

# Developing a vision, criteria and options for the future of the Ocean Resources Enhancement and Hatchery Program



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Final report

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**Submitted by:**  
California Sea Grant  
Scripps Institution of Oceanography  
University of California, San Diego

**Sea  
Grant**



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**FLORIDA**



# Developing a vision, criteria and options for the future of the OREHP

## Final report

Project no. P2170016

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# Developing a vision, criteria and options for the future of the OREHP

## Executive Summary

The Ocean Resources Enhancement and Hatchery Program (OREHP) is an experimental hatchery program investigating the feasibility of using cultured marine finfish to successfully enhance wild fish populations. The 2017 OREHP Evaluation revealed successes in improving understanding of marine finfish biology and hatchery science but highlighted challenges such as low contribution to the White Seabass stock and fishery 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, partly based on stakeholder input. California Sea Grant was contracted in 2022 to obtain stakeholder input for this reform process consisting of an initial situation assessment that informed a stakeholder focus group and an Ocean Enhancement Validation holder survey.

The situation assessment aimed to inform the design of the subsequent project elements. The assessment consisted of a review of relevant developments since the 2017 OREHP Evaluation and a series of in-depth, semi-structured interviews conducted with twenty-four OREHP stakeholders. The situation assessment revealed varied stakeholder perspectives on the Program's intended goal and contribution rates to the wild stock, concerns about a lack of integration with fisheries management and lost partnership opportunities to make this happen, a lack of inclusive decision-making, and potentially under-prioritized social benefits of the Program. The design of the participatory process, therefore, included activities and questions that sought to gather more information about stakeholder perceptions and understanding of the OREHP.

A focus group of 16 members representing 14 stakeholder groups and varied experience with the OREHP was convened in facilitated meetings held both in person and virtually. The focus group discussions aimed to create a shared understanding of goals and a set of criteria that stakeholders found important for the OREHP to work. The focus group collaboratively identified five important elements of the OREHP: research discoveries, enhancement, integration with fisheries and ocean management, public education and engagement, and transparent and inclusive governance. This group also developed an initial, prioritized list of success criteria for each Program element.

An online stakeholder survey of Ocean Enhancement Validation holders, namely recreational and commercial fishers and charter fishing operators in Southern California was conducted. The survey revealed an overall belief among these stakeholders that the 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. This broad range of program success criteria was notable because it implies that achieving population enhancement (e.g., a particular level of increase) does not make or break the program. A 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.

Overall, the focus group and survey revealed that stakeholders value the OREHP for its varied contributions to research, fisheries and ocean management, stewardship, and education as much or more than its role in the enhancement of wild stocks. Again, this does not mean that the enhancement contribution to the stock or fishery is seen as unimportant to stakeholders, but rather it is not a singular indication of Program success. Reflective of stakeholder input, the OREHP’s overarching goal could be described as furthering the conservation and sustainable use of the White Seabass stock through an enhancement initiative that provides research discoveries, integration with fisheries and ocean management, public education and engagement, and transparent and inclusive governance. The underlying decision-making processes, Program activities, and outputs of each Program element should include current and potential stakeholders, and be broadly accessible and transparent, including clear and consistent communications and messaging.

Based on stakeholder input, we provide suggestions for goals and specific success criteria. Success criteria are provided to measure the achievement of goals in the long term (ultimate success) and to measure progress toward meeting goals in the short term (by the 2027 Evaluation deadline). Short-term criteria focus primarily on developing strategies or plans that should lead to the achievement of goals in the long term if properly implemented. Co-development or co-modification of priorities and strategies by OREHP leadership and partners would ensure that Program directions, activities, and outcomes are agreed upon, comprehensive (reflective of stakeholder priorities), and transparent. Specifically, stakeholder input supports the prioritization of research and enhancement objectives that build on the Program’s 40 years of hatchery and monitoring achievements, and strategies that will lead to more inclusive, expansive and impactful education, engagement, and public messaging; contributions to fisheries and ocean management; and Program-wide governance and adaptive management.

A process for incorporating California Ocean Enhancement stakeholder priorities into the OREHP is provided (Fig. 1). Integration of these priorities would align the Program with the values and visions of its supporters and may also strengthen the Program’s impact on fisheries, the ocean, and a variety of communities ultimately leading to broader support for the Program.



Fig. 1. Suggested steps for developing agreed-upon strategies (plans) in the short-term that will be implemented for the eventual achievement of outcomes associated with the longer-term goals and criteria. Green= completed during the visioning and reform project, Orange= next steps for OREHP leadership (i.e., CDFW, OREAP, and SAC), Blue= actions taken beyond the 2027 Evaluation.

## Guidance summary for OREHP decision-makers

### Background

The Ocean Resources Enhancement and Hatchery Program (OREHP) is an experimental hatchery program investigating the feasibility of using cultured marine finfish to enhance wild fish populations successfully. A three-phased, two-year-long, comprehensive public information-gathering process revealed common perceptions of the success and values of the OREHP, as well as shared goals, success criteria, and vision for the future of the OREHP. As per AB 1949 (2020), this input should inform the Program's goals and directions including short-term success criteria to be used in a 2027 program evaluation and longer-term criteria.

