State of the San Juan County Marine Stewardship Area

2024

San Juan County
Marine Resources Committee
&
San Juan County Environmental Stewardship

State of the San Juan County Marine Stewardship Area 2024

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SAN JUAN COUNTY
Marine Resources Committee

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Acknowledgement

The Coast Salish people have lived in and stewarded the lands and waters encompassed by the Marine Stewardship Area as part of their ancestral territory since time immemorial. We recognize, acknowledge, and honor their inherent, aboriginal, and treaty rights that have been passed down from generation to generation.

Through this assessment of the State of the San Juan County Marine Stewardship Area, the San Juan County Marine Resources Committee and the San Juan County Department of Environmental Stewardship reaffirm their commitment to progressing efforts toward the restoration and protection of the Marine Stewardship Area's shorelines and waters by furthering the recommendations put forth herein and ensuring that this work is grounded in a sense of place and connectedness, guided by indigenous knowledge systems, stewardship practices, science, and adaptive management strategies.

We recognize our shared responsibilities to continue to foster a healthy and vibrant marine environment for the generations to come.

Acknowledgement

This report has been a multi-year effort and would not have been possible without the generous donations of time, expertise, and dedication of the many scientists, marine managers, Marine Resources Committee (MRC) members, and community members. In particular, the authors would like to thank the San Juan County MRC MSA subcommittee including Dr. Megan Dethier, Phil Green, Christina Koons, Lovel Pratt, Elizabeth Tate, Tina Whitman, and Marta Green for their enduring patience, expert guidance, and thoughtful discussions. Their institutional knowledge about the 2007 MSA Plan and other more recent local research and planning efforts was invaluable in helping the authors understand the original context of the MSA and the 2007 MSA plan. Together they have steered this effort toward an end result that will be so much more impactful than what was originally proposed.

Since the publication of the MSA Plan in 2007 the MRC has continued to pursue projects that address the strategies identified in the plan, but in 2018 they also recognized the need to review its status and determine how things had changed within the MSA since its publication. The many present and past MRC members engaged throughout this effort helped to identify the many anc varied threats impacting the MSA today and put forth recommendations to tackle these complex and evolving stressors that continue to impact or have recently emerged to impact the San Juan County Marine Stewardship Area. The MRC (and alumni) is a dedicated group of community members who strive to drive efforts that will ultimately protect the waters and marine resources, including the marine-based livelihoods of the San Juan Islands and their contribution to this work is a testament to this.

There are too many regional and local marine experts in science and policy to name who have provided their time and knowledge to ensure that this body of work encompasses the current state of the San Juan MSA. The authors are grateful for those who took the time to participate in the surveys, travel to Friday Harbor to participate in the Marine Managers Workshops, provide interviews, and tolerate prods for new maps and survey reports.

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Carl Davies	2018-2022
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Forward

This assessment of the State of the San Juan County Marine Stewardship Area has been distilled from the work of many passionate voices as an offering to the community and to those who share a similar desire to steward and nurture our surrounding waters of the Salish Sea. Now facing what appears at times as insurmountable challenges, this comprehensive detailed summary provides a compass heading on how to navigate towards an appropriate compassionate response to the health and wellbeing of the San Juan County Marine Stewardship Area (MSA). From its conception, the MSA was identified as an area calling for the intimacy of local care, local knowledge, and of local leadership.

All of us on this committee share with many members of our community a deep respect for the more-than-human world of the Salish Sea that has evolved over millennia and for the stewardship practices of the Coast Salish people who have inhabited these coasts and seas since time immemorial. As we begin to understand and acknowledge the complex, intricate, and delicate nature of our surrounding aquatic worlds, and how our relationship with these worlds reflects their health and well-being, as well as our own, we regain a foothold with our ability to impact and change the trajectory of uncertainty and crisis towards renewal and balance.

There is no question as to the enormity of the work set before us in the *State of the San Juan County Marine Stewardship Area 2024*, nor do we have all the answers to the many questions that may arise within this body of invaluable reference. However, as we stand at the crossroads and have a look around us at this point in time, may we be called to deepen our sense of place, beyond our wildest imagination, with the more than human community all around us. Combining our sciences, our methodologies, our policies, and a sense of stewardship towards all life forms, with which we are all inextricably connected, we begin a path toward the right action. With our growing awareness of the MSA and its surrounding shorelines and habitats, may we begin to make steps toward a more equitable future for all life.

Sourced by its incredible beauty, awestruck by its inherent vast intelligence, and humbled by our feelings of wonder, may we not forget our potential for collective transformative change residing in every one of us, within our small community, from this place on Earth, from which we call home.

Jeffrey Dyer & Christina Koons, San Juan County Marine Resources Committee
February 16, 2024

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1. INTRODUCTION

San Juan County lies at the heart of the Salish Sea, at the convergence of Puget Sound, the Georgia Basin, and the Strait of Juan de Fuca. The archipelago is characterized by a rich diversity of marine life and habitats.

The islands have been a thoroughfare to Coast and Straits Salish Tribes and First Nations since time immemorial, and more recently Euro-American settlers, providing access to natural resources that have shaped Indigenous and Islanders' lifeways.

Today there are 14 federally recognized Coast Salish and Straits Salish Tribes that have treaty-reserved rights and, or ceded territories within the islands. They remain inextricably linked to the lands and waters as their ancestors were. The Islands' natural resources continue to provide traditional foods and cultural sustenance for their families and communities.

The transboundary waters of the Salish Sea have historically provided important trading routes between the islands and the mainland to both present-day British Columbia, Canada, and Washington State. Now, the waters include major commercial shipping lanes that see commercial vessel traffic circumnavigating and passing through San Juan County waters.

The Islands continue to attract new residents and remain a popular tourist destination attracting an average of 655,000 visitors a year. The Islands are consistently one of the top ten boating destinations in the United States. The popularity of the islands combined with the expanding mainland urbanization brings with it a plethora of impacts on the local marine environment that will only increase, especially as demand for global freight increases. In turn, the expansions in vessel traffic and the continued popularity of the islands for recreational boating increase

the risks of accidents and oil spills.

The preservation and restoration of our marine environment, which makes up the San Juan County Marine Stewardship Area, flows from our collective actions on land and water to our beaches, eelgrass, and kelp beds, and the dynamic troughs of the Salish Sea.

This report provides a comprehensive assessment of the current state of the Marine Stewardship Area. The assessment allowed the Marine Resources Committee (MRC), the San Juan County Marine Program, and partners to provide a list of recommendations needed for continued collective progress towards restoration and protection of our marine habitats and species, so that we may successfully foster a healthy and vibrant marine environment for generations to come.

BACKGROUND

In 2004, the San Juan County Council designated San Juan County as a voluntary Marine Stewardship Area (Resolution 8-2004). This designation had the objective of

> "***Facilitating the protection and preservation of our natural marine environment for the tribes and other historic users, current and future residents and visitors.***"

It was designed to protect the unique and valuable marine resources of the islands while allowing ongoing sustainable use to occur.

With this designation, the San Juan County Council tasked the Marine Resources Committee (MRC) with developing a Marine Stewardship Area (MSA) Plan that laid out detailed strategies for how the County could achieve the MSA's stated goal (Evans & Kennedy, 2007). The MRC undertook an extensive planning effort guided by The Nature Conservancy, which involved hundreds of stakeholders, numerous workshops, many months, and extensive funding. The plan was published and adopted by the County Council in 2007.

The 2007 MSA Plan identified 7 core biodiversity targets to protect, 3 socio-cultural targets that addressed the socio-cultural and economic importance of the marine environment, and specific threats and stressors impacting the waters around the islands.

Extensive community input gathered as a part of the development of the MSA plan in 2007 resulted in six top-priority protection strategies (figure 1). The strategies considered to be the most important for protecting the Marine Stewardship Area were:

- fostering a stewardship ethic in residents and visitors,
- managing activities to reduce harm to marine habitat and water quality,
- reducing toxins entering the food web,
- reducing the risk of large oil spills in county waters,
- recovering bottom fish species,
- preserving marine access and views.

Since 2009, the MRC and County have built local capacity for supporting these strategies by coordinating efforts among collaborating organizations, focusing local, state, and federal resources, and launching new conservation and education programs.

Over the last decade, there have been many changes to marine resource health and use within the MSA that were not reflected in the 2007 plan. Prominent examples of this include the sea star wasting disease epidemic (Harvell et al., 2019), the onset of eelgrass wasting disease, the return of humpback whales, the continued decline of Southern Resident killer whales, and the discovery of invasive species such as European green crab. In addition, while there has been state-led success in recovering bottom fish, limited monitoring of voluntary bottom fish reserves indicates the variable efficacy of these protective measures, providing valuable lessons for current and future marine resource monitoring efforts.

Figure 1. The top six strategies for protecting the San Juan County MSA identified in 2007.

EFFORTS SINCE 2007

- Monitoring eelgrass and documenting eelgrass wasting disease (Christiaen et al., 2022,).
- Mapping of shoreline modifications (Friends of the San Juans, 2010, 2022a).
- Mapping of forage fish spawning locations (Friends of the San Juans, 2022b).
- Comprehensive beach seining to document nearshore fish utilization (Beamer & Fresh 2012).
- Monitoring changes in kelp presence within the islands (Palmer-McGee, 2019).
- Identifying the costs of oil spill impacts and oil spill prevention, and the effectiveness of positioning an Emergency Response Towing Vessel in the vicinity of the San Juan Islands (Page et al., 2019, and the Vessel Drift and Response Analysis for the Strait of Juan de Fuca to the Southern Strait of Georgia).
- Analyzing oil spill response capacity (Nuka, 2015).
- Stormwater monitoring and management through the Clean Water Utility (County Storm Water Basin Planning I & II).
- Salmon recovery planning efforts:
    - Pulling It All Together (PIAT) II (Friends of the San Juans, 2017)
    - San Juan County Salmon Recovery Chapter Update (San Juan County Salmon Recovery Lead Entity, 2022).
- Washington State Governors Southern Resident Killer Whale Task Force (SRKW Task Force, 2019)

While the MSA has experienced a variety of changes over the last decade there has also been significant progress towards addressing many of the 2007 strategies. Despite these accomplishments, few of the 2007 plan's strategies have been fully implemented and the plan has had limited use by local and regional managers and planners, despite the County's intentions. Furthermore, the 2007 MSA Plan no longer reflects the state of the MSA's marine ecosystems, nor the local use of marine resources. Thus, an assessment of the status of the MSA is overdue.

GOALS & OBJECTIVES

In 2007, the MSA Plan set out to facilitate the protection and preservation of our natural marine environment for the tribes and other historic users, current and future residents, and visitors.

The MRC and County's Marine Program have now had the opportunity to assess the current status of the MSA and to provide recommendations that will allow the MRC, and local, State, Federal, and Tribal partners to achieve the goal of fostering a healthy and vibrant marine environment for future generations.

This status assessment addresses the following goals:

- Status review of strategies and related actions identified in 2007.
- Review and update current and emerging threats and stressors.
- Review and update the core biodiversity targets.
- Identify recommendations needed to address the identified threats and knowledge gaps going forward.

In addition, this effort included a compilation of maps of critical areas and protected habitats that occur within the MSA, and a list of relevant management efforts and plans related to the MSA and surrounding region.

ASSESSMENT LAYOUT

This report has been structured around five chapters and related appendices. A comprehensive review of the 2007 MSA plan was undertaken by the MRC and its MSA subcommittee with the support of County staff. This review and assessment included the following core activities:

1. Reviewed and assessed the 2007 Plan's Strategic Actions and compared to the local Ecosystem Protection and Recovery Plan (San Juan County LIO 2017), and the WIRA 2 Salmon Recovery Chapter Update (San Juan County, 2022).
2. Undertook a marine managers survey
3. Hosted a series of Marine Manager Workshops to review and discuss trends, threats, and key knowledge gaps to the core biodiversity targets identified in the 2007 plan and identify recommendations to address the threats and knowledge gaps.

Summaries of the 2007 Strategic Action Review, marine managers survey, and the marine manager workshops are provided in Appendix 1.

The report is laid out around the following key chapters:

Chapter 1: Introduction
Chapter 2: Threats and Stressors
Chapter 3: Focal Conservation Targets
Chapter 4: Recommendations for Continued Progress
Chapter 5: Conclusion

The State of the San Juan County Marine Stewardship Area 2024 provides a comprehensive review of the Threats and Stressors currently impacting the MSA. Additionally, each of the MSA Focal Conservation Targets have been reviewed, updated, and expanded to provide a more thorough understanding of the current status of key marine habitats and species found within the MSA. This has allowed the MRC and partners to provide a comprehensive list of Recommendations For Continued Progress to address the identified threats, stressors, and data gaps.

While the bulk of this status report concentrates on the current status of the MSA this report also provides details and map links to the many protected areas and management areas that fall within the MSA (Appendix 2), as well as the many management efforts and plans that apply to the MSA (Appendix 3). These sections provide a comprehensive list of resources and links to relevant maps. These lists will be updated as new information becomes available.

2. THREATS AND STRESSORS

The Salish Sea is one of the world's largest and most biologically rich inland seas that supports numerous species of mammals, birds, fish, and invertebrates, which in turn are vital to the regional economy, culture, and quality of life (Khangaonkar et al. 2021).

However, the region is under significant pressure from a growing human population, over-exploitation of natural resources, changing oceanic and atmospheric conditions, and urban development (Gaydos et al., 2015).

By next year, 2025, the human population within the Salish Sea ecosystem is expected to expand beyond 9 million people and continue to increase through 2050 (Sobocinski, 2021).

The impacts of this growth are already being felt throughout the San Juan County Marine Stewardship Area (MSA).

There are 175 islands encompassed by the MSA and people reside on approximately 44 either permanently or temporarily. For many residents and visitors, the Islands are an escape from the big urban centers, but the MSA is not immune to the impacts of increasing development here and in the surrounding US and Canadian mainland and Vancouver Island, nor the rapid pace of global climate change. Since 2010 the population of San Juan County has grown by 17.7% to 18,557. However, the San Juan County Visitors Bureau suggests the islands attract an average of 655,000 visitors per year, with half of those coming during the peak summer months of June-August. This represents an

estimated 8-fold increase during the summer months over the year-round population.

Population growth in the region has driven the development of both private and public infrastructure (Sobocinski, 2021), and this has also been true for San Juan County.

The health and resilience of the Salish Sea ecosystem and surrounding bioregion is threatened by a broad array of legacy, continuing, and emergent stressors associated with industrialization and urbanization (Sobocinski, 2021, Gaydos et al., 2015).

These same stressors also impact the marine species, habitats, and lifeways of the residents of the San Juan Islands and the Coast and Straits Salish people with cultural and treaty ties to the islands and surrounding waters. This chapter lays out the core threat themes that have been identified for the Marine Stewardship Area.

More specific sub-threats were further identified by the Marine Resources Committee and San Juan County Department of Environmental Stewardship. The five core threat themes identified as impacting the San Juan County Marine Stewardship Area include:

1. Shipping and Boating
2. Recreation & Resource Extraction
3. Shoreline Development
4. Climate Change
5. Invasives Species and Altered Food Web Dynamics

CORE THREAT THEMES

Shipping and Boating

Human Recreation and Resource Extractions

Development of Islands and Shoreliens

Climate Change

Invasive Species and Altered food Web Dynamics

Five core threat themes were identified as impacting the San Juan County Marine Stewardship Area.

These threat themes were identified through review of the following plans:

- 2007 MSA Plan (Evans and Kennedy, 2007),
- Ecosystem Protection and Recovery Plan (EPRP, San Juan Local Integrating Organization, 2017),
- Salmon Recovery Chapter Update (San Juan County Salmon Recovery Lead Entity, 2022),
- State of the Salish Sea Report (Sobocinski, 2021),

Threats and stressors identified during the 2020 Marine Managers Workshop were also considered.

More specific sub-threats were further identified by the Marine Resources Committee and San Juan County Department of Environmental Stewardship staff.

SHIPPING AND BOATING IMPACTS

Approximately 90% of traded goods are transported across ocean waters (OCED, 2021). Total global transport (passenger and freight transport and all transport modes) is projected to more than double by 2050 as compared to 2015 (OCED, 2021). This has been associated with wildlife disturbance and the effects are expected to increase with continued vessel traffic expansion (Cunha et al., 2017, Gaydos et al., 2015). The threats associated with shipping were recognized in the 2007 plan and have also been a core focus of the San Juan Local Integrating Organization (LIO) and Marine Resources Committee.

The San Juan MSA includes and is bordered by commercial shipping lanes providing access to the Port of Vancouver (Canada's largest port) as well as other ports and terminals in BC, and ports, terminals, and refineries in Washington State. San Juan County's marine waters to the north, west, and south include a Traffic Separation Scheme that is regulated by the International Maritime Organization (IMO) to manage large commercial shipping (IMO 1972). Vessel traffic is managed by the US Coast Guard and Canadian Coast Guard Co-operative Vessel Traffic Services (CVTS) for the Strait of Juan de Fuca region (US Coast Guard, 2022). San Juan County also includes the Turn Point Special Operating Area (USCG) and the Eastern San Juan Island Archipelago VTS Special Area Regulations (also known as Rosario Strait Special Area, CFR 161.13 and CFR 161.55).

These ocean-going vessels include tankers, bulk carriers, cargo, and cruise ships. Ferries and government vessels including the Coast Guard and Navy are also common in the MSA. In addition to shipping and commercial traffic, there are many stressors associated with smaller vessels including commercial tugs, fishing vessels, wildlife viewing boats, and numerous recreational boats ranging in size from small skiffs to large sailing and motor cruising boats (summarized in Sobocinski 2021).

There are diverse threats associated with increases in vessel traffic in the Salish Sea (Table 5.1). An increase in shipping leads to a higher risk of oil spills (Page et al., 2019). Shipping activity has also been identified as a threat to the critically endangered Southern Resident killer whales (NMFS 2016). Disturbance from vessels and vessel noise are hindering the recovery of the Southern Resident killer whale population (NMFS 2016). Diverse threats are associated with increased vessel traffic in the Salish Sea (Table 5.1). An increase in shipping leads to a higher risk of oil spills (Page et al., 2019). Shipping activity has also been identified as a threat to the critically endangered Southern Resident killer whales

(NMFS 2016). Disturbance from vessels and vessel noise are hindering the recovery of the Southern Resident killer whale population (NMFS 2016). In 2018, the Southern Resident Orca Task Force identified 12 recommendations to address the impacts of vessel disturbance on the imperiled population (Southern Resident Killer Whale Task Force, 2019). These recommendations addressed both the increase in shipping traffic as well as impacts related to smaller vessels that frequent the whales' critical habitat and the MSA.

The San Juan Islands are a popular boating destination for recreational boaters from throughout the Northwest. There are 17 public, club, or commercial marinas on the three main San Juan islands (Whittaker et al. 2018). These range in size from 8 to over 500 slips, providing for approximately 1,940 boats (Whittaker et al. 2018). In addition, there are numerous private docks and mooring buoys. In 2009, 1,835 mooring buoys were identified in the MSA, accounting for approximately two-thirds of all the mooring buoys in the inland waters of Washington State (Friends of San Juans, 2010). This number does not appear to have changed significantly though there are increasing reports of buoys being installed without the required authorizations.

Boaters also anchor out around the islands, particularly at popular marine state parks at Sucia, Jones, and Stuart Islands. Other popular anchorages include Westcott Bay on the west side of San Juan Island, Blind Bay at Shaw Island, and Watmough Bay on Lopez Island. Whittaker et al., (2018) conservatively estimated that the well-known anchorage areas could accommodate approximately 270 boats per night, however, vessel counts conducted during 2020 and 2021 when the Canadian border was closed to boater traffic due to COVID-19 restrictions suggest that this is a gross underestimate.

The impacts of recreating boaters include disturbance to the nearshore and embayment habitats from anchoring activity, shading, and the improper discharge of waste, and disturbance of marine wildlife through noise and encroachment at sensitive habitats such as seal haul-out sites.

Vessel strikes with marine mammals (Olson et al., 2021) are also an increasing concern in the islands. Harbor porpoise, Southern Resident killer whales, minke whales, and humpback whales have all been observed with either injuries consistent with a vessel strike or have been observed being directly impacted by a vessel. Marine mammals have also been observed entangled in fishing lines (Warlick et al., 2018).

The San Juan archipelago is not only a premier boating destination for recreational boaters, but it is also a popular wildlife viewing destination. The MSA is home to numerous whale-watching and fishing charters while companies also come to view wildlife and fish from the surrounding region, including from Canada. As a result, vessel presence and density within the San Juan MSA is an increasing concern and their associated stressors are becoming more apparent. The stressors or sub-threats identified are detailed in Table 2.1.

Table 2.1 Threat themes identified for shipping and boating in the MSA

Threat Theme: Shipping and Boating
Sub-Threats • Increased accident and spill risk • Increased vessel disturbance for species and habitats from noise and presence • Increased vessel strike/collision risk with marine mammals • Transboundary differences in spill prevention and preparedness measures • Remoteness of islands hindering the 4-6 hour planning standard for spill response combined with limited local capability for emergiency spill response. • Lack of preparedness for non-floating oil type spills • Increased risk of invasive species introduction • Anchor disturbance • Pump-out infrastructure/facilities and non-compliance • Liveaboards outside marinas • Derelict vessls and vessels of concern

HUMAN RECREATION AND RESOURCE EXTRACTION

Recreation in and alongside the marine environment of the San Juan MSA is one of the main economic drivers for the County (Whittaker et al., 2018). The islands host numerous public parks that provide residents and visitors access for recreational boating, kayaking, and paddle boarding, particularly on the larger ferry-served islands of San Juan, Orcas, Lopez, and Shaw Islands. During the summer months, the islands see their population increase approximately 8-fold with seasonal workers and visitors. Visitors to the islands reportedly numbered 589,671 in 2022 and 568,335 in 2021, down from a pre-pandemic level of 820,553 in 2019 and 749,498 visitors in 2018 (San Juan Islands Visitors Bureau, 2023). The peak visitor season is June through September with the vast majority visiting during July and August (San Juan Islands Visitors Bureau, 2023). While the exact number of visitors engaged in boating is unknown, the number of boats registered within the county was 5,670 in 2021. Recreation was not identified as a threat to the MSA in the 2007 plan (Evans & Kennedy, 2007), but as noted above, recreational boating impacts the marine environment. Pressures are related to both boaters who stay on board their boats and cruise the islands, as well as boaters with a focus on day trips and recreational fishing.

Fishing and shellfish harvests as both a recreational activity and a commercial pursuit have long occurred in the San Juan MSA and were identified as a stressor in the 2007 plan (Evans & Kennedy, 2007). Marine resource extraction has been occurring in the islands for millennia. Fishing for salmon continues to be a focal activity of the Coast Salish, but they also cultivated and harvested a variety of marine invertebrates including clams, cockles, mussels, oysters, and sea cucumbers (Pratt, 2022), as well as eelgrass and kelp (Pratt, 2022, Calloway et al., 2020). While traditional fishing methods were generally considered sustainably managed (Lichatowich 1999, Atlas et al., 2021), the unregulated extraction from a growing population in the early 20th Century (Sobocinski, 2021) and the continued industrialization of fishing throughout the latter half of the 20th Century have resulted in the closure or severe reduction of several fisheries in the islands. Commercial harvest for herring and herring roe began in the islands in the 1870s and peaked in the mid-1970s, but declining stocks led to a region-wide closure in the 1980s (Pratt, 2022). Modern commercial fishing for rockfish began in the 1920s and saw a significant increase in the 1970s and 1980s followed by abrupt declines. Commercial catches hit an all-time low by 2009 (WDFW 2011) and in 2010 the recreational and commercial rockfish fishery closed. The overfishing of rockfish in the San Juan Islands and Puget Sound resulted in several species being listed

under the ESA and led the MRC to implement voluntary rockfish area closures throughout the MSA (Evans & Kennedy, 2007).

There was also a substantial recreational abalone fishery centered in the San Juan Islands that may have yielded as many as 41,000 individuals per year (Sowul et al., 2021). Despite the introduction of management actions, the abalone population has not been able to recover, in part due to the impacts of illegal harvest (Sowul et al., 2021). Pinto Abalone were listed as endangered in Washington State in 2019.

Tribal, commercial, and recreational fisheries remain for Dungeness crab, spot prawn, geoduck, green sea urchin and sea cucumber. There is a very limited fishery for some rockfish and salmon species. These fisheries are closely managed through a co-management system of the tribes and Washington State, as well as with Canada through the Pacific Salmon Commission.

There are several shellfish farms in the islands and people can locally dig for clams under recreational fishing licenses. Harvesting of marine resources is considered a mainstay to the lifeways of many islanders and continued access to harvestable marine resources in the islands by Tribal members is protected through the Treaties with the US (e.g., Point Elliot Treat, 1855, GOIA) for those with established Usual and Accustomed areas.

However, continued declines and loss of biodiversity threaten access to adequate resources for food security, ceremonial, and subsistence needs (Sobocinski, 2021). Other impacts to treaty rights and lifeways are linked to the increased density of recreational boats using the waters around the islands as well as increasing levels of private and public marine infrastructure that restrict access to traditional shellfish beds or fishing areas. Additionally, the legacy of the industrial fishing age continues to impact species' ability to recover through direct mortality and habitat degradation associated with derelict fishing gear.

Other legacy impacts are related to derelict pilings and creosote. Piers and docks litter the shorelines of the Salish Sea, and the San Juan MSA is not immune. Creosote-treated pilings, both those abandoned and derelict relics from a bygone era of maritime industry, as well as modern marine infrastructure, leach toxic materials into the water and sediments around pilings (Sobocinski, 2021). This legacy is not only a threat to marine organisms but also human health, particularly when degraded structures break apart and end up on public beaches (Sobocinski, 2021).

Beaches are also the landing place for more modern marine debris including plastics. Plastic pollution in our oceans is now of global concern as plastics are found throughout the world's marine environments. The stressors or sub-threats identified to result from recreation and resource extraction in the MSA are detailed in Table 2.2.

Table 2.2 Threat themes identified for recreation and resource extraction in the MSA

Threat Theme: Recreation and Resource Extraction
Recreation Sub-Threats • Visitor capacity • Recreational boats • Overuse and inappropriate use – e.g., driftwood removal, removing flora and fauna, extended stays on boats in one location, trampling • Plastic pollution, littering, and marine debris • Lack of appropriately sited and designed marine infrastructure • Lack of awareness/education • Shoreline users • Recreation activities e.g., shoreline modifications (mooring buoys) impacting Tribes' access to Usual and Accustomed areas and lifeways **Resource Extraction Sub-Threats** • Harvest -illegal poaching and underreporting/misreporting of catch • Evolving aquaculture developments • Coordination challenges between Federal, State and local land managers resulting in greater human access to sensitive marine habitats (e.g., rocky reefs used by pinnipeds and shore birds) • Lost and derelict fishing gear

DEVELOPMENT OF ISLANDS AND SHORELINES

The San Juan County MSA encompasses over 400 miles of shoreline. While approximately two-thirds of the shoreline is rocky, the rest consists of soft shore habitats including pocket beaches and drift cell systems (feeder bluffs, transport zones, and accretionary beaches, Whitman et al., 2012, Friends of the San Juans, 2022a). Eighty-nine percent of marine parcels in the MSA are in private ownership, equating to 301.69 miles of the MSA in private ownership. These soft shore habitats are particularly vulnerable to impacts from shoreline development.

Shoreline alteration rates are highest in urban areas, however, rural regions also experience shoreline development (Sobocinski, 2021), and this is especially true in the San Juan archipelago. In recent years real estate transactions in the County have accelerated (increasing by 63% in the first half of 2021 compared to the same period in 2020, and high-end sales exceeding $1 million increasing by 158%, San Juan County Salmon Recovery Lead Entity, 2022). Friends of the San Juans (2010) found that most shoreline impacts are driven by residential development. In addition to shoreline armoring; docks, floats, and mooring buoys are commonplace in the MSA, and all have related impacts on shoreline functions, species, and marine habitats. Such modifications were identified as a top threat to the San Juan County MSA in the 2007 plan (Evans & Kennedy 2007), and these impacts continue over a decade later.

Shoreline armoring has been highlighted as one of the most significant threats to marine and estuarine shorelines in the Salish Sea, impacting both biological and physical processes (Sobocinski, 2021), and the same is true for the MSA. The MSA plan identified shoreline armoring and other modifications as a top threat to the county's marine biodiversity (Evans & Kennedy, 2007), as did the County's Ecosystem Protection and Recovery Plan (San Juan Local Integrating Organization, 2017) and the County's Salmon Recovery Chapter Update (San Juan County Salmon Recovery Lead Entity, 2022).

Shoreline armoring impacts natural coastal processes including "squeezing" the intertidal zone (Dethier et al., 2016) and disrupting the conditions required by beach spawning fish (Sobocinski, 2021, Friends of the San Juans 2022a). Loss of natural shoreline structures such as beach wrack, driftwood, and upland vegetation impact invertebrate communities that rely on them for food and shelter, as well as result in loss of shade that leads to mortality of surf smelt eggs (Sobocinski, 2021, Quinn et al., 2012) and

disruption to migrating salmon.

Despite changes to the regulatory landscape and increased voluntary efforts such as the Shore Friendly program, Friends of the San Juans (2022a) found that new armor installation in San Juan County continues to outpace armor removals. Between 2009 and 2019 1.8 miles of new armor was installed compared to the removal of just 0.3 miles. Additionally, almost 80% of the new armor was not permitted (Friends of the San Juans, 2022a). This indicates that shoreline armoring is a continuing threat to the shoreline species and habitats of the MSA.

Other shoreline modifications include docks, boat ramps, mooring buoys, and jetties. Most of these structures are located along non-rocky, more protected shorelines in the county, and thus are concentrated in areas important to forage fish, eelgrass and other key species and habitats (Friends of the San Juans, 2010).

There is consistent evidence that overwater structures such as docks and piers impair eelgrass survival and growth and potentially also impact other marine vegetation species (Fresh et al., 2006, Lambert et al., 2021). However, more research is needed to fully understand the impacts of these structures on fish species.

While the impacts of mooring buoys are thought to be limited to the seabed, almost 2,000 mooring buoys were recorded in the MSA in 2009 (Friends of the San Juans, 2010) and again in 2022 (MRC, 2022) and there may be unknown indirect impacts in areas with high densities. The Coast Salish Tribes with Usual and Accustomed fishing areas in the MSA have begun to express increasing concerns over the impacts of shoreline modifications to their Usual and Accustomed fishing and harvesting areas. These developments may also impinge on culturally sensitive sites.

While much concern focuses on the development of shorelines and coastal areas, any development in the islands will inevitably have an impact on the marine environment. Terrestrial urbanization, agriculture, and other developments lead to the fragmentation of freshwater systems and an increase in chemicals and bacterial pollutants entering our waters through stormwater. Rainfall runs across hard, impervious surfaces, picking up pollutants before discharging into streams, rivers, and the ocean. Surface runoff is the largest contributing source of toxic loading to the Salish Sea (Ecology and King County 2011).

While many chemicals entering the waterways are considered legacy pollutants because of their long history of use and persistence in the environment (Sobocinski, 2021), there are also novel contaminants of emerging concern (CECs) now posing threats to the marine environment. The impacts of these pollutants have been documented throughout the Salish Sea ecosystem.

Relatively higher concentrations of PAHs and PCPs have been detected in mussels of the San Juan MSA, which is more typical of urbanized and industrialized areas in the South-Central Puget Sound Basin, though concentrations of DDTs and PBDEs tended to be lower in the MSA (Langness & West 2020).

Impervious surfaces continue to provide a transport pathway for toxic chemicals from terrestrial to aquatic habitats in Puget Sound (Langness and West, 2020). The stressors or sub-threats identified to result from the development of the islands and shorelines of the MSA are detailed in Table 2.3.

Table 2.3 Threat themes associated with development of the islands and shorelines in the MSA

Threat Theme: Development of Islands and Shorelines
Sub-Threats • Marine infrastructure both legacy and active • Lack of well-managed infrastructure and legacy impacts including poor placement of infrastructure relative to aquatic vegetation and shorelines. • Shoreline vegetation removal • Unpermitted (and permitted) shoreline development • Regulatory complexity that leads to unpermitted actions • Poor implementation and enforcement of Shoreline Master Program code. • Lack of enforcement activities, - monitoring or tracking of on the ground conditions. • Lack of incentive to do the right thing – e.g., to clean up creosote, replace docks, non-compliance • White cap-to-white cap (holistic region-wide) impacts on salmon & marine ecosystem • Agricultural run-off and other non-point source contaminants • Novel chemicals entering fresh water and transported to the ocean

CLIMATE CHANGE

There is nowhere in the world that is not impacted by climate change. It is a global problem with local impacts and the San Juan County MSA has not escaped the effects of a changing climate. The key threats to the MSA associated with climate change include sea level rise, increased prevalence of severe storm events, changes to precipitation patterns, increases in water temperature, and ocean acidification. Climate change affects both the physical conditions and the ecology of the MSA's marine habitats.

Sea Level Rise

For a county composed entirely of islands, the most obvious impact related to climate change is sea level rise. Modeling suggests that sea level rise will directly impact those properties within the FEMA 100-year flood plain. Sea levels are expected to rise 2 ft by 2060, this means that those properties that currently have a 1% probability of flooding within the 100-yr flood plain will experience a 99% probability of annual flooding by 2060 (ESA, 2023).

Coastal habitats are likely to experience an increase in erosion, inundation of low-lying coastal areas, and the landward translation of beaches, especially as increases in sea level interact with tides, storm surges, and freshwater input (MacLennan et al., 2013). Coastal bluffs, beaches, estuaries and lagoons, deltas, and human-modified shore types are more vulnerable than rocky shorelines (MacLennan et al., 2013) threatening coastal developments, infrastructure, culturally important areas, and critical habitats such as forage fish spawning habitats (Johannessen and Macdonald, 2009, Sobocinski, 2021). Habitat changes associated with sea level rise are expected to affect the geographic range, abundance, and diversity of marine species, particularly those that utilize shallow nearshore habitats (Sobocinski, 2021). Shellfish and eelgrass beds are likely to change distribution and extent as they experience longer inundation times and changes to water depth (Sobocinski, 2021). While soft shorelines are generally more tolerant of fluctuating water levels, those that have been degraded or modified will be less likely to adapt to higher water levels, particularly where there is shoreline development, e.g., armoring, and roads (ESA, 2023).

The increasing frequency of severe storm events will result in an increase in backshore connector roads and other critical infrastructure at risk of inundation and/or falling into the sea. Attempts to maintain this infrastructure through the armoring of shorelines impact the natural shoreline processes critical to ESA-listed species and reduce the resiliency of these shorelines to the impacts of sea level rise and storm surges. Community awareness and acknowledgment of the impacts of sea level rise and increased severe storm surge frequency are needed to build support for a shift away from current management practices to something that will enable greater resiliency across the board – for ecology, community, and economic sustainability of infrastructure.

Temperature

Thermal stress is widely studied and known to be a major structuring force in intertidal and nearshore ecosystems (Raymond et al., 2022), but with extreme heat events expected to become more common, they are likely to become a major influencing factor on the ecology of the MSA's intertidal ecosystem with significant economic and cultural impacts.

Rising ocean temperatures are another consequence of global climate change. Sea surface temperatures in Southern British Columbia have shown warming trends of ~0.56°C per decade, higher than the global average (Sobocinski, 2021). Higher temperatures increase the susceptibility of organisms such as sea stars and eelgrass to marine diseases (Harvell et al., 2019, Burge and Hershberger 2020), and amplify bioaccumulation of contaminants (Alava et al., 2018). Higher sea surface temperatures are also contributing to the loss of kelp forests (Calloway et al., 2020). Marine heatwaves are another climate change-induced temperature anomaly. Two significant heatwaves have occurred off the west coast in the North Pacific in the last decade, the "blob" beginning in late 2013 and persisting through 2016, and another in 2019 (Wagner, 2022). The warmer ocean conditions had wide-ranging direct and indirect impacts on marine species in the Salish Sea and the marine ecosystem response was complex, especially at higher trophic levels (Bond, 2021). Harmful algal blooms had extended effects through the food web to higher trophic levels including seabirds and marine mammals (Bond, 2021), while zooplankton productivity appeared to increase because of higher nutrient loads entering via freshwater inflows (Khangaonkar et al., 2021). The effects of the blob persisted for several years afterwards (Sobocinski, 2021).

Ocean Acidification

Ocean acidification refers to the reduction in the pH of the ocean due to the absorption of carbon dioxide from the atmosphere. Ocean acidification, like sea level rise and warming temperatures, has a global impact. Pacific Northwest coastal waters are among the most acidified worldwide and the geography, bathymetry, and natural physical forcing in the Salish Sea puts the region at a similar risk as neighboring coastal areas to ocean acidification (Sobocinski, 2021). Many key biological processes are sensitive to changes in ocean pH and high CO2 levels. Direct effects include impeding the calcification process impacting ecologically and economically important shellfish species, e.g., clams and oysters (Sobocinski, 2021). Fish have also been shown to experience olfactory disruption and other

physiological impacts (Williams 2019). Increased acidity will further harm local shellfish and related recreational, cultural, and commercial fisheries (Island Climate Resilience, 2017).

