AGENDA ITEM SUMMARY

BACKGROUND

Red abalone (*Haliotis rufescens*) are large marine snails that inhabit rocky areas in the lowest intertidal zone and shallow subtidal zone along the southern Oregon coast. Populations of abalone are typically patchy, and individuals occur in low-density aggregations in rocky reef areas where they inhabit cracks and crevices, consume drift algae, and periodically emerge to graze understory seaweeds and kelp. Red abalone are the largest species of abalone in the world, and they occur at the northernmost extent of their biogeographic range along the Oregon coast. Consequently, the red abalone that occur in Oregon are popular targets for an active sport fishery that harvests abalone for meat and their large trophy-sized shells.

Oregon's red abalone populations have been the focus of a regulated fishery for over 60 years (1953-2017). Red abalone were first harvested commercially beginning in the 1950s, and they decreased rapidly in abundance until ODFW discontinued the commercial fishery in 1962. Oregon enacted the first rules regarding recreational harvest of red abalone in 1959 with establishment of a minimum shell size limit of 8 inches, pre-measurement of shells before removal, and a daily limit of three abalone per day. Stock enhancement projects were implemented in Oregon over the periods of 1960-1974 (Whale Cove) and 1994 (southern Oregon coast) in efforts to help bolster the population, but those stock enhancement activities were largely ineffective in increasing abalone densities. The population of red abalone in Oregon decreased further to a level that raised additional concern among resource managers, and the Oregon Fish and Wildlife Commission restricted the recreational bag limit to one abalone per day and five per year in 1995. From 1997-2017 recreational collectors harvested an average of 149 red abalone each year from Oregon waters. During the 2007-2017 portion of this period, average annual harvest was 189 abalone per year over the past decade, reflecting the growing interest among recreational collectors in Oregon and California.

Populations of red abalone exhibited signs of further decline in Oregon and northern California over the period of 2015-2018, coincident with a regional marine heatwave and widespread declines in the spatial cover and availability of kelp as a food source. In 2018, both the California Department of Fish and Wildlife and the Oregon Fish and Wildlife Commission suspended the recreational harvest of red abalone for a period of three years (2019-2021). Suspension of the recreational abalone fishery in Oregon was due to:

(1) low densities of red abalone observed during underwater index surveys (2015);

(2) unfavorable environmental conditions associated with the marine heatwave and loss of food; and

(3) increasing effort among recreational harvesters, coupled with an expected further increase in effort concurrent with suspension of the recreational fishery in California.

ODFW conducted underwater surveys of red abalone populations at key sites along the south coast in 2015 and 2019. Data generated by the index surveys indicate that the density of red

abalone was low in 2015 (*i.e.*, 0.03 abalone/m^2) and even lower in 2019 (0.015 abalone/m^2). These densities of adult red abalone are well below the threshold (0.15-0.20 abalone/m^2) that is considered essential to ensure successful reproduction and maintenance of a local abalone population. Continued decline in Oregon's population of red abalone highlights the need to take further conservation and management actions.

Recent Actions to Address Low Densities of Abalone in Oregon: ODFW staff completed several actions over the past two years to address the low densities of red abalone along the southern Oregon coast, including:

- work with contract divers to conduct underwater surveys of red abalone populations at 11 index sites (2019);
- provide logistic support and assist with underwater surveys conducted by the Reef Check citizen group (Port Orford, OR; fall 2020);
- complete a technical report and draft manuscript to summarize the history and trends for commercial and recreational harvest of abalone in Oregon (1940-2019);
- collaborate with Oregon State University (OSU) to develop a research proposal to characterize the genetic diversity and effective populations size for red abalone in Oregon (O'Malley, OR Sea Grant; proposal not selected for support 2020-2022);
- contribute to a research proposal developed by the University of Oregon (UO) and OSU to investigate ecological communities and ecosystem services associated with bull kelp forests on the Oregon coast (proposal selected for support 2021-2023);
- prepare a research proposal to fill critical data gaps and document shifts in nearshore ocean drivers and adaptive responses by bull kelp, sea urchins, sea stars, and abalone in priority rocky reef habitats along the southern Oregon coast (US Fish and Wildlife Service – Competitive State Wildlife Grant, pending); and
- participate in planning with academic investigators, the Oregon Kelp Alliance (ORKA), and Reef Check to determine feasibility of future citizen-scientist surveys of kelp beds, abalone, and sea urchins.

