Chapter 5. Overview of Abalone Recovery and Management in the ARMP

Recovery of at-risk abalone species and management of abalone fisheries are separate but continuous and complementary processes in the ARMP. The recovery portion of the plan addresses the seven species in central and southern California (red, pink, green, black, pinto, flat, and white) that currently have severely reduced populations and reduced ranges. The management portion of the plan applies to stock that is considered sustainable for fishing. The management plan will initially apply to the northern California red abalone fishery, but ultimately will apply to any fully recovered species in central and southern California, outside of the Central California Sea Otter Range.

Abalone in California vary in status from populations bordering on extinction (white abalone) to a sustainable population with surplus animals that is still being fished (northern California red abalone). The ultimate goal of recovery is to move species from a perilous condition to a sustainable one with surplus abalone available for fishing. The ultimate goal of management is to maintain sustainable fisheries under a long-term management plan that can be adapted quickly to respond to environmental or population changes.

The primary criteria used to evaluate progress in achieving recovery and management goals involve estimates of recruitment and population abundance (measured by density). For populations with very low densities, evidence of recruitment is used as one of the first indicators that stock is recovering. For a fished stock, recruitment is important to ensure that animals removed from the fishery will be replaced, and is used with density criteria to trigger management actions. Two density levels are integral to both recovery and management as measures of population abundance: minimum viable population size (MVP, 2,000 ab/ha) (Section 6.2.2.1 Criterion 2 - First Density Level (2,000 ab/ha)) and a sustainable fishing density (6,600 ab/ha) (Section 6.2.2.2 Criterion 3 - Fishery Density Level (6,600 ab/ha); Section 7.1.2.1 Criteria for Evaluating Stock). The density levels used are derived from red abalone populations in northern and southern California and published research from other abalone species (Section 6.2.2 Density-based Criteria). Density data for other California abalone species are not available at this time; therefore, red abalone densities are used because they represent the best available data until such time as data can be obtained to refine density levels for each species.

Abalone populations below the MVP (Figure 5-1) are at risk of recruitment failure and face possible extinction. Populations at or above the upper limit of the precautionary area (Figure 5-1) are likely to have sufficient abalone to support a sustainable fishery.

The precautionary area (Figure 5-1) is where recovery and management overlap. The precautionary area is bounded on the lower end by an abalone density that combines the MVP with an additional density buffer (50% of the MVP), and on the upper end by the upper limit of the precautionary area. Populations in the precautionary area are likely to be self-sustaining (experiencing successful reproduction

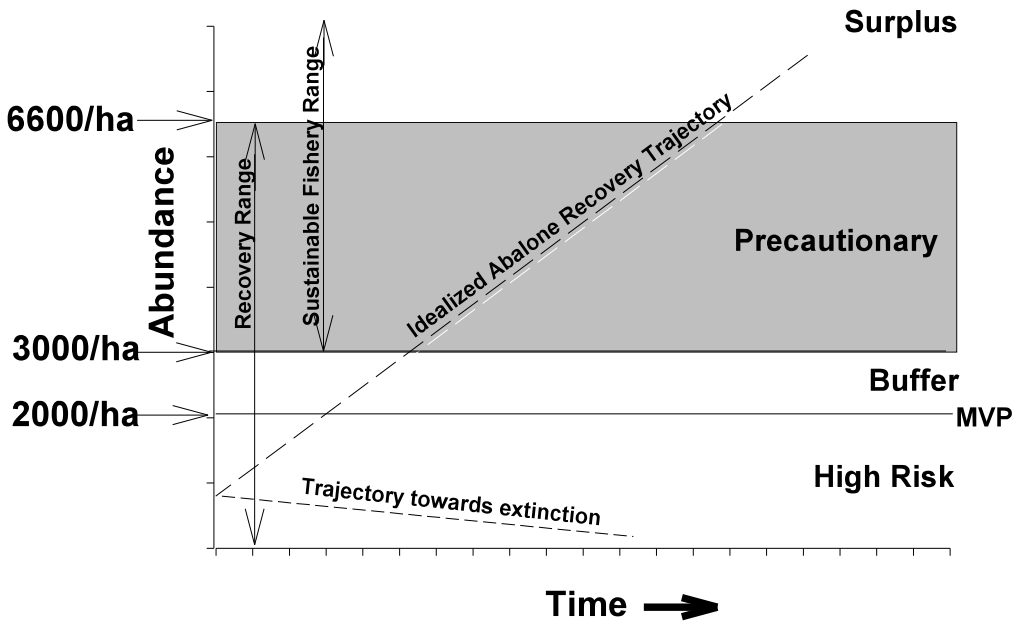

Figure 5-1. Conceptual approach for recovery and management under the ARMP. Note that in the precautionary area, fishing is only allowed in open fisheries that are subject to management under the ARMP. As densities decline, catch levels are progressively reduced. Closed fisheries that are recovering will not be considered for reopening while their abundances are in the precautionary area.
MVP = minimum viable population

