

# Red Abalone FMP Project Team Meeting

## High Level Summary of Revised Draft Management Strategy

Support material for September 19, 2019 Project Team Meeting

***This document provides a high-level overview of a revised draft integrated management strategy for the North Coast recreational red abalone fishery. It has been developed by the modelers as part of the Red Abalone Fishery Management Plan (FMP) development process, at the direction of the Fish and Game Commission. The original draft strategy (summary [here](#)) was revised to reflect the discussions and suggestions of the Project Team during the August 27, 2019 meeting, as well as follow-up discussions from the modelers in-person meeting on August 28, 2019. The August 27 Project Team meeting Key Themes Summary ([here](#)) provides additional details on the rationale behind Project Team suggestions, some of which have been incorporated into the revised strategy. During the September 19, 2019 meeting the Project Team will have the opportunity to learn more about the revisions and to read the technical report from the modelers, in advance of the modelers conducting a preliminary run of the Management Strategy Evaluation (MSE). A reminder that MSE will be used to understand the trade-offs associated with the selection of final reference points.***

### Overview

In the absence of sufficient data to conduct a more traditional, quantitative stock assessment, the modelers have developed a draft management strategy<sup>1</sup> that relies on simpler indicators to evaluate the status of the North Coast red abalone resource. The management strategy is designed to inform decision-making, with the objective of providing fishing opportunities while safeguarding the recovery of the red abalone resource. This strategy utilizes a decision tree in order to recommend a management status (i.e., open, *de minimis*, or closed fishery). Based on recent Project Team discussions, the appropriate interval at which the management status of the fishery should be re-evaluated (i.e., decision interval) is annually.

The management strategy would be applied separately to each 'fishing zone' (i.e., geographic areas of coastline comprising several defined abalone report card sites). A total allowable catch (TAC) would be defined for each fishing zone, with TACs examined via MSE. If a zone is accessible for fishing activities (open or *de minimis* fishery), it is possible to harvest at all sites within the zone (minus Marine Protected Areas or closed sites). This strategy assumes a restricted access policy, as well as a number of existing management measures would be in place for a *de minimis* fishery. This strategy also proposes exploration of a randomized design for sampling site selection within a fishing zone, where sites sampled would vary over time.

### Summary of Revisions

The revised management strategy considers and reflects on Project Team feedback. Major changes incorporated since the August 27th Project Team meeting include:

- Management strategy re-structured into two parts. Part A assesses if exceptional circumstances have occurred (referred to as conducting a 'catastrophic environmental safety check' and ongoing monitoring of 'investigative triggers' during the August 27 Project Team meeting). And if no exceptional circumstances have occurred, Part B follows an indicator-based decision tree.
- Environmental indicators (e.g. ocean temperature, kelp abundance, sea urchin density, etc.) were removed from decision tree and included in Part A of management strategy (as an

---

<sup>1</sup> A management strategy consists of three parts: the data streams that comprise the monitoring program, the data analysis used to calculate indicator values, and a harvest control rule that is used to interpret indicator values within a pre-agreed decision framework and produce a recommended management action

'investigative triggers'). The list of environmental factors to monitor was also expanded by the Project Team<sup>2</sup>.

- Decision tree further streamlined to only include two indicators: length-based spawning potential ratio (SPR) and red abalone density, based on further discussion by modelers. While the Project Team suggested body condition or gonad index be included as the third indicator in the decision tree, after further discussion by the modelers it has been removed based on limitations around data availability and costs of processing samples.
- Maintained that two fishing zones (1 - Marin, Sonoma counties; 2 - Mendocino, Humboldt, Del Norte counties) will be evaluated via MSE, however three fishing zones (1 - Marin, Sonoma counties; 2 - Mendocino county; 3 - Humboldt, Del Norte counties) could still be considered. In the case of three zones, with Humboldt and Del Norte separate, given the lack of baseline data available for that region, a TAC could still be allocated for a highly limited fishery with a catch limit equivalent to biological sampling needs for research or other management purposes. The Project Team will still need to consider trade-offs of complexity, cost, data limitation, and enforcement challenges with more than two zones.
- Highlighted the need to include a subsistence fishery as part of allocation discussions to honor the central role of red abalone in the lives of Tribes and tribal communities.

