



Quartermaster Harbor Mooring Buoy Management Plan

Supplement to Maury Island Environmental Aquatic Reserve
Management Plan

April 3, 2013



WASHINGTON STATE DEPARTMENT OF
Natural Resources
Peter Goldmark - Commissioner of Public Lands

Acknowledgements

Executive Sponsorship

Peter Goldmark, Commissioner of Public Lands
Megan Duffy, Deputy Supervisor, Aquatic Resources

Aquatic Resources Division

Kristin Swenddal, Division Manager
Michal Rechner, Assistant Division Manager
Cyrilla Cook, Policy Unit Supervisor
Lisa Randlette, Environmental Resources Planner
Kyle Murphy, Aquatic Reserves Program Manager
Betty Bookheim, Natural Resources Scientist
Mac McKay, GIS Analyst
Maurice Major, DNR Archaeologist

Shoreline District

Derrick Toba, Assistant Division Manager
Neal Cox, District Manager
Cindy Rathbone, Aquatic Lands Manager
Rolin Christopherson, Aquatic Lands Manager

Principal Author

Lisa Randlette, Environmental Resources Planner

Communications

Toni Droscher, Communications Manager, Aquatic Resources Division

Contributors are staff of the Washington State Department of Natural Resources (DNR) unless otherwise indicated.

Washington State Department of Natural Resources
Division of Aquatic Resources
P. O. Box 47027
Olympia, WA 98504-7027

www.dnr.wa.gov

Request printed copies of this document by contacting DNR's Aquatic Resources Division at 360-902-1100.

Those needing this information in an alternative format, please call TTY-711.

Quartermaster Harbor Mooring Buoy Management Plan

**Supplement to Maury Island Environmental Aquatic Reserve
Management Plan**

.....

April 3, 2013

Washington State Department of Natural Resources

Aquatic Resources Division — Aquatic Reserves Program

1111 Washington St. SE

MS 47027

Olympia, WA 98504-7027

360-902-1100

www.dnr.wa.gov



April 3, 2013

Dear Reader:

I am pleased to present the Quartermaster Harbor Mooring Buoy Management Plan. This plan, which the Washington State Department of Natural Resources prepared as a supplement to the Maury Island Environmental Aquatic Reserve Management Plan (adopted on October 29, 2004), was prepared with the goal of safely, sustainably, and legally improving moorage opportunities while protecting the interests of local recreational boaters and waterfront residents.

The Maury Island Environmental Aquatic Reserve encompasses Quartermaster Harbor, one of the largest bays in Puget Sound. The protected waters support extensive spawning grounds for Pacific herring, attract thousands of migrating birds each year, and provide a permanent home for dozens of species, including shellfish, heron, and bald eagles.

I want to thank the community for their participation in this planning process. With everyone's continued interest and involvement, these marine waters and surrounding intertidal and subtidal habitats of Maury and Vashon Islands will provide a healthy ecosystem, scenic beauty, and enjoyment for us and for future generations.

Sincerely,

A handwritten signature in black ink, appearing to read "Peter Goldmark", written over a horizontal line.

Peter Goldmark
Commissioner of Public Lands

Table of Contents

| | |
|---|-----------|
| 1. Executive Summary | 1 |
| 2. Introduction | 3 |
| State-Owned Aquatic Lands | 3 |
| About the Area | 3 |
| Recreational Boating and Mooring Buoys in Quartermaster Harbor | 3 |
| Purpose of the Quartermaster Harbor Mooring Buoy Management Plan..... | 4 |
| 3. DNR Position / Assumptions | 5 |
| 4. Planning Process | 5 |
| 5. Mooring Buoy Management Plan: A Supplement to the <i>Maury Island Environmental Aquatic Reserve Management Plan</i> | 7 |
| 6. Plan Recommendations | 8 |
| Near-term Implementation | 8 |
| Long-term Management Recommendations | 12 |
| 7. Quartermaster Harbor Description | 13 |
| Physical Setting | 13 |
| Bottom Sediments | 13 |
| Eelgrass Habitat / Pacific Herring | 13 |
| Water Quality | 14 |
| Links to Other Projects Influencing Quartermaster Harbor | 14 |
| 8. Aquatic Land Use Activities | 16 |
| Docks, Floats, and Mooring Buoys | 16 |
| Quartermaster Yacht Club | 17 |
| Quartermaster Harbor Marina | 17 |
| Burton Acres Park | 17 |
| Dockton Beach Marina Park | 17 |
| 9. Vessel Mooring Systems | 20 |
| Concrete Blocks | 20 |
| Embedded Helical Anchors | 20 |
| Other Buoy Anchor Systems..... | 21 |
| 10. Determining Water Depth | 21 |
| Assumed Water Depths in Study Area | 21 |
| Determining Vessel Scope and Spacing..... | 22 |
| 11. Management Options Considered but Not Selected | 25 |
| Option 1: Maintain Current Management Approach | 25 |
| Option 2: Remove Unauthorized Mooring Buoys (Most Restrictive Option) | 25 |
| 12. Permitting and Enforcement | 26 |
| Mooring Buoys and Boatlifts | 26 |
| Tribal Authority | 26 |
| Regulatory Authorities..... | 27 |
| 13. Aquatic Reserve Resources Addressed by Mooring Buoy Management Plan | 29 |

References31

Appendices32

- A. Quartermaster Harbor Mooring Buoy Management Plan Study Area Boundary
Legal Description33**
- B. Inventory of Recreational Mooring Buoys in Quartermaster Harbor.....34**
- C. Quartermaster Harbor—Maury Island Aquatic Reserve: Survey of Moorage Buoy Systems
for Potential Impacts to Aquatic Reserve Habitat, United States Environmental Protection
Agency Region 10, Dive Unit (June 5 - 7, 2012)44**
- D. Informational Workshops Summaries54
(June 15, 2011; May 31, 2012; June 27, 2012)**
- E. Quartermaster Harbor Mooring Buoy Management Plan Timeline55**
- F. Pacific Herring Spawning Surveys / Eelgrass Presence—Summary, Maps56
(extrapolated from WDFW data)**
- G. RCW 79.105.430 Private Recreational Docks—Mooring buoys.....60**
- H. Mooring Buoy License Application Form62**
- I. Excerpt from User’s Guide for Nationwide Permits in Washington State66
(US Army Corps of Engineers / Seattle District)**
- J. Certificate of Adoption.....68**

List of Figures and Tables

- 1. Vicinity Map: Maury Island Aquatic Reserve boundaries.....1
- 2. Photo: Recreational mooring buoy and boat in Burton Cove1
- 3. Map: Study Area—Quartermaster Harbor Recreational Mooring Buoy Management Plan7
- 4. Map: Proposed buoy field for Burton Cove with 54 buoy circles11
- 5. Map: Proposed buoy field for Judd Creek with 16 buoys11
- 6. Map: Proposed buoy field for Dockton with 56 buoy circles12
- 7. Photo: Unauthorized buoys and vessels in Burton Cove.....16
- 8. Photo: Unauthorized buoys and vessels in Dockton16
- 9. Map: Existing recreational mooring buoy locations in Burton Cove18
- 10. Map: Existing recreational mooring buoy locations in Dockton19
- 11. Diagram: Embedded helical anchor with mid-line float21
- 12. Diagram: How water depth is determined22
- 13. Diagram: Vessel swing and anchor line23
- B-1 Quartermaster Harbor recreational mooring buoy inventory34
- B-2 Map: Recreational Mooring Buoy—Map of Inventory Areas.....35

Table 1: 1.5 Scope radius and various depths and vessel lengths24

1. EXECUTIVE SUMMARY

The Washington State Department of Natural Resources (DNR) designates reserves on certain state-owned aquatic lands to preserve, restore, and enhance lands that provide benefits to the health of native aquatic habitats and species. With community help and support in 2004, DNR designated the Maury Island Aquatic Reserve (Figure 1, map). Among the many resources protected in this reserve, Quartermaster Harbor sustains the largest population of Pacific herring in central Puget Sound and the third largest in all of Puget Sound.

The *Maury Island Environmental Aquatic Reserve Management Plan* (October 29, 2004) supports a variety of activities within the reserve, including traditional recreational uses such as boating.

DNR prepared the Quartermaster Harbor Mooring Buoy Management Plan to supplement the *Maury Island Environmental Aquatic Reserve Management Plan*. This plan considers the interests of buoy owners and property owners and addresses the presence and extent of existing, unauthorized mooring buoys. (See Appendix A, Legal Description)

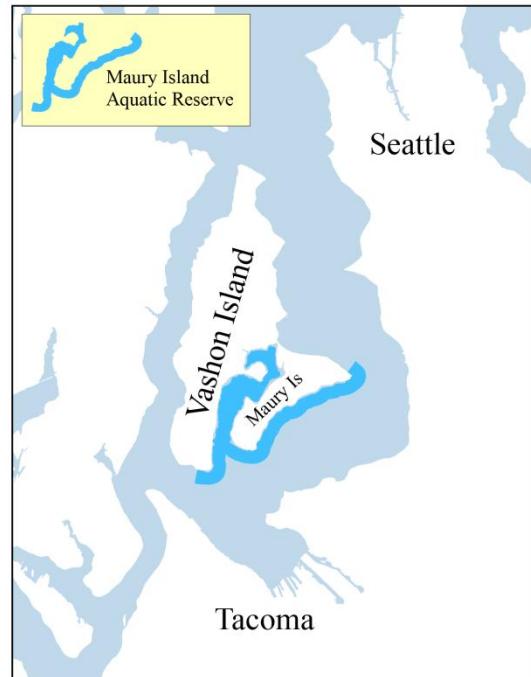


Figure 1. Vicinity Map: Maury Island Aquatic Reserve boundaries.

Why is DNR developing a mooring buoy plan for Quartermaster Harbor?

Historically, recreational boaters moored their vessels in Quartermaster Harbor wherever there was open water. Buoy owners informally cooperated to allow space for other boats. Over time, more buoys and boats accumulated to the point where mooring conditions today have become congested, posing a risk to navigational safety, particularly in Burton Cove, Judd Creek, and Dockton.



Figure 2. Recreational mooring buoy and boat in Burton Cove. (DNR photo, November 2011)

Many vessels and mooring buoys in the Harbor have been abandoned and created hazardous conditions for boaters. In 2011 alone, DNR removed three derelict vessels in Quartermaster Harbor that either sank or were at risk of sinking and potentially colliding with nearby vessels. DNR's Derelict Vessel Removal Program

(DVRP), established in RCW 79.100, spent more than \$32,000 removing the three derelict vessels and sought reimbursement from the boat owners for removal costs.

DNR developed this plan to address navigational safety concerns and avoid potential adverse environmental effects posed by vessel anchors dragging through eelgrass and herring spawning areas and to minimize possible oil spills from vessels colliding or sinking.

Recommendations

After reviewing physical and environmental conditions in Quartermaster Harbor, meeting with waterfront landowners, members of the local community, and boaters, and conducting surveys and inventories of existing mooring buoys, DNR developed the following recommendations for the mooring buoy management plan, which are detailed in Chapter 6, “Plan Recommendations.”

- Designate buoy fields in Burton Cove, Judd Creek, and Dockton to accommodate existing users as well as provide capacity for anticipated future demand, in response to public comments.
- Require that boaters use helical or other DNR approved embedded anchors with mid-line floats.
- Streamline the permitting process by allowing DNR to obtain necessary county, state, and federal permits. Boaters will only need to submit one application to DNR, which will include use authorization and the necessary permits.
- Designate a navigational channel at Dockton and include a voluntary no-anchor area.
- Monitor and evaluate the effects of mooring buoys on eelgrass habitat and herring spawning substrates.
- Remove abandoned and derelict buoys.
- Promote establishment of a public access point in Burton Cove.

Public Review

DNR held a public informational meeting on December 6, 2012, in Vashon to present an overview of the draft plan recommendations and answer questions. DNR requested feedback from the public about the findings and recommendations in this plan. In conjunction with public review of the plan, DNR also conducted a State Environmental Policy Act (SEPA) review. The SEPA public comment period ran from **November 26, 2012, through Monday, January 7, 2013.**

2. INTRODUCTION

State-Owned Aquatic Lands

The Washington State Department of Natural Resources (DNR) manages 2.6 million acres of state-owned aquatic lands—including the bedlands under Puget Sound and the coast, many beaches, and navigable lakes and rivers. DNR manages these aquatic lands as a public trust for the people of the state. As steward of these public lands, DNR works to protect the environment, provide opportunities for recreation, support water-dependent uses, promote sustainable use of natural resources, and protect public navigational and fishing access from obstructions.

DNR's role as manager of aquatic lands is similar to that of a landlord. The agency leases these lands for a variety of uses, including marinas and recreational mooring buoys. Before DNR authorizes a lease or license, it must consider the potential impact of the use on the environment, public health and safety, public use and access, navigation, marine animals, and shellfish beds.

About the Area

The Maury Island Aquatic Reserve is located in central Puget Sound, southwest King County, and includes state-owned aquatic lands in Quartermaster Harbor on the east side of Vashon Island and around much of Maury Island.

Vashon Island is about 12-miles long. Maury Island is about 6-miles long and is connected to Vashon Island by a narrow isthmus. Vashon Island can be reached by public ferry from the south via the Point Defiance to Tahlequah ferry terminals and from the north via the Fauntleroy and West Seattle to Vashon ferry terminals. (Appendix A, Legal description.)

Recreational Boating and Mooring Buoys in Quartermaster Harbor

DNR has documented the location and condition of nearly 200 unauthorized buoys and vessels on state-owned aquatic lands in Quartermaster Harbor (Appendix B, Quartermaster Harbor Recreational Mooring Buoy Inventory). As steward of these lands, DNR's management responsibility is to facilitate navigation and public access as well as to ensure environmental protection. DNR may authorize placement of these mooring buoys by issuing leases or licenses to individual buoy owners who meet King County, state, and federal regulatory requirements and buoy installation standards.

Recreational mooring buoys are a regulated use under the Washington State Shoreline Management Act (King County and Washington Department of Ecology), Hydraulic Project Approval (Washington Department of Fish and Wildlife), and Section 10 Corps Permit (U.S. Army Corps of Engineers). King County shoreline regulations authorize buoys for waterfront residents as a Shoreline Exemption. King County considers all other mooring buoys placed by non-waterfront residents as an unlisted conditional use and requires that these buoy users apply for shoreline permits and go through a public review process to evaluate land-use and environmental compatibility.

These regulatory permits typically require use of embedded helical anchors, with mid-line floats to minimize impacts to bottom sediments, as a condition of authorizing mooring buoy installation.

Helical anchors can be installed and provide effective holding strength in the muddy bottom sediments and relatively shallow water depths found throughout Quartermaster Harbor. Most existing buoys in Quartermaster Harbor are tied to concrete anchor blocks that don't meet the regulatory requirements and may not provide adequate holding strength, as indicated by the number of reports of vessels breaking loose in adverse weather conditions.

Purpose of the Quartermaster Harbor Mooring Buoy Management Plan

This plan addresses navigational safety concerns and how to avoid adverse environmental impacts. This plan documents how DNR will establish and manage buoy fields in the congested areas of Burton Cove, Judd Creek, and Dockton.

DNR proposes to authorize additional buoys on state-owned aquatic lands along the shorelines outside of the focus area of this plan, based on best management practices and consistent with applicable regulatory installation standards.

Conditions of authorization will ensure vessels are anchored in sufficient water depths to avoid grounding, are adequately separated to avoid collisions, and the buoy installation avoids scouring the bottom and potential adverse impacts to eelgrass and Pacific herring.

Maury Island Environmental Aquatic Reserve Management Strategies

Recreational mooring areas will be allowed throughout the reserve based on the following specific management actions:

- *Inventory existing buoys and docks on state-owned aquatic lands and identify ownership;*
- *Cooperate with local authorities and residents to identify appropriate installation methods, locations, and maintenance practices;*
- *Authorize buoys on state-owned aquatic lands;*
- *Remove mooring buoys and recreational docks on state-owned aquatic lands that appear to be abandoned as soon as practical, if ownership of inventoried buoys and docks cannot be determined;*
- *Ensure that all buoys are installed to avoid scouring of aquatic habitat;*
- *Minimize shading where possible; and*
- *Promote public awareness of location of eelgrass and forage fish spawning locations.*

(Maury Island Environmental Aquatic Reserve Management Plan, October 29, 2004, page 42)

3. DNR POSITION / ASSUMPTIONS

To determine the layout of recreational mooring buoy fields in Burton Cove, Judd Creek, and Dockton, DNR will assume a consistent vessel length of 30 feet. While actual vessel lengths vary, this calculation will allow for some flexibility in anchor placement and mooring line length. DNR will consider allowing some minor overlap of vessel swing in the buoy fields to optimize the adjacent navigation channels and the number of mooring buoys for use by the boating community, while discouraging unsafe vessel traffic through the buoy field.

DNR will calculate a vessel swing circle for helical anchors, assuming a scope radius of 1.5-to-1. The calculation will include the length of the attached vessel and 10 feet of mooring line. Anything less will be too narrow a swing and will not allow for storm surge and/or wind wave conditions in Quartermaster Harbor.

DNR will authorize buoy placement using licenses, applying the following additional conditions and priorities:

- Waterfront property owners that meet the requirements of RCW [79.105.430](#) may license recreational mooring buoys for no fee.
- DNR will consider applications for existing mooring buoy users, including designating appropriate locations and installation methods, before licensing new buoys.
- After existing buoys have been addressed, applications for any new mooring buoy installations will be considered on a first-come, first-served basis depending on available capacity.
- No live-aboard vessels will be allowed.
- No rafts will be allowed with mooring buoy licenses.

4. PLANNING PROCESS

DNR developed this plan with the following elements and public process:

Inventoried existing buoys. To the extent that shallow tidelands permitted, DNR inventoried the location of existing buoys and boats throughout Quartermaster Harbor on May 5, 2011, to identify abandoned and potentially environmentally harmful buoys and vessels. (Appendix B.) DNR placed notices on buoys requesting owners to apply for mooring buoy licenses and to identify unclaimed and abandoned buoys for future removal (October 28, November 7 and 10, 2011).

Developed maps of existing buoys. Using the inventory data and water depths of buoy anchors, DNR mapped existing mooring buoy locations and estimated vessel swing circles. Maps of recorded buoy locations are available online at: tinyurl.com/DNR-qm-harbor.

Conducted an underwater survey. DNR conducted an underwater survey of existing mooring buoy fields to collect data on bottom sediment conditions and types of mooring buoy anchor systems currently in place, with assistance from the Region 10 Environmental Protection Agency (EPA) Dive Team (June 5, 6, 7, 2012). (Appendix C.)

Proposed appropriate mooring buoy locations. DNR considered boating conditions, vessel traffic, and potential risk of collisions between moored vessels, and developed a proposal for locating new mooring buoys in a density intended to ensure long-term navigational safety and protect environmental conditions, while also providing sufficient moorage opportunities for the boating community. (Figures 4 and 5.)

Reached out to the boating community. Through a series of three informational workshops, DNR asked boat owners and community members to help identify which mooring buoys are abandoned and which may still be in use. DNR also conducted extensive, directed outreach to the boating community outside the workshops, which laid the foundation for the workshops and helped guide development of this plan. (Appendix D: Informational Workshops Summaries.)

We asked local boaters what conditions they considered necessary for safe moorage in Quartermaster Harbor. According to boaters, water currents and prevailing winds in the relatively sheltered areas of Burton Cove, Judd Creek, and Dockton reduce the potential of vessels colliding while moored within each other's swing circle. Vessels generally swing in the same direction in response to currents, tidal changes, and wind patterns.

At the workshops, DNR also encouraged people to apply for a mooring buoy license if they had an existing buoy in place that DNR had not previously authorized. DNR is holding applications and will determine which buoy owners will receive a license once the planning process is complete and regulatory permits have been issued by King County, Washington Department of Fish and Wildlife (WDFW), and the U.S. Army Corps of Engineers (Corps).

Sought public review of the plan. DNR drafted this plan, incorporating boaters' input, information about aquatic land use patterns, physical and biological conditions, and regulatory requirements. After the public informational meeting (December 7, 2012) and review period (November 26, 2012 – January 7, 2013), DNR revised and finalized the plan in response to comments and suggestions. The **final plan** will serve as a basis for DNR to seek regulatory permits to implement the preferred management option. (Appendix E: Quartermaster Harbor Mooring Buoy Management Plan Timeline.)