and recruitment to survive natural fluctuations in abundance), but excessive fishing mortality could cause these populations to decline. When a fishery closes because of depletion, it is likely near or below the lower end the precautionary area (Figure 5-1). The affected abalone populations are subject to recovery, and no fishing will be proposed for these populations until the sustainable fishery density is reached. Abalone populations that are actively managed as part of a fishery, however, may be fished while their abundance level is in the precautionary area, but with progressively reduced take. The precautionary area thus acts as a buffer between conditions that mandate fishery closure and those that allow fishery reopening; conditions for fishery reopening are set at the sustainable fishery density (6,600 ab/ha) (Section 6.2.2.2 Criterion 3 - Fishery Density Level (6,600 ab/ha)) to ensure that a fishable surplus has been rebuilt.

Progress toward meeting ARMP criteria is measured and evaluated over time at index sites in areas of abalone habitat that have experienced high use in former or current fisheries. Costs associated with assessing recovery and management are minimized by sharing resources among governmental agencies and the private sector, and by alternating efforts between regions.

Because several species in central and southern California are deemed to be at high risk, during the first 7 years of implementation the majority of research will be directed towards recovery. Recovery efforts will initially focus on assessing the relative

risk of extinction, identifying where remnant populations remain, developing recovery techniques, and using these techniques to rebuild populations of at-risk species to self-sustaining levels. An ideal abalone recovery trajectory is represented by the upward diagonal line in Figure 5-1.

Recovery is a stepwise process, where goals must be met sequentially. Once recovery goals are met, a species may be evaluated and considered for a fishery. Recovery success will be evaluated at index sites in recovery areas to determine when critical densities are attained. Before a fishery is considered, range-wide recovery must occur for a species. Range-wide recovery is accomplished when three-quarters of the recovery areas (Section 6.2.1.1 Criterion 1 - Broad Size Distribution Over the Former Abalone Range) have met all the recovery criteria; recovery in a single area alone will not provide adequate insurance against future catastrophic events such as disease, pollution, or the expansion of the sea otter populations.

The management portion of the ARMP establishes guidelines for determining allowable take levels and for closing and reopening fisheries. During the first seven years of ARMP implementation, management of the existing fishery will occur with limited resources under an interim plan that sets a total allowable catch level and uses established criteria to guide regulatory change. However, because the interim plan operates in a data-limited environment, it follows a precautionary approach to setting take. Under the interim plan, fishery closure (zero take) occurs when average densities at eight index sites fall below 3,000 ab/ha (the MVP with a 50% precautionary buffer). If additional resources become available, a long-term management plan may be implemented using zonal management with take allocated through an abalone tag system. The long-term plan allows management with greater precision on a localized basis. The long-term plan would require increased assessment and enforcement, but is more responsive to stock changes and can therefore be less precautionary. Because of the use of zones in the long-term plan, total fishery closure is less likely. However, at least half of the zones must continually have densities above 3,000 ab/ha in order for a fishery to remain open under the long-term plan (Section 7.1.3.4 Closing and Reopening Fisheries).

Marine Protected Areas (MPAs) provide refuge from take for all species, and are important to the recovery and management of individual species such as abalones for several reasons. MPAs are legally established and their protections can be enforced. In contrast, *de facto* refugia and single species moratoria do not provide the same level of protection for a species. A single species or species group moratorium does not convey protection to the ecological niche of the species. For example, the abalone closure from Palos Verdes Point to Dana Point in southern California was ineffective because fisheries for species that interact with abalones remained open. Preventing the take of abalone in areas open to other fisheries is difficult. *De facto* refugia are effective only as long as the characteristics governing the refugia, such as severe sea conditions, cold water, or inaccessability, remain effective. Subtle and sometimes undetectable changes in these characteristics could also change or eliminate the protections *de facto* refugia provide for abalones.

Within MPAs, abalones may be able to develop extensive populations within a complete, natural community that includes local food sources and a complement of predators (sea otters present a special case, as discussed Section 6.5.2 Sea Otters)

and competitors. Such complete populations may provide responsive mechanisms to address acute problems such as disease. For example, when WS was discovered in black abalone, the fishery was not closed because healthy (marketable) individuals could still be found (Section 3.1.1.1 Serial Depletion). Their removal eliminated these abalone from the reproductive population, and deprived the species of its only mechanism to combat the disease.

For these reasons, properly located, well-enforced MPAs should be required under the long term management plan. MPAs are currently being addressed under the Marine Life Protection Act.

The ARMP is meant to be adaptive. A timeline has been established for the first seven years of ARMP implementation. The plan will be reviewed in 2011. Revisions to evaluate success and funding needs and to refocus efforts will be performed when needed. In 2011 the Department and constituents will create a new timeline.