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### Key Findings



Fishing stakeholder support for the Program is rooted in a stewardship ethic. Fishing stakeholders are, overall, supportive of the Program. Most of those who stated an opinion judged the Program to be at least somewhat successful and only a small proportion (less than 11%) advocated to end the program. Support is rooted in a stewardship ethic, valuing the existence of the Program and its contributions to research, conservation, and community participation. Strong values related to research on ecology and conservation, enhancement contribution not being a singular criterion for success, and willingness to pay more for the Program whether or not it would result in additional harvest opportunities are examples of stakeholder motivations rooted in a sense of stewardship. Stewardship is a broad concept encompassing values, motivations, agency, and knowledge to protect, care for, and/or responsibly use natural resources.



Stakeholders identified five broad goal components and criteria for OREHP success: research, enhancement, education & engagement, fisheries & ocean management, transparent governance

In line with the stewardship ethic and motivation, stakeholders identified and supported **five broad goal components and criteria** to consider when judging Program success: contributions to research, population/fisheries enhancement, education & engagement, fisheries & ocean management, and transparent governance. The Program currently contributes to all goal components but maintains a primary focus on hatchery operation and related research. Stakeholders expressed support for broadening the Program, i.e. elevating activities that contribute to other goal components and further integrating the program with broader fisheries, environmental, and societal initiatives while maintaining hatchery and enhancement efforts. In particular, there was widespread support for:

- Fishery-associated ecology and conservation efforts, including conservation and restoration of degraded (fish) habitat and improvement of water quality.
- Contributing to fisheries stock assessments, including collecting data and other information needed to keep assessments updated and inform fishery and environmental management decisions.
- Other or more target species of interest, including improving our understanding of their biology, rearing, and release.

- Improved communication strategies, including more frequent and inclusive consultation of stakeholders, and consistent and accurate public messaging by Program leadership and partners.
- Education and community engagement, expanding and making more inclusive STEM education and public/youth fishing programs.



Population enhancement is ultimately important but achieving a specific target is not seen as necessary or feasible in the short term

Achieving some level of population enhancement is one of several long-term goals of the program. However, narrowly focusing on setting and demonstrating a particular enhancement level or contribution rate in the next three years is problematic because:

- Enhancement is not a deal breaker to stakeholders (as shown by the survey results) so it is not necessarily a priority that *must* be determined by 2027.
- There is not yet a shared understanding of which methods will provide accurate estimates of the enhancement level or contribution rate. Currently, the SAC is identifying the most reliable genetic analysis method for determining parentage and contribution rates.
- A productive and safe (i.e., “successful”) enhancement level or contribution rate has not yet been defined. This ideal contribution rate, which would be high enough to enhance the population without being so high as to cause harm, needs to be defined and justified by the SAC, with contributed expertise, if needed, from partnering scientists and external experts.



Preparing for the 2027 Evaluation icon

Criteria for program success in the long term (ultimate outcomes) and short term (progress to be achieved by the 2027 evaluation) are suggested based on stakeholder consultations. The short-term criteria focus on development and implementation of plans that will put the program on track toward achieving the long-term (ultimate) goals. Specific criteria presented in this report are examples meant to inform the formal definition and adoption of criteria and priorities by

OREHP leadership (CDFW, OREAP and SAC). The Program could be deemed “successful” during the 2027 Evaluation if the answer is “yes” to this question: ***Are the long-term outcomes and criteria defined and adequately planned for by July 2027?*** Plans would then be implemented by OREHP leadership (CDFW, OREAP and SAC) after 2027 to achieve long-term goals.

## Synthesis and recommendations report

### Background

The Ocean Resources Enhancement and Hatchery Program (OREHP) is an experimental hatchery program investigating the feasibility of using cultured marine finfish to successfully enhance wild fish populations. Its primary focus has been on spawning, rearing and releasing the White Seabass (*Atractoscion nobilis*) and assessing the impacts of these releases on the wild stock and fishery.

In operation since 1983, the Program underwent its first independent evaluation by a scientific advisory panel in 2015-2017. The 2017 Evaluation concluded that the OREHP has contributed to research discoveries surrounding the biology and culture of all life stages of White Seabass, developed appropriate hatchery and tagging methods, successfully evaluated the post-release survival of hatchery fish and their contribution to the White Seabass stock, and conducted valuable education and outreach programs. However, the tagging program revealed low survival of stocked White Seabass and consequent low contribution to the adult stock. The Evaluation indicated a need to adaptively manage and reform the OREHP in the light of its measured outcomes and recommended undertaking a stakeholder-participatory and science-based reform process.

In 2020, the California Legislature provided a framework for OREHP reform in AB 1949. The bill establishes a permanent scientific advisory committee (SAC), requires solicitation of input from stakeholders, and requires the California Department of Fish and Wildlife director to issue a report on the progress of the OREHP in meeting its goals and objectives before a sunset provision that would take effect in 2028 should progress be deemed insufficient.

In 2022, the California Department of Fish and Wildlife (CDFW) contracted California Sea Grant (CASG) to obtain stakeholder input to help develop clear and shared goals for the OREHP, as well as success criteria and options for future development. The contract stipulated a two-stage process, an initial situation analysis that in turn informed the design of a stakeholder focus group and an Ocean Enhancement Validation holder survey to provide stakeholder perspectives on a vision, goals, and criteria.

