. Response rates of Ocean Enhancement Validation holders to the survey. Emails refers to the email invitation to complete the survey that was sent to validation holders. Data are from January 22, 2023 and February 2, 2023.

Variable	Recreational	Commercial	Charter
Emails sent	60,000	1,375	76
Emails bounced	1,325	35	10
Duplicate email addresses (removed)	0	0	3
Actual emails	58,675	1,340	63
Survey started	4,981	203	9
Survey finished	3,648	151	7
Response rate (survey started / actual emails)	8.5%	15.1%	14.3%
Completion rate (surveys finished / surveys started)	73.3%	74.4%	77.8%
Adjusted response rate (surveys finished / actual emails)	6.2%	11.3%	11.1%
Respondent self-identification	3,479	127	99
Total Enhancement Validation holders	271,194	1,531	n/a
Total Enhancement Validation holders with email	116,810	1,377	n/a

Sample sizes
Throughout this report, sample sizes (n values) are given in the figure legends. Sample sizes for particular questions may vary since not all respondents completed the whole survey or answered every question.

Checking for non-response bias
To check for possible non-response bias, responses by the last respondents were compared to those of the first. This is a common practice and based on the idea that respondents filling out the survey late and after multiple reminders are more representative of non-respondents than those who responded early. The first and last 10% of respondents in the recreational angler representative sample were used for this test. Numbers of commercial and charter respondents were too low to conduct a meaningful test. Given a representative angler sample of n=3,479, using 10% of respondents led to a comparison of the first and last 348 respondents. No significant differences were detected between the first and last respondents in any of the survey scores, and any differences were generally less than 10% of the average scores. Therefore, no evidence was found for significant non-response bias in the representative angler survey.

Respondent Demographics

The mean and median ages of respondents were 56 and 58, respectively, with a range of 19 to 99 years of age. The majority of respondents were male (93.1%), 4% were female, 0.3% were non-binary/third gender, and 2.6% preferred not to say. Most respondents (67.3%) identified as white, followed by people identifying as two or more races (11%), Asian (9.3%), and Hispanic or Latino (8.4%). The lowest proportions were of those identifying as American Indian or Alaskan Native (1.1%), Black or African American (2%), and Native Hawaiian or Other Pacific Islander (1%) (Figure 1). The survey was only offered in English and therefore may under-represent respondents from these groups who were non-English speakers.

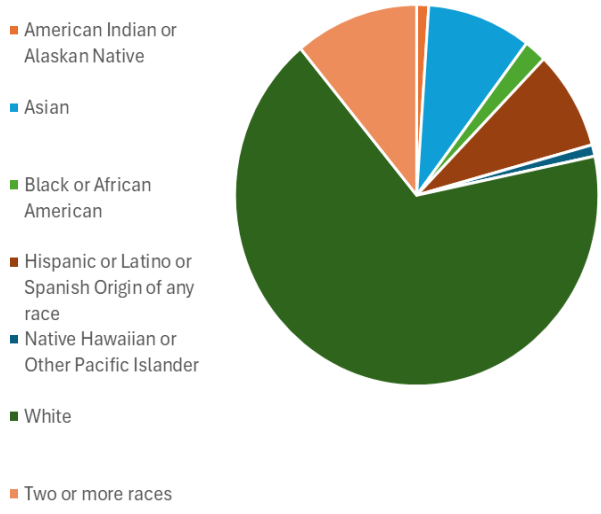


Figure 1. Self-identified ethnicity of survey respondents.

Nearly 25% of respondents had an annual household income range of $101-150k, with 22% earning between $50-100k and 16% earning above $250k. Only 8.8% earned less than $50k (Figure 2). Most respondents (70.1%) were not members of any fishing-related groups or

organizations. Of those who said they were members, most belonged to local angling clubs (12.4%) and Coastal Conservation Association (CCA; 7.1%) (Figure 3).

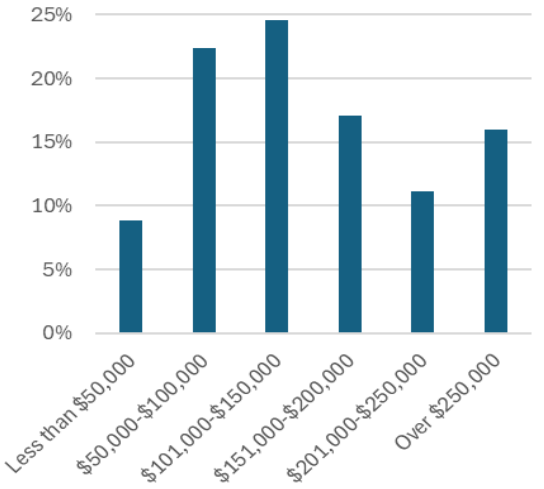


Figure 2. Annual household income of survey respondents.

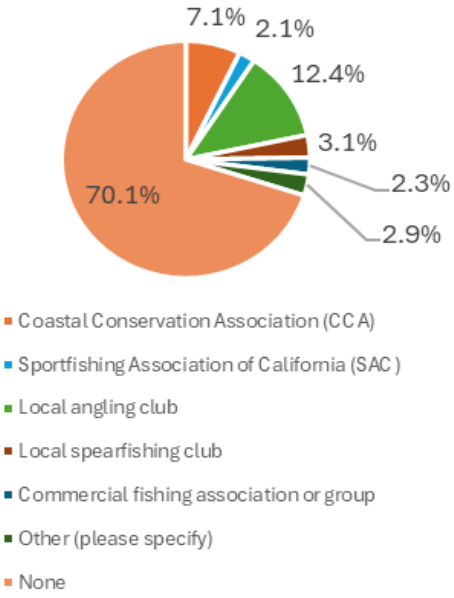


Figure 3. Survey respondent membership in organization.

Familiarity with OREHP

When asked about the level of familiarity with the OREHP, 49% of all respondents answered they were *not at all familiar* with the OREHP leaving about half who felt they were at least *slightly familiar* with the Program. Those *extremely* and *moderately familiar* with the Program totaled 11% of respondents (Figure 4). Recreational respondents were on average the least familiar with the OREHP followed by commercial fishing and charter operators (Figure 5).

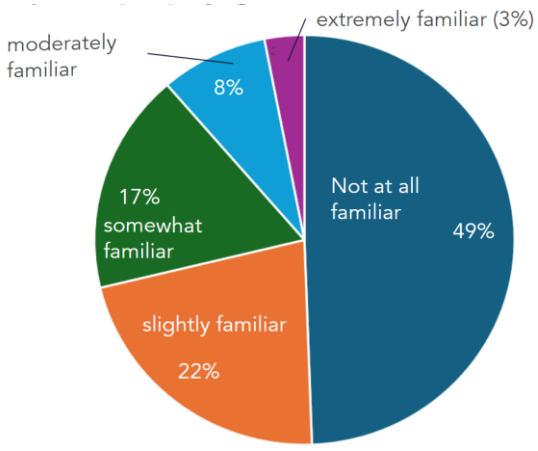


Figure 4. Responses to the question: *How familiar do you feel you are with The Ocean Resources Enhancement and Hatchery Program (OREHP)?*

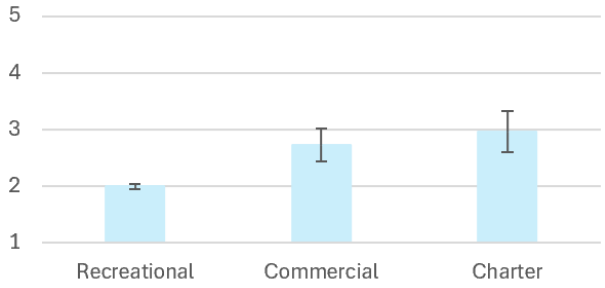


Figure 5. Average (±95% CI) familiarity with the OREHP of respondents (Scale: 1=not at all familiar; 2=slightly familiar; 3=somewhat familiar; 4=moderately familiar; 5=extremely familiar).

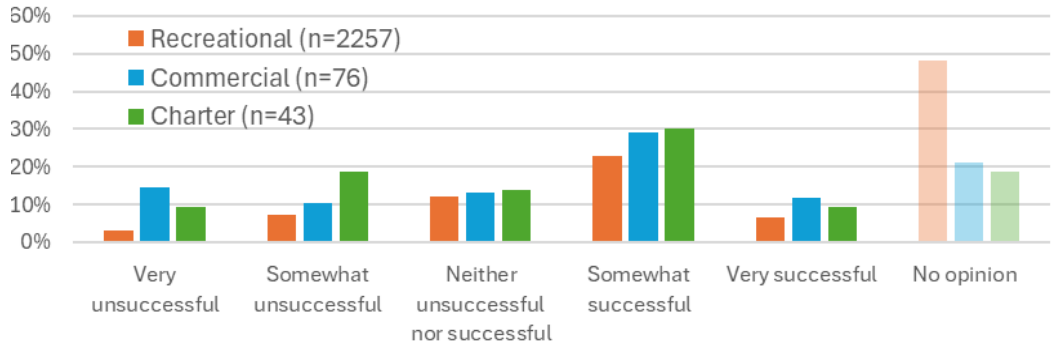
Perceptions of OREHP success

Perceptions of overall OREHP success

When asked about perceptions of Program success, one of the answers respondents could check was "*no opinion*" (option 6 – which was excluded from the average calculation). Nearly half the recreational respondents had no opinion (Figure 6A), which aligns with the lack of familiarity with the OREHP expressed by about half the recreational respondents. There were respondents, however, who were unfamiliar with the Program yet viewed it as a success- it is uncertain whether this is so because of an informed belief or due to other external factors such as assuming that the Department's support and longevity of the Program are indicators of success. About 20% of commercial and charter respondents had no opinion either (Figure 6A), which was the second most common response from these two groups.

Of those respondents who did have an opinion, most thought it was at least *somewhat successful* across the three groups (Figure 6B). Despite the extreme opinions of *very unsuccessful* and *very successful* receiving the least responses, the commercial fishing respondents were the most common in choosing these polarized categories (Figure 6A).

A. **Stakeholder response rate for each success level**



B. **Average level of success of the OREHP by stakeholder group**

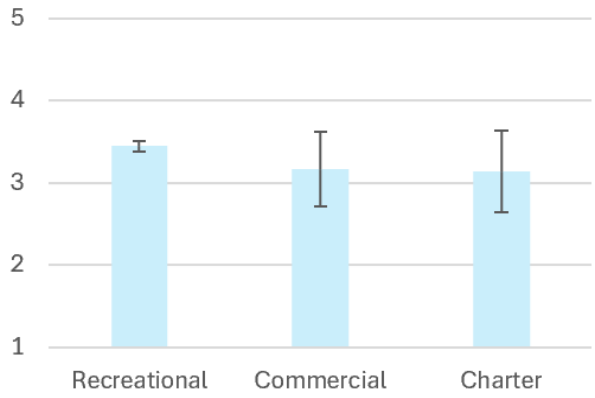


Figure 6. Responses to the question: *Overall, how successful do you think the OREHP is?* presented as (A) response rates of each stakeholder group by success level and (B) average (±95% CI) success level of each stakeholder group (1=very unsuccessful; 2= unsuccessful; 3=neither unsuccessful nor successful; 4=successful; 5= very successful; 6=no opinion (excluded from average calculations)).

Perceptions of OREHP hatchery contribution to the White Seabass population

The survey asked about respondents' perceptions of the hatchery Program's contribution to the White Seabass population (i.e., the proportion of fish in the population that are of hatchery origin). Perceptions of hatchery contribution varied widely, ranging from "*less than 1%*" to "*more than 50%*" (Figure 7). The most common perception was "*1-10%*" (34-39% of respondents), followed by "*less than 1%*" (24-32% of respondents), while 32-37% respondents perceived the contribution to exceed 10% (Figure 7). The true hatchery contribution has been estimated at less than 1% of the fishable and spawning population (adults) and around 7% in juveniles, based on the OREHP tagging data (CASG 2017). A recent study based on genetic parentage assignments hinted at the possibility of larger hatchery contributions (Reiber and Darden 2022); but a peer review by the OREHP SAC and two independent experts concluded that those contribution estimates were likely unreliable. An independent study to estimate hatchery contributions from by genetic parentage assignments is currently being conducted by CDFW. Despite contribution estimates like these having been made public over recent years, understanding how these contributions are calculated or even what the contribution levels mean are not likely broad public knowledge. Many of the respondents were not familiar with the Program, so it is uncertain what information their responses are based on. However, the value of this question lies in understanding their perceptions of contribution and its relation to success.