The consequences of climate change are far-reaching. The economic and cultural impacts on coastal communities are unlikely to be equitably distributed, especially in terms of sea level rise, habitat loss, and changing distributions of organisms that humans have relied on since time immemorial (Sobocinski, 2021). Table 2.4 lists the main sub-threats or stressors identified for climate change in the MSA.

Table 2.4 Threat Themes associated with Climate Change

Threat Theme: Climate Change
Sub-Threats • Sea level rise and associated flood and erosion hazards • Increased prevalence of intense storm/heatwave/rain events • Increased storm surge resulting in degradation of near-shore habitats • Increasing water temperatures impacting key species & susceptibility to marine diseases • Rising temperatures - sea water and intertidal • Coastal eutrophication and hypoxia/harmful algal blooms • Loss of habitat through coastal squeeze • Shift to warm water species • Ocean acidification • Uninformed public

INVASIVE SPECIES AND ALTERED FOODWEB DYNAMICS

Food webs throughout the Salish Sea are in a near-constant state of flux, whether due to local or regional conditions, seasonal changes, or large-scale perturbations, the potential consequences of which often remain unknown (Wagner, 2016). Organisms' response to these changes can have cascading effects through the food web. Pinniped populations in the Salish Sea have recovered since marine mammals became protected under the US Endangered Species Act in 1973 (Jeffries et al., 2003). Humpback whales also now have a year-round presence in the MSA. There are both ecological and economic consequences of these recoveries, including higher predation pressures on forage fish, competition with other predators (e.g., marine mammals and seabirds), and impacts to fisheries (Chasco et al., 2017). Another example of altered food web dynamics includes the effect of the widespread loss of sea stars from the sea star wasting disease that has attacked >20 species of sea star since 2013 (Harvell et al., 2019). The loss of keystone species like sea stars can have cascading effects that can drive community effects influencing marine ecosystem processes (Harvell et al., 2019).

Changes in the abundance of almost any species can cause strong ripples as the remaining organisms reshuffle themselves. Alterations to food webs within the MSA likely result from the interaction of all the threat themes addressed in this chapter. Additionally, other human actions resulting in the introduction of non-native species, and from aquaculture and hatchery practices have also been identified as impacting the MSA's food webs. This section addresses some of these associated threats as well as highlights the fact that there may be emerging and novel impacts to come that we do not yet fully understand.

Invasive species

Invasive species are non-native species introduced to an area that adversely affect habitats and bioregions causing ecological, environmental, and often economic damage. Nearly half the invasive species in Puget Sound's marine waters have been found in the last 20 years (Dunagan, 2016). Of these, the Washington Invasive Species Council listed five marine animals, two marine plants, and one virus that infects fish as priority species for action (Dunagan, 2016).

These include European green crab, Asian marine clam, tunicates, Chinese mitten crabs, Atlantic Salmon, cordgrass (Spartina), Caulerpa, and viral hemorrhagic septicemia. Most invasive species arrive via ballast water or other aquatic activities such as the movement of recreational boats and are considered a global threat to the functioning and structure of aquatic ecosystems (Jägerbrand et al., 2019). Invasive species were identified as a threat in the 2007 MSA plan (Evans & Kennedy, 2007).

European green crabs are considered one of the world's worst invasive species, posing a threat to farmed and wild shellfish, eelgrass, and shoreline habitats and ecosystems (Adams et al., 2021, Ens et al., 2022). They were first detected in the MSA in 2016 (Adams et al., 2021). Since then, monitoring and trapping efforts in the islands have detected fewer than 5 crabs at the Westcott Bay site on San Juan Island, one of six sites monitored by volunteers in the MSA (WSG, 2023). However, in 2019 the crabs appeared in a Lummi Nation sea pond and since then thousands have been trapped and removed to slow down their population growth. Their presence in neighboring Whatcom County increases the risk of the species establishing themselves within the MSA. Invasive tunicates were discovered in the MSA in 2008 by a REEF surveyor and the invasive seaweed Sargassum is also abundant in the MSA. Spartina was present at three sites in the MSA (on San Juan Island and Lopez Island) in 2017 (WADA, 2017), though presence is kept low through a dedicated survey and treatment effort by the County's noxious weed program and the Washington State Department of Agriculture. Atlantic salmon were raised in net pens in waters neighboring the MSA until 2017.

Aquaculture

Atlantic salmon were being farmed at a net pen site at Cypress Island, on the eastern edge of the MSA up until 2017. The collapse of the pen allowed over 250,000 salmon to escape into the area and resulted in a ban on farming non-native Atlantic salmon in Washington State. San Juan County Code prohibits commercial finfish net pens (SJCC 18.50.230 A.24) and finfish aquaculture in the state was banned in November 2022. However, there are continued concerns related to the introduction of parasites, viruses, and bacteria that wild fish may still be exposed to when migrating through waters with farm facilities in Canada. Other new forms of aquaculture practices are now emerging that could impact the MSA, for example, there is increasing interest in the commercial cultivation of kelps and other seaweeds (Peabody et al., 2020, Calloway et al., 2020). However, these potential threats are not yet quantifiable.

Hatchery Practices

Chinook salmon hatcheries have become a mainstay in the Pacific Northwest. As wild salmon populations have continued to decline the demand for salmon hatcheries has risen, driven by a need to ensure continued commercial, recreational, and Tribal fishing opportunities. While large-scale hatcheries can have ecological and economic benefits, there are also concerns surrounding potential impacts on wild fish populations (including through competition or how they influence density-dependent processes, Nelson et al., 2019), as well as on the broader marine food webs. In the marine environment, hatchery programs may have

bottom-up or top-down effects on food webs (Nelson et al., 2019, Rand et al., 2012). Hatchery Chinook released into the Salish Sea tend to be larger and less variable in size than their natural counterparts, and thus are preferable to avian, fish, and marine mammal predators (Nelson et al., 2019).

While there is only one small-scale hatchery within the MSA, the broader ecosystem-level effects of current large-scale hatchery practices around the region could influence the complex marine food web dynamics of the San Juan MSA.

In the face of changing and unpredictable environmental conditions, understanding the interaction between hatchery strategies and the ecosystem is essential for improving future hatchery practices (Nelson et al., 2019) to reduce their impacts on the region's food webs.

The stressors or sub-threats identified as impacting the MSA's food webs are detailed in table 2.5.

Table 2.5 Threat Themes associated with invasive species and altered food web dynamics in the MSA

Threat Theme: Invasive species and altered food web dynamics
Sub-Threats • Invasive species cause community shifts • Aquaculture of non-native and native species • Unmanaged increases in hatchery salmon • Shifts in the abundance of foundation species and key predators • Increased nutrient inputs and changes to biotic interactions

3. FOCAL CONSERVATION TARGETS

The San Juan County Marine Stewardship Area (MSA) 2007 Plan was created using The Nature Conservancy's Five-S framework for site conservation, known more broadly as "Conservation Action Planning (Evans & Kennedy, 2007; Low, 2003; TNC, 2003). This approach involved the selection of a limited set of ecosystem elements called 'focal conservation targets' that served as the focus of the conservation effort.

The Nature Conservancy's Five-S framework required the identification of 5-8 conservation targets that represented the range of biological organization within the MSA; from species to ecological communities to ecological systems and other important natural resources and occurred at a range of scales from local (< 10 km squared), to regional (>10,000 km squared, Evans & Kennedy, 2007).

During the planning for the 2007 plan the MRC selected 7 Biodiversity Targets through an iterative process involving formal and informal consultation with scientific and technical experts, and review by a broader group of stakeholders.

The 2007 Targets selected included:

- Rocky intertidal communities
- Rocky subtidal communities
- Nearshore sand, mud, and gravel communities
- Rockfish, lingcod, and greenling
- Seabirds
- Marine Mammals
- Pacific Salmon

The Targets collectively play an important ecological role in the MSA marine ecosystem by serving as a nursery area for many fish species, a foraging area for fish, birds, and mammals, and an area of primary production that feeds deeper water habitats.

Reviews of the 2007 plan identified challenges with the initial selection of species or definition of "principal species." Thus, the need to reorganize some of the Targets or create new Targets was recognized to ensure that habitats and species vital to the health of key species and ecosystems within the MSA were properly encompassed.

For example, recent decades have seen declines in both eelgrass (Christiaen et al., 2022) and kelp (Calloway et al., 2020; Palmer-McGee, 2019) with no clear cause. Together, these marine vegetation species provide critical habitat for a wide range of culturally and economically important species (Plumer et al., 2013; Naar, 2020).

As such, the Biodiversity Targets were revised and updated as a part of the assessment to now include:

- Intertidal Communities and Nearshore Habitats
- Subtidal Communities
- Kelp and Eelgrass
- Rockfish and Bottomfish
- Salmon and Forage Fish
- Marine Birds
- Marine Mammals

These revised Biodiversity Targets were updated using information provided through a combination of the Marine Managers' Survey, Marine Managers Workshop, directed interviews with scientific and technical subject experts, and a review of the available scientific literature.

For each Biodiversity Target, we have provided a list of core species and their federal and state status.

Federal species status is indicated by Federal Endangered (FE), Threatened (FT), Candidate (FC), and Species of Concern (FSC). State species status is indicated by State Endangered (SE), Threatened (ST), Sensitive (SS), and Candidate (SC).
The State Endangered species are designated in Washington Administrative Code (WAC) 220-610-010, and the State Threatened and Sensitive listed species are specified in WAC 220-200-100.

The Five-S framework used in the 2007 MSA plan integrated a viability analysis where the viability of a focal target was defined as the likelihood that a target will persist long-term, usually 100 years (Evans & Kennedy, 2007). This analysis used the following rating categories (adapted from Low, 2003):

- Very Good = optimal: the factor is functioning at an ecologically sustainable level and requires little or no human intervention to ensure long-term (100 years) viability.
- Good = acceptable: the factor is functioning within its range of natural variation; it may require some human intervention to ensure long-term (100 years) viability.
- Fair = unacceptable: the factor is outside the range of natural variation and requires human intervention. If unchecked, the attribute will be vulnerable to serious degradation.
- Poor = extreme danger: the factor is well outside the natural range of variation and allowing this condition to persist for an extended period will make restoration practically impossible.

The viability analysis conducted for the 2007 MSA plan was thorough, encompassing a scientific workshop, numerous small group meetings with technical experts, and finally an outside technical review. The full details of this process are included in the 2007 plan. We have not conducted the same level of viability analysis with this assessment, instead consulting with subject experts through the online marine manager survey, marine managers workshop, targeted interviews, and literature review. With a changing climate, it may also be argued that the ability to estimate or accurately predict conditions over time are increasingly difficult, especially given the interacting stressors impacting the system.

The 2007 MSA plan also identified a set of socio-cultural focal targets, because the goals of the MSA explicitly included the protection of direct use benefits of marine resources. They were also recommended at a technical workshop held by the MRC to obtain scientific input into the selection of focal targets (Evans & Kennedy, 2007).

The human-use targets developed in consultation with stakeholders included:

- Enjoyment of the marine environment
- Thriving marine-based livelihoods
- Cultural traditions: ceremonial, subsistence, sustenance, and spiritual uses and aspects.

The MRC also conducted a viability analysis of these focal targets using a similar approach to that used for the biodiversity targets, resulting in a thorough assessment of these targets for the 2007 plan.

Since 2007 there have been several efforts dedicated to exploring the importance of the San Juan Islands and surrounding marine environment to residents and visitors as well as economic assessments of, for example, the whale watch industry (Van Deren et al., 2019) and the consequences of a major oil spill (Page et al., 2019).

Other planning efforts addressing socio-cultural areas include the Recreation and Outdoor Space Strategy (ROSS) Plan, and efforts to understand where and how recreational boating impacts marine habitats and species within the MSA. These efforts aim to protect natural and cultural resources through the identification of appropriate voluntary and regulatory approaches, such as voluntary anchor out of eelgrass campaigns.

These efforts negated the need for a full review as part of this assessment therefore these targets have not been updated and are included in their original form at the end of this chapter for reference.

CONSERVATION/ BIODIVERSITY TARGETS

Intertidal Communities and Nearshore Habitats

Subtidal Communities

Kelp and Eelgrass

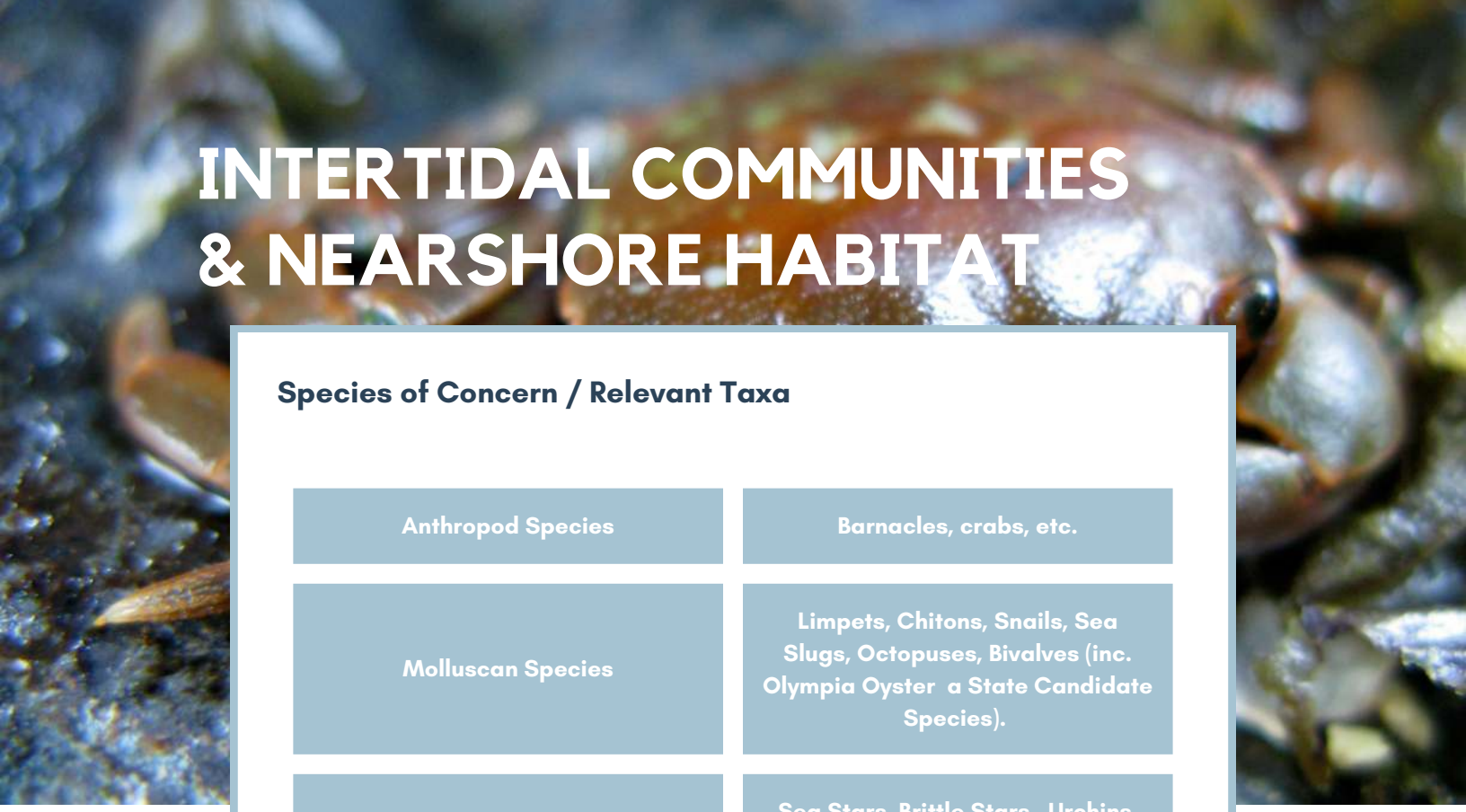
Rockfish and Bottomfish

Salmon and Forage Fish

Marine Birds

Marine Mammals

The following sections provide summaries for each biodiversity focal target with updated information on their characteristics, current status, threats, and associated knowledge gaps.



INTERTIDAL COMMUNITIES & NEARSHORE HABITAT

Species of Concern / Relevant Taxa

Anthropod Species	Barnacles, crabs, etc.
Molluscan Species	Limpets, Chitons, Snails, Sea Slugs, Octopuses, Bivalves (inc. Olympia Oyster a State Candidate Species).
Echinoderm Species	Sea Stars, Brittle Stars., Urchins, Sea Cucumbers
Fucus Species	Rockweed and other seaweeds
Anemones	
Sponges	

BACKGROUND

This target combines the rocky intertidal communities and nearshore sand, mud, and gravel communities that were identified in the 2007 plan (Evans & Kennedy, 2007). The habitats covered by this target are sites with high productivity due in part to the communities experiencing the highest levels of light. The intertidal doesn't just have a high diversity of macroalgae, but it's also home to anemones in the genus *Anthopleura* that host single-celled photosynthetic symbiotic dinoflagellates similar to those found in tropical coral reefs.

Rocky intertidal communities include a highly diverse assemblage of marine algae and animals that inhabit the rocky shores of the San Juan Islands, along with dynamic physical and biological processes

that are a feature of this environment.

The habitat extends from the interface between terrestrial vegetation and the upper splash zone to the depth of the lowest tides. In addition to its ecological importance as a producer of organic material and as a foraging area for both terrestrial and marine animals, the rocky intertidal is the dominant shoreline type in the MSA. It has been a significant source of food for indigenous people since time immemorial, with areas once carefully managed to provide sustainable harvests of e.g., clams through clam gardens. Today It is also an important recreational area for humans.

Nearshore sand, mud and gravel communities include the ecological communities found in soft-bottom habitats, which typically occur along beaches with lower wave and current energy and embayments, from the intertidal to a depth of 30 m.

Characteristics common to this assemblage:

Characteristic species include eelgrass (*Zostera marina*) and other submerged aquatic vegetation, clams, and forage fish (herring, sand lance, and surf smelt), along with the shoreline processes that maintain the sediments and provide vital forage fish spawning habitat. These are also discussed in the Kelp & Seagrass, and Forage Fish target sections in this chapter.

- Organisms tend to be sessile (immobile) and adapted to tidal changes and wave action.
- Organisms tend to broadcast gametes and/or larvae, which are sensitive to water quality changes and localized currents.
- Organisms are sensitive to changes in environmental conditions.

Current Status

Intertidal and nearshore targets were not well defined within the 2007 plan and there are few monitoring programs that have targeted the intertidal, let alone the indicators identified in the 2007 plan (e.g., the abundance of barnacles, limpets, and Fucus, littleneck clam abundance, and overall clam species richness). However, there are some good unpublished datasets that could be mined for illustration of problems associated with shoreline development, invasive species, diseases, and threatened native species such as eelgrass and kelp. These include invasion history of varnish clams, abundance and prevalence of eelgrass disease, and biodiversity studies of individual sites around the county.

Because of their unique positions and adaptations to a suite of conditions (i.e., submerged or dry), organisms in these habitats could be particularly sensitive to extreme temperatures that could come with climate change. This was observed in late June 2021 when the Pacific Northwest experienced extreme temperatures resulting in the die-off of millions of organisms in this intertidal zone.

Knowledge Gaps & Emerging Threats

Issues related to harvest, development and habitat modifications, disease, invasive species, and climate change are all considered threats to nearshore and intertidal ecosystems. The sea star wasting disease outbreak that began in 2013–2015 occurred alarmingly fast and almost extirpated sea stars along the entire Pacific coast, highlighting the impact of marine disease on the biodiversity and overall ecosystem function within the MSA and the broader Salish Sea.

Extreme temperature events such as those experienced in June 2021 could have extensive impacts on nearshore habitats and communities should they become more common in occurrence, limiting the recovery time between events. There are currently no broad data available on the extent or impact of invasive species.

The top **knowledge gaps** for the nearshore conservation target identified by the 2020 workshop participants were:

- Nearshore development and runoff trends
- Increase in pollutants in areas seasonally frequented by visitors
- Use of desalination plants
- Forage fish spawning areas

The top **threat themes** identified by the 2020 workshop participants as impacting the nearshore conservation target are:

- Climate change
- Resource extraction
- Shoreline development
- Invasive species and altered food web dynamics

SUBTIDAL COMMUNITIES

Species of Concern / Relevant Taxa

Species/Assemblage	Federal Status	State Status
Sea cucumber (*Parastichopus californicus*)	-	-
Red sea urchin (*Mesocentrotus franciscanus*)	-	-
Green sea urchin (*Strongylocentrotus droebachiensis*)	-	-
Pink and spiny scallops (*Chlamys spp.*)	-	-
Pinto abalone (*Haliotis kamtschatkana*)	FSC	SE

BACKGROUND

This focal target represents the benthic communities found on rocky substrates from just below the lowest tides to a depth of ~30 m. The Washington State Department of Ecology has listed over 1800 taxa of benthic infaunal invertebrates since it initiated monitoring in 1989. Benthic infaunal invertebrates, often referred to as benthos, are tiny animals, including worms, clams, snails, shrimp, crabs, brittle stars, and many others, that live in the sand and mud of the seabed.

Benthos are an essential link in the Puget Sound food chain and changes in its community structure and functional groups are an indicator of sediment quality and overall environmental condition, thus a Marine Benthic Index is now included as a Vital Sign Indicator for Puget Sound (PSP, 2022b).

The target includes commercially and culturally important invertebrates such as sea urchins, sponges, and crabs. This target also includes the pinto abalone (*Haliotis kamtschatkana*), listed as endangered by Washington State in 2019. Like rockfish, pinto abalone are slow to mature to reproductive age and size. In addition, they are broadcast spawners and so must be relatively close to one another in order to be able to reproduce (Carson & Ulrich, 2019).

Overharvesting and poaching resulted in the species being almost lost from Washington State waters. Despite a statewide fishery closure, numbers continued to decline (Carson & Ulrich, 2019; Rothaus et al., 2008). San Juan County remained one of the abalone's core habitats and thus restoration efforts through an out-planting program have been focused in the MSA (Sowul et al., 2022).

Other important fish species, such as juvenile rockfish, salmon, and forage fish species, as well as understory kelps, are also sensitive and essential species found in this community but are formally covered in separate biodiversity targets.

Characteristics common to this assemblage:

- Broadcast spawners with larval stages in the water column or close to the benthos with limited capacity for dispersal distance.
- Associated with kelp and other rocky habitats.
- Generally long-lived and slow to mature.
- Fishing can have both direct and indirect (such as dredging bottoms destroying habitat and loss from bycatch) impacts.

Current Status

Sea cucumber populations have suffered from overharvesting and poaching that threatens the sustainability of the harvest, resulting in quota reductions and closures. The 2020 harvest rate was reduced to 5% of the biomass. Despite challenges in fisheries monitoring, permanently closed areas have provided un-fished populations for long-term monitoring.

Both the green sea urchin and the pink and spiny scallops lack formal stock assessments and fisheries management is based on a quota system. The green sea urchin population has remained stable over the past decade, as has the red sea urchin.

The pinto abalone continues to struggle to recover from overharvesting, but an active restoration effort is underway with several juvenile out-planting sites around the San Juan Islands. This effort was bolstered by the 2019 endangered species listing of pinto abalone in Washington State. One challenge for restoration is that abalone aren't just threatened by past overharvesting, but also by habitat degradation.

Please refer to Chapter 4 for links to maps of sea cucumber and sea urchin no-take zones within the MSA.

Knowledge Gaps & Emerging Threats

The top **knowledge gaps** for the subtidal conservation target identified by the 2020 workshop participants were:

- Subtidal species composition/abundance/community indices
- Increase in vessel traffic, size, and speed, and related impacts on erosion rate
- Chemical pollution from boats
- Effect of commercial harvest on purple urchin populations
- Causes of unsuccessful abalone outplants

The top **threat themes** identified by the 2020 workshop participants as impacting the subtidal conservation target are:

- Resource extraction
- Invasions and food web dynamics
- Climate change

KELP AND EELGRASS

Species of Concern / Relevant Taxa

Species/Assemblage	Federal Status	State Status
Seagrasses: eelgrass (*Zostera marina, Z. japonica*)	-	-
Surfgrass (*Phyllospadix spp.*)	-	-
Kelp: bull kelp (*Nereocystis luetkeana*), understory kelps (*Laminariales, etc.*)	-	-
Coralline algal species (could be sensitive to ocean acidification)	-	-

BACKGROUND

Both kelps and seagrasses need sunlight and therefore are found near shore in water shallow enough for appropriate levels of light to penetrate. Seagrasses are found in the sand or soft shore bottoms while kelps dominate the rocky substrates. Characteristic species include the canopy-forming kelps (e.g., bull kelp), understory kelps (*Laminariales*), seagrasses (e.g., *Zostera marina* and *Zostera japonica*) and surfgrass (*Phyllospadix spp.*). Organisms from both groups create structures and frameworks that act to anchor soft sediments in place and prevent erosion. Sometimes referred to as 'forests' or 'meadows', expanses of kelp and seagrass serve as a nursery habitat for various juvenile stages of fishes and as hosts to numerous invertebrate species.

Kelp and eelgrass beds have been identified by the County Code (SJCC 18.35.115, 18.35.130) as critical fish and wildlife habitat conservation areas. This is because they are important spawning and holding areas for forage fish, such as herring, as well as for juvenile Chinook salmon. These habitats are also

important for numerous commercial, subsistence, and culturally important species, as well as commercial and recreational shellfish beds, and provide a plethora of ecosystem services such as carbon sequestration and water filtration (Constanza et al., 1997, Inaba et al. 2017).

Please refer to Chapter 4 for links to current maps of eelgrass habitat within the MSA.

Characteristics common to this assemblage:

- Sensitivity to light reduction (due to shading from structures, turbid water, or growth of epiphytes covering blades and photosynthetic surfaces)
- Sensitivity to temperatures and to nutrient levels in sediments and water column.

Current Status

Recent decades have seen localized declines in both eelgrass and kelp with no one clear cause (Calloway et al., 2020; Christiaen et al., 2022; Palmer-McGee, 2019). In the short term, the decline in eelgrass may be due to a combination of factors including eelgrass wasting disease (e.g., Ralph and Short, 2002, Sullivan et al., 2013, Graham et al., 2021), recreational vessels, water quality, sedimentation of embayments (e.g., Dooley et al., 2013), shoreline modification (e.g., Fresh et al., 2006), and installation of submarine cables (e.g., Austin et al., 2004). Similarly, there is widespread concern about the losses of bull kelp in the San Juan Islands and other parts of the Salish Sea (Calloway et al., 2020). Kelp canopy area is highly variable, there were large region-wide decreases in 2014 and losses of roughly 30% in the San Juans over a ten-year period (Palmer-McGee, 2019). Rebounds have been faster at sites where the oceanography produces well-mixed waters but have been delayed in Puget Sound. The most recent kelp distribution data relevant to the MSA were collected by the Samish Indian Nation and results are detailed in this story map: **storymaps.arcgis.com/stories/b9f979a547004c32a616b5319a6410c0 .**

In the long-term, declines of eelgrass and kelps may be tied to climate change, unregulated activities of recreational vessels, increases in human population density, and higher potential for oil spills due to increased vessel traffic.

Puget Sound Partnership has included eelgrass as a vital sign indicator in their measures of ecosystem health and progress towards Puget Sound recovery goals, and vital sign indicators for bull kelp canopy and understory kelp abundance and condition (the latter still being under development):

- Eelgrass Area vital sign: **vitalsigns.pugetsoundinfo.wa.gov/VitalSignIndicator/Detail/10**
- Floating Bull Kelp Bed Area Vital Sign: **vitalsigns.pugetsoundinfo.wa.gov/VitalSignIndicator/Detail/62**
- Understory Kelp Abundance and Condition: **vitalsigns.pugetsoundinfo.wa.gov/VitalSignIndicator/Detail/82**

Knowledge Gaps & Emerging Threats

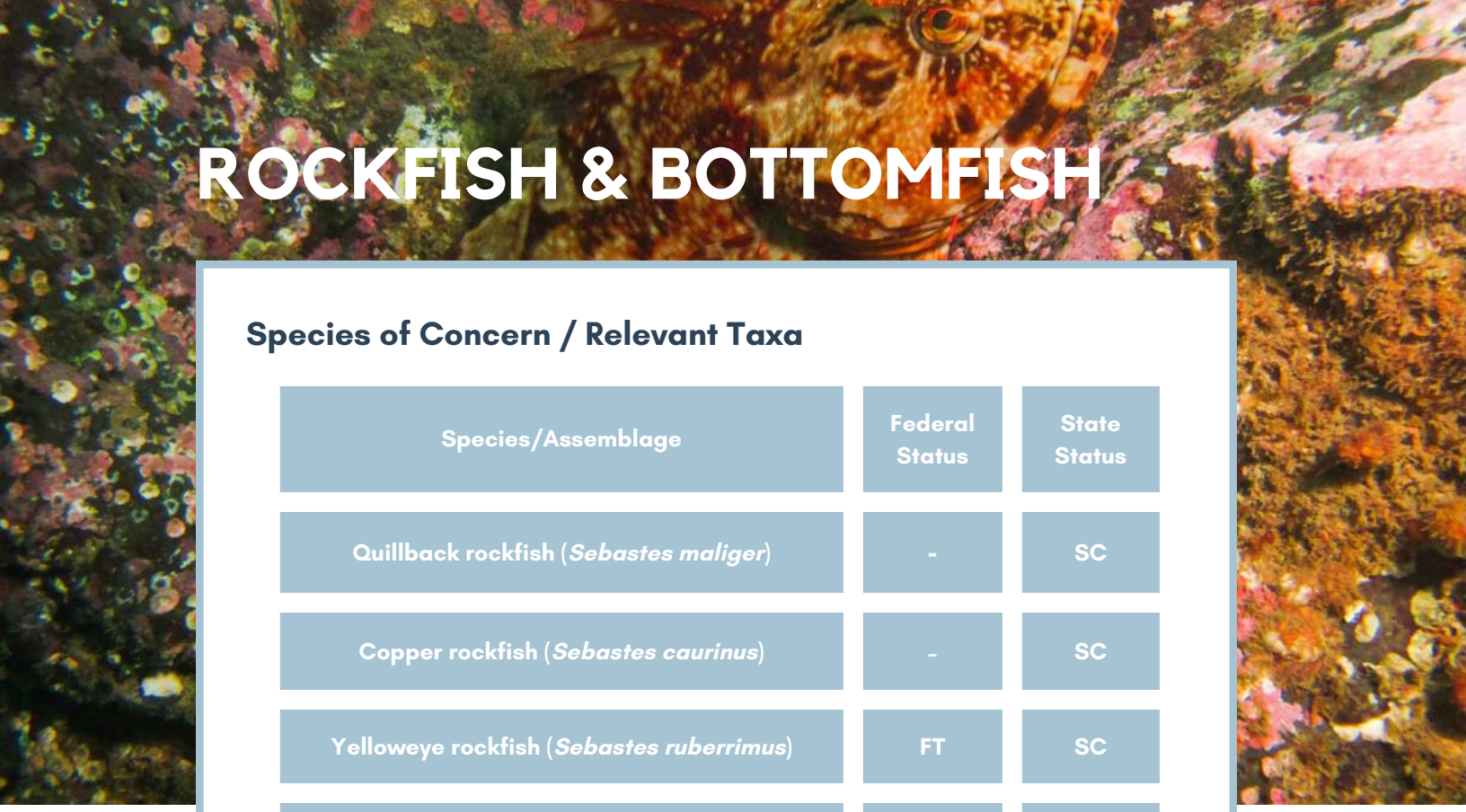
The declines in eelgrass and kelp in the MSA may be due to a variety of contributing causes including run-off from development on land, increased boat traffic with associated pollution and anchoring, the increase in shoreline armoring and construction of overwater structures, and the interaction of varying impacts that results in eelgrass wasting disease.

The top **knowledge gaps** for the kelp and eelgrass conservation target identified by the 2020 workshop participants were:

- Links between eelgrass wasting disease and actual mortality
- Ocean acidification impacts on eelgrass and kelp
- Impact of health of understory kelp communities on bull kelp loss
- Should eelgrass meadows be managed on a site-specific basis
- Develop better existing condition data for kelps and eelgrasses
- Identify fish use sites in areas of eelgrass
- Identify seagrass and kelp areas that are intact and need protection as well as areas that are degraded and need restoration

The top **threat themes** identified by the 2020 workshop participants as impacting the kelp and eelgrass conservation target are:

- Climate change
- Shoreline development
- Shipping and boating
- Invasive species and altered food web dynamics



ROCKFISH & BOTTOMFISH

Species of Concern / Relevant Taxa

Species/Assemblage	Federal Status	State Status
Quillback rockfish (*Sebastes maliger*)	-	SC
Copper rockfish (*Sebastes caurinus*)	-	SC
Yelloweye rockfish (*Sebastes ruberrimus*)	FT	SC
Bocaccio (*Sebastes paucispinis*)	FE	SC
Black rockfish, brown rockfish, tiger rockfish, canary rockfish, yellowtail rockfish, greenstriped rockfish, widow rockfish, redstripe rockfish, china rockfish		SC
Puget Sound rockfish (*Sebastes emphaeus*)		
Lingcod (*Ophiodon elongatus*)		
Kelp greenling (*Hexagrammos decagrammus*)		

BACKGROUND

This focal target represents an assemblage of bottom-dwelling fish species comprised of rockfish and bottomfish. These are historically abundant groups of bottom-dwelling and mid-water fishes that are

common to the rocky reefs of the Salish Sea and the Pacific coast of North America.

Within the Marine Stewardship Area boundaries (San Juan County), the characteristic species included in the 2007 plan included quillback, copper and Puget Sound rockfishes, lingcod and kelp greenling. Yelloweye and Bocaccio species have now been added as a part of this assessment.

Yelloweye were federally listed as threatened and Bocaccio as endangered under the Endangered Species Act (ESA) in 2010.

Conservation-focused management of rockfish did not start to occur until the late 1980s (Williams et al., 2010). By the time management actions were deemed necessary, a significant reduction in numbers had already occurred that led to population collapse in previously abundant species. In 2010, all commercial and recreational rockfish fisheries were closed, and many entities pursued recovery efforts, including the San Juan County MRC.

However, because rockfish biology and ecology were not well understood prior to increasing fishing pressure, historical abundance and baselines are not available which presents challenges in the management of this unique assemblage of fish.

Characteristics common to this assemblage:

- Species are long-lived and slow to mature
- Reach maturity at 10-20 years
- Lifespans >50 years
- Dispersion of larvae may be limited
- Juvenile rockfish are associated with a variety of habitats, including kelp and eelgrass
- Adult rockfish associated with deeper, high-relief rocky substrates

These traits make this group vulnerable to overfishing and population collapse. The recovery of rockfish populations has long been a goal of the MRC and the Northwest Straits Commission.

Current Status

Rockfish species:

Recent surveys conducted by the Washington Department of Fish and Wildlife (WDFW) and REEF (Reef Environment Education Foundation) suggest that some species are increasing. Since the publication of the MSA plan in 2007, WDFW has completed at least two dedicated rockfish and bottomfish surveys in the San Juan Islands. In 2007 they performed the first regional rockfish surveys using a Remotely Operated Vehicle (ROV) equipped with video recording technology. A subsequent survey was conducted in 2008 with adapted methodologies in coastal and inland marine waters.

The 2008 survey found that more rockfish occur in the western portion of the MSA due to the prevalence of rocky habitat; species composition also differed by depth stratum (Pacunski et al., 2013). Puget Sound rockfish were the most abundant species in the MSA, with an estimated 4.5 million individuals, while Copper and Quillback rockfish populations were estimated at 546,000 and 440,000 individuals, respectively (with CVs of 14% and 10.5% respectively, Pacunski et al., 2013). There were an estimated 47,000 yelloweye rockfish (25% CV), a population that is heavily depleted in the San Juan Islands and Puget Sound. The trends observed in these surveys provide hope that the closure of the rockfish fishery, strict gear limitations in other fisheries, and other management actions, may be aiding the recovery of rockfish populations. However, population sizes of endangered and threatened species like Yelloweye remain low.

The Puget Sound/Georgia Basin Yelloweye rockfish was federally listed under the Endangered Species Act as threatened in 2010 and the Bocaccio was listed as endangered in 2010. Federal critical habitat designations for these species occurred in 2015 and the Recovery Plan was finalized in October 2017 (NMFS, 2017).

Nearshore habitat protection and restoration were identified as high-priority actions in the recovery plan. Other actions included the removal of derelict gear, cooperative research, barotrauma research, education and outreach, habitat mapping, and kelp habitat conservation and recovery (NMFS, 2017). With these species needing another 10-15 years to reach sexual maturity, we may still be 15-20 years away from knowing whether these efforts are positively affecting extremely sensitive species. WDFW conducted ROV surveys to estimate rockfish and bottomfish populations again in 2023.

Please refer to Chapter 4 for links to maps of no-fish rockfish recovery zones within the MSA.

Current Status

Bottomfish species:

Lingcod and kelp greenling are additional ecologically and commercially important species common to the San Juan Islands. These species are regularly fished by recreational anglers and currently have healthy population numbers and reliable data from recreational angler surveys.

