

Glossary of Key Terms

Red Abalone Fishery Management Plan Process

Version Last Updated: December 2019

This document is intended to serve as a resource to members of the Project Team to provide definitions for some common terminology encountered during their engagement in the fishery management plan (FMP) development process for the North Coast recreational red abalone fishery. Definitions are provided in normal font and context specific to the Red Abalone FMP process are indicated in *italics*. For a more comprehensive list of fishery terms please see the following glossaries: [NOAA Fisheries, 2018 Marine Life Management Act \(MLMA\) Master Plan for Fisheries](#), [California Water Board](#), and [FAO](#).

For more information about the Project Team, and access to additional resources, visit: [Recreational Red Abalone Management Strategies Integration](#) and [Red Abalone Fishery Management Plan](#).

Abundance: The total number of a kind of fish or invertebrate in a population.

- *True estimates of abundance are rarely known, and usually estimated from the relative abundance, such as the case with the red abalone density surveys.*

Administrative Team: A team comprised of representatives from the California Department of Fish and Wildlife (CDFW), the Ocean Protection Council (OPC), the Fish and Game Commission (Commission), the Nature Conservancy (TNC), Tribes and tribal communities, and the red abalone fishing community, charged with ensuring that the management strategies integration process occurs in a collaborative, efficient, and timely manner and informs a revised management chapter for the recreational red abalone FMP, in line with the recommendation from the Commission.

- *The Administrative Team Charter is available [here](#).*

Allee effect: Biological occurrence characterized by a correlation between population density and per capita growth rate. Either overcrowding (i.e., very high density) or under crowding (i.e., very low density) can have a negative impact on population survival, growth, and development. Below a critical density threshold, spawning success declines, resulting in population declines and even localized extinctions.

Allocation: In regard to fisheries, allocation means the direct and deliberate distribution of the opportunity to participate in a fishery, or to receive a share of a catch quota, among identifiable, discrete user groups or individuals.

Bag limit: A limit per day or per trip on the number or weight of fish, invertebrates, or plants that a recreational fisherman may legally retain.

Bobber: Anglers that search for abalone in between the waterline and a depth they can reach without fins by “bobbing”. They do not reach depths beyond about 6 ft.

Body condition: A metric used to assess red abalone health. It is scored from 0 to 3 based on the appearance of the foot muscle, where a 0 score represents a healthy abalone where the foot muscle fully fills the circumference of the shell and a 3 is the opposite where the foot is severely shrunken.

Bio-fishery: A fishery in which limited harvesting activities are permitted to fishermen to collect biological information in alignment with pre-defined research objectives. A bio-fishery can be site-specific or applied at the fishing zone level, and may occur even when the recreational fishery is at a closed status.

Catch: The total number (or weight) of fish [or invertebrates] caught by fishing operations. Catch should include all fish [or invertebrates] killed by the act of fishing, not just those landed.

Citizen science: Public participation in data collection and/or scientific research.

Catch Per Unit Effort (CPUE): The catch obtained by a vessel, gear, or fisherman per unit of fishing effort (e.g., number or weight of fish [or invertebrates] caught per hour of trawling).

Data stream: A continuous flow of data (information) from a fishery which can be analyzed to inform management decisions.

Decision interval: Frequency or interval at which the management status recommendation is evaluated by re-assessing the harvest control rule.

- *For red abalone, an annual decision interval is proposed that is based on a running average of the previous three years of data.*

De minimis fishery: A fishery with a level of catch that is anticipated to have little to no effect on the health or recovery of a fishery resource . It is applied at the fishing zone level and occurs based on predefined thresholds set in an associated harvest control rule.

- *One approach to achieving a de minimis fishery for red abalone is through a managed or restricted access policy.*

Density: Number of organisms per unit of area.

- *In the case of current red abalone management, density represents the number of abalone per square meter (CDFW).*

Diver: A fisherman who uses free diving (i.e., being completely submerged underwater with the use of swim fins) as a method to catch fish or other species.

Eggs Per Recruit (EPR): Average number of eggs a recruit produces over its lifetime. Similar to Spawning Potential Ratio (SPR) [see below].

Exceptional Circumstance: A deviation from “normal” environmental conditions (i.e. anomalous and/or extreme environmental conditions) which may result in a catastrophic decline in red abalone

- *In the case of the proposed red abalone management, Part A of all proposed management strategies would involve a precautionary evaluation of environmental conditions and/or biological conditions for red abalone before proceeding to Part B (the decision-tree)*

Facilitation Team: In the context of this project, the facilitation team are third-party, neutral facilitators funded by a grant from the Ocean Protection Council in support of the FMP development process.