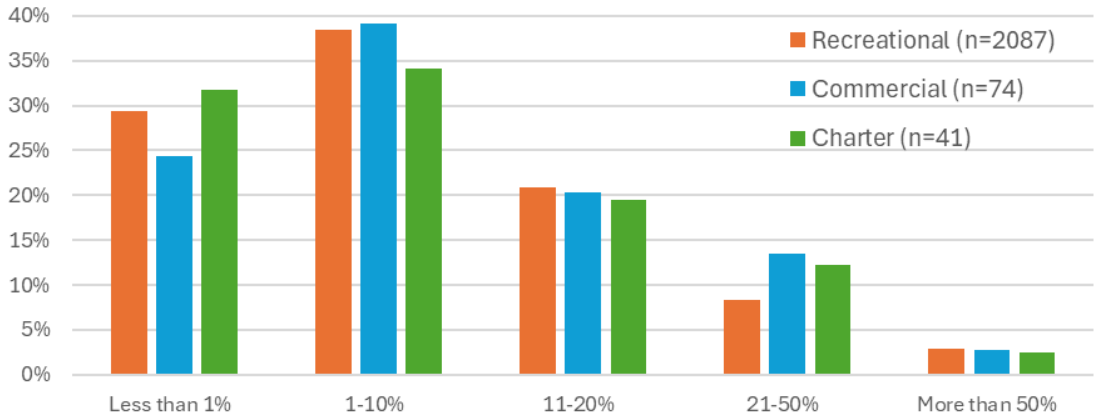


Figure 7. Responses to the question: *What percentage of the current White Seabass population in the ocean off Southern California do you think was stocked from the OREHP hatchery?* (Contribution scale: 1=less than 1%; 2=1-10%; 3=11-20%; 4=21-50%; 5=more than 50%).

Perceptions of the OREHP success were somewhat correlated with perceptions of wild stock contribution level. Most people who thought the Program was *very unsuccessful* also believed it was contributing <*1%* (Figure 8). Most who thought it was *very successful* also believed it was contributing *11-20%* or more. The largest proportion of all respondents thought the Program was *successful* and also thought that it was contributing *1-10%* and *11-20%* to wild stocks (Figure 8). But there were respondents who believed the Program was *successful* or *very successful* despite also believing the contribution rate was <*1%*. Most of the respondents who chose "*no opinion*" for the level of success of OREHP also believed that the contribution was *less than 10%* (Figure 8).

Increased familiarity of respondents with the OREHP was somewhat correlated with more positive perceptions of the Program's success and contributions to the wild stock (Figure 9). But those extremely familiar with the Program believed on average that contributions were slightly lower than those who were moderately familiar, and those extremely familiar had similar views of OREHP success as those who were not familiar at all.

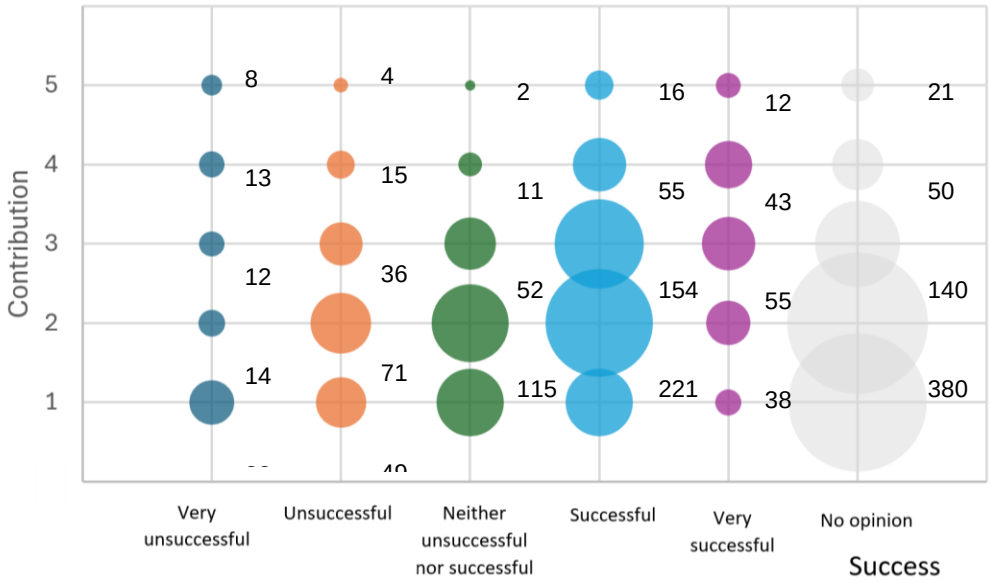


Figure 8. Perceptions of contribution against success for all respondents. (Contribution scale: 1=less than 1%; 2=1-10%; 3=11-20%; 4=21-50%; 5=more than 50%. Success scale: 1=very unsuccessful; 2=unsuccessful; 3=neither unsuccessful nor successful; 4=successful; 5=very successful; 6=no opinion (not counted towards mean averages)).

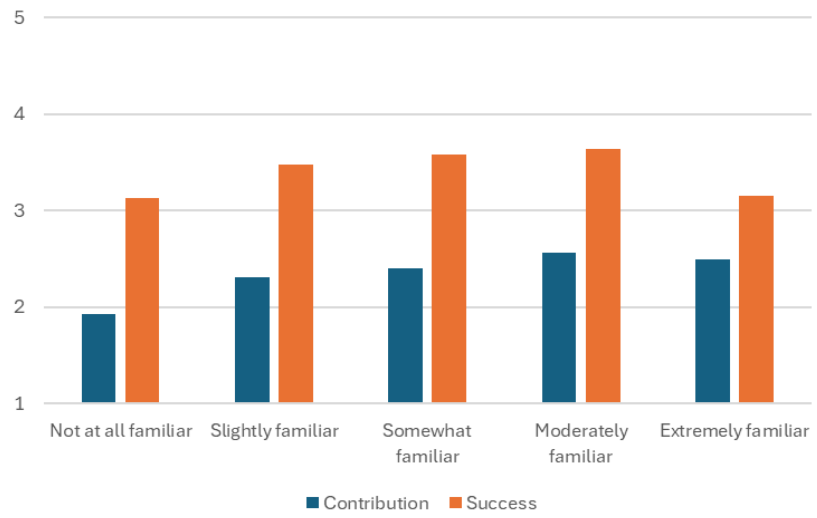


Figure 9. Perceptions of hatchery contribution and success with different levels of familiarity. (Contribution scale: 1=less than 1%; 2=1-10%; 3=11-20%; 4=21-50%; 5=more than 50%. Success scale: 1=very unsuccessful; 2=unsuccessful; 3=neither unsuccessful nor successful; 4=successful; 5=very successful; 6=no opinion (not counted towards mean averages)).

Success criteria

Respondents were asked to rate the importance of a range of potential criteria for judging the success of the OREHP. The list of potential success criteria was developed considering input from the focus groups held with key stakeholders. During the focus group meetings, the participants identified criteria important for assessing the success of the OREHP (see Focus Group report section). Some criteria were very specific and required background knowledge of the Program. The survey was designed for an audience (validation holders) assumed to have less knowledge about the Program. Therefore, the statements used in this section of the survey were aligned with the focus group-informed success criteria and the perceived five main elements of the Program (research, enhancement, fisheries and ocean management, education and engagement, and governance) but were broad enough to not require specific programmatic or scientific knowledge (Table 2).

Table 2. Success criteria used in the survey and the main Program elements they relate to.

Success criteria	Program element
The Program generates new scientific knowledge about raising and stocking fish.	Research
The Program generates new scientific knowledge about the ecology and management of wild fish.	Research
Strategies for raising and releasing fish are consistently improved based on new scientific knowledge.	Research
Fish released by OREHP increase the wild white sea bass population even a little.	Enhancement
Fish released by OREHP increase the white sea bass population to the point that it is noticeable in people's fishing experiences.	Enhancement
Fish released by OREHP don't damage the wild fish stocks or ecosystem health.	Enhancement
An education program associated with OREHP helps K-12 students learn about the science related to fish rearing, stocking and conservation.	Education & Engagement
Volunteers from the community participate in OREHP activities such as maintaining grow-out pens and participating in fish releases.	Education & Engagement
Students, volunteers and/or advisory board members involved with OREHP represent diverse groups (e.g. variety of disciplines, race, ethnicity, background).	Education & Engagement

Success criteria	Program element
Data generated from the OREHP are useful for assessing fish stocks and informing fishery and environmental management.	Fisheries & Ocean Management
Traditional ecological knowledge from native communities is integrated into research and decision making.	Governance
Conservation-minded NGOs and community groups are incorporated into the decision-making process.	Governance
OREHP engages diverse communities in its activities.	Education & Engagement
Other criteria (if applicable, please specify).	N/A

The responses from the recreational fishing and charter operator respondents on the importance of each success criterion tended to be in agreement (Figure 10). Commercial fishing respondents' ratings of importance were always lower, although in most cases within 0.5 average point difference. Recreational and charter respondents did not see any of the criteria as unimportant. The two criteria that were rated as least important were related to governance and engagement. These criteria were viewed by commercial respondents as being between unimportant and neutral (Figure 10).

Respondents placed high importance on a range of criteria related to research about both hatchery operations and the ecology of wild fish, and to population enhancement (e.g. increase in the White Seabass population). Criteria related to education and volunteer participation were also rated as important. Notably, population enhancement was not singled out but viewed as one of a broad range of important criteria. Achieving population enhancement (e.g. a particular level of increase) does not make or break the program in the minds of most respondents.

The three criteria viewed as most important were to *not cause damage to the wild fish stock or ecosystem health*, to *generate enough data to assess fisheries and environmental management*, and to *generate new scientific knowledge*. Although these three criteria were most important on average, the small variation between responses and the highly overlapping confidence intervals indicate that respondents view an array of success criteria as important (Figure 10). There was no indication of a preference for discarding any element of the Program.