PUBLIC INVOLVEMENT

Input from Recreational Abalone Harvesters: Prior to suspension of the recreational abalone fishery in 2018, ODFW staff sent an informational letter and survey to each holder of an active abalone/scallop permit (2016 or 2017). The mailer included background information about the current status of the abalone population and habitat conditions, and solicited input regarding a series of possible management options. The survey was sent to 418 individuals, and the response rate was 40%. The majority of respondents (65%) identified "*alternative fishery rules*" (meaning the fishery should continue with new regulations to increase sustainability) as their preferred option, 27% identified "*suspension or closure of the recreational abalone fishery*", 4% identified "*status quo*", and 4% chose to defer to ODFW's recommendation.

We believe that information generated by the 2018 survey of recreational harvesters is still valid in 2020 and reflective of strong interest expressed by stakeholders to take management actions designed to increase sustainability of red abalone populations and continuation of the recreational fishery.

In addition to the mailer survey conducted in 2018 to solicit direct input from active recreational abalone harvesters, ODFW staff also delivered informational seminars and received input about possible management options from two distinctly different groups: (1) west coast abalone fishery managers and academic investigators; and (2) southern Oregon coastal stakeholders.

West Coast Abalone Fishery Managers: ODFW staff (Scott Groth, South Coast Shellfish Biologist and Pink Shrimp Fishery Manager) delivered an invited seminar during the West Coast Abalone Conservation Workshop (October 15, 2020) which included participation by a diverse group of over 100 marine scientists and west coast abalone fishery managers from California, Oregon, Washington, British Columbia, and Alaska. Mr. Groth presented information about the history of commercial and sport abalone fisheries in Oregon, described the current status of abalone populations and habitat conditions on the Oregon coast, and discussed potential options for management of the recreational abalone fishery. Workshop participants recommended that additional steps are needed to extend current protections for abalone populations, develop regional approaches to management of recreational abalone fisheries, continue monitoring of important index populations, improve the effectiveness of stocking and enhancement activities, and give serious consideration to the impacts of climate change and shifts in regional ocean conditions on the shallow-water rocky kelp forest habitats that support abalone.

Southern Oregon Coastal Stakeholders: Mr. Groth and Dr. Steve Rumrill, ODFW Shellfish Program Leader, have been active participants over 2019-2020 in discussions hosted by ORKA (**https://oregonkelp.com**). ORKA is a collaborative stakeholder group that includes commercial urchin divers, researchers, managers, conservationists, tour guides, sport divers, chefs, and other community members who work together in support of healthy kelp forests. ORKA is focused specifically on current challenges to maintenance of healthy kelp beds in the vicinity of Port Orford, OR, and the group has received updates from ODFW about the status of abalone populations and possible management actions to address their decline along the southern Oregon coast. In November 2020, Dr. Rumrill delivered an invited seminar to Coast Watch Oregon (a citizen-science monitoring program) which included an audience of about 50 stakeholders who have interest in stewardship of the Oregon coast. Dr. Rumrill's seminar summarized information about the history of commercial and sport abalone fisheries in Oregon, described the current status of abalone populations and habitat conditions on the Oregon coast, and discussed potential management options to address the recent increase in purple sea urchins, loss of predatory sea stars, and decline of abalone. Input received from discussions with ORKA and Coast Watch Oregon included concern about conservation of Oregon's populations of red abalone, continued support for suspension of the recreational fishery, further monitoring of abalone at underwater index sites, and interest in active intervention to reduce the numbers of purple urchins that compete with abalone for food.