Fishery: The combination of fish and fishers in a region, the later fishing for similar or the same species with similar or the same gear types

- *For red abalone, refers to harvesting from commercial fishermen, recreational divers, rock pickers, and bobbers.*

Fishery-dependent data: Information collected directly from a fishery, such as sampling catch at landing sites and information from commercial landing receipts and commercial fishing passenger vessel logbooks.

- *For red abalone, refers to the data collected from abalone report cards and creel surveys.*

Fishery-independent data: Information collected separately or independent of fishery landing or catch data.

- *Examples include in-water subtidal surveys conducted by CDFW, ReefCheck, and MARINE/PISCO*

Fishery Management Plan: A planning document based on the best-available scientific knowledge and other relevant information that contains a comprehensive review of the fishery along with clear objectives and measures to ensure its sustainability. Components of an FMP are described in the MLMA.

Gonad index: The gonadosomatic index, abbreviated as GSI, is the calculation of the gonad mass as a proportion of the total body mass. It is represented by the formula: $GSI = [\text{gonad weight} / \text{total tissue weight}] \times 100$.

Harmful Algal Bloom (HAB): HABs occur when colonies of algae — simple plants that live in the sea and freshwater — grow out of control and produce toxic or harmful effects on people, fish, shellfish, marine mammals and birds.

Harvest Control Rule (HCR): Describes how harvest is intended to be controlled by management in relation to the state of some indicator of stock status.

- *For example, a harvest control rule can describe the various values of fishing mortality that will be aimed at for various values of the stock abundance. It formalizes and summarizes a management strategy.*
- *A decision-tree is a type of harvest control rule, and may be used interchangeably during this management strategy integration process*

Index sites: The 10 landing locations used by the CDFW when conducting subtidal dive surveys and collecting data to inform decision-making.

- *Red abalone density data used in the Abalone Recovery and Management Plan (ARMP) is generated from these subtidal surveys.*

Indicator: A measure of a component or process that can serve as a proxy for values that are difficult to calculate, such as abundance of a species or ecosystem health.

- *For example, CPUE is often used as an indicator of stock abundance or availability. In the case of red abalone, density, SPR, and catch are some examples of indicators evaluated in the peer review process.*

Intertidal: The area on a seacoast between the highest and lowest tide.

Invertebrate: An animal lacking a backbone.

- *Examples include abalones, jellyfish, shellfish, etc.*

Landings: The number or poundage of fish or other species unloaded at a dock by commercial fishermen or brought to shore by recreational fishermen for personal use. Landings are reported at the locations at which fish are brought to shore.

Managed access: A fisheries management tool which seeks to protect the rights of fishermen by giving them exclusive access to fish certain areas.

Management strategy: A strategy adopted by a management authority to reach established management goals. In addition to the objectives, it includes choices regarding all or some of the following: access rights and allocation of resources to stakeholders, controls on inputs (e.g. fishing capacity, gear regulations), outputs (e.g. quotas, minimum size at landing), and fishing operations (e.g. calendar, closed areas, and seasons).

- *For the red abalone FMP development process, the OST-facilitated peer review recommended that elements of each of the two management strategies should be combined into a single management strategy to form a more cohesive plan and reduce the risk of overfishing and increase management performance (i.e., management strategy integration)*

Management strategy evaluation (MSE): MSE is a modeling-based approach aimed at testing the robustness of possible management [strategies] by examining which sets of decision rules, which are used to adjust Total Allowable Catch or effort controls, perform the best in achieving the management objectives for a fishery. This simulation testing can also be used to determine how robust the management [strategies are] likely to be to uncertainties. These analyses enable the choice of which management planning option has the most reasonable likelihood of achieving the management goals.

Maximum Sustainable Yield (MSY): The highest average yield over time that does not result in a continuing reduction in stock abundance, taking into account fluctuations in abundance and environmental variability.

Model: A mathematical means of explaining a system, studying the effects of various components, and making predictions about behavior or management outcomes, as informed by hypothetical and/or measured values.

Open access: Condition in which access to a fishery is not restricted (i.e. no license limitation, quotas, or other measures that would limit the amount of fish that an individual fisher can harvest).