A number of respondents chose "*other*" criteria and included comments that were sorted into the following topics:

- Communication (n=22 comments)
    - Consulting with stakeholders (e.g., input from commercial, recreational, disabled, subsistence, freedivers)
    - Feedback to public (e.g. visibility, transparent outreach)
- Various advocacy-related comments (n=12) (e.g., no DEI, disregarding a "woke agenda", excluding animal rights)
- Robust and unbiased science (n=7)
- Impact assessments (n=5)
- Prove it works (n=5)
- Fisheries management/regulation/enforcement (n=10)
- Not specific (n=44)

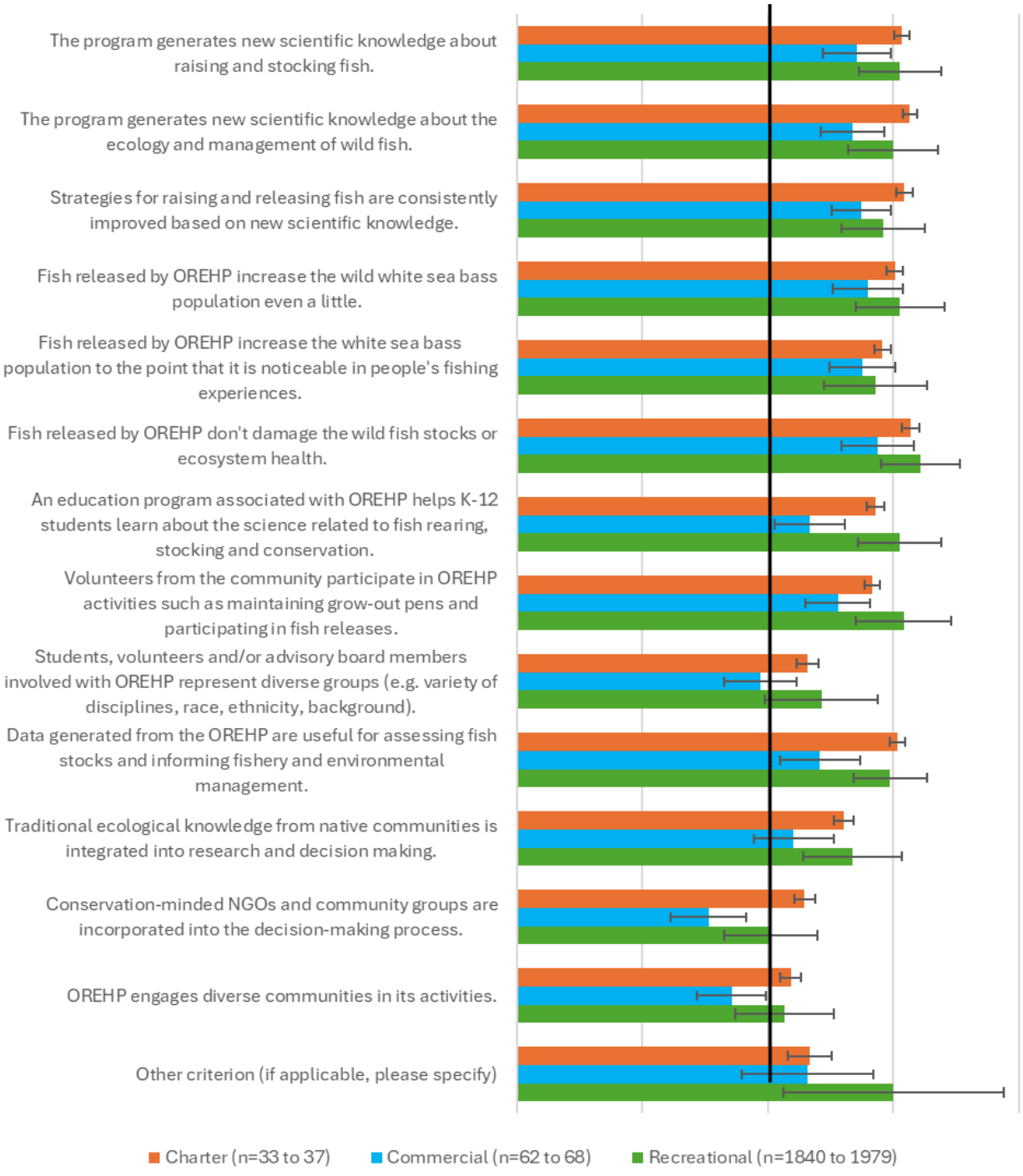


Figure 10. Importance of success criteria. Responses to the question: *If you are to judge the success of the OREHP, how important is each of the following criteria to you?* (Scale: 1=very unimportant; 2=unimportant; 3=neither unimportant nor important; 4=important; 5=very important). Green boxes represent statements that relate to education and engagement; purple boxes represent governance statements; blue boxes represent statements related to fisheries and ocean management; yellow boxes represent enhancement statements, and; red boxes represent research statements.

Willingness to pay in relation to outcomes

In order to further elucidate how validation holders value the Program and different potential outcomes, the survey included a question about respondents' willingness to pay more for the validation stamp subject to different outcome scenarios. Each participant received only one question asking if they would be willing to pay one specific amount in excess of the current validation price considering a specific scenario. Three alternative scenarios associated with the increased payment, (1) "no noticeable changes in the White Seabass population or fishery", (2) "a noticeable improvement in the White Seabass population", and (3) "one-fish increase in (recreational) bag limit (increased harvest opportunity) " were designed to elucidate how respondents value the existence of the hatchery program and specific outcomes related to enhancement of the White Seabass population and/or the fishery.

The willingness to pay questions included the following monetary value and scenario combinations. Each individual was asked only one of the questions with only one of the three values listed.

Recreational

- Ocean Enhancement Validation Stamps contribute to funding for the OREHP White Seabass hatchery program. Validation stamps are $6.25 per year and are required for all saltwater anglers fishing south of Point Arguello, California.
    - Would you be willing to pay $10/$12/$15 for the stamp to support improvements in the hatchery program even if that did not lead to noticeable changes in the White Seabass population or fishery?
    - Would you be willing to pay $10/$12/$15 for the stamp to support improvements in the hatchery program if that led to noticeable improvements in the White Seabass population?
    - Would you be willing to pay $10/$12/$15 for the stamp to support improvements in the hatchery program if that led to a one-fish increase in the White Seabass bag limit?

Commercial

- The Ocean Enhancement Validation contributes funding for the OREHP White Seabass hatchery program. Commercial validations are $63.60 per year and are required for anyone who takes, possesses, or lands White Seabass commercially in waters south of Point Arguello, California.
    - Would you be willing to pay $80/$100/$120 for the validation to support improvements in the hatchery program even if that did not lead to noticeable changes in the White Seabass population or fishery?
    - Would you be willing to pay $80/$100/$120 for the validation to support improvements in the hatchery program if that led to noticeable improvements in the White Seabass population?
    - Would you be willing to pay $80/$100/$120 for the validation to support improvements in the hatchery program if that led to an increase in opportunities to harvest White Seabass?

Each respondent was asked only one realization of this question to avoid bias associated with choosing one answer that then influences their other subsequent answers (aka "anchoring"). For example, if a person decides they would not pay $10 ($3.75 more than the current level) for a validation, then they may automatically choose 'no' for all higher levels. Nine pairwise combinations of three monetary amounts and three different scenarios were offered. This also meant that there were nine potential sample sizes (i.e., different numbers of responses for each pairwise money-scenario question). Recreational fishing responses totalled about 250 for each realization of the

question and provided reliable estimates of willingness to pay. Due to the much smaller size of the commercial fishing sample, only about 8 responses were received per realization of the willingness to pay question and no reliable inferences could be drawn from this sample.

The proportion of recreational respondents willing to pay more for the OREHP validation generally decreased with increasing price (Figure 11). A majority of respondents were willing to pay more for the validation even if that did not result in a noticeable change in the White Seabass population or fishery (dropping marginally below 50% only at the highest price of $15).

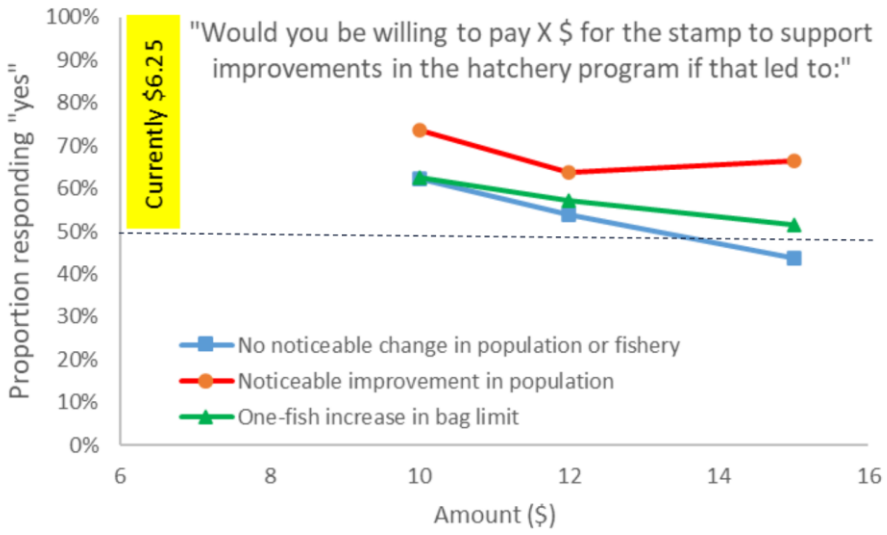


Figure 11. Recreational anglers' willingness to pay a higher amount for the Ocean Enhancement Validation under various scenarios. The cost at the time of the survey ($6.25) was provided as a reference. Results from commercial fishers are not shown because there were too few responses to draw reliable conclusions.

This is indicative of how respondents value the Program for a broad range of reasons other than specific population or fishery enhancement outcomes, consistent with the broad range of success criteria rated as important by respondents. Nonetheless, successful population enhancement would add significantly to the perceived value of the Program, as evidenced by a significantly increased willingness to pay under this scenario. Again, this is consistent with respondents' rating of increasing the White Seabass population as one of several important success criteria. Interestingly, increased harvest opportunity (one-fish increase in bag limit) has only a very slight impact on average willingness to pay, and only at substantially increased price levels. This suggests that recreational validation holders view the OREHP broadly as a stewardship activity and/or that opportunity to harvest is only a weak component of their fishing motivations.

General attitudes towards stocking of hatchery fish

Respondents' general attitudes towards stocking of hatchery fish were elucidated through a series of questions (Figure 12). Respondents overall had a moderately positive attitude towards stocking, agreeing on average with most positive statements about benefits of stocking and disagreeing on average with negative statements such as "*stocking will damage the ecosystem*" or "*stocking cannot improve saltwater fishing*". They also agreed on average that "*The state of California should have an active marine stocking program"*. This indicates that respondents from all sectors (recreational, commercial, and charter) are overall supportive of (marine) fish stocking and have limited awareness of constraints to the effectiveness of stocking or the risks it can pose to wild fish population and ecosystems. However, when asked about stocking in the

context of habitat and fisheries management, respondents on average agreed that "*habitat protection is better than stocking when habitat is poor*", and "*stocking has little benefit when fish populations are well-managed*". Respondents also on average showed a preference for catching wild fish rather than stocked fish. Overall this indicates support for stocking but not over and above other management measures aimed at sustaining or improving wild fish populations.

Respondents on average disagreed with statements about altering their own fishing behavior in response to stocking (e.g., fishing more or changing locations to catch stocked fish). Together with relatively strong agreement with statements about stocking that were focused on restoring or sustaining fish populations and using stocking as a way of giving back to the ecosystem, these response patterns illustrate that stocking is viewed more as a form of stewardship than necessarily a way of improving fishing.