5. MOORING BUOY MANAGEMENT PLAN: A Supplement to the *Maury Island Environmental Aquatic Reserve Management Plan*

DNR developed this plan and conducted State Environmental Policy Act (SEPA) analysis to guide future decisions about mooring buoy authorizations in Quartermaster Harbor. This plan was adopted as a supplement to the *Maury Island Environmental Aquatic Reserve Management Plan*.

Based on the SEPA analysis and on behalf of buoy applicants, DNR will directly apply for regulatory permits associated with DNR's buoy authorizations from King County, Washington Department of Fish and Wildlife, and the U.S. Army Corps of Engineers.

Quartermaster Harbor consists of state-owned aquatic lands within the Maury Island Aquatic Reserve boundary. Private tidelands adjacent to the reserve are outside of the study area. Any mooring buoys and rafts on private tidelands are not under the jurisdiction of DNR and were therefore not considered in this plan.

DNR has made some revisions to the buoy inventory map during the plan development to verify private tideland boundaries and to preclude associated buoys from the DNR inventory.

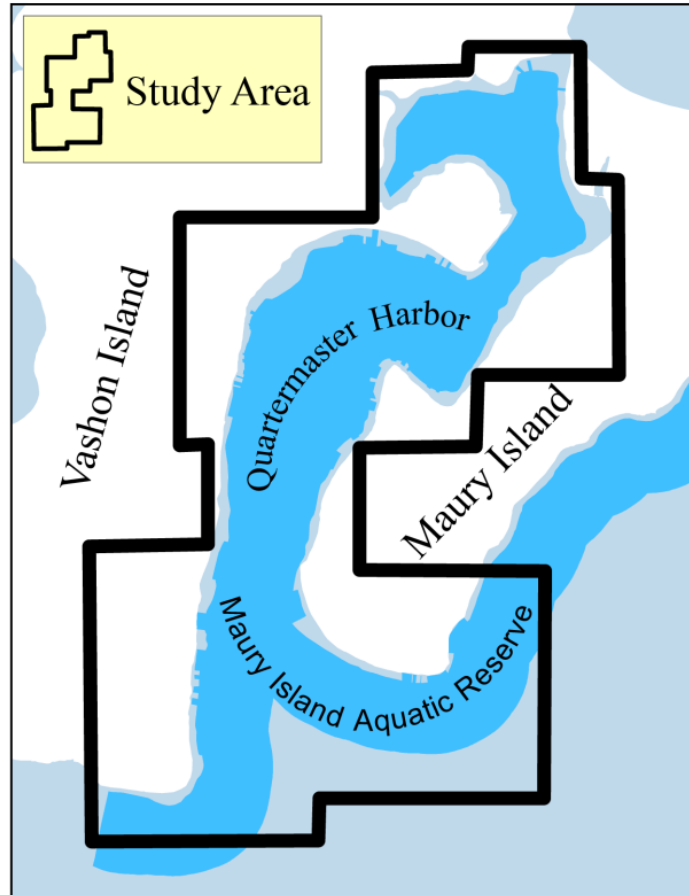


Figure 3. Study area—Quartermaster Harbor Mooring Buoy Management Plan.

6. PLAN RECOMMENDATIONS

Near-Term Implementation

1. **Designate areas in Burton Cove, Judd Creek, and Dockton for buoy fields and along the shoreline in appropriate densities and water depths.** DNR will designate buoy fields within the Maury Island Aquatic Reserve in Burton Cove, Judd Creek, and Dockton, consistent with best management practices outlined in this plan. These areas have the greatest number of existing buoys in Quartermaster Harbor.

The buoy fields will be configured to maintain adequate navigational access through designated buoy fields to private tidelands. When issuing buoy licenses, DNR will minimize potential use conflicts between existing buoys on private tidelands and state-owned aquatic lands by allowing adequate space for navigational access to private tidelands.

Some minor overlap of vessel swing circles may be calculated in the proposed buoy field layouts to optimize the adjacent navigational channels and to discourage additional transient anchoring or vessel transiting through the proposed buoy fields.

This preferred management option identifies the maximum area available for traditional boating activity based on current use patterns, local conditions, and boater preferences. DNR proposes to designate three mooring buoy fields: one in Burton Cove for up to 54 buoys, one near Judd Creek for up to 16 buoys, and one in Dockton for up to 56 buoys (Figures 4, 5 and 6), which will provide capacity for existing buoy users as well as provide additional space for anticipated future demand, in response to public comments.

As of November 26, 2012, DNR received 31 buoy installation applications for Burton Cove, 1 application for Judd Creek, and 28 applications for Dockton. In addition, waterfront residential property owners submitted 19 applications for buoys fronting their private tidelands along shorelines throughout Quartermaster Harbor. (Appendix B: Inventory of Recreational Mooring Buoys in Quartermaster Harbor.)

Unclaimed buoys posing potential navigation hazards will be removed as part of implementing the plan and authorizing buoy applications.

The buoy field layouts will require owners of authorized buoys to install helical or other DNR-approved embedded anchor systems and mid-line floats, with an assumed vessel length of up to 30 feet. The unauthorized floating net pen structure in Dockton and vessels tied up to it will be removed to allow room for the mooring buoy field arrangement and improve navigational access to waterfront property.

Along the shoreline, DNR will authorize residential waterfront buoy installations up to a maximum density between one and two buoys per acre, depending on water depth and vessel length. All buoys authorized on state-owned aquatic lands will be installed in water depths of at least 9 feet mean low low water (MLLW).

2. **Require the use of embedded anchors with mid-line floats.** DNR will require mid-line floats and helical or other DNR-approved embedded anchors for all authorized mooring buoys.

Embedded anchor systems are designed to effectively anchor boats and lessen scouring impacts to the sea floor and habitat such as eelgrass beds. Helical and other DNR-approved embedded anchors provide the most secure fastening system in muddy bottom sediments and minimize risk of vessels dragging or breaking away under adverse weather conditions. The anchors will also accommodate the highest density of mooring vessels, calculated on a 1.5-to-1 scope radius for the vessel swing circle. Mooring buoys installed with embedded anchors will encompass a smaller buoy field area than concrete block anchors, which require a greater scope radius to ensure enough friction on the seafloor to hold the vessel in place.

DNR will consider allowing other embedded anchor systems, as long as they can provide the needed holding power while allowing space for an optimal number of buoys and protecting the seafloor, and they are approved by regulatory agencies. DNR considered and rejected the alternative of allowing both concrete blocks and helical anchors. This alternative would have required a larger swing circle for each buoy and would have reduced the total number of mooring buoys that DNR could accommodate in a buoy field layout. As part of any buoy authorization, DNR will allow a transition period to convert existing concrete anchors to new buoys with helical anchors.

DNR will apply for the necessary local, state, and federal regulatory permits for buoys based on the final adopted mooring buoy management plan and preferred buoy field layouts. DNR will coordinate local meetings with regulatory agencies and applicants to assist with completing permit forms. Boaters will pay DNR the required license fees and a prorated portion of the regulatory permit fees. This management approach will streamline the application process and expedite implementation of the mooring buoy plan.

Once DNR obtains necessary regulatory permits, it will evaluate boaters' applications and issue buoy licenses consistent with approved regulatory conditions and requirements. Based on the DNR-designated fields, individuals could apply to DNR for buoy licenses in available locations. DNR will maintain a waiting list for buoy licenses once the buoy fields are at capacity.

Adopting this management option will implement the optimal distribution and maximum spatial carrying capacity for mooring buoys. Based on community input, this is the most equitable management option for the current boating community and the citizens of the state for which these public lands are managed.

3. **Streamline permitting.** When this plan is finalized, DNR will apply for all of the necessary regulatory permits to establish mooring buoy fields and linear shoreline buoy areas fronting private tidelands to reduce the regulatory burden on applicants.

Once DNR receives regulatory permits, the agency will evaluate all applications submitted and held during the planning process and issue buoy licenses consistent with any approved regulatory conditions and requirements. Boaters will only need to complete one mooring buoy application for DNR authorization and pay one fee, which will cover the required license fees as well as the necessary regulatory permit fees from the other agencies.

DNR will work with the boating community and other stakeholders, King County, WDFW, and the Corps to implement this plan.

4. **Enforcement.** For mooring buoys that are not authorized and where no one has applied for a mooring buoy license, DNR will post a 30-day notice on the mooring buoy, notifying the owner they must remove the buoys from state-owned aquatic lands. DNR may charge a Use and Occupancy Fee ([RCW 79.105.200](#), [WAC 332-30-127](#)) for continued, unauthorized use of state-owned aquatic lands. DNR may remove unclaimed buoys and hold them for a period of time to allow owners to collect them. If a vessel attached to an unclaimed buoy appears abandoned, DNR may coordinate with the King County Sheriff's Office to obtain custody and dispose of the vessel under the Derelict Vessel Removal Program regulation ([RCW 79.100](#)).
5. **Navigational Channels.** DNR will work with King County Parks and the U.S. Coast Guard to designate a navigational channel at Dockton, including a voluntary no-anchorage area. This channel will recognize and accommodate the navigational traffic needs of the King County Marine Park boat ramp and marina. DNR will work with Quartermaster Yacht Club (QYC) to formalize the currently designated navigational channel at Burton Cove, where QYC maintains private aids to navigation with U.S. Coast Guard approval. This channel accommodates the vessel traffic area between QYC, Quartermaster Marina, and the adjacent, informal mooring buoy anchorage area.

DNR will work with marina lessees and the U.S. Coast Guard to clearly delineate navigation channels beyond future designated buoy fields with the intent of reducing the risk of collisions with moored vessels.

6. **Eelgrass and Herring Spawn.** DNR will continue to evaluate WDFW annual surveys, sampling and characterizing types and extent of vegetation and other spawning substrates. DNR's Submerged Vegetation Monitoring Program (SVMP) may periodically sample in the same areas throughout Quartermaster Harbor to track status and trends of vegetation types, particularly eelgrass.

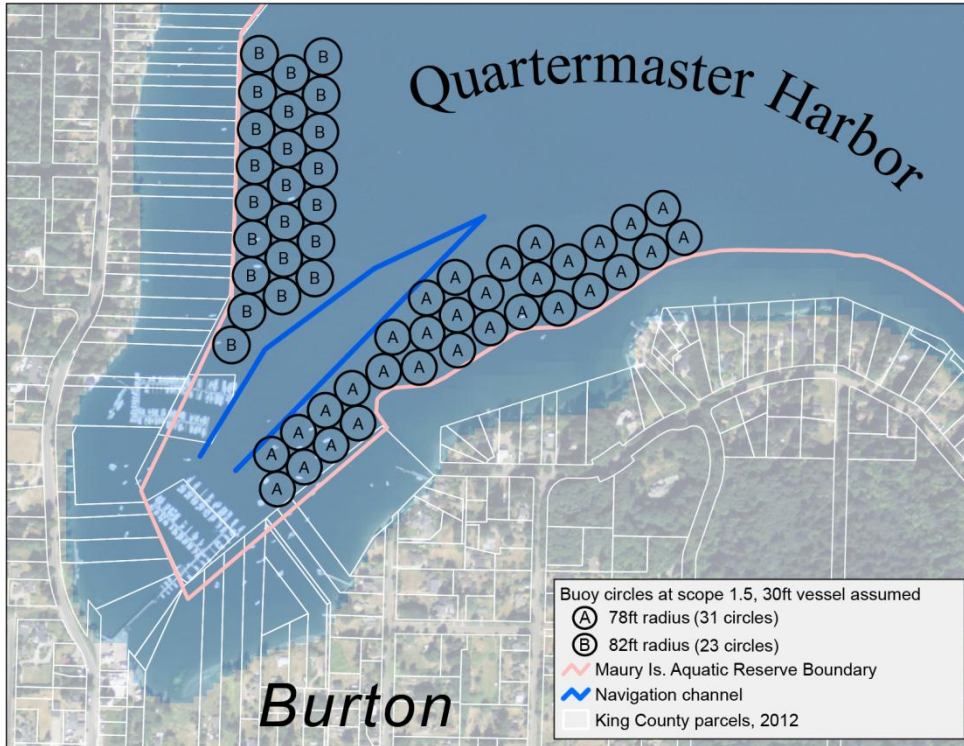


Figure 4. Map of proposed buoy field for Burton Cove with 54 buoy circles.

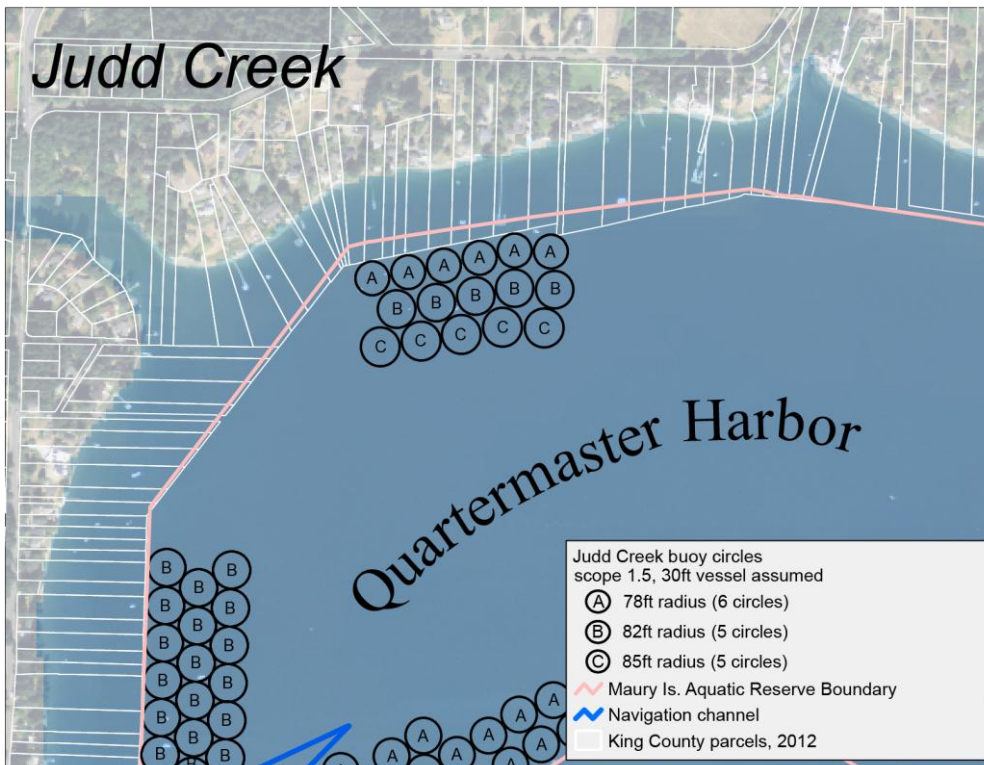


Figure 5. Map of proposed buoy field for Judd Creek with 16 buoy circles.

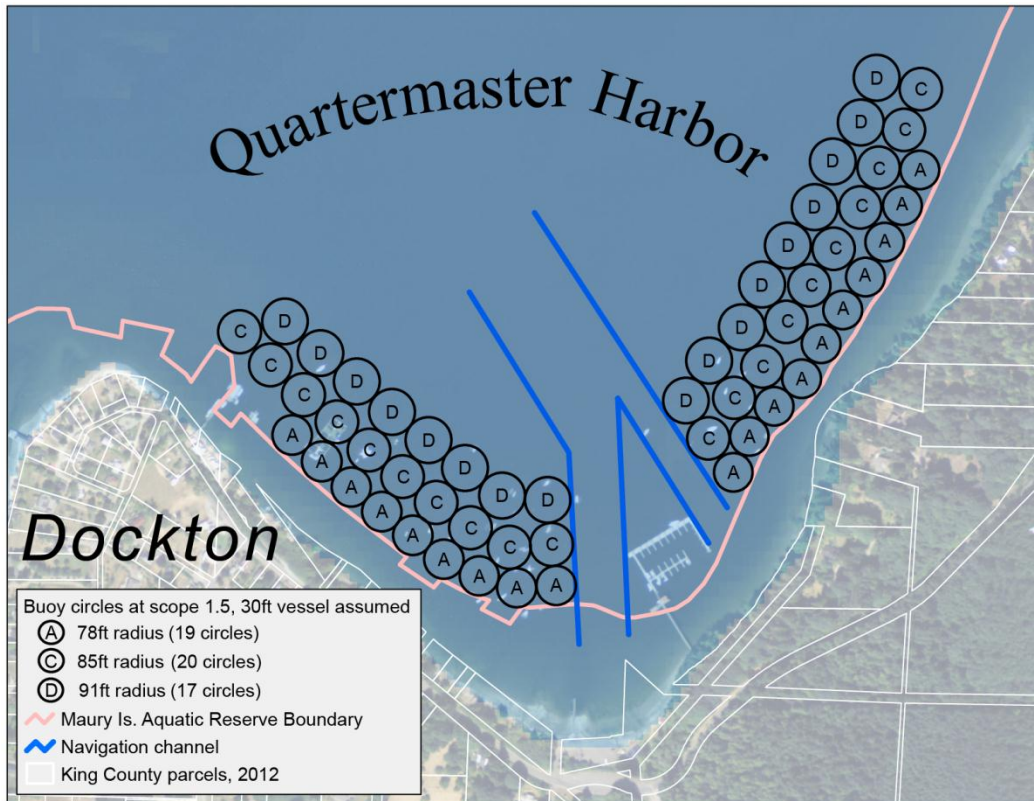


Figure 6. Map of proposed buoy field for Dockton with 56 buoy circles

Long-Term Management Recommendations

1. **Remove abandoned and derelict buoys** posing the greatest threats to the environment and navigation in priority order, as funding becomes available. As it removes these buoys, DNR will document the substrate conditions and establish a baseline for future monitoring. Any future restoration actions related to removal of concrete blocks will be identified and conducted separately from implementing the buoy plan. Depending on the number of buoys identified, DNR may consider removal through contracted services, similar to restoration efforts with the City of Bainbridge Island for buoy removals at Eagle Harbor.
2. DNR will encourage King County to **establish a paid Harbor Master position** to monitor and enforce throughout Quartermaster Harbor and the outer shorelines of Vashon and Maury Islands, similar to what the City of Bainbridge Island Sheriff's Department is implementing for Eagle Harbor and the more rural Bainbridge Island shorelines.
3. DNR will encourage King County Parks or Vashon Park District to **establish a public access point in Burton**. Boaters currently use Burton Acres Park boat ramp (at Jensen Point) and two informal sites at King County-owned public street ends.

The most accessible street end is located adjacent to Quartermaster Marina at Burton and is fully paved to the low-bank bulkhead. According to records, the street right-of-way appears to extend

into the tidelands. During higher tides, visiting boaters launch their dinghies from the county-owned and marina-owned tidelands and often leave the dinghies there.

The second street end (north end of 99th Avenue S.E.) is less accessible and is located in a residential area outside of Burton. Parking is very limited on the side of the paved street right-of-way. The street end is undeveloped for at least 100 feet between the paved street to extensive, low-bank tidelands, owned by Vashon Park District. Boaters leave at least five dinghies within the undeveloped right-of-way on a year-round basis. They use a dirt trail to drag the dinghies down to the tidelands for launching (L. Randlette, personal observation).

7. QUARtermaster HARBOR DESCRIPTION

Physical Setting

Quartermaster Harbor is a large, marine embayment located in south central Puget Sound, King County. It encompasses approximately 3,600 acres of marine waters and is relatively shallow (generally 5- to 70-foot deep). The shoreline in Quartermaster Harbor is roughly 17-miles long, running from Neill Point on the southwest entrance around the sheltered inner harbor of Burton Cove, Judd Creek, Portage, to Dockton and along the eastern shore to Piner Point. (Appendix A: Legal Description.)

The harbor is divided into two distinct ecological zones with differences in associated natural resources and ecological processes. The **Inner Quartermaster Harbor** (roughly north of Burton Peninsula and Raab's Lagoon) is the most protected and shallow portion of the harbor with limited flushing and weak currents. Except for the protected area around Dockton, **Outer Quartermaster Harbor** experiences much higher wave exposure, currents, and circulation. The waters in Quartermaster Harbor are warmer, less saline, and have a higher residency time than waters offshore of Maury Island's east shore.

Bottom Sediments

The bottom sediments in Quartermaster Harbor are classified as soft mud and silt, and are especially deep mud in inner Quartermaster Harbor. Areas closer to shore tend to have a more sandy texture than in deeper waters. Concrete anchor blocks and debris can crush sediment and displace habitat, shading from overwater structures can limit available light for vegetation growth, and boat anchors and chains can scour and disrupt bottom sediments.