## Goal & Objectives

The goal of this reform and visioning project was to design and conduct a stakeholder-participatory and science-based process to foster a shared understanding of OREHP strategic goals, outcomes, and options for future development by meeting the following objectives:

- Identify and characterize stakeholders and their experiences and attitudes related to OREHP and related fisheries management efforts
- Develop a stakeholder engagement and visioning process for informing reform of the OREHP
- Conduct the stakeholder engagement and visioning process for formulating recommendations for reforming the OREHP
- Inform and get feedback on the project process and outcomes from the Ocean Resources Enhancement Advisory Panel (OREAP), the OREHP Science Advisory Committee (SAC), CDFW and members of the public
- Evaluate the stakeholder engagement and visioning process after the process is complete

## Approaches & Results

### Situation assessment

The goal of the situation assessment conducted in January – March 2023 was to inform the design of the subsequent project elements, including the focus group and Ocean Enhancement Validation holder survey. The assessment consisted of a review of relevant developments since the 2017 OREHP Evaluation and a series of in-depth, semi-structured interviews conducted with twenty-four OREHP stakeholders reflecting multiple voices across the range of stakeholder



groups. Questions aimed to elicit characteristics of fisheries stakeholders, their experiences with the Program, views on the OREHP outcomes and governance, and visions for its future.

Interview data were analyzed with conventional content analysis.

The situation assessment revealed varied stakeholder perspectives on the Program's intended goal and contribution rates to the wild stock, concerns about a lack of integration with fisheries management and lost partnership opportunities to make this happen, a lack of inclusive decision-making, and potentially under-prioritized social benefits of the Program. The design of the participatory process, therefore, included activities and questions that sought to gather more information about stakeholder perceptions, understanding, and support or agreement of these (and other) topics to develop a stakeholder vision for the OREHP.

The report detailing the results of the initial situation analysis is included as Appendix 1: Developing a vision, criteria and options for the future of the OREHP: Situation Analysis.

## Focus group

A total of 16 focus group members, with representation spanning 14 stakeholder groups and varied experience with the OREHP, participated in structured activities at facilitated meetings held both in person on August 7-8, 2023 and virtually on October 9-10, 2023. The composition and specific aims of the focus group were informed by the initial situation assessment and designed to facilitate respectful and productive discussions that could lead to a shared understanding of goals and a set of criteria that stakeholders found important for the OREHP to work. The focus group perspectives also guided elements of the design of the Ocean Enhancement Validation holder survey.

The focus group collaboratively identified five important elements of the OREHP: research discoveries, enhancement, integration with fisheries and ocean management, public education and engagement, and transparent and inclusive governance. This group also developed an initial, prioritized list of success criteria for each Program element. Most of the focus group's perceptions and values surrounding the OREHP were reflected in the Ocean Enhancement Validation holder responses to the survey questions except that the focus group viewed actual stock enhancement as a singly important outcome while the Ocean Enhancement Validation holders viewed stock enhancement as one of many valued outcomes including conservation, fisheries and environmental management, education and research.

The report detailing the results of the focus group is included as Appendix 2: Summary and synthesis of the OREHP Visioning focus group.

## Survey

An online survey was conducted to collect data from Ocean Enhancement Validation holders, namely recreational anglers, commercial fishers, and charter operators in Southern California, regarding their perceptions and awareness of the OREHP, attitudes toward fisheries management options including stock enhancement, fishing behavior and motivations, fisheries and conservation Program preferences, willingness to pay for the OREHP as a stock enhancement program, and demographics. The survey was distributed to a random, representative sample of participants who held recreational or commercial Ocean Enhancement Validations between November 15, 2022 and November 14, 2023. It was also sent to a list of recreational fishing charter operators in Southern California.

The survey revealed that Ocean Enhancement Validation holders on average believed that OREHP was at least somewhat successful, based on an array of criteria. When asked to rate the importance of different success criteria, 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. There was strong and consistent support for broad ecology and conservation efforts associated with the program, as evidenced by responses throughout the survey that favored criteria, management strategies, and programs that prioritize these efforts.

Respondents also favored broadening the OREHP in other 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 report detailing the results of the survey is included as Appendix 3: Summary and synthesis of the Ocean Enhancement Validation holder survey responses and the survey itself is included as Appendix 4: Ocean Enhancement Validation holder survey.

## Public input

The project team, California Sea Grant (CDFW contractor) and University of Florida (sub-contractor) provided regular updates and sought input by attending the public OREAP and SAC meetings. After the introductory OREAP meeting in April 2022, there were five OREAP and two SAC meetings attended between March 2023 and April 2024. Questions and perspectives from OREAP and SAC members and other meeting attendees were important for the project team to gain knowledge from those deeply involved in the Program, fine-tune the participatory process (i.e. focus group and survey design), and gauge possible external and internal biases which informed the interpretation of findings and communications among stakeholders.