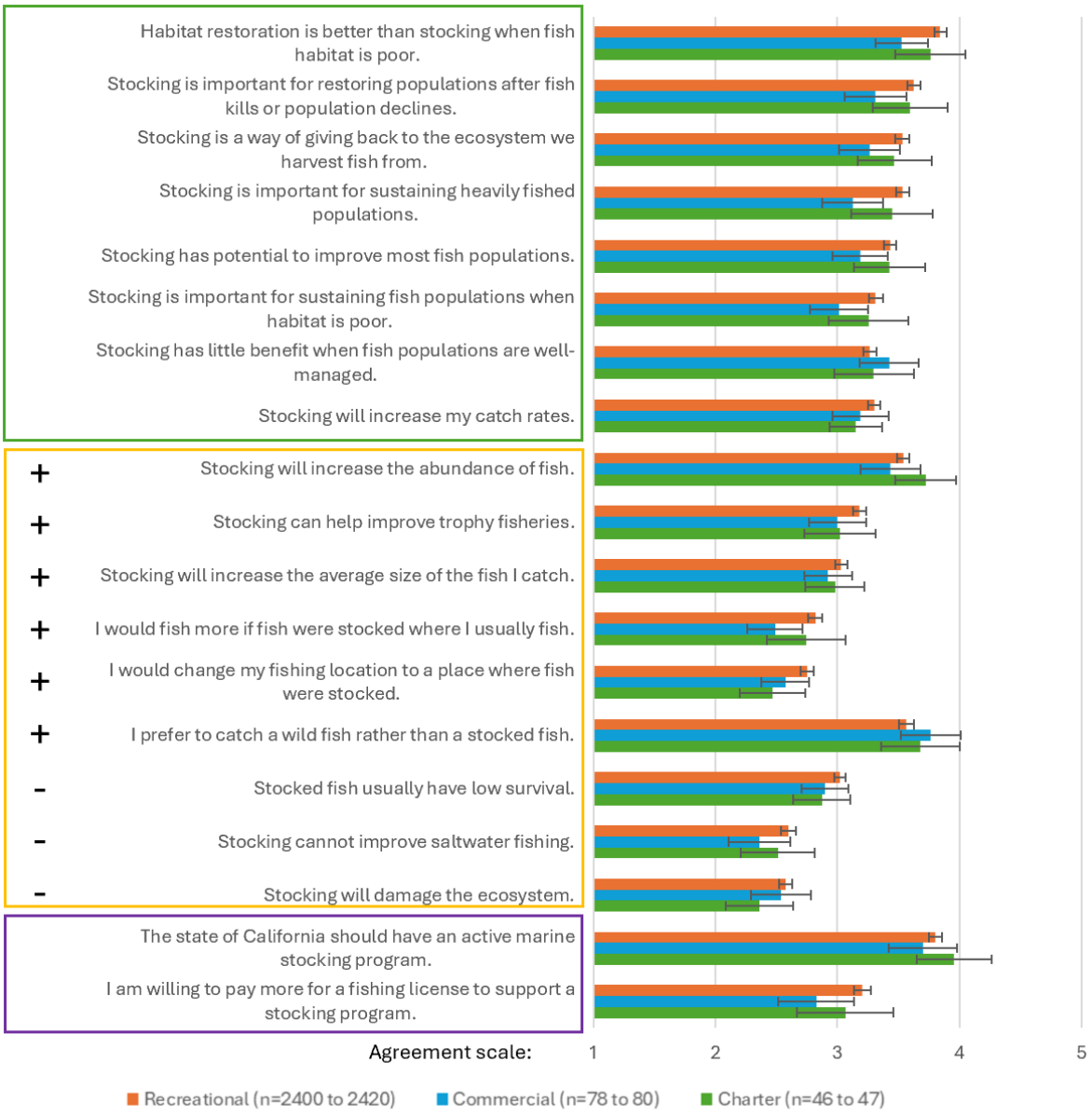


Figure 12. *Stocking preferences. Averages to the question: Please indicate the extent to which you agree or disagree with these statements about ocean enhancement through stocking of hatchery-reared fish (hereafter "stocking").* (Scale: 1=strongly disagree; 2=disagree; 3=neither disagree nor agree; 4=agree; 5=strongly agree). Blue boxes represent statements that relate to a sense of stewardship; red boxes represent Program-specific statements; yellow boxes represent statements related to enhancement. "+" are next to positively formulated statements and "-" are negatively formulated statements.

General support for different fisheries management measures

General support for different fisheries management measures was assessed in order to better understand respondents' support for stocking versus other measures. All three stakeholder groups favored the *protection and restoration of degraded habita*t, the *provision of artificial habitat, limits to fish minimum sizes, stocking of hatchery reared fish*, and *limiting the number of fish you can keep.* There was less support (recreational stakeholders) or opposition (commercial stakeholders) to area-based or seasonal fishing restrictions. The patterns of support across all measures were similar for the three groups and average recreational fishing support was always slightly positive on average (i.e., above 3; Figure 13). Commercial fishing respondents had lower average levels of support overall with opposition (i.e., below 3) for d*esignating some areas as no fishing areas* and *designating some areas as marine reserves with recreational catch and release only* (Figure 9). *Stocking hatchery reared fish* was one of the most favored management measures, but less so than habitat restoration/provision and size-based fishing restrictions.

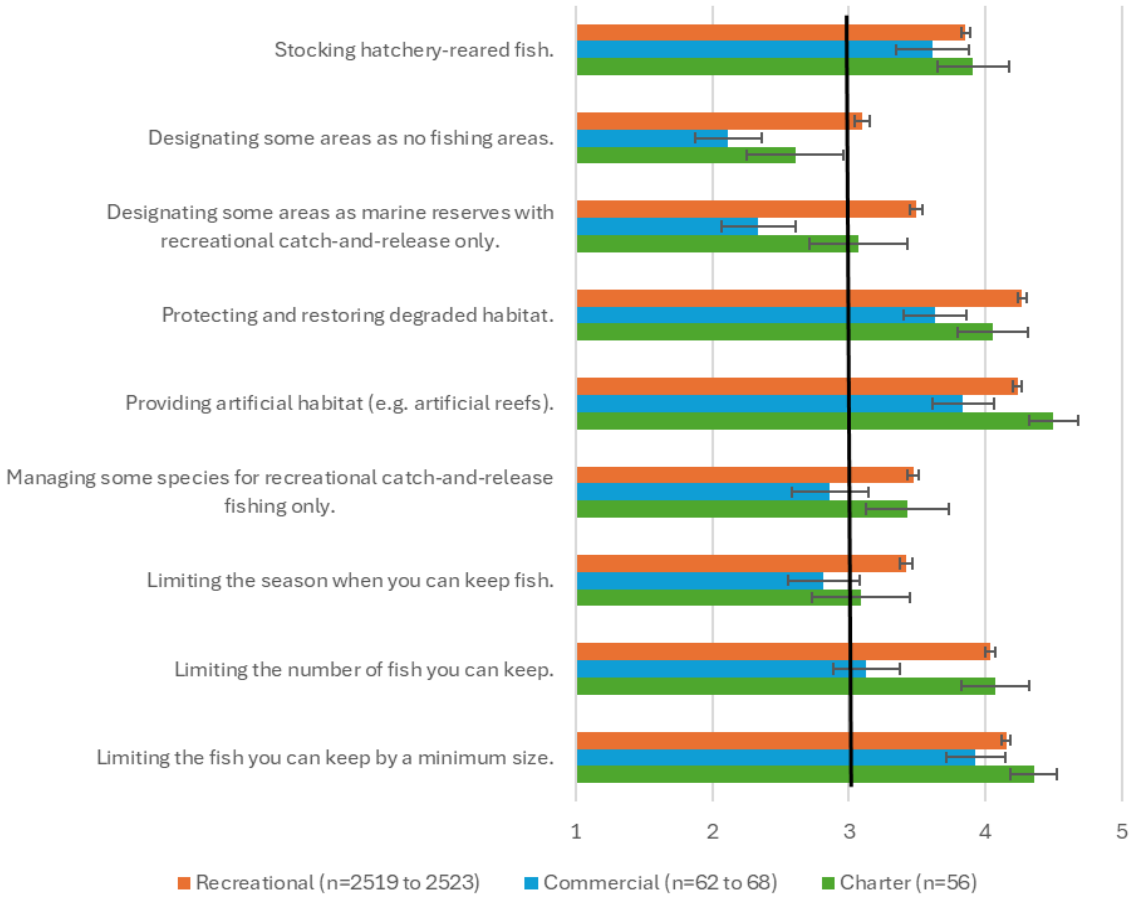


Figure 13. Extent that fisheries management strategies are favored or opposed. Average responses to the question: *Please indicate the extent to which you favor or oppose the following fisheries management strategies.* (Scale: 1=strongly oppose; 2=oppose; 3=neither oppose nor favor; 4=favor; 5=strongly favor)

Perceived importance of ocean management and conservation programs

Validation holders were asked to rate the importance of a variety of existing ocean management and conservation programs including the OREHP's White Seabass enhancement program in order to assess their support for the OREHP relative to other programs (Figure 14). The list of candidate programs was developed with input from the focus group. Recreational fishing and charter operator respondents deemed all programs at least somewhat important (i.e., above 3). Commercial fishing responses again follow the general patterns of importance of the other groups while being slightly lower. Only three programs were deemed slightly unimportant (i.e., between 2 and 3) by any groups. These were programs related to climate change resilience and adaptation, increasing tribal and disadvantaged communities' access to ocean resources, and MPA monitoring and research. The programs considered most important focused on public fishing education and youth, habitat conservation and restoration, regional fisheries management plan development, stock assessments, and stock enhancement (including the OREHP) (Figure 14).

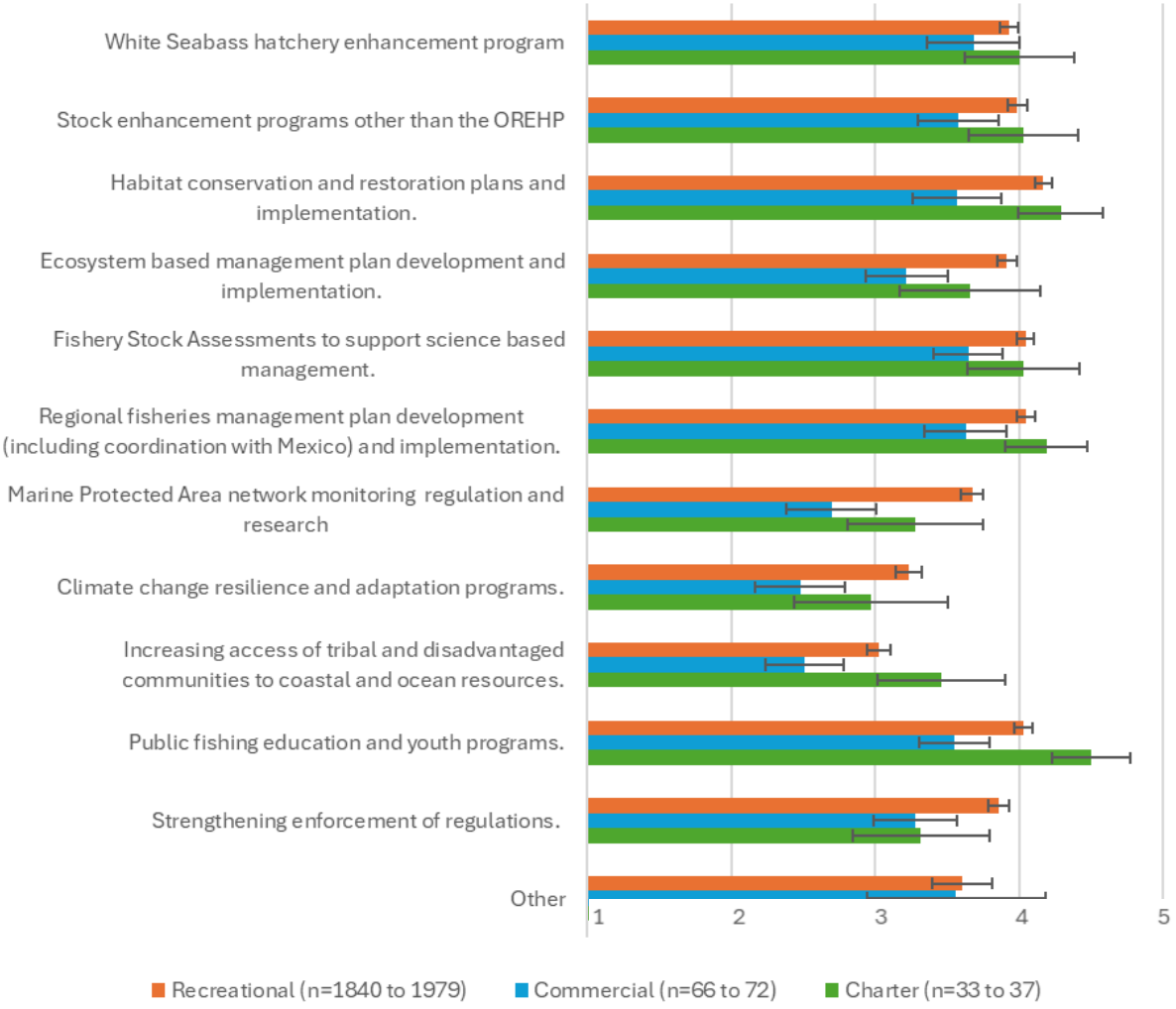


Figure 14. Perceived importance of different ocean management and conservation programs. Average responses to the question: *In your opinion, how important are the following programs for supporting fisheries and coastal conservation off California?* (Scale: 1=very unimportant; 2=unimportant; 3=neither unimportant nor important; 4=important; 5=very important)

A number of respondents chose “other” programs and included comments. In some cases, the suggested program descriptions seem repetitive with program topics that were provided but these were left separate in case there were distinctions. The suggested programs were sorted into the following topics:

- 31 Conservation-focused programs (e.g., California Collaborative Fisheries Research Program, artificial reefs, kelp restoration, seal population management, enforcement, stock endangered species, education for youth, invasive species management)
- 29 Management and regulation actions (e.g., stricter regulations, simplified regulations, more fee programs or higher fees for users)
- 11 MPA-focused actions around themes of improving the science/reducing the bias underlying MPA decisions, increasing fishing community input on MPAs, removing designations/reducing restrictions, changing MPA design (larger vs more MPAs, rotate closures)
- 8 Alternative species suggestions (six comments listed only species names which may indicate novel species to consider but the comments did not specify)
- 25 General comments

Respondents were also asked to choose their top two preferred ocean management and conservation programs from the same candidate list. All three validation holder groups prioritized fisheries and ocean management (i.e., regional fisheries management, stock assessments, habitat conservation and restoration) and enhancement programs (White Seabass and other stock enhancement). Public fishing education and youth programs were also favored (although to a lesser degree) by recreational fishing and charter operators.