State recreational fishery data suggests that there has been a sharp increase in the number of lingcod fishing licenses sold, but the overall yield of lingcod in the MSA is stable (pers. comm, Dayv Lowry). Pacific halibut is the largest and most valuable flatfish in the Salish Sea, and is important as a cultural, commercial, and recreational species. The Pacific Fisheries Management Council adopts recreational harvest quotas and rules related to Marine Area 7, which encompasses the MSA, are detailed by WDFW's fishing regulations. Anglers are required to fish using barbless hooks for all species.

- WDFW fishing regulations:
https://wdfw.wa.gov/fishing/regulations/halibut/puget-sound

Knowledge Gaps & Emerging Threats

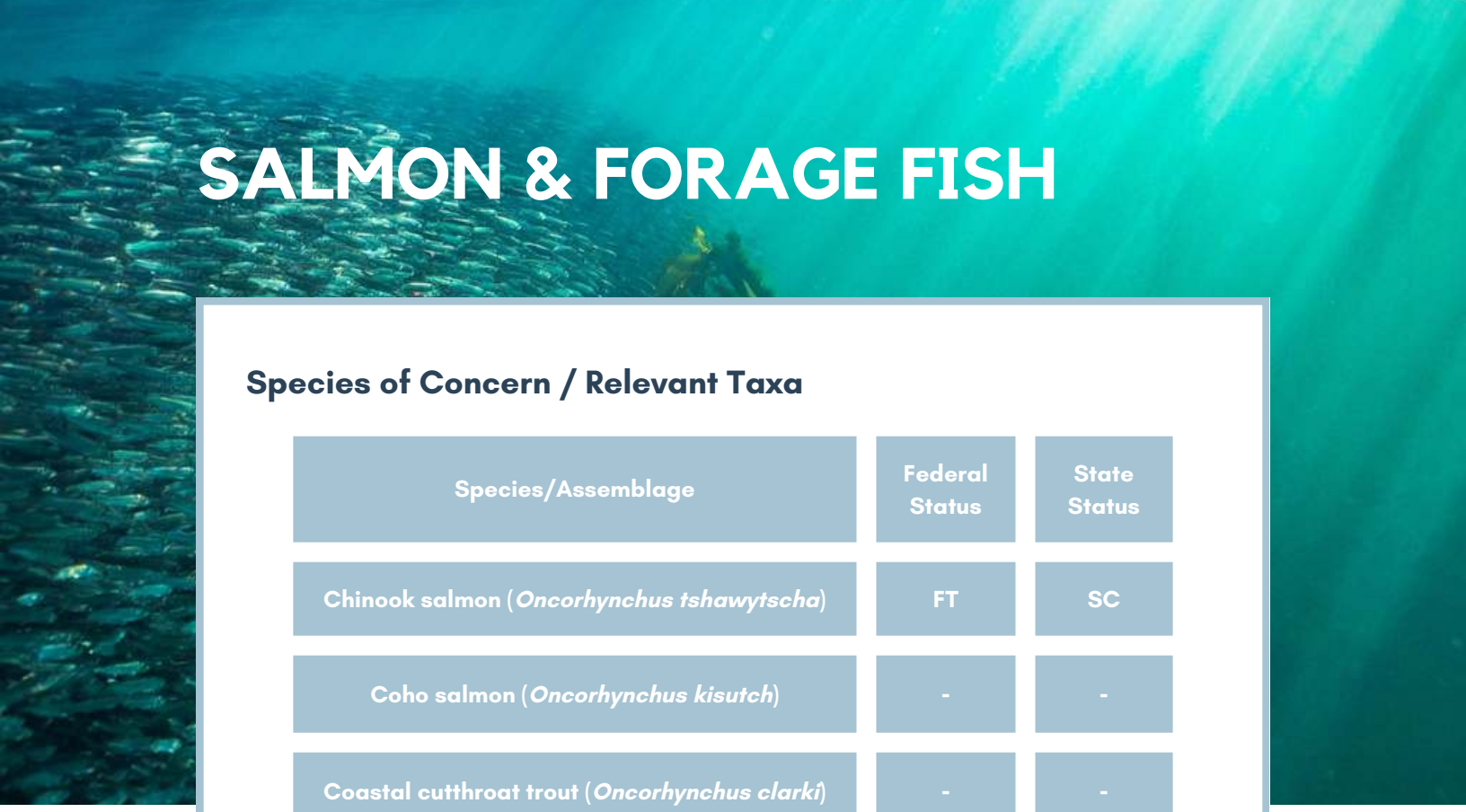
Considerable knowledge gaps remain despite dedicated efforts to understand the biology of rockfish. These need to be addressed for comprehensive management and recovery to succeed.

The top **knowledge gaps** for the rockfish and bottomfish conservation target identified by the 2020 workshop participants were:

- Reasons for kelp habitat decline and effective restoration methods
- Locations to protect in order to keep adult populations healthy for future fishery opportunities
- Impacts of ocean acidification and climate change

The top **threat themes** identified by the 2020 workshop participants as impacting the rockfish and bottomfish conservation target are:

- Recreation and resource extraction
- Shipping and boating
- Shoreline development



SALMON & FORAGE FISH

Species of Concern / Relevant Taxa

Species/Assemblage	Federal Status	State Status
Chinook salmon (*Oncorhynchus tshawytscha*)	FT	SC
Coho salmon (*Oncorhynchus kisutch*)	-	-
Coastal cutthroat trout (*Oncorhynchus clarki*)	-	-
Pacific sand lance (*Ammodytes hexapterus*)	-	-
Pacific herring (*Clupea pallasii*)	-	SC
Surf smelt (*Hypomesus pretiosus*)	-	-

BACKGROUND

This focal target includes juvenile salmon and forage fish (Pacific herring, surf smelt, and Pacific sand lance). Salmon utilize marine habitats of the San Juan Islands as they migrate through the MSA, while forage fish serve as an important prey source for marine mammals, birds, and fish, including salmon that feed and rear in the MSA on their way to the ocean. Also included are the resident population of Chinook salmon (a.k.a. "blackmouth"), and Coastal cutthroat trout, a freshwater fish found in at least five watersheds in the San Juan Islands which also move into the marine environment to feed.

The San Juan Islands, with its >400 miles of shoreline, contribute greatly to regional salmon abundance and diversity by providing favorable nearshore habitat for Chinook and other salmon species (San Juan

County Salmon Recovery Lead Entity, 2022). The islands' nearshore habitats provide important rearing grounds for juvenile salmon from at least 20 of 22 stocks of federally endangered Puget Sound Chinook.

Juvenile salmon from Puget Sound watersheds and eight watersheds in British Columbia, Canada, utilize a variety of nearshore habitats in the San Juan MSA, where they feed on terrestrial insects, forage fish, crab larvae, and other marine invertebrates during their migration to the Pacific Ocean (San Juan County Salmon Recovery Lead Entity, 2022).

These fish species mostly rely on intact nearshore habitats (including pocket beaches, bluff-backed beaches, and pocket estuaries) for shelter, feeding, and rearing.

The MSA's waters also provide important feeding habitat as salmon migrate to natal spawning grounds and hatcheries. The top pressures on the nearshore habitats of the MSA are marine shoreline infrastructure (armoring and overwater structures), and backshore roads.

The impacts from marine shoreline infrastructure are concentrated on soft shore types (including feeder bluffs, sediment transport zones, accretion shore forms, and pocket beaches), which provide important habitat for forage fish spawning and other habitat-forming processes. The freshwater streams of the San Juans also impact nearshore habitat functions by contributing to estuarine processes and transporting nutrients and insect prey.

n addition to the importance of the islands' marine habitats to salmon, the MSA also provides significant spawning and rearing habitat for forage fish. Species include Pacific herring, Pacific sand lance, and surf smelt.

Critical forage fish habitats in the San Juans include sand and gravel beaches and eelgrass beds. Eelgrass beds are used by Pacific herring for spawning and rearing. Juvenile Pacific herring and other juvenile fish, including salmon, utilize eelgrass beds as nursery habitat (San Juan County Salmon Recovery Lead Entity, 2022).

Forage fish provide important prey to salmon as well as numerous seabirds, marine mammals, and other fish species.

This target was not one of the original targets recommended by the 2004 Scientific Workshop participants but was added by the MRC because of its cultural importance as well as the desirability of integrating the MRC's role in salmon recovery efforts with this broader ecosystem-focused effort. As salmon are a migratory species, this focal target has the added benefit of tying in freshwater systems and the larger Salish Sea landscape context.

Characteristics common to this assemblage:

- Vulnerable to shoreline modifications such as hard armoring. Shoreline armoring can reduce forage fish spawning habitat by blocking the transfer of sediment or directly covering beach habitat.
- Utilize a variety of soft shore types (including pocket beaches, bluff-backed beaches, and pocket estuaries).
- Native populations of coastal cutthroat and coho salmon migrate in and out of natal freshwater streams as they seek refuge in the process of completing their life cycles.

Current Status

There are 22 stocks of federally threatened Puget Sound Chinook and 20 of those stocks use the habitats of the MSA at some point in their life cycle. Other species of Pacific salmon also migrate through the San Juans during their lifecycles. The islands lie on the migratory path of commercially and culturally important Skagit and Fraser River-bound Chinook, Coho, Chum, sockeye and pink salmon, and Steelhead.

At the time the 2007 MSA Plan was published, only 9 Pacific sand lance spawning beaches had been documented in the San Juans (FSJ & WDFW, 2004). Recent surveys performed by Friends of the San Juans documented an additional twelve previously unknown Pacific sand lance and nine additional surf smelt spawning beaches, increasing the length of documented forage fish spawning sites from 10 to 13 miles (FSJ, 2022b). Eelgrass beds are used by Pacific herring for spawning and provide nursery habitat for juvenile salmon. Many eelgrass meadows that were once thriving in the San Juans have seen significant declines, which has resulted in the loss of structure for young herring and salmon to find cover and avoid predation. Eelgrass is specifically addressed above in the eelgrass and kelp biodiversity target.

The Puget Sound Partnership has included Chinook salmon and Pacific herring as vital sign indicators in their measures of ecosystem health and progress toward Puget Sound recovery goals.

- Salmon vital sign: **vitalsigns.pugetsoundinfo.wa.gov/VitalSign/Detail/32**
- Forage Fish vital sign: **vitalsigns.pugetsoundinfo.wa.gov/VitalSign/Detail/33**

Knowledge Gaps & Emerging Threats

Over the last decade, the presence of rearing and spawning coastal cutthroat trout, Coho salmon, and chum salmon have been confirmed in island streams within the MSA (Hernandez et al., 2019; Small et al., 2016). However, there is still a lack of understanding of these populations. The recent WIRA2 Salmon Recovery Chapter update identified this as a data gap for the salmon in the islands (San Juan County Salmon Recovery Lead Entity, 2022).

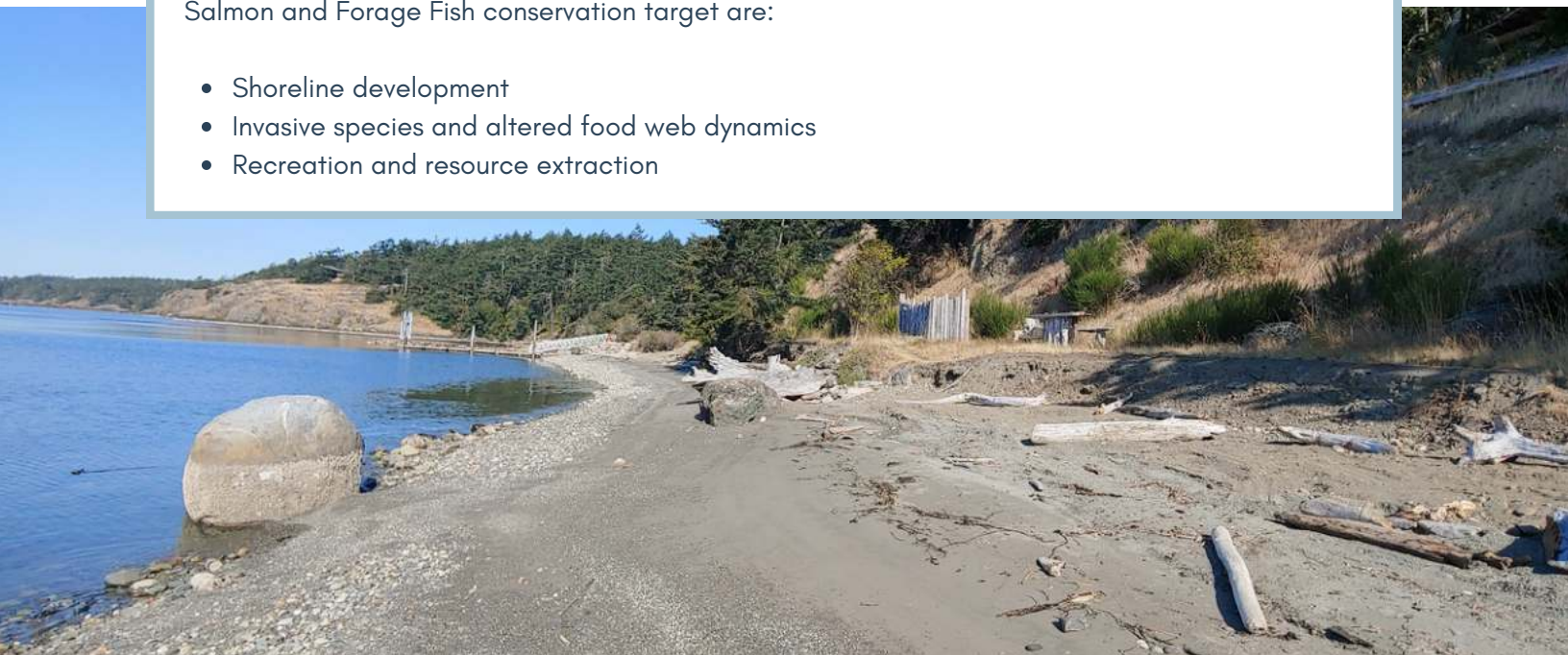
The recent Salish Sea Survival Project has suggested that there has been a tenfold decline in early marine survival of salmon in the Salish Sea (Salish Sea Marine Survival Project, 2021). This poor survival is likely related to habitat degradation and changes in ocean climate and physical oceanography leading to changes in the food webs. For example, salmon prey such as juvenile herring, other forage fish species, and certain zooplankton have declined in the Salish Sea along with kelp habitat, while urbanization and marine temperatures have increased (Sobocinski, 2021). Zooplankton composition and abundance are thought to be critical for early growth in Chinook and Coho salmon, but greater understanding is needed (LLTK, 2021). There is further evidence to indicate that the diet of Chinook salmon in the Georgia Strait is changing (LLTK, 2021).

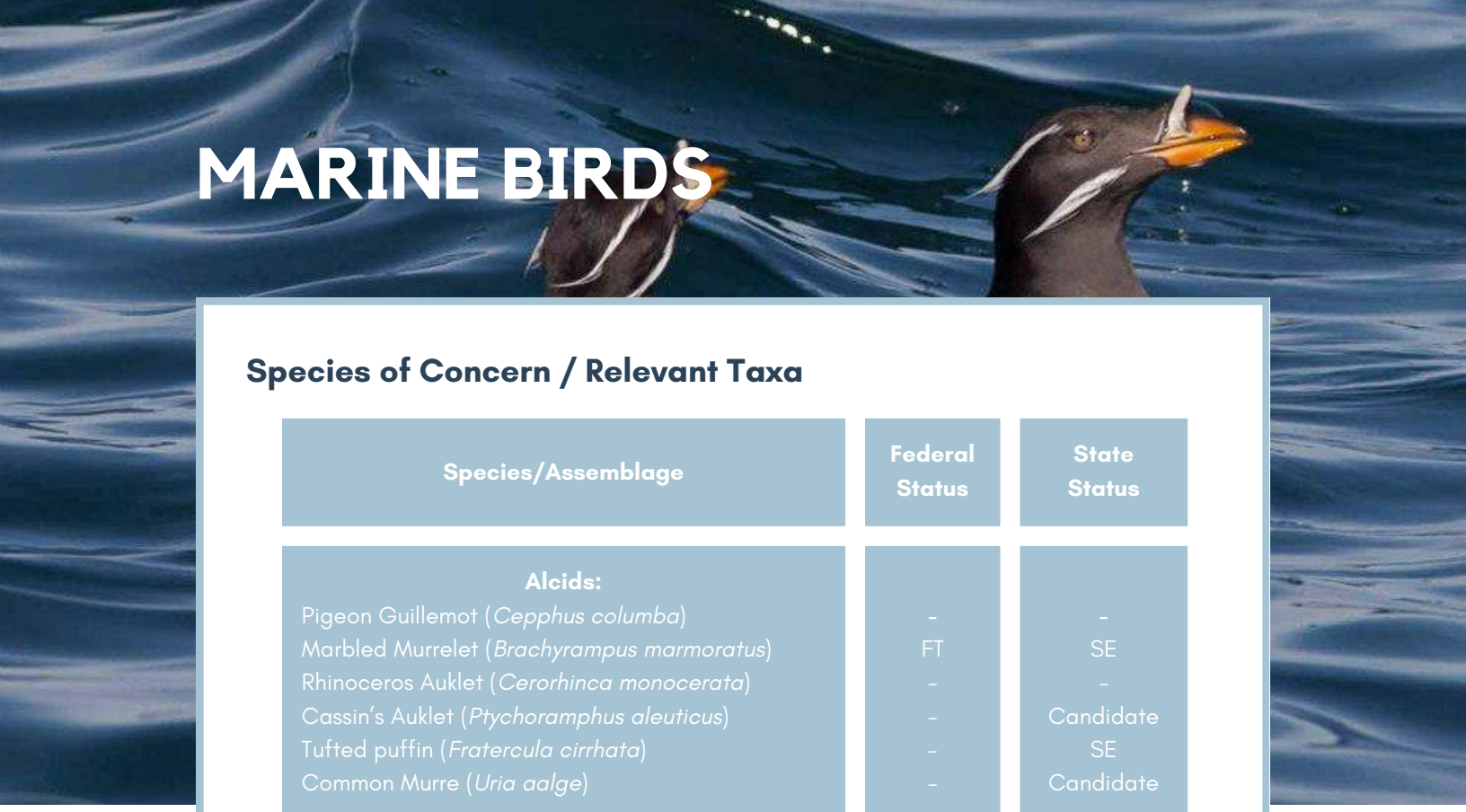
The top **knowledge gaps** for the Pacific Salmon and Forage Fish conservation target identified by the 2020 workshop participants were:

- Identify forage fish spawning sites and beaches
- Identify fish use sites in areas of eelgrass and kelp
- Information on coastal wetlands, including location, quality, and restoration needs
- Local water quality and impacts of treatment facilities and stormwater

The top **threat themes** identified by the 2020 workshop participants as impacting the Pacific Salmon and Forage Fish conservation target are:

- Shoreline development
- Invasive species and altered food web dynamics
- Recreation and resource extraction





MARINE BIRDS

Species of Concern / Relevant Taxa

Species/Assemblage	Federal Status	State Status
Alcids: Pigeon Guillemot (*Cepphus columba*) Marbled Murrelet (*Brachyrampus marmoratus*) Rhinoceros Auklet (*Cerorhinca monocerata*) Cassin's Auklet (*Ptychoramphus aleuticus*) Tufted puffin (*Fratercula cirrhata*) Common Murre (*Uria aalge*)	- FT - - - -	- SE - Candidate SE Candidate
Sea Ducks & Scoters: Scoters (*Melanitta spp.*) Hooded Mergansers (*Lophodytes cucallatus*) Harlequin Ducks (*Histrionicus histrionicus*) Bufflehead (*Bucephala albeola*) Goldeneyes (*Bucephala spp.*)	-	-
Pelagic Cormorants (*Phalacrocorax pelagicus*) **Brandt's Cormorant (*Phalacrocorax penicillatus*)**	-	- **Candidate**
Black Oystercatcher (*Haematopus bachmani*)	-	-
Gulls (Larus sp.)	-	**SC**
Common Loon (Gavia immer)	-	**SS**
Western Grebe (Aechmophorus occidentalis)	-	**Candidate**

BACKGROUND

This focal target represents marine birds with significant feeding aggregations or nesting sites within the MSA, including seaducks and shorebirds. Over 172 species of marine birds are highly dependent on the Salish Sea, including the San Juan County MSA.

The islands and surrounding waters provide critical coastal habitats and food resources - particularly access to forage fish and invertebrates. Some species use the region year-round, while others overwinter, or use the area for spring staging in order to accumulate fat stores that are critical to successful breeding (WDFW, 2022).

Marine birds utilize estuarine, intertidal, and pelagic environments in the San Juan MSA. Active monitoring has been occurring through a combination of dedicated boat-based, aerial, and nesting colony surveys as well as utilizing citizen scientists through the Coastal Observation and Seabird Survey Team (COASST), Puget Sound Seabird Survey, and the Guillemot Research Group.

Locally, the University of Washington's Friday Harbor Labs have conducted 5-6 strip transect surveys each fall since 2005. These efforts provide vital data on population trends throughout the Salish Sea, as well as within the MSA.

In Washington State, most important nesting colonies for seabirds are managed through the National Wildlife Refuge (NWR) Complex. The MSA includes 83 NWR sites comprised of rocks, reefs, and small islands. See Chapter 4 for links to maps of these sites.

Current Status

The status of marine birds in the MSA and broader Salish Sea region is determined through annual and biannual survey efforts that include both systematic surveys and citizen science efforts. These surveys indicate that there is variation in status between species. The surveys that have been conducted by Friday Harbor Labs suggest some variation in abundance of species but no particularly strong trends over the last decade. Similarly, there does not appear to be a large variation in community structure over the last decade (B. Tyler pers comm.).

The largest declines have been observed in diving birds such as the western grebe, though the declines are larger in southern Puget Sound than within the San Juan County MSA. Regionally, declines have also been documented in the common murre and scoter populations; however, numbers of common murre using the MSA appear to be stable. Extensive surveys for oystercatchers were conducted in the early 2000s and nesting sites were mapped in 2006. These data along with a telemetry study in 2010 indicate that individuals

in the MSA are resident and not migratory. Sea duck species are monitored by WDFW winter seabird aerial survey program and population trends for sea duck species were found to be relatively stable between 2003 and 2013 (WDFW, 2013). Cormorant numbers in the MSA are also likely stable (J. Evenson pers comm.). Comprehensive guillemot surveys suggest that colonies are generally stable (PSP, 2022a).

The MSA is an important area for the Marbled murrelet. Marbled murrelets were listed as threatened under the Endangered Species Act in 1992, this species has been subject to annual (2000 -2016) or biannual (2016-present) monitoring via boat-based line-transect surveys. The population continues to decline; the population estimate for Puget Sound and the Strait of Juan de Fuca in 2020 was 3,143 birds with a -4.96% average annual rate of decline for the 2001-2020 period (Lance & Pearson, 2021; Lorenz & Raphael, 2018).

Tufted puffins were also listed as endangered at the State level in 2015 and have been experiencing a decline. Historically, 43 Tufted Puffin nesting colonies were documented in Washington and the bird was considered common in the San Juan Islands, the Strait of Juan de Fuca, and particularly along the outer coast of the Olympic Peninsula (Hanson & Wiles, 2015). There are now no breeding colonies remaining within the MSA, the only remaining colonies within the inland waters of Washington State are found at Protection Island and Smith Island. Tufted puffins have experienced a steady and significant decline with an estimated annual rate of decline of 8.9% (Hanson & Wiles, 2015; Pearson et al., 2022). Recent models have predicted a 92% decline has occurred in Washington State since 1905 (Pearson et al., 2022).

The Puget Sound Partnerships has included the following species as vital sign indicators in their measures of ecosystem health and progress towards Puget Sound recovery goals: Marbled murrelet, Rhinoceros auklet, Pigeon guillemot, and three species of scoters (Surf, Black, and White-winged).

vitalsigns.pugetsoundinfo.wa.gov/VitalSign/Detail/17

Knowledge Gaps & Emerging Threats

The largest impacts to marine birds in the MSA include climate change, vessel traffic, and changes to food/resource availability. Decadal declines in winter counts of diving marine bird species that rely on forage fish have been recorded (Vilchis et al., 2014). These declines have been driven by changes in the availability of low-trophic prey that may be forcing wintering range shifts, especially for those wide-ranging species without local breeding colonies in the Salish Sea.

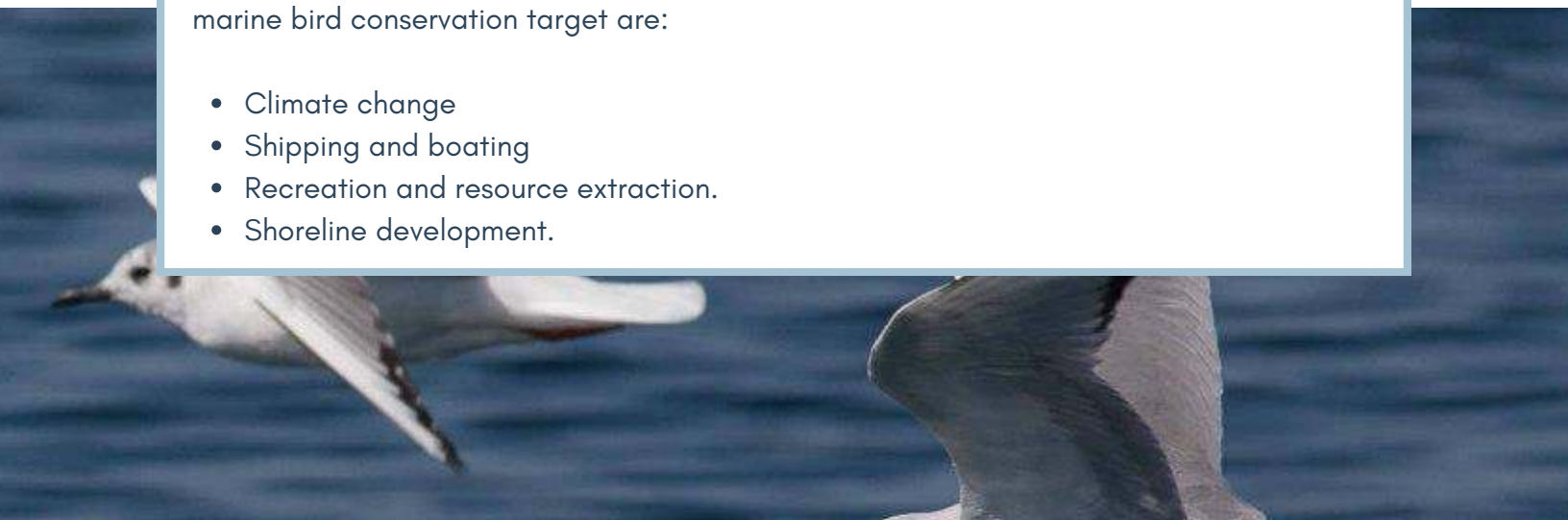
Food availability changes are driven by changes to ocean conditions, as well as habitat degradation and pollution. Vessel traffic is disrupting foraging behavior and ability for many seabirds and other marine animals. Increased vessel traffic, including from recreational boaters, also increases the likelihood of oil spill. The largest known mortality event for the Tufted puffin in Washington State was the 1991 Tenyo Maru oil spill that killed an estimated 9% of the state's population (Hanson & Wiles, 2015).

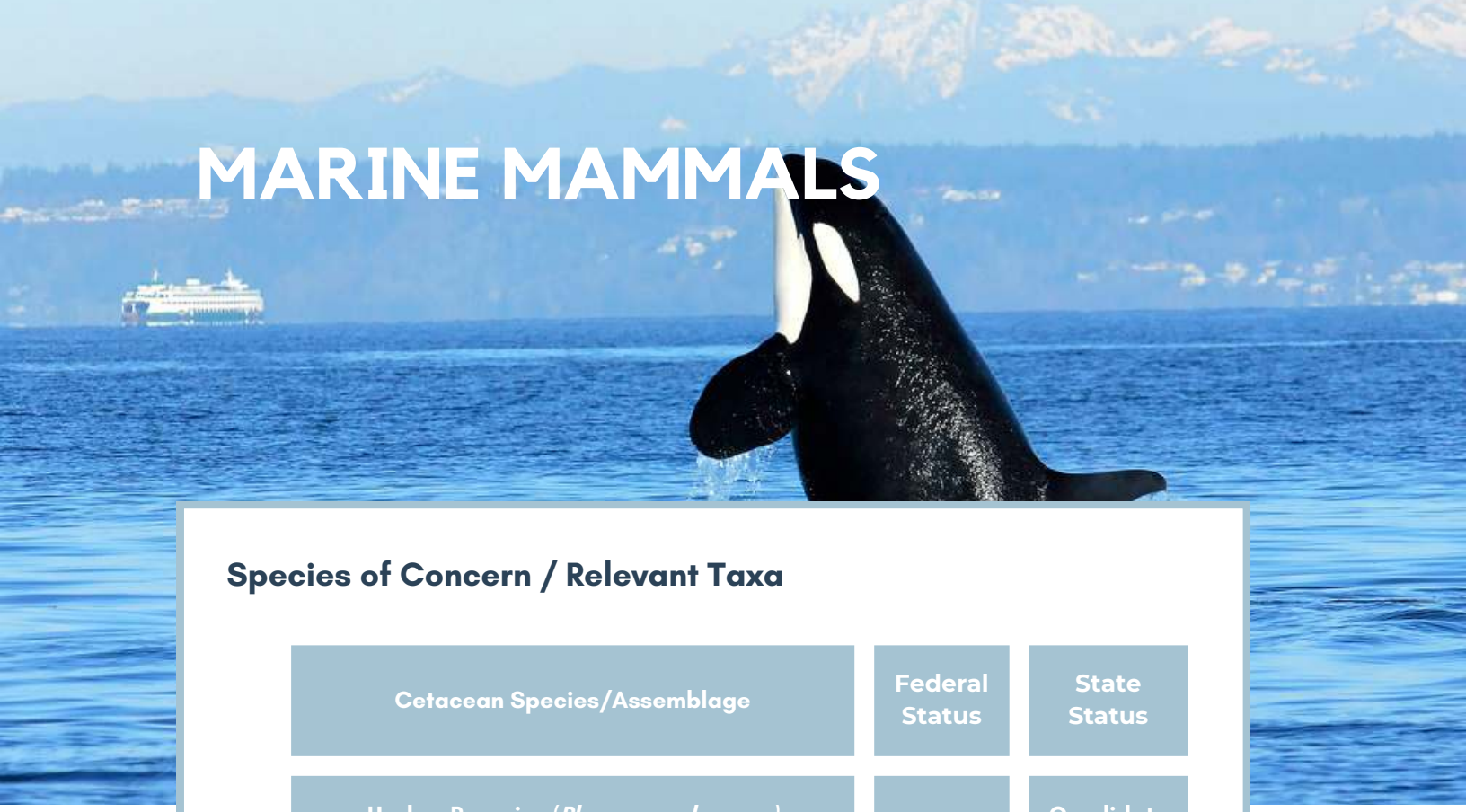
Increasing sea surface temperatures and ocean acidification related to climate change impacts prey availability and the impacts of reduced prey availability are the likely cause of the regional declines in diving birds. However, Lorenzo and Raphael (2018) suggest that the San Juans provide refugia marine habitat for species such as Marbled murrelets when prey availability along the outer Pacific Coast is poorer than usual, e.g. during El Niño years.

With climate change, sea level rise could pose a significant threat to Black Oystercatchers as a species that has high nest fidelity and narrow nesting and foraging zones. The Western Hemisphere Shorebird Reserve Network lists San Juan County as an Important Shorebird Site because it supports >1% of the global Black Oystercatcher population. It is currently unknown if they will adapt to rises in sea level in the Salish Sea. Other more recent concerns have arisen around the increasing numbers of Canada geese and large birds of prey (e.g., Bald eagles). The recovery of large birds of prey has been found to result in spatial and temporal redistribution of water birds, including dabbling ducks and diving birds (Middleton et al., 2018). The increase in eagle numbers may also be modifying nesting behavior of cormorants (R. Milner Pers comm).

The top **threat themes** determined by the 2020 workshop participants to impact the marine bird conservation target are:

- Climate change
- Shipping and boating
- Recreation and resource extraction.
- Shoreline development.





MARINE MAMMALS

Species of Concern / Relevant Taxa

Cetacean Species/Assemblage	Federal Status	State Status
Harbor Porpoise (*Phocoena phocena*)	-	Candidate
Dall's porpoise (*Phocoena dalli*)	-	-
Pacific white-sides dolphins (*Lagenorhynchus obliquidens*)	-	-
Southern Resident killer whale (*Orcinus orca*)	FE	SE
Transient (Biggs) killer whale (*Orcinus orca*)	FT	-
Humpback whale (*Megaptera novaeangliae*) *Mexico DPS* *Central America DPS* *Hawaiian DPS*	 FT FT -	 - - -
Minke whale (*Balaenoptera acutorostrata*)	-	-
Gray whale (*Eschrichius robustus*)	-	SS

MARINE MAMMALS

Species of Concern / Relevant Taxa

Pinniped Species/Assemblage	Federal Status	State Status
Harbor Seal (*Phoca vitulina)*	-	-
Steller sea lion (Eastern Pacific DPS) *(Eumetopias jubatus)*	-	-
California Sea lion *(Zalophus californianus)*	-	-
Northern elephant seal *(Mirounga angustirostris*)	-	-

BACKGROUND

There are four species of pinnipeds (California and Steller sea lions, Northern elephant seal, and the harbor seal) and seven species of cetacean commonly encountered in the Salish Sea, including two ecotypes of killer whale: the endangered Southern Resident killer whale (SRKW) and the threatened Transient (or Biggs) killer whales (TKW).

There are four species of pinnipeds (California and Steller sea lions, Northern elephant seal, and the harbor seal) and seven species of cetacean commonly encountered in the Salish Sea, including two ecotypes of killer whale: the endangered Southern Resident killer whale (SRKW) and the threatened Transient (or Biggs) killer whales (TKW).

There have been shifts in both presence patterns and behavior of the SRKW since the MSA plan was published. These have been mostly attributed to changes in prey availability, meanwhile, the presence of TKWs has increased, also likely related to the abundance of their prey, which includes harbor porpoise, harbor seals, and Steller sea lions. The other toothed cetaceans commonly encountered include the harbor porpoise and to a lesser extent Dall's porpoise and the Pacific white-sided dolphin.

Three species of baleen whale commonly encountered in the Salish Sea are gray, humpback, and minke whales. Humpback whales are now encountered year-round in the MSA, having shown remarkable recovery from the impacts of commercial whaling a century ago (Olson et al., 2024).

Minke whale numbers remain low but relatively stable in the MSA, with the same individuals known to return year after year (Dorsey et al., 1990), while gray whales are encountered comparatively the least often within the MSA due to their preference for foraging habitats further south into Puget Sound. In addition to playing potentially important roles in structuring the marine ecosystem as predators, these species have great cultural importance for the Coast Salish, Island residents, and visitors to the MSA.

Current Status

The populations of all four resident and migratory pinniped species are increasing, with evidence suggesting that harbor seal populations may be stabilizing. The population trends of the cetacean species are more variable and, thus difficult to generalize. The Washington inland waters population of harbor porpoise appears to be increasing, currently estimated at ~11,233 animals based on aerial survey sighting data collected from 2013-2015 (Jefferson et al., 2016). Dall's porpoise population numbers are unknown but there appears to be some seasonal and interannual variability. The Southern Resident killer whales are perhaps the most well-known cetaceans in the region and their population decline has been well documented. Their population sits at 75 as of July 1, 2023. Transient killer whales are being encountered at an increased frequency; however, their population trends are not well known. In recent years, calf survival rates appear to be better for Transients than Southern Residents.

Of the three baleen whale species that occur in the MSA gray and humpback whales have exhibited increased prevalence as their populations have recovered from the effects of historical commercial whaling, while minke whale presence has remained relatively stable (Olson et al., 2024). Gray whales are mostly found further south in Puget Sound where a segment of the population known as 'The Sounders' come to feed, they are less prevalent in the MSA but spend time in the islands on occasion, Despite the increases in population size of the Eastern North Pacific stock of gray whales, NOAA declared an 'Unusual Mortality Event' for the population in 2019, this has continued into 2023 due to the higher numbers of recorded strandings along the Pacific coast.

Humpback presence in the Salish Sea and around the San Juan Islands has been increasing over the last decade. Whales from three Distinct Population Segments (DPS') have been encountered, most commonly from the Hawaii DPS, and the threatened Mexico DPS. There have been relatively few encounters with animals from the endangered Central American DPS (these animals are encountered in greater numbers further south, off the coast of California).

Minke whales are predictably found around the San Juans during the late spring, summer, and early fall. These animals are part of the CA/OR/WA stock, and while stock assessments have estimated lower numbers (currently ~600 animals), population trends are unknown. Photo-ID data suggests that individual whales have been returning to feed in the Salish Sea, and especially within the MSA area for decades (Salish Sea minke whale project, *unpublished data*), highlighting the long-term importance of the area to this regionally rare whale species. All three species have been impacted by vessel strikes and entanglement in the Salish Sea. In 2022 a minke whale was found to have died as a result of a ship strike in the MSA and in 2020 a young humpback whale was struck and killed by a ferry in Puget Sound. The impacts of Transient killer whale predation, and competition from the increase in humpback numbers on minke whales remain unknown.