## Synthesis of the participatory process findings

### A stewardship ethic is the driving motivation for stakeholders' support

Ocean Enhancement Validation holders tended to value the OREHP for the sense of stewardship that it instills often over its potential fishing benefits. This was reflected throughout the survey responses including, i) rating ecology and conservation as some of the most well-supported and important elements, ii) stocking being seen as an act of giving back, iii) a preference for the stocking of White Seabass despite it not being one of the most popularly targeted species, iv) willingness to pay more for the Ocean Enhancement Validation even if there was no noticeable increase in the population or fishery, and v) willingness to pay more for a noticeable change in the population than a one fish increase in bag limit. The stronger stewardship than extractive mentality of Ocean Enhancement Validation holders indicates that the success of the OREHP (and other stocking programs) need not be coupled to a numerical enhancement outcome, but rather the intent to enhance the resources and the effective implementation of the hatchery and stocking operation. These conclusions are, however, made with some assumptions about Ocean Enhancement Validation holders' knowledge of the Program. For example support for the OREHP may also be influenced by the framing of public information about the Program or an implicit assumption that a program that has been around for over 40 years must be successful.

## A multifaceted program

OREHP was established in legislation as an experimental hatchery and enhancement program and has evolved into a multifaceted program. The focus group agreed upon five general program elements: Research, Enhancement, Education and Engagement, Fisheries and Ocean Management, and Governance, all five of which were considered important by Ocean Enhancement Validation holders who responded to the survey. These outcomes indicate a need for similarly multifaceted success criteria by which to evaluate the Program.

## Broadening the Program toward ecology, conservation and ocean management

The survey indicated that Ocean Enhancement Validation holders generally and often strongly supported broadening the Program towards a greater emphasis on ecology and conservation. This is in line with stewardship being a driving motivation behind stakeholder support for the Program. The focus group similarly supported greater integration of the Program with fisheries and ocean management. Priority areas identified for success criteria were to collect and contribute data, resources and partnerships to keep White Seabass stock assessments updated; research of environmental processes and disturbances impacting the stock; and improvement of fishery landings data. Understanding and quantifying the population dynamics of the White Seabass stock is crucial to understanding the potential contribution of hatchery releases to fishery management and conservation goals. Therefore, synergizing and incorporating more research on the wild stock component into the Program is consistent with the overall enhancement remit of the OREHP. Contributing to broader nearshore ecosystem conservation efforts was also discussed as a success criterion but rated lower than the above-mentioned criteria focused on the White Seabass stock.

Broadening the Program would require an increase and/or re-balancing of resources and expertise across components of the program in a manner that places the hatchery operation and release component within the broader context of fisheries ecology, management and conservation of the focal species. Doing so would improve our understanding of the potential for both hatchery releases and other conservation measures to contribute to fisheries management and conservation goals. Moreover, insights gained from a better understanding of the wild population component and other conservation measures will be valuable even if the research should ultimately conclude that effective hatchery enhancement of the stock is not possible.

## Enhancement outcome is seen as important but not singularly so

The focus group felt actual enhancement of the wild stock should be a criterion of program success. Ocean Enhancement Validation holders, however, did not single out enhancement as a pre-requisite for OREHP success, rather, they considered enhancement to be one of many program components and there was indication that the Program would enjoy support without actual enhancement. Namely, the Ocean Enhancement Validation holders supported the Program even if those efforts did not result in noticeable population enhancement.

The focus group's emphasis on enhancement as a success criterion was in part due to an expressed concern that anglers might not be supportive of the Program if there was no improvement in contribution. This concern may have been a real sentiment of OREHP partners, Ocean Enhancement Validation holders and/or other anglers, or a perceived sentiment based on self-imposed pressure to achieve actual enhancement. Other focus group members supported the OREHP and did not consider enhancement to be the goal of the Program, yet

also revealed concerns about the potential of low contribution rates leading to the end of the Program.

## Improving communication

An underlying distrust of the CDFW emerged during the initial situation analysis. This was partly attributed to the need for strengthened communication between CDFW, OREHP partners, and the public. The importance of communication about the Program, its decision-making process, and its outputs also revealed a need for better planned, coordinated, transparent, and strategic communication channels and messages for the public. The concept of effective, accurate, coordinated, and transparent communication also emerged during the focus group meetings. There was interest in holding the Program more accountable for improved communication as reflected in the agreed-upon definition of the “Research” element: *Research discoveries are clearly and transparently communicated and made accessible.*

More than half of the Ocean Enhancement Validation holders who participated in the survey were not familiar at all with the Program reflecting a need for an improved outreach strategy. Additionally, there were comments throughout the survey about the need for the Program to engage with a wider array of stakeholders (e.g., input from commercial fishers, recreational anglers, subsistence fishers, disabled anglers, and freedivers), and both increase visibility and communication with the public through transparent outreach and publicity.

## Diversity, Equity and Inclusion (DEI)

Topics surrounding diversity, equity and inclusion were brought up throughout the project. During the situation assessment, one interviewee in particular expressed concern about the lack of diverse representation in the OREAP, inclusion of native voices, and incorporation of Traditional Ecological Knowledge (TEK) into the Program. Initiated and led by some of the newer, least familiar members, the focus groups discussed the need to increase the representation of non-governmental organizations (NGOs), TEK, and Black, Indigenous, People of Color (BIPOC) groups in OREHP decision-making and Program activities (i.e, increased inclusivity in both governance and target audiences). In particular, there was interest in integrating native voices, practices, and innovation science into the Program’s science and management. During the focus group meeting discussions, these concepts were well accepted overall and in some instances incorporated into activities by other focus group members. However, during rating activities, these inclusivity aspects were rated as less important and urgent/critical overall by the group. Similarly, Ocean Enhancement Validation holder survey respondents rated DEI topics as the least important but never as unimportant. There were also some rare occasions in the survey where respondents specifically opposed DEI.