Eelgrass Habitat / Pacific Herring

Historically, herring spawn occurred on all available vegetation types distributed throughout Quartermaster Harbor. Eelgrass presence has gradually dwindled in the inner harbor during the past 30 years of herring and vegetation sampling. Since 2001, no herring have been documented spawning on eelgrass in Burton Cove, and limited spawning on other substrate. In the last decade, spawning has occurred on red and brown seaweeds at a few focused sites near the Judd Creek delta. These few remaining vegetated spawning sites tend to have higher densities of spawn than what occurred historically in the area.

Other macroalgae have disappeared from the inner bay and are much less dense throughout Quartermaster Harbor. Three other vegetation data sets corroborate this trend of fewer occurrences and less dense spawning in inner harbor. No single cause can be attributed to this decline.

In the past decade, vegetation was well dispersed throughout Dockton, and herring spawn was found in different densities and concentrations on vegetation. There is less eelgrass present near the east of the Dockton County Marine Park than historically documented, although it persists in the more shallow area. Spawning is also less dense on available eelgrass. Over the past decade, there are more occurrences of herring spawning on macroalgae and other spawning substrates in the more shallow, nearshore area of Dockton. WDFW sampling documented more occurrences of very light (less dense concentration of) herring spawn, compared to historically wider distribution of spawn densities.

Herring spawning has been observed in greater spatial concentration near the outer Park dock structure, rather than historically more dispersed spawning throughout the Dockton area. WDFW has observed a greater number of deposition occurrences with smaller amounts (fewer eggs) deposited. (Appendix F: Pacific Herring Spawning Surveys.)

Water Quality

Quartermaster Harbor experiences limited water circulation and very long flushing times compared to similar-sized bays in Puget Sound, with a mean flushing time of 23.6 days. Inner Quartermaster Harbor, particularly Burton Cove, has the longest flushing time, which contributes to water quality problems. While most Pacific Northwest estuaries have the slowest flush time in September and October and the quickest flush times in November and December, Quartermaster Harbor also experiences slow flushing time in late spring, coincident with the snowmelt-driven Puyallup River plume. It is beyond the scope of this buoy management plan to address ways to increase the limited water circulation in the Harbor.

King County Department of Natural Resources and the University of Washington are conducting the Quartermaster Harbor Nitrogen Management Study, funded in part by a West Coast Estuaries Initiative grant from EPA, Region 10. The study is monitoring oxygen levels in Quartermaster Harbor and evaluating the role of high nitrogen levels in creating low-level dissolved oxygen events in the bay. The study is identifying sources of nitrogen input from small streams, on-site septic systems, and direct groundwater discharge flow.

www.kingcounty.gov/environment/watersheds/central-puget-sound/vashon-maury-island/quartermaster-nitrogen-study.aspx

King County will develop new policies related to nitrogen management on Vashon-Maury Island and recommend management actions for implementing the new policies in the King County Comprehensive Plan update.

Links to Other Projects Influencing Quartermaster Harbor

- Washington State Department of Natural Resources' Maury Island Aquatic Reserve web page includes a link to the *Maury Island Environmental Aquatic Reserve Management Plan* and other information related to DNR's management of the reserve.
www.dnr.wa.gov/ResearchScience/Topics/AquaticHabitats/Pages/aqr_rsve_maury_island.aspx

- The Vashon-Maury Island Groundwater Protection Committee is working to broaden the understanding of the impacts to Quartermaster Harbor. Groundwater Protection Committee meetings are open to the public and held quarterly on the fourth Wednesday of the month (Jan/Apr/Jul/Oct).
www.kingcounty.gov/environment/waterandland/groundwater/management-areas/vashon-maury-island-gwma/committee.aspx
- Washington State Department of Ecology South Puget Sound Dissolved Oxygen Study on low dissolved oxygen levels in South Puget Sound.
www.ecy.wa.gov/puget_sound/dissolved_oxygen_study.html
- Public Health - King County Vashon-Maury Island Marine Recovery Area to correct failing on-site sewage systems on the west side of outer Quartermaster Harbor.
www.kingcounty.gov/healthservices/health/ehs/wastewater/mra.aspx
- Washington State Department of Health Shellfish Program to monitor and classify water quality and manage shellfish harvest in Quartermaster Harbor.
www.doh.wa.gov/CommunityandEnvironment/Shellfish.aspx
- Puget Sound Restoration Fund Quartermaster Harbor Nutrient Mitigation Project to test effects of growing mussels on water quality in Quartermaster Harbor.
www.restorationfund.org/projects-Nutrients.php

8. AQUATIC LAND USE ACTIVITIES

The primary land use along the waterfront of Quartermaster Harbor is low density residential development, with roughly 700 parcels. The location and extent of private tideland ownership boundaries varies between neighboring waterfront owners, depending on how the tidelands were initially surveyed and platted and when they were purchased. The waterward boundary of private tidelands in Quartermaster Harbor varies between the meander line, mean lower low water, extreme low tide, or even farther waterward for some platted oyster tracts. Waterfront residents own more than 500 acres of private tidelands; many have installed docks, piers, floats, and recreational mooring buoys on both private tidelands and on state-owned aquatic lands.

Residential waterfront owners have a statutory right to register or license a mooring buoy on state-owned aquatic lands for no annual fee ([RCW 79.105.430](#)). DNR may revoke this right if the agency determines it is necessary to protect access, ingress rights of other landowners, public health and safety, and natural resources. DNR charges non-waterfront owners an annual licensing fee for mooring buoys, based on the length of their vessel.

Traditional recreational activity in Quartermaster Harbor includes fishing, crabbing, boating, a rowing course for the Vashon Rowing Club, water skiing, swimming, and swim rafts. DNR received many public comments confirming that local residents are frequent boaters in the Harbor. From historical times to the present, they use various existing docks, barges, floats, and buoys. Some of these floating structures provide incidental roosting and haul-out opportunities for wildlife.

Historically, there were major shipbuilding facilities at Dockton; today, there is no major commercial development in the area. Two private recreational marinas operate at Burton Cove. Vashon Parks District maintains a waterfront public park and boat ramp at Burton Peninsula. King County Parks maintains a waterfront park, marina, and boat ramp at Dockton.

Docks, Floats, and Mooring Buoys

Only those buoys anchored on state-owned aquatic lands are within the Maury Island Aquatic Reserve. The reserve does not include private tidelands. DNR estimates that roughly 274



Figure 7 (above). Boats and mooring buoys in Burton Cove. **Figure 8** (below). Boats and mooring buoys in Dockton. Most of these mooring buoys have not been authorized by DNR. (Photo: DNR. May 2011)



permanently installed recreational mooring buoys and rafts are located throughout Quartermaster Harbor. Of these, approximately 187 buoys and rafts currently are anchored on state-owned aquatic lands, with the majority congregated in Burton Cove and Dockton (Figures 6 and 7). The remaining 87 buoys are moored landward of the reserve on private tidelands. The buoys on private tidelands are broadly distributed throughout Quartermaster Harbor, fronting the associated residential waterfront. (Appendix B.)

Most existing buoys on state-owned aquatic lands have not been authorized by DNR. In some cases, vessels have been abandoned and pose a risk to boaters. The King County Sheriff's Office regularly monitors vessel registration and responds to unsafe navigational conditions, including enforcement action to remove sinking vessels.

Quartermaster Yacht Club

The Quartermaster Yacht Club (QYC) maintains private facilities with approximately 100 mooring slips and dock space for club members and reciprocal moorage for members visiting from other yacht clubs. They lease almost three acres of state-owned aquatic lands from DNR for the marina and are considered an existing use within the reserve.

Many of the existing buoy owners in Burton Cove access the uplands by being a member of the Yacht Club or by renting moorage space from the Quartermaster Harbor Marina.

DNR is cooperatively working with QYC to reduce impacts to habitats and species caused by anchoring, according to the reserve management plan provisions. (Section 5.2.3.1 *Maury Island Environmental Aquatic Reserve Final Management Plan*, October 29, 2004, pp. 50 - 52)

Quartermaster Harbor Marina

The Quartermaster Harbor Marina has approximately 90 mooring slips. In 2011, the Marina replaced and reconfigured docks, removed creosote pilings, and extended floats roughly 50 feet waterward and 50 feet lateral to the shoreline. DNR is cooperatively working with the Marina to reduce impacts to habitats and species caused by anchoring, according to the reserve management plan provisions. (Section 5.2.3.2 *Maury Island Environmental Aquatic Reserve Final Management Plan*, October 29, 2004, pp. 53-54)

Burton Acres Park

Vashon Park District maintains the Vashon Kayak Center at Jensen Point on Burton Peninsula. The Park includes a rowing club boat house, public parking area, and public no-fee boat ramp that provides access for boaters to row out to vessels moored nearby.

Dockton Beach Park Marina (King County Parks)

The Dockton Beach Park Marina contains approximately 40 mooring slips and dock space in the short-stay marina, public showers and restrooms, picnic area, parking, and boat ramp and provides access for boaters to row out to vessels moored nearby. DNR is cooperatively working with King County to reduce impacts from visiting boaters, including reducing impacts to habitats and species caused by anchoring within the harbor and addressing the need to maintain an operable pump-out facility. (Section 5.2.3.3 *Maury Island Environmental Aquatic Reserve Final Management Plan*, October 29, 2004, p. 54)

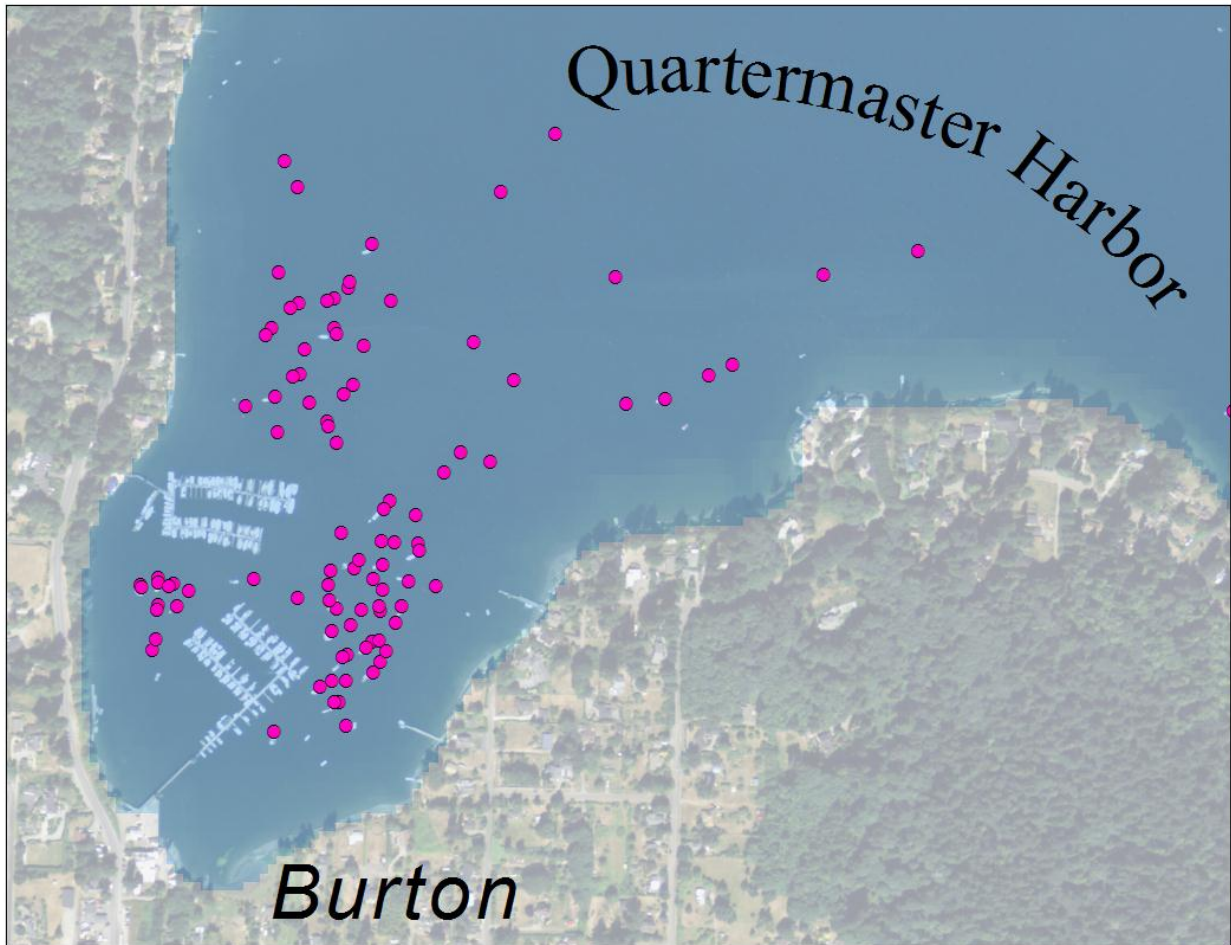


Figure 9. Existing recreational mooring buoy locations in Burton Cove. Area contains 67 buoys with 21 moored vessels (as of November 26, 2012):

- 45 buoys on state-owned aquatic lands.
- 13 buoys on private tidelands.
- 6 buoys on King County tidelands.
- 3 on Vashon Park District tidelands.

For Burton Cove, DNR received 31 applications for existing, unauthorized buoys and 2 applications for new buoys as of November 26, 2012.

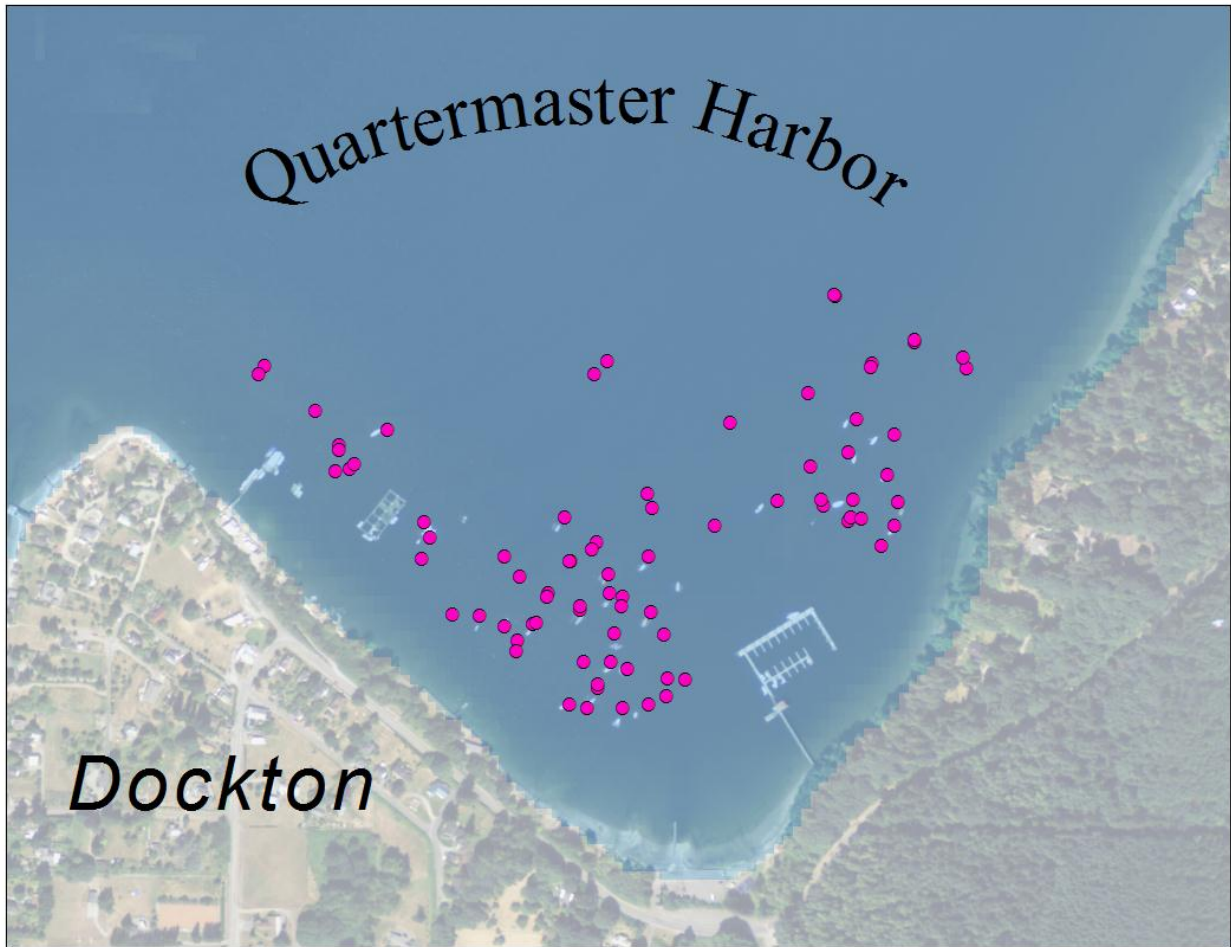


Figure 10. Existing recreational mooring buoy locations in Dockton. Area contains 52 buoys on state-owned aquatic lands with 22 moored vessels. For Dockton, DNR has received 28 applications for existing unauthorized buoys and 2 applications for new buoys, as of November 26, 2012.

9. VESSEL MOORING SYSTEMS

The basic components of any vessel mooring system include an anchor, anchor line with a mid-line float, buoy, and mooring line connecting to the vessel. The key design requirement in any vessel mooring system is to safely accommodate the maximum horizontal load (calculated in pounds of breaking strength) that a vessel may exert in adverse weather conditions. Owners need to regularly maintain and clean buoys, anchor lines, and tackle to check for corrosion and bio-fouling.

The length of most vessels observed in Quartermaster Harbor, particularly the concentrations in Burton Cove, Judd Creek, and Dockton, range from 16 to 28 feet. (DNR will assume an average 30 foot length when designating authorized buoy locations to accommodate different-sized vessels over time.) The lengths of anchor lines varied significantly between adjacent buoys and vessels and in some cases posed the risk of potential overlap of vessel scopes and potential collisions, given countervailing wind and current conditions (Appendix B: Inventory of Recreation Mooring Buoys in Quartermaster Harbor). Most of the mooring buoys in Burton Cove, Judd Creek, and Dockton are connected to undersized concrete blocks as anchors, with no mid-line floats on the anchor lines (Appendix C: Maury Island Aquatic Reserve: Survey of Moorage Buoy Systems). A number of the derelict buoys are so covered with mussels and other marine growth that they are partially submerged and pose potential navigation hazards.

Concrete Blocks

Concrete anchor blocks of a sufficient weight and holding strength hold vessels in place by friction across the sediment bottom. The scope of the vessel swings when using concrete anchors require an angle of at least 2.5-to-1 on the anchor line, including consideration of storm surge conditions. If the concrete anchor blocks sink into the substrate, the suction provides additional holding strength.

Advantages: Concrete anchor blocks are best used where embedded anchors can't be installed due to water depths greater than 30 feet or in substrate conditions such as impermeable rock or clay where embedded anchors can't hold.

Disadvantages: Concrete anchor blocks displace or crush any habitat under the footprint of the anchor. Concrete anchors require a greater scope to ensure enough friction on the seafloor to hold the vessel in place.

Since moving parts corrode, buoy chains and anchor connections require regular inspection for wear, maintenance, and replacement of worn parts.

Embedded Helical Anchors

Embedded helical anchor systems consist of a shaft made of 1¼-inch or 1½-inch solid, galvanized steel with two or three anchor plates that are hydraulically screwed into the substrate. Double-braided anchor lines are connected to the shaft by a shackle with plastic thimbles and then connected from the shackle to a swivel and 6 feet of chain that passes through the buoy.

Advantages: These anchor systems provide a stronger holding anchor system. A scope of 1.5-to-1 creates more compact buoy circles and allows a higher density of mooring buoys in a given area.

Installation of embedded helical anchors does not displace or crush habitat and substrate.

Proper design and installation of embedded helical anchors reduces the need for regular maintenance to the top section of the anchor system.

Embedded helical anchors are the preferred environmental option for regulatory permit consideration.

Relatively shallow water depths and muddy substrate conditions in Quartermaster Harbor are appropriate for installation of embedded helical anchors.

Disadvantages: Initial installation costs are typically more expensive than concrete blocks. Embedded helical anchors may not be installed in greater than 30-foot water depths or in impermeable substrates.