While sea otters (*Enhydra lutris*) were historically rare in the MSA (Sato, 2018, McKechnie & Wigen, 2011), individuals were, and continue to be occasionally present, particularly during summer months. These individuals are likely to be lone males and are encountered in the southwestern part of the MSA (Sato, 2018). The sea otter remains listed as endangered in the State of Washington.

The Puget Sound Partnership has now included the Southern Resident killer whale as a vital sign indicator in their measures of ecosystem health and progress towards Puget Sound recovery goals:

vitalsigns.pugetsoundinfo.wa.gov/VitalSign/Detail/19

Knowledge Gaps & Emerging Threats

Top **knowledge gaps** identified by the 2020 workshop participants included:

- Lack of long-term data trends for species including the Dall's porpoise and minke whale.
- The role of pinniped species in the ecosystem and long-term diet composition.
- The impact of humpback whale recovery on other species that consume forage fish.
- The relationship between the increased presence of Transient killer whales and changes in the presence and behavior of Southern Resident killer whales, and other cetacean populations.
- Impacts of entanglement and vessel strike risk on cetaceans. Entanglement rates are increasing but little is known about the prevalence, gear type, and location of entanglement.
- How incorporating Southern Resident killer whales into management decisions for fisheries management may increase prey allocation for the whales.

The top **threat themes** determined by the 2020 workshop participants to impact marine mammals within the MSA are:

- Shipping and boating
- Shoreline development
- Recreation and resource extraction.

SOCIO-CULTURAL TARGETS

Due to the comprehensive, community-wide planning process that went into the production of the 2007 MSA Plan, it was determined that a revision of the socio-cultural targets was not necessary for this MSA status assessment. The socio-cultural targets included in the 2007 MSA plan are as follows:

Enjoyment of the marine environment

This focal target includes the numerous ways in which residents and visitors enjoy the marine environment and the different values we obtain from it. This includes having a diversity of marine recreation opportunities as well as spiritual resources and is a fundamental component of our sense of place. Some of the important characteristics of this target are the existence of abundant populations of marine wildlife for people to enjoy viewing, locally caught and raised high-quality seafood available for consumption, opportunities to engage in diverse recreational activities and particularly boating, public access to beaches and shorelines, unspoiled views, and the enjoyment and respect of historical and present-day marine cultural sites and traditions.

Thriving marine-based livelihoods

The Thriving marine-based livelihoods focal target describes the residents' desire to support livelihoods and make a living in ways that use the marine environment of the MSA, recognizing that the ability to do so is dependent upon having healthy and abundant marine wildlife populations and our ability to understand the ecosystem that supports them. This includes having local food security, whether via sustenance harvests or the ability to purchase local seafood, having various marine transportation options available to serve the many islands (some of which do not have ferry service), and being able to make a living in diverse ways related to the marine environment

Cultural traditions: ceremonial, subsistence, sustenance, and spritual uses and aspects

The Cultural traditions focal target encompasses a range of values related to the marine environment other than purely recreational or commercial values. These values include intangible benefits such as spiritual values and fulfillment and tangible benefits such as personal harvest for sustenance purposes and stewardship. This target encompasses physical marine cultural sites, historical and modern marine-related cultural practices, opportunities to harvest for tribal ceremonial, subsistence, and sustenance purposes protected through sovereign treaty rights, and the recognition and appreciation of these tribal treaty rights and access to marine resources. Sustenance uses differ from subsistence uses in that subsistence uses fill a critical need for physical and/or cultural survival, while sustenance uses refer to personal harvest for dietary purposes. Sustenance harvests may have a spiritual or ethical component when an individual chooses not to harvest a particular species as an act of stewardship of their environment.

4. RECOMMENDATIONS

The Marine Resources Committee and San Juan County's Marine Program undertook a review of the 37 strategies (or actions) identified in the 2007 Plan. The findings of this review are summarized in Appendix A1.

This review resulted in the identification of strategies that remain unaddressed as well as new and emerging strategies from which a series of recommendations arose. These recommendations were further reviewed, refined, and prioritized at the 2023 Marine Managers Workshop resulting in 60 specific recommendations that fall within 9 core objectives:

1: Climate Resilience
2: Oil Spill Prevention and Preparedness
3: Protect Submerged Aquatic Vegetation
4: Enhance Nearshore Food webs
5: Reduce Human Impact
6: Improve Regulatory Compliance
7: Ensure Shoreline Functioning
8: Reduce Vessel Impacts
9: Upgrade Marine Infrastructure

The strategies review also considered and incorporated actions identified in the 2022 Salmon Recovery Chapter Update and the San Juan Ecosystem Protection and Recovery Plan (Appendix A1). Each recommendation was assessed as to which objective criteria it addressed as well as which threat category it addressed:

Objective Criteria

- Monitoring
- Protections
- Restorations
- Planning
- Policy & Regulatory Development
- Enforcement
- Outreach & Education

Threat Category

- Shipping & Boating
- Climate Change
- Recreation & Resource Extraction
- Shoreline Development
- Invasive Species & Altered Food Webs

In addition, a key expected result, justification for, and the main steps needed for implementation of each recommendation have been identified, as well as the lead agency or organizations responsible.

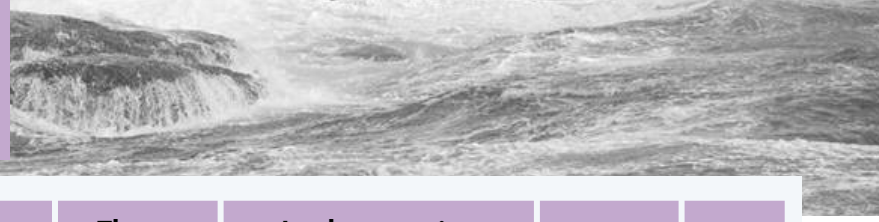
The following pages lay out summary tables for each **Key Objective** and detail each recommendation. These tables include the recommendation identifier, the recommendation, if the recommendation is also included in the Salmon Recovery Chapter Update (SCRU) or Ecosystem Protection and Recovery Plan (EPRP), objective criteria addressed by the recommendation, the expected key result, the threat categories that the recommendation addresses, the main implementation steps identified, the lead agencies and/or organizations responsible for, or leading current efforts, and a progress status indicating whether each recommendation is complete (or partially complete), ongoing, started, or not yet started.

The 2023 Marine Managers Workshop attendees were asked to identify their top three recommendations for each Key Objective group. This allowed each list to be ranked, the ranked priority is identified in brackets beside each recommendation identifier.

Table 4.1. List of agencies and organizations identified in the listed recommendations

SJC	San Juan County
SJC DCD	San Juan County Dept. Community Development
SJC DEM	San Juan County Dept. Emergency Management
SJC ES	San Juan County Environmental Stewardship
SJC Land Bank	San Juan County Conservation Land Bank
SJC PA	San Juan County Prosecuting Attorney
SJC PW	San Juan County Public Works
LIO	Local Integrating Organization
SJC Lead Entity	San Juan County Salmon Recovery Lead Entity
MRC	San Juan County Marine Resources Committee
NWSC	Northwest Straits Commission
NWSF	Northwest Straits Foundation
WA DNR	Washington Dept. Natural Resources
WDFW	Washington Dept. Fish and Wildlife
Ecology	Washington Dept. Ecology
WA Agriculture	Washington Dept. Agriculture
Samish Nation	Samish Indian Nation
FOSJ	Friends of San Juans
IOSA	Islands Oil Spill Association
NWAC	Northwest Area Committee
SJCD	San Juan Conservation District
SJPT	San Juan Preservation Trust
Soundwatch	Soundwatch Boater Education Program
UW FHL	University of Washington Friday Harbor Labs
WSG	Washington Sea Grant
WSU Extension	Washington State University Extension Office

Key Objective Group:
A. Climate Resilience



Recommendation	Recommendation Justification	Plan	Objective Area	Expected Result	Threat Category	Implementation approach	Agencies	Status
A.1 *(1)* Encourage protection of natural functioning low-lying land inland of existing coastal wetlands, barrier beaches and bluffs to allow for natural translation in response to changing sea levels.	Sea level rise and storms will impact low-lying habitats such as estuaries, intertidal zones, mudflats and coastal wetlands. Increased wave energy reaching farther inland will increase coastal flooding, resulting in inundation and erosion that will alter or shift habitats and threaten livelihoods. Preserving the ecological functions of existing healthy shorelands and coastal wetlands will mean that shorelines are more resilient to these impacts. Allowing translation inland reduces requests for new shoreline armoring.		Protections Policy & Regulatory Development	Protection and expansion of areas inland of coastal wetlands, barrier beaches and bluffs.	Climate Change Shoreline Development	1) Ensure future local regulations incorporate need to protect areas inland of wetlands, barrier beaches and bluffs; 2) Identify parcels that meet these criteria for consideration in voluntary willing seller acquisition and conservation easement plans.	San Juan County - ES & Land Bank, SJPT	ongoing
A.2 *(2)* Evaluate managed retreat of infrastructure and structures to improve community resiliency and restore habitat.	Backshore roads are failing and low lying shoreline structures are facing inundation. Efforts to protect shoreline infrastructure often involve armoring impacting shoreline functions such as forage fish spawning habitats and nearshore food webs. Septic and water systems are also being compromised with salt water intrusion. Functioning shorelines that have been allowed the space needed for natural retreat are more resilient to impacts from sea level rise and storm impact.		Protections Restorations Planning Policy & Regulatory Development	Modification of roads and structures allowing for inland retreat and creating continuous climate refugia, thereby allowing species migration and more climate resilient functioning shorelines; habitat restoration along shorelines and adjacent habitats. Identifying undeveloped parcels at risk of sea level rise and prioritize for willing seller acquisition to promote resiliency.	Climate Change Shoreline Development	1) Identify options for addressing backshore roads erosion and/or inundation; 2) Ensure only softshore armoring applied where necessary.	San Juan County - ES, PW, DCD	ongoing

Key Objective Group:
A. Climate Resilience

Recommendation	Recommendation Justification	Plan	Objective Area	Expected Result	Threat Category	Implementation approach	Agencies	Status
A.3 *(3)* Communicate risk of climate change impacts in the marine environment to the public.	Sea level rise and changes to weather patterns, including extreme temperature, rain, and storm events are impacting communities around the Salish Sea. A more informed public is better able to prepare for these events. County residents that are informed about impacts of climate changes, particularly in relation to storm events, sea level rise, and associated impacts, are more able to engage in decision making surrounding policies and local actions to address the impacts.		Outreach & Education	A more informed, prepared, engaged, and proactive public.	Climate Change Shoreline Development	1) Develop messaging around climate impacts and associated marine environments, create and implement communication plan. 2) Coordinate with Natural Hazards Mitigation Planning as part of FEMA / Department of Emergency Management, and with future updates to the County's Comprehensive Plan.	San Juan County - ES & DEM	not started
A.4 *(4)* Establish incentives program for property owners to utilize shore friendly solutions to address increasing climate risks.	Functioning shorelines are more resilient to impacts from sea level rise and storm impact. Private property owners face unnecessary hurdles related to permitting when undertaking work that will improve the resiliency of their shoreline to sea level rise and storm surge. e.g., when trying to revegetate or undertake soft shore armoring as an alternative to traditional shoreline armoring		Planning Policy & Regulatory Development Outreach & Education	Prevention of traditional hard shoreline armoring in favor of functioning shorelines.	Climate Change Shoreline Development	Address permitting barriers at local, state and federal levels. Create incentives program, including securing accessible and adequate funds.	San Juan County - ES & DCD	not started

Key Objective Group:
A. Climate Resilience

Recommendation	Recommendation Justification	Plan	Objective Area	Expected Result	Threat Category	Implementation approach	Agencies	Status
A.5 *(5)* Conduct king tide and storm surge monitoring and associated public outreach and education.	Climate change is leading to rising sea levels. King tides and storm surges enable us to project what water levels will be in the future, and where they will impact infrastructure and resources. They also provide striking visuals for communication and educational outreach regarding impacts of local sea level rise.		Monitoring Outreach & Education	Create baseline database of HAT (highest astronomical tide) levels at key locations around the county. Better public understanding of sea level rise threats.	Climate Change	County ES staff and MRC volunteers take photos at key locations around the County during King tide and storm surge events, followed by public outreach and education.	San Juan County - ES	not started
A.6 *(6)* Conduct mussel monitoring	Transplanted mussels are a useful tool to help identify the presence of, and potential sources of PAH pollutants in Puget Sound. This method enables long-term consistent data collection that can be used to characterize the extent and magnitude of nearshore contamination in the region.		Monitoring	Improve understanding on contaminants in nearshore habitats around the San Juans.	Climate Change	MRC members assist WDFW in deployment and retrieval of mussel cages.	WDFW	ongoing

Key Objective Group:
B. Oil Spill Prevention and Preparedness

Recommendation	Recommendation Justification	Plan	Objective Area	Expected Result	Threat Category	Implementation approach	Agencies	Status
B.1 *(1)* Address and prevent small but cumulatively impactful spills that occur at marinas and marine fuel stations.	Significant numbers of small spills from recreational boats have been frequently observed in San Juan County marinas, and cumulative impacts of these small spills are substantial.		Protections Policy & Regulatory Development Outreach & Education	Improved oil spill prevention in San Juan County marinas and marine fuel stations.	Shipping & Boating	1) Work with marinas and marine fuel facilities to more effectively prevent small spills; 2) Develop and establish county-wide educational program targeted at resident and visiting recreational boaters.	SJC - ES, MRC, FOSJ, IOSA, WSG	started
B.2 *(2)* Support the adoption and implementation of state, provincial, and federal legislation that improves oil spill prevention, response, preparedness, and capacity, including the positioning of an additional ERTV in or near San Juan County.	The San Juan Islands are surrounded by international shipping lanes and the risk of a major oil spill is a long-standing existent and increasing threat. Vessel traffic has increased over recent years and is projected to continue to increase with population and economic growth; continued increase in vessel traffic increases risk of a major spill. Response time to an oil spill event greatly influences extent of environmental harm and economic burden. Current positioning of nearest ERTVs is not adequate for a timely response, and adding an ERTV to or immediately adjacent to San Juan County waters will significantly increase response time and effectiveness.	EPRP	Protections Policy & Regulatory Development Outreach & Education	Improved oil spill prevention and response preparedness, as well as demonstrated capacity for implementation, at the state, provincial, and federal levels in the US and Canada. Station an ERTV in or near San Juan County for immediate response to vessels in need.	Shipping & Boating	1) Support advocacy for Canada and State to require stand-by emergency response (ERTV, Firefighting) to be situated in or near San Juan County. 2) Support advocacy for protection-related permit conditions. 3) Support advocacy for State to require quiet ship certification and prohibition on discharges from exhaust gas cleaning systems.	SJC, MRC, FOSJ	ongoing

Key Objective Group:
B. Oil Spill Prevention and Preparedness

Recommendation	Recommendation Justification	Plan	Objective Area	Expected Result	Threat Category	Implementation approach	Agencies	Status
B.3 *(4)* Support San Juan County advocacy for the identification of and financial guarantees for oil spill costs.	The San Juan Islands are surrounded by international shipping lanes, four refineries, and designated anchorage areas. The risk of accidents and a major oil spill is a long-standing existent and increasing threat. Vessel traffic has increased over recent years and is projected to continue to increase with population and economic growth; continued increase in vessel traffic increases the risk of a major spill. While financial guarantees for commercial ships have been in place for over 20 years and Financial responsibility requirements for onshore bulk oil handling facilities will soon be required at a maximum of $300 million, a higher financial responsibility amount is needed to ensure that the onshore facilities won't go bankrupt before covering all of their oil spills' response and damage costs.		Protections Policy & Regulatory Development Enforcement Outreach & Education	Secured funding to compensate for oil spill response and damages.	Shipping & Boating	Actively research and identify opportunities for funding, and actively support pursuit of sustainable funding for oil spill response costs through direct and targeted communication with pertinent governing bodies.	SJC, MRC, FOSJ	not started

Key Objective Group:
B. Oil Spill Prevention and Preparedness

Recommendation	Recommendation Justification	Plan	Objective Area	Expected Result	Threat Category	Implementation approach	Agencies	Status
B.4 *(3)* Support San Juan County advocacy for sustainable funding for Primary Response Contractor(s).	The Islands are surrounded by international shipping lanes and are also one of the most popular boating destinations in the US. Spills can happen from any size vessel and having a trained and responsive crew on scene early will help prevent further environmental damage. Sustained establishment of a Primary Response Contractor with demonstrated capacity for effective oil spill response significantly reduces impacts from such events.		Protections Policy & Regulatory Development Outreach & Education	A robust and well-prepared Primary Response Contractor(s) with demonstrated capacity for providing the 2-, 3-, 4-, and 6-hour planning standards (per WAC 173-182-370) and maintaining robust volunteer training and engagement in oil spill response preparedness.	Shipping & Boating	Identify required resources (e.g., sustainable budget, staffing requirements, equipment needs and costs) to ensure functioning and sustainable PRC(s), and participate in and provide training opportunities, including wildlife response	SJC, MRC, Ecology	ongoing
B.5 *(3)* Monitor permit applications and engage in permit application review processes where there could be increases in vessel traffic.	Increases to ocean-going shipping pose a threat to county waters and the broader region. Threats include increased chance of accidents, including oil spills, ship strikes with marine mammals, increased underwater noise disturbance, and introduction of invasive species through ballast discharge.	EPRP	Monitoring	Regulators address potential impacts from increases in vessel (shipping) traffic.	Shipping & Boating	Engage permitting bodies and seek participation in permit application review process	San Juan County, MRC, FoSJ	not started
B.6 *(5)* Support San Juan County advocacy for a robust implementation of whale deterrence plan.	Killer whales and other cetaceans are known to suffer both short- and long-term effects from oil spill exposure, which poses a critical and population-endangering threat to the Southern Resident Killer Whale community. It is imperative that effective deterrence operations are ready for immediate deployment in San Juan County to prevent cetaceans, especially SRKWs, from approaching oil spills.		Protections Policy & Regulatory Development Outreach & Education	Equipment and personnel required for effective deterrence operations are trained, prepared, and readily available for immediate response, and are compensated appropriately	Shipping & Boating Recreation & Resource Extraction	Identify and commit to a sustainable plan in support of whale deterrence resources.	San Juan County, MRC, FoSJ, NWAC, WDFW	started

Key Objective Group:
C. Protect Submerged and Aquatic Vegetation

Recommendation	Recommendation Justification	Plan	Objective Area	Expected Result	Threat Category	Implementation approach	Agencies	Status
C.1 *(2)* Conduct monitoring and stressor research for kelps and seagrasses.	Kelp forests and eelgrass meadows are important ecosystem engineers that provide primary production, and essential refuge and habitat for invertebrates and fish species, especially juvenile fishes including threatened and endangered salmon and rock fish species, and forage fish species. Primary production in kelp forests is high and provides an important food source supporting complex food webs inside kelp forests and in neighboring deep-water and shoreline habitats. These habitats also provide buffers to the impacts of storms providing protection to forage fish spawning habitat. The impacts of local stressors on kelp are not well understood. Local stressors may include stormwater runoff related to growth around the urban centers of the islands; urchin populations; and nutrient and turbidity levels in the water column.	EPRP	Monitoring Protections Outreach & Education	Understand which local stressors impact kelp presence.	Climate Change Recreation & Resource Extractions Shoreline Development	1) Plan for white paper on multiple stressors and effects to inform actionable research; 2) Identify monitoring methods; 3) Identify the knowledge gaps for understory kelps.	DNR, UW FHL, NWSC, WDFW	started

Key Objective Group:
C. Protect Submerged and Aquatic Vegetation

Recommendation	Recommendation Justification	Plan	Objective Area	Expected Result	Threat Category	Implementation approach	Agencies	Status
C.2 *(1)* Protect eelgrass and kelps along highest fish use shoreforms.	Kelp forests and eelgrass meadows are important ecosystem engineers that provide primary production, and essential refuge and habitat for invertebrates and fish species, especially juvenile fishes including threatened and endangered salmon and rock fish, and forage fish species. Primary production in kelp forests is high and provides an important food source supporting complex food webs inside kelp forests and in neighboring deep-water and shoreline habitats. These habitat also provide buffers to the impacts of storms providing protections to forage fish spawning habitat.	SRCU	Protections	Protect functioning habitat for key nearshore food webs.	Climate Change Recreation & Resource Extractions Shoreline Development	Implement local salmon recovery plan.	San Juan County Lead Entity	ongoing

Key Objective Group:
C. Protect Submerged and Aquatic Vegetation

Recommendation	Recommendation Justification	Plan	Objective Area	Expected Result	Threat Category	Implementation approach	Agencies	Status
C.3 *(3)* Protect eelgrass habitat by monitoring and testing efficacy of management strategies.	Eelgrass habitats are foundational to the Salish Sea ecosystem and the Coast Salish Culture. They provide vital nearshore habitat. Over a third of San Juan County's 408 miles of shoreline host eelgrass beds and meadows. Eelgrass habitat provides nursery, refuge, and is a food source to many invertebrate and fish species including forage fish, and ecologically, economically, and culturally important crab and salmon species. Eelgrass is protected under Environmentally Sensitive Areas section of the San Juan County Code 9SJCC 18.30.110.5. Eelgrass habitats are sensitive to environmental and physical stressors and eelgrass health and density have declined in the San Juans. Stressors include physical disturbance, shoreline modifications, and oceanographic variations in temperature.	EPRP SRCU	Monitoring Protections Policy & Regulatory Development Outreach & Education	Reduce rate of decline in eelgrass bed extent in embayments.	Shipping & Boating Climate Change Shoreline Development	1) Monitor known eelgrass meadows; 2) Identify locations where eelgrass is resilient; 3) Map deep water edge to identify safe anchoring depths; 4) Identify and implement anchoring protection zones; 5) Test efficacy of protection zones.	WA DNR, UW FHL, FOSJ, San Juan County ES, MRC	ongoing

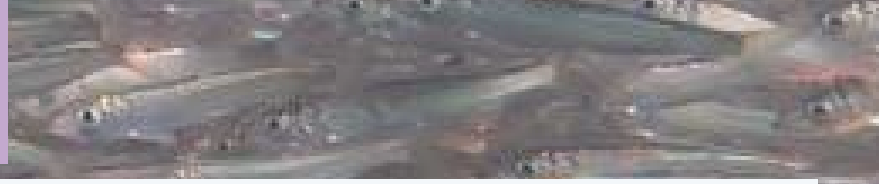
Key Objective Group:
C. Protect Submerged and Aquatic Vegetation

Recommendation	Recommendation Justification	Plan	Objective Area	Expected Result	Threat Category	Implementation approach	Agencies	Status
C.4 *(5)* Restore eelgrass and kelps along highest fish use shoreforms and private tidelands associated with Pacific herring spawning.	Kelp forests and eelgrass meadows are important ecosystem engineers that provide primary production, and essential refuge and habitat for invertebrates and fish species, especially juvenile fishes including threatened and endangered salmon and rock fish species, and forage fish species. Primary production in kelp forests is high and provides an important food source supporting complex food webs inside kelp forests and in neighboring deep-water and shoreline habitats. These habitats also provide buffers to the impacts of storms providing protection to forage fish spawning habitat.	SRCU	Restorations	Enhance habitat for key nearshore food webs and forage fish spawning habitat.	Climate Change Recreation & Resource Extraction Shoreline Development	1) Implement local salmon recovery plan. 2) Continue to test eelgrass restoration techniques at degraded and healthy sites. 3) Pursue further research around kelp restoration.	San Juan County Lead Entity, DNR, UW FHL, MRC	started

Key Objective Group:
C. Protect Submerged and Aquatic Vegetation

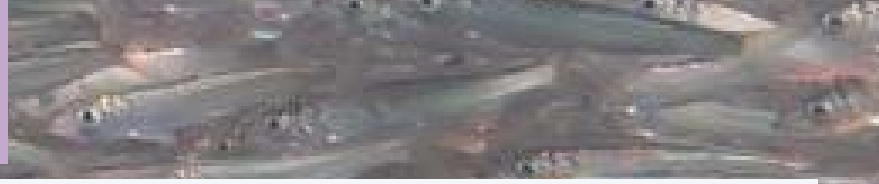
Recommendation	Recommendation Justification	Plan	Objective Area	Expected Result	Threat Category	Implementation approach	Agencies	Status
C.5 *(4)* Protect kelp habitat	The Salish Sea is a hotspot for kelp diversity with 21 species identified in the region. It provides critical habitat to an array of invertebrates, fishes, and marine mammals. It provides food, shade, and other valuable ecosystem services. Bull kelp is the primary floating canopy-forming species but has declined in the San Juans and this may lead to cascading ecological, socio-cultural, and economic impacts. Bull Kelp is protected under the Environmentally Sensitive Areas section of the San Juan County Code SJCC 18.30.110.5. Little is known about understory kelps in the San Juans. Kelps are subject to an array of stressors including climate change, nearshore and upland development, and biological stressors. Protecting kelp beds is recommended.	EPRP SRCU	Monitoring Protections Policy & Regulatory Development Outreach & Education	Map of kelp habitat and vulnerable kelp habitat within MSA.	Shipping & Boating Climate Change Recreation & Resource Extraction Shoreline Development Invasive Species & Altered Food Webs	1) Monitoring of bull kelp and understory kelp trends in the Islands, via dive/kayak/drone surveys; 2) Create map of resilient/vulnerable kelp forests; 3) Use map to inform possible protection measures, e.g. defining zones where kelp protection could offer the greatest resilience for these critical kelp- forest communities.	Samish Indian Nation, WA DNR, San Juan County - ES, MRC, FOSJ	ongoing

Key Objective Group:
D. Enhance Nearshore Food Webs



Recommendation	Recommendation Justification	Plan	Objective Area	Expected Result	Threat Category	Implementation approach	Agencies	Status
D.1 *(1)* Promote protection of known herring spawning sites with willing owners.	Pacific herring plays an important role in the food web of the Salish Sea and are also culturally and commercially important. Herring stocks are variable but in the San Juans have experienced declines. The Cherry Point stock has declined 97% since 1973. Herring spawn in nearshore areas with females depositing eggs on macrophytes (eelgrass, kelps). Herring are important prey to a multitude of species including juvenile Chinook and coho salmon, pinnipeds, seabirds and baleen whales.	EPRP SRCU	Protections Restorations Policy & Regulatory Development	Enhance forage fish spawning habitat and other elements of nearshore food webs.	Recreation & Resource Extraction Shoreline Development	1) Work with willing waterfront owners to protect private tideland parcels associated with Pacific herring spawning. 2) Implement local salmon recovery chapter.	San Juan County Lead Entity, Land Bank, SJPT, FOSJ	ongoing
D.2 *(2)* Promote protection of tideland parcels with juvenile rearing habitats (rockfish and herring) with willing owners.	Rockfish continue to recover from overharvest. Herring is an important food source for endangered Chinook salmon.		Protections	Critical components of nearshore food webs gain additional protection.	Recreation & Resource Extraction Shoreline Development	1) Continue to support State rockfish recovery areas. 2) Work with willing tideland owners to protect Pacific herring spawning sites.	San Juan County Lead Entity, WDFW	ongoing

Key Objective Group:
D. Enhance Nearshore Food Webs



Recommendation	Recommendation Justification	Plan	Objective Area	Expected Result	Threat Category	Implementation approach	Agencies	Status
D.3 *(3)* Expand shorefriendly program and promote other existing programs.	Local regulations offer reasonable protections; however compliance levels could be improved. Resource protections could be improved through a combination of: -greater outreach to landowners and contractors regarding the importance of, and benefits provided by functioning natural shorelines, -having enforced, substantive consequences for not following regulations.	EPRP	Outreach & Education	Increase public awareness of the importance and types of functioning natural shorelines and increased compliance with regulations.	Climate Change Shoreline Development	1) Assess status of Shore Friendly Program (SFP) in San Juan County; 2) Determine resources required to implement SFP in standardized manner; 3) Expand Shore Friendly beyond current focus on armor; 4) Establish annual outreach efforts (workshops/trainings) for landowners and contractors; 5) Incorporate messaging into permit applications from County planning department; 6) Implement annual county-wide outreach/information campaign.	San Juan County - ES & DCD MRC, FOSJ, NWSF	ongoing

Key Objective Group:
E. Reduce Human Impact

Recommendation	Recommendation Justification	Plan	Objective Area	Expected Result	Threat Category	Implementation approach	Agencies	Status
E.1 *(1)* Encourage enforcement of existing marine harvest regulations and limitations.	In most cases, harvest regulations are likely adequate to protect stressed populations of marine species, but these regulations are seldom enforced.		Protections Enforcement Outreach & Education	Reduce further pressure on species already at risk because of reduced populations.	Recreation & Resource Extraction	1) Determine fishing impact through analysis of recreational vs. commercial harvest amounts in MSA; 2) Identify barriers to compliance and enforcement; 3) Advocate to the State for more enforcement resources dedicated to San Juan County; 4) Install signage for reporting poaching.	WDFW, MRC	not started
E.2 *(2)* Remove derelict fishing gear.	Derelict fishing gear causes mortality to diverse marine organisms including birds and mammals. Much of this gear is made of materials that will not degrade. Derelict gear may include crab and shrimp pots as well as nets.		Restoration Outreach & Education	Reduce mortality to diverse marine organisms.	Recreation & Resource Extraction	1) Survey for lost gear; 2) Identify type and location; 3) Remove gear; 4) Provide outreach to recreational fishing sector on best practices e.g. Catch More Crab; 5) host gear turn-in events.	NWSF MRC	ongoing
E.3 *(3)* Continue beach and marine debris surveys and cleanups.	Plastic pollution in the world's oceans is having a devastating effect on marine life and human health. Plastic debris is found daily on San Juan County's shorelines. Microplastics are particularly worrying given that they are found in fish and shellfish and even in sea salt, through which they are also finding their way into our diets.		Monitoring Outreach & Education	Reduce amount of marine debris on shorelines	Recreation & Resource Extraction	1) Maintain efforts; 2) Participate in 2x GICU events/year; 3) Engage beach and road stewards through PFSS; 4) Continue large debris removal efforts.	Samish Indian Nation San Juan County - ES, MRC, WA DNR	ongoing

Key Objective Group:
E. Reduce Human Impact

Recommendation	Recommendation Justification	Plan	Objective Area	Expected Result	Threat Category	Implementation approach	Agencies	Status
E.4 *(4)* Develop/enhance program of greater visitor outreach at Biological Reserves.	Local and visitor awareness of presence and rules related to biological reserves is low. With increases in visitors and locals eager to explore beaches and shorelines with their families and pets there is a need for outreach to share information on the importance of the areas, the impacts humans have and the stewardship ethic needed to minimize impact to the habitats and species found in sensitive protected areas.		Outreach & Education	Increased awareness of the fragility of resources and human impacts.	Climate Change Recreation & Resource Extraction Shoreline Development Invasive Species & Altered Food Webs	1) Establish locations and platforms to introduce outreach; 2) Craft local outreach communication plan and implement; 3) Establish volunteer naturalist program to engage visitors.	MRC	ongoing
E.5 *(5)* Continue green crab monitoring.	European green crabs are considered one of the world's worst invasive species and were discovered in the Salish Sea in 2016. They can significantly impact the biodiversity and functioning of nearshore ecosystems.		Monitoring	Prevent establishment of a self-sustaining population of EU green crab in the San Juan Islands.	Invasive Species & Altered Food Webs	Support State monitoring efforts through MRC and recruitment of volunteers for WA Sea Grant led monitoring teams to expand monitored sites around the San Juans.	WSG	ongoing
E.6 *(6)* Track growth of invasive marine vegetation.	Spartina outcompetes native plant species, including rare and endangered plant species, reducing marsh biodiversity and ecological functions. The introduced Japanese alga *Sargassum muticum (Yendo) Fensholt* is common and abundant in shallow, subtidal, rocky habitats of the Salish Sea, but cause shading to native aquatic plant species, which in turn impacts species reliant on kelps.		Monitoring	Prevent establishment of invasive marine vegetation (e.g. Spartina and sargassum) in MSA.	Invasive Species & Altered Food Webs	1) Identify locations and extent of sargassum and spartina. 2) Coordinate with noxious weed crews and Dep. Agriculture to remove spartina. 3) Coordinate with State on sargassum removal.	WSU Extension, San Juan County - ES, WA Ag, WA DNR, Ecology	ongoing

Key Objective Group:
F. Improve Regulatory Compliance

Recommendation	Recommendation Justification	Plan	Objective Area	Expected Result	Threat Category	Implementation approach	Agencies	Status
F.1 *(1)* Address compliance on unpermitted structures and improve enforcement effectiveness and capacity.	Compliance with state and local shoreline regulations has been identified as an issue in many parts of WA State, including in San Juan County. Recent analysis of shoreline armoring shows a net increase in armoring in the county and 80% of this was unpermitted. There are also known compliance issues with mooring buoys and other over water marine infrastructure in the County. There is evidence that compliance with permits, especially for shoreline development and marine infrastructure is lower than expected.	EPRP	Monitoring Policy & Regulatory Development Enforcement	Reduce levels of non-compliance with existing environmental regulations.	Shipping & Boating Recreation & Resource Extraction Shoreline Development	1) Increase local enforcement capacity with dedicated Environmental Inspector; 2) Establish project pre-post monitoring and enforcement implementation strategy to ensure requirements of permits are met; 3) Identify parcels with shoreline compliance issues; 4) Identify unauthorized mooring buoys. Coordinate with WDFW, DNR and local code enforcement to address unpermitted activities.	WDFW, WA DNR, San Juan County - ES & DCD	started
F.2 *(2)* Address barriers to permitting to improve compliance with regulations.	The permitting process is often confusing and contradictory between different agencies and levels of government. To improve compliance, the permitting process should be streamlined, and clearly defined steps outlined for applicants. The onus of compliance with permit requirements could be jointly held by the landowner and contractor to increase accountability of all parties involved.		Policy & Regulatory Development Outreach & Education	Reduce levels of non-compliance.	Shipping & Boating Shoreline Development	1) Identify mechanisms to streamline process for beneficial projects (e.g. restoration, environmental improvements). 2) Engage state and federal partners to identify solutions for improved coordination. 3) Improve public education through workshops and trainings for realtors, contractors, and property owners.	San Juan County - ES & DCD, MRC	not started

Key Objective Group:
F. Improve Regulatory Compliance

Recommendation	Recommendation Justification	Plan	Objective Area	Expected Result	Threat Category	Implementation approach	Agencies	Status
F.3 *(3)* Support the implementation of a business license system in San Juan County.	There is currently no system available that requires contractors working in San Juan County to be licensed and the responsibility of permitting and ensuring that work is conducted within compliance of those permits falls on the property owner or developer. There is no incentive for the contractor to ensure compliance regardless of the wish of the property owner.		Policy & Regulatory Development Enforcement	Reduce levels of non-compliance.	Shoreline Development	1) Identify avenue for county-wide business license system; 2) Implement business license system; 3) Identify businesses working in nearshore or marine areas and make information available regarding all legal requirements of working in sensitive areas.	San Juan County - PA & DCD	not started
F.4 *(4)* Conduct an Ecological Value Assessment of marine areas as a basis for addressing Conflict Analysis.	The MSA is a patchwork of protected areas, sensitive habitats, restored areas, culturally important areas, critical marine infrastructure etc. There is currently no comprehensive mapping effort that allows marine users, shoreline property owners and marine managers to understand how all these resources intersect. This has resulted in, e.g. new development on/adjacent to restoration site, or unlimited access to culturally sensitive areas by agencies tasked with permitting access etc.		Planning Policy & Regulatory Development	A comprehensive map tool showing how protected areas, sensitive habitats, restoration sites, cultural areas, marine infrastructure overlap, allowing for multi-use prioritization.	Shipping & Boating Climate Change Recreation & Resource Extraction Shoreline Development Invasive Species & Altered Food Webs	1) Complete MSA Update; 2) Update maps in county system and create webmap of all protected areas and sensitive habitats; 3) Undertake marine spatial planning effort to categorize and apply ecological values; produce report and finalize webmap for public use.	San Juan County - ES & GIS MRC	started

Key Objective Group:
F. Improve Regulatory Compliance

Recommendation	Recommendation Justification	Plan	Objective Area	Expected Result	Threat Category	Implementation approach	Agencies	Status
F.5 *(4)* Review shoreline code for 2028 Shoreline Master Program (SMP) update.	The State Shoreline Management Act requires all counties with shorelines to develop and implement Shoreline Master Programs so taking an active role in protecting shoreline ecology. The local County Code (SJCC 18.50) is reviewed and approved by the State Department of Ecology. However, improvements to the code have been identified that would address inconsistencies and incompatibility across agencies, reducing barriers to updating aging marine structures and improve regulatory compliance. Recommendations for these needed improvements will be required in time for the next SMP update in 2028.		Policy & Regulatory Development	Improved clarity of code language.	Climate Change Shoreline Development	1) Review other County and City codes; Review and ID areas of code that need to be changed; 2) Improve clarity in wording and close loopholes; 3) Implement guidance for watershed (WIRA) level mitigation.	San Juan County - DCD	started