Habitat conservation and restoration and the White Seabass enhancement Program were, on average, the top two rated programs by recreational fishing respondents with public fishing education and youth programs as a close third (Figure 15). Commercial fishing respondents preferred both the White Seabass and other stock enhancement programs as the top two programs on average with regional fisheries management as the third most preferred program (Figure 15). Charter operator respondents most preferred regional fisheries management programs with the second preferred program tied between fisheries stock assessments and White Seabass enhancement. Habitat conservation and restoration, other stock enhancement, and fishing education and youth programs were all tied as close third preferences of charter operators (Figure 15).

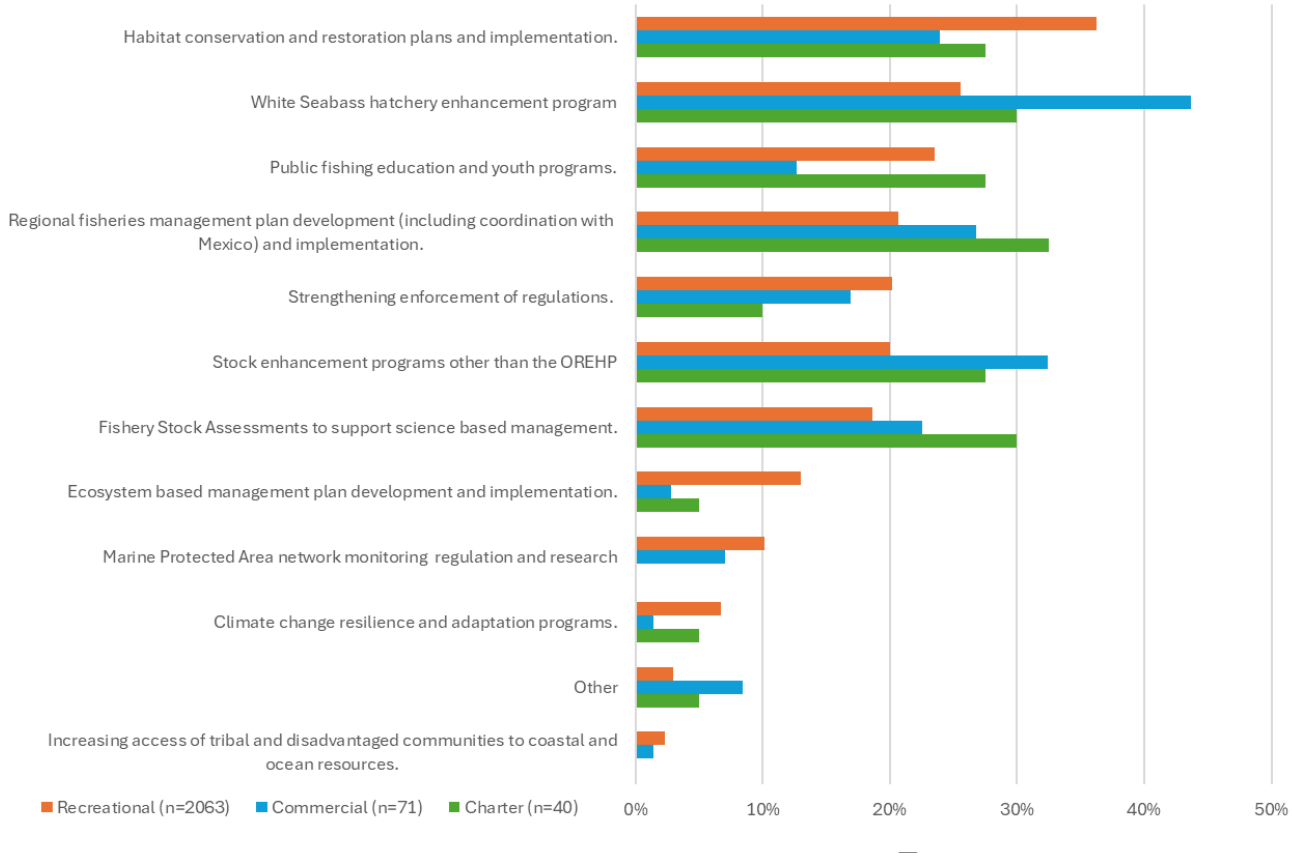


Figure 15. Top two preferred ocean management and conservation programs. Response to the question: *In your opinion, how important are the following programs for supporting fisheries and coastal conservation off California?*

Perspectives on the future of the OREHP

When asked how participants would change the OREHP, most wanted to see the Program broadened to include more ecology and conservation or keep it as it is. Recreational anglers and charter operators were most of those who supported the focus on ecology and conservation while commercial fishers were most of those who wanted to keep it as is (Figure 16). Between 5% and 11% of respondents supported the option to end the Program (Figure 16). Commercial validation holders were proportionally the strongest supporters of either keeping the Program as it is (38%) or ending it (11%), revealing polarized opinions within the commercial fishing sector and more limited interest in broadening the Program than among the recreational and charter sector respondents. Shifting the focus of the OREHP to a different species did not have as much support as broadening to include more ecology and conservation, or maintaining the Program as is (Figure 16).

Respondents who selected the “other” option (Figure 16) stated that communication including outreach, publicity, and transparency were important to them.

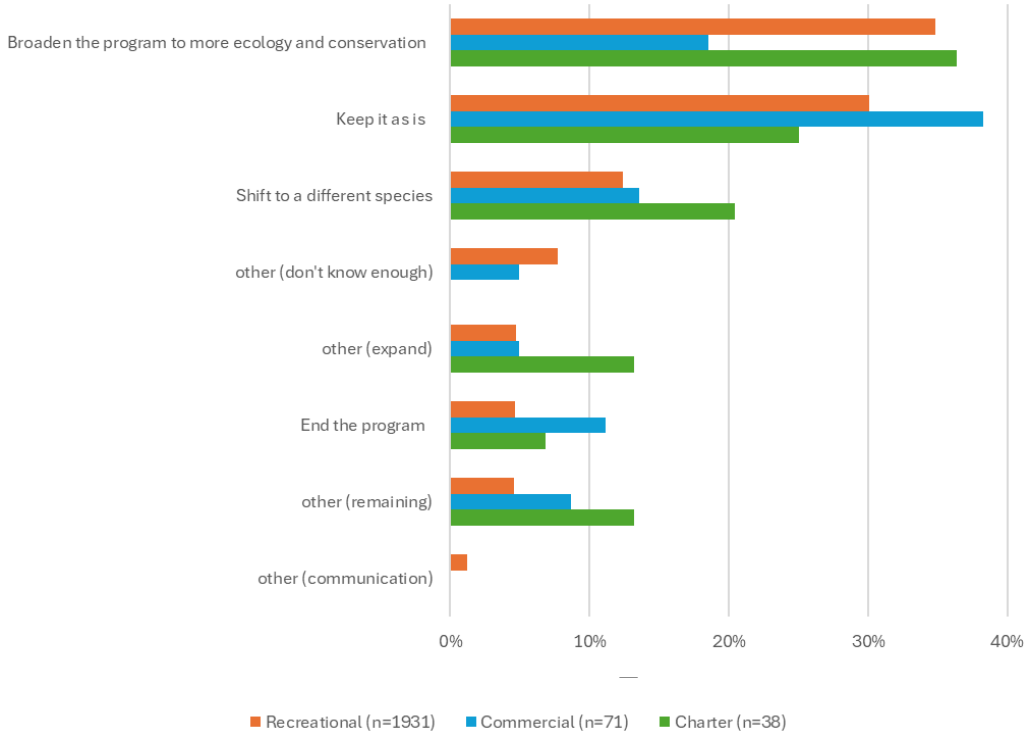


Figure 16. Desired changes to the OREHP. Responses to the question: *If you could change the OREHP how would you do so? (Check all that apply).*

Perspectives on the funding of OREHP

When asked who should pay for the OREHP, most preferred options were the fishing community in Southern California through the Ocean Enhancement validation, grants, and private donations (Figure 17). The options of accessing Federal Sportfish Restoration funds (which are derived from excise taxes on fishing equipment), expanding the geographic range of stamp validation payers, or expanding the pool of people who pay (to all taxpayers in Southern CA) were supported by only about 10% to 15% of each group. The least supported option was to stop funding the Program. Only about 2% of recreational and charter participants and 5% of commercial fishing participants chose this option.

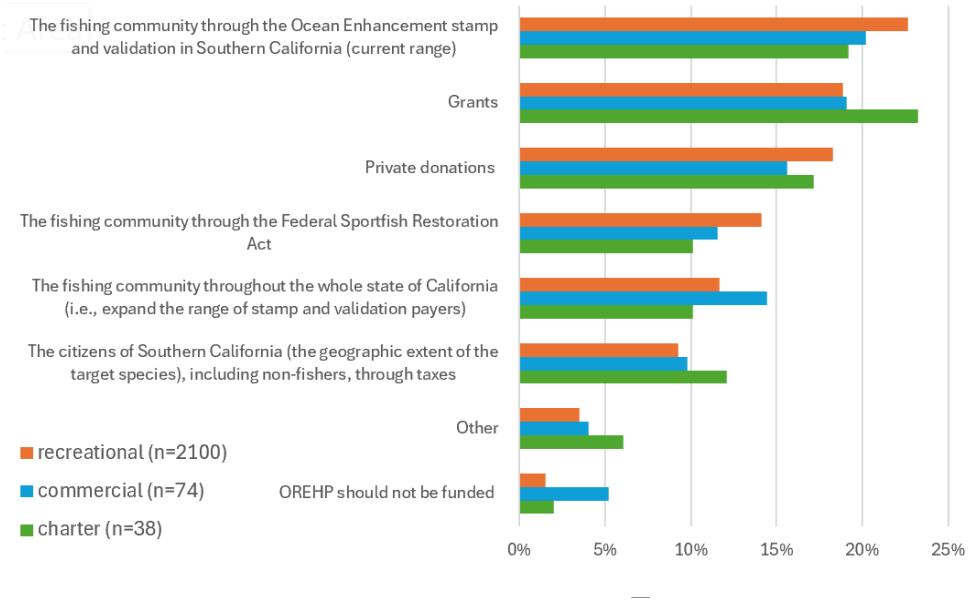


Figure 17. Frequency of response to the question: *Who should pay for the OREHP ? (Check all that apply).*

Fish species preferences

Preferred target species for fishing

Recreational anglers' preferred target species were Bluefin Tuna, Yellowtail, California Halibut, and Kelp Bass. White Seabass was in the midrange of popularity among the recreational target species (Figure 18). White Seabass, California Halibut, and Bluefin Tuna were the preferred targets for commercial fishing (Figure 19). The strong interest in White Seabass among commercial fishermen may contribute to their strong support for keeping the OREHP (including the species stocked) as is (Fig. 16).