### **Exceptional Circumstances**

This part of the management strategy was developed by the Project Team as both an ecological safe-guard and as an opportunity to consider and respond to exceptional environmental circumstances, as measured by observations or changes in various indicators (e.g., kelp abundance, sea urchin density, ocean temperature, sea star density, acidification (pH), body condition/ gonad index, etc.) or the occurrence of catastrophic environmental events (e.g. harmful algal blooms, disease, oil spill, etc.). Where such exceptional circumstances protocols are used in other fisheries, responses to exceptional circumstances tend to either trigger a formal review of the management strategy or an adjustment to the current decision interval. The Project Team suggested the response to such circumstances be a shorter decision interval, which will likely require Commission and Department direction and potential temporary adjustments to regulations. The set of rules for what constitutes exceptional circumstances have not been fully defined, nor have the justifications for triggering this condition or the protocol or advisory process involving such decision-making; discussions on the design of Part A will be ongoing at future Project Team meetings.

### **Harvest Control Rules**

With support from the Project Team, the draft management strategy retains a harvest control rule structured as a decision tree that uses the traffic light method. In a scenario where data availability or quality is limited, this method provides a coarse characterization of the state of the resource or environment. Each indicator is scored for each fishing zone (red, yellow, green – see Figure 1) based on the analysis of a data stream and comparison to an established reference point (see below for proposed<sup>3</sup> reference points for each indicator).

The harvest control rule is applied by first using the previous management status to determine which harvest control rule to follow in Part B – Closed (Decision Tree #1), *De Minimis* (Decision Tree #2), Open (Decision Tree #3). A different indicator is evaluated at each tier of the harvest control rule (i.e., decision tree), and ultimately identifies all potential decision-making outcomes. If the status of the resource is improving, it is possible to only move one step (i.e. from closed to *de minimis* or from *de*

---

<sup>2</sup> In addition to ocean temperature, canopy-forming kelp abundance, and sea urchin density, the Project Team suggested including sea otter presence/abundance, sea star presence/abundance, pH/acidification, oxygen levels, and presence/abundance of empty red abalone shells included as investigative triggers.

<sup>3</sup> Please note that reference points are not final and will be further discussed with the Project Team during review of preliminary MSE results

*minimis* to open but not closed to open). If the status of the resource is deteriorating, multiple steps can be taken as needed (i.e., from open to closed, open to *de minimis*, or *de minimis* to closed).

### Indicators

The draft harvest control rules include the following indicators: SPR and density. SPR and red abalone density are the foundational indicators of the harvest control rules, and therefore MSE will focus on the performance of these two indicators in characterizing the status of the resource. The remaining indicators<sup>4</sup> outlined in Part A of the management strategy will provide added insights and precaution to the decision-making process, but will not undergo formal performance testing, in part due to challenges in clearly defining the associated mechanistic links.

The following proposals are outlined as a means to score each indicator using the traffic light method (green, yellow, red) within the harvest control rule:

- Length-based SPR
  - Percentiles used to score this indicator relative to target reference point (e.g. 0.75)
    - If  $\geq 75\%$  of sites fall below target reference point, RED
    - If  $\leq 25\%$  of sites fall below target reference point, GREEN
    - Otherwise, YELLOW
- Red abalone density
  - Three separate indicators are calculated based on density values relative to limit, intermediate, and target reference points
  - Percentiles used to score this indicator are based on whether confidence intervals (CIs) contain the limit (e.g.,  $0.2/m^2$ ), intermediate (e.g.,  $0.3/m^2$ ), or target (e.g.,  $0.4/m^2$ ) reference points
    - Limit Reference Point Indicator
      - 100% of density CIs are greater than limit reference point, RED
      - Otherwise, GREEN
    - Intermediate Reference Point Indicator
      - 100% of density CIs are greater than intermediate reference point, YELLOW
      - Otherwise, GREEN
    - Target Reference Point Indicator
      - 100% of density CIs are greater than target reference point, YELLOW
      - Otherwise, GREEN

### Project Team Meeting & Next Steps

During the September 19th Project Team meeting, the modelers will present the revised draft integrated management strategy for discussion and final input, in advance of the modelers preparing to evaluate it via MSE following the September meeting. Following the meeting, a more detailed technical report on the management strategy will be shared with the Project Team, and will reflect suggestions and input provided during the meeting.