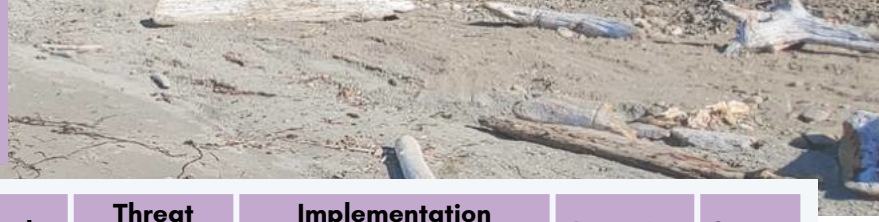
Key Objective Group:
G. Ensure Shoreline Functioning

Recommendation	Recommendation Justification	Plan	Objective Area	Expected Result	Threat Category	Implementation approach	Agencies	Status
G.1 *(3)* Create incentives to make softshore protection easier and cheaper than armoring.	Bulkheads and other shore modifications that bury habitat, and limit bluff erosion and littoral sediment transport have led to major changes in sediment supply and associated changes in beach and habitat stability. Shoreline erosion rates in the MSA vary across the County based on coastal orientation and geomorphic conditions, and in many cases hard armor is unnecessary. Functioning shorelines are more resilient to impacts from sea level rise and storm impact.		Policy & Regulatory Development Enforcement Outreach & Education	Reduction in demand for shoreline armoring results in less armoring and more shorelines have improved ecological function.	Shoreline Development	1) Identify barriers in code and permitting: implement outreach to educate about permits, forms, and realistic timelines so that the process less onerus for applicants; 2) Educate landowners, realtors and contractors regarding shoreline work and permits required; 3) expand shorefriendly program with more presence and accessibility; 4) tighten loopholes in code so that softshore options are the most streamlined and cost effective.	San Juan County - ES & DCD, WDFW	not started
G.2 *(3)* Track and monitor impacts of permitted (and unpermitted) shoreline development.	There is evidence that little post construction activity impacts are monitored or tracked in the County. Showcasing both the consequences of shoreline alterations, as well as the improvements for restoring shorelines can be used to convince shoreline property owners of the benefits of natural shorelines.	EPRP	Monitoring Policy & Regulatory Development Outreach & Education	Reduction in shoreline modifications, including armoring.	Shoreline Development	1) Establish system to monitor and track shoreline modifications in County and impacts on shorelines; 2) Determine capacity needs for compliance and monitoring; 3) Create demonstration sites to educate public on benefits of natural shorelines.	San Juan County - ES & DCD	not started

Key Objective Group:
G. Ensure Shoreline Functioning

Recommendation	Recommendation Justification	Plan	Objective Area	Expected Result	Threat Category	Implementation approach	Agencies	Status
G.3 *(2)* Permanently protect priority pocket beaches, intact sand and gravel beaches, feeder bluffs, and intact beaches in the highest and high priority fish use shoreforms.	Protecting intact nearshore habitat is the top priority salmon recovery strategy in the San Juan Islands. Nearshore habitats of the San Juans provide critical feeding and rearing habitat for juvenile Puget Sound Chinook and other salmonids that migrate through the MSA. The Islands also host spawning and rearing forage fish, important prey for salmon, other fish species, marine birds and mammals. With increased pressure from sea level rise, as well as increasing rates of population growth and shoreline development, strategic parcel protection through willing seller acquisitions and conservation easements ensure that the most important habitats remain intact for juvenile salmon to rear and forage fish to spawn and rear.	SRCU	Protections	Protect shoreline ecological function to improve natural sediment supply that enhances and protects forage fish spawning habitat and key resting/feeding sites for juvenile salmon and other elements of nearshore food webs.	Shoreline Development	1) Implement local salmon recovery plan; 2) Support San Juan County Landbank and San Juan Preservation Trust in their negotiations to protect high value areas.	San Juan County Lead Entity	ongoing

Key Objective Group:
G. Ensure Shoreline Functioning



Recommendation	Recommendation Justification	Plan	Objective Area	Expected Result	Threat Category	Implementation approach	Agencies	Status
G.4 *(4)* Permanently protect unarmored forage fish spawning beaches with quality overhanging vegetation.	Protecting intact nearshore habitat is the top priority salmon recovery strategy in the San Juan Islands. Nearshore habitats of the San Juans provide critical feeding and rearing habitat for forage fish, juvenile Puget Sound Chinook and other salmonids that migrate through the MSA. The Islands also host spawning and rearing forage fish, important prey for salmon, other fish species, marine birds and mammals. With increased pressure from sea level rise, as well as increasing rates of population growth and shoreline development, strategic parcel protection through willing seller acquisitions and conservation easements ensure that the most important habitats remain intact for juvenile salmon to rear and forage fish to spawn and rear.	SRCU	Protections	Protect forage fish spawning habitat and other elements of nearshore food webs.	Climate Change Shoreline Development	1) Implement local salmon recovery plan; 2) Support San Juan County Landbank and San Juan Preservation Trust in their negotiations to protect high value areas.	San Juan County Lead Entity	ongoing

Key Objective Group:
G. Ensure Shoreline Functioning

Recommendation	Recommendation Justification	Plan	Objective Area	Expected Result	Threat Category	Implementation approach	Agencies	Status
G.5 *(5)* Permanently protect intact coastal wetlands/tide channels associated with highest and high priority fish use areas.	Protecting intact nearshore habitat is the top priority salmon recovery strategy in the San Juan Islands. Nearshore habitats of the San Juans provide critical feeding and rearing habitat for juvenile Puget Sound Chinook and other salmonids that migrate through the MSA. The Islands also host spawning and rearing forage fish, important prey for salmon, other fish species, marine birds and mammals. With increased pressure from sea level rise, as well as increasing rates of population growth and shoreline development, strategic parcel protection through willing seller acquisitions and conservation easements ensure that the most important habitats remain intact for juvenile salmon to rear and forage fish to spawn and rear.	SRCU	Protections	Protect forage fish spawning habitat and other elements of nearshore food webs.	Climate Change Shoreline Development	1) Implement local salmon recovery plan; 2) Support San Juan County Landbank and San Juan Preservation Trust in their negotiations to protect high value areas.	San Juan County Lead Entity	ongoing

Key Objective Group:
G. Ensure Shoreline Functioning

Recommendation	Recommendation Justification	Plan	Objective Area	Expected Result	Threat Category	Implementation approach	Agencies	Status
G.6 *(8)* Protect highest and high priority fish use shoreform with intact forested riparian buffers.	Protecting intact nearshore habitat is the top priority salmon recovery strategy in the San Juan Islands. Nearshore habitats of the San Juans provide critical feeding and rearing habitat for juvenile Puget Sound Chinook and other salmonids that migrate through the MSA. The Islands also host spawning and rearing forage fish, important prey for salmon, other fish species, marine birds and mammals. With increased pressure from sea level rise, as well as increasing rates of population growth and shoreline development, strategic parcel protection through willing seller acquisitions and conservation easements ensure that the most important habitats remain intact for juvenile salmon to rear and forage fish to spawn and rear.	SRCU	Protections	Protect forage fish spawning habitat and other elements of nearshore food webs.	Climate Change Shoreline Development	1) Implement local salmon recovery plan; 2) Support San Juan County Landbank and San Juan Preservation Trust in their negotiations to protect high value areas.	San Juan County Lead Entity	ongoing

Key Objective Group:
G. Ensure Shoreline Functioning

Recommendation	Recommendation Justification	Plan	Objective Area	Expected Result	Threat Category	Implementation approach	Agencies	Status
G.7 (4) Restore priority pocket beaches, restoration feeder bluffs, and degraded shoreline habitats in the highest and high priority fish use shoreforms.	Bulkheads and other shore modifications that bury habitat, and limit bluff erosion and littoral sediment transport have led to major changes in sediment supply and associated changes in beach and habitat stability. These structures are a major impediment to salmon recovery as they impact these shoreline functions that create and maintain beaches. They reduce or eliminate forage fish spawning habitat, and are associated with less large woody debris, less wrack, and riparian vegetation removal which all impact prey availability for juvenile salmon and other nearshore fish species. Functioning shorelines are more resilient to impacts from sea level rise and storm impact.	SRCU	Restorations	Improved shoreline ecological function with more natural sediment supply that enhances forage fish spawning habitat and key resting/feeding sites for juvenile salmon.	Shoreline Development	1) Implement local salmon recovery plan; 2) Streamline permitting process for restoration projects at the local level to compliment new state and federal programs.	San Juan County Lead Entity	ongoing

Key Objective Group:
G. Ensure Shoreline Functioning

Recommendation	Recommendation Justification	Plan	Objective Area	Expected Result	Threat Category	Implementation approach	Agencies	Status
G.8 *(6)* Restore coastal wetlands/tide channels associated with highest and high fish use shore forms.	Bulkheads and other shore modifications that bury habitat, and limit bluff erosion and littoral sediment transport have led to major changes in sediment supply and associated changes in beach and habitat stability. These structures are a major impediment to salmon recovery as they impact these shoreline functions that create and maintain beaches. They reduce or eliminate forage fish spawning habitat, and are associated with less large woody debris, less wrack, and riparian vegetation removal which all impact prey availability for juvenile salmon and other nearshore fish species. Functioning shorelines are more resilient to impacts from sea level rise and storm impact.	SRCU	Restorations	Enhance forage fish spawning habitat and other elements of nearshore food webs.	Climate Change Shoreline Development	1) Implement local salmon recovery plan; 2) Streamline permiting process for restoration projects at the local level to compliment new state and federal programs.	San Juan County Lead Entity	ongoing

Key Objective Group:
G. Ensure Shoreline Functioning

Recommendation	Recommendation Justification	Plan	Objective Area	Expected Result	Threat Category	Implementation approach	Agencies	Status
G.9 *(7)* Restore marine riparian buffer vegetation along highest and high priority fish use shoreforms with degraded vegetation.	Bulkheads and other shore modifications that bury habitat, and limit bluff erosion and littoral sediment transport have led to major changes in sediment supply and associated changes in beach and habitat stability. These structures are a major impediment to salmon recovery as they impact the shoreline functions that create and maintain beaches. They reduce or eliminate forage fish spawning habitat, and are associated with less large woody debris, less wrack, and riparian vegetation removal which all impact prey availability for juvenile salmon and other nearshore fish species. Functioning shorelines are more resilient to impacts from sea level rise and storm impact.	SRCU	Restorations	Enhance forage fish spawning habitat.	Climate Change Shoreline Development	1) Implement local salmon recovery plan; 2) Streamline permiting process for restoration projects at the local level to compliment new state and federal programs.	San Juan County Lead Entity	ongoing

Key Objective Group:
G. Ensure Shoreline Functioning

Recommendation	Recommendation Justification	Plan	Objective Area	Expected Result	Threat Category	Implementation approach	Agencies	Status
G.10 *(5)* Remove shoreline armoring.	Bulkheads and other shore modifications that bury habitat, and limit bluff erosion and littoral sediment transport have led to major changes in sediment supply and associated changes in beach and habitat stability. These structures are a major impediment to salmon recovery as they impact these shoreline functions that create and maintain beaches. They reduce or eliminate forage fish spawning habitat, and are associated with less large woody debris, less wrack, and riparian vegetation removal which all impact prey availability for juvenile salmon and other nearshore fish species. Functioning shorelines are more resilient to impacts from sea level rise and storm impact.	EPRP	Restorations	Reduction in shoreline armoring and more shorelines have improved ecological function.	Shoreline Development	1) Identify lead entity for compliance and undertake regular compliance inspections; 2) Focus compliance efforts in high priority areas and enforce removal of unpermitted shoreline armoring; 3) Update code to require most preferred to least preferred armoring options as per WAC 220-660-370 4) Seek out funding to remove shoreline armoring from public lands and cooperative private properties; 5) Remove the barriers to applying for funding and streamline reporting requirements to increase grant capacity.	San Juan County - DCD, ES, & PW, WDFW	started

Key Objective Group:
G. Ensure Shoreline Functioning

Recommendation	Recommendation Justification	Plan	Objective Area	Expected Result	Threat Category	Implementation approach	Agencies	Status
G.11 *(8)* Remove priority tidal barriers.	Tidal circulation affects the transport of sediment and detritus, patterns of salinity, and food web function, as well as the movement of organisms, including forage fish and salmon. Tidal barriers prevent tidal inundation, which disrupts tidal hydrology and displaces the tidally determined habitat and communities that otherwise would have been present (PIAT 2012) such as coastal wetlands and lagoons. These complex habitats are critical for juvenile Chinook rearing and serve as the interface between saltwater and freshwater ecosystems. While tidal barriers in the rest of Puget Sound are typically large levees and dikes, in San Juan County, they take the form of bulkheads, tidegates, and shoreline roads. Tidal barriers in San Juan County are present on private property as well as lands owned by local, state, and federal entities. Addressing low-lying roads is a strategy that will also provide public benefits by ensuring safety and resiliency in the face of rising sea levels.	SRCU	Restorations	More shorelines have improved ecological function.	Shoreline Development	Implement local salmon recovery plan.	San Juan County Lead Entity	started

Key Objective Group:
H. Reduce Vessel Impacts

Recommendation	Recommendation Justification	Plan	Objective Area	Expected Result	Threat Category	Implementation approach	Agencies	Status
H.1 *(1)* Protect sensitive habitats from recreation.	Offshore, nearshore, and shoreline areas provide important habitats to a wide variety of marine flora and fauna throughout the MSA. Kelp forests and eelgrass meadows provide vital habitat and protection for fish and invertebrate species. Rocky reefs provide refugia for resting pinnipeds and nesting seabirds. Recreational activities including boating, shoreline/reef access, harvesting and collecting may impact these habitats and species, as well as sensitive cultural sites known to exist throughout the islands.		Protection Restoration Policy & Regulatory Development Enforcement Outreach & Education	Eelgrass beds are protected from impacts of recreational vessels and anchor scour. Functioning habitats, species, and sensitive cultural sites are protected through stronger regulations and management policies.	Shipping & Boating Recreation & Resource Extraction	I) Support policies that limit human access to culturally significant remote rocks and reefs in MSA; 2) Support policies that limit harvest and/or collection in sensitive habitats, and support and honor sovereign treaty rights; 3) Identify critical areas where a) expanded anchor-out zones will be effective for habitat protection and regeneration, b) mooring fields can be established.	San Juan County - ES, MRC, WDFW, WA Parks USFWS	not started
H.2 *(2)* Create Southern Resident Killer whale Quiet Foraging Areas to protect highest priority foraging habitat and connecting corridors on the westside of San Juan Island.	Vessel disturbance impacts SRKW ability to forage and the impact is greater for females. When present the SRKW require areas with little or no interference from vessels in order to get access to already scarce prey.		Protection Planning Policy & Regulatory Development	Place-based management tools utilized to provide SRKWs ample quiet foraging areas when they are present.	Shipping & Boating Recreation & Resource Extraction	1) Address knowledge gaps in whale habitat use and soundscape of SW area of westside; 2) Undertake community engagement; 3) Compile recommendations; 4) Seek input from Tribes and management agencies; support recommendations.	San Juan County - ES, MRC,	80% complete: study completed & presented to agencies in 2022

Key Objective Group:
H. Reduce Vessel Impacts

Recommendation	Recommendation Justification	Plan	Objective Area	Expected Result	Threat Category	Implementation approach	Agencies	Status
H.3 *(3)* Expand boater education and outreach.	Vessel disturbance impacts Southern Resident killer whales' ability to forage and the impact is greater for females. When present the Southern Residents require areas with little or no interference from vessels in order to access to already scarce prey. Educating boaters on laws and guidelines helps them make good decisions that reduce impacts from their boating activities on the endangered Southern Resident killer whales as well as other species of whales present in the islands.		Outreach & Education	Increase in compliance levels with Be Whale Wise guidelines, regulations, and with eelgrass anchor-out zones.	Shipping & Boating Recreation & Resource Extraction	1) Identify mechanisms to improve State level boater education. 2) Actively engage with Be Whale Wise partners to expand, refine and amplify messaging and public education, including distribution and use of the Whale Warning Flag. 3) Actively promote consistent and widespread educational messaging about nearshore habitat and eelgrass anchor-out zones. 4) Update signage and materials distributed throughout County. 5) Provide outreach presentations and tool kits to boating groups.	San Juan County - ES, MRC, WDFW, Soundwatch, FOSJ, WSG	ongoing
H.4 *(4)* Improve vessel compliance with regulations.	Compliance with state and federal vessel regulations, and guidelines continues to be challenging, particularly among recreational boaters, which result in negative impacts to the MSA.		Monitoring Enforcement Outreach & Education	Increase in vessel compliance rates.	Shipping & Boating	1) Conduct vessel compliance monitoring for regulations and distance guidelines (e.g. distance from haulouts and National Wildlife Refuge sites; 2) Expand enforcement capacity and consequences.	Soundwatch WDFW	ongoing

Key Objective Group:
H. Reduce Vessel Impacts

Recommendation	Recommendation Justification	Plan	Objective Area	Expected Result	Threat Category	Implementation approach	Agencies	Status
H.5 *(5)* Assessment of marine based recreation and use, including marinas, ports, county and state facilities.	Recreational boating in the county has increased over recent years leading to crowding at popular anchorages and increased pressures for shoreside services.		Monitoring Planning	Improved understanding and next steps needed to address impacts to marine environment and infrastructure resulting from marine based recreation.	Shipping & Boating Recreation & Resource Extraction	1) Summary of findings from pre-COVID boater surveys; 2) Conduct post-COVID boater surveys including ports and marinas surveys; 3) Incorporate results of mooring buoy assessment (numbers and regulatory status), ecological data, and culturally significant areas; 4) Conduct research to understand impacts and their extent e.g. sea bed scour, water quality impacts.	San Juan County - ES, MRC	ongoing
H.6 *(4)* Conduct vessel surveys for county.	Recreational vessel presence in County waters has been growing resulting in crowded anchorages, anchoring in sensitive habitats, and increased demand for services.		Monitoring	Improved understanding of spatial/temporal presence, density, and associated potential impacts of vessels utilizing county waters.	Shipping & Boating Recreation & Resource Extraction	1) Conduct aerial surveys of San Juan County to estimate vessel use and density, including by vessel type and activity; 2) Compare to Dismukes et al. (2010) to identify areas with highest impacts	San Juan County - ES, MRC	started
H.7 *(6)* Derelict Vessel Prevention.	Derelict vessels are a hazard to the marine environment and are costly to remove. Prevention efforts result in reduction of financial burden of costly removals as well as decreased detrimental impacts to the environment and community.		Monitoring Enforcement Outreach & Education	Prevent vessels of concern from becoming derelict and requiring emergency removal.	Shipping & Boating	1) Conduct marine patrols; 2) Maintain vessels of concern database; 3) Prioritize vessels for removal; 4) Conduct outreach and education for boaters	San Juan County - ES & Sheriff, MRC	ongoing

Key Objective Group:
H. Reduce Vessel Impacts

Recommendation	Recommendation Justification	Plan	Objective Area	Expected Result	Threat Category	Implementation approach	Agencies	Status
H.8 *(7)* Derelict Vessel Removal.	Derelict vessels represent a pollution risk to the County's marine waters and resources, and may also be a danger to navigation, personal property, and community infrastructure.		Protections Outreach & Education	Reduce number of derelict vessels causing environmental and community harm in County waters.	Shipping & Boating	1) Remove priority derelict vessels; 2) Respond to emergency vessel removal needs in County.	San Juan County - ES, MRC, WA DNR	ongoing
H.9 *(9)* Monitor soundscape of Quiet Foraging Areas Southern Resident killer whale foraging areas.	Vessel disturbance impacts SRKW ability to forage and the impact is greater for females. When present the SRKW require areas with little or no interference from vessels in order to access to already scarce prey. Acoustic monitoring occurs at Lime Kiln but little monitoring has occurred off the SW end of San Juan Island around Eagle and Salmon Bank, an area that has been identified as a high priority foraging area for the whales. Seasonal acoustic monitoring would allow data on whale presence and use and vessel presence and use to be monitored to help inform management policies.		Monitoring	Improved understanding of whale and vessel use of proposed Quiet Foraging Areas.	Shipping & Boating Recreation & Resource Extraction	1) Determine monitoring approach (cabled vs. anchored); 2) Determine cost of seasonal monitoring, secure resources; 3) Implement seasonal monitoring.	San Juan County - ES, MRC	not started

Key Objective Group:
I. Upgrade Marine Infrastructure

Recommendation	Recommendation Justification	Plan	Objective Area	Expected Result	Threat Category	Implementation approach	Agencies	Status
I.1 *(2)* Conduct creosote structure inventory and removal of identified derelict structures.	Creosote has been used as a wood preservative for more than a century to treat telephone poles, railroad ties, piers, docks and floats. Thousands of derelict creosote pilings remain in Puget Sound, including in the MSA. This old infrastructure is now disintegrating and contributing to marine debris. The treated timbers also leach toxic chemicals into the nearshore environment. These old structures need to be removed and, where still in operation, replaced.	EPRP	Monitoring Restorations Planning	Mapped and detailed inventory of creosote structures located in or immediately adjacent to San Juan County waters. And, removal of creosote from marine environment, or encasement with pile jacketing to prevent leaching if removal not feasible or practical.	Shipping & Boating Shoreline Development	1) Complete a county-wide assessment of creosote infrastructure located in San Juan County waters, including shorelines; 2) Identify public structures for removal, develop removal strategy including permitting and contracting, and execute removal; 3) Where necessary, replace with steel infrastructure.	San Juan County - ES, MRC, LIO	complete June 2024
I.2 *(5)* Implement County marine infrastructure upgrades.	Public marine infrastructure is essential to island communities but requires upgrading to meet environmental standards and maintain public safety. With stricter mitigation requirements now in place it is important to understand where county-owned infrastructure is located, what state it is in, and what mitigation credits would be provided by replacement of creosote and solid decking (and required) for removal or upgrade of facilities.		Protections Planning Policy & Regulatory Development	Upgraded public marine infrastructure for improved public safety and environmental health.	Shipping & Boating Shoreline Development	1) Use results of County-wide assessment to prioritize and develop plan for public infrastructure upgrades within framework of the County's Transportation Improvement Plan; 2) Calculate estimated mitigation credits associated with each site, identify required permits and data, and produce a roadmap for permitting, design and contracting for removal; 3) Conduct public outreach about upgrades; 4)Execute upgrade plan.	San Juan County - PW	started

Key Objective Group:
I. Upgrade Marine Infrastructure

Recommendation	Recommendation Justification	Plan	Objective Area	Expected Result	Threat Category	Implementation approach	Agencies	Status
I.3 *(6)* Conduct mooring buoy assessment for presence and regulatory status.	Approximately 1/3 of all mooring buoys in WA State inland waters are located in San Juan County MSA. In 2009 Friends of the San Juans recorded 1,914 buoys and floats in the MSA, with an average of 4.7 per linear marine shoreline mile. Many are known to be unauthorized and/or need to be brought up to code. Understanding the status of buoys is required before the County can implement a public mooring buoy policy.		Monitoring Planning	MSA-wide mapping and inventory of public and private mooring buoys and their regulatory status.	Shipping & Boating Shoreline Development	1) Conduct MSA-wide mapping assessment of mooring buoys and compare to 2009 assessment conducted by FoSJ; 2) Investigate regulatory status of each identified mooring buoy.	San Juan County - ES, & DCD, MRC, WA DNR, WDFW	50% complete
I.4 *(4)* Develop and establish mooring buoy management process.	In 2009 1,914 buoys and floats were recorded in the MSA, with an average of 4.7 per linear marine shoreline mile. Since this time the county has received reports of unauthorized buoys appearing. The extent of unauthorized buoys is not known, and WA DNR have limited resources to monitor mooring buoys. Addressing unauthorized mooring buoys through either removal or addressing permit issues is now a priority in the MSA especially with the future consideration of a public mooring buoy system.		Restorations Enforcement	Removal of unauthorized and derelict buoys in MSA through an established and expedient process.	Shipping & Boating Recreation & Resource Extraction Shoreline Development	Partner with WA DNR and Tribes to develop a realistic and sustainable plan for identifying and addressing unauthorized mooring buoys, prioritizing popular embayments.	San Juan County - ES, & DCD, MRC, WA DNR	not started

Key Objective Group:
I. Upgrade Marine Infrastructure

Recommendation	Recommendation Justification	Plan	Objective Area	Expected Result	Threat Category	Implementation approach	Agencies	Status
I.5 *(1)* Create and manage public mooring buoy system.	Mooring buoys offer a means for boaters to stay in an area without deploying their anchor. Locating public mooring buoys in popular anchorages and in areas close to onshore services provides access for boats while also serving to protect the nearshore environment.		Protections Planning Enforcement	Deployment and active management of a fair and equitable public mooring buoy system.	Shipping & Boating Recreation & Resource Extraction Shoreline Development	1) Determine locations for public mooring buoy fields with guidance from State and Tribes; 2) Conduct assessment of supply, demand, capacity, and trade-offs to inform the development and deployment of a reservation system. Coordination and partnership with Tribes, State and boating organizations will be critical.	San Juan County - ES, DCD, & PW	not started
I.6 *(6)* Develop and establish mooring buoy tracking system.	The large and growing number of mooring buoys in the MSA (>1,900 2023) is prohibitive to readily and efficiently monitor for compliance with federal, state, and local regulations. A tracking system allows for real-time understanding of the mooring buoy landscape across the MSA, as well as efficient response to and enforcement of unauthorized buoys.		Planning Policy & Regulatory Development	Real-time tracking and monitoring system for all mooring buoys.	Shipping & Boating Recreation & Resource Extraction Shoreline Development	Work to create a simple but effective mooring buoy tracking system that is easy for DNR to adopt and manage.	San Juan County - ES, FOSJ, Tribes, WA DNR	not started
I.7 *(7)* Complete a barge landing inventory.	The number and status of barge landings throughout the MSA is required to inform policy and permitting on where and when barge landing activities occur within the MSA.	EPRP	Planning Policy & Regulatory Development	Detailed inventory of barge landing sites, including map data.	Shipping & Boating Shoreline Development	1) Identify and inventory current and historic barge landing sites; 2) Identify and classify environmental characteristics of each site culturally sensitive sites, what craft is landed and how often, and permitting status.	San Juan County - ES & DCD, MRC, WDFW	not started

While several of the recommendations involve ongoing monitoring activities, others are one-off projects that will depend on grant funding, this is especially the case for those recommendations where the MRC or Environmental Stewardship have been identified as leading the effort.

The MRC expects to regularly review the state of the MSA and the list of recommendations identified within this report to ensure that there remains a valid need for the recommendation or identify other recommendations that may be needed to address emerging threats and stressors to the MSA. A full status assessment of the MSA to understand current conditions is expected to take place every 5 years.

5. CONCLUSION

The San Juan Islands have long been a thoroughfare to people and movement of resources and goods. Since time immemorial the Coast Salish and Straits Salish Tribes and First Nations have been tied to the waters and lands of what we now call the San Juan Islands.

The islands have been compared to a roundabout providing vital travel and trade linkages between Vancouver Island, the mainland, and the Olympic Peninsula. The islands have also been traditionally rich in biological resources providing for deep cultural and ancestral ties that remain today.

Transportation and trade are now dominated by international cargo ships, tankers, and cruise liners, with ferries, and a plethora of working and recreational boats plying the waters surrounding the islands sustaining local and regional economies.

The continued population growth and urbanization throughout the region have broad implications for the health and resilience of the Salish Sea and the habitats and species within the MSA, especially against the backdrop of a changing climate.

These stressors are not new, many were identified in the first Marine Stewardship Area Plan (Evans & Kennedy, 2007). These stressors impact the MSA's natural systems and the lifeways of islanders and the Coast Salish and Straits Salish people with cultural and treaty ties to these islands and waters.

Despite the challenges identified first in the MSA 2007 Plan and again in this report there has been progress made to reduce or mitigate stressors associated with growth, overuse, and a changing climate. Importantly, the momentum and willingness to continue to work towards returning to a healthy and

resilient environment remains, both within the local communities of the islands and throughout the Salish Sea region. This progress, highlighted in this report and in Appendix 1 has provided the Marine Resources Committee and the County's Department of Environmental Stewardship the opportunity to undertake an extensive assessment of the MSA to better understand how it is doing today.

Drawing on the expertise of local partners, scientists, state, federal, and tribal agencies, and knowledge holders, the team has compiled a broad list of recommendations that address the challenges the MSA faces today. As a result, this assessment provides a comprehensive reference document that will guide the work plans and grant applications of the MRC, the County's Marine Program, and our partners who engage in the conservation, protection, restoration, and sustainable management of marine resources within the MSA.

The majority of the work that needs to be done can only be achieved through grants but this status update provides not only the navigational chart to guide those grant applications but also the justification for why grants are sought. Several of the recommended studies or projects have either already been completed or are in progress because of dedicated grant funding.

This status update will enable us to undertake periodic reviews of the recommendations to track progress and identify emerging issues and concerns in a timely manner. The next review is recommended to occur in 2028. This report also provides the opportunity for new partnerships as we can only tackle the identified stressors through collective action that builds from a diversity of perspectives, knowledge, and expertise.

To ensure the sustained health of the MSA for future generations, partnerships will require broad and ongoing coordination between local, state, and federal agencies. Support of, and where requested collaboration with sovereign Treaty Tribes will be essential.

Residents and visitors alike also have an important role to play. The 2007 MSA Plan identified the need to foster a stewardship ethic in residents and visitors as one of the top six strategies needed for protecting the MSA. This continues to be the case today.

"The path towards sustainability requires that residents, businesses, and visitors take personal responsibility for caring for the natural wealth held in private ownership and public trust."

While we face future uncertainties surrounding the impacts of climate change and population growth, we can turn the tide by committing to addressing the challenges faced by the Marine Stewardship Area, identified throughout this report. This report builds on the 2007 MSA Plan to chart a course toward ensuring a healthy and resilient future for the Marine Stewardship Area and the lifeways of those who are inextricably tied to this special place.

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APPENDIX 1.

ASSESSMENT OF THE MSA 2007 PLAN.

The review of the 2007 MSA Plan was led by the San Juan County Marine Resources Committee (MRC) and its MSA subcommittee, with the support of County staff. The review and assessment were initiated in late 2019 and included three core activities:

1. Review and assess the 2007 Plan's Strategic Actions and compare to the local Ecosystem Recovery Plan and the WIRA 2 Salmon Recovery Chapter Update.
2. Conduct a marine manager survey.
3. Host a Marine Managers Workshop to review and discuss trends, threats, and key knowledge gaps to the core biodiversity targets identified in the 2007 plan.

Efforts related to the Marine Managers Workshop also included the creation of a contact database (Appendix 4), target interviews for seabird and rockfish experts not able to attend the 2020 Marine Managers Workshop, and a review of pertinent literature.

1A.STRATEGIC ACTION REVIEW AND ASSESSMENT

The MRC reviewed 37 strategic actions and related objectives identified in the 2007 plan. These strategies were the management actions identified as those needed to conserve priority systems (Evans & Kennedy, 2007), and most often focused on abating threats and maintaining the health of the MSA's marine systems. Most of these strategies were determined through community and stakeholder workshops held during the creation of the 2007 plan.

The MRC's MSA subcommittee reviewed the 2007 strategic actions to identify which entities (if any) were working on each action, and what progress or accomplishments had been achieved since the publication of the plan.

In addition, San Juan County staff also assessed each strategic action in relation to the strategies and goals of the San Juan Action Area Ecosystem Protection and Recovery Plan (SJ LIO, 2017).

The review was compiled into a Strategic Action Status Report that included categorization of each strategy as having no progress or regression (28% of the original 37 strategic actions), some progress (56%), significant progress (8%), or unknown/too broad to achieve (8%). This preliminary evaluation effort (summarized in Table A1.) highlighted the need to further assess each strategy to determine its actionability and feasibility of progress.

This led to a second phase of revising the original set of 37 strategies into a list of recommendations that are both implementable and achievable.

The MRC MSA subcommittee led this effort before convening with the MRC in December 2022 to carefully and thoroughly refine these recommendations into a new and detailed set of 63 recommendations. These recommendations were further assessed and refined during the 2023 Marine Managers Workshop.

A final list of 60 recommendations can be found in Chapter 4 of this report.

In addition to the review of the 2007 Plan, the MRC's MSA Subcommittee also undertook a comparison of the 2007 Plan with the recovery goals, strategies, and actions identified in the local Ecosystem Protection and Recovery Plan (EPRP) and the Salmon WIRA Recovery Chapter Update. These are summaries are included in this section.

Appendix A1: Review of MSA Strategies

An assessment of the strategic actions and related objectives identified in the 2007 plan was conducted in 2020. The MSA Strategies were the management actions identified as needed to conserve priority systems. They most often focused on abating threats and maintaining the health of the county's marine systems. These strategies were identified through community and stakeholder workshops where a variety of specific management actions that may be used to abate the threats identified in the plan were put forth.

The MSA Subcommittee reviewed the strategic actions to identify which entities were working on each action, and what progress or accomplishments had been achieved since the publication of the plan. In addition, San Juan County's Puget Sound Ecosystem Recovery Coordinator, Marta Green, assessed each strategic action in relation to the strategies and goals of the San Juan Action Area Ecosystem Protection and Recovery Plan.

The review was compiled into a Strategic Action Status Report in which each strategic action was identified as having no progress, some progress, significant progress, or unknown/too broad to achieve. This effort lays the foundation for phase II of the MSA update to identify limitations with the original strategies and revise the strategies with achievable actions. This second phase will be implemented during the 2020-2021 grant year.

The high-level Strategic Action Status Report assessment determined that 28% of the strategies had made no progress, or had regressed, the majority, 56% had made some progress and in 8% we were unable to determine if progress had occurred as they were too broad or dependent on external pressures. Only 8%, or three strategies were identified as where significant progress had been achieved. The Strategic Action Status Report is attached to this report. This preliminary evaluation effort has identified the need to evaluate many of the strategies in terms of how actionable they are to ensure that progress is possible. For each strategy, specific actions need to be identified and categorized to determine actions that are implementable and achievable in defined timescales.

Results of Strategic Action Status Review

- No progress or regressed: 28% (10 strategies)
- Some progress: 56% (20 strategies)
- Unable to determine: 8% (3 strategies)
- Significant progress: 8% (3 strategies)

Table A1. **San Juan County Marine Stewardship Area Plan Strategic Action Status Report**

Category 1: Education

	No Progress	Some Progress	Significant Progress	Could not determine
1	Communicate a clear, inspiring stewardship message to the public and develop a comprehensive communication strategy.			
2		Education & outreach on the benefits of "softshore" alternatives for shoreline armoring.		
3		Education & outreach on the importance of eelgrass and the benefits of best marine use/shoreline development practices.		
4	Promote public awareness of the status of and threats to rockfish, lingcod, and greenling so that the public is involved, understands, and takes ownership over the problem and action toward a solution.			
5		Promote water quality protection through best management practices to help ensure that locally harvested marine species pose insignificant risks to human health.		

Category 2: Community Stewardship

	No Progress	Some Progress	Significant Progress	Could not determine
6		Foster projects that engage the public (seasonal and year-round residents) in marine stewardship.		
7		Work with stakeholders to develop and implement a strategy for identifying and engaging key partners as active marine stewards.		
8		Promote concept of the county doing its part to reduce greenhouse gas emissions (think globally, act locally).		
9		Minimize chronic pollution from land and marine sources (includes medium spills and chronic events like bilge pumping).		
10		Reduce nitrogen inputs from human sources to improve water quality for eelgrass.		
11	Minimize new armored shoreline.			
12		Remove shoreline armoring where appropriate		
13	Increase prey base in order to restore herring spawning to all historic areas.			

14	Protect and restore herring spawning habitat.			
15		Reduce bycatch of depleted species of bottomfish.		
16	Reduce disturbance of seabirds.			
17		Support efforts to reduce risk and improve response to oil spills.		
18		Reduce impacts of derelict fishing gear to seabirds.		
				Support efforts to reduce bio-accumulative toxins in order to help restore local populations of killer whales.

Category 3: Management and Planning

	No Progress	**Some Progress**	**Significant Progress**	**Could not determine**
20		Draw attention to and work to include marine issues (stormwater, wastewater, etc) within watershed management plans and programs.		
21				Work to ensure that fisheries management supports a local fishing economy.

22	Work to ensure that species restoration/recovery is to a level that allows sustainable fishing.			
23		Suspend direct harvest of select species of bottomfish until recovery goals are met.		
24			Implement the local salmon recovery plan.	
25	Increase salmon (considering their size and the season) to support restored marine mammal populations.			
26		Recommend that the County plan for sea level rise and other climate change implications.		
27		Recommend that County policies & regulations are directed toward achieving a scenic, functional and natural marine environment that is available for human enjoyment.		
28			Determine the scope and nature of the water quality problem and develop an implementation plan.	