The reasons for DEI aspects being considered generally less important than other priorities are uncertain, but may be a function of the long-term focus of the Program being on research and enhancement and/or the overall low representation of people of color, female and non-binary genders, and lower-income households among the OREHP stakeholders in this study (i.e., little representation of the people who may prioritize DEI). Despite this, looking at OREHP reform through a lens of DEI 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. Engaging Tribal, BIPOC, and other groups underrepresented in STEM and fishing, and under-resourced communities, in the Program can be part of the long-term vision and committed to in the shorter term for 2027 (e.g., development of a strategy).

## Governance

Coordinated OREHP leadership including CDFW, OREAP, SAC, contractors, educators, and key volunteers was identified as an important success criterion by the focus group. This group also prioritized adaptive management and the need to demonstrate the probability of success of new Program directions (e.g., new focal species or research directions) before embarking on them including scientific, economic, and practical (e.g., available infrastructure, equipment) assessments. Integration of TEK into decision-making was ranked among the least important, although still somewhat important, by the focus group and Ocean Enhancement Validation holders (see DEI section above). The incorporation of conservation-minded e-NGOs and communities into Program decision-making was rated as the least important success criterion, considered to be of neutral importance to somewhat unimportant, by Ocean Enhancement Validation holders. Given traditional conflicts between fishing sectors (i.e., extractive) and e-NGOs (i.e., protective), this was not surprising and demonstrates a need to have representation from e-NGOs in the decision-making process to settle potential conflicts and come to shared understandings early in the process.

## Adding more and/or shifting to other species

The focus group discussed the potential of the OREHP shifting towards a focus on an alternative species. California Halibut was the most commonly mentioned alternative to White Seabass, but any potential pivoting was recognized to come with important questions about the biological, technical, economic, and social feasibility. For instance, is California Halibut easy to raise and monitor once released? Would stakeholders (e.g., commercial fishing, other potentially interested groups) be in favor of California Halibut? Could the 2011 California Halibut stock assessment be updated to inform that decision?

When Ocean Enhancement Validation holders were asked specifically about their preferred changes to the Program, the option to shift to a different species was only somewhat supported and was not rated as one of the most preferred changes. The most preferred options were broadening to more ecology and conservation and keep it (the OREHP) as is. Of the Ocean Enhancement Validation holders who thought the OREHP should shift to a different species, only a small number provided a comment about their species preferences and the suggestions were varied, including California Halibut, Black Seabass, salmon, Cabezon, and abalone.

## Goals and criteria for the future of the OREHP

### Project outputs in the context of OREHP governance and the 2027

## Evaluation

The stakeholder perspectives on OREHP goals, criteria, and options derived in this project are intended to help inform the future development of the program and the 2027 Evaluation. As per California AB 1949 (2020), the OREHP Scientific Advisory Committee (SAC) is tasked with providing advice and recommendations about the OREHP's success in meeting its objectives to the California Fish and Wildlife director and the Ocean Resources Enhancement Advisory Panel

(OREAP). The conclusions and outputs from this project are intended to help inform the recommendations and decisions of these legally constituted decision-making bodies. To this end, the project has obtained and synthesized stakeholder input to provide suggestions for goals and specific success criteria that can be used to measure progress toward meeting goals in the short term (by the 2027 Evaluation deadline) and in the longer term. Short-term criteria will focus primarily on developing strategies that should lead to the achievement of long-term goals if properly implemented. Outputs from this project are suggestions or recommendations for consideration and further development by OREHP leadership (i.e. the OREAP, SAC, and CDFW) as outlined in Figure 1. Co-development of new and co-modification of existing strategies and approaches by OREHP leadership and partners will ensure that Program goals, objectives and activities are agreed upon, comprehensive (reflecting all priorities of stakeholders), and transparent (itself a stakeholder priority).



**Figure 1. Suggested next steps**

Steps will provide agreed-upon strategies in the short term that will be implemented for the eventual achievement of outcomes associated with the longer-term goals and criteria. Green= completed during the visioning and reform project, Orange= next steps for OREHP leadership (i.e., CDFW, OREAP, and SAC), Blue= actions taken beyond the 2027 Evaluation.

## Overarching OREHP goal

This participatory process revealed that stakeholders support the OREHP for its contributions to research, fisheries and ocean management, stewardship, and education in addition to its potential for enhancement of wild stocks. When thinking about the future of the Program, stakeholders valued furthering the conservation and sustainable use of wild stocks (currently White Seabass) through an enhancement initiative that provides research discoveries, strong(er) integration with fisheries and ocean management, public education and engagement, and transparent and inclusive governance. The notion that achievement of a particular enhancement rate needs to be a main success criterion is not necessarily so. This does not mean that the enhancement element was viewed as unimportant, but rather there is an opportunity to reduce the pressure associated with having to achieve a particular enhancement rate and allow the Program to be evaluated on a broader scope of short-term and long-term objectives and criteria that reflect stakeholder values. Furthermore, the underlying decision-making processes, Program activities, and outputs of each Program element should include current and potential stakeholders, and be broadly accessible and transparent, including clear and consistent communications and messaging.