---

<sup>4</sup> In addition to ocean temperature, canopy-forming kelp abundance, and sea urchin density, the Project Team suggested including sea otter presence/abundance, sea star presence/abundance, pH/acidification, oxygen levels, and presence/abundance of empty red abalone shells included as investigative triggers.

Management objective: enable open fishery status

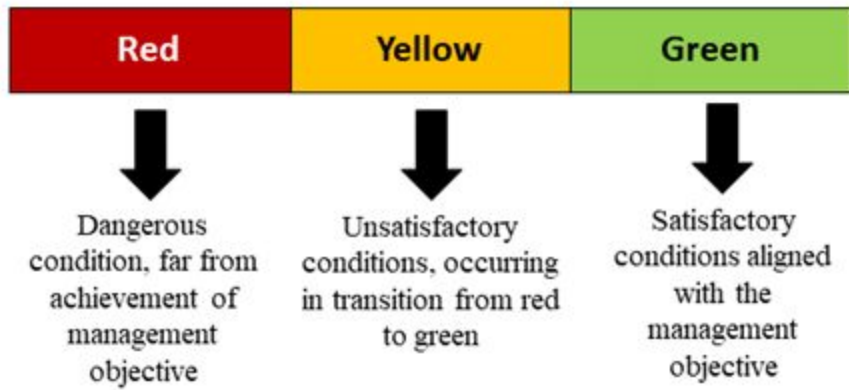


Figure 1. Traffic light method.

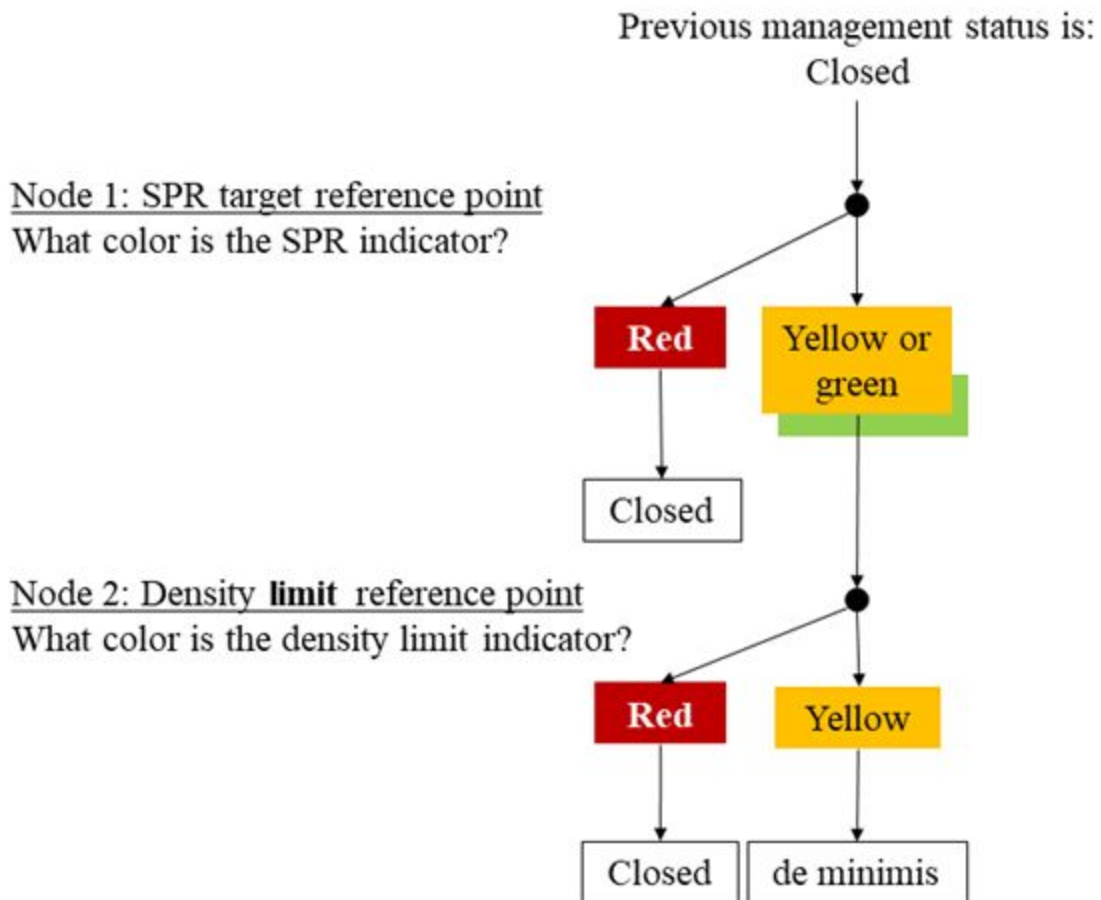


Figure 2. Part B of the management strategy. Decision tree #1. Applied when previous management status is closed.