Category 4: Coordination

	No Progress	Some Progress	Significant Progress	Could not determine
29			Connect with regional efforts working to protect and restore salmon populations.	
30		Continue and build upon MRC, county and others' outreach efforts with the tribes.		
31	Help marine managers address the pressures on marine resources associated with increased population and demand.			
32	Recommend improved and coordinated policies for building, anchoring, docks, enforcement, and mitigation.			
33		Support others' efforts to highlight traditional marine practices.		
34				Work with county and port districts to develop criteria for facility (such as barge landings) siting, operation and maintenance.

Category 5: Research

	No Progress	Some Progress	Significant Progress	Could not determine
35		Support research to inform the MRC, managers, and decision makers on the trends and conditions of marine communities in the San Juans.		
36		Monitor the effectiveness of marine management and stewardship measures to better inform the MRC, managers, and decision makers.		

Appendix A2: Summary of EPRP and Salmon Recovery goals, strategies, and actions.

Summary of EPRP Key Pressures, Associated Goals, Strategies and Actions

Key Pressures and Goals

Focal Component	Key Pressures	Goals
Vessel Traffic	Shipping Lanes	• Reduce the risk of large oil spills • Reduce vessel traffic impacts to marine habitat and threatened and endangered species.
Shoreline Hardening	Shoreline Hardening Conversion of land cover	• Reduce shoreline armoring and increase protection in high priority nearshore habitat areas. • Maintain abundance of kelp habitat and reduce rate of eelgrass decline.
Stormwater	Point-/non-point source contaminants to aquatic systems	• Reduce sources of contaminants to stormwater and sediment transport to fresh and marine waters.
Freshwater Restoration	Altered low flows from surface water withdrawals	• Increase summer stream flow and establish physical habitat for salmonoids and cutthroat in 8 priority watersheds.

Strategies and Actions

Focal Component	
Vessel Traffic	• Participate in Transboundary Safety Forum • Promote additional spill prevention measures • Seek effective spill response planning and capacity • Support additional protection of habitat and threatened and endangered species from vessel traffic.
Shoreline Hardening	• Encourage residential bulkhead removal • Promote avoidance of shoreline armoring
Stormwater	• Treat stormwater from Friday Harbor and urban growth areas to protect water quality.
Freshwater Restoration	• Augment summer low flows and restore physical habitat in priority watersheds to support salmonoid and cutthroat.

Summary of Salmon Recovery Chapter Update Goals and Strategies

This summary pertains to those goals and strategies developed for Nearshore Habitat types that fall within marine realm.

Nearshore Habitat Type		**Goals and Implementation Targets**
Sand and Gravel Beaches	Forage Fish Spawning Beaches	**Long-term protection goal**: By 2070 permanently protect 8.2 miles of intact sand and gravel beaches utilized for forage fish spawning. *Implementation target: By 2030, permanently protect 4.1 miles of intact sand and gravel beaches utilized for forage fish spawning.* **Long-term Restoration Goal:** By 2070, restore 2.8 miles of degraded spawning beaches. *Implementation Target: By 2030, restore 1.4 miles of degraded spawning beaches.*
	Rearing Fish (Forage and juvenile Chinook)	**Long-term protection goal**: By 2070 permanently protect 63 miles of intact beaches in the highest and high priority fish use shoreforms. *Implementation target: By 2030, permanently protect 31.5 miles of intact beaches in the highest and high priority fish use shoreforms.* **Long-term Restoration Goal:** By 2070, restore 27 miles of degraded shoreline habitats and processes in the highest and high priority fish use shoreforms. *Implementation Target: By 2030, restore 13.5 miles of degraded shoreline habitats and processes in the highest and high priority fish use shoreforms.*
Seagrasses and Kelps	Pacific herring spawning	**Long-term protection goal**: By 2070 permanently protect 130 parcels (360 acres) of the private parcels associated with Pacific Herring spawning grounds. *Implementation target: By 2030, permanently protect 65 parcels (180 acres) of the private tideland parcels associated at with herring spawning grounds.* **Long-term Restoration Goal:** By 2070, restore eelgrass and kelps at 200 parcels (688 acres) of public and/or private tideland parcels associated with Pacific Herring spawning grounds.

Nearshore Habitat Type		Goals and Implementation Targets
		Implementation Target: By 2030, restore eelgrass and kelps at 100 parcels (344 acres) of public and/or private tideland parcels associated with Pacific Herring spawning grounds.
	Rearing Fish (Forage and juvenile Chinook)	**Long-term goal**: By 2070 protect and/or restore eelgrass and kelps along the 8.5 miles of highest fish use shoreforms and 60 miles of high fish use shoreforms. *Implementation target: By 2030, protect and/or restore eelgrass and kelps along 4.25 miles of the highest fish use shoreform and 30 miles of high fish use shoreforms.*
Marine Riparian Vegetation	Forage Fish Spawning Beaches	**Long-term protection goal**: By 2070 permanently protect 4.2 miles of unarmored forage fish spawning beaches with high quality overhanging vegetation. *Implementation target: By 2030, permanently protect 2.1 miles of unarmored forage fish spawning beaches with high quality overhanging vegetation.* **Long-term Restoration Goal:** By 2070, restore overhanging marine riparian vegetation at 5.5 miles of the forage fish spawning sites with degraded overhanging vegetation. *Implementation Target: By 2030, restore overhanging marine riparian vegetation at 2.75 miles of forage fish spawning sites with degraded overhanging vegetation.*
	Rearing Fish (Forage and juvenile Chinook)	**Long-term protection goal**: By 2070 permanently protect 5.4 miles of the highest priority and 27 miles of high priority fish use shoreforms with intact forested riparian buffers. *Implementation target: By 2030, permanently protect 2.7 miles of the highest priority and 13.5 miles of high priority fish use shoreforms with intact forested riparian buffers.* **Long-term Restoration Goal:** By 2070, restore marine riparian buffer vegetation at 5 miles of the highest priority fish use shoreforms and 40 miles of high priority fish use shoreforms with degraded vegetation. *Implementation Target: By 2030, restore marine riparian buffer vegetation at 2.5 miles of the highest priority fish use shoreforms and 20 miles of high priority fish use shoreforms with degraded vegetation.*
Feeder Bluffs		**Long-term protection goal**: By 2070 permanently protect 14 miles of priority intact feeder bluffs. *Implementation target: By 2030, permanently protect 7 miles of priority intact feeder bluffs.*

Nearshore Habitat Type		Goals and Implementation Targets
		Long-term Restoration Goal: By 2070, restore 6.5 miles or priority restoration feeder bluffs. *Implementation Target: By 2030, restore 3.25 miles of priority restoration feeder bluffs*
Pocket Beaches		**Long-term protection goal**: By 2070 permanently protect 61 miles of priority pocket beaches. *Implementation target: By 2030, permanently protect 30.5 miles of priority pocket beaches.* **Long-term Restoration Goal:** By 2070, restore 26.5 miles of priority pocket beaches. *Implementation Target: By 2030, restore 13.25 miles of priority pocket beaches.*

1B. MARINE MANAGER SURVEY

A marine managers survey was created and distributed to marine managers, researchers, environmental non-profit organizations, and residents active in marine resource issues within the MSA. The short survey was conducted in February 2020 prior to the marine managers workshop in March 2020.

The survey asked respondents to identify whether they had data pertinent to the plan's biodiversity target areas, whether they had conducted research or monitoring on these targets (or aspects of the targets) since 2007, and whether or not their efforts had included a citizen or community science effort.

In addition, the survey asked respondents if they or their organization had made any strategic efforts to protect the biodiversity targets that they had identified. The survey also asked the respondents to identify the key threats and emerging issues that have or will impact the MSA.

Thirty-three individuals participated in the survey. These respondents included marine managers and researchers from local, state, federal, and tribal government agencies, nonprofits operating within the MSA, and the University of Washington. Local commercial fishermen with extensive place-based knowledge and members of the State's Southern Resident Orca Task Force (2018-2019) also participated.

Respondents indicated that they had data on all biodiversity targets (Intertidal Communities, Rocky Subtidal Communities, Rockfish, Bottomfish, Forage Fish, Salmon, Marine Mammals, and Seabirds) and the two social-cultural targets (Human Enjoyment and Cultural, Traditional or Spiritual).

Almost half the respondents indicated having data on Forage Fish (46.9%), while other key areas included Intertidal Communities (40.6%), Pacific Salmon (34.4%), and Rocky Subtidal Communities (31.3%). Equal numbers of participants reported having data on marine mammals (25%) and Seabirds (25%), and on Cultural (21.9%) or Human Enjoyment (21.9%).

Respondents also identified the following areas with data pertinent to the MSA:

- Oil transport activities & vessel movements
- Eelgrass health & bed density
- Benthic habitat classifications
- Saltwater lagoons
- Invasive species

Over 80% of respondents reported that they or their predecessor(s) had conducted research or monitoring on the target areas for which they had data, and just over half (56.3%) reported that their efforts involved citizen or community science components, indicating the importance of citizen input to these efforts locally.

Respondents highlighted a combination of monitoring, management, research, and outreach efforts that have, or are being undertaken to protect the identified biodiversity targets, and that address the 2007 strategic actions. These included:

- Advocating for stronger habitat protections through new legislation.
- Species recovery planning, including critical habitat designation (e.g., salmon, forage fish, Southern Resident killer whales).
- Habitat and species restoration efforts (e.g., eelgrass, pinto abalone, forage fish spawning habitat).
- Outreach and education to inform marine resource users (e.g., Be Whale Wise, anchor out of eelgrass, invasive species, salmon and rockfish fishery rules and regulations).
- Training and collaboration with citizen science initiatives.
- Invasive species assessment and eradication programs.
- Maintenance, preservation of natural land for visitors, and protection of valuable cultural sites and habitats, particularly for forage fish and salmon.
- Improved oil spill prevention, preparedness, and response activities.
- Marine debris and creosote removal.
- Improve water quality and quantity in marine and freshwater habitats through prioritization of funding, directed projects, and legislation (e.g., the hydraulic code).
- Modeling and mapping impacts of climate change such as sea level rise to understand how vulnerability varies across the region to habitats, species, and cultural sites.
- Implementing fishery management rules and regulations.

The threats and emerging issues identified by respondents fell into the following core themes:

- Climate Change
  - Sea level rise
  - Increasing ocean temperatures/temperature stress
  - Ocean acidification
  - Increase in hypoxic conditions
- Oil Spill Risk, Vessel Traffic, and Local Boat Impacts
  - Increase in vessel traffic and associated noise and presence impacts and increase in accident and oil spill risk; and transport of Canadian tar sands crude oil (also known as diluted bitumen or dilbit).
- Habitat degradation/destruction
  - Construction of overwater structures and shoreline modifications, including shoreline hardening.
  - Physical disturbance from vessel anchoring activities.
- Species decline
  - Decline in forage fish populations
  - Kelp canopy decline
  - Decline in Fraser River Chinook and Sockeye populations.
- Marine diseases – eelgrass and sea star wasting diseases
- Increase in toxins and pollutants
- Invasive species
- Overfishing
- Pinniped predation on juvenile salmon
- Human population growth and changing demographics.

A full review and assessment of the current threats and stressors to the MSA is addressed in Chapter 2 of this report.

1C. MARINE MANAGERS WORKSHOPS

The 2020 and 2023 Marine Managers Workshops were integral to assessing the 2007 MSA Plan and the state of the MSA overall. The workshops were hosted at the University of Washington's Friday Harbor Laboratories in March 2020, and April 2023. Prior to the 2020 workshop, a short survey was distributed to the invited workshop participants (see previous section).

2020 Workshop

Forty-three individuals participated in the 2020 workshop, representing a variety of local and regional interest groups. Despite efforts to reach all Tribes with Usual and Accustomed fishing areas, and ancestral ties to the MSA, there was limited Tribal participation due in part to concerns about, and travel restrictions related to the emerging COVID-19 pandemic.

The core goals of the workshop were to engage partners in the MSA plan and collectively identify data trends in the biodiversity targets, associated knowledge gaps, emerging or new threats not identified in the 2007 plan, and to facilitate further collaboration with and between partners.

The objectives guiding the workshop, and the wider effort to assess the state of the MSA were focused on the strategic actions, monitoring activities, and the threats and stressors laid out in the 2007 MSA Plan.

The objectives guiding the workshop, and the wider effort to assess the state of the MSA were focused on the strategic actions, monitoring activities, and the threats and stressors laid out in the 2007 MSA Plan.

The workshop was conducted over a 2-day period and structured around 9 core sessions. These sessions focused on 6 of the biodiversity targets and a review of the socio-economic and cultural targets of the 2007 plan.

Biodiversity Target Sessions:

1. Intertidal and nearshore habitats
2. Kelp and eelgrass
3. Subtidal habitats
4. Marine mammals
5. Rockfish
6. Pacific salmon

Participants also discussed emerging threats and stresses, and new management actions and efforts that have been implemented since the 2007 plan was published.

The biodiversity and socio-cultural sessions were led by target area experts. Session leads provided a short summary of current data trends and monitoring activities for their respective biodiversity target. These presentations were followed by an open discussion to identify further data trends, knowledge gaps, and threats.

Details for each of these key information areas were recorded on wall posters, where workshop participants were later asked to identify their top three threats and top three knowledge gaps for each biodiversity and socio-cultural economic target.

Threats and stressors discussed included sea star wasting disease and eelgrass wasting disease impacts, both new threats that have emerged since the publication of the 2007 plan. Oil spill risk, identified in the 2007 plan as a key threat, was discussed in the context of the State's efforts regarding prevention and preparedness, in addition to local efforts regarding oil spill risk.

New management efforts discussed included the County's nearshore management and stormwater management efforts related to the County's Clean Water Utility, as well as an overview of the Washington State Governor's Southern Resident Killer Whale (SRKW) State Task Force outcomes.

Despite the increasing threats, stressors, and knowledge gaps identified throughout the workshop, discussions revealed a growing list of positive actions that have been or are being undertaken in the MSA or by other groups in the Salish Sea region.

Marine Managers Workshop 2020

Workshop Summary Report

May 15, 2020

San Juan County Marine Resources Committee

San Juan County Environmental Resources Division

Marine Managers Workshop 2020

Summary Workshop Report

Frances C. Robertson

Abigail Ames

San Juan County Marine Resources Committee

Public Works Environmental Resources Division

May 15, 2020

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Workshop Sponsors

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Executive Summary

In 2004, San Juan County Council designated the San Juan Islands a voluntary Marine Stewardship Area. This designation was designed to protect the unique and valuable marine resources of the islands while allowing sustainable use to occur. Following the creation of the Marine Stewardship Area (MSA), the Marine Resources Committee (MRC) for San Juan County was tasked with developing a plan to guide the parameters and strategies for the Marine Stewardship Area. This plan was published in 2007 after a broad effort that involved hundreds of stakeholders, numerous workshops, many months, and extensive funding.

The MSA plan is now over 12 years old and has become less useful in marine management decisions at the local, state and federal level because it does not capture the current status of knowledge regarding marine resources, nor resource use within the County. Thus, the MRC is undertaking a modest 'review' of the targets, strategies, and knowledge that the original plan encompassed. The MRC aims to gather collective knowledge from current and past MRC members, local research and non-profit organizations (including the Northwest Straits Commission and partnering MRCs), and from tribal, local, state and federal agencies actively engaged in research, monitoring, and resource management in San Juan County waters. This consolidated input will help the MRC create a refreshed, relevant, and practical plan to help move stewardship efforts forward within the San Juan Islands.

A key element of this effort was the Marine Managers Workshop, hosted at the University of Washington's Friday Harbor Laboratories in March 2020. Forty-three individuals participated in the workshop, representing a variety of local and regional interest groups. Despite efforts to reach all Tribal Nations with usual and accustomed fishing and hunting areas in San Juan County waters, there was limited tribal expertise present due in part to concerns and travel restrictions related to the COVID-19 outbreak.

The core goals of the workshop were to engage partners in the MSA plan, identify data trends, knowledge gaps, emerging or new threats not identified in the original plan, and to facilitate further collaboration with and between partners. The objectives guiding the workshop, and the wider effort to update the plan, were focused around the strategic actions, monitoring activities, and the threats and stressors laid out in the 2007 MSA Plan.

The workshop was conducted over a 2-day period and structured around 9 core sessions. The first day was dedicated to focused sessions on five biodiversity targets: (1) intertidal and nearshore habitats, (2) kelp and eelgrass, (3) subtidal habitats, (4) marine mammals, and (5) rockfish and Pacific salmon. Due to a scheduling conflict, the marine bird experts were not able attend the workshop and provide an update on the status of marine birds in San Juan County. The second day of the workshop saw specific sessions focused on the socio-economic and cultural targets of the plan, on emerging threats and stresses, and on new management actions that have been implemented since the original plan was published.

The biodiversity and socio-cultural sessions were each led by an expert on the specific session's target area. Session leads provided a short summary of current data trends and monitoring activities. These presentations were followed by an open discussion by all participants to identify further data trends, knowledge gaps, and threats. Details for each of these key information areas were recorded on wall posters, where workshop participants were later asked to identify their top three threats and top three knowledge gaps for each biodiversity and socio-cultural economic target with sticker dots.

The threats and stressors and new management sessions included a series of short presentations highlighting new efforts at local and state levels. Sea star wasting disease and eelgrass wasting disease impacts were presented; these threats had not been identified at the time of the original plan. Oil spill risk, identified in the 2007 plan as a key threat, was discussed in the context of the State's efforts regarding prevention and preparation, in addition to local efforts regarding oil spill risk. New management efforts included presentations on nearshore management and stormwater management efforts made by the County as well as other projects related to the Clean Water Utility. In addition to these topics, an overview of Governor Jay Inslee's Southern Resident Killer Whale (SRKW) State Task Force was provided to the group.

Despite the increasing threats, stressors, and knowledge gaps identified throughout the workshop, discussions during each session revealed a growing list of positive actions that have been or are being undertaken in the County or by other groups in the Salish Sea region.

Introduction

In 2004, the San Juan County Council designated the San Juan Islands as a voluntary Marine Stewardship Area (Resolution 8-2004). This designation was designed to protect the unique and valuable marine resources of the islands while allowing ongoing sustainable use to occur. After this designation, San Juan County Council tasked the Marine Resources Committee with developing a Marine Stewardship Area (MSA) Plan. This plan was published in 2007 after a broad effort that involved hundreds of stakeholders, numerous workshops, many months, and extensive funding.

The MSA plan is now over 12 years old and has become less useful in marine management decisions at the local, state, and federal level because it does not capture the current status of knowledge regarding marine resources, nor resource use within the County. The MSA Plan identified the following core biodiversity targets to protect:

- Rocky intertidal communities
- Rocky subtidal communities
- Nearshore sand, mud and gravel communities
- Rockfish, lingcod and greenling
- Sea birds
- Marine mammals
- Pacific salmon and forage fish

To address the socio-cultural and economic importance of the marine environment, the plan detailed three specific socio-cultural targets:

- Enjoyment of the marine environment
- Thriving marine-based livelihoods
- Cultural traditions: ceremonial, subsistence, sustenance and spiritual uses and aspects

In addition to the biodiversity and socio-cultural targets, the plan identified specific threats and stressors to the marine environment. These included:

- Polluted stormwater runoff
- Septic systems and wastewater
- Shoreline habitat modification
- Salmon decline
- Large oil spills/chronic small oil spills
- Human disturbances on and off the water
- Climate change

Community input gathered during the process of designing the MSA plan in 2007 resulted in six protection strategies of top priority. The strategies considered to be the most important for protecting the Marine Stewardship Area were (1) fostering a stewardship ethic in residents and visitors, (2) managing activities to reduce harm to marine habitat and water quality, (3) reducing toxins entering the food web, (4) reducing the risk of large oil spills in county waters, (5) recovering bottom fish species, and (6) preserving marine access and views. Since 2009, the MRC and County have focused federal, state and local resources, provided coordination, and launched programs to build local capacity for implementing these strategies.

The top six strategies for protecting the San Juan County Marine Stewardship Area, determined in 2007.

The MSA plan also suggested a wide range of monitoring efforts, but there has been no systematic tracking or documentation of what monitoring has occurred or by what entities. Over the last decade there have been many changes to marine resource health, and use within the County that were not reflected in the 2007 plan. Prominent examples of this are the onset of sea star wasting and eelgrass wasting disease, the return of humpback whales, the continued decline of Southern Resident killer whales, and the introduction of invasive species such as European green crab. In addition, limited monitoring of particular marine resources indicates that some protective measures have not been as effective as hoped (e.g. voluntary bottom fish reserves). However, there have been extensive efforts dedicated toward many of the targets and threats outlined in the 2007 plan. These include monitoring eelgrass and documenting eelgrass wasting disease, mapping of shoreline modifications, including armoring, mapping of beach spawning forage fish, comprehensive beach seining to document nearshore fish utilization, monitoring changes in kelp presence within the county, identifying the costs of oil spill impacts and oil spill prevention (San Juan County Oil Spill Risk Consequences Assessment and San Juan County Emergency Response Towing Vessel Cost Evaluation[12]), stormwater monitoring and management

[1] Page, R., Van Deren, M., Soares, J., Kerr, N. 2019. San Juan County Oil Spill Risk Consequences Assessment. Earth Economics, Tacoma, WA.

[2] Northern Economics, Inc. San Juan County Emergency Response Towing Vessel Cost Evaluation. Prepared for San Juan County. December 2018.

through the clean water utility, and efforts such as the Pulling It All Together (PIAT) I (2012[3]) and II (2017[4]) strategic salmon recovery planning effort project related to nearshore marine habitat protection and restoration. Thus, it is timely to assess the current state of knowledge for each of the biodiversity targets which will allow better integration with the socio-cultural and economic targets. To move forward effectively in improving protection and ensuring sustainable resource use, it is essential to have clear documentation of current efforts within the county to assess and monitor particular species targets and whole habitats; at this point, we only know that these efforts are scattered and not yet coordinated.

The MRC is undertaking a modest 'review' drawing upon information gathered during this marine managers workshop and review of relevant studies and plans completed in the last decade, such as the San Juan Ecosystem Protection and Recovery Plan[5] to which the MRC contributed. While the MRC is unable to replicate the same thorough process that resulted in the creation of the MSA plan, it aims to make great strides by gathering collective knowledge from current and past MRC members, local research and non-profit organizations (including the Northwest Straits Commission and partnering MRCs), and from tribal, local, state and federal agencies actively engaged in research, monitoring, and resource management in San Juan County waters. With such consolidated input, the MRC anticipates being able to come up with a review of the current status of the many efforts proposed in the plan. This will enable the MRC to begin to create a refreshed, relevant, and practical updated plan to help move forward with stewardship efforts.

A key element of this effort was the Marine Managers Workshop, hosted at the University of Washington's Friday Harbor Laboratories in March 2020. This workshop aimed to bring together a core group of partners to gather knowledge and initiate conversations and further partnerships. In total, 88 individuals were invited from tribal, federal, state, and local agencies, local non-profits and academic institutions (the full list of those invited is available in Appendix 1c). Forty-three individuals participated in the workshop, representing a variety of local and regional interest groups, including local County departments such as Community Development and Environmental Resources, the San Juan Preservation Trust and the San Juan Islands Conservation District, Friends of the San Juans, and the University of Washington's Friday Harbor Laboratories. Individuals from Washington State's Departments of Ecology, Fish and Wildlife, Parks, and Natural Resources were present and federal scientists and managers also participated. Local marine resource users were represented by the Washington Reef Netters Association, the Port of Friday Harbor, Jen-Jay Consulting and eco-tourism operators. Despite efforts to reach all Tribal Nations with usual and accustomed fishing and hunting areas in San Juan County waters, there was limited tribal expertise present due in part to concerns and travel restrictions related to the COVID-19 outbreak. A full list of Attendees is available in Appendix 1a.

[3] Friends of the San Juans 2012. Strategic Salmon Recovery Planning in San Juan County Washington: The Pulling It All Together (PIAT) Project. *Report* to San Juan County Lead Entity for Salmon Recovery and Washington State Salmon Recovery Funding Board, RCO #10-1789.

[4] Whitman, T, S. Hawkins, J. Slocomb, B. Rot, A. MacLennan, and P. Schlenger. 2017. Strategic Salmon Recovery Planning in the San Juan Islands: Nearshore Marine Habitat Restoration and Protection Project Prioritization, PIAT II. *For* San Juan County Lead Entity for Salmon Recovery. Pp. 110

[5] San Juan Action Agenda Oversight Group Ecosystem Protection and Recovery Plan, available here: http://www.sanjuanlio.com/wp-content/uploads/2017/11/San-Juan-EPRP-Final-2017-06-29.pdf

Workshop Goals

The core goals of the workshop were to engage partners in the MSA plan, identify data trends, knowledge gaps, emerging or new threats not identified in the original plan, and to facilitate further collaboration with and between partners. The objectives guiding the workshop and the wider effort to update the plan were focused around the strategic actions, monitoring activities, and the threats and stressors laid out in the 2007 MSA Plan.

1) Strategic Actions: Identify who is working on the listed strategic actions and what has been accomplished to date.
2) Monitoring: Identify what monitoring data exist and who is gathering it, and what trends exist within available monitoring data.
3) Threats and Stressors: Identify what has been done to identify threats and what has been done to reduce those identified in the original plan.

Summary of Workshop Sessions

The workshop was conducted over a 2-day period and structured around 9 core sessions. The first day was dedicated to 60-minute focused sessions on five biodiversity targets: (1) intertidal and nearshore habitats, (2) kelp and eelgrass, (3) subtidal habitats, (4) marine mammals, and (5) rockfish and Pacific salmon. Due to a scheduling conflict, the marine bird experts were not able to attend the workshop and provide an update on the status of marine birds in San Juan County. The second day covered sessions focused on socio-economic and cultural targets, threats and stressors, and new management strategies. Each session was led by an expert on that specific session's target. Session leads presented a 10-minute summary of current data trends and the status of monitoring efforts. The remaining 50 minutes of each session were dedicated to open discussion between all participants to identify further data trends, knowledge gaps, threats, stressors, and positive actions taken. Central points from these discussions were recorded by designated notetakers on wall posters. Between sessions, workshop participants were asked to prioritize their top three knowledge gaps and threats for each target with sticker dots.

Summaries of each session are provided below along with the results of the activity to identify the top three threats and top three knowledge gaps for each of the biodiversity and socio-cultural economic target sessions.

Intertidal and Nearshore Biodiversity Target

This session was led by MRC member and Director of the UW Friday Harbor Laboratories, Megan Dethier, a shoreline biologist with extensive expertise in shoreline habitats and the impacts of human development such as shoreline armoring. Dr. Dethier introduced the nearshore and intertidal session in the context of the 2007 plan, highlighting the indicators that the 2007 plan identified for monitoring and the objectives and strategic actions related to this specific biodiversity target. Monitoring data were identified as being available from Friends of the San Juans (e.g., shoreline armoring, docks, and nearshore buoys and eelgrass locations), Washington State Department of Natural Resources for kelp and eelgrass surveys, and the Friday Harbor Laboratories where class surveys have provided some of the most

consistent monitoring data over time, including valuable annual quantitative data collected by local 3rd and 5th grade students. In recent years there have been more extensive surveys to document sea star wasting disease and eelgrass wasting disease.

Dr. Dethier highlighted that there have been incremental changes in shoreline armoring since 2007, as well as a continued decline of eelgrass. Sea star wasting disease may have stabilized, but this was a threat that was not identified at the time that the 2007 plan was published, and eelgrass wasting disease had not been identified as a threat in 2007 but appears to be increasing. No broad data are available on the extent or impact of invasive species. Issues related to harvest, disease, invasive species, and climate change are likely the greatest threats to nearshore and intertidal ecosystems. The take home of the presentation was that the intertidal and nearshore targets were not well defined within the 2007 plan and there are few monitoring programs that have targeted the intertidal, let alone the indicators identified in the 2007 plan (e.g. abundance of barnacles, limpets, and Fucus, littleneck clam abunandce and overall clam species richness). However, there are some good individual datasets that will help illustrate problems associated with shoreline development, invasive species, diseases and threatened native species such as eelgrass and kelp.

The top three knowledge gaps for the nearshore conservation target were identified by workshop participants as:

- Nearshore development and runoff trends (20 votes)
- Increase in pollutants in seasonally frequented areas (5 votes)
- Use of desalination plants (4 votes)
- Foraging fish spawning (4 votes)

The top three threats to the nearshore conservation target were identified by workshop participants as:

- Shoreline armoring (12 votes)
- Nearshore development and associated runoff, septic systems, and agriculture (10 votes)
- Rising intertidal temperature (10 votes)

The full lists of data trends, knowledge gaps, and threats identified from the nearshore conservation target session are available in Appendix 3a.

Kelp and Eelgrass Biodiversity Target

Helen Berry, marine ecologist with the Washington State Department of Natural Resources led the kelp and eelgrass session. There have been long-term declines in eelgrass around the San Juan Islands. In the short-term, this decline could be due to eelgrass wasting disease, recreational vessels, water quality and shoreline modification. In the long-term, declines may be tied to climate change, increases in human population density and higher potential for oil spills due to increased vessel traffic.

In addition to concerns surrounding eelgrass loss, there is widespread concern about the losses of bull kelp in the San Juans and the Salish Sea region. Kelp canopy area is highly variable, there were large region-wide decreases in 2014; rebounds have been faster at sites where the oceanography produces well-mixed waters, but have been delayed in Puget Sound. The most recent kelp distribution data relevant to San Juan County have been collected by the Samish Indian Nation and detailed results are due to be published in April 2020.

The top three knowledge gaps for the eelgrass and kelp biodiversity target were identified by workshop participants as:

- Is persistent bull kelp loss due to healthy understory kelp communities? (13 votes)
- Site specific management of eelgrass meadows (12 votes)
- Links between eelgrass wasting and actual mortality (5 votes)
- Ocean acidification impacts on eelgrass and kelp (5 votes)

The top three threats to the eelgrass and kelp biodiversity target were identified by workshop participants as:

- High temperatures (impact both *Nereocystis* (bull kelp) and *Zostera* (eel grass)) (13 votes)
- Runoff of pollutants (8 votes)
- Eelgrass wasting disease (7 votes)

The full lists of data trends, knowledge gaps, and threats identified from the eelgrass and kelp biodiversity session are available in Appendix 3b.

Subtidal Biodiversity Target

The subtidal biodiversity session was led by Henry Carson of Washington Department of Fish and Wildlife. Dr. Carson introduced the session within the context of how the subtidal biodiversity target was defined in the MSA Plan. He went on to provide summaries of the sea cucumber (*Parastichopus californicus*), red sea urchin (*Mesocentrotus franciscanus*), green sea urchin (*Strongylocentrotus droebachiensis*), pink and spiny scallops (*Chlamys spp.),* and pinto abalone (*Haliotis kamtschatkana*) populations, providing information on habitat requirements, harvest data related to the associated fishery, and monitoring trends around the San Juans. All species summarized, apart from the pinto abalone, are the subject of commercial fisheries, most of which is shipped to markets in Asia.

Sea cucumber populations have suffered from overharvesting and poaching that threatens the sustainability of the harvest, resulting in quota reductions and closures. The 2020 harvest rate has been reduced to 5% of the biomass. Despite challenges in fisheries monitoring, permanent closed areas have provided unfished populations for long-term monitoring. Both the green sea urchin and the pink and spiny scallops lack formal stock assessments and fisheries management is based on a quota system. The green sea urchin population has remained stable over the past decade, as has the red sea urchin. Pinto abalone continue to struggle to recover from overharvesting, but an active restoration effort is underway with several juvenile out-planting sites around the San Juan Islands. This effort is bolstered by the 2019 endangered species listing of pinto abalone in Washington State.

The top three knowledge gaps for the subtidal conservation target were identified by workshop participants as:

- Use of sand waves by forage fish and their link to salmon (8 votes)
- Subtidal species composition/abundance/community indices (8 votes)
- Increase in vessel size and speed, impacts of this on erosion rate (4 votes)
- Chemical pollution from boats (4 votes)
- Effect of commercial harvest on purple urchin populations (4 votes)

- Causes of unsuccessful abalone outplants (4 votes)

The top three threats to the subtidal conservation target identified by workshop participants as:

- Lack of funding leading to gaps in research and management (13 votes)
  - Change in funding sources from hunting licenses to another source
  - Change in export demand, regulations, and economy
- Increase in non-floating oils (9 votes)
- Sea star wasting disease (7 votes)
- Poaching & under reporting (7 votes)

The full lists of data trends, knowledge gaps, and threats identified from the subtidal session are available in Appendix 3c.

Marine Mammal Biodiversity Target

The marine mammal session was led remotely by Lynne Barre, NOAA Branch Chief for the West Coast Regional Office. There are four species of pinnipeds and seven species of cetacean commonly encountered in the Salish Sea, including two eco-types of killer whale; the endangered Southern Resident killer whale (SRKW) and the threatened Transient killer whales (TKW).

The populations of all pinniped species (California and Steller sea lions, Northern elephant seal, and the harbor seal) are increasing and evidence suggests that harbor seal populations may be stabilizing. The population trends of the cetacean species are more variable, thus difficult to generalize. The Washington Inland Waters stock of harbor porpoise appears to be increasing, currently estimated at ~11,233 animals based on aerial survey sighting data collected 2013-2015. The Dall's porpoise population numbers are unknown but there appears to be some seasonal and interannual variability. The Southern Resident killer whales are perhaps the most well-known cetaceans in the region and their population decline has been well documented. Their population sits at 73, but a mature male, L41, is currently missing and presumed dead. Transient killer whales are being encountered at an increased frequency, however their population trends are not well known. In recent years, calf survival rates appear to be better for Transients than Southern Residents.

The three species of baleen whale commonly encountered in the Salish Sea are the gray, humpback and minke whales. The Eastern North Pacific stock of gray whales has been increasing, however in 2019 NOAA declared an Unusual Mortality Event for the population which has continued into 2020. Humpback presence in the Salish Sea and around the San Juan Islands has been increasing over the last decade. Whales from three Distinct Population Segments (DPSs) have been encountered, most commonly from the Hawaii DPS and from the threatened Mexico DPS. There have been relatively few encounters with animals from the endangered Central American DPS –these animals are encountered in greater numbers further South, off the coast of California. Minke whales are predictably found around the San Juans during the late spring, summer and early fall. These animals are part of the CA/OR/WA stock, and while stock assessments have estimated lower numbers (currently ~600 animals), population trends are unknown. There are increasing concerns related to entanglement and ship strikes for all species of baleen whale, but particularly for humpback and gray whales.

The top three knowledge gaps for the marine mammal biodiversity target were identified by workshop participants as:

- Pinnipeds – long term diet composition, role of species in ecosystem (3 votes)
- Long term data trends for Dall's porpoise (3 votes)
- Entanglement rates of baleen whales are increasing but little known about prevalence, type of gear and location of where whales pick up the gear (2 votes)
- Fishery management in relation to SRKW (2 votes)
- Long term data trends on minke whales (2 votes)

The top three threats to the marine mammal biodiversity target were identified by workshop participants as:

- Lack of prey for SRKW (11 votes)
  - Fishery management
  - Habitat
- Opening BLM lands leading to human access to haulout areas (8 votes)
- Oil spill risk (6 votes)
- Vessel disturbance (6 votes)

The full lists of data trends, knowledge gaps, and threats identified from the marine mammal biodiversity session are available in Appendix 3d.

Rockfish Biodiversity Target

The rockfish session was shorter than intended due to scheduling conflicts with those best suited to provide information related to rockfish monitoring and management data in the San Juan Islands. Despite this, Lynne Barre was able to share updates on two distinct population segments federally listed under the Endangered Species Act; the Puget Sound/Georgia Basin Yelloweye rockfish (listed as threatened in 2010) and the Bocaccio (listed as endangered since 2010). Critical habitat designations for these species occurred in 2015 and the Recovery Plan was finalized in October 2017. Nearshore habitat protection and restoration was identified as high priority actions in the recovery plan. Other actions included removal of derelict gear, cooperative research, barotrauma research, education and outreach, habitat mapping, and kelp habitat conservation and recovery.

The top three knowledge gaps for the rockfish conversation target were identified by workshop participants as:

- Reasons for kelp habitat decline and effective restoration methods (10 votes)
- Locations to protect in order to keep adult populations healthy if a fishery was opened in the future (6 votes)
- Impacts of ocean acidification and climate change (2 votes)

The top three threats to rockfish conservation target were identified by workshop participants as:

- Rearing habitat and effects of habitat decline (13 votes)
- Fishing/overfishing (8 votes)
- Oil spills with sinking oils (6 votes)

The full lists of data trends, knowledge gaps, and threats identified from the rockfish session are available in Appendix 3e.

Pacific Salmon Biodiversity Target

Jacques White, Executive Director of Long Live the Kings, led the Pacific salmon session with a comprehensive presentation on the past and present status of Pacific salmon species. He highlighted the continued decline of Chinook salmon as well as the fact that salmon populations used to be more diverse. The recent Salish Sea Survival Project has suggested that there has been a tenfold decline in salmon survival in the Salish Sea. This poor survival is likely related to habitat degradation and changes in ocean climate and physical oceanography leading to changes in the food webs. For example, salmon prey such as juvenile herring, other forage fish species, and certain zooplankton have declined in the Salish Sea along with kelp habitat, while urbanization and marine temperatures have increased. Zooplankton composition and abundance are thought to be critical for early growth in Chinook and Coho salmon, but greater understanding is needed. There is further evidence to indicate that the diet of Chinook salmon in Georgia Strait is changing.

