



Wyckoff/Eagle Harbor Superfund Site

30-Month Report No. 1

Toxics Cleanup Program
HQ Cleanup Section

Washington State Department of Ecology
Olympia, Washington

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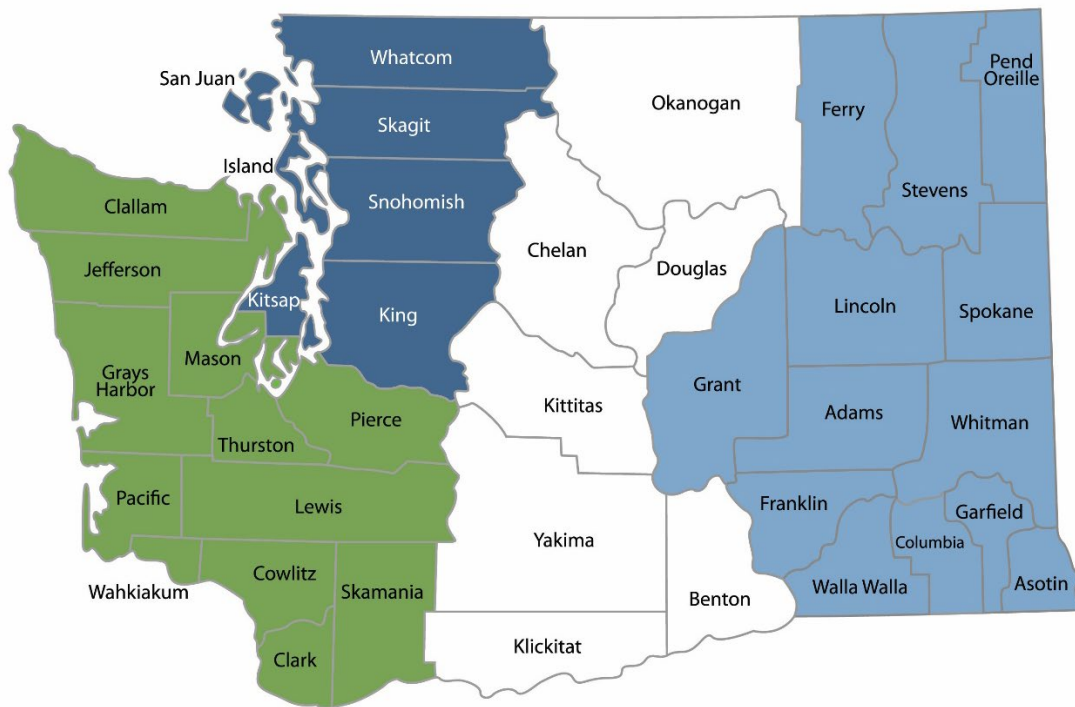
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Central Region
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Headquarters
Lacey, WA

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DEPARTMENT OF
ECOLOGY
State of Washington

Table of Contents

Introduction..... 6

Groundwater Treatment Plant..... 6

Subtidal Sediment Transferred to Ecology 8

Major upgrades that were overseen by Ecology on behalf of EPA 11

Site Utilities 13

Projected O&M Costs for Next Cycle..... 13

Total Costs to Date for Cycle 13

Conclusions and Proposed Areas for Optimization 14

Figures 15

References..... 17

Appendix A: Wyckoff Effluent Bioassay Recommended Determinations Memo 18

Appendix B: Wyckoff Regulatory Buoys Report 24

Introduction

This 30-month report describes the Operations and Maintenance (O&M) activities of the Washington State Department of Ecology (Ecology) performed at the Eagle Harbor/Wyckoff Superfund site (site; EPA Identification Number WAD009248295, Ecology Cleanup Site ID 2683) between July 1, 2023, and December 31, 2025. O&M activities during this period were performed at the Groundwater Treatment Plant (GWTP) and the area of subtidal sediment transferred to Ecology for long-term O&M (Figure 1). Ecology is required to develop 30-month reports under the Comprehensive Superfund State Contract (SSC) between the US Environmental Protection Agency (EPA) and the State of Washington signed and executed on January 26, 2024 (EPA & Ecology 2024).