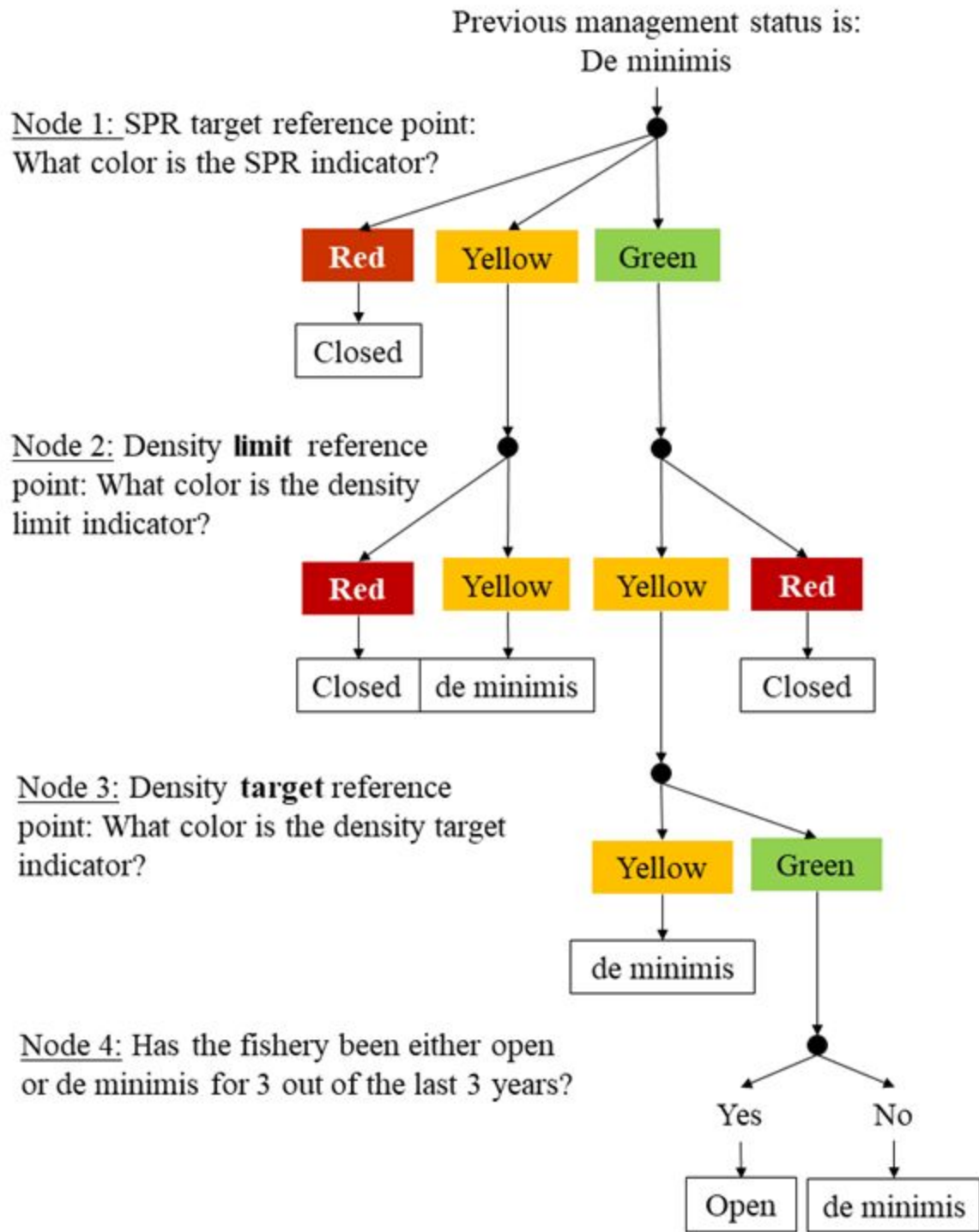


Figure 3. Part B of the management strategy. Decision tree #2. Applied when previous management status is de minimis.