- *In the case of the abalone fishery, open access means that anyone may buy an abalone report card but they are still required to adhere to regulations/restrictions (e.g., bag limits, size limits).*

Operating model: A central model to a management strategy evaluation (MSE) that simulates all relevant aspects of the fisheries system and proposed management strategy. It includes all plausible hypotheses about the biology of the stock, such as recruitment, and aspects of the fishery, such as the level of illegal fishing activity.

Precautionary management: A resource management framework that implements conservation measures even in the absence of scientific certainty that fish stocks are being overexploited.

Project Team: A team charged with discussing and providing feedback on all scientific analyses conducted by the modelers to inform the management strategies integration process and provide input on de minimis (i.e., restricted/managed) fishery design in the red abalone FMP development process.

- *The Project Team is open to all members of the public, including members of the abalone fishing community, Tribes and tribal communities, non-governmental organizations, scientists, resource managers, the Recreational Abalone Advisory Committee, as well as staff of state agencies (i.e. CDFW, OPC, Commission). The Project Team Charter is available [here](#).*

Quota: A limit on the amount of fish which may be landed in any one fishing season or year. May apply to the total fishery, a geographical area, or an individual share.

Recruitment: A measure of the number of fish [or invertebrates] that survive to a particular life stage, often used to predict future population size.

- *Some examples include the number of offspring that survive the larval stage and reach the juvenile stage (larval recruitment), the number of individuals that survive (i.e., recruit) to the next year (e.g., age two recruits), the number of fish that reach sexual maturity (i.e., recruit to the spawning population), or in the case of a fishery, the number of fish that recruit to the catchable component of the population.*

Reference point: Quantitative (numerical) values that inform managers about the current status of a stock. *Target reference point* is a numerical value that indicates that the status of a stock is at a desirable level; often times management is geared towards achieving or maintaining this target. *Threshold (limit) reference point* is a numerical value that indicates that the status of a stock is unacceptable (e.g. overfished), and that management action should be taken to improve stock status.

Relative abundance: A relative measure of the weight or number of fish in a stock, a segment of the stock (e.g. the spawners), or an area. Often available in time series, the information is collected through scientific surveys or inferred from fishery data.

- *For red abalone, relative abundance is a comparison of density transect surveys at one period in time to another.*

Report card: Cards issued to recreational fishermen (i.e. divers, rock pickers, bobbers) for recording the landing location (out of a total of 56 sites), date and time, method used, and number of abalone taken. Also referred to as punch cards or tags.

Restricted access: Restriction of the right to participate in a fishery, using permits or other means. This is one method managers may use to ensure sustainable fisheries, reduce fishing effort, or protect recovering or threatened stocks.

Rock picker (or shore picker): An angler whose method of take involves searching for abalone in the exposed intertidal habitats during low tides without the use of fins.

Size limit: A minimum or maximum limit on the size of fish [or invertebrate] that may be legally be caught.

- *Minimum size limits are typically intended to prevent the harvest of juvenile or young individuals before they have reproduced. Maximum size limits are typically intended to prevent the harvest of highly fecund female fish. Size limits may be sex-specific for some species.*

Spawning Potential Ratio (SPR): A ratio of reproductive potential for a fished population relative to that of an unfished population, used to characterize the amount of impact that all forms of mortality (natural and fishing-based) have on a population's ability to reproduce. Similar to EPR.

Subtidal: Permanently below the level of low tide, an underwater environment.

Sustainable: "Sustainable," "sustainable use," and "sustainability," with regard to a marine fishery, mean both of the following: (a) Continuous replacement of resources, taking into account fluctuations in

abundance and environmental variability; and 2018 Master Plan for Fisheries Glossary 85 (b) Securing the fullest possible range of present and long-term economic, social, and ecological benefits, maintaining biological diversity, and, in the case of fishery management based on MSY, providing for a fishery that does not exceed optimum yield.

Total Allowable Catch (TAC): A specified numerical catch (including discard mortality) for each fishing season, the attainment (or expected attainment) of which may cause closure of the fishery.

Tribal Tradition and Culture (CUL): Uses of water that support the cultural, spiritual, ceremonial, or traditional rights or LIFEWAYS of CALIFORNIA NATIVE AMERICAN TRIBES, including, but not limited to: navigation, ceremonies, or fishing, gathering, or consumption of natural aquatic resources, including fish, shellfish, vegetation, and materials.

Tribal Subsistence Fishing (T-SUB): Uses of water involving the non-commercial catching or gathering of natural aquatic resources, including fish and shellfish, for consumption by individuals, households, or communities of California Native American Tribes to meet needs for sustenance.

Zones: Geographic areas of the coastline comprising several of the formerly defined abalone report card sites