In the SSC, Ecology agreed to develop reports summarizing its O&M activities on a 30-month cycle. Ecology submits these reports to EPA to inform the site's Five-Year Reviews (FYRs). Per the SSC, 30-month reports are to contain all O&M costs to date, projected near-term O&M costs, and proposed plans for optimizing O&M. Additionally, EPA's Remedial Project Manager (RPM) and Ecology's Site Manager (SM) agreed that this report would include details surrounding the transfer of the GWTP back to EPA, utilities that Ecology continues to fund and manage, and two major upgrades that were overseen by Ecology on behalf of EPA.

Groundwater Treatment Plant

Ecology operated the GWTP from April 1, 2012 until June 30, 2024, before the GWTP operations were transferred back to EPA. This section will include the last year of Ecology's O&M activities (conducted April 2012 to June 2024) and the operational activities required to transfer the GWTP back to EPA, i.e., system upgrades, replacement parts and heavier maintenance activities (conducted between June 2024 and January 2025).

Operations and Maintenance

During normal operations of the GWTP, Ecology's contractor performed on site tasks needed to pump and treat site groundwater. Regular operations included influent processing, weekly chemistry sampling at several steps of the GWTP process, and quarterly bioassay analysis. Regular maintenance of field pumps and GWTP equipment were also conducted.

As parts of the process required heavier maintenance, Ecology worked with the contractor to get special subcontractors or new equipment on hand to keep the process running. These items included heavier service on pumps, activated granular charcoal change out, fencing, septic repairs and service, PPE and product waste removal, and any electrical work.

Routine analysis was also performed for the GWTP. Weekly chemistries were collected along the treatment process along with quarterly bioassays of the effluent discharged. Chemistry grab samples were not a requirement for the GWTP but were a backup for the required bioassays in the event of an exceedance or reduction in toxicity results. Ecology performed this testing until transfer of the GWTP to EPA. Ecology also investigated testing methods for the bioassay given that the SSC did not outline specific testing parameters. A memo was generated and shared with EPA in May 2024 (see Appendix A).

Normal O&M of the GWTP was contracted for \$56,498 per month (\$785,976 annually). This cost did not include non-routine maintenance (e.g. equipment breakdowns and replacements, product disposal, GAC removal and replacement, and non-routine cleanings). Typical non-routine maintenance for the GWTP added an additional \$200k-\$400k per year. For the final year of O&M by Ecology, our non-routine maintenance was \$503,913. This final number also included some of the necessary tasks for transfer to EPA.

Operational Activities associated with the GWTP transfer to EPA

One of the requirements of the SSC for transfer of the GWTP to EPA was to bring the plant back to complete working order before handover. State spending restrictions on updates to the GWTP can justify the escalated cost to get the GWTP up to working standards. Ecology anticipated that these upgrades and fixes would take at least a year to complete. In the end tasks were completed by the end of 2024.

There were two major expenses for this transfer: product disposal and the cleaning of tanks located in the tank farm. The tank cleanings were robust and tackled areas that had never been done, and the estimation of the amount of accumulated material was impossible due to the tank composition and lack of a viewing hatch in the tank. The composition of the material was also a surprise and required settling tanks as well as more process time. The time, water and sheer quantities of material needing disposal caused this task to be quite expensive. The age of the tank and its current condition also restricted more useful tool selection for cleaning and sludge removal.

Product disposal was costly due to the amount of material, the location of disposal, and the risk associated with this transfer to the disposal site. The location for disposal was chosen because the site utilized the process of treatment of the material for energy generation as opposed to simpler heat remedies where beneficial use for the heat generated is not usually considered.