ISSUE

Regulations for the Oregon Recreational Red Abalone Fishery

ANALYSIS

Unusual Habitat Conditions along the Southern Oregon Coast: Recent changes in nearshore ocean conditions along the Oregon continental shelf have contributed to broad-scale impacts to priority marine species and their habitats along the southern Oregon coast. Like other areas along the west coast (Rogers-Bennet and Catton, 2019), Oregon experienced a record-breaking marine heatwave beginning in 2013-2015. Elevated seawater temperatures over the past several years contributed to impacts to ecologically-important rocky reef communities along the southern Oregon coast, including:

- mass mortality of predatory sea stars, including sunflower stars (*Pycnopodia helianthoides*) that consume purple sea urchins;
- unusual variability and declines in the spatial extent of bull kelp beds (*Nereocystis leutkeana*) and understory algae;
- dramatic increases in the recruitment and abundance of purple sea urchins (*Strongylocentrotus purpuratus*); and
- starvation and declines in the density of red abalone.

Considered together, the magnitude of recent ecological changes to shallow-water rocky reef habitats and communities is unprecedented in recorded history for the southern Oregon coast.

Recent Surveys of Oregon Abalone Populations: ODFW conducted recent underwater surveys of red abalone populations at 24 sites in 2015 and 11 sites in 2019. Data generated by these index surveys indicate that:

- the density of red abalone was low in 2015 (*i.e.*, 0.03 abalone/m^2, or 1 abalone per 33 m^2); and
- their density decreased further in 2019 (0.015 abalone/m^2, or 1 abalone per 67 m^2).

These densities of red abalone are very low and well below the threshold (0.15-0.20 abalone/m^2; 1 abalone per 5-7 m^2) that is considered essential to ensure successful reproduction and maintenance of a local abalone population (Shepherd and Partington, 1995; Kashiwada and Taniguchi, 2007). The continued trend toward decline in Oregon's population of red abalone raises concern about the need to take further conservation and management actions, including suspension of the recreational fishery for three more years (2021-2024). This action will allow time to continue to monitor habitat conditions within rocky habitats, assess the status of abalone populations at the index sites, and evaluate the suite of factors associated with rebuilding of the stocks.

Identification of Abalone Fishery Management Strategies: Marine resource managers and academic investigators have worked together over the past several years to develop conservation plans and evaluate alternative fishery management strategies to address declines in abalone populations along the west coast of North America. For example, substantial declines have been observed for several species of abalone that occur in shallow-water habitats in Washington, Oregon, and California (*i.e.*, green, white, black, pinto, and red abalone). Important steps have been initiated to assess the status of the abalone populations and develop conservation plans that include suspension of fishery harvests, habitat enhancement, predator exclusion, captive rearing activities, and out-planting of hatchery-reared juveniles.

Efforts are currently underway to address regional declines in the populations of red abalone along the rocky coasts of Oregon and California. Fishery scientists recently worked in collaboration with the California Department of Fish and Wildlife and Reef Check California (a citizen science monitoring group) to evaluate options for a new red abalone fishery management plan for California (Harford *et al*., 2019; Jackson *et al*., 2020). Their analysis of alternative fishery management strategies included recommendations for establishment of two or three distinct fishery management zones coupled with identification of annual total allowable catch, a system of population indicators, and thresholds to help guide fishery management decisions.

Primary outcomes generated by the planning work for California are:

- continued monitoring of red abalone populations is needed to develop additional growth and age data that can be incorporated into stock dynamics;
- regional forecasts for red abalone populations generated from data-rich areas can be applied to data-limited areas;
- the rate of abalone stock recovery needed to reach a "minimal impact" fishery will likely extend over a period of 11 to 31 years, depending on ecological conditions, fishery areas, and rebuilding strategies;
- recovery is expected to be considerably slower for populations of red abalone located in the northern region of the coast in comparison with populations located further south; and
- undesirably low stock sizes can be avoided in the future by allowing abalone populations to rebuild to a level when they can be coupled with subsequent maintenance of a "minimum impact" regional abalone fishery, even under sub-optimal ecological conditions.