The San Juan Islands were highlighted as particularly important rearing grounds for juvenile Chinook salmon entering the Salish Sea from the Fraser River basin, the Whidbey Basin (including the Skagit, Stillaguamish, and Snohomish River systems), Nooksack/Samish as well as Eastern Vancouver Island, and the Thompson River system in BC. Nearshore habitat along the Northern edges of the County and Eastern parts of the County have been identified by Skagit Systems Research Cooperative and NOAA fisheries as important habitat for out-migrating juvenile Chinook salmon.

The top three knowledge gaps for the pacific salmon conservation target were identified by workshop participants as:

- Local water quality and impacts of treatment facilities and stormwater (10 votes)
- How to manage pinniped populations (6 votes)
- Role of Transient killer whales (4 votes)

The top three threats to the pacific salmon conversation target were identified by workshop participants as:

- Predation on salmon by pinnipeds (10 votes)
- Shoreline development and water quality (10 votes)
- Disconnect between plankton/forage fish and juvenile salmon (6 votes)
- Harvest (6 votes)

The full lists of data trends, knowledge gaps, and threats identified from the pacific salmon session are available in Appendix 3f.

Socio-Cultural Targets

A unique feature of the original SJC MSA was inclusion of human focused targets and the topic was also addressed in the 2020 workshop. The socio-cultural session was led by Katharine Wellman of Northern Economics. Dr. Wellman presented on the Puget Sound Partnership's (PSP) effort surrounding the human wellbeing component of the Partnership's Action Agenda. In 2015, the integrated conceptual model for ecosystem recovery was published[6]. This model linked the condition of human wellbeing with the biophysical condition through human activities, human responses, and the ecosystem services that the biophysical condition provides to human wellbeing. The Action Agenda outlined human wellbeing vital signs related to healthy human populations (e.g. air quality, drinking water, local foods, outdoor activities and shellfish beds), and vibrant human quality of life (e.g. sound stewardship, sense of place, good governance, economic vitality and cultural wellbeing). These components were also highlighted in the 2007 MSA plan.

Data specific to San Juan County included employment in tourism and recreation that has shown a continuous increase since 2008. The employment in natural resource industries indicator tells us how many jobs are supported by natural resource industries in Puget Sound, including timber, fishing, agriculture, recreation and tourism. This information can be used to track changes in the sustainability of employment opportunities in natural resource industries. The data suggest that while employment in fishing and agriculture has stayed steady, there has been growth in the tourism and recreation industry.

A summary of the PSP Human Wellbeing in the Puget Sound report was also provided. This report stemmed from survey work conducted in partnership with the Oregon State University and provides data on outdoor recreation, sense of place, stewardship activity markers. Hood Canal[7] provides a good example of how these human wellbeing indicators are being included in strategic plans and are being monitored – something that was highlighted by the workshop participants as a limitation of the 2007 MSA Plan.

Dr. Wellman's presentation sparked a comprehensive discussion that resulted in an extensive list of data trends, knowledge gaps and threats related to human wellbeing, cultural and economic activities and opportunities in the County. The recent publication of the San Juan tourism and visitor management studies[8] were also highlighted as valuable data sources, along with the MRC's Oil Spill Consequences study. While not directly addressed in the workshop these data will assist the MRC in their efforts to incorporate the economic value of the County's marine resources into the revised plan.

Due to dwindling attendance in the final hours of the workshop, the knowledge gaps and threats collected in this session did not receive complete voting. This summary of information covered at the workshop will be sent to all invited guests along with a poll to collect the remainder of votes. Once these data are collected this report will be amended with final numbers. Meanwhile, a full list of topics discussed in this session can be found in Appendix 3g.

[6] Stiles, K., K. Biedenweg, K.F. Wellman, L. Kintner, and D. Ward. 2015. Human wellbeing vital signs and indicators for Puget Sound Recovery. A technical memorandum for the Puget Sound Partnership. Puget Sound Partnership Technical Report 2015-01. Pp28

[7] Hood Canal Coordinating Council. 2014. Hood Canal Integrated Watershed Plan: Five-year Strategic Priorities

[8] Reports available here: https://sjclandbank.org/results-from-the-islands-wide-survey-about-tourism-and-visitor-management-in-the-san-juan-islands/

Emerging issues: Threats and Stressors

This session included presentations from Drew Harvell (Cornell University and the Friday Harbor Laboratories) on sea star and eelgrass wasting diseases in San Juan County. Dr. Harvell highlighted continued low numbers of many sea star species on the West coast of the US after the 2015 and 2016 wasting mortality events. Although some sea star populations may be recovering, mortality events are still being observed and numbers are only at ~30% of those pre-2015. Eelgrass wasting disease continues to reduce eelgrass density and is especially prevalent in the San Juans.

Sara Thompson at the Washington State Department of Ecology provided a summary of the State's efforts towards oil spill risk, prevention and preparedness. Oil spill risk, identified in the 2007 plan as key threat, was discussed in the context of the State's efforts regarding prevention and preparedness; in addition, local efforts regarding oil spill risk were discussed, including the efforts to evaluate the costs of stationing an Emergency Response Towing Vessel (ERTV) in the San Juan Islands and the need for a feasibility study to determine the effectiveness of having an ERTV stationed in the islands. While there was no dedicated climate change presentation, the subject, and related changes to ocean conditions was noted as continuing to be one of the overarching threats to all the biodiversity targets as well as the human wellbeing related socio-economic and cultural targets.

New Management Efforts

New management efforts included presentations from Tina Whitman of Friends of the San Juans discussing nearshore management in the County, Kendra Smith of San Juan County's Environmental Resources Division providing an update on the stormwater management efforts in the County as well as other projects related to the Clean Water Utility, and Mindy Roberts from the Washington's Environmental Council provided an overview of the Governor's SRKW State Task Force.

Positive Actions Identified

Despite the increasing threats, stressors, and knowledge gaps identified throughout the workshop, discussions during each session revealed a growing list of positive actions that have been or are being undertaken in the County or in the Salish Sea region. Those actions identified during the workshop include:

- Derelict gear removal
- Creosote log removal
- Boater pump outs
- Sea Level Rise study by Friends of the San Juans
- No discharge zone for sewage
- Derelict boat removal
- Mooring buoy design upgrades?
- San Juan Preservation Trust and County Land Bank more strategically protecting shoreline habitat
- Removal of most invasive Spartina
- Voluntary anchor out sites, and boater education on anchoring out of eelgrass
- Stormwater management and enforcement

- Increased abalone restoration efforts, including growing partnerships with aquaria, labs, and hatcheries for these efforts
- Increased enforcement of poaching
- Canada implementing measures to protect SRKW and increased federal and state regulations in the US.
- Geographic Response Plan (GRP) updates including pocket beaches as areas important to salmon
- ROV studies for eelgrass
- Kelp conservation and recovery plan
- Cuts to sea cucumber harvest quotas
- Rockfish recovery plan implemented in 2017 – removing derelict gear, habitat mapping, kelp recovery, education and outreach
- Ongoing rockfish and ground fish population surveys from Washington Department of Fish and Wildlife

Next Steps

Over the remainder of the spring and summer of 2020 the MRC MSA Plan steering committee will guide the continuing efforts of the support staff (MRC Coordinator and San Juan County Marine Program Coordinator Frances Robertson, and MRC Research Fellow Abigail Ames) as they gather additional information and data from partners. The information shared at this workshop along with that gleaned through phone interviews and email inquiries will provide the resources necessary to revise each of the biodiversity targets with the latest data trends and identify knowledge gaps. In addition, the threats and stressors identified in the 2007 plan will be updated to reflect current knowledge and include emerging threats. The efforts of the Puget Sound Partnership with regards to their human wellbeing vital sign work, combined with the tourism and visitor management surveys will be invaluable in helping the MRC address the socio-cultural and economic aspects of the plan and the interconnections with the biodiversity targets. Ultimately, the MRC is keen to produce a revised plan that will enable a coordinated approach to the County's management of, and sustainable use of marine resources in San Juan County.

The current difficult situation related to the global COVID-19 pandemic has highlighted the vulnerability of San Juan County with regards to its reliance on a tourism-based economy. There is opportunity to assess whether there are additional opportunities available to the island communities to further diversify the local economies, therefore building resilience against such disruption in the future. Such opportunities, however, must be considered within the context of impacts to the marine systems that make the San Juan Islands a valuable, but vulnerable biological resource. The MRC and the MSA Plan have an opportunity to help guide any such efforts to ensure healthy economic diversification in a sustainable manner.

Acknowledgements

San Juan County MRC and the MSA Plan steering committee would like to thank the following for their assistance with this workshop:

- Friday Harbor Laboratories for providing the space and supporting the overall effort.
- The MRC members and members of the steering committee for their support in planning and preparing the event and presenting, in particular: Megan Dethier, Christina Koons, Lovel Pratt, Phil Green, Terry Turner, Tina Whitman, Kari Koski, and Abigail Ames
- The presenters for being willing to share their expertise and lead the sessions; Megan Dethier, Helen Barry, Henry Carson, Lynne Barre, Jacques White, Katharine Wellman, Sara Thompson, Drew Harvell, Tina Whitman, Mindy Roberts, and Kendra Smith.
- San Juan County Council, Rick Hughes, Jamie Stephens and Bill Watson for their ongoing support of marine resource management in the County.
- San Juan County Manager Mike Thomas.
- Cover photo by Phil Green.

Appendices

Appendix 1. MSA Plan Working Group members, workshop attendees list, and list of individuals invited.

Appendix 1a. MSA Plan Working Group Members

MRC Members:

Megan Dethier
Phil Green
Lovel Pratt
Christina Koons

Non-MRC Members:

Tina Whitman, former MRC Member and Friends of San Juans
Terry Turner, former MRC Member, and OPALCO
Kari Koski, 2007 MRC MSA Plan Working Group member

Support Staff

Frances Robertson –MRC Coordinator and County Marine Program Coordinator
Abigail Ames –MRC Research Fellow

Appendix 1b. Workshop Attendee List

Name	Affiliation
Abigail Ames	San Juan MRC/FHL
John Aschoff	Tombolo Mapping Lab
Helen Berry	WA Dep. Natural Resources
Chris Betcher	Jen-Jay Consulting
Jodi Bluhm	Samish Indian Nation
Cathleen Burns	San Juan MRC
Hank Carson	WA Fish and Wildlife
Tom Cowan	NW Straits Commission
Krista Davis	San Juan County Environmental Resources
Megan Dethier	San Juan MRC/FHL
Brendan Flynn	Washington Reef Netters Association
Kathleen Foley	San Juan Preservation District
Deborah Giles	UW Center for Conservation Biology
Olivia Graham	Cornell University/FHL
Marta Green	San Juan County Environmental Resources
Phil Green	San Juan MRC
Adam Griesemer	US Fish and Wildlife Service
Chris Guidotti	WA State Parks
Drew Harvell	FHL/Cornell University
Toby Haskett	San Juan County Parks
Lisa Hillier	WA Fish and Wildlife
Katie Jones	Center for Whale Research
Christina Koons	San Juan MRC
Kari Koski	Local knowledge/Former MRC
Linda Kuller	San Juan County Community Development
Trent Lieber	National Parks Service
Doug McCutcheon	San Juan County Land Bank
Russ Mullins	WA Fish and Wildlife
Jess Newley	Friends of the San Juans
Todd Nicholson	Friday Harbor Port Authority
Dana Oster	Northwest Straits Initiative
Lovel Pratt	San Juan MRC/Friends of the San Juans
Mike Ramsey	San Juan Island Conservation District
Marcus Reaves	WA Fish and Wildlife
Ivan Reiff	San Juan MRC/Pacific Whale Watch Association
Frances Robertson	San Juan County Environmental Resources
Laura Jo Severson	San Juan MRC
Kendra Smith	San Juan County/San Juan MRC
Jamie Stephens	San Juan County Council
Beth Tate	Jen-Jay Consulting

Name	Affiliation
Jacques White	Long Live the Kings
Tina Whitman	Friends of the San Juans
Sam Whitridge	San Juan County Environmental Resources

Remote presenters and participants:
Lynne Barre – NOAA
Katherine Wellman – Northern Economics
Sara Thompson – WA State Ecology
Mindy Roberts – WA Environmental Council

Appendix 1c. List of partners contacted for workshop participation

Organization	Name
NW Indian Fisheries Commission	Cecilia Gobin
Jamestown S'klallam Tribe	
Port Gamble S'Klallam Tribe	Paul McCollum
Lower Elwha Klallam Tribe	
Lummi Nation	Alan Chapman Lisa Wilson
Suquamish Tribe	
Swinomish Indian Tribal Community	Stan Walsh Amy Trainer Tim Hyatt
The Tulalip Tribes	Patti Gobin Colin Wahl Todd Zackey
Samish Indian Nation	Todd Woodard **Jodi Bluhm**
National Ocean and Atmospheric Administration	**Lynne Barre**/Grace Ferrarar Jameal Samhouri Kurt Fresh*
US Army Corp	Jordan Bunch
US Fish and Wildlife	Adam Griesemer Craig Burley Keven Ryan Kolleen Irvine
Monuments/Bureau of Land Management	Marcia deChandenedes Nick Teague
National Parks Service	Elexis Freddy Sara Dolan Joe Dolan
WA Department of Fish and Wildlife	Chelsey Buffington **Henry Carson** **Lisa Hillier** **Russ Mullins**/Taylor Kimball **Marcus Reeves** Amy Windrope Bob Pacunski Phil Dionne Dayv Lowry
WA Department of Ecology	Brian Kirk/ **Sara Thompson**
WA Department of Natural Resources	Gabe Harder **Helen Berry** Jeff Gaeckle
Puget Sound Partnership	Jennifer Burke
WA State Parks	**Chris Guidotti**
San Juan County Public Works	**Kendra Smith** **Krista Davis** **Byron Rot** **Sam Whitridge** **Marta Green**
San Juan County Parks	**Toby Haskett**

Organization	Name
San Juan County Community Development	Erika Shook Colin Maycock **Linda Kuller**
San Juan County Community Health	Kyle Dodd
San Juan County LandBank	Lincoln Bormann **Doug McCutchen**
San Juan County Council	**Jamie Stephens** Rick Hughes Bill Watson
Friends of the San Juans	**Tina Whitman** **Jess Newley** **Lovel Pratt**
Sea Doc Society	Joe Gaydos
The Whale Museum/Soundwatch	Rich Osborne Taylor Shedd
Wild Orca	Deborha Giles
NW Straits Initiative	Lucas Heart **Dana Oster** Sasha Horst Susanne Shull **Tom Cowan**
Puget Sound Restoration	Betsy Peabody
Long Live the Kings	**Jacques White**
Anglers Association –Local	Steve Ravello Robert Wilson
The Nature Conservancy	Kirsten Evans Fayette Krause
University of Washington Friday Harbor Laboratories	**Megan Dethier** **Drew Harvell** Matt Baker
Skagit Systems Research Coorp	Eric Beamer
San Juan County Conservation District	**Mike Ramsey**
San Juan Preservation Trust	Kathleen Foley Angela Anderson
Washington Sea Grant	Emily Grayson
Port of Friday Harbor	Tammy Hayes/Barbara Merret/ **Todd Nicholson**
San Juan Island Visitors Bureau	Barbara Merret
Center for Whale Research	**Katie Jones**
Washington Reef Netters Association.	**Brendan Flynn**
Other including SRKW Task Force	Kimbal Sundberg **Kari Koski** **Phil Green** Rep. Debra Lekanoff Sen. Liz Lovelett **John Aschoff** Gary Greene

*Retired

Appendix 2. 2020 Marine Managers Workshop Agenda

Tuesday March 10

8:45 - 9:00	**Arrive**
9:00 – 9:30	**Introductions**
9:30 - 10:30	**Session 1: Intertidal/nearshore**
	Dr. Megan Dethier, University of Washington
10:30 - 11:30	**Session 2: Kelp and eelgrass**
	Dr. Helen Berry, DNR
11:30 - 11:45	**Coffee Break**
11:45 - 12:45	**Session 3: Subtidal**
	Dr. Hank Carson, WDFW
12:45 - 1:30	**Working Lunch**
1:30 - 2:30	**Session 4: Marine Mammals**
	Lynne Barre, NOAA
2:30 - 3:15	**Session 5: Rockfish**
	Federal updates from Lynne Barre, NOAA
3:15 - 3:30	**Coffee Break**
3:30 - 4:45	**Session 6: Pacific Salmon**
	Jacques White, Long Live the Kings
5:00 – 7:00	**Marine Stewardship Social**

Wednesday March 11

8:30 – 8:45	**Arrive – coffee**
8:45 – 9:00	**Debrief of Day 1**
9:00 – 10:45	**Session 1: Socio-cultural**
	Dr. Katharine Wellman, Northern Economics
10:45 - 11:00	Coffee Break
11:00 - 12:15	**Session 2: Threats and Stresses**
	Wasting Disease
	Dr. Drew Harvell, Cornell University
	Oil spill risk, prevention and preparedness
	Sara Thompson, Ecology
	Climate Change:
	General discussion
12:15 - 1:00	**Working Lunch**
1:00 - 2:30	**Session 3: New Management Efforts**
	SRKW Task Force overview
	Dr. Mindy Roberts, WA Environmental Council
	Land use issues
	Tina Whitman, Friends of the San Juans
	Stormwater Management
	Kendra Smith, San Juan County Environmental Resources
2:30 - 3:00	**Wrap up**

Appendix 3. Summary tables for data trends, knowledge gaps and threats

Summary tables detailing the data trends, knowledge gaps, and threats identified by workshop participants for each of the biodiversity sessions and the socio-economic and cultural session.

Appendix 3a. Nearshore and intertidal biodiversity target

Data Trends	Votes
● Increase in armoring	
● Increase in eelgrass wasting disease	
● Invasive species, sargassum increasing	
● Increase in oil spill risk	
● Increase in size and speed of vessels	
● Potential data source: NPS data on intertidal inventory available.	
Knowledge Gaps	
● Nearshore development and runoff trends	**20**
● Increase in pollutants in seasonally frequented areas	**5**
● Use of desalination plants	**4**
● Foraging fish spawning	**4**
● Increase in Egregia alga	2
● Understanding relationship between precipitation levels and increased landslide frequency	0
Threats	
● Shoreline armoring	**12**
● Nearshore development and associated runoff, septic systems, and agriculture	**12**
● Rising intertidal temperature	**10**
● Oil spill risk	4
● Opening areas previously closed to public	3
● Unknown trends in desalination plant use	3
● Increased vessel size and associated increase in erosion	2
● Shoreline trampling and boat use	2
● Increased precipitation and landslide frequency	1
● Invasion of European green crab	1
● Invasion of Spartina alga	0
● Sea star wasting disease	0
● Extreme tidal events	0
● Harvest of crab	0

Appendix 3b. Kelp and eelgrass session

Data Trends	Votes
● Increased oil spill risk	
● More losses than gains across all seagrass species	
● Extreme loss of eelgrass in shallows and sheltered bays	
● Decline in eelgrass density	
● Decreased kelp at northern outer islands and inner eastern islands	
● Anecdotal observation from Lime Kiln	
● Increase in snorkelers	
● Strongly impacted by local conditions rather than larger scale conditions.	
Knowledge Gaps	
● Understory kelp – is lost *Nereocystis* algae now healthy understory?	**13**
● Site specific management of eelgrass meadows	**12**
● Links between eelgrass wasting and actual mortality	**5**
● Ocean acidification impacts on eelgrass and kelp	**5**
● Thresholds (of temperature, nutrients etc) for kelp	4
● Impacts of turbidity	3
● Changes in salinity and impacts on eelgrass (both natural and desalination related)	3
● Long-term trends in temperature and turbidity	2
Threats	
● High temperatures (impact both *Nereocystis* and *Zostera*)	**13**
● Runoff of pollutants	**8**
● Eelgrass wasting disease	**7**
● Large urchin populations impacting *Nereocystis*	6
● Oil Spill risk	5
● Sedimentation impacts on *Nereocystis*	5
● Sargassum out competing *Nereocystis*	4
● Damage caused by anchoring in/near eelgrass meadows	3
● Trophic imbalances	1
● Impacts of fine sediment in shallows for *Zostera*	0

Appendix 3c. Subtidal Biodiversity Target Session

Data Trends	Votes
● Data forthcoming: population genetics of restored abalone communities	
● Data forthcoming: is out-planting more abalone always better?	
● Declining numbers of sea stars	
● Increase in sea urchins	
● Decline in pinto abalone	
● General rise in sea cucumber numbers, decline with overharvest	
● Some rise and some decline in urchin populations depending on species	
● Little evidence of disease in urchins and cucumbers	
Knowledge Gaps	
● Use of sand waves by forage fish and their link to salmon	**8**
● Subtidal species composition/abundance/community indices	**8**
● Increase in vessel size and speed, impacts of this on erosion rate	**4**
● Chemical pollution from boats	**4**
● Effect of commercial harvest on purple urchin populations	**4**
● Causes of unsuccessful abalone outplants	**4**
● Use of harvest to manage increasing urchin populations	3
● Can citizen scientist snorkelers document urchin counts?	3
● Best places to outplant abalone	1
● Red urchin recruitment dynamics	1
● Unpredictable changes in global economy	1
● Trajectory of sea stars after sea star wasting disease	1
● Populations of urchins in harvest vs closed areas	0
● Trend of purple urchin populations	0
Threats	
● **Lack of funding leading to gaps in research and management** ○ **Change in funding sources from hunting licenses to other?** ○ **Change in export demand, regulations, and economy**	**13**
● Increase in non-floating oils	**9**
● Sea star wasting disease	**7**
● Poaching & under reporting	**7**
● Sargassum – invasive algae	6
● Increase in harvest (and poaching) of abalone and cucumbers	3
● Leaching creosote from docks and debris	2
● Invasive tunicate	1

Appendix 3d. Marine Mammal Biodiversity Target Session

Data Trends	Votes
Pinnipeds: ● Studies on pinniped population vs salmon populations ● California Sea lion population increase year round ● Steller Sea lion Eastern Distinct Population Segment increasing at rate of 4.67/yr, a new rookery has been established on the WA coast. ● Harbor Seals –WA inland waters stock is leveling off for the inland waters, but still need an updated haul out atlas. ● Northern Elephant Seal – population increasing, more animals are being encountered in inland waters in recent years. Cetaceans: ● Harbor porpoise are present year round, part of the WA inland stock which is ~11,000 animals. ● Dall's porpoise – decline in sightings ● Transient killer whales –increase in encounters– population at 349, over 600 if including Canadian and offshore transients. Population has been increasing at rate of 4.1%/yr since 2012 and >1000 calves have been born. ● Southern Residents have declined to 72 animals ● More studies on Transient killer whales – increase as frequency of sightings of Transients vs Residents changes. ● Available sightings databases: Orca Master, Orca Network, BCCSN, Whale Watch operator sightings. ● SRKW sighting days from data compiled by the Orca Behavior Institute : o 2005 – 150 days in summer, 2017 – 54 days in summer, 2018 – 76 days in summer, 2019 50 days in summer, In last three years 170/180 days had Transient killer whales ● Gray whales – increase but a UME was declared in 2019 and is ongoing as the result of high numbers of strandings and poor body condition in migrating whales. ● Humpback whales – 3 distinct population segments –all considered to be part of the CA-OR-WA stock but are coming from the HI, Mexican, and Central American breeding stocks (DPS). The Hawaiian DPS is not listed under the ESA, the Mexican stock is listed as threatened, and the CA stock is listed as Endangered. o Beginning to see interactions between humpbacks and fishing gear in Strait of Juan de Fuca. ● Minke whales – data trends for numbers unknown but data available through the Northeast Pacific Minke Whale Project.	
Knowledge Gaps	
● **Pinnipeds – long term diet composition, role of species in ecosystem**	**3**
● **Long term data trends for Dalls porpoise**	**3**
● **Entanglement rates of baleen whales are increasing by little known about prevalence, type of gear and where.**	**2**
● **Fishery management in relation to SRKW**	**2**
● **Long term data trends on minke whales**	**2**
● The NOAA status report for Transient killer whales is outdated – but look at the material that DFO has available, they will have more up-to-date information on population estimates and trends.	0
● Predation rates or consumption levels of Transients, and diet composition	0
● Survey limitations are linked to funding	0

Threats	
● **Lack of prey – SRKW** ○ **fishery management** ○ **Habitat** ● **Opening BLM lands leading to Human access to haulouts** ● **Oil spill risk** ● **Vessel disturbance** ● Contaminate levels ● Entanglements in fishing gear/ vessel or ship strike ● Predation threats by Transient killer whales ● Changes in Prey distribution	**11** **5** **8** **6** **6** 3 2 0 0 0

Appendix 3e. Rockfish Biodiversity Target Session

Data Trends	Votes
● Yelloweye has been listed as endangers with a recovery plan in place ● WDFW is conducting ongoing ROV rocky habitat surveys to track population trends of rockfish, greenling, and lingcod ● NEW REPORT from dive surveys: lingcod increased in BFRZ and increased diversity ● General increase in numbers of all species in region but not so much for two listed rockfish	
Knowledge Gaps	
● **Reasons for kelp habitat decline and restoration methods** ● **Locations to protect in order to keep adult populations healthy if a fishery was opened in the future** ● **Impacts of ocean acidification and climate change** ● Predation and diet relationships ● Quantitative effects of marine protected areas	**10** **6** **2** 1 0
Threats	
● **Rearing habitat and effects of habitat decline** ● **Fishing/overfishing** ● **Oil spills with sinking oils** ● Predation and diet relationships ● Deep water derelict gear ● Effects of climate change ● Barotrauma related to fishing ● Increased urchin populations lowering kelp habitat	**13** **8** **6** 4 3 3 0 0

Appendix 3f. Pacific salmon Biodiversity Target Session

Data Trends	
• Need to increase funding for salmon habitat restoration/research • Reduced fishing in 1999 did not lead to more salmon (Marine Survival project report 2020) • Race rocks temperature data • Hatchery fish are 4 times as abundant as wild fish in Puget Sound • Change in juvenile chinook diet from fish to zooplankton in Georgia Strait • SJI chinook eat more fish and grow faster (Davis et al.) • Predation on steelhead leaving Hood Canal very high – 80% Coho, 45% leaving Strait of Georgia • Sea lions have no impact of Chinook • SRKW remove most Chinook by pound, harbor seals are eating most Chinook by number • Lower seal predation on salmon when forage fish are abundant	
Knowledge Gaps	
• **Local water quality and impacts of treatment facilities and stormwater** • **How to manage pinniped populations** • **Role of Biggs killer whales** • Water quality of urban estuaries • Changing hatchery production • Prey – plankton-forage fish relationships	**10** **6** **4** 2 1 0
Threats	
• **Predation by pinnipeds** • **Shoreline development and water quality** • **Disconnect between plankton/forage fish and juvenile salmon** • **Harvest** • Poor ocean conditions • Changes in marine fish populations, forage fish, plankton, habitat, competitors, and predators leading to smaller fish and late returns • Disease from fish farms	**10** **10** **6** **6** 3 2 0 0

Appendix 3g. Socio-Cultural and Economic Target Session

Data Trends

- Increased visitors from NPS and Land Bank
- Increased wildlife viewing opportunities for some species (humpbacks, transient killer whales)
- Decreased wildlife viewing opportunities for some species (Southern Resident Killer Whales, salmon)
- Protection funding comes from increased population and increased visitors
- Livelihoods tied to global economy which is inconsistent and unpredictable
- Change in people experiencing homelessness (knowledge gap?)
- Perception of deterioration of natural areas
- Degradation of marine environment
- Desalination allowed as primary water source
- Increased shoreline development
- Increased shoreline development in areas previously without source of water (due to increase in desalination)
- Increased noise pollution
- DATA SOURCE: red fish school
- Increase in vacation rentals
- Change in demographics of year-round residents
- Change in demographics of workforce

Knowledge Gaps

- How demographics are changing in SJIs
- Differences in data gathering between year-round residents, secondary home owners, and visitors
- Knowledge and understanding of first nations' wants and needs for cultural use in SJIs
- Understanding economic value of natural resources to county
- Natural area condition
- Ability and success of restoration
- Importance of naming related to geography and sense of place
- Desalination plant capacity
- San Juan county residents
- How will the MSA integrate socio-cultural and biodiversity targets – focused local survey to gather representative input?
- Local EPRP human wellbeing components – how can we gauge those?
- Enjoyment of marine environment – recreational
- How to ask the question to capture cultural traditions and experience for tribal and nontribal communities
- Bridging link to the tribes
- Communication with tribes
- Telling stories – outreach related to treaty rights, cultural practices, and traditions – both current and historic
- Welcoming first nations practices on SJIs public lands with an invitation to use
- Aligning impacts related to locations with visitor use
- Localized vital signs survey run by MRC
- Review past SJC surveys and PSP data

Threats
● Increased tourism leading to capacity and infrastructure failing ● Decreased tourism ● Increased population size leading to water issues ● Availability of affordable housing ● Increased fire danger ● Shifting baselines of ecosystem health with changing demographics ● Cost of access to visit and live narrowing demographics ● Ties of natural resources to global economy limiting livelihoods ● Economic and recreational access to shoreline by community limited by shoreline development

2023 Workshop

In April 2023 the MRC reconvened the Marine Managers Workshop and invited stakeholders and co-mangers back to the University of Washington's Friday Harbor Labs.

The goals of this workshop included:

1. To assess the list of recommendations compiled by the MRC to address the threats and knowledge gaps identified during the assessment of the 2007 plan.
2. Prioritize the identified recommendations and determine partnerships to further the MRC's goal of collectively addressing the threats and stressors faced by the MSA.

The workshop was conducted over 2 days following a similar format to the 2020 workshop and was focused on the following discussion areas:

1. Review of the identified recommendations
2. Prioritization of recommendations
3. Identification of gaps
4. Partnerships

Recommendations Assessment
Workshop participants were divided into 9 subject expert break-out groups, representing each of the identified Key Objective Groups (KOG). They were asked to review each recommendation, identify any gaps, refine language, and discuss how the recommendations might be prioritized.

Prioritization
Based on the discussions around the recommendations, participants were asked to identify the top three recommendations for each KOG during the workshop. In addition to this effort, a pre-workshop survey allowed invitees (including those who could not attend) to identify their top three priority recommendations for each KOG. The scores from the survey and the workshop were combined and the recommendations within each KOG were ranked to identify the top three recommendations for each KOG. These are detailed in the appendices of the 2023 Marine Managers Workshop Report, included at the end of this section.

Identification of Gaps
Discussions around what was missing from the lists of recommendations identified a combination of knowledge gaps and actions needed to address threats to the Focal Conservation Targets (see Chapter 3).

Additionally, gaps were identified in understanding how new or increasingly popular technologies including marine renewables and de-salinization plants might impact the MSA's species and habits.

Finally, the potential for impacts to the MSA resulting from changing political environments, especially with regard to regulatory frameworks and increased unpredictability of funding was noted. This is particularly important since the majority of work proposed through the recommendations is reliant on grant funding.

Gaps identified by workshop participants are summarized in the appendices of the 2023 Marine Managers Workshop Report, included at the end of this section.

Partnerships
An opportunity was provided for participants to share their efforts and offer potential partnerships and/or connections. These included the Washington Sea Grant program, Orcas Power and Light Cooperative's (OPALCO) plan for expanding into tidal energy within the MSA, and SMRU Consulting's work with marine acoustic monitoring in the MSA and surrounding region.

Other partnerships identified included working with the Agricultural Resource Committee on Orca- or Salmon-safe products as a means to encourage local producers to avoid practices that may impact nearshore environments.

SAN JUAN COUNTY
Marine Resources Committee

san juan county
marine stewardship area
our sea • our source • our future

2023 Marine Managers Workshop: Identified Gaps.

Submerged aquatic vegetation

- Other seagrass species also require monitoring, especially susceptible to heat.
- Determining the impacts of pesticide use on eelgrass.
- Need to monitor both terrestrial and adjacent nearshore habitats to understand the impacts of freshwater flows and stormwater runoff on nearshore habitats.
- Map areas where habitats are found to be more resilient in order to better guide protection priorities.

Subtidal Communities

- *To understand impacts from anchoring need to undertake benthic habitat mapping.*
- *Recommend sea stars for listing under the ESA and undertake monitoring to determine long-term impacts of sea star wasting disease.*
- *Identify other key invertebrate species to monitor (e.g., commercially important, at-risk species, and invasive species)*

Marine Birds

- *Actions specific to marine birds to address threats from recreation, oil spills, and boat traffic:*
- *Enforcement of sea duck hunting and impacts of recreational hunting on tribal treaty rights.*
- *Impacts of marine plastics on sea birds and food webs.*
- *Disturbance from dogs on beaches.*
- *Recording rare events such as the presence of black swans.*

Marine Mammals

- A need to broaden boater outreach to include other species.
- Greater enforcement of disturbance buffer zones, both animal-based and land-based buffers.

- A better understanding of the extent of entanglement and ensuring trained teams are available to respond.
- Development of renewable power (wind and tidal) and how it may impact species and habitats.
- Understanding how desalinization plants impact water quality in nearshore areas.
- Oil spill preparedness plans were identified as needing to include data on floating kelp

Resources from the 2023 Marine Managers Workshop

1) **Materials provided by Drew Harvell:**
   - https://tos.org/oceanography/article/uav-high-resolution-imaging-and-disease-surveys-combine-to-quantify-climate-related-decline-in-seagrass-meadows
   - https://royalsocietypublishing.org/doi/10.1098/rstb.2022.0016
   - https://agupubs.onlinelibrary.wiley.com/doi/full/10.1029/2022GL101985
   - https://www.frontiersin.org/articles/10.3389/fmars.2021.768668/full
   - https://aslopubs.onlinelibrary.wiley.com/doi/full/10.1002/lno.12152

2) **SJC MRC Mooring Buoy Preliminary Density Assessment (attached)**

3) **Friends of the San Juans Shoreline Hardening Change Analysis**
   - https://sanjuans.org/wp-content/uploads/2022/08/SanJuanCountyArmorChangeAnalysisandRegulatoryReviewProject_2022_FriendsoftheSanJuans.pdf

2023 Marine Managers Workshop

Ranking of Recommendations

Key Objective Group	Recommendation	2023 Survey score	2023 MMW Score	Total Score	Rank
1: Climate Change	Encourage protection of natural functioning of low-lying land inland of existing coastal wetlands, barrier beaches and bluffs to allow for natural translation in response to changing sea levels	22	12	34	1
	Evaluate managed retreat of infrastructure and structures to improve community resiliency and restore habitat.	17	11	28	2
	Communicate risk of climate change impacts in the marine environment to the public	10	11	21	3
	Establish incentives program for property owners to utilize shore friendly solutions to address increasing climate risks.	15	3	18	4
	Conduct king tide and storm surge monitoring and associated public outreach and education	7	3	10	5
	Conduct mussel monitoring	1	0	1	6
2: Oil spill prevention and preparedness	Address and prevent small but accumulatively impactful spills that occur at marinas and marine fuel stations	12	13	25	1
	Support the adoption and implementation of state, provincial, and federal legislation that improves oil spill prevention and response preparedness and capacity, including the positioning of an additional ERTV in or near San Juan County.	12.5	9	21.5	2
	Support San Juan County advocacy for sustainable funding for Primary Response Contractor(s)	7	3	10	3
	Monitor permit applications and engage in permit application review processes where there could be increases in vessel traffic	6	4	10	3
	Support San Juan County advocacy for the identification of and financial guarantees for oil spill costs	5	4	9	4
	Support San Juan County advocacy for a robust implementation of whale deterrence plan	7	1	8	5
3: Protect submerged aquatic vegetation	Protect eelgrass and kelps along highest fish use shoreforms.	18	11	29	1
	Conduct monitoring and stressor research for kelps and seagrasses	16	11	27	2
	Protect eelgrass habitat by monitoring and testing efficacy of management strategies.	16	10	26	3
	Protect kelp habitat	16	7	23	4
	Restore eelgrass and kelps along highest fish use shoreforms and private tidelands associated with Pacific herring spawning	8	10	18	5

Key Objective Group	Recommendation	2023 Survey score	2023 MMW Score	Total Score	Rank
4: Enhance nearshore food webs	Promote protection of known herring spawning sites with willing owners	23	6	29	1
	Promote protection of tideland parcels with juvenile rearing habitats (rockfish and herring) with willing owners	23	4	27	2
	Expand shorefriendly program and promote other existing programs	20	4	24	3
5: Reduce Human Impact	Encourage enforcement of existing harvest regulations and limitations.	16	15	31	1
	Remove derelict fishing gear	16	11	27	2
	Continue beach and marine debris surveys and cleanups	14	7	21	3
	Develop/enhance program of greater visitor outreach at Biological Reserves	9	6	15	4
	Continue green crab monitoring	9	3	12	5
	Track growth of invasive marine vegetation	2	0	2	6
6: Improve regulatory compliance	Address compliance on unpermitted structures and improve enforcement effectiveness and capacity.	17	10.5	27.5	1
	Address barriers to permitting to improve compliance with regulations.	14	12	26	2
	Support the implementation of a business license system in San Juan County	5	11	16	3
	Review shoreline code for 2028 SMP update	6	5	11	4
	Conduct an Ecological Value Assessment of marine areas as a basis for addressing Conflict Analysis	5	6	11	4
7: Ensure shoreline functioning	Permanently protect intact coastal wetlands/tide channels associated with highest and high priority fish use areas	9	10	19	1
	Permanently protect priority pocket beaches, intact sand and gravel beaches, and feeder bluffs, and intact beaches in the highest and high priority fish use shoreforms.	9	9	18	2
	Create incentives to make softshore protection easier and cheaper than armoring	7	10	17	3
	Track and monitor impacts of permitted (and unpermitted) shoreline development	6	11	17	3
	Restore priority pocket beaches, restoration feeder bluffs, and degraded shoreline habitats in the highest and high priority fish use shoreforms.	10	5	15	4
	Permanently protect unarmored forage fish spawning beaches with quality overhanging vegetation	6	9	15	4
	Remove shoreline armoring	6	4	10	5
	Restore coastal wetlands/tide channels associated with highest and high fish use shore forms	6	3	9	6
	Restore marine riparian buffer vegetation along highest and high priority fish use shoreforms with degraded vegetation	4	0	4	7
	Remove priority tidal barriers	3	0	3	8

Key Objective Group	Recommendation	2023 Survey score	2023 MMW Score	Total Score	Rank
	Protect highest and high priority fish use shoreform with intact forested riparian buffers	3	0	3	8
8: Reduce Vessel Impacts	Protect sensitive habitats from recreation	13	14	27	1
	Create Southern Resident Killer whale Quiet Foraging Areas to protect highest priority foraging habitat and connecting corridors on the westside of San Juan Island.	10	8	18	2
	Expand boater education and outreach	10	6	16	3
	Improve vessel compliance with regulations	9	5	14	4
	Assessment of marine based recreation and use, including marinas, ports, county and state facilities.	6	7	13	5
	Derelict Vessel Prevention	6	5	11	6
	Derelict Vessel Removal	7	3	10	7
	Conduct vessel surveys for county	5	2	7	8
	Monitor soundscape of Quiet Foraging Areas Southern Resident killer whale foraging areas.	2	2	4	9
9: Upgrade marine infrastructure	Create and manage public mooring buoy system	9	19	28	1
	Conduct creosote structure inventory and removal of identified derelict structures	10	8.5	18.5	2
	Establish incentives to minimize new installation or replacement of in- or over-water infrastructure, and encourage joint use/community structures.	10	6	16	3
	Develop and establish mooring buoy management process	8	5	13	4
	Expand pump-out facilities and compliance monitoring		13	13	4
	Implement County marine infrastructure upgrades	6	6	12	5
	Conduct mooring buoy assessment for presence and regulatory status.	2	2	4	6
	Develop and establish mooring buoy tracking system		4	4	6
	Complete a barge landing inventory	1		1	7

APPENDIX 2.