Costs associated with getting the GWTP back to optimal operating status totaled around \$1MM given that typical non-routine maintenance has typically been around \$375k. This cost also included waste disposal of PPE and the transfer and disposal of NAPL from the site. Total spent for the last year of non-routine O&M and the hand over tasks was \$1,323,082.

Subtidal Sediment Transferred to Ecology

The Record of Decision (ROD)-selected remedy for subtidal² sediment contamination in operational unit 1 (OU1) included capping and institutional controls (ICs; EPA 1994). In 2021 Ecology and EPA agreed that remedial action in the capped subtidal area was complete. Ecology assumed responsibility to satisfactorily complete O&M activities on this area under the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) §104(c)(3)(A) in Paragraphs 23 and 24 of the 1995 Superfund State Contract (SSC), subsequent SSC amendments, and Ecology's formal O&M Transfer Letter (EPA 2021; EPA & Ecology 1995; EPA & Ecology 2015; EPA & Ecology 2018; EPA & Ecology 2024). Ecology's required O&M activities include development of an Operations, Maintenance, and Monitoring Plan (OMMP) and Quality Assurance Project Plan (QAPP), O&M monitoring, reporting, maintenance of site buoys, and maintenance of applicable ICs.

O&M Monitoring 2025

In 2025, Ecology developed the new OMMP and QAPP. Both documents were reviewed by EPA. Equipment-specific details in the QAPP were added by the contractor that conducted the bathymetry survey and sediment sampling. The OMMP and QAPP were finalized in 2026. Both documents can be found as a separate file included in this report.

In November 2025, Ecology contractors conducted the O&M monitoring as described in the OMMP and QAPP. O&M monitoring included a bathymetric survey and surface sediment sampling of the subtidal sediment transferred to Ecology. The area transferred to Ecology encompasses the Site's subtidal cap. Additionally, Ecology surveyed and sampled a portion of OU 1's MNR, which remains under EPA's responsibility and is outside of Ecology's O&M scope, for credit toward the State's 10% match. The results of the bathymetric survey and surface sediment sampling are described in three reports authored by Ecology's contractor: 2025 Operation & Maintenance Monitoring of Subtidal Sediment: Bathymetric Survey; 2025 Operation & Maintenance Monitoring Report Wyckoff/Eagle Harbor Superfund Site – Subtidal Sediment Transferred to Ecology; 2025 Operation & Maintenance Monitoring Report Wyckoff/Eagle Harbor Superfund Site – Monitored Natural Recovery Area. A summary of findings regarding the subtidal sediment transferred to Ecology from the bathymetric survey and surface sediment sampling are included in the sections below.

Physical Stability

The bathymetric survey was conducted to evaluate the physical condition of the subtidal remedy and to collect topographic information on EPA's MNR area. The subtidal area transferred to Ecology encompasses a capped area; 2025 bathymetric survey data were compared to 2019 USACE bathymetric survey data to assess for elevation changes that could suggest a loss of cap material. A visual representation of this comparison can be seen

² Subtidal is defined as sediment -2 feet mean lower low water and deeper.

in Figure 2. Per the QAPP, any capped area with an elevation loss of more than one foot is considered a change of concern and triggers a secondary inspection.

Comparison of the 2025 bathymetry with the 2019 USACE data detected minimal overall elevation change across the survey area, with the average difference of less than 0.02 feet. Most of the subtidal sediment maintained a stable elevation. Four limited locations with changes of concern were identified within the subtidal sediment area transferred to Ecology, two near the ferry terminal and two along the steep slope of a shoal. All locations with changes of concern were further evaluated via drop camera surveys that collected discrete images with laser scaling.

Only one of the locations with change of concern, the location near the ferry terminal, was within the surveyed bounds of the 1994 cap, i.e. Phase I cap. The other three locations were at the bounds of the cap where cap material was placed at a thickness between 0-1 feet and serve only a transitional/grading area for the more substantive cap placement. No changes of concern were detected over the remedial area hotspots.