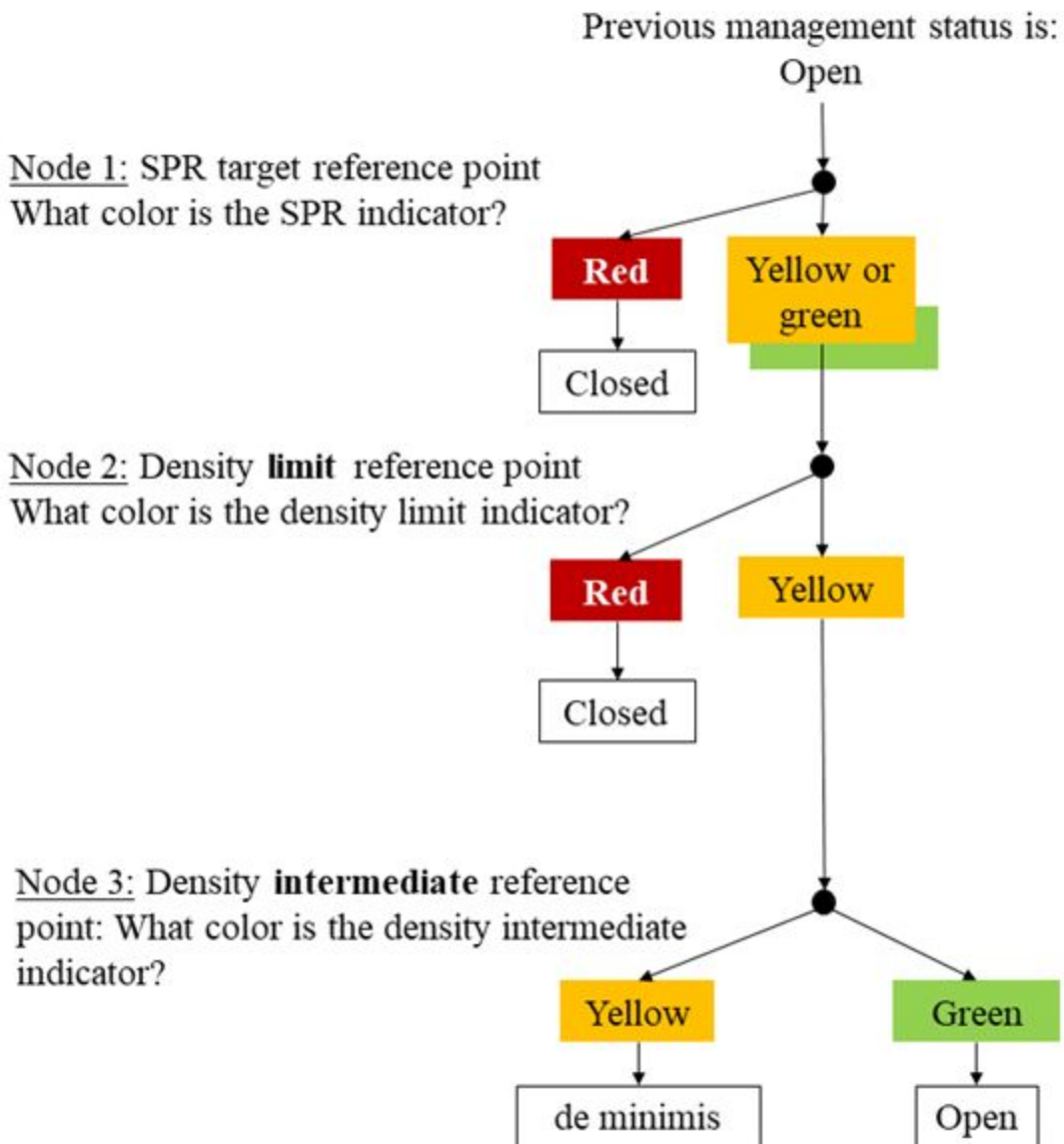


Figure 4. Part B of the management strategy. Decision tree #3. Applied when previous management status is open.