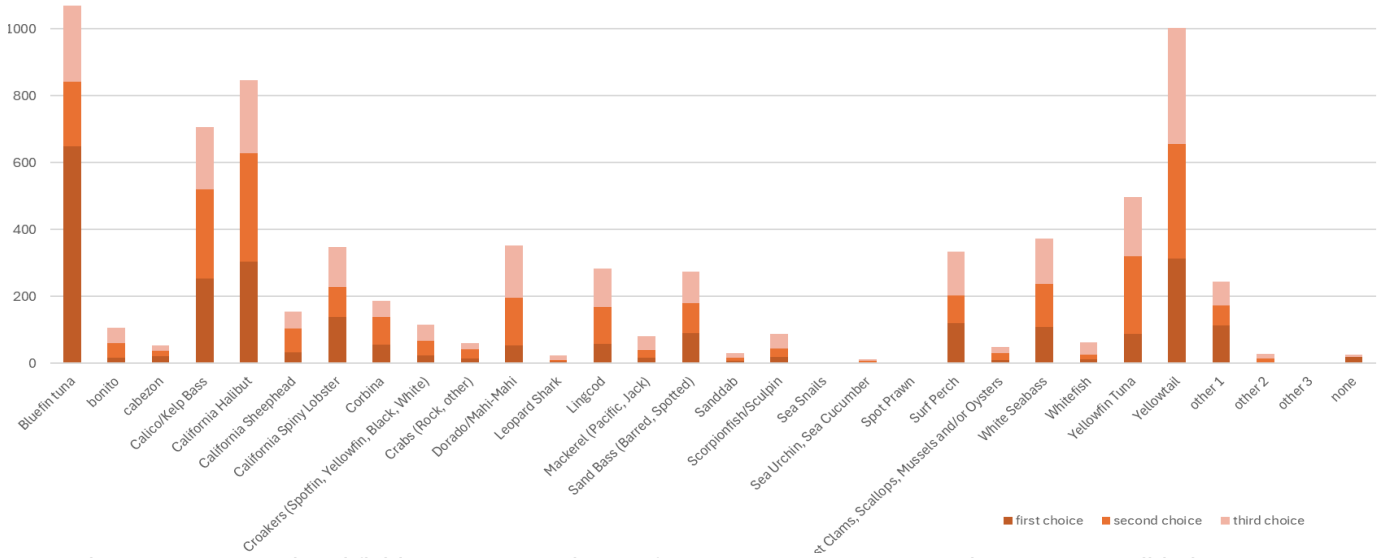


Figure 18. Recreational fishing target species preferences among Ocean Enhancement Validation holders (i.e., recreational anglers in Southern California).

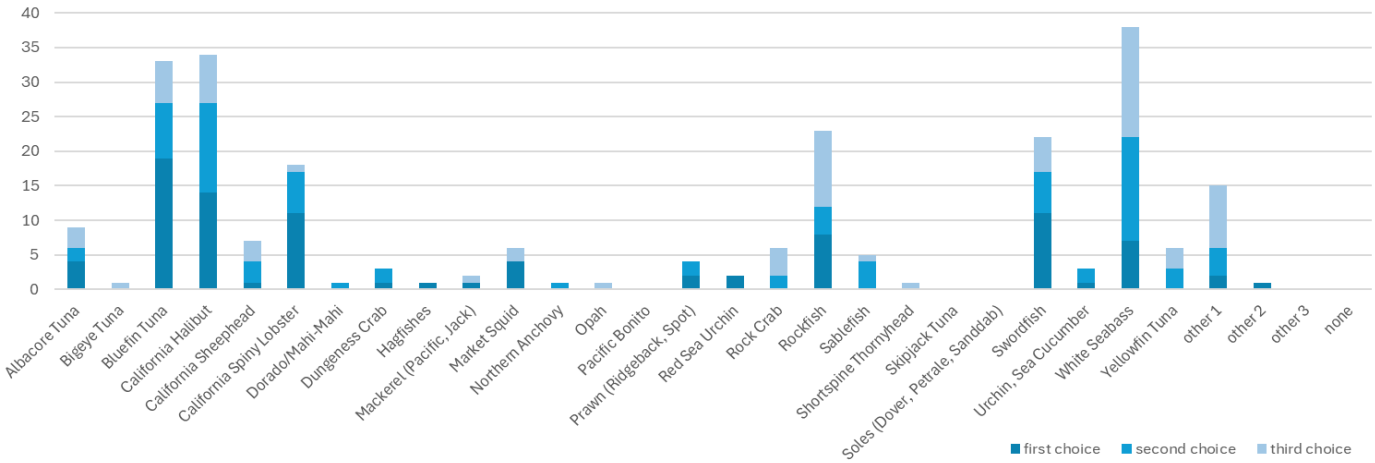


Figure 19. Commercial fishing target species preferences among OREHP enhancement validation holders (i.e., commercial fishers in Southern California).

Preferred species for stocking

A candidate species list from the 2017 OREHP Evaluation (Table 6.1 in California Sea Grant 2017) was provided as species options. Recreational anglers (Figure 20), commercial fishers

(Figure 21) and charter operators (Figure 22) all identified White Seabass as their most preferred species for stocking, followed by California Halibut and abalone. The preference for stocking White Seabass among recreational anglers, despite the species not being among their top fishing targets, may reflect the previously noted tendency to view the Program more as stewardship than strictly as a fisheries enhancement measure. The commercial fishing group had the most respondents preferring White Seabass, which was their first choice. Charter operators chose White Seabass first, California Halibut second and abalone third although White Seabass and abalone received the same number of votes as a first choice (Figure 22).

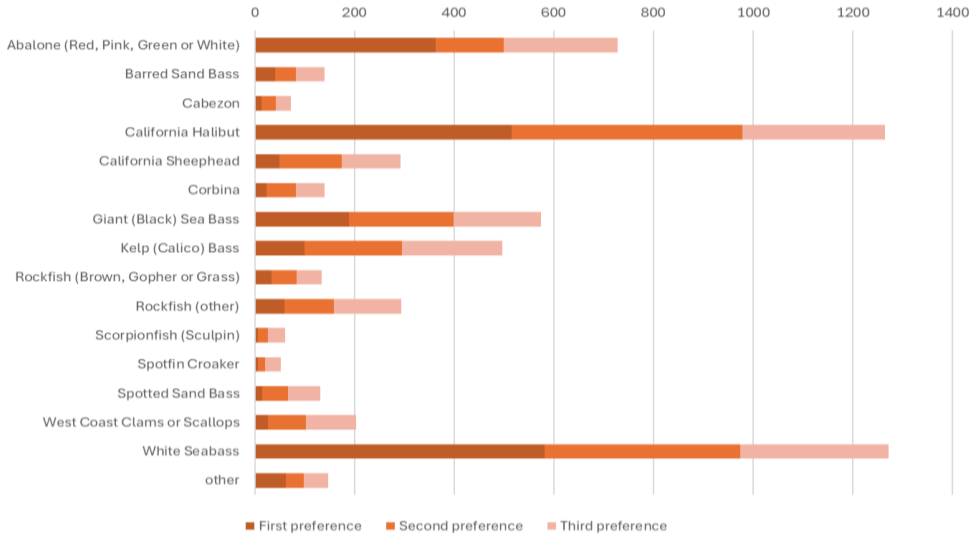


Figure 20. Stocking preferences of recreational anglers who hold an Ocean Enhancement validation in Southern California.

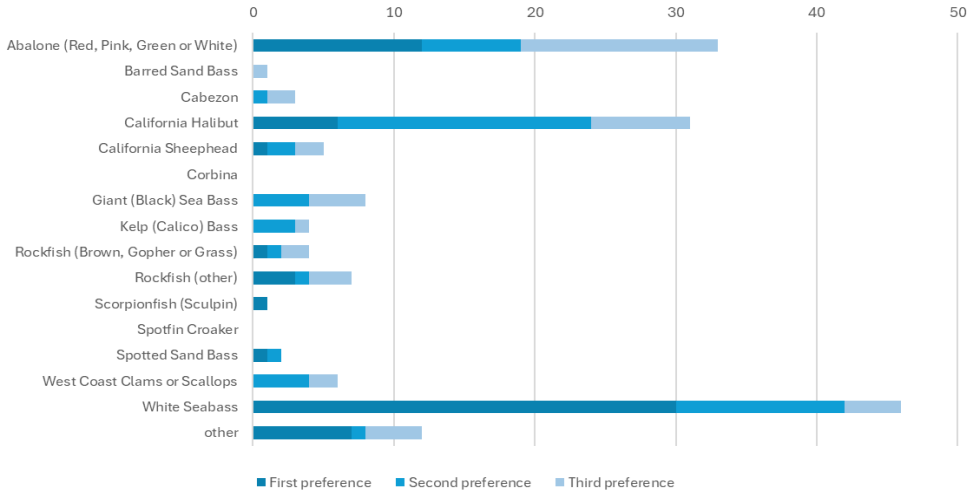


Figure 21. Stocking preferences for commercial fishers who hold an Ocean Enhancement validation in Southern California.

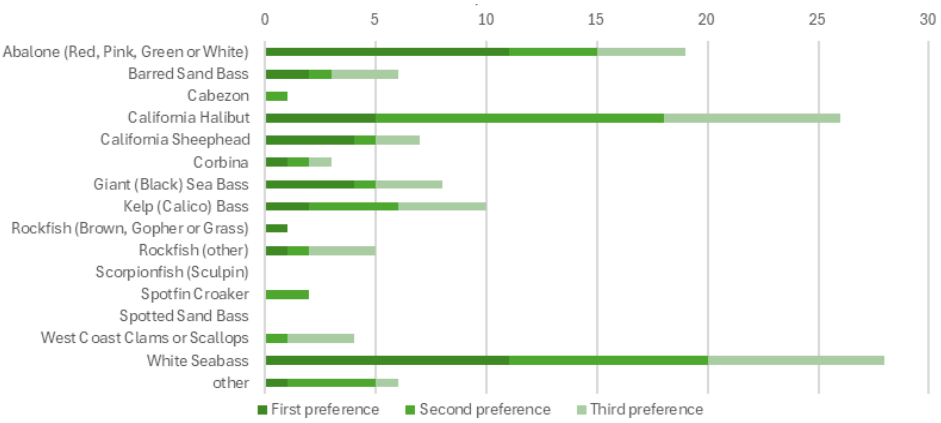


Figure 22. Stocking preferences for charter operators in Southern California.

Insights from comparing the most pro- and anti-OREHP respondents

Insights into the reasons behind opposing views of the Program were explored by comparing responses of those who most strongly supported and opposed the OREHP to questions about fishing experience, the OREHP, management, and stocking. Respondents were characterized as most pro-OREHP if they chose the OREHP as one of their two top programs when asked "*Please select the two programs that you feel are most important*". Respondents were characterized as most anti-OREHP if they answered the question "*What would you change about the Program*?" with only "End the Program".

Overall, 15.4% of respondents were classified as most pro-OREHP and 2.6% as most anti-OREHP, with all stakeholder groups having higher most pro- than anti-OREHP proportions (Table 3). Commercial fishermen were the most polarized with the highest proportions in both the most anti- and most pro-OREHP groupings (Table 3).

Table 3. Sample sizes and percentages of the most anti- and pro-OREHP respondents per stakeholder group and the total.