Application of California's Red Abalone Fishery Planning to Oregon: Information generated by the ongoing planning work within northern California may have added value in the coming years to help identify sustainable harvest rates for the small populations of red abalone that occur along the southern Oregon coast. In particular, rebuilding the abalone population and re-opening the recreational fishery along the rocky shores of the southern Oregon coast (Cape Blanco to Chetco Point/Brookings; 97 km) is expected to be similar to the northernmost region of northern California (Point St. George/Crescent City to Trinidad/Camel Rock; 93 km). Like northern California, it is anticipated that recovery of red abalone populations along the southern Oregon coast will be a long, slow process that will likely extend beyond 25 years. Changes in the status of abalone populations along the southern Oregon coast are also expected to be driven by the magnitude and timing of regional changes in nearshore ocean conditions (*i.e.*, likelihood of persistence or recurrence of marine heatwaves, return to "normal" ocean conditions), coupled with shifts in the ecological communities that inhabit rocky shores (including recovery of kelp beds and understory seaweeds, fate of purple sea urchins, recovery of predatory sea stars, etc.). It is important to acknowledge that considerable uncertainty exists in the forecasts for shifts in regional ocean conditions, and that the variability in ocean conditions will extend into uncertainty in the ecological communities that occur within Oregon's rocky shore habitats.

The recreational red abalone fishery in California is currently closed from April 1, 2018 to April 1, 2021. In October 2020, the California Fish and Game Commission heard from stakeholders about extending the sunset date on the current recreational red abalone closure beyond 2021, and the Commission is scheduled to adopt a Red Abalone Fishery Management Plan during the winter/spring of 2021 (subject to change). The CDFW 2020-2021 Ocean Sport Fishing

Regulations (Invertebrate Fishing Regulations) currently state that the "red abalone season closure may be extended through April 2026."

Recommendation: Given the current status and low density of abalone along the southern Oregon coast observed during the most recent surveys of underwater habitats (2019), a precautionary approach at this time would be to extend suspension of the recreational fishery in Oregon for three more years (2021-2024). Extension will allow time to monitor habitat conditions and conduct additional underwater surveys to assess changes in the index populations located along the southern Oregon coast. In particular, new underwater surveys are needed in 2021-2022 to determine whether the density of red abalone has remained low or decreased substantially below the level observed in 2019 (0.015 abalone/m^2, or 1 abalone per 67 m^2). Suspension of the recreational abalone fishery until 2024 will also allow time for ODFW to work with CDFW to develop a regional forecast for populations of red abalone that will be applicable to the section of rocky shore habitats that extends from Cape Blanco, OR to Trinidad/Camel Rock, CA (190 km). This cross-border area is of particular importance to red abalone because it is the northernmost extent of their biogeographic range where population densities are typically low, individual abalone and shell sizes are large, and the likelihood of recruitment from adjacent populations is expected to be very limited.

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- Shepherd, S.A., and D. Partington. 1995. Studies on southern Australian abalone (genus *Haliotis*). XVI. Recruitment, habitat, and stock relations. Marine and Freshwater Research. 46:669-680.
- Rogers-Bennett, L., and C.A. Catton. 2019. Marine heat wave and multiple stressors tip bull kelp forest to sea urchin barrens. Scientific Reports 9: 1-9 (15050. https://doi.org/10.1038/s41598-019-51114-y)
- Jackson, A., P. Berube, I. Taniguchi, J. Likins, J. Silva, E. Pope, and S. Mastrup. 2020. Summary of the Management Strategy Integration Process for the North Coast Recreational Red Abalone Fishery. California Department of Fish and Wildlife, Administrative Team Report to the California Fish and Game Commission. 115 pp.

OPTIONS

Option 1 – Maintain the current temporary closure of the recreational abalone fishery for an additional period of three years (March 17, 2021 to March 17, 2024).

Option 2 – No Action (status quo; recreational harvest of abalone would resume on March 17, 2021).

STAFF RECOMMENDATION

Option 1: *Maintain the current temporary closure of the recreational abalone fishery for an additional period of three years (March 17, 2021 to March 17, 2024).*

DRAFT MOTION

"I move to amend the 2021 Oregon Sport Fishing Regulations for the Marine Zone contained in OAR 635-039-0090 as proposed by staff in Attachment 3."

EFFECTIVE DATE: Upon Filing