Other Buoy Anchor Systems

DNR will consider allowing other embedded anchor systems, as long as they can provide the needed holding power while allowing space for an optimal number of buoys and protecting the seafloor. These alternatives would also need to be approved by regulatory agencies.

Proponents for other systems, such as dual mushroom anchors, will need to document that these performance criteria can be met.

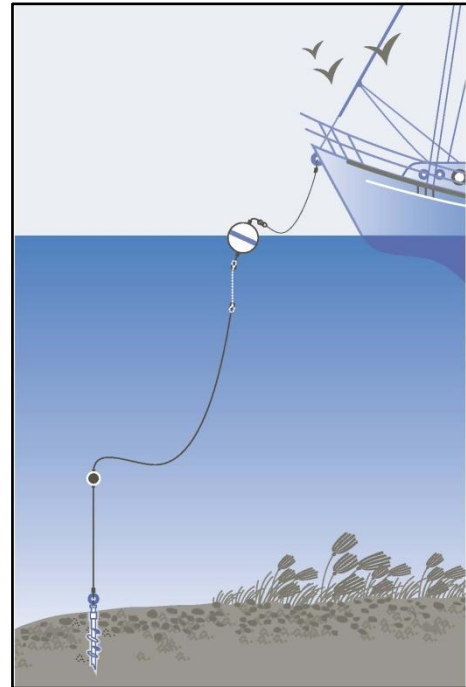


Figure 11. Embedded helical anchor with a mid-line float.

10. DETERMINING WATER DEPTH

DNR measured the water depths of surveyed mooring buoys to determine the approximate vessel swing circles and densities. Buoys located in shallow water generally encompass smaller swing circles than buoys located in deeper water. Buoys placed too close to one another overlap their swing circles and create potentially unsafe conditions, allowing moored vessels to collide. DNR determined the optimal buoy density by factoring water depths, allowable vessel scope (by anchor type), and estimated vessel lengths.

Assumed Water Depths in Study Area

- Burton Cove north area assumed depth — 12.5 feet
- Burton Cove south area assumed depth — 10.0 feet
- Judd Creek assumed depths — 10.0, 12.5, 15.0 feet
- Dockton area assumed depths — 10.0 feet, 15.0 feet, 20.0 feet
- Inner Quartermaster Harbor average assumed depth — 10.0 feet
- Outer Quartermaster Harbor average assumed depth — 15.0 feet

DNR used tide data from the National Oceanic and Atmospheric Administration (NOAA) website (tidesandcurrents.noaa.gov) and calculated depth relative to the tidal datum based on the following information:

| | |
|------------------------|--|
| Station 944648 | 12.39 Mean Higher-High Water (MHHW) |
| Name: Tacoma, WA | 0.58 Mean Lower-Low Water (MLLW) |
| Units: Feet | 0.00 Station Datum |
| Tidal Epoch: 1983-2001 | 15.15 Highest Observed Water Level (EHT) |
| | -4.11 Lowest Observed Water Level (ELT) |

For the surveyed buoys, the range between the Extreme Low Tide (ELT) and Extreme High Tide (EHT) is 19.26 ft.—calculated using the measured depths and the method shown in Figure 11, below. The calculation did not consider any error introduced due to variation in tidal heights between Tacoma and Quartermaster Harbor. Water and storm surge conditions can add up to 6 to 8 feet of depth in Quartermaster Harbor. (Personal communications from Mr. Winters, long-time boater in Dockton.)

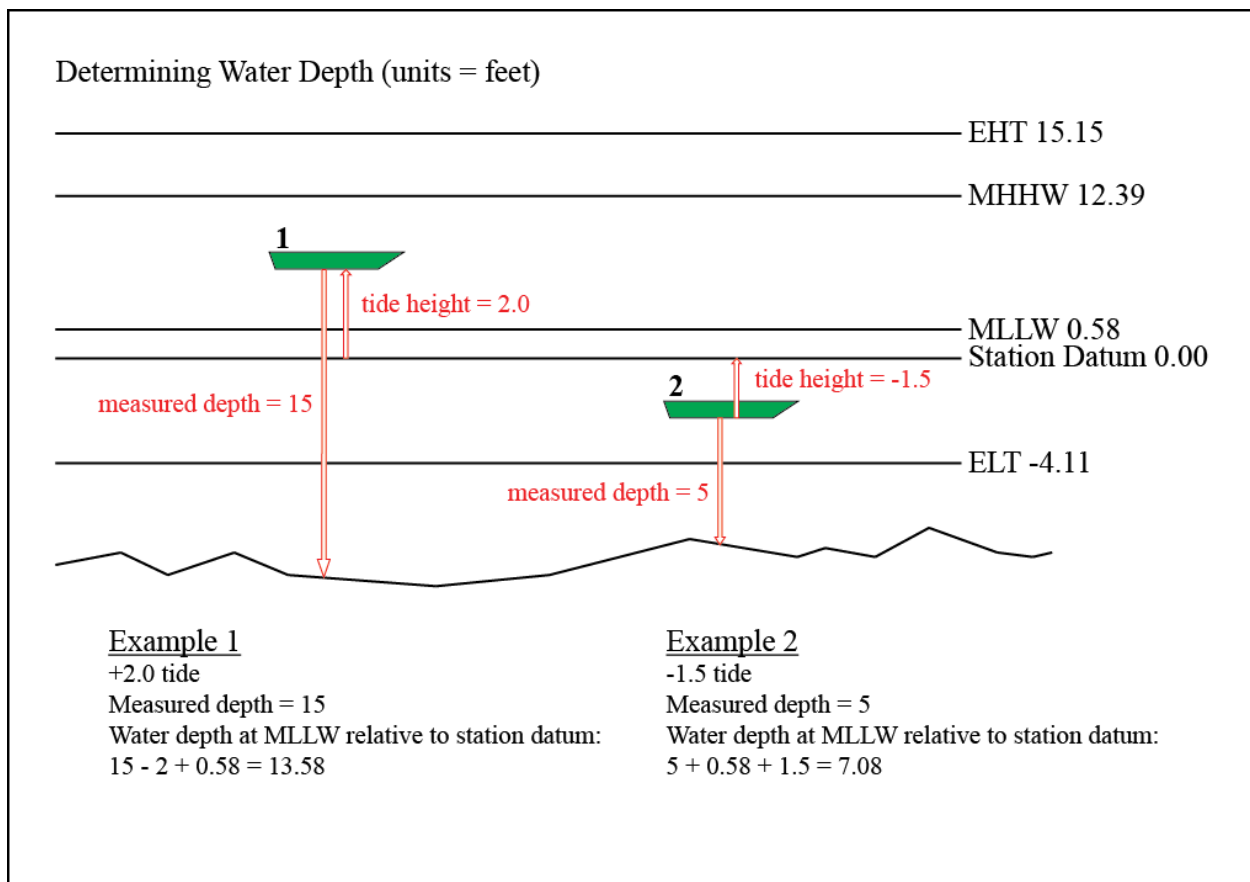


Figure 12. How water depth is determined by correcting for tidal variation

Determining Vessel Scope and Spacing

The required vessel scope for any system of boat mooring is determined by the type of anchor used and the relative holding power of the anchor. Boat anchors used for short-term, temporary moorage require considerable scope to provide a shallow angle of line to the vessel. This allows the anchor to settle into the sediment for holding power; yet the anchor can also be pulled up when preparing to

leave. Permanent mooring systems are designed with anchors that provide high holding power that require less scope.

The extreme high tide and low tide levels were used to find anchor line length and vessel swing radius by the following formulas:

Anchor line length (L) = SCOPE x EHT (highest observed water level) where SCOPE is the ratio of anchor line length to water depth. DELT= Water Depth at Extreme Low Tide.

Vessel Swing = $\sqrt{(L^2) - (DELT^2)}$ + mooring line (10ft. assumed) + vessel length
(Figure 12.)

A scope of 1.5-to-1 was used in these calculations, assuming the installation of permanent embedded helical anchor systems. Concrete anchor blocks require a minimum scope of 2.5 to 1. Vessel anchors require a minimum scope of 4.0 to 1. Washington State Parks recommends a scope between 4 and 7 feet of anchor line for every 1 foot of water depth for vessel anchors. To optimize the number of buoys DNR can accommodate in the buoy fields, helical anchors or other DNR-approved embedded anchor systems will be authorized in place of concrete blocks, which occupy substantially more area. DNR will provide specific latitude and longitude coordinates for each authorized buoy license and will field verify locations once anchors are installed.

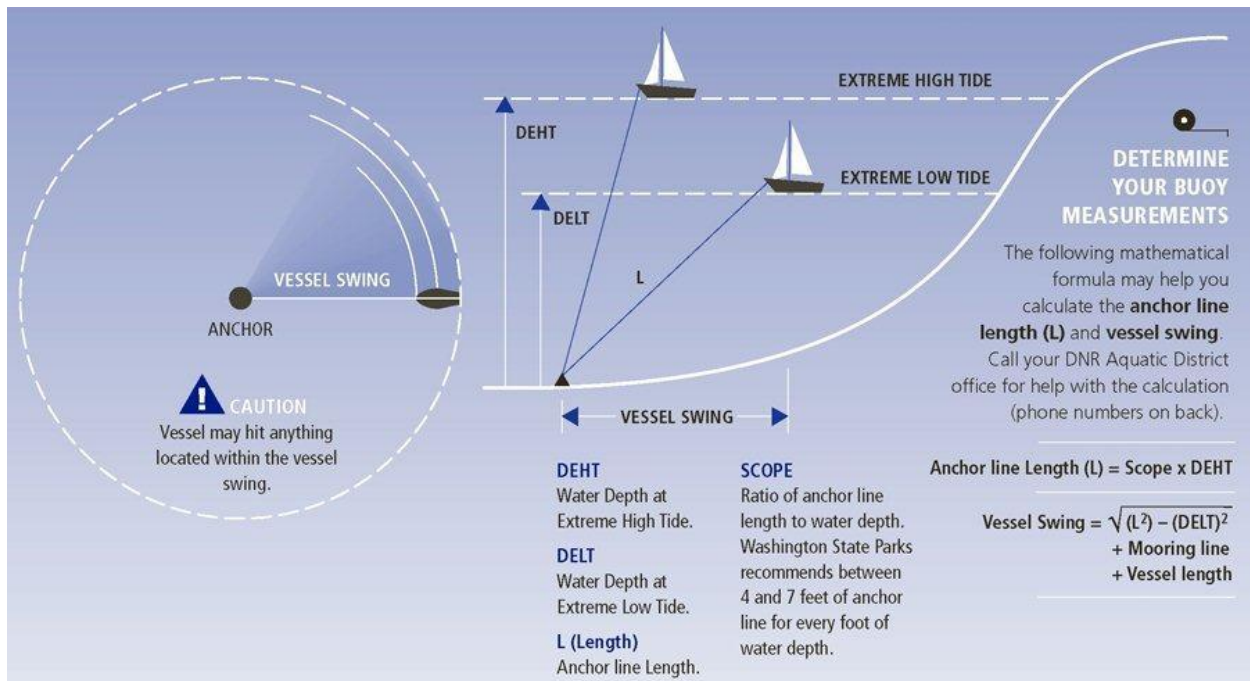


Figure 13. Vessel Swing and Anchor Line—showing formula for calculating radius. (From DNR brochure: “Recreational Mooring Buoys for Residential Owners Next to State-Owned Aquatic Lands.”)

Table 1: 1.5-to-1 Scope Swing Radius at Various Depths and Vessel Lengths.

| MLLW* | Scope | ELT** | EHT*** | Anchor Line Length (ft) | Swing Radius (ft) | Boat 30 (ft) | Boat 40 (ft) | Boat 50 (ft) | Boat 60 (ft) |
|--------------|--------------|--------------|---------------|--------------------------------|--------------------------|---------------------|---------------------|---------------------|---------------------|
| 0 | 1.5 | -4.69 | 15.73 | 24 | 23 | 63 | 73 | 83 | 93 |
| 2.5 | 1.5 | -2.19 | 18.23 | 27 | 27 | 67 | 77 | 87 | 97 |
| 5 | 1.5 | 0.31 | 20.23 | 31 | 31 | 71 | 81 | 91 | 101 |
| 7.5 | 1.5 | 2.81 | 23.3 | 35 | 35 | 75 | 85 | 95 | 105 |
| 10 | 1.5 | 5.31 | 25.73 | 39 | 38 | 78 | 88 | 98 | 108 |
| 12.5 | 1.5 | 7.81 | 28.23 | 42 | 42 | 82 | 92 | 102 | 112 |
| 15 | 1.5 | 10.31 | 30.73 | 46 | 45 | 85 | 95 | 105 | 115 |
| 17.5 | 1.5 | 12.81 | 33.23 | 50 | 48 | 88 | 98 | 108 | 118 |
| 20 | 1.5 | 15.31 | 35.73 | 54 | 51 | 91 | 101 | 111 | 121 |
| 22.5 | 1.5 | 17.81 | 38.23 | 57 | 55 | 95 | 105 | 115 | 125 |
| 25 | 1.5 | 20.31 | 40.73 | 61 | 58 | 98 | 108 | 118 | 128 |
| 27.5 | 1.5 | 22.81 | 43.23 | 65 | 61 | 101 | 111 | 121 | 131 |
| 30 | 1.5 | 25.31 | 45.73 | 69 | 64 | 104 | 114 | 124 | 134 |
| 32.5 | 1.5 | 27.81 | 48.23 | 72 | 67 | 107 | 117 | 127 | 137 |
| 35 | 1.5 | 30.31 | 50.73 | 76 | 70 | 110 | 120 | 130 | 140 |
| 37.5 | 1.5 | 32.81 | 53.23 | 80 | 73 | 113 | 123 | 133 | 143 |
| 40 | 1.5 | 35.31 | 55.73 | 84 | 76 | 116 | 126 | 136 | 146 |

Based on National Ocean Service (NOAA) data

* MLLW — Mean Low Low Water

** ELT — Extreme Low Tide

*** EHT — Extreme High Tide

11. MANAGEMENT OPTIONS CONSIDERED BUT NOT SELECTED

Option 1. Maintain Current Management Approach

Under this option, DNR would issue mooring buoy licenses to those applicants who can provide documentation of regulatory permission from King County, WDFW, and the Corps of Engineers. The vessel swing circle of DNR-licensed buoys may not overlap onto private tidelands or interfere with reasonable navigational access. Due to high demand, DNR would authorize only one mooring buoy per person.

If permitted by the regulators, DNR would allow use of existing anchor blocks in their current location and configuration. Boaters are responsible for ensuring existing blocks provide adequate holding strength for their vessel size. The buoy user must install a mid-line float as a condition of the DNR buoy license requirement.

Note: Mooring buoy licensees must regularly maintain their anchors. If an anchor corrodes, the licensee must either replace it with an embedded anchor or abandon the buoy. The inspection procedure for DNR buoy licenses requires:

- A letter from a licensed diver to confirm the anchor is secure.
- A work invoice submitted to document that a mid-line float is installed on the anchor line.

Newly authorized buoys would displace existing, unauthorized buoys. DNR would notify owners of unauthorized buoys to remove their buoys when they conflict with the vessel swing circle of an authorized buoy. With limited DNR enforcement available, unauthorized buoys would remain in place and any ongoing navigational safety threats, vessel traffic conflicts, and environmental impacts would continue to occur.

Existing buoys owners using concrete anchors would be required to install embedded anchors if they were allowed to relocate to a new location. (They would individually have to obtain a King County shoreline permit, a Hydraulic Project Approval (HPA) permit from WDFW, and a permit from the U.S. Army Corps of Engineers.)

This option was not selected because it would result in continuing navigational safety concerns which is inconsistent with supporting traditional boating activities within the aquatic reserve. Buoy owners generally want protection for their boats from encroaching unauthorized buoys. Environmental conditions in existing buoy anchorage areas would not measurably improve.

Option 2. Remove Unauthorized Mooring Buoys (Most Restrictive Option)

Under this option, DNR would notify owners that their existing buoys are unauthorized and would be removed within a set timeframe as a necessary proprietary management enforcement action. DNR would refer all current buoy license applicants to King County for shoreline permit authorizations.

DNR would designate a limited band of state-owned aquatic lands potentially available for residential waterfront owners fronting their private tidelands. The designated area would extend

waterward from a minimum depth of at least 9 feet MLLW in direct proximity to private tidelands, in order to authorize buoys as near to the upland residence as practical while minimizing potential habitat impacts. DNR would require lateral spacing of buoys to accommodate adequate spacing for vessel scope, allowing some clearance to account for necessary egress from private tidelands.

This option was not selected because it may encourage buoy owners to move their buoys to shallow, private tidelands and result in additional sediment disturbance and scouring of habitat. This option doesn't meet reserve management plan goals of:

- Conserving native habitats and associated plant and wildlife species.
- Supporting traditional boating activities and would displace many long-term buoy users.

12. PERMITTING AND ENFORCEMENT

DNR developed this plan to facilitate cooperative management of recreational mooring buoys in Quartermaster Harbor with King County and the other regulatory agencies. DNR will apply for necessary regulatory permits and work with owners of existing, unauthorized buoys to assist them in applying for DNR-issued mooring buoy licenses.

Mooring Buoys and Boat Lifts

Boat owners wishing to install a private, recreational mooring buoy or boat lift on state-owned aquatic lands in Quartermaster Harbor may apply to DNR for one of the following authorizations:

Mooring buoy license. For applicants who don't own residential waterfront property. An application fee is charged, based on the length of the vessel.

Mooring buoy registration. For applicants who own residential waterfront property that abuts state-owned aquatic lands may install and maintain a mooring buoy without charge (per RCW 79.105.430(2)). (Appendix G: Private recreational docks — Mooring buoys.)

Mooring buoy lease. For applicants, regardless of whether or not they own residential waterfront property, an annual rent is charged based on the amount of area encumbered, calculated on the full vessel swing circle (per RCW 79.105.360 and WAC 332-30139).

All three authorizations are on the same application form, downloadable at:

www.dnr.wa.gov/Publications/aqr_mooringbuoy_app_qtrmstrhbr.pdf

(Appendix H: Mooring Buoy License Application)

Tribal Authority

The Maury Island Reserve is located within the Puyallup Tribe's exclusive 'usual and accustomed' area and includes treaty interests in the waters and bedlands of Quartermaster Harbor. The mooring buoy and management activities proposed in this plan will be implemented in consultation with the Puyallup Tribe to ensure their treaty rights are upheld and not infringed upon in any way.

Regulatory Authorities

The following agencies require permits for recreational mooring buoy installation. DNR will apply for the necessary permits as part of implementing this plan.

King County Shoreline Management Master Program

King County regulates development along shorelines and on water bodies under its jurisdiction. The Washington State Shoreline Management Act ([RCW 79.90](#)) gives cities and counties the responsibility to plan and manage shoreline development and activities. In King County, residential shoreline property owners may install a recreational mooring buoy as a residential accessory structure. If an existing buoy was present prior to November 22, 1976, King County considers it a “legal, non-conforming use.” New or unpermitted buoys are not legally non-conforming, and property owners may request a “shoreline exemption.” King County considers recreational mooring buoys installed and maintained by non-waterfront owners an “unlisted” shoreline conditional use. Such mooring buoys need a substantial development and conditional use permit, including meeting criteria for boat launch access and vehicle parking.

For detailed shoreline permit information visit:

www.kingcounty.gov/property/permits/info/PermitTypes/landuse/shorelines.aspx

Washington State Department of Ecology (Ecology)

Washington State Department of Ecology provides oversight and review of local regulations and permit decisions, including approval of conditional-use permits and variances. Ecology is responsible for [Section 401 Water Quality Certifications](#) and [Coastal Zone Management Consistency](#) decisions relating to [Nationwide Permits](#).

Washington State Department of Fish and Wildlife (WDFW)—Hydraulic Project Approval

WDFW is responsible for preserving, protecting, and perpetuating all fish and shellfish resources of the state and has jurisdiction to regulate activities that will use or obstruct the bed or flow of state waters. Within the Quartermaster Harbor study area, activities requiring a Hydraulic Project Approval (HPA) include any in-water development such as marinas and mooring buoy installations. Mooring buoy owners must obtain an HPA and comply with the permit terms and conditions that avoid damage or loss of fish and shellfish habitat ([RCW 77.55](#)). WDFW typically requires a vegetation survey for a mooring buoy to confirm the presence or absence of eelgrass and /or macroalgae, which are protected species for the benefit of fish and shellfish. As part of this planning process, DNR evaluated the presence and current extent of marine vegetation and Pacific herring spawning areas in order to avoid potential impacts from mooring buoys.