## Goals and success criteria

Based on stakeholder priorities, the project has identified broad goal components and success criteria (Table 1). Short-term success criteria focus primarily on developing strategies (approaches to achieve an outcome vs the outcome itself) that should lead to the achievement of long-term goals if properly implemented. The strategies should be co-developed by OREHP leadership with strong input from the SAC to ensure that they are scientifically sound and realistic.

### Research and enhancement

The widespread stakeholder support of research, White Seabass enhancement, and/or stock enhancement in general, supports a research and enhancement program that continues to build on the 40+ years of scientific, technological, and methodological discoveries surrounding the hatchery production and ocean monitoring of White Seabass. Achieving actual enhancement remains an important element within the broad, multi-faceted goals of the OREHP. A priority in the short term is agreement on research and enhancement priorities and associated approaches needed to address the remaining uncertainties and priority challenges surrounding White Seabass enhancement (CASG 2017). Therefore, short-term research criteria should focus on the collaborative assessment of, modification of, and agreement on hatchery, growout, and ocean monitoring priorities and protocols (Table 1). For example, a priority on improved understanding of post-release survival may require agreeing upon which combination of tagging, marking, and/or tracking methods would be best and within those, which specific methods or analyses are needed (e.g., specific appropriate genetics sampling and analysis methods). The integration of traditional knowledge into the research and enhancement elements was viewed by newer stakeholders as important and also requires integration into each of the Program's strategies in the short term.

### Education and Engagement

Achieving long-term criteria surrounding the strengthened, expanded, and more inclusive education and engagement elements of the OREHP first requires co-developed, agreed-upon strategies (Table 1). The short-term criteria include developing strategies for achieving consistent and transparent messaging, and equitable and accessible data and information sharing (acknowledging the need for partners to have time to analyze and publish results; i.e., a data and information sharing plan). Also needed are paths forward for achieving expanded education surrounding STEM, fishing, stock enhancement, fisheries ecology and conservation, and environmental conservation for all ages, and more inclusive community engagement including new and strengthened relationships with TEK, BIPOC, and NGO groups (Table 1). Identification of education and community partnerships will be important early in the process so that they may be involved in planning of outcomes and activities. While this may eventually require new partnerships to broaden inclusivity, OREHP leadership can leverage existing partners (e.g., schools involved in SITC, public aquarium partners, angling clubs, Focus Group members, California Sea Grant) and their networks to get started.

### Fisheries and Ocean Management

**A plan** needs to be developed in the short term to guide and achieve the longer-term objectives of better integrating the OREHP and associated fisheries and ocean management (Table 1). In short, the stakeholders' view of "Enhancement" (i.e., the E in OREHP) is holistic, going beyond the rearing and release of hatchery fish into the ocean and valuing the role of this program as a multi-faceted fishery conservation program (now White Seabass) that integrates hatchery rearing and release, fishery and wild population management, and ocean management as it relates to support of the fishery to conserve and allow sustainable use of the resource (the target fishery). Therefore, a plan is needed to better integrate the goals, objectives, activities, data, resources, and/or people associated with the OREHP and relevant fisheries and ocean management efforts (e.g., stock assessment, fish habitat restoration, water quality projects;

Table 1). Analogous to education and engagement, connection early in the planning process of the OREHP leadership and partners working in these areas can help to identify the highest priority and/or most logical areas of collaboration. For example, including a stock assessment scientist who has intimate experience with conducting West Coast marine species stock assessments (preferably involvement with the target species' stock assessment) on the SAC (see "Governance" section) and/or consulting with West Coast marine species stock assessment scientists to identify and prioritize continued and new ways that OREHP and White Seabass stock assessment activities can leverage and complement each other (e.g., continue providing fisheries independent data such as juvenile White Seabass distributions and support expansion through addition of new juvenile survey areas and/or new/strengthened partnerships that can contribute to data collection (e.g., charter operations)). Examples of ways that the OREHP can better integrate stakeholder priorities include engagement with experts in the state working on projects that benefit target species such as nearshore habitat restoration, artificial reef, and/or water quality management to identify and prioritize continued and new ways to leverage and complement efforts (e.g., coordinate an anglers' community science program to provide observations of and data on artificial reefs and associated catch, or water quality conditions like turbidity and debris assessments or use of sampling kits). The OREHP's network of people and organizations, including people and initiatives within the CDFW, spans a variety of expertise, locations, resources, and interests that provide many opportunities for innovative and holistic improvements to the OREHP's enhancement approaches ensuring that efforts are better connected to and are able to leverage other relevant stakeholder-valued fisheries and ocean management programs in the state.