Group	**Most anti-OREHP**	**Most pro-OREHP**
Recreational	**84**/3479 = 2.4%	**527**/3479 = 15.1%
Commercial	**9**/127 = 7%	**31**/127 = 24.4%
Charter	**3**/99 = 3%	**12**/99 = 12.1%
Total	**96**/3705 = 2.6%	**570**/3705 = 15.4%

The most pro-OREHP respondents had varying levels of familiarity with only 5.4% self-assessed as extremely familiar with the Program (Figure 23A). Whereas, a majority (55.2%) of respondents who are most anti-OREHP are *not at all familiar* with the Program, and 9.4% say

they are *extremely familiar*. In other words, when comparing the two groups (most pro- and anti-OREHP), respondents who support the Program have more varied levels of familiarity while those who want to end the Program are mostly unfamiliar with the Program or know it extremely well. Most respondents in both groups (50% to 67%)) did not hold memberships in clubs or other organizations and composition of existing memberships for those who did was similar between the most pro-OREHP and most anti-OREHP groups. The biggest difference was that there were over four times more CCA members in the most pro-OREHP (13%) than most anti-OREHP (3%) group.

The two groups (the most pro- and anti-OREHP respondents) shared similar perceptions and attitudes in many areas, but displayed large differences in perceptions and opinions about fishing satisfaction, management and the OREHP. Both groups had similar views on the condition of the White Seabass fishery with 33-40% of respondents seeing the condition of the fishery as negative, and 60-67% seeing the condition of the fishery as positive. Overall, both the most anti- and most pro-OREHP groups were on average somewhat dissatisfied with saltwater fisheries management in Southern California, but the proportion of *very dissatisfied* respondents was substantially higher in the most anti-OREHP group.

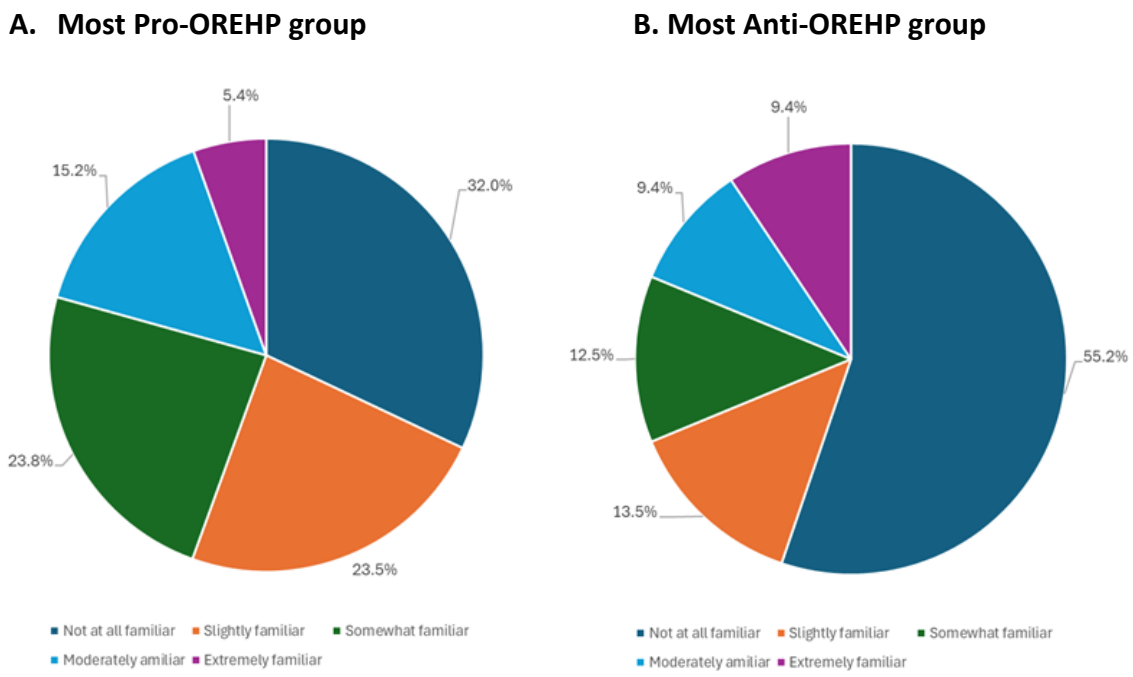


Figure 23. Familiarity with OREHP of respondents classified as (A.) most pro-OREHP and (B.) most anti-OREHP.

The most pro-OREHP respondents were generally more positive than the most anti-OREHP respondents in their satisfaction with fishing and fisheries and ocean management and in their perceptions of program success and importance of aspects of the Program.

The most pro-OREHP group was also more likely to view the OREHP as *very successful* (14%) or *somewhat successful* (34%) while only 1% of the most anti-OREHP group viewed the

Program as *very successful* and 3% as *somewhat unsuccessful*. That one third of most pro-OREHP respondents who viewed the Program as *somewhat successful* vs. *very successful* may indicate an acknowledgment that there is room for improvement. Large proportions of respondents in both groups (37% of the most pro-OREHP and 47% of the most anti-OREHP respondents) have no opinion or view the Program as neither unsuccessful nor successful.

Most (70%) of the most anti-OREHP respondents viewed the OREHP's contribution to the White Seabass population as less than 1%. The remaining 30% of the most anti-OREHP respondents thought that the Program was contributing between 1%-20% (Figure 24). The most pro-OREHP respondents saw the Program as contributing anywhere from less than 1% to more than 50%, although most stated a rate between 1% and 20%. Nearly 20% of most pro-OREHP respondents thought the Program was contributing ≤1% supporting the notion that support or opposition of the Program is not solely based on its actual contributions to the wild population. Furthermore, the most pro-OREHP respondents rated almost all the success criteria across Program elements (research, enhancement, education, fisheries and ocean management) as *somewhat important* to *important* (at or just above 4), while the most anti-OREHP respondents rated almost all the criteria as *somewhat unimportant*. These responses indicate that support for or opposition to the Program is based on a broad set of criteria that encompass all elements of the Program rather than primarily the perceived hatchery contribution to the wild population.

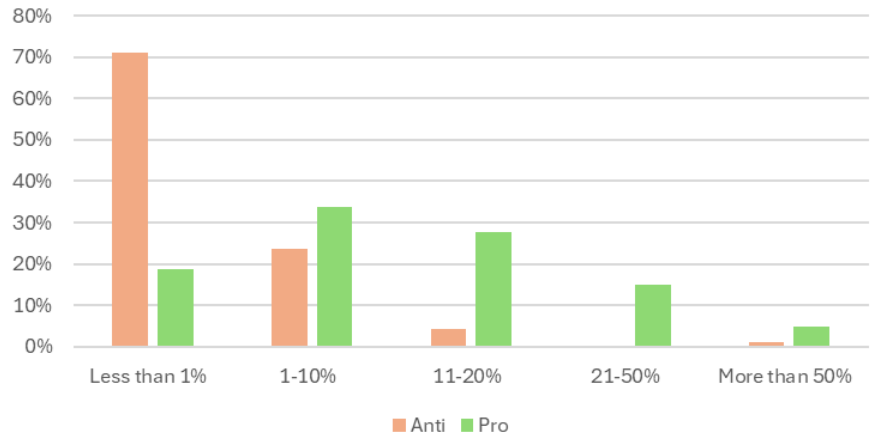
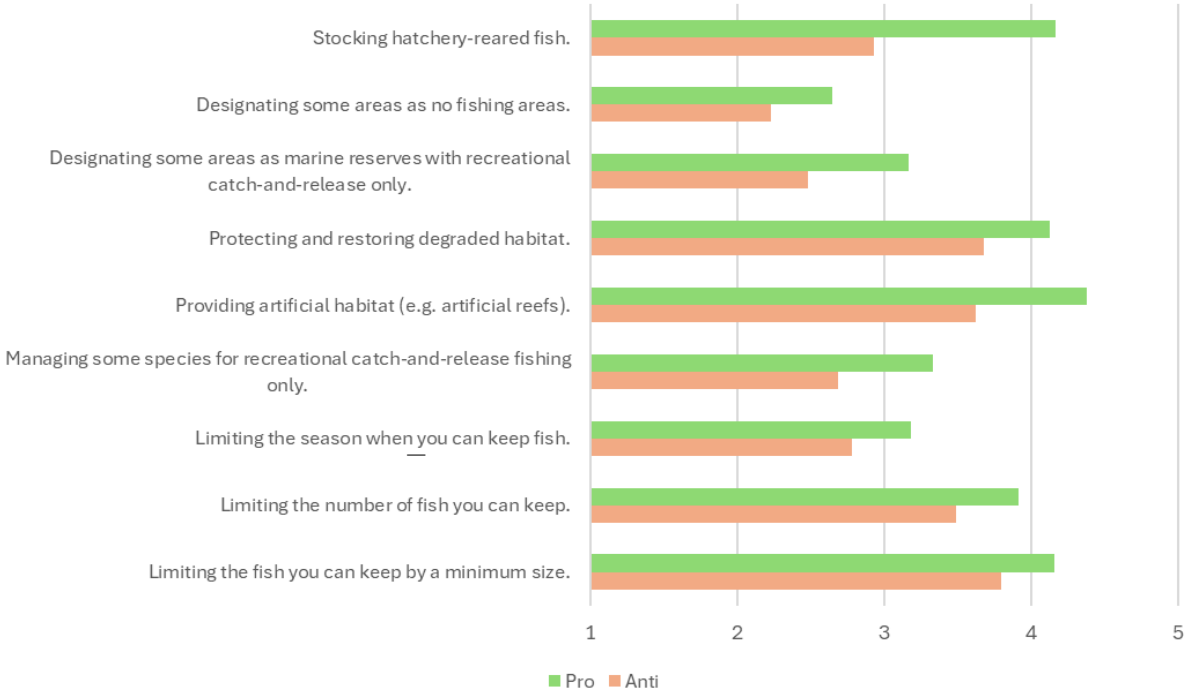


Figure 24. Perceived contribution of OREHP to the White Seabass population by most anti- and pro-OREHP respondents

The patterns of relative support for various fisheries management strategies was similar between the most anti- and pro-OREHP groups (Figure 25). However, the most pro-OREHP group tended to support all strategies across the board more strongly than the most anti-OREHP group. In terms of specific ocean management and conservation programs, the most pro-OREHP respondents showed greater support across the board for all such programs than

the most anti-OREHP respondents. The difference was largest for stock enhancement programs in general and for the OREHP (Figure 26).