DNR will coordinate the implementation of this mooring buoy management plan with WDFW and will directly apply for the necessary HPA to remove unclaimed and potentially hazardous mooring buoys. DNR will ensure that buoy license applicants comply with HPA requirements prior to their installing new buoy systems.

For additional information:

- HPA Frequently Asked Questions - wdfw.wa.gov/licensing/hpa/faq.html
- How to Apply for an HPA - wdfw.wa.gov/licensing/hpa/how_to_apply.html

- RCW 77.55.021 Construction projects in state waters / Permits - apps.leg.wa.gov/RCW/default.aspx?cite=77.55.021
- WAC 220-110-010 Hydraulic Code - apps.leg.wa.gov/wac/default.aspx?cite=220-110-010
- WAC 220-110-250 Saltwater habitat of special concern - apps.leg.wa.gov/wac/default.aspx?cite=220-110-250

U.S. Army Corps of Engineers (Corps) Section 10—Nationwide Permit

The U.S. Army Corps of Engineers (Corps) administers a regulatory program that requires permits for certain activities in waters of the United States, including wetlands. Under Section 404 of the Clean Water Act (CWA), the Corps regulates the discharge of dredged or fill material into waters of the United States, including wetlands. Under Section 10, the Corps regulates structures and /or work in or affecting the course, condition, or capacity of navigable waters of the United States. (<http://water.epa.gov/lawsregs/guidance/wetlands/sec404.cfm>)

Activities requiring Corps authorization that are similar in nature and have minimal individual and cumulative environmental impacts may qualify for authorization by a general permit, such as a nationwide permit. On March 19, 2012, all nationwide permits were reissued, some with changes. The nationwide permit for non-commercial, single-boat, mooring buoys includes additional regional conditions to protect aquatic resources. For additional details, see Appendix L: Excerpt from ‘User’s Guide for Nationwide Permits in Washington State’ (US Army Corps of Engineers / Seattle District).

If a project meets all of the terms and conditions of the Specific Project Information Form (SPIF) for Mooring Buoys—programmatic Endangered Species Act (ESA) consultation, the Corps does not need to consult individually with National Marine Fisheries Service (NMFS) or US Fish and Wildlife Service (USFWS).

Additional information on the Nationwide Permit program:

www.nws.usace.army.mil/Portals/27/docs/regulatory/NWPs/2012%20NWP%20Users%20Guide.pdf
(Appendix I: User’s Guide for Nationwide Permits in Washington State)

13. AQUATIC RESERVE RESOURCES ADDRESSED BY MOORING BUOY MANAGEMENT PLAN

DNR established the Maury Island Environmental Aquatic Reserve to conserve the habitats and species that make the area unique. A primary goal of the reserve management plan commits DNR to “preserve, or restore and enhance where there are opportunities, native habitats and associated plant and wildlife species, with a special emphasis on forage fish, salmonids, and migratory birds.” (Section 3.0 *Maury Island Environmental Aquatic Reserve Final Management Plan, October 29, 2004, p. 9*)

By implementing this mooring buoy plan, DNR protects species, habitats and spawning and rearing conditions. Owners of authorized mooring buoys will install embedded anchors and mid-line floats on anchor lines, minimizing potential scouring from lines dragging or crushing the vegetation and substrate. DNR will reduce the potential risk of accidental oil spills from vessel collisions or sinking by authorizing mooring buoys in limited densities and locations. DNR will continue to prohibit live-aboard vessels from using mooring buoys and increase enforcement efforts, which will help reduce the amount of incidental waste discharges to marine waters.

- **Eelgrass / Forage Fish Habitat**
Quartermaster Harbor sustains the largest population of Pacific herring in central Puget Sound and the third largest in all of Puget Sound. It provides extensive spawning and rearing habitat for Pacific herring, sand lance, and surf smelt. Herring spawn in the nearshore at depths that may coincide with locations of mooring buoy anchors. Sand lance and surf smelt spawn in intertidal areas along the shoreline landward of mooring buoy installations. (Appendix F: Pacific Herring Spawning Surveys / Eelgrass Presence)
- **Salmonid Spawning, Rearing, and Migratory Habitat**
All species of salmon have been observed rearing and migrating in the nearshore areas of Quartermaster Harbor, including Chinook, coho, chum, and cutthroat salmon.
- **Marine Bird Habitat**
Quartermaster Harbor serves as a major wintering ground for important populations of migratory marine birds. More than 70 species of birds frequent the area including: bald eagle, great blue heron, common loon, western grebes, Aleutian goose, peregrine falcon, and marbled murrelet.
- **Shellfish Habitat**
Quartermaster Harbor sediments foster a substantial shellfish resource, including commercially significant densities of geoduck clams.
- **Archaeological, Cultural, and Historical Resources**
Cultural resource review of the mooring buoy area reveals a single known archaeological site (45-KI-783) consisting of a disturbed shell midden on the shoreline near Dockton, and none in the aquatic lands. Traditional place names for Dockton translate to “launching things into the water,” and the bay to the east was named “sitting between.” The place names, the existing site, and landforms suggest some potential for archaeological sites in the mooring

area, which would have been above sea level within the period of human presence in the Northwest.

Neither the 1857 Government Land Office (GLO) survey nor the 1895 United States Geological Survey (USGS) quad map show any evidence of in-water structures. However, the 1949 USGS quad map indicates a large dock near the tip of Dockton Point, northwest of the proposed mooring buoy field area. In 1892, Puget Sound Dry Dock Company established a floating drydock, measuring 102 x 325 feet. An historical photograph taken from the water suggests that the pier connecting the drydock to land was near the tip of the point. The size of this facility and the vessels it serviced mean that it had to be in relatively deep water, further suggesting that it was closer to the point than in the shallower harbor to the east, where the mooring buoys will be located.

It's likely there will be a debris field of discarded boat materials and other refuse around the drydock site, which operated until 1909. Two boatyards also operated at Dockton until 1929, although the precise locations have not been determined for this assessment. The National Oceanic and Atmospheric Administration (NOAA) performed multi-beam sonar mapping of Quartermaster Harbor in 2007, locating two vessels on the bottom in or near the mooring area, but the imagery indicates that they are not historically significant.

Installing new mooring buoys is unlikely to have an impact on cultural resources. Anchoring techniques for new buoys do not cause enough disturbance to substantially affect any prehistoric archaeological sites that may be present. Removal of existing buoy anchors has some potential for discovering historic artifacts, possibly including materials associated with the drydock or boat yards. DNR will use future removal of anchors as an opportunity to search for submerged sites. As the anchors are raised, they will be examined to determine whether they are of historic significance. If so, DNR will record the location and photograph the object. DNR will map the extent of their distribution if enough historic finds occur within the buoy field. If particularly significant materials are found in the process, DNR will seek to transfer ownership to a museum.

REFERENCES

David Palazzi and Phillip Bloch, 2004. Maury Island Environmental Aquatic Reserve Final Management Plan. p136. Washington Department of Natural Resources, Aquatic Reserves Program, Aquatic Resources Division, Olympia, WA. (October 29, 2004)

Final Supplemental Environmental Impact Statement, Maury Island Aquatic Reserve, (October 29, 2004).

Gaeckle, J., P. Dowty, H. Berry, S. Wyllie-Echeverria and T. Mumford. 2008. *Puget Sound Submerged Vegetation Monitoring Project: 2006-2007 Monitoring Report*. Nearshore Habitat Program, Washington State Department of Natural Resources, Olympia, WA.

General Regulatory Assistance: www.ora.wa.gov/

King County Shoreline Management Master Program – info.kingcounty.gov/property/permits/PermitGlance

U.S. Army Corps of Engineers website: www.nws.usace.army.mil/

Philips, Ronald C., 1984 The Ecology of Eelgrass Meadows in the Pacific Northwest: A Community Profile. Unites States Fish and Wildlife Technical Report FWS/OBS - 84/24. United States Department of the Interior, Fish and Wildlife Service.

Kurt C. Stick and Adam Lindquist, 2009. 2008 Washington State Herring Stock Status Report. Stock Status Report No. FPA 09-05. P100. Washington Department of Fish & Wildlife, Fish Program, Fish Management Division, Olympia , WA.

Forage Fish Habitat - wdfw.wa.gov/fish/forage/forage.htm

Washington Department of Fish & Wildlife Hydraulic Project Approval (HPA) RCW 77.55 / WAC 220-110-250.

Washington Department of Fish & Wildlife, Herring spawning data from 1981-2011 provided by Kurt Stick and Adam Lundquist, Fish Program, Fish Management Division.

ShoreZone Inventory. 2001. The Washington State ShoreZone Inventory. Nearshore Habitat Program, Washington State Department of Natural Resources, Olympia, WA.

Washington State Department of Natural Resources, Submerged Vegetation Monitoring Program. GIS data for Eelgrass in Quartermaster Harbor 2004, 2007. Olympia, WA.

‘Seasonal Variations in Flushing Time for Quartermaster Harbor, an Enclosed Puget Sound Estuary,’ November 2011 – Department of Ecology Publication 11-03-062, www.ecy.wa.gov/biblio/1103062.html

Appendices

- A. Quartermaster Harbor Mooring Buoy Management Plan Study Area Boundary Legal Description
- B. Quartermaster Harbor Recreational Mooring Buoy Inventory (DNR, May 2011, August 2012)
- C. Quartermaster Harbor – Maury Island Aquatic Reserve: Survey of Moorage Buoy Systems for Potential Impacts to Aquatic Reserve Habitat, United States Environmental Protection Agency Region 10, Dive Unit (June 5 - 7, 2012) - Summary of Anchor Types and Condition, Depth, Photos
- D. Informational Workshops Summaries (June 15, 2011; May 31, 2012; June 27, 2012)
- E. Quartermaster Harbor Mooring Buoy Management Plan Timeline
- F. Herring Spawning / Eelgrass Presence – Summary, Maps (extrapolated from WDFW data)
- G. RCW 79.105.430: Private Recreational Docks - Mooring buoys.
- H. Mooring Buoy License Application Form
- I. Excerpt from ‘User’s Guide for Nationwide Permits in Washington State’ Effective Date: June 15, 2012 (US Army Corps of Engineers / Seattle District) [pages 22 – 23]
- J. Certificate of Adoption

APPENDIX A

Quartermaster Harbor Mooring Buoy Management Plan Study Area Boundary Legal Description

The tidelands and bedlands of navigable waters of Quartermaster Harbor, owned by the state of Washington within Maury Island Aquatic Reserve, described as follows:

- Those tidelands and bedlands lying westerly of Maury Island which are fronting and abutting only those portions of Section 9, 16, 20, 21, 29, 30, and 31, which are fronting on Quartermaster Harbor, Township 22 North, Range 3 East, W.M.;
- Together with, those tidelands and bedlands lying southerly of said Maury Island, which are fronting and abutting Section 5 and 6, Township 21 North, Range 3 East, W.M.; and said reserve extends waterward to a water depth of 70 feet below mean lower low water OR one-half mile from the line of extreme low tide, whichever line is farther waterward.
- Those tidelands and bedlands lying southerly and easterly of Vashon Island, which are fronting and abutting Section 1, Township 21 North, Range 2 East, W.M.;
- Together with, those tidelands and bedlands lying easterly of said Vashon Island, which are fronting and abutting Sections 24, 25, and 36 Township 22 North, Range 2 East, W.M.;
- Together with, those tidelands and bedlands lying easterly of said Vashon Island, which are fronting and abutting Sections 17-20, inclusively, Township 22 North, Range 3 East, W.M.;
- Together with, those tidelands and bedlands lying southerly and westerly of Vashon Island, which are fronting and abutting only those portions of Section 8, which is fronting on Quartermaster Harbor, Township 22 North, Range 3 East, W.M.; and said reserve extends waterward to a water depth of 70 feet below mean lower low water OR one-half mile from the line of extreme low tide, whichever line is farther waterward.
- Situated in King County, Washington.

APPENDIX B

Inventory of Recreational Mooring Buoys in Quartermaster Harbor (DNR, May 2011, August 2012)

Summary

187 on state-owned aquatic lands / **78** applications received or pending (*as of 11/26/12*)

87 on private tidelands (+4 proposed new buoys)

274 Total Buoys (*based on May 2011 and August 2012 DNR Inventories*)

| Inner Harbor | Map Area | SOAL Buoys | Unclaimed | Private Buoys | Total Buoys by Map Area |
|--------------|---|---|------------|--|-------------------------|
| Inner Harbor | 1. Burton Cove | 45 31 applications | 14 | 22 (6 King Co./ 3 Vashon Pk) | 67 |
| | 2. Judd Creek | 11 1 app. | 10 | 17 | 28 |
| | 3. Portage / N. Burton Peninsula | 13 (12 Portage/ 1 N. Burton) 4 apps. | 9 | 25 (22 Portage/ 3 N. Burton) | 38 |
| | 4. Jensen Pt. / Melita | 10 (4 Jensen Pt. / 6 Melita) 6 apps. | 4 | 7 (1 Jensen Pt. / 6 Melita) | 17 |
| | 5. Dockton | 52 28 apps. | 24 | 0 | 52 |
| Outer Harbor | 6. S. Burton, Magnolia Beach, Indian Pt. / W. Dockton | 36 (19 S. Burton, Magnolia Bch, Indian Pt. / 17 W. Dockton) 6 apps. | 30 | 9 (5 S. Burton, Magnolia Bch, Indian Pt. / 4 W. Dockton) | 45 |
| | 7. Harbor Hts. / SW Maury | 16 2 apps. | 14 | 2 | 18 |
| | 8. Neill Pt. | 1 | 1 | 0 | 1 |
| | 9. Piner Pt. | 3 | 3 | 5 | 8 |
| | TOTALS | 187 78 apps. (+4 new buoy apps.) | 109 | 87 | 274 |

Figure B-1: Inventory of recreational mooring buoys in Quartermaster Harbor. Inventories conducted May 2011 and August 2012.

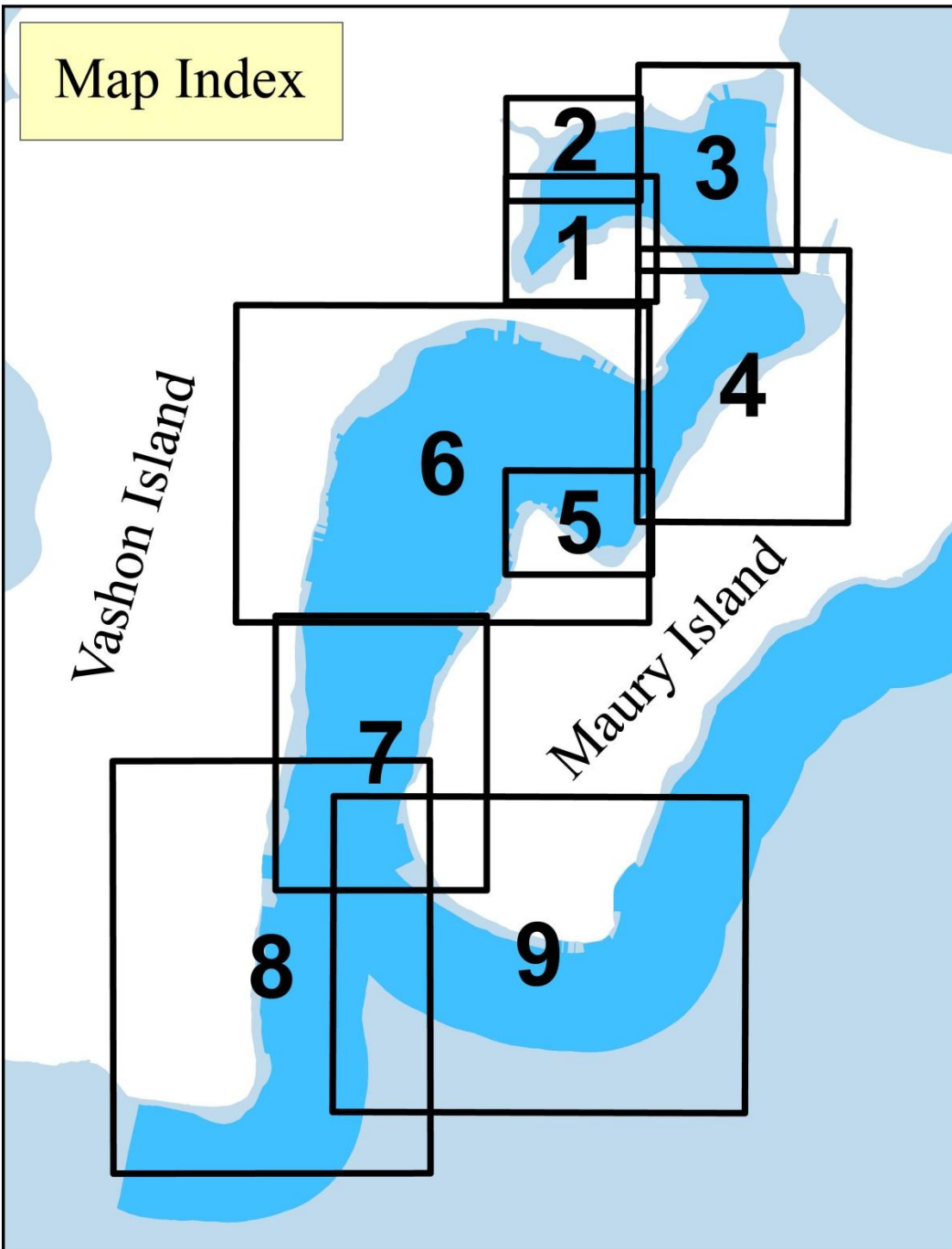


Figure B-2. Recreational Mooring Buoys – Map of inventory areas.

Inner Quartersmaster Harbor (Maps 1 - 5)

- 1. Burton Cove
- 2. Judd Creek
- 3. North Burton Peninsula / Portage
- 4. Jensen Point / Melita
- 5. Dockton

Outer Quartersmaster Harbor (Maps 6 - 9)

- 6. Magnolia Beach / Indian Pt. / South Burton / West Dockton
- 7. Harbor Heights / S.W. Maury
- 8. Neill Point
- 9. Piner Point

1. Burton Cove

(Map 1 – download details at: www.dnr.wa.gov/Publications/aqr_qrtrmharbor_pg1.pdf)

Location by Property Owner

45 on state-owned aquatic lands (SOAL)
13 on private tidelands
6 on King County (KC) tidelands
3 on Vashon Park District (VPD) tidelands
67 Total Buoys

18 Buoys Cross-Ownership Boundaries

4 on SOAL cross private tidelands
2 on SOAL cross VPD tidelands
8 on private cross SOAL
2 on King County cross SOAL
2 on VPD cross SOAL

Far East Side of Burton Cove

(Numbers correspond to the inventoried buoy numbers on Map 1.)

39 – (SOAL) buoy / _____
40 – (SOAL) buoy / _____
41 – (SOAL) buoy / _____
42 – (SOAL) buoy / _____
43 – (SOAL) buoy / waterfront owner (application 3/23/12)
44 – (SOAL) buoy / waterfront owner (application 6/21/12)
107 – (SOAL) channel marker / Quartermaster Yacht Club
108 – (SOAL) channel marker / Quartermaster Yacht Club
109 – (SOAL) channel marker / Quartermaster Yacht Club

Southeast Side of Burton Cove

(Numbers correspond to the inventoried buoy numbers on Map 1.)