#### Governance

Considerations for transparent and inclusive governance also include planning to ensure that Program governance includes diverse voices and that roles, responsibilities, and governance processes are well defined for inclusively and collaboratively leading and supporting the OREHP. For example, SAC positions should be updated to reflect the expertise required to broaden the OREHP (e.g., expertise in TEK, West Coast fisheries science and stock assessments, stewardship and community science, science communication, education and social science research, fishery-related ocean management such as water quality or ecosystem restoration) (Table 1). The legislative responsibility of the SAC is large and commensurate compensation of SAC members' time and intellectual input may be required for achieving appropriate inclusivity, especially for members whose professional positions do not or cannot compensate for participation. The demonstration of the probability of success of OREHP research and enhancement directions was one of the more important, urgent, and critical criteria. Therefore, the development of a strategy for conducting economic, biological, and social cost-benefit assessments of new Program directions is a high-priority short-term criterion. This strategy may simply consist of the identification of an existing feasibility assessment tool (e.g., cost-benefit analysis spreadsheet) and a brief plan for how to apply it to the OREHP. While the 2020 legislation (AB 1949) calls for input and evaluation of the OREHP, a more detailed adaptive management plan for the Program is needed in the short term, including a process for information collection, assessment, and response to assessment outcomes for all Program elements. For example, a plan that informs program adaptation given progress or challenges (e.g., when to redirect research directions and resources because questions are answered or new gaps need to be filled). Finally, a fiscal plan for supporting the broadening of the Program's objectives in a scenario of current funding levels and identification of sources to supplement funding (e.g., stakeholders suggested an increase in Ocean Enhancement Validation fees, expanding Ocean Enhancement Validation extent, grants) is required before the 2027 Evaluation.



## Options

Stakeholder input as synthesized in the previous section suggests four broad options for the future of the program:

- (1) Continue the program broadly as it is (but with strategies in place to address relevant success criteria);
- (2) Broaden the program towards more fisheries ecology, management and conservation while retaining the core element of the hatchery and release program (with strategies in place to address a broadened set of success criteria);
- (3) Adding or shifting to another focal species; or
- (4) Ending the program.

Based on the survey, broadening the program (Option 2) received the greatest support from recreational fishing and charter stakeholders, followed by continuing as is (Option 1).

Commercial fishing stakeholders preferred Option (1) over Option (2). Shifting to a different species (Option 3) enjoyed less support than Options (1) or (2) from all stakeholder groups surveyed and ending the program had the lowest support overall.

## Conclusion

Incorporation of California Ocean Enhancement stakeholder priorities into the OREHP would better align the Program with the values and visions of its stakeholders and may also strengthen the Program's impact on fisheries, the ocean, and a variety of communities ultimately leading to broader and more impactful outcomes.

## Table 1. Short- and long-term OREHP success criteria

**Examples** of short-term (by 2027) and long-term success criteria that are reflective of the outcomes of the stakeholder participatory process. The examples of details and long-term criteria are based on stakeholder suggestions and may not be complete or feasible. **Final decisions about criteria and the details within are made by OREHP leadership.**

Topic	Short-term criteria	Long-term criteria
<p>Research: Transparent and openly accessible research discoveries Build off of 40 years of research producing hatchery White Seabass and integrate traditional knowledge to continue advancing science and technology while striving for improved survival and enhancement (can be aspirational).</p>	<ul style="list-style-type: none"> <li>● Hatchery, growout, and post-release monitoring approaches are co-assessed, modified, agreed upon, and address priority challenges (CASG 2017)               <ul style="list-style-type: none"> <li>○ Survival determination methods</li> <li>○ Broodstock genetics methods</li> <li>○ Tagging/tracking methods</li> <li>○ Genetics methods</li> <li>○ Growout practices</li> <li>○ Hatchery practices</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>● Improved understanding of the methodological and environmental influences on post-release survival and stock enhancement rates</li> <li>● Accurate survival and enhancement rates based on several rigorous approaches (tags, genetics, acoustics)</li> <li>● Improved understanding of the appropriate variability and types of genetic diversity of broodstock and associated influences</li> <li>● Rigorous genetic (parentage, contribution) estimates</li> <li>● Improved understanding of methodological and environmental influences on the health and survival of fish in growout</li> <li>● Improved understanding of the drivers of efficient, healthy and low-impact hatchery production</li> <li>● A regularly updated set of research</li> </ul>

Topic	Short-term criteria	Long-term criteria
		<p>priorities informed by the discoveries and challenges of the previous priorities (demonstration of adaptive research)</p>
<p>Enhancement: Adaptive enhancement strategies that focus on assessment and learning De-emphasize achievement of enhancement targets, and focus on responsible and adaptive practices including integration of traditional knowledge, monitoring to produce sufficient data to evaluate all stages of stock enhancement, evaluation, and response to evaluation findings</p>	<ul style="list-style-type: none"> <li>● Responsible hatchery production is maintained (e.g., minimal environmental impacts, disease outbreaks, fish health conditions)</li> <li>● Responsible genetic diversity management is maintained (e.g., maintenance of broodstock genetic variability)</li> <li>● Science-based enhancement targets are defined for White Seabass (rates that contribute to the fishery but do not cause genetic harm to the wild stocks; can be an aspirational target)</li> <li>● Enhancement stages most in need of new information/ data and evaluation (e.g., post-release) are prioritized</li> <li>● A plan for an improved fish head collection and scanning process (i.e., more efficient process, more participants)</li> </ul>	<ul style="list-style-type: none"> <li>● Improved post-release survival and stock enhancement rates or an understanding of and response to a lack of improvement</li> <li>● Effective genetic diversity management: no genetic impacts to the wild stock, appropriate levels and types of broodstock genetic variability</li> <li>● Optimized hatchery production: Maximum production of healthy, genetically diverse fish</li> <li>● Hatchery production methods are scalable to production-driven operations</li> <li>● Improved fish head collection and scanning process (i.e., more efficient process, more participants)</li> </ul>
<p>Education &amp; Engagement: Broad and inclusive education and engagement of the public Strengthen, expand, and make more inclusive education and engagement</p>	<ul style="list-style-type: none"> <li>● Communications strategy for development and outreach of consistent messaging</li> </ul>	<ul style="list-style-type: none"> <li>● Messaging about the OREHP is consistent, coordinated and/or agreed upon</li> <li>● OREHP research materials and</li> </ul>