Figure 25. Extent that fisheries management measures are favored or opposed. Average responses to the question: *Please indicate the extent to which you favor or oppose the following fisheries management strategies.* (Scale: 1=strongly oppose; 2=oppose; 3=neither oppose nor favor; 4=favor; 5=strongly favor)



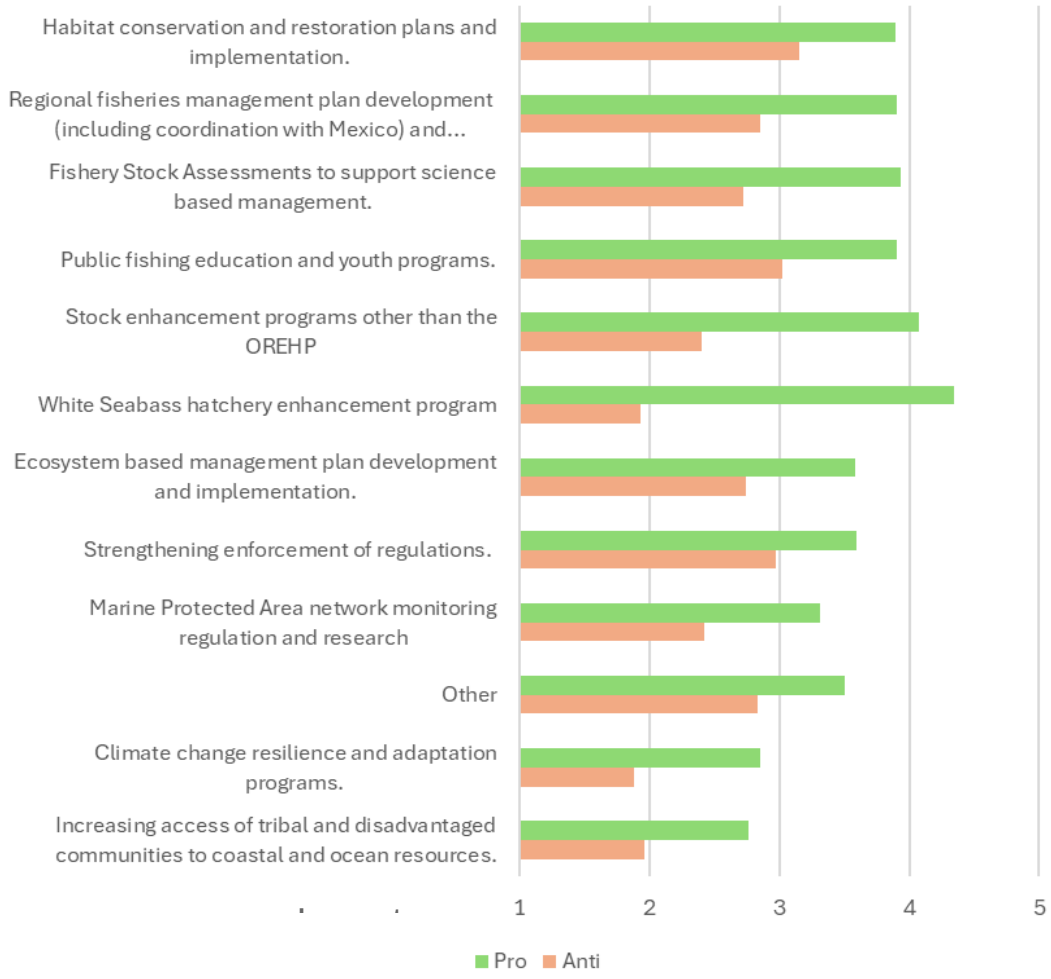


Figure 26. Perceived importance of ocean management and conservation program. (Scale: (scale: 1=very unimportant; 2=unimportant; 3=Neither unimportant nor important; 4=important; 5=very important)

Overall, the most anti-OREHP validation holders can be characterized as less satisfied with fisheries management in general and less supportive of a broad suite of fisheries management measures and initiatives than the most pro-OREHP validation holders. Support for stocking in general and the OREHP in particular was particularly low among the most anti-OREHP respondents, but that did not imply strong support for other, alternative measures or initiatives.

Summary of results

Respondents & their familiarity with the OREHP

- There were 3,479 recreational angler, 127 commercial fisher and 99 charter operator respondents (all self-assessed identities); Most respondents were not affiliated with fishing-related organizations.
- Only 3% of respondents were *extremely familiar* with the OREHP, the majority were *not at all familiar* with recreational anglers being the least familiar group.

Respondent perceptions of the OREHP

- Nearly half of recreational angler respondents had *no opinion* about the Program's level of success. Of those that did share an opinion, most thought that was at least somewhat successful.
- A majority believed that the contribution to the wild White Seabass population was less than 10%.
- There was no strong relationship between respondents' familiarity with the OREHP and their perception of overall Program success or hatchery contribution to the wild White Seabass population, indicating that these perceptions may be grounded in general beliefs more than specific information about the Program.
- The three most important success criteria were related to conservation and stewardship, generating knowledge, and collecting data for stock assessments and environmental management, but many criteria were viewed as important, revealing that "success" spans all facets of the Program.
- The proportion of recreational anglers willing to pay more for the OREHP validation generally decreased with increased price but a majority was willing to pay more even if that did not result in a noticeable change in the White Seabass population or fishery. Willingness to pay increased further if that led to a noticeable increase in the White Seabass population. This indicates that anglers value the Program for a broad suite of reasons not primarily related to population or fishery enhancement outcomes, but achieving a population enhancement outcome is not considered unimportant and would further increase support.
- A majority of respondents wanted to *Broaden the Program to more ecology and conservation* or *Keep it as it is*, only a minority of respondents supported the option to end the Program.
- The commercial fishing respondents had the most internally polarized views in terms of continuing or ending the OREHP and overall had the least interest in broadening the Program.
- Shifting the focus of the OREHP to a different species was not as well supported as broadening to include more ecology and conservation, or maintaining the Program as is.
- When asked who should pay for the OREHP, the most preferred options were the fishing community in Southern California through the Ocean Enhancement validation (i.e., as is), grants, and private donations; the least supported option was to stop funding the Program.
- The most pro-OREHP respondents were generally more positive than the most anti-OREHP respondents in their perceptions of Program success and importance of aspects of the Program.

Respondent perceptions of management measures and programs

- There was support for stocking programs in general, possibly indicating limited awareness among respondents of constraints to the effectiveness of stocking or the risks it can pose to wild populations.
- Stocking was a supported management measure but not over and above other measures aimed at sustaining or improving wild fish populations. The management measures perceived as most important overall related to habitat protection, followed by fishing regulations.
- Specific programs considered most important related to public fishing education and youth, habitat conservation and restoration, regional fisheries management plan development, stock assessments, and stock enhancement (including the OREHP).
- The most anti-OREHP respondents (those who wanted to discontinue the Program) showed lower support across the board for fisheries management and conservation measures and programs than the most pro-OREHP respondents (those who identified the Program as one of their top 2 priorities) and were particularly critical of hatchery programs including but not limited to the OREHP.

Preferred target species for enhancement

- Recreational anglers, commercial fishers and charter operators all identified White Seabass as their most preferred species for stocking, followed by California Halibut and abalone.

Conclusions

The Ocean Enhancement Validation-holder survey gathered information on fisher experiences and perspectives and opinions surrounding the OREHP, fishing and fisheries, and ocean and fisheries management. The survey used intentionally varied questions around these topics to capture motivations and other reasons underlying responses. Survey data were analyzed using two types of analyses– one looking at responses by sector and the other support level (i.e., most pro- and anti-OREHP) to provide additional insights into responses. The survey results provide information needed to guide the legislatively mandated OREHP reform process, including setting criteria for the associated evaluation in 2027.

Multidimensional criteria
The criteria important to validation holders and therefore by which the OREHP should be evaluated are multidimensional. Respondents tended to place more importance on research, but all of the Program components (research, enhancement, education, governance, management) were viewed as at least somewhat important, and enhancement was not singled out as a stand- alone necessary outcome. The belief that the OREHP's value extended beyond enhancement was most obvious in the willingness to pay exercise where most respondents were willing to pay a higher enhancement validation fee even if that led to no noticeable change in the population or fishery.

Emphasis on conservation
Repeatedly throughout the survey, validation holders placed emphasis on conservation motivations and benefits of the OREHP over its enhancement and other benefits. In the willingness to pay question, the most favorable option was paying extra for a noticeable improvement in the population. This option was preferred to having a one-fish increase in the bag limit, which indicates the value given to ecology and conservation over fishing experiences (e.g., amount of catch). The success criterion considered most important was "*Fish released by OREHP don't damage the wild fish stocks or ecosystem health".* This was also the only criterion that the most anti-OREHP respondents rated above neutral. This also aligned with one of the most favored changes to the OREHP– "*broaden the Program to more ecology and conservation".* Another example comes from the support of management strategies where some of the most favored options were "*Protecting and restoring degraded habitat",* and *"providing artificial habitat."* In addition, one of the most preferred programs was "*habitat conservation and restoration plans and implementation."* Finally, within the stocking preferences question, most respondents agreed with "*habitat restoration is better than stocking when fish habitat is poor".* This was also true of the most pro- and anti-OREHP respondents, illustrating that habitat restoration was important to respondents with opposing views.

Various questions throughout the survey also revealed that stocking was additionally important to many validation holders. For example, some of the top programs preferred by respondents were "*stock enhancement programs other than the OREHP",* and *"White Seabass hatchery enhancement Program."* But as discussed and directly illustrated with the willingness to pay exercise, this preference for stocking does not come coupled with the pressure to actually enhance the stock, which might have been a prior assumption.

Broadening the Program

Validation holders supported broadening the OREHP in several ways. First, *broadening the Program to include more ecology and conservation* was a highly supported option when respondents were asked about how they would like to "change the OREHP" if they could. An important success criterion of the OREHP was the *assessment of fish stocks to inform fishery and environmental management* which would require broadening of the Program to achieve. Consideration of other or more focal species in the OREHP was also a popular option for broadening the Program. This was not the most favored option when asking about potential changes to the OREHP, but respondents supported using other or more species for stock enhancement throughout survey responses and in the comments that were added. *Communication* was also mentioned by some as an area of improvement, for instance, consulting a wider array of stakeholders, and encouraging visibility through transparent feedback to the public. *Public fishing and education programs* was an important success criterion and one of the most important types of ocean management and conservation programs; inclusion and/or expansion of these types of programs would also require a broadening of the OREHP.

Insights from most anti- and most pro-OREHP groups

The contrast of extreme opinions from most anti- and pro-OREHP respondents also provided guiding insights. Some of the main differences between these two groups were that most anti-OREHP respondents viewed the success criteria and stocking preferences as slightly unimportant to unimportant whereas the most pro-OREHP group viewed them as slightly important to important. This trend was not exclusive to views of stocking or stocking programs, it was an overall trend. The most anti-OREHP were also generally less satisfied with their fishing experiences and management, more likely to find the OREHP success criteria and ocean management and conservation programs unimportant, and more likely to oppose management strategies than most pro-OREHP respondents.

Stocking, stewardship, and social value

Support for the OREHP by validation holders may be due more to an overall appreciation of stocking programs than an affinity to this particular program. For example, *stocking hatchery-reared fish* was one of the most favored management strategy options, and *Stock enhancement programs other than the OREHP* was a highly favored program option. Stocking is favored, in fact, despite the highly variable perceptions of the OREHP's success and White Seabass not being among the most recreationally targeted species. Further, there was a willingness to pay more for the validation even with no noticeable change in the population or fishery, and a noticeable change in the wild population was still more valued over observing a one-fish increase in bag limit.

Throughout the survey, the highly favored stocking preferences were associated with responses indicating a sense of stewardship, for example protecting and restoring habitat, contributing to fisheries management and stock assessments, and wanting to enhance the population more than the catch. This trend aligns with the themes of ecology and conservation favored throughout the survey. The benefits of stocking might, therefore, have a social dimension by facilitating a sense of stewardship in the user more than an interest in fishing benefits (e.g., more of a stewardship mentality than an extractive mentality). This indicates that the success of a stocking program should include criteria capturing the human psychological wellbeing impacts.

Diversity, equity and inclusion

Inclusion of Indigenous people (and traditional knowledge), diverse communities and disadvantaged communities into the OREHP's decision-making and outreach and education activities was rated in the survey (e.g., as success criteria) as neutral to slightly important. Similarly, programs that *increase access to tribal and disadvantaged communities to coastal and ocean resources* were viewed as neutral or slightly unimportant. The reasons for DEI aspects being considered generally less important than other priorities are uncertain. We do note however that such communities were not strongly represented among the respondents (and likely the marine fishing license and Ocean Enhancement validation-holders in Southern California) who were predominantly male (93%), white (67%), and had household incomes of $101k or more (over 67%). The survey was only offered in English which would have prevented non-English speakers from participating, but the general demographic profile of respondents likely fits the validation holder population.

Opportunities to connect under-resourced communities and reconnect Indigenous communities to the coast and ocean should be prioritized. While these communities are not currently major stakeholders in Southern California fisheries and ocean management initiatives, like the OREHP, it may not be by choice (e.g., lack of knowledge about the Program, lack of access to opportunities). These potential Ocean Enhancement validation-holders and partners could greatly benefit and add great value to the Program and its outcomes. For example, these relationships can increase the visibility of the Program, expand participation in the Program including new volunteers and professional partners, extend the Program's reach to educate more youth in STEM, fishing and enhancement-related topics, and bring alternative knowledge and practices to strengthen the science, sustainability and management outcomes of the Program. Expanding the stakeholder pool may also increase and broaden support for the Program.

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