45 – (SOAL) buoy / _____
46 – (SOAL) vessel / _____
47 – (SOAL) buoy / (application 4/10/12)
48 – (SOAL) buoy / (application 3/2/12)
49 – (VPD / crosses SOAL) buoy / (application 7/12/12)
50 – (SOAL) buoy / _____
51 – (SOAL) vessel / (application 1/11/12)
52 – (SOAL) vessel / (application 6/7/12)
53 – (SOAL) vessel / _____
54 – (SOAL) buoy / _____
55 – (SOAL) raft / (application 5/31/12)
56 – (SOAL) vessel / (application 6/15/11)
57 – (SOAL) vessel / _____
58 – (SOAL) vessel / _____
59 – (SOAL / crosses VPD) vessel / _____
60 – (VPD / crosses SOAL) buoy / _____
61 – (SOAL / crosses VPD) buoy / _____ (tied to #85)
62 – (SOAL) vessel / 'Nadine' _____
63 – (VPD / crosses private) vessel / _____
64 – (private) two rafts
65 – (private / crosses SOAL) vessel / _____
66 – (private) derelict vessel / private party removed vessel
67 – (private / crosses SOAL) vessel / (application 4/10/12)
68 – (private / crosses SOAL) buoy / _____
69 – (SOAL / crosses private) buoy / _____
70 – (private / crosses SOAL) buoy / vessel removed by Derelict Vessel Removal Program

- 71 – (SOAL) vessel / (application 5/4/12)
- 72 – (SOAL) vessel / (application 4/10/12)
- 73 – (SOAL) buoy / _____
- 74 – (SOAL) vessel / _____
- 75 – (SOAL) red channel marker / Quartermaster Yacht Club
- 84 – (SOAL) green channel marker / Quartermaster Yacht Club
- 85 – (SOAL) vessel / (tied to #61 - application 4/10/12)

West Side of Burton Cove

(Numbers correspond to the inventoried buoy numbers on Map 1.)

- 76 – (private) buoy / non waterfront owner (non-waterfront owner 10/23/12)
- 77 – (private) buoy
- 78 – (KC) vessel / _____
- 79 – (KC) buoy / _____
- 80 – (KC) vessel / (application 9/12/11)
- 81 – (KC) vessel / (application 3/8/12)
- 82 – (KC / crosses SOAL) vessel / (application 5/1/12)
- 83 – (KC / crosses SOAL) vessel / _____

Northwest Side of Burton Cove

(Numbers correspond to the inventoried buoy numbers on Map 1.)

- 86 – (SOAL) channel marker #4 / Quartermaster Yacht Club
- 87 – (SOAL) buoy / (application 6/15/11)
- 88 – (SOAL / crosses private) buoy / waterfront owner (application 6/15/11)
- 89 – (private / crosses SOAL) vessel / (application 6/15/11)
- 90 – (private) buoy
- 91 – (SOAL / crosses private) buoy /
- 92 – (SOAL) buoy / _____
- 93 – (SOAL) buoy / (application 6/15/11)
- 94 – (SOAL) vessel / (application 5/11/12)
- 95 – (SOAL) buoy / waterfront owner (application 5/31/12)
- 96 – (SOAL / crosses private) vessel / (application 6/19/11)
- 97 – (private) buoy
- 98 – (private / crosses SOAL) buoy / _____
- 99 – (SOAL) buoy / _____
- 100 – (SOAL) buoy / _____
- 101 – (SOAL) buoy / _____
- 102 – (private) vessel / (email confirmation 6/12/12)

2. Judd Creek

(Map 2 - www.dnr.wa.gov/Publications/aqr_qtrmharbor_pg2.pdf)

Location by Property Owner

- 11 on state-owned aquatic lands (SOAL)
- 17 on private tidelands
- 38** Total Buoys

9 Buoys Cross-Ownership Boundaries

- 2 on SOAL crosses private tidelands
- 7 on private cross SOAL

(Numbers correspond to the inventoried buoy numbers on Map 2.)

- 103 – (private / crosses SOAL) buoy / _____
- 104 – (private / crosses SOAL) buoy / _____
- 105 – (SOAL) buoy / _____
- 106 – (SOAL) buoy / _____

- 209 – (private) vessel
- 210 – (private / crosses SOAL) buoy / _____
- 211 – (private) vessel
- 212 – (private) buoy
- 213 – (SOAL) buoy / _____
- 214 – (private / crosses SOAL) vessel / _____
- 215 – (SOAL / crosses private) swim float w/ dinghy / _____
- 216 – (SOAL / crosses private) vessel / _____
- 217 – (private) buoy
- 218 – (private) buoy
- 219 – (private) buoy
- 220 – (SOAL) vessel / _____
- 221 – (SOAL) vessel / _____
- 222 – (SOAL) buoy / _____
- 223 – (SOAL) buoy / _____
- 224 – (SOAL) vessel /application (8/_/12)
- 225 – (SOAL) buoy / _____
- 226 – (private) buoy
- 227 – (private) vessel
- 228 – (private / crosses SOAL) buoy / _____
- 229 – (private / crosses SOAL) buoy / _____
- 230 – (private) buoy
- 231 – (private) buoy
- 232 – (private / crosses SOAL) vessel / _____

3. North Burton Peninsula / Portage

(Map 3 - www.dnr.wa.gov/Publications/aqr_qrtrmharbor_pg3.pdf)

Location by Property Owner

12 on state-owned aquatic lands - SOAL

25 on private tidelands

37 Total Buoys

6 Buoys Cross-Ownership Boundaries

3 on SOAL crosses onto private tidelands

3 on private cross onto SOAL

North Burton Peninsula

(Numbers correspond to the inventoried buoy numbers on Map 3.)

36 – (private / crosses SOAL) buoy / _____

37 – (private / crosses SOAL) buoy / _____

38 – (private / crosses SOAL) buoy / _____

233 – (SOAL) vessel / _____

Portage

(Numbers correspond to the inventoried buoy numbers on Map 3.)

174 – (private / crosses SOAL) buoy / _____

175 – (private) buoy / waterfront owner (confirmed 7/2/12)

176 – (private) buoy

177 – (SOAL) buoy / _____

178 – (SOAL) buoy / _____

179 – (private / crosses SOAL) buoy / _____

180 – (SOAL) buoy / _____

181 – (SOAL) buoy / _____

182 – (SOAL / crosses private) buoy / _____

183 – (private) buoy

- 184 – (SOAL) buoy / _____
- 185 – (SOAL) buoy / Vashon Island Rowing Club (application pending)
- 186 – (SOAL) buoy / _____
- 187 – (private) buoy
- 188 – (private) buoy
- 189 – (private) buoy
- 190 – (private) buoy
- 191 – (private / crosses SOAL) buoy / waterfront owner (confirmed 8/4/12)
- 192 – (private) buoy / (email confirmation 6/4/12)
- 193 – (private) buoy
- 194 – (private) buoy
- 195 – (private) buoy
- 196 – (SOAL) buoy / waterfront owner (application 6/6/12)
- 197 – (SOAL) buoy / Vashon Island Rowing Club (application pending)
- 198 – (SOAL / crosses private) buoy / _____
- 199, 200 – (SOAL / crosses private) mussel raft / waterfront owner (application 7/19/12)
- 201 – (private) vessel
- 202 – (private) buoy
- 203 – (private) buoy
- 204 – (private) buoy
- 205 – (private) vessel
- 206 – (private) vessel
- 207 – (private) buoy
- 208 – (private) buoy

4. Jensen Point / Melita

(Map 4 - www.dnr.wa.gov/Publications/aqr_qrtrmharbor_pg4.pdf)

Location by Property Owner

- 10 on SOAL
- 7 on private tidelands
- 17 Total Buoys**

4 Buoys Cross-Ownership Boundaries

- 0 on SOAL cross private
- 4 on private cross SOAL

Jensen Point (Vashon Island side)

(Numbers correspond to the inventoried buoy numbers on Map 4.)

- 32 – (SOAL) vessel / _____
- 32A – (SOAL) buoy / waterfront owner (application 8/2/12)
- 33 – (SOAL) buoy / waterfront owner (application 5/17/12)
- 34 – (SOAL) buoy / Vashon Island Rowing Club (application pending)
- 35 – (private / crosses SOAL) buoy / waterfront owner (11/14/11)

Melita (Maury Island side)

(Numbers correspond to the inventoried buoy numbers on Map 4.)

- 162 – (SOAL) buoy / Vashon Island Rowing Club (application pending)
- 163 – (private / crosses SOAL) buoy / _____
- 164 – (SOAL) buoy / _____
- 165 – (SOAL) buoy / waterfront owner (application 3/28/12)
- 166 – (SOAL) buoy / waterfront owner (application 7/17/12)
- 167 – (private / crosses SOAL) buoy / _____
- 168 – (private / crosses SOAL) buoy / _____
- 169 – (private) buoy
- 170 – (private) buoy
- 171 – (private) buoy

- 172 – (SOAL) buoy / _____
- 173 – (SOAL) vessel / _____

5. Dockton

(Map 5 - www.dnr.wa.gov/Publications/aqr_qrtrmharbor_pg5.pdf)

Location by Property Owner

52 on SOAL

 0 on private tidelands

52 Total Buoys

6 Buoys Cross-Ownership Boundaries

6 on SOAL cross private tidelands

East of Dockton Beach Park Marina

(Numbers correspond to the inventoried buoy numbers on Map 5.)

- 110 – (SOAL) buoy / _____
- 111 – (SOAL) buoy / _____
- 112 – (SOAL) buoy / _____
- 113 – (SOAL) buoy / _____
- 114 – (SOAL) buoy / (application 6/15/12)
- 115 – (SOAL) vessel / (application 8/15/11)
- 116 – (SOAL) vessel / (application 6/25/12)
- 117 – (SOAL) buoy / (application 5/19/12)
- 118 – (SOAL / crosses private tideland) vessel / waterfront (application)
- 119 – (SOAL / crosses private tideland) vessel / waterfront (application 5/3/12)
- 120 – (SOAL / crosses private tideland) buoy / _____
- 121 – (SOAL) vessel / _____
- 122 – (SOAL) vessel / _____
- 123 – (SOAL) buoy / _____
- 124 – (SOAL) buoy / _____
- 125 – (SOAL) vessel / (application 6/7/12)
- 126 – (SOAL) buoy / _____
- 127 – (SOAL) vessel / _____

West of Dockton Beach Park Marina

(Numbers correspond to the inventoried buoy numbers on Map 5.)

- 128 – (SOAL) buoy / _____
- 129 – (SOAL) buoy / (application 6/24/12)
- 130 – (SOAL) vessel / (application pending)
- 131 – (SOAL) vessel / (application 6/15/12)
- 132 – (SOAL) buoy / (application 6/27/12)
- 133 – (SOAL) buoy / (application 10/30/11)
- 134 – (SOAL / crosses private) vessel / (application 6/15/11)
- 135 – (SOAL / crosses private) vessel / (application 6/15/11)
- 136 – (SOAL) vessel / (application 6/15/11)
- 137 – (SOAL) vessel / (application pending)
- 138 – (SOAL) vessel / (application pending)
- 139 – (SOAL / crosses private) vessel / (application 7/13/12)
- 140 – (SOAL) vessel / _____
- 141 – (SOAL) vessel / (application 12/21/11)
- 142 – (SOAL) buoy / (application 7/11/12)
- 143 – (SOAL) vessel / (application 1/30/12)
- 144 – (SOAL) buoy / _____
- 145 – (SOAL) vessel / (application 10/24/12)
- 146 – (SOAL) buoy / (application pending)

- 147 – (SOAL) buoy / (application 2/21/12)
- 148 – (SOAL) vessel / (application 6/6/12)
- 149 – (SOAL) buoy / _____
- 150 – (SOAL) buoy / (application 6/15/11)
- 151 – (SOAL) vessel / _____
- 152 – (SOAL) buoy / _____
- 153 – (SOAL) vessel / (application 6/15/11)
- 154 – (SOAL) buoy / _____
- 155 – (SOAL) buoy/ (application pending 10/25/2012)
- 156 – (SOAL) vessel / _____
- 157 – (SOAL) buoy / _____
- 158 – (SOAL) buoy / _____
- 159 – (SOAL) buoy / _____
- 160 – (SOAL) buoy / _____
- 161 – (SOAL) buoy / _____

6. Magnolia Beach / Indian Point / South Burton / West Dockton

Map 6 - www.dnr.wa.gov/Publications/aqr_qrtmharbor_pg6.pdf

Location by Property Owner

36 on SOAL

9 on private tidelands

45 Total Buoys

12 Buoys Crossing Ownership Boundaries

3 on SOAL cross private tidelands

9 on private cross SOAL

Magnolia Beach (Vashon Island side)

(Numbers correspond to the inventoried buoy numbers on Map 6.)

3 – (SOAL) buoy / _____

4 – (SOAL) buoy / _____

5 – (SOAL / crosses private) buoy / _____

Indian Point (Vashon Island side)

(Numbers correspond to the inventoried buoy numbers on Map 6.)

6 – (SOAL) buoy / (application 6/15/11)

7 – (private / crosses SOAL) buoy / _____

8 – (SOAL) buoy / waterfront owner (application)

9 – (SOAL) buoy / _____

10 – (SOAL / crosses private) buoy / _____

11 – (SOAL) vessel / _____

12 – (SOAL) vessel / waterfront owner (application pending as of 8/7/12)

13 – (SOAL) vessel / _____

14 – (SOAL) vessel / _____

15 – (SOAL) buoy / _____

16 – (SOAL / crosses private) buoy / _____

17 – (SOAL) buoy / _____

18 – (private / crosses SOAL) buoy/ _____

19 – (private / crosses SOAL) buoy / _____

20 – (private / crosses SOAL) buoy / _____

21 – (SOAL) raft / waterfront owner (application 2/2/12)

22 – (SOAL) buoy / (application 2/2/12)

23 – (SOAL) buoy / _____

24 – (private / crosses SOAL) buoy / _____

25 – (SOAL) buoy / _____

South Burton (Vashon Island side)

(Numbers correspond to the inventoried buoy numbers on Map 6.)

26 – (SOAL) buoy / _____

27 – (SOAL) buoy / _____

28 – (SOAL) buoy / _____

29 – (SOAL) buoy / _____

30 – (SOAL) buoy / waterfront owner (application 9/9/12)

31 – (SOAL) buoy / _____

West Dockton (Maury Island side)

324 – (SOAL) buoy / _____

325 – (SOAL) buoy / _____

326 – (SOAL) buoy / _____

327 – (SOAL) buoy / _____

328 – (SOAL) vessel / _____

329 – (SOAL) buoy / _____

330 – (SOAL) buoy / _____

331 – (SOAL) vessel / _____

332 – (private / crosses SOAL) buoy / _____

333 – (private / crosses SOAL) buoy / _____

334 – (private / crosses SOAL) buoy / _____

335 – (SOAL) buoy / _____

336 – (SOAL) buoy / _____

337 – (private / crosses SOAL) buoy / _____

338 – (SOAL) vessel / _____

339 – (SOAL) vessel / _____

340 – (SOAL) anchored vessel / _____

7. Harbor Heights / S.W. Maury

(Map 7 - www.dnr.wa.gov/Publications/aqr_qrtrmharbor_pg7.pdf)

Location by Property Owner

16 on SOAL

2 on private tidelands

18 Total Buoys

3 Buoys Cross-Ownership Boundaries

1 on SOAL crosses private tidelands

2 on private cross SOAL

Harbor Heights (Vashon Island side)

(Numbers correspond to the inventoried buoy numbers on Map 7.)

Buoy 1 – (SOAL) buoy / Coast Guard Marker for sunken vessel

Buoy B – (SOAL) buoy / Coast Guard Marker for sunken vessel

2 – (SOAL) buoy / _____

S.W. Maury (Maury Island side)

(Numbers correspond to the inventoried buoy numbers on Map 7.)

309 – (SOAL) anchored vessel / _____

310 – (SOAL) buoy / _____

311 – (SOAL) vessel / _____

312 – (SOAL) vessel / _____

313 – (SOAL) buoy / _____

314 – (SOAL) buoy / _____

- 315 – (SOAL) buoy / _____
- 316 – (private / crosses SOAL) buoy / _____
- 317 – (private / crosses SOAL) buoy / _____
- 318 – (SOAL) buoy / _____
- 319 – (SOAL) vessel / _____
- 320 – (SOAL) buoy / _____
- 321 – (SOAL) vessel / _____
- 322 – (SOAL) vessel / _____
- 323 – (SOAL / crosses private) buoy / _____

8. Neill Point (southeast side of Vashon Island)

(Map 8 - www.dnr.wa.gov/Publications/aqr_qrtrmharbor_pg8.pdf)

Location by Property Owner

- 1 on state-owned aquatic lands - SOAL
- 0 on private tidelands
- 1 Total Buoy**

(Numbers correspond to the inventoried buoy numbers on Map 8.)

- 234 – (SOAL) buoy / _____

9. Piner Point (southwest side of Maury Island)

(Map 9 - www.dnr.wa.gov/Publications/aqr_qrtrmharbor_pg9.pdf)

Location by Property Owner

- 3 on SOAL
- 5 on private tidelands
- 8 Total Buoy**

5 Buoys Cross-Ownership Boundaries

- 1 on SOAL crosses private tidelands
- 4 on private cross SOAL

(Numbers correspond to the inventoried buoy numbers on Map 9.)

- 301, 302 – (private) dock remnant w/ building
- 303 – (SOAL / crosses private) buoy / _____
- 304 – (private / crosses SOAL) buoy / _____
- 305 – (private / crosses SOAL) buoy / _____
- 306 – (private / crosses SOAL) buoy / _____
- 307 – (private / crosses SOAL) buoy / _____
- 308 – (SOAL) navigation buoy #2 / _____
- 309 – (SOAL) anchored vessel / _____

APPENDIX C

Survey of Moorage Buoy Systems for Potential Impacts to Aquatic Reserve Habitat



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 10
1200 Sixth Avenue
Seattle, Washington 98101

Dive Dates: June 5-7, 2012

From: Rob Pedersen,

Divemaster/Dep. UDO Thru: Sean Sheldrake, UDO

To: Mark Filippini, Unit Manager, Environmental Services
Unit, OEA Joyce Kelly, Director OEA

Project: Quartermaster Harbor – Maury Island Aquatic Reserve

Requested by: Lisa Randlette, Washington State Department of Natural Resources
(WDNR), Aquatic Resources Division

Overall Objective: Survey of moorage buoys systems for potential impacts to aquatic reserve
habitat. **Location:** Quartermaster Harbor – Vashon and Maury Island, WA

Background:

As manager and trustee for state-owned aquatic lands WDNR has designated Quartermaster Harbor, King County as part of an aquatic reserve around Maury Island. They are currently developing a recreational mooring buoy plan for Quartermaster Harbor in response to an increase of unauthorized buoys in recent years.

WDNR requires documentation of the sea floor in two areas – Dockton and Burton Cove. They are concerned about anecdotal reports of car batteries, sunken vessels, broken creosote pilings, and similar debris in the vicinity of existing, unauthorized mooring buoys. WDNR has also evaluated 30 years' worth of Department of Fish and Wildlife herring spawn surveys that illustrate a substantial decline in eelgrass and other aquatic vegetation.

Objective:

[R10 Dive Unit](#) to perform a visual & photographic survey of moorage buoys, buoy tether and anchor systems, impacts to marine substrate, substrate type and condition and, algal/eel grass presence for ongoing WDNR regulatory enforcement and management of moorage buoys in Burton and Dockton Coves of the aquatic reserve. EPA, as a WDNR Puget Sound Initiative partner, is supporting this work as eelgrass is a keystone species to overall Puget Sound Health.

Methodology:

Figure 1 represents the approximate survey area for this dive operation. Figures 2 and 3 show the Burton and Dockton Coves, respectively. To increase productivity, divers on the *Monitor* worked one section while the *Wooldive* with the ROV worked a different area. At the guidance of WDNR and WDFW personnel, each boat’s crew identified buoy targets and surveyed the buoy systems (employing WDNR’s maps and latitude/longitude coordinates).

A dive buddy team descended a buoy line noting and photographing: the type of buoy tether and anchor; substrate type and condition (e.g., damage by anchor dragging); marine life (invertebrates and algae); and presence of eel grass. Divers also looked for debris on the bottom and for potentially hazardous materials (divers did not approach). The presence of invasive tunicates was also to be noted.

For efficiency and where practical, divers swam from buoy to buoy. To keep track of the observations, before each dive, a picture was taken of a slate with the buoy number or other descriptor written on it. Divers reported their observations from each dive to the topside crew.

The ROV was employed to collect similar observations. A “tape”/file folder was created for each location. The ROV operator narrated location information and observations onto each file. The ROV also searched for sunken, derelict vessels in the Dockton area – and documented the bottom conditions and debris under the Dockton net pen. These file folders were provided to WDNR at the completion of the project and are not a part of this dive report.

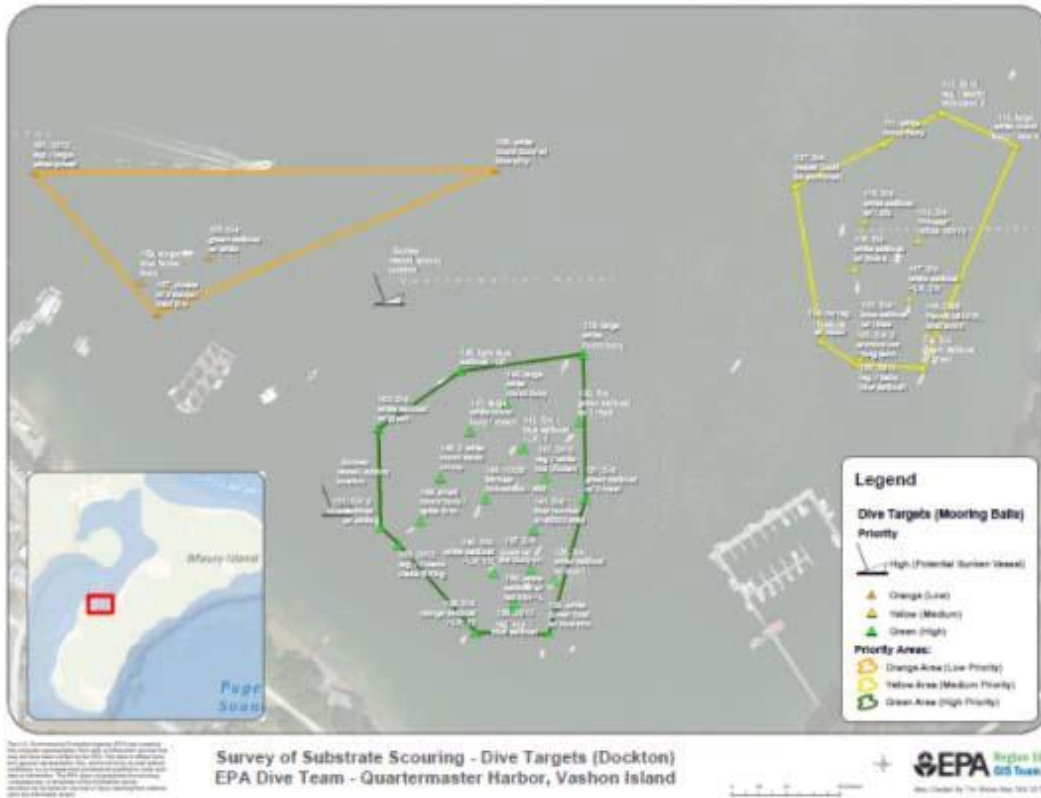
Figure 1. Overview of the work areas.



Figure 2. Burton Cove, Green = 1st priority, Orange = 2nd priority, Yellow = 3rd priority.



Figure 3. Dockton Cove.



Observations/Dive Details:

June 5, Burton Cove

Neap tide conditions and the timing of the tide with our dives, plus plankton growth created very poor to no visibility; very fine sediment also contributed to this problem. Some tube worms and old algae were noted on the buoy lines. Otherwise, visibility prevented any other marine life observations. The bottom was soft and silty.

Buddy team: SS, AB

Buoy 47 tackle

Line to chain – chain in 55 gal. concrete filled steel drum; depth 6’.

Buoy 62 tackle

All line to 55 gal. concrete filled steel drum; depth 4’

Buoy 72/73 tackle “Nadine” & “Ukelele Lady”

2 with float – line to chain to concrete block; plywood debris to the N; depth 4’.

Buoy 74 tackle Boat: “Antigua” WN7602JD

Line to zero vis, could not feel anchor (submerged in sediment); depth 3’

Buoy 54 tackle Boat: WN9511LG; sail boat tied to float with skiff on top.

Line to zero visibility, anchor unidentified; depth 5’.

Buoy 53 Two boats tied to a float in between. WA9511LG

Line to chain – chain in 55 gal. concrete filled steel drum; depth 6’.

Buoy ? Sailboat WA3797LA

Line to [unidentified, refer to WDNR report; depth 7’

Buoy ? Sailboat WN137BA

Unidentified, refer to WNDR report; depth 7’

Buoy ? WN80023JD white sailboat with blue stripe.

Line to 55 gal. concrete filled drum; depth 4’

Buoy 51? White sailboat with yellow stripe, blue boom; N47.39283W-122.46192 #137BA
Line to 10’ chain and concrete filled drum; depth 5’

Buddy team: RP, LM

Buoy ?

Unidentified, refer to WNDR report; depth 11’

Buoy ?

Unidentified, refer to WNDR report; depth 10’

June 6, Dockton Cove

The divers and the ROV crew worked the green/high priority area. The ROV crew also searched for sunken vessels and under the net pen.

Timing of the neap tide was better than June 5th – visibility was better (although still poor).

The bottom condition was soft mud and silt; areas closer to shore had a more sandy texture mixed in. The lack of solid objects on the bottom limited the diversity of marine life.

The following observations pertain, in general, to the area surveyed, but not indicative of every dive.

Bivalve shells on the bottom were common; clusters of mussels were often observed on buoy lines.

Cancer crabs were common and hermit crabs were also observed. Sea stars were common on and near buoy anchors; typical species notes were: *Pycnopodia helianthoides*, *Evasterias troschelii*, *Pisaster brivispinus*, *Pisaster ochraceus*.

Algal growth was limited to the buoys, lines, and some anchors. Very little new algal growth was seen. No eel grass was found.

On the lines, the sabellid tube worm was common (*Eudistylia vancouveri*); the attached hydroid *Haliclystus stejne* was also common.

Buddy team: TS, RP

Buoy 132 tackle "Private buoy"

Line to chain – chain in 55 gal. concrete filled steel drum; depth 4’.

Buoy 133 tackle "Ciao Bella" sailboat

Line to chain to a green colored, concrete filled drum (steel?) with large spikes protruding out of the concrete through the drum ("mine like look"); depth 7’.

Buoy 134 tackle

Line to lots of chain – chain in 55 gal. concrete filled steel drum; depth 4’.

Buoy 135 tackle Wooden boat "Connie U"

No line, all chain to an engine block; depth 4’.

Buoy 139 tackle "Mustard" sailboat WN1947RK

Line to kitchen-sized concrete filled garbage can with chain imbedded; depth 4’.

No buoy, line only on surface. Near buoy 13547.37200 122.45618

Line to 30 gal. concrete filled drum; depth 7’.

Buddy team: CS, BR

Buoy 138 tackle Buoy is a drum; Orange-red sailboat

Line to chain to steel I-beams (welded in a "Roman numeral" 5 shape); depth 6’.

Buoy 136 tackle WN490ED

Line to chain to 55 gal. concrete filled drum; 14’.

Buoy 136a (unknown) WN7521V

Line to chain to 55 gal. concrete filled drum; 15’.

Buoy 136b tackle WN2650B, wooden boat

Line to chain to concrete filled "ball"; 18’.

Buoy 131 WN856DH, Amaryllis sailboat

Line to chain to concrete mooring block; 20’.

Unknown buoy near 130, no boat.

Line to chain to 55 gal. concrete filled drum; 20’.

Buoy 137 tackle

Line to buried anchor (large Danforth?); 18’.

Buoy 141 tackle Panda Rand WN700DP sailboat

Line to chain to 55 gal. concrete filled green colored drum; 20’.

June 7, Dockton Cove

Completion of green/highest priority area by divers and ROV crew.
See above for description of marine life and other general observations.

Buddy team: BR, RP

Buoy 142 tackle White sailboat WN6899W with blue cover
Line to short chain to 55 gal. concrete filled drum; 27'.

Unknown, Buoy 142b tackle Red sailboat WN7866JD
Line to chain to 55 gal. concrete filled drum; 27'.

Buoy 148 tackle Black sailboat WN5548RI
Lone chain to lots of chain attached to a concrete mooring anchor; 26'.

Buoy 149 tackle Canoe, aluminum
Thin line to short chain to a tire imbedded upright and mostly exposed but "solid" (connected to something else?);
25'.

Buoy 150 tackle White sailboat WN56854NF
Line to short chain to 55 gal. concrete filled drum; 16'. Nearshore, more of a sandy bottom.

Buddy team: RR, AB

Buoy 143 tackle Light blue sailboat WN0947JF
Line to chain to 55 gal. concrete filled drum, 80% buried; 26'.

Buoy 144 tackle no boat
Short line to chain to 55 gal. concrete filled drum; 26'.

Buoy 147 tackle Tan sailboat WN9353KU
Medium thick line to thick chain to 30 gal. concrete filled drum 23'.

Buoy 146 tackle Wooden cruiser needing maintenance.
Medium thick line to thick chain to 55 gal. concrete filled drum, 50% buried; 21'.

EPA Personnel:

Divemaster: Rob Pedersen
Tender: Divers
Divers: Brent Richmond, Chad Schulze, Lisa Macchio, Adam Baron, Sean Sheldrake,
 Rob Rau, Tim Siwec
Boat Operator: Doc Thompson

Hazards and Hazard Management: Entanglement in lines (fishing, mooring, other) managed by careful approach to anchor, following the mooring line and not swimming under floating docks or vessels; buddy teams staying together underwater and moving from station to station on the surface. For future work in this area at neap tides, different loading approaches will be pursued, as loading was quite difficult in the area due to lack of water at docks and extremely shallow depths.

Exposures: None except possible biological hazards in the water column; used fresh water rinse. Though no diver sickness occurred after these dives, it was noted that septic systems are failing nearby, and a shellfish bed is closed. Future work in Quartermaster Harbor or the Dockton area will require upgraded diver PPE as a preventative measure, until these situations are resolved.

Diver/Equipment/Other Issues: RP suit flood due to an open relief zipper; tank O-ring replacement; RP's octopus exhibited slow free flow; BR's wrist computer indicated low battery; lost set screw on camera strobe arm mount to the tray.

First Aid Supplies Expended: None

Decontamination: Potable water rinse

Follow-Up Issues:

- 1) Tank fills and vip's – BR, RR, AB not yet completed (no tanks are back)
- 2) Replace camera strobe set screw – RR in process
- 3) Post processing on pictures and observations – RP
- 4) BR to replace battery in wrist computer.

A buddy team keeping track of data collection station to station.



Marine life on shallow part of mooring line.



Mooring chain on an anchor.





Burton Cove – boat and float with multiple mooring anchors.



Boats and mooring floats, Dockton Cove



Neglected boat, Dockton Cove.



APPENDIX D

Informational Workshops Summaries

The following workshops took place at the McMurray Middle School in Vashon, WA

June 15, 2011 — 38 attendees

Purpose of workshop:

- To help DNR, the community and local boaters to identify abandoned derelict mooring buoys that create unsafe navigational conditions for recreational boats in Quartermaster Harbor.

May 31, 2012 — 82 attendees

Purpose of workshop:

- Seek input from boaters and the public interested in helping to develop a plan for mooring buoys on state-owned aquatic lands in Quartermaster Harbor.
- Present a preliminary plan showing the proposed layout for mooring buoy fields in the Burton and Dockton areas of Quartermaster Harbor.
- Explain how the preliminary plan proposes to address requirements for regulatory permits required by King County, the Washington Department of Fish and Wildlife, and the US Army Corps of Engineers.
- Encourage boaters to submit applications for mooring buoy licenses.

June 27, 2012 — 31 attendees

Purpose of workshop:

- Provide updated information on proposed mooring buoy locations in Quartermaster Harbor.
- Seek further input from boaters and members of the public interested in helping to develop the mooring buoy plan.
- Present information about the condition of existing buoys from dive surveys conducted in Burton and Dockton the week of June 5.
- Explain how the preliminary plan proposes to address requirements for regulatory permits from King County, the Washington Department of Fish and Wildlife, and the US Army Corps of Engineers.
- Review pending buoy license applications with applicants and confirm existing buoy locations, including those that are unused and may be removed over time.

December 7, 2012 — 46 attendees

Purpose of workshop:

- Provide draft plan recommendations and answer questions.
- Seek public comments and suggestions.

APPENDIX E

Quartermaster Harbor Mooring Buoy Management Plan

Timeline

May 2011

- Conducted field inventory of buoys and vessels throughout Quartermaster Harbor.

June 2011

- Prepared base maps (waterfront parcels, bathymetry, environmental features) –
- Held public informational workshop (June 15, 2011)

July 2011

- Followed up with individual meeting attendees.
- Gathered additional information about existing environmental and land use conditions
- Met with King County Parks representatives about boating activity.

August 2011

- Met with ORA and regulatory agencies (Corps, DFW, King County) about buoy installation options and how to coordinate regulatory permitting.
- Conducted field visit to photograph underwater conditions on anchorage systems.

September 2011

- Met with Quartermaster Yacht Club representatives. They recommended applying 1.5-to-1 scope for buoys.
- Evaluated additional herring and eelgrass data from WDFW, NOAA. Mapped areas of eelgrass distribution and extent.

October / November 2011

- Tagged buoys at Dockton and Burton notifying owners to contact DNR and apply for buoy licenses (King County Marine Unit – 10/28, 11/10; Citizens for a Healthy Bay – 11/7, 11/10).
- Met with local boaters and residents of Burton. They recommended applying 1.5-to-1 scope for buoys. (11/15)

May / June 2012

- Conducted dive survey of buoy anchors in Burton Cove and Dockton (6/5, 6/6, 6/7)
- Held public informational workshops (5/31, 6/27).

July – November 2012

- Prepared draft Quartermaster Harbor Mooring Buoy Management Plan.

November 26, 2012 – January 7, 2012

- Held public informational workshop on draft plan recommendations (12/6/12).
- Public review of draft plan.
- Public informational workshop on draft plan.

January –March 2013

- DNR finalizes and adopts Quartermaster Harbor Mooring Buoy Management Plan.

APPENDIX F

Herring Spawning / Eelgrass Presence – Summary, Maps (extrapolated from WDFW data)

Eelgrass, macroalgae, and herring spawn status and assessment for Inner Quartermaster Harbor focusing on Burton Cove and Dockton Area.

The Maury Island Aquatic Reserve area was established in 2000 as an Aquatic Reserve to ensure protection to unique habitats and species identified in the area. A major emphasis of the management within the Maury Island Aquatic Reserve area is to reduce or eliminate existing impacts and enhance native habitats and associated plant and wildlife species. In addition there is a special emphasis on salmonids, marine birds, and forage fish.

This review is specifically directed to evaluating the status of nearshore vegetation, particularly eelgrass and macroalgae, and the co-existing keystone forage fish in Puget Sound, the Pacific herring's (*Clupea pallasii*) spawn status and assessment for Upper Quartermaster Harbor. Pacific herring use attached marine vegetation and other sessile substrates in the shallow subtidal up to the lower mid-intertidal zones along the shorelines of Quartermaster Harbor for deposition of eggs during spawning. Spawning in this area occurs in the late January until mid-March, with the spawning peak in late January and early February. In south/central Puget Sound region's cumulative spawning biomass has been relatively high (approx. 10,000 tons) since the late 1990's and is comparable to estimated abundance in the late 1970's and 1980's, although the region's total dropped noticeably in 2010. Because of the decrease in 2010, the stock status is considered "Moderately Healthy."

In the upper Quartermaster Harbor area, Burton Cove and Dockton are the focus areas of this assessment because they include two private marinas, a public dock and marina, and major congregations of mooring buoys. All these uses may cause negative impacts to the habitat. For instance, mooring buoys may drag anchor chain and scour submerged vegetation and substrate, shade eelgrass, impact water quality, contaminate sediments, and hamper vessel navigation. Mooring buoys are managed by DNR and specifically addressed in the *Maury Island Environmental Aquatic Reserve Management Plan*, as a strategy to diminish negative impacts to aquatic lands and resources. DNR is working with local establishments and residents to establish a safer, more effective, and more environmentally responsible way to reconfigure mooring buoy areas and individual mooring buoys in these areas.

Herring Spawn and Submerged Aquatic Vegetation Data

This review is specifically directed to assessing nearshore submerged vegetation, eelgrass and macroalgae, and the co-existing herring spawn status for Quartermaster Harbor, targeting Burton Cove and Dockton areas. Four data sets were examined to determine the distribution and status of eelgrass and macroalgae in Burton Cove and Dockton. The primary data set used to assess herring spawn status is the extensive and descriptive data created for this purpose, the Washington Department of Fish and Wildlife (WDFW) Pacific herring spawning data from 1981-2011. Throughout the greater Puget Sound region, WDFW has assessed Pacific herring spawn yearly and specifically within Quartermaster Harbor for over thirty-two years. The dataset also documents the sample or transect positions, the vegetation or substrate types present, and the

amount of spawn on the vegetation. Status and trend reports for Pacific herring are done based on this work periodically by WDFW, the last was completed in 2008.

The other dataset reviewed and compared, occur within the thirty-two time frame of the herring spawning data and deal with distribution or status of nearshore submerged aquatic vegetation. They are 1987 National Wetlands Inventory (NWI) dataset, the Puget Sound Atlas (1989), DNR Shore Zone data (2001), and the DNR Submerged Vegetation Monitoring Program (2004, 2008) (SVMP). These data corroborated the findings of the herring spawning vegetation data and effectively, although not in a quantitative way, augment the story of eelgrass and macroalgae gradually diminishing in Burton Cove.

Considerable variability in eelgrass distribution and density can be attributed to natural variation. Temperature is a controlling factor as it affects metabolic rates in eelgrass. By 2010, eelgrass had totally disappeared from the north side of Burton Cove to Judd Creek and on the south side of Burton Cove as well until it turns and opens up to the east. The status of other spawning substrates including red and brown algae, worm tubes, hydroids, and terrestrial debris take the place of the eelgrass for spawning structure.

The Dockton area Pacific herring spawn and vegetation data is not as clear-cut as the Burton Cove. However, there is a trend toward more numerous, and more dispersed, smaller deposits of herring spawn on diminishing amounts of submerged aquatic vegetation in that embayment of Quartermaster Harbor.

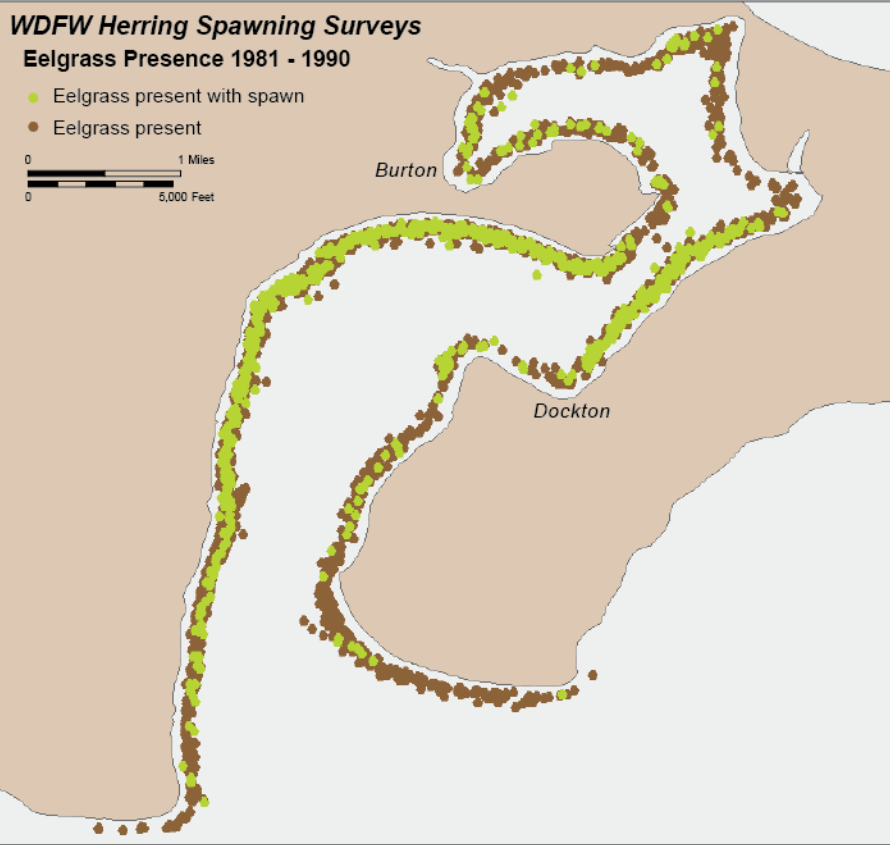
Nearshore waters support a wide variety of fin fish, one of the most notable in Puget Sound is the Pacific herring. This forage fish is an ecological keystone species in Pacific Northwest marine ecosystems and is an important food resource for federally listed fishes and other salmonids as well as marine bird and mammal species. Herring depend on an intact nearshore habitat for depositing their adhesive eggs upon eelgrass and other submerged vegetation. Understanding the abundance and integrity and distribution of these habitat types is integral to maintaining a healthy ecosystem and supporting healthy herring populations. Human development and population growth may directly reduce the amount or quality of spawning habitat for herring or continue to result in more or new chemical contamination that affects egg, larval, juvenile, and adult life phases.