STEWARDSHIP AREAS AND HABITATS OF IMPORTANCE

San Juan County is located at the heart of the Salish Sea, where Puget Sound meets with the waters of the Straits of Georgia, Rosario, and Juan de Fuca, resulting in extraordinarily rich marine biodiversity.

The County encompasses over 400 islands and rocky reefs and over 400 miles of shoreline. The San Juan Archipelago was a thoroughfare for indigenous First Nations and Coast Salish Tribes, and is the traditional ancestral home for many who are intricately and spiritually connected to these lands and waters, and continue to live here, with sovereign harvesting, fishing, and resource collection rights determined through treaties with the United States.

The San Juan Islands are also a popular destination for visitors and are considered one of the premier boating destinations in the United States.

Despite management efforts, marine species and the habitats they rely on continue to be impacted by local and regional development, recreation, and climate change.

Over the years there have been efforts to protect sensitive habitats and sites from human disturbance, including resource extraction and shoreline modification.

Progress has been varied, often complicated by the fact that the vast majority of shoreline property in the MSA is private residential, while tidelands are a confusing mix of private and public.

Despite these land ownership challenges; protection efforts have resulted in a combination of regulatory and voluntary approaches.

Protected shorelines include:

- 2 National Historic Parks
- 16 Marine State Parks
- 18 County Parks (including three with camping facilities)
- 83 National Wildlife Refuge Sites managed by the US Fish and Wildlife Service
- 4 Island preserves managed by The Nature Conservancy (TNC)

In addition, shoreline habitat is protected through land acquisitions and conservation easements by the San Juan County Land Bank and the San Juan Preservation Trust.

Other sites and habitats that have key ecological functions or cultural values garner additional protections through San Juan County's Shoreline Management Program.

Additional protections include the designation of San Juan County as a National Monument by President Barack Obama in 2013, which designated 1,000 acres of federal land in the San Juans as a monument managed by the Bureau of Land Management.

- www.blm.gov/programs/national-conservation-lands/national-monuments/oregon-washington/san-juan-islands

The Islands are also included in the recently formed Maritime Washington National Heritage Area:

- maritimewa.org

This Chapter includes a comprehensive list of protected areas, sensitive habitats, and areas of importance for human access, including those considered important Coast Salish cultural areas that require additional consideration in the context of shoreline, or marine development.

MAPS FOR STRATEGIC MANAGEMENT

Protected Areas in the MSA

National Wildlife Refuge Sites

There are 83 sites scattered throughout the MSA protecting sensitive marine mammal, marine bird, and plant life habitats. There is a 200-yard buffer around each site.

- www.fws.gov/refuge/san-juan-islands
- www.arcgis.com/apps/webappviewer/index.html?id=e379b7e1fff54f00b826ce18183458bd&extent=-18139024.5238%2C2047562.8107%2C-5615581.8096%2C8377771.7452%2C102100

Marine Preserves

Preserves managed by the University of Washington's Friday Harbor Labs:

1. False Bay: Open to recreational and commercial salmon fishing, and limited forage fish, closed to all else. WAC 220-302-100
   wdfw.wa.gov/fishing/management/mpa/marine-preserves/false-bay
2. Parks Bay, Shaw Island: Closed to recreational and commercial bottomfish fishing, limited forage fish and shellfish – only crabbing allowed in Parks Bay. Open to recreational and commercial salmon fishing. WAC 220-302-100
   wdfw.wa.gov/fishing/management/mpa/marine-preserves/shaw-island
3. Argyle Lagoon: open to recreational and commercial salmon fishing, closed to all else. WAC 220-302-100
   wdfw.wa.gov/fishing/management/mpa/marine-preserves/argyle-lagoon

MAPS FOR STRATEGIC MANAGEMENT

Protected Areas in the MSA

Other marine preserves:

1. Friday Harbor Preserve – off UW FHL land: open to recreational & and commercial salmon fishing, closed to bottomfish fishing, closed to shellfish WAC 220-302-100 wdfw.wa.gov/fishing/management/mpa/marine-preserves/friday-harbor
2. Yellow and Low Islands: closed to recreational salmon, bottomfish fishing or shellfish, closed to commercial salmon and bottomfish fishing, or commercial shellfish. WAC 220-302-100 wdfw.wa.gov/fishing/management/mpa/marine-preserves/yellow-and-low-islands

Sea Urchin and Sea Cucumber exclusion zones:

Two zones in MSA managed and enforced by Washington Department of Fish and Wildlife.

- Haro Strait and San Juan Channel – no harvesting of sea cucumber or sea urchin. WAC 220-340-730(3)(a)(ii): (sea cucumber) and WAC 220-340-750(4)(b)(i): (sea urchin), WAC 220-330-090(2)(b): (sea cucumber & sea urchin) wdfw.wa.gov/fishing/management/mpa/exclusion-zones/san-juan-upright

Pinniped haulouts:

wdfw.wa.gov/sites/default/files/publications/00427/wdfw00427.pdf

For the 2022 haul-out maps please contact Casey Clark at WDFW casey.clark@dfw.wa.org

MAPS FOR STRATEGIC MANAGEMENT

Voluntary Protected Areas:

1. The whale and salmon sanctuary - This is a voluntary no-boat zone on the west side of San Juan Island stretching from Mitchell Bay in the North to Cattle Point in the South. The zone extends ¼ mile offshore, and ½ mile around Lime Kiln State Park. www.sjcmrc.org/projects/southern-resident-killer-whales/
2. Bottomfish Recovery Zones - The MRC promoted 8 voluntary recovery areas; however, the efficacy of these sites was not proven and they are no longer promoted or monitored.

Sensitive Habitat Areas:

Eelgrass habitat:

- wadnr.maps.arcgis.com/apps/webappviewer/index.html?id=83b8389234454abc8725827b49272a31
- maps.cob.org/geviewer/Html5Viewer/Index.html?viewer=SoundIQ

Kelp habitat:

- wadnr.maps.arcgis.com/apps/webappviewer3d/index.html?id=bf65099e13d14dbfa386bf54790eea01
- maps.cob.org/geviewer/Html5Viewer/Index.html?viewer=SoundIQ

Floating kelp forest indicator interactive map for WA State.

- wadnr.maps.arcgis.com/apps/webappviewer/index.html?id=f10864050bf14f57ba751ae53bc061f5

Forage Fish Spawning habitat:

- sanjuans.org/wp- content/uploads/2021/02/ALLspawn_final_updated.pdf

Juvenile salmon and forage fish presence/habitat:

- skagitcoop.org/wp-content/uploads/Beamer_Fresh_2012_Final.pdf

Nearshore marine habitat restoration and protection prioritization:

- sanjuans.org/wpcontent/uploads/2018/04/PIAT_II_Final_Report_Dec_2017_with_appendices.pdf

MAPS FOR STRATEGIC MANAGEMENT

Fishing Areas:

Commercial fishing areas:
wdfw.wa.gov/fishing/locations/marine-areas/san-juan-islands#
Recreational fishing areas:
wdfw.wa.gov/fishing/locations/marine-areas/san-juan-islands#

Fish and Wildlife Habitat Conservation Areas:

All shorelines are subject to the FWHCA section of the Critical Area regulations, SJCC 18.35.110-140.
www.codepublishing.com/WA/SanJuanCounty/#!/SanJuanCounty18/SanJuanCounty1835.html#18.35.110

Fish and wildlife marine habitat conservation areas protected by SJCC include:

- Areas where endangered, threatened, and sensitive species have a primary association. Species listed under the state or federal Endangered Species Acts are included:
  - Shellfish areas
  - Kelp and eelgrass beds
  - Herring, smelt, sand lance and other forage fish spawning areas
  - State natural area preserves, natural resource conservation areas and state wildlife areas
- Habitats of Local Importance, including:
  - Critical Saltwater Habitats including all kelp beds, eelgrass beds spawning and holding areas for forage fish; subsistence, commercial and recreational shellfish beds; mudflats; intertidal habitats with vascular plants; and areas with which priority species have a primary association
  - Pocket beaches and bluff back beaches
- Areas where species of local importance have a primary association:
  - Black Oystercatcher and active nests of Black Oystercatcher.
  - Golden Eagle.
  - Great Blue Heron.
  - Pigeon Guillemot.

MAPS FOR STRATEGIC MANAGEMENT

Public Access to Shoreline:

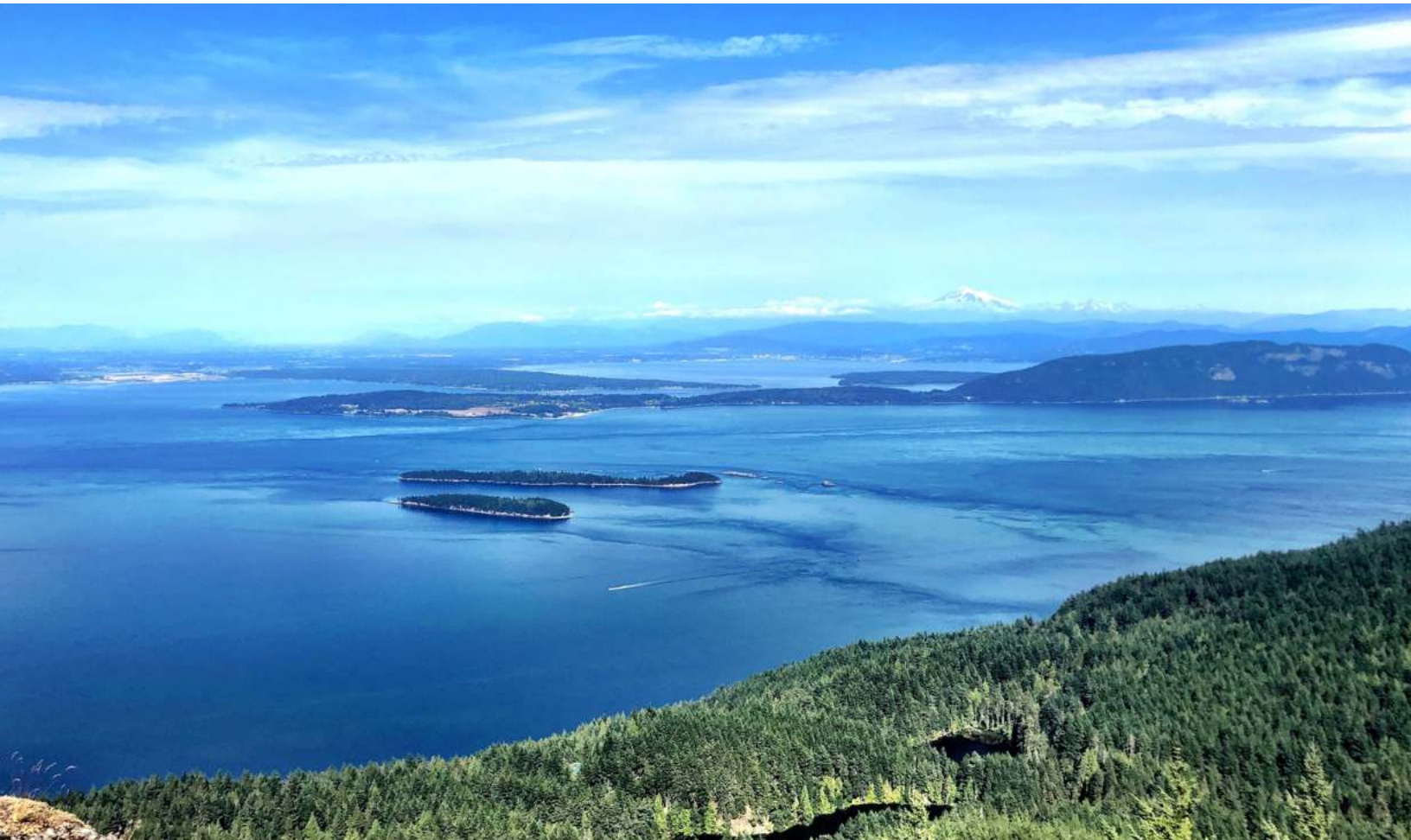
Includes Federal, State, and local parks and public space

WA State Coastal Atlas public access locations
apps.ecology.wa.gov/coastalatlas/tools/PublicAccessResults.aspx

Cultural Areas:

Please contact the Washington State Department of Archeology and Historic Preservation (DAHP)
dahp.wa.gov

or the San Juan County Department of Community Development.
www.sanjuanco.com/1778/Community-Development



APPENDIX 3.

RESOURCES

This section provides links to additional resources relevant to the San Juan County Marine Stewardship Area.

These include ecosystem and species-specific protection, recovery, and management plans, as well as plans and assessments related to oil spill risk and response, and climate change action plans.

LOCAL, STATE, FEDERAL, AND TRIBAL EFFORTS

Climate Change Action Plans

Swinomish Climate Change Initiative: Climate Adaptation Action Plan:
www.swinomish-climate.com/
Our Future Climate in Samish Traditional Territory:
storymaps.arcgis.com/stories/2aa409a8988e401088cd0658148a53e9
Tulalip Climate Change Adaptation Plan:
nr.tulaliptribes.com/Topics/ClimateChange/ClimateChangeAdaptation
Lummi Nation Climate Change Mitigation and Adaptation Plan: 2016-2026:
www.lummi-nsn.gov/userfiles/360_Climate%20Change%20Assessment%20FINAL.pdf
Stillaguamish Tribe Natural Resources Climate Change Vulnerability Assessment
cig.uw.edu/projects/stillaguamish-tribe-of-indians-natural-resources-climate-change-adaptation-plan/
Nooksack Tribe Climate Change Adaptation Plan for Key Species and Habitats
cig.uw.edu/wp-content/uploads/sites/2/2020/05/Nooksack-Indian-Tribe-ClimateChange-Adaptation-Plan.pdf
Jamestown S'Klallam Tribe Climate Vulnerability Assessment and Adaptation Plan
jamestowntribe.org/natural-resources/environmental-planning/climate-change/
Washington State Priority Climate Action Plan Effort
www.epa.gov/system/files/documents/2024-02/washington-cprg-pcap.pdf

Ecosystem Protection And Recovery Plan

- San Juan County LIO:
  www.sanjuanco.com/DocumentCenter/View/27610/San-Juan-EPRP-Final-2017-06-29

Puget Sound Recovery

- Puget Sound Partnership State of the Sound report
  stateofthesound.wa.gov
- 2022 - 2026 Action Agenda
  www.psp.wa.gov/2022AAupdate.php
- Puget Sound Vital Signs
  vitalsigns.pugetsoundinfo.wa.gov/

Eelgrass Recovery Plan

Washington State:

- www.dnr.wa.gov/programs-and-services/aquatics/aquatic-science/nearshore-habitat-eelgrass-monitoring
- www.dnr.wa.gov/publications/aqr_nrsh_eelgrass_strategy_final.pdf

Kelp Recovery Plan

Northwest Straits Commission:

- www.nwstraits.org/our-work/kelp/
- www.nwstraits.org/media/2880/pugetsoundkelpconservationandrecoveryplan_public_review_draft_1219.pdf

Pinto Abalone Recovery Plan

- Washington State: Pinto Abalone Recovery Plan (WDFW)
  wdfw.wa.gov/publications/02284

Sunflower Sea Star Recovery Plan

- Roadmap to Recovery for the Sunflower Sea Star (The Nature Conservancy)
  www.nature.org/content/dam/tnc/nature/en/documents/tnc_Roadmap_to_Recovery_for_the_Sunflower_Sea_Star_Nov2022.pdf

Rockfish Recovery Plan

- Washington State: Puget Sound Rockfish Recovery Plan (WDFW)
  wdfw.wa.gov/publications/00035

- Rockfish recovery plan Puget Sound/Georgia Basin: yelloweye rockfish (*Sebastes ruberrimus*) and bocaccio (*Sebastes paucispinis*)
  repository.library.noaa.gov/view/noaa/16866

Forage Fish Recovery Plan & Studies

- Anticipated Effects of Sea Level Rise in Puget Sound on Two Beach-Spawning Fishes.
  wdfw.wa.gov/publications/01210
- Effects of Sea Level Rise on the Spawning Habitat of Two Beach Spawning Fishes
  wdfw.wa.gov/publications/01213

Salmon Recovery Chapter Update

- San Juan County:
  www.sanjuanco.com/DocumentCenter/View/25143/Salmon-Recovery-Plan-Update-February-2022_Final

State of Our Watersheds Report

- State of Our Watersheds, Northwest Indian Fisheries Commission
  nwifc.org/publications/state-of-our-watersheds/

Oil spill prevention, preparedness and response

- San Juan Islands Geographic Response Plan:
  www.oilspills101.wa.gov/northwest-area-contingency-plan/geographic-response-plans-grps/san-juan-islands-grp/
- San Juan County oil spill risk consequences assessment:
  www.sanjuanco.com/DocumentCenter/View/24733/SanJuanCo-Oil-Spill-Consequences--ERTV-Cost-Reports-Feb-2019
- Vessel drift and response analysis for the Strait of Juan de Fuca and the southern Strait of Georgia.
  www.sanjuanco.com/DocumentCenter/View/24711/Vessel-Drift-and-Response-Analysis-Inland-Waters-SJC-Apr-2021

San Juan County Comprehensive Plan

www.sanjuanco.com/1079/Comprehensive-Plan-Update

San Juan County Shoreline Master Plan and Critical Areas Regulations

The Shoreline Master Program (SMP) is the local instrument by which San Juan County and the State Department of Ecology (DOE) jointly administer the 1971 Shoreline Management Act (SMA), Chapter 90.58 of the Revised Code of Washington (RCW).

The overarching goal of the SMA is "to prevent the inherent harm in an uncoordinated and piecemeal development of the state's shorelines." To achieve this end, the legislation directs San Juan County to focus on three main areas:

- Encourage reasonable and orderly development of shorelines, with an emphasis on water-dependent and related uses that control pollution and prevent damage to the natural environment
- Protect the natural character of Washington shorelines, including the land, vegetation, wildlife and shoreline environment
- Promote public access and provide opportunities to enjoy views and recreational activities in shoreline areas

The Shoreline Master Program for San Juan County can be found here:
www.sanjuanco.com/578/Shoreline-Master-Program

The Adopted Shoreline Master Program Documents can be found here:
www.sanjuanco.com/907/Adopted-SMP-Documents

SOUTHERN RESIDENT KILLER WHALES

Southern Resident Killer Whale Federal Recovery Plan

- www.fisheries.noaa.gov/west-coast/endangered-species-conservation/southern-resident-killer-whale-recovery-planning-and
- www.fisheries.noaa.gov/resource/document/recovery-plan-southern-resident-killer-whales-orcinus-orca
- repository.library.noaa.gov/view/noaa/15975

Southern Resident Killer Whale State Reviews and Recommendations

- Washington State Periodic Status Review for the Killer Whale (Orca) (2016) wdfw.wa.gov/publications/01773
- Task Force recommendation implementation monitoring and progress: orca.wa.gov/progress/

San Juan County

- Exploring management options to protect Southern Resident killer whale foraging areas: www.sanjuanco.com/DocumentCenter/View/26871/Exploring-Protection-Priorities-for-Southern-Resident-killer-whale-foraging-areas-along-the-west-side-of-San-Juan-Island-
- The whale warning flag: www.sjcmrc.org/media/19297/san-juan-county-whale-warning-flag-final-report-combined-april-2020.pdf

TRANSBOUNDARY EFFORTS

- The State of the Salish Sea: cedar.wwu.edu/cgi/viewcontent.cgi?article=1000&context=salish_pubs
- Canada – US Cooperation in the Salish Sea: 2021-2024 Action Plan: www.canada.ca/en/environment-climate-change/services/cumulative-effects/salish-sea-ecosystem/action-plans-joint-statement-cooperation-georgia-basin-puget-sound.html

COMMUNITY EFFORTS

- Island Climate Resilience: Working towards climate resilience in the San Juan Islands www.madrona.org/islands-climate-resilience
- Strategic Salmon Recovery Planning in the San Juan Islands: Nearshore Marine Habitat Restoration and Protection Project Prioritization. PIAT II sanjuans.org/wp-content/uploads/2018/04/PIAT_II_Final_Report_Dec_2017_with_appendices.pdf
- Shoreline modification Inventory, Friends of the San Juans sanjuans.org/wp-content/uploads/2016/11/FSJ_shoreline_modification_inventory_2010.pdf
- Salish Sea Vessel Traffic Projections: sanjuans.org/ssvtp/
- Sea Level Rise Vulnerability in San Juan County, Washington sanjuans.org/wp-content/uploads/2016/11/MacLennanetal_2014_SJC_Sea_Level_Rise_Vulnerability_final.pdf
- Friends of the San Juans Nearshore Habitat Assessments sanjuans.org/wp-content/uploads/2016/11/Nearshore-habitat-assessment-results.pdf
- San Juan County documented forage fish spawning sites 2020 update sanjuans.org/wp-content/uploads/2021/02/ALLspawn_final_updated.pdf
- San Juan County forage fish habitat assessment report sanjuans.org/wp-content/uploads/2016/11/ForageFishFinalReport.pdf
- Economic benefits of whale watching in San Juan County static1.squarespace.com/static/5b071ddea2772cebc1662831/t/5fd011e67025b80c8175578a/1607471596065/SRKW+Economic+Valuation+Earth+Ecoomics+Jan+2019.pdf
- San Juan County eelgrass report and maps sanjuans.org/wp-content/uploads/2016/11/Eelgrass-Final-Report.compressed.pdf
- Friends of the San Juans kelp habitat white paper sanjuans.org/wp-content/uploads/2016/11/FSJ_Kelp-Habitat-Value-and-Threats.pdf
- Puget Sound Biodiversity Assessment sanjuans.org/wp-content/uploads/2016/11/PugetSoundBasinBiodiversityAssessment.pdf
- The San Juan Alliance. 2013. The Salish Sea Imperiled: A Community Response to Increased Coal Transport Around the San Juan Islands. San Juan Islands, Washington. sanjuans.org/wp-content/uploads/2016/11/THE-SALISH-SEA-IMPERILED.pdf
- Soft shore restoration blueprint sanjuans.org/wp-content/uploads/2016/11/Soft_Shore_Restoration_Blueprint.pdf

Tourism and Visitor Management in the San Juan Islands:

Part I: Resident and business survey
sjclandbank.org/wp-content/uploads/2020/10/Tourism-in-the-San-Juan-Islands-Part-I-Resident-and-businesses-v2.pdf

Part II: All islands boater survey :
sjclandbank.org/wp-content/uploads/2020/10/Tourism-in-the-San-Juan-Islands-Part-II-Visiting-boater-survey-v2.pdf

Part III: Remote Islands boater survey:
sjclandbank.org/wp-content/uploads/2020/10/Tourism-in-the-San-Juan-Islands-Part-III-Remote-Islands-visitor-survey-v2.pdf

Part IV: Conclusions and Recommendations:
sjclandbank.org/wp-content/uploads/2020/10/Tourism-in-the-San-Juan-Islands-Part-IV-conclusions-and-recommendations-v2.pdf

University of Washington Friday Harbor Labs Published Research:

fhl.uw.edu/research/research-projects/publications/

APPENDIX 4.

CONTACT LIST.

Appendix 4. Contact List

List of individuals and affiliations invited to the 2020 an/or 2023 Marine Managers Workshops.

Name	Agency/Organization	2020	2023
Aaron Boyles	Jen Jay/MRC	-	N
Aaron Barnett	Washington Sea Grant	-	Y
Abigail Ames	MRC intern/FHL	Y	-
Adam Griesemer	US Fish and Wildlife	Y	Y
Adam Parrot	Port of Friday Harbor/MRC	-	N
Alan Chapman		N	N
Alanna Frayne	The Whale Museum	-	N
Amy Trainer	Swinomish Indian Tribal Community	N	N
Amy Windrope	WA Department of Fish and Wildlife	N	-
Angela Anderson	San Juan Preservation Trust	N	-
Angela Broderick	SJC Environmental Stewardship	-	N
Barbara Marrett	Port of Friday Harbor/past MRC	N	N
Barbara Rosenkotter	TAG		N
Bart Christiaen	DNR		N
Beth Tate	WA Dept. Fish & Wildlife /MRC	Y*	Y
Betsy Peabody	Puget Sound Restoration	N	N
Bill House	DNR	N	-
Bill Watson	San Juan County Council	N	-
Bob Pacunski	WDFW	N	N
Bob Wilson	Anglers Association	N	-
Brandon Cadwell	SJC Parks	-	N
Brendan Casey	Island Conservation Corp	-	Y
Brendan Flynn	Reef Netters Assoc.	Y	N
Brian Kirk/ Sara Thompson	WA Department of Ecology	Y	-
Bridget Trosin	UW Friday Harbor Labs	-	Y
Brooke Sullivan	SJC Community Development	-	Y
Byron Rot	SJC Environmental Stewardship	N	-
Carolyn Chase	WA Dept of Ecology	-	Y
Catherine Buchalski Smith	WA State Parks	-	Y
Cathleen Burns	MRC	y	-
Cecilia Gobin	NW Indian Fisheries Commission	N	N
Chad Yunge	Ecology	-	N
Chelsey Buffington	WA Department of Fish and Wildlife	N	-
Chris Betcher	Jen Jay Inc	Y	N
Chris Guidotti	WA State Parks	Y	Y
Chris Luerkens	Ecology	-	N

Name	Agency/Organization	2020	2023
Chris Robertson	DNR	-	N
Christina Koons	Marine Resources Committee (MRC)	Y	Y
Cindy Wolf	SJC County Council	-	Y
Colin Maycock	San Juan County Community Development	N	-
Colin Wahl	The Tulalip Tribes	N	-
Craig Burley	US Fish and Wildlife	N	-
Craig Smith	MRC	-	Y
Craig Staude	Friday Harbor Labs	-	N
Cynthia Harbison	WA Dept of Natural Resources	-	Y
Dana Oster	Northwest Straits Commission	Y	N
David Brownell	James Town S'Klallam	-	N
Dayv Lowry	WA Department of Fish and Wildlife	N	-
Deb Fritz	Tow Boat US	-	N
Debra Giles	Wild Orca	Y	Y
Doug McCutchen	SJC Landbank	Y	N
Drew Harvell	UW Friday Harbor Labs	Y	Y
Elaina Thompson	IOSA	-	Y
Elexis Fredy	NPS	N	N
Elizabeth Fint	WA Dept of Ecology	-	Y
Elizabeth Spaulding	WA Dept of Natural Resources	-	Y
Emily Grayson	Washington Sea Grant	N	-
Eric Beamer	Skagit Systems Research Coorp	N	N
Erika Shook	SJC Community Development	N	-
Erin Halcomb	SJC Landbank	-	N
Erin Licata	Madrona Institute	-	N
Ethan Schmidt	SJC Environmental Health	-	Y
Fayette Krause	The Nature Conservancy	N	-
Frances Robertson	SJC Environmental Stewardship	Y	Y
Francine Shaw	Permit Consultant	-	N
Frank Lawrence III	Lummi Nation	-	N
Gabe Harder	WA Dept of Natural Resources	N	Y
Gary Greene	Tombolo Consulting	N	N
Gene Helfman	TAG	-	N
George Swanaset Jr	Nooksack Indian Tribe		N
Grace Ferrara	NOAA	N	N
Grant Carlton	SJC Managers	-	N
Greg Hood	Skagit Systems Research Coop	N	N
Henry Carson	WDFW	Y	N
Hansi Hals	James Town S'Klallam	N	N
Heather Spore	Swinomish Indian Tribal Community	-	Y

Name	Agency/Organization	2020	2023
Helen Barry	DNR	Y	N
Ivan Reiff	MRC	Y	-
Jacques White	Long Live the Kings	Y	N
Jameal Samhouri	NOAA	N	-
Jamie Stephens	San Juan County Council	Y	-
Jason Hodin	UW Friday Harbor Labs	-	Y
Jason Morgan	Northwest Straits Commission	-	N
Jason Wood	SMRU Consulting	-	Y
Jay Kimball	SJC Climate & Sustainability Committee	-	Y
Jeff Dyre	MRC	N	Y
Jeff Gaeckle	WA Dept of Natural Resources	N	Y
Jeff Otis		-	N
Jeff Whitty	Northwest Straits Commission	-	Y
Jennifer Burke	Puget Sound Partnership	N	-
Jennifer Lang	US Army Corp	-	N
Jenny DeGroot	TAG	-	N
Jess Farrer	The Whale Museum	-	N
Jess Newly	Friends of the San Juan	Y	N
Jessa Madosky	SJC Community Development	-	Y
Jessica Stocking	WDFW	-	N
Jim Johannessen	Coastal Geologic Services	-	N
Jodi Bluhm	Samish Tribe	Y	N
Joe Dolan	NPS	N	N
Joe Gaydos	Sea Doc Society	N	N
Joelene Boyd	State Parks	-	N
John Aschoff	Tombolo Consulting	Y	N
Jordan Bunch	US Army Corp	N	-
Judy Meyer	TAG	-	N
Kailey Genther	MRC members	-	N
Kari Koski	Community Member	Y	Y
Karin Roemers-Kleven	MRC	N	Y
Katherine Wellman	Northern Economics	Y**	-
Kathleen Foley Lewis	San Juan Preservation Trust	Y	N
Katie Jones	Center for Whale Research	Y	-
Kendra Baird	Jen Jay Inc	-	Y
Kendra Smith	SJC Environmental Stewardship/MRC	Y	Y
Keven Ryan	US Fish and Wildlife	N	-
Kimbal Sundberg	TAG	N	N
Kira Swanson	State Parks	-	N
Kirsten Evans	The Nature Conservancy	N	-

Name	Agency/Organization	2020	2023
Kolleen Irvine	US Fish and Wildlife	N	-
Krista Davis	SJC Environmental Stewardship	Y	Y
Kurt Fresh	NOAA	N	-
Kurt Licence	WDFW	-	N
Kurt Nelson	Tulalip Tribes	N	N
Kyle Dodd	San Juan County Community Health	N	-
Laura Jo Severson	Marine Resources Committee (MRC)	Y	Y
Lena Tso	Lummi Nation	N	N
Lincoln Borrowman	SJC Landbank	N	N
Linda Kuller	San Juan County Community Development	Y	-
Lisa Hillier	WA Department of Fish and Wildlife	Y	-
Lisa Kaufmann	Northwest Straits Commission	N	N
Lisa Wilson	Lummi Nation	N	N
Lovel Pratt	Friends of the San Juan/MRC	y	Y
Lucas Heart	NW Straits Initiative	N	N
Lynne Barre	NOAA	Y**	N
Marcia de Chandenedes	BLM	N	-
Marcus Reeves	WDFW	Y	N
Marta Green	SJC Environmental Stewardship	Y	Y
Matt Arata	A1 Marine/MRC	-	Y
Matt Axling	The Nature Conservancy	-	N
Matt Baker	Friday Harbor Labs	N	N
Matt Castle	Samish Tribe	-	Y
Matt Colston	PSP	-	N
Megan Dethier	UW Friday Harbor Labs	Y	Y
Merle Jefferson	Lummi Nation	-	N
Mike Ramsey	San Juan County Conservation District	Y	-
Mindy Roberts	WA Environmental Council	Y**	-
Mindy Rowse	Salmon Recovery TAG	-	Y
Molly Bogeberg	The Nature Conservancy	-	N
Monea Kerr	The Nature Conservancy	-	N
Nick Teague	BLM	N	-
Noel Sharp	WA Dept of Natural Resources	-	Y
Olivia Graham	Friday Harbor Labs	Y	N
Patti Gobin	Tulalip Tribes/MRC	N	Y
Paul Andersson	San Juan Conservation District	-	Y
Paul McCollum	Port Gamble S'Klallam	N	N
Paul Pittman	Saturna H20	-	N
Pema Kitaeff	FHL/MRC	N	Y
Phil Dionne	WA Department of Fish and Wildlife	N	-

Name	Agency/Organization	2020	2023
Phil Green	Marine Resources Committee (MRC)	Y	Y
Ray Glaze	TAG	-	N
Rep. Debra Lekanoff	WA State 40th Rep	N	-
Rich Osborne	The Whale Museum/Soundwatch	N	-
Rick Hughes	San Juan County Council	N	-
Robert Wilson	Anglers Association –Local	N	-
Ron Thom	Northwest Straits Commission	-	N
Russ Mullins/Taylor Kimball	WA Department of Fish and Wildlife	Y	-
Ryan Miller	Tulalip Tribes	N	N
Sam Barr	Stillaguamish Tribes of Indians	-	N
Sam Whitridge	SJC Environmental Stewardship	Y	Y
Sandy Whyllie-Eschievera	Friday Harbor Labs	-	Y
Sara Dolan	NPS	N	N
Sara Thitipraserth	Stillaguamish Tribes of Indians	-	N
Sara Thompson	WA Ecology	Y**	-
Sasha Horst	NW Straits Initiative	N	N
Sen. Liz Lovelett	WA State 40th Senator	N	-
Sheryl Albritton	Permit Consultant	-	N
Sonja Larson	Ecology	N	N
Sophie Todd	US Ecology	N	N
Stan Walsh	Swinomish Indian Tribal Community	N	N
Steve Ravello	Anglers Association –Local	N	-
Susanne Shull	NW Straits Initiative	N	-
Taylor Shedd	The Whale Museum/Soundwatch	N	-
Teal Waterstrat	USFWS	-	N
Tim Hyatt	Swinomish Indian Tribal Community	N	N
Tina Whitman	Friends of the San Juan	Y	Y
Toby Hasket	SJC Parks	Y	N
Todd Nicholson	Port of Friday Harbor	N	Y
Todd Woodard	Samish Tribe	N	N
Todd Zackey	Tulalip Tribes	N	N
Tom Cowan	Northwest Straits Commission	Y	N
Tom Mumford	UW Friday Harbor Labs	-	Y
Trent Lieber	National Parks Service	Y	-
Trevor Delgado	Nooksack Indian Tribe	-	N
Tyler Davis	SJC Environmental Stewardship	-	Y
Wendel Raymond	WA Dept. Fish & Wildlife /MRC	-	Y

*Elizabeth Tate was with Jen Jay in 2020 but an MRC member and with WDFW in 2023

** Attended/presented at 2020 workshop virtually.

SAN JUAN COUNTY
Marine Resources
Committee

SAN JUAN
COUNTY
WASHINGTON