Topic	Short-term criteria	Long-term criteria
<p>through co-development and implementation of efforts involving volunteers of all ages, youth, early career, underrepresented, under resourced, and Indigenous people</p>	<ul style="list-style-type: none"> <li>● Data and information sharing plan allowing for equitable access to information while making allowances for partners to publish findings before public release</li> <li>● Inclusive engagement plan for inclusive community engagement &amp; access to opportunities including relationship building with TEK, BIPOC and NGO entities and assessments of effectiveness)</li> <li>● All-ages education strategy for co-development and hosting of STEM literacy content and activities for the public and students, including assessments of effectiveness (e.g. education/training in youth fishing, K-12 fish rearing and stocking, public stock enhancement, fisheries ecology and conservation, and environmental conservation)</li> </ul>	<p>discoveries and other information and products generated are equitably available, accessible to and used by current and future potential users</p> <ul style="list-style-type: none"> <li>● OREHP research, enhancement, education, and management partners and audiences include a meaningful proportion of TEK, BIPOC and NGO groups</li> <li>● Increased number, type and location of education programs for all ages</li> <li>● Improved literacy in STEM, stock enhancement and fishing fields among education audiences</li> </ul>
<p>Fisheries &amp; ocean management: integration with fisheries and ocean management Ensure Program priorities, practices, and outputs are integrated with fisheries and ocean management</p>	<ul style="list-style-type: none"> <li>● Fisheries management integration strategy for integrating OREHP activities, data, resources and/or people with stock assessment and other fisheries management efforts (e.g., use of data</li> </ul>	<ul style="list-style-type: none"> <li>● OREHP activities, resources and/or information contribute to updates of the White Seabass stock assessment</li> <li>● OREHP activities, resources and/or information contribute</li> </ul>

Topic	Short-term criteria	Long-term criteria
	<p>on otoliths, biometrics, landings to supplement assessments and FMPs)</p> <ul style="list-style-type: none"> <li>● Environmental management integration strategy for integrating OREHP resources and outputs and those of other ocean management efforts (e.g., habitat restoration and management, water quality, climate change resilience plans)</li> </ul>	<p>to other fisheries management and ocean management plans and efforts</p> <ul style="list-style-type: none"> <li>● Community and cross-agency partnerships are in place to integrate with other fisheries and ocean management efforts</li> <li>● Increased White Seabass fisheries landings due to contributions of data, resources and insights that inform management practices leading to healthy fish stocks/populations</li> </ul>
<p>Governance: Transparent and inclusive governance Ensure coordinated leadership, transparent and more inclusive and diverse decision-making and adaptive management</p>	<ul style="list-style-type: none"> <li>● Program governance and inclusivity plan that defines roles, responsibilities and processes for inclusively and collaboratively leading and supporting the OREHP</li> <li>● SAC positions reflect the expertise needed to broaden the OREHP (e.g., expertise in TEK, fisheries science, stewardship &amp; community science, science communication, education &amp; social science research, ocean management)</li> <li>● Cost-benefit or feasibility assessment strategy to guide economic, biological</li> </ul>	<ul style="list-style-type: none"> <li>● An inclusive Program governance team with strong core leadership and coordination by CDFW and diverse and well-supported advisory committees and major partners</li> <li>● Governance team includes meaningful representation of TEK, BiPOC and NGO groups</li> <li>● The probability of economic, biological and social success of OREHP research and enhancement directions is clearly demonstrated</li> <li>● An adaptive management strategy is underway with</li> </ul>

Topic	Short-term criteria	Long-term criteria
	<p>and social cost-benefit assessments of new Program directions</p> <ul style="list-style-type: none"> <li>● Adaptive management plan including a process for data/information collection, assessment and response to assessment outcomes for all Program elements</li> <li>● Fiscal plan for broadening the Program's objectives in a scenario of current funding levels and identification of sources to supplement funding (e.g., stakeholders suggested an increase in Ocean Enhancement Validation fees, expanding Ocean Enhancement Validation extent, grants)</li> </ul>	<p>enough information and data to assess each element of the OREHP, completed assessments and demonstrated actions resulting from assessment outputs (e.g., shifts in research directions to address remaining uncertainty or new challenges, redirection of resources filled gaps)</p>