Based on bathymetric survey data, discrete images, discussions with the contractor, and knowledge of Eagle Harbor, the causes of elevation changes of concern are likely as follows: (1) Elevation changes in the vicinity of the ferry terminal and directly below the ferry route is very likely due to ferry propellor turbulence (i.e., prop wash) from the ferry operations and (2) The elevation change at the slope of the shoal is likely from the natural erosion of material (particularly larger material like cobbles) down the steep slope of the shoal. This phenomenon is visible in historical imaging dating back to 2011.

Chemical Monitoring

Twenty-four surface sediment samples were collected from the subtidal sediment transferred to Ecology. Sample locations were selected using a grid system with a higher concentration of grids on the southeast boundary of the transferred area since this is the area with greatest risk of recontamination due to its proximity to NAPL in sediments (i.e., nearest to where historic dock operations and intertidal and upland areas of the site where remedy has not yet been completed). Surface sediment samples were analyzed for PAHs and pentachlorophenol and compared to Site sediment CULs for the protection of benthic invertebrates.

All but one of the samples from the area transferred to Ecology did not exceed CULs. The one sample location with exceedances was collected at Station 48 in grid cell JK56. The calculated TOC normalized concentrations of fluoranthene (292.2 [J] mg/Kg) and benz(a)anthracene (113.7 [J] mg/Kg) in this sample exceeded the applicable SCO values of 160 mg/Kg and 110 mg/Kg, respectively. Station 48 is near the eastern bounds of the area transferred to Ecology and is outside the surveyed boundary of the 1994 Phase I cap. It is in the area where cap material was placed at a thickness between 0-1 feet and serves only a transitional/grading area for the more substantive cap placement.

Therefore, exceedance likely does not indicate a cap breakthrough. The location of this station could suggest there is mixing of sediments at the bounds of the MNR area and the area transferred to Ecology.

2025 O&M Monitoring Conclusions and Recommendations

Overall, 2025 O&M monitoring results indicate that the cap remedy on the subtidal sediments transferred to Ecology remains physically stable and effective at chemically isolating contaminated sediment. Locations where elevation was lost do not appear to impact the overall functionality of the cap.

The locations with changes of concern from the bathymetric survey are not in the same location as the surface sediment sample with SCO exceedances (station 48) was collected. Rather, the location of station 48 had elevation gain since 2019 which supports the conclusion that fluoranthene and benz(a)anthracene impacted sediment may have migrated from the MNR area of the Site. The sample does not suggest a cap breakthrough since the station location is in the transitional/grading of the cap and not an area of more substantive cap placement. The surface sediment samples near the only location with change of concern within the surveyed bounds of the 1994 cap did not have any exceedances of CULs.

The 2025 monitoring results will serve as the baseline dataset for future O&M monitoring. As Ecology's O&M monitoring dataset grows, changes in elevation will be assessed over time, e.g., changes in elevation not only compared over 5-year intervals but relative to 10-year-old data etc.). It is recommended that future O&M monitoring focus on the body of the cap which is isolating sediment contamination hotspots. For example, prioritizing focus of elevation changes, if any, on the main body of the cap itself rather than its graded boundary.

The total cost for the OU1 bathymetry and the surface sediment sampling for the subtidal area transferred to Ecology and the MNR area managed by EPA was \$196, 865.46. This cost was divided between Ecology and EPA as a joint effort to monitor the OU1 area. Combining the monitoring of both areas and coordinating between agencies was cost-effective and a better use of resources compared to both agencies contracting separate monitoring events.

No Anchor Buoys

As part of the transfer of the capped areas in OU1, Ecology is responsible for the maintenance and potential retrieval of buoys designated to inform boaters of the Regulated Navigational Area (RNA; 33 CFR 165.1309). This RNA was implemented to protect the Site's cap and adjacent seabed from damage/disturbance by prohibiting vessels and persons from anchoring, dredging, laying cable, dragging seining, bottom fishing, conducting salvage

operations, or other potentially disturbing activities. The transfer of these buoys was completed in November 2023, more than 2 years after the subtidal sediment transfer to Ecology.

Since November 2023, Ecology has had two events that triggered our inspections of the buoys. In 2024, Ecology was informed by the Coast Guard that one of the buoys was reported floating in the nearby waterway. This was retrieved using an emergency contract. The buoy was reattached and the remaining three buoys were inspected for potential weaknesses or worn parts. Excessive growth was removed and a recommendation to replace the markings in the next year was also made.

In 2025, Ecology anticipated the need for an on-call contractor as well as annual inspections of the buoy system. Due to unforeseen staffing limitations, the contract for this work was held up and during this time one of the buoys went missing in the Fall of 2025. This buoy was retrieved from City custody by the contractor in place and the contract tasks were executed. This maintenance contract also included updating the markings on the buoys, replacing the last nylon line with galvanized chain, and inspecting the remaining three buoys.

The inspection reports can be found in Appendix B. Videos of the inspections were taken, and these are available upon request.

The inspection report from Seattle Diving Services showed that the buoys systems are in relatively good shape. Three of the buoys will need to have their can pipes replaced in the next one to two years and the midline floats will need to be flipped in one of the next two inspections. Current midline floats are only attached to one end, so the underutilized ends will be used when flipped. Some of the chains are also showing some signs of galvanizing wear and will continue to be watched and replaced as needed. Whole line replacement estimates are around \$1500 per buoy, although costs are continuing to increase.

The buoy cans (portion of the buoy above the water line) were also removed for cleaning and application of new markings. The new markings are full sheets and should allow for a longer life span and quicker changing when new markings are needed.

The cost for these two rounds of maintenance, graphic updating and retrieval was \$43,077. Current contract coverage runs through June 2027 for retrieval. A new inspection contract will be generated in Q4 of 2026 as the current contract has reached its monetary limit to also include another round of inspections.

Major upgrades that were overseen by Ecology on behalf of EPA

Two areas on site needed upgrades due to future use and the transfer of operations back to EPA. Upgrades to the non-potable water system, the CT-01 deep water well, were needed to

help supply water for construction operations and the well system had not had an overhaul since it was installed. The GWTP also had antiquated technology that needed upgrading to conform to the current federal standard for security. These two items were addressed by Ecology for two reasons: access to funding and faster implementation.

CT-01: Non-Potable Water Source Upgrades

In 2023 EPA approached Ecology and asked for help in upgrading the aging CT-01 Deep Water Well System. This system was originally installed in 2002 and needed repairs and updates to help support regular on-site operations and to serve as a backup to construction operations on site. EPA installed a second deep water supply well in 2025, and this will serve as the primary water source for the remaining construction operations.

Ecology, with the help of our contractor we completed the upgrades and modifications recommended in the *CT-01 Well Upgrades and Water Storage Tank and Effluent Tank Modifications* (2023, CH2M Hill) Memo. A completion report will come as a separate document due when the final task is complete.

Estimated cost for the project from CH2M was \$505,357. The final cost of the upgrades has not been determined due to work not being complete and should remain below the class 4 cost estimate. Costs for these upgrades were paid for by Ecology and per the SSC (2024) will be used to offset the 10% matching required by the State for the remediation of the site. As of the writing of this report, one last line item remains incomplete, and completion of this will occur before June 2026.

Cybersecurity Upgrades

Beginning in 2022, EPA approached Ecology to help upgrade the cybersecurity present at the site and in the GWTP. Ecology agreed to make this upgrade, which included both hardware and software upgrades, in 2025. EPA provided a technical memo (*Cybersecurity Assessment – Wyckoff Groundwater Treatment Plant, 2022*) to Ecology as a roadmap for these updates. Using our contractor, a work plan was created along with necessary adjustments that included some overlooked features that were needed to complete the project correctly. This task was added to the comprehensive SSC between Ecology and EPA to allow us to use funds spent on the project for our required 10% match for remediation construction.

Completion of these upgrades was needed before the GWTP transfer due to federal regulations surrounding cybersecurity at federally run sites. This task was not completed before the handover due to lead times on hardware and the need to add scope to the original plan presented to Ecology. As of the writing of this report, Ecology and its contractor have completed all the required tasks and are still overseeing the purchasing of software renewals when needed. Complete transfer of these renewals will be necessary by June of 2026 due to Ecology's contractor period ending. Options to extend are not feasible as we are currently in the only extension period allowable per State contracting regulations.

Costs for these upgrades were estimated to be beyond \$600,000. During the execution of these upgrades prices for items needed to complete the project jumped substantially. Total cost for labor, design, hardware, programming and software to date is at \$850,480. Software renewals are still being processed under this same contract so the final total cost will be slightly higher upon task completion.

Site Utilities

Utilities on the site cover both construction and general site operations. These utilities include Power (PSE), internet and phone (Century Link and Verizon), trash (BI Disposal), water (City of Bainbridge Island), and septic inspections.

From July 1, 2023 to June 30, 2024, Ecology covered these costs as part of the O&M of the GWTP on site. After July 1, 2024, these utilities remained with Ecology, however per the SSC (EPA & Ecology 2024) costs incurred from the site would be used for our remedial match. For the last 18 months the total utility cost for the site through the end of 2025 was \$159,837.

Projected O&M Costs for Next Cycle

For the next 30-month cycle (January 1, 2026 – June 30, 2028) Ecology expects to incur O&M costs associated with the utilities for the site and the inspection of the NRA.

Annual Inspections, retrieval and repairs for the buoys in this next cycle are estimated to be around \$20,000 although retrieval will hopefully be unnecessary due to more consistent inspections and a current contract. No bathymetry or chemistry analysis is scheduled until 2030.

The utilities on the site are expected to remain about the same with typical increases following inflation trends. At the current construction operation levels and at current rates, annual costs should be around \$150,000. This would be applied to Ecology's 10% Match credit and is currently being drawn from past 10% Match allocation from the legislature.

Total cost for Ecology would be around \$425,000 for the next cycle.

Total Costs to Date for Cycle

The total cost incurred for Ecology's O&M responsibilities in this cycle was \$3,538,542. Total included O&M costs of the GWTP before transfer to EPA, disposal costs for waste removal and disposal, bathymetric and sediment sampling, and buoy maintenance. Ecology also paid for CT-01 upgrades and Cybersecurity for credit applied to later invoices.

Conclusions and Proposed Areas for Optimization

Ecology worked closely with its contractors and EPA to get the GWTP to a workable standard. While the original timeline was not met, delivery of a working GWTP was still accomplished. We thank EPA for their patience and understanding while we completed our required tasks post transfer.

Ecology overcame several challenges while conducting the required O&M monitoring of the subtidal sediments transferred to Ecology. Specifically, Ecology was faced with lower staffing rates that increased internal contracting times, which extended the lead time for deploying fieldwork. Since this was Ecology's first O&M monitoring event for the subtidal sediment transferred to Ecology, Ecology had to draft an OMMP workplan and QAPP. Now that these initial documents are drafted, the groundwork has been laid for this process and should help guide the future O&M monitoring. For the next cycle Ecology will aim to conduct this sampling and surveying closer to the beginning of 2030 to allow for scope changes and potential discoveries that require further investigation. Ecology looks forward to helping support EPA throughout the remaining remedial construction. If anything is missing from this report that would help EPA with their 2027 Five-Year Review, please contact Kristen Reed, Ecology Wyckoff Site Manager, at kristen.reed@ecy.wa.gov.