Demands on marine habitats for marinas, mooring buoys, boat ramps, and bulkheads may potentially impact herring spawning locations. Increased vessel traffic and upland development impacts could contribute to a decline in water quality and destruction or degradation of Pacific herring nearshore spawning habitat. (Penttila 2007, Ruckleshaus and McClure 2007).

WDFW Herring Spawning Surveys

Eelgrass Presence 1981 - 1990

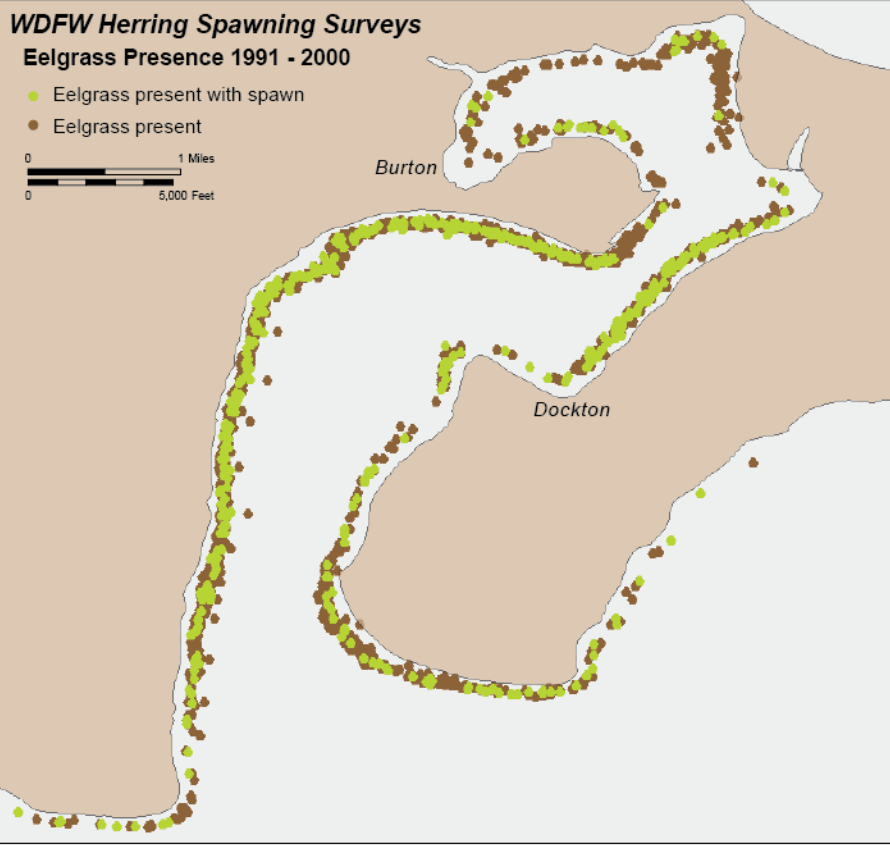
- Eelgrass present with spawn
- Eelgrass present



WDFW Herring Spawning Surveys

Eelgrass Presence 1991 - 2000

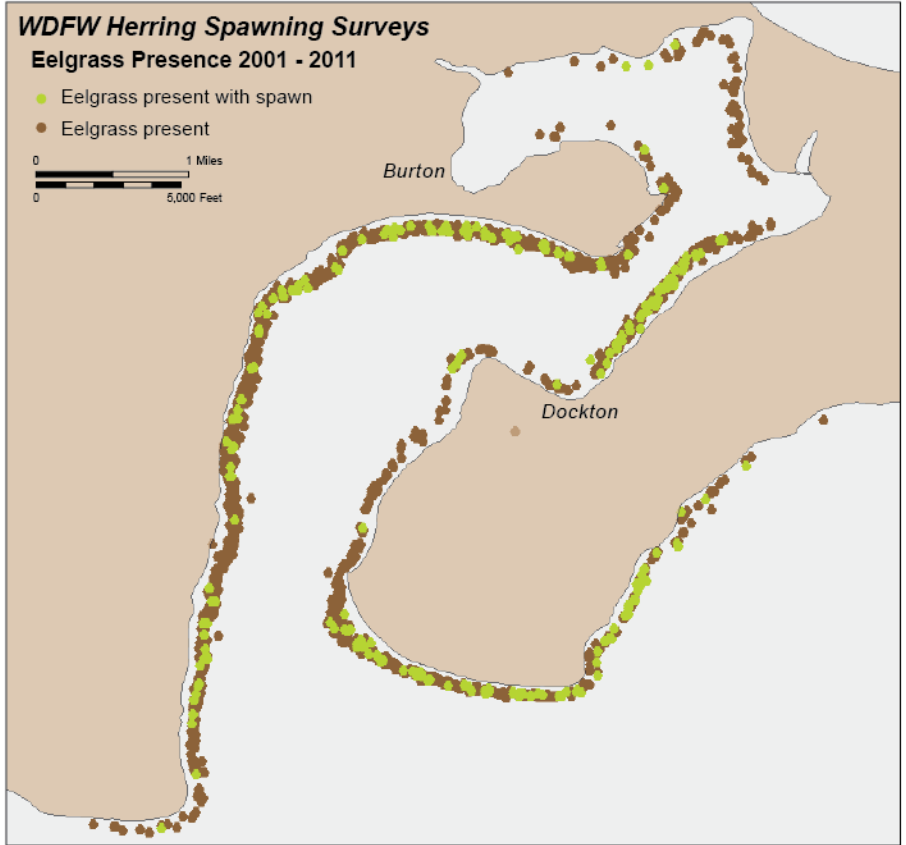
- Eelgrass present with spawn
- Eelgrass present



WDFW Herring Spawning Surveys

Eelgrass Presence 2001 - 2011

- Eelgrass present with spawn
- Eelgrass present



APPENDIX G

Revised Code of Washington (RCW) 79.105.430

Private recreational docks — Mooring buoys.

(1) The abutting residential owner to state-owned shorelands, tidelands, or related beds of navigable waters, other than harbor areas, may install and maintain without charge a dock on the areas if used exclusively for private recreational purposes and the area is not subject to prior rights, including any rights of upland, tideland, or shoreland owners as provided in RCW 79.125.400, 79.125.460, 79.125.410, and 79.130.010. The dock cannot be sold or leased separately from the upland residence. The dock cannot be used to moor boats for commercial or residential use. This permission is subject to applicable local, state, and federal rules and regulations governing location, design, construction, size, and length of the dock. Nothing in this subsection (1) prevents the abutting owner from obtaining a lease if otherwise provided by law.

(2) The abutting residential owner to state-owned shorelands, tidelands, or related beds of navigable waters, other than harbor areas, may install and maintain a mooring buoy without charge if the boat that is moored to the buoy is used for private recreational purposes, the area is not subject to prior rights, including any rights of upland, tideland, or shoreland owners as provided in RCW 79.125.400, 79.125.460, 79.125.410, and 79.130.010, and the buoy will not obstruct the use of mooring buoys previously authorized by the department.

(a) The buoy must be located as near to the upland residence as practical, consistent with applicable rules and regulations and the provisions of this section. The buoy must be located, or relocated if necessary, to accommodate the use of lawfully installed and maintained buoys.

(b) If two or more residential owners, who otherwise qualify for free use under the provisions of this section, are in dispute over assertion of rights to install and maintain a mooring buoy in the same location, they may seek formal settlement through adjudication in superior court for the county in which the buoy site is located. In the adjudication, preference must be given to the residential owner that first installed and continually maintained and used a buoy on that site, if it meets all applicable rules, regulations, and provisions of this section, and then to the owner of the residential property nearest the site. Nothing in this section requires the department to mediate or otherwise resolve disputes between residential owners over the use of the same site for a mooring buoy.

(c) The buoy cannot be sold or leased separately from the abutting residential property. The buoy cannot be used to moor boats for commercial or residential use, nor to moor boats over sixty feet in length.

(d) If the department determines that it is necessary for secure moorage, the abutting residential owner may install and maintain a second mooring buoy, under the same provisions as the first, the use of which is limited to a second mooring line to the boat moored at the first buoy.

(e) The permission granted in this subsection (2) is subject to applicable local, state, and federal rules and regulations governing location, design, installation, maintenance, and operation of the mooring buoy, anchoring system, and moored boat. Nothing in this subsection (2) prevents a boat owner from obtaining a lease if otherwise provided by law. This subsection (2) also applies to areas that have been designated by the commissioner or the fish and wildlife commission as aquatic reserves.

(3) This permission to install and maintain a recreational dock or mooring buoy may be revoked by the department, or the department may direct the owner of a recreational dock or mooring buoy to relocate their dock or buoy, if the department makes a finding of public necessity to protect waterward access, ingress rights of other landowners, public health or safety, or public resources. Circumstances prompting a finding of public necessity may include, but are not limited to, the dock, buoy, anchoring system, or boat posing a hazard or obstruction to navigation or fishing, contributing to degradation of aquatic habitat, or contributing to decertification of shellfish beds otherwise suitable for commercial or recreational harvest. The revocation may be appealed as provided for under RCW 79.105.160.

(4) Nothing in this section authorizes a boat owner to abandon a vessel at a recreational dock, mooring buoy, or elsewhere.

[2005 c 155 § 106; 2002 c 304 § 1; 2001 c 277 § 1; 1989 c 175 § 170; 1983 2nd ex.s. c 2 § 2. Formerly RCW 79.90.105.]

Notes:

Effective date -- 1989 c 175: See note following RCW 34.05.010.

APPENDIX H



WASHINGTON STATE DEPARTMENT OF
Natural Resources
Peter Goldmark - Commissioner of Public Lands

QUARtermaster HARBOR

RECREATIONAL MOORING BUOY/BOATLIFT APPLICATION

Please complete and return this application for placing a recreational mooring buoy or boatlift on state-owned aquatic land to the Washington State Department of Natural Resources (DNR). The DNR will review it and notify you in writing if the application is accepted for further review. DNR may reject this application at any time before authorization.

Per RCW 79.105.430(2), residential property owners who abut state-owned aquatic lands may apply for an authorization to install and maintain a mooring buoy without charge, if the boat that is moored to the buoy is used for private, recreational purposes. This authorization is referred to as a **Mooring Buoy Registration**. Applications may be submitted without an application fee.

All other boat owners wishing to install a private, recreational mooring buoy on state-owned aquatic lands may apply to DNR for an authorization. This authorization is referred to as a **Mooring Buoy License** and requires payment of a fee, based on the length of the vessel (see fee schedule at #11). Please enclose a \$25.00 non-refundable processing fee with the completed application.

Either residential property owners who abut state-owned aquatic lands or other boaters wishing to install a boatlift - in addition to a mooring buoy - may apply to DNR for a **Boatlift License**. This requires payment of a fee, in addition to the mooring buoy license. If you follow the guidelines in this application, it will serve as your license application.

Send your application and processing fees (if a license) to:

Department of Natural Resources
Shoreline District
Aquatic Region
950 Farman Avenue N
Enumclaw, WA 98022-9282
360-825-1631 _____

1. This application is for a:

Mooring Buoy Registration (no fee) Mooring Buoy License Boatlift License

2. Name:

Date:

Address:

City:

State:

Zip:

Phone Number: Home:

Work:

E-mail Address:

3. Which of the following applies to Applicant (check one):

Washington corporation Partnership Marital Community Single Individual – **OR-**
 (Other – please explain)

4. Check if Upland Parcel owner address is the same as above. If not, fill in below:

Upland Parcel Owner Name:

Address:

City:

State:

Zip:

Phone Number: Home:

Work:

E-mail Address:

List or attach the required information for the mooring buoy/boatlift location:

5. Legal Description: County Tax Parcel Number

Government Lot(s) in Section Township N. Range East–West W.M.

6. Coordinates in Decimal Degrees /NAD83 DATUM Latitude: Longitude:

7. Depth of water at buoy / boatlift location at extreme low tide:

8. Length of Vessel: Vessel Registration Number:

9. Attach copies of any regulatory permits or waivers required. Although this may not be a complete list for your area, note the ones needed and attached:

- WA Department of Fish & Wildlife
- Local Jurisdiction (County, City) Shoreline Permit (s)
- U.S. Army Corp of Engineers
- Other

11. For a Mooring Buoy License only, check which fee applies.

Vessel Length:

Up to 30' = \$175.00 Yearly / or \$700.00 one-time payment for full 5-year term

31' to 60' = \$310.31 Yearly (includes leasehold tax) / or \$1,241.24 one-time payment for full 5-year term (includes leasehold tax)

Greater than 60' = \$564.20 Yearly (includes leasehold tax) / or \$2,256.80 one-time payment for full 5-year term (includes leasehold tax)

Boatlift fee (in addition to buoy license fee) = \$175.00 Yearly / or \$700 one-time payment for full 5-year term

INTERNAL USE ONLY

Land Manager: New Application Renewal Application

Land Manager: Initials _____ Aquatic Program Manager Initials _____

Support: Application Fee Received _____ Date

Land Records: New Application Number

Land Records: Trust _____ County _____ AQR Plate No.

INFORMATION REQUIREMENTS FOR A MOORING BUOY/BOATLIFT LICENSE APPLICATION

With your application, please include the following:

A vicinity map (that provides the details for question 5, below) depicting the location of the mooring buoy/boatlift. The map should be no larger than 8 ½ x 11.

1. Is there a mooring buoy or boatlift currently at this site? Yes No
2. If yes, does the mooring buoy or boatlift belong to the applicant? Yes No

If no, please provide owner information:

Name:

Address:

City:

State:

Zip:

Phone Number: Home:

Work:

E-mail Address:

3. If yes, is the mooring buoy or boatlift authorized by DNR?

Yes No I don't know

4. If yes, what is the DNR lease or authorization number?

5. On the vicinity map, mark the position of the buoy or boatlift, acquired either by a differentially corrected Global Positioning System (GPS) measurement or by conventional surveying methods. Mark the position in relation to its anchor. The information must be accurate to (+ or -) 10 feet. A licensed surveyor must provide this information, or you must document it as follows:

- A. List the anchor position coordinate, with a state plane grid coordinate or a latitude and longitude.
- B. Detail the survey method used to mark the position of the buoy or boatlift.
- C. List the land stations used to fix the position. You must have a minimum of two fixed stations and a closed traverse, or differentially corrected GPS measurements to determine the (+ or -) 10 feet requirement, and verify azimuth.
- D. List the date and time you performed the work.
- E. List the tidal correction and the depth to the anchor of the buoy or boatlift, and how you determined it.
- F. Provide the distance from the appropriate line of state ownership—for example, mean high tide, extreme low tide, the line of ordinary high water, or the line of navigability (fresh water).
- G. List the distance from other mooring anchors, structures or hazards in the area.
- H. Show the extent of the swing of the vessel using a full circle on the vicinity map. This circle must be free from all obstacles including buoys, docks or other hazards.

EXHIBIT B

PLAN OF OPERATIONS AND MAINTENANCE FOR A MOORING BUOY

When applying for a mooring buoy registration/license that will encumber State-Owned Aquatic Lands, the applicant will provide to the Washington State Department of Natural Resources (DNR or State) all the requirements outlined in this Exhibit B.

Note: If the mooring buoy currently occupies state property, these requirements will still need to be met prior to DNR authorizing a registration/license to the applicant.

Mooring buoys must be anchored where the water will be deeper than 7 feet (2 meters) at the lowest low water.

The buoy must meet or exceed all United States Coast Guard regulations as well as the following:

Visibility and Identification:

1. The buoy must float at least 18 inches above the surface of the water and be painted reflective white with a blue stripe.
2. The buoy must be marked, in letters visible from 20 feet, with the DNR Registration/License authorization number.

Anchor Design:

1. The anchor must be sufficient to hold the vessel in all weather.
2. The person to whom the license will be granted is responsible to ensure no movement of the anchor.
3. Movement of the anchor off site may cause DNR to terminate this license and require removal of the buoy and anchor.
4. Anchor systems which minimize impacts to the bottom are preferred. "Dampening anchor" systems are not allowed.

Buoy Design:

1. All buoys shall have a mid-line float system installed.
2. The mid-line float must be sufficient to hold the tether line off the bottom at all tides.
3. The mid-line float must be located at a distance from the anchor equal to 1/3 of the water depth at Mean High Water (MHW).

MAINTENANCE PLAN

Describe in detail the maintenance plan for the mooring buoy and anchoring system:

APPENDIX I

US Army Corps of Engineers / Seattle District Excerpt from User's Guide for Nationwide Permits in Washington State Effective Date: June 15, 2012 [pages 22 – 23]

10. Mooring Buoys Non-commercial, single-boat, mooring buoys. (Section 10)

Summary of National and Regional Pre-Construction Notification Requirements –

Pre-construction notification (e.g., a permit application or JARPA) must be submitted to the Corps for work that results in any of the following:

- a) impacts to aquatic resources requiring special protection (Regional General Condition 1)
- b) if any ESA-listed species, designated critical habitat or essential fish habitat might be affected or is in the vicinity of the project (National General Condition 18 and Regional General Condition 7)
- c) an affect or potential to affect listed historic properties (National General Condition 20)
- d) impacts a designated critical resource waters (National General Condition 22)

See National General Condition 31 (Pre-Construction Notification) for notification requirements.

Regional Conditions –

1. NWP 10 may not be used in any waterbody the Washington State Department of Health has designated as “closed” to shellfish harvesting (due to the number of boats moored in the waterbody). The Seattle District will publish the list of closed waterbodies in a Special Public Notice as waterbodies are added or removed from this list.

2. NWP 10 may not be used in any waterbody the Washington State Department of Health has designated as “threatened” due to the number of boats moored in the waterbody. This designation is made on an annual basis by the Washington State Department of Health. The Seattle District will publish the list of threatened waterbodies in a Special Public Notice as waterbodies are added or removed from this list.

NOTE 1: *At the time of publication of this Special Public Notice, no waterbodies are listed as “closed” and Filucy Bay is listed as “threatened”. Check with the Seattle District for the current list of “closed” or “threatened” waterbodies.*

NOTE 2: *To minimize impacts and to expedite Endangered Species Act review, we recommend applicants complete and follow the terms and conditions detailed in the Programmatic Consultation Specific Project Information Form for Mooring Buoys located on Seattle District's web page, www.nws.usace.army.mil (select Regulatory/Permits, then Permit Guidebook, Endangered Species). This includes the completion and submittal of a survey of submerged aquatic vegetation (e.g., kelp and eelgrass). The appropriate survey protocols must be undertaken. These protocols can be found at the Washington State Department of Fish and Wildlife website. In addition, the Corps' programmatic ESA protocols require surveying a larger area encompassing 25 feet plus the length of the moored vessels from vegetated shallows.*

NOTE 3: *Washington State Department of Natural Resources has specific guidance for installation of mooring buoys on state-owned aquatic lands entitled How Do I Authorize My Mooring Buoy? at:*

www.dnr.wa.gov/recreationeducation/howto/homeowners/pages/aqr_mooring_buoy.aspx.

All projects proposed to occur on State-owned aquatic lands will require separate authorization from WDNR. For further information contact the WDNR's Aquatic Resources Division at (360) 902-1100 or Leasing & Land Transactions.

401 Certification – Not required by EPA or Tribes with 401 authority. Certified by Ecology.

CZM Consistency Response – Concur.

Appendix J

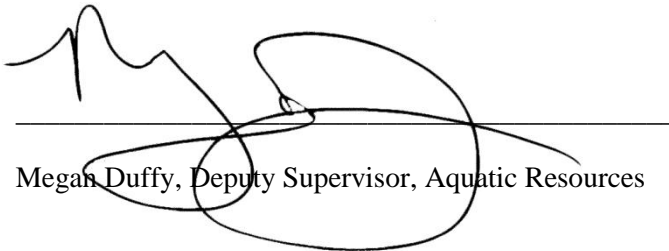
Certificate of Adoption



QUARtermaster HARBOR MOORING BUOY MANAGEMENT PLAN

CERTIFICATE OF ADOPTION

The signature below certifies the adoption of this document by the Washington State Department of Natural Resources for the management of mooring buoys in Quartermaster Harbor.



Megan Duffy, Deputy Supervisor, Aquatic Resources

_____ April 3, 2013 _____

Date