Figures

Figure 1: Subtidal area transferred to Ecology

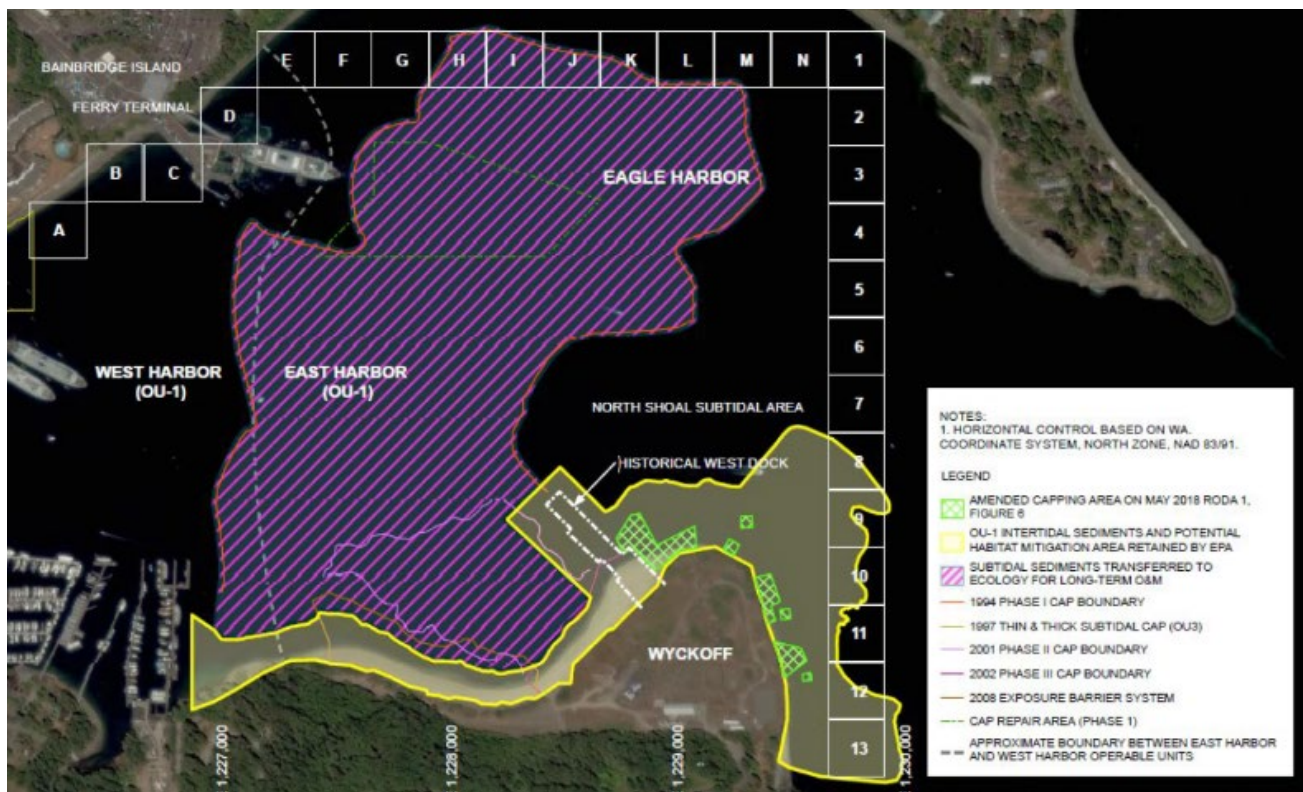
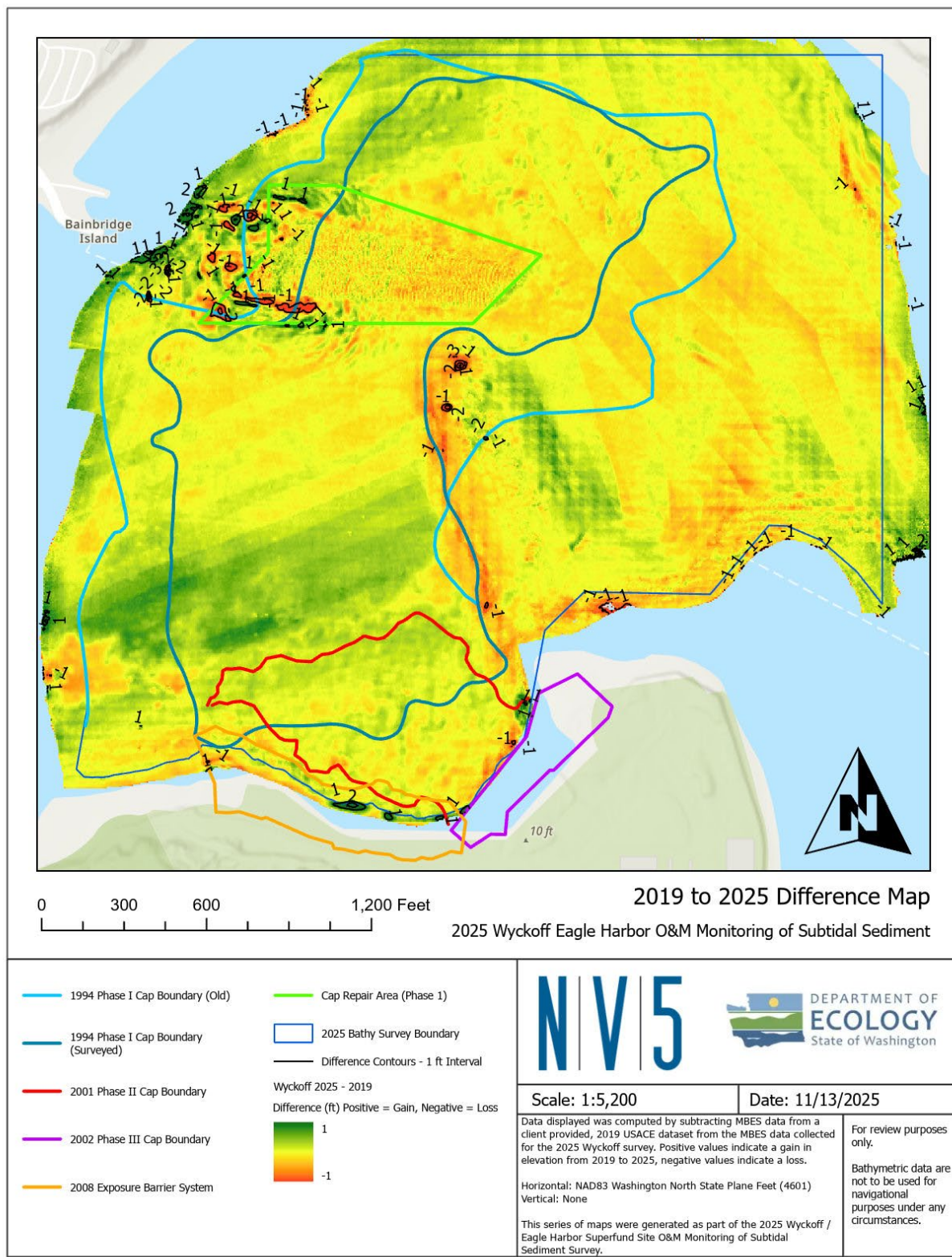


Figure 2: Bathymetric survey differences between 2019 and 2025



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Appendix A: Wyckoff Effluent Bioassay Recommended Determinations Memo



STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY

PO Box 47600, Olympia, WA 98504-7600 • 360-407-6000

May 2, 2024

Jacob Moersen
U.S. Environmental Protection Agency, Region 10
1200 Sixth Avenue
Seattle, Washington 98101

RE: Wyckoff/Eagle Harbor Superfund Site Bioassay Recommended Determinations

Dear Jacob Moersen,

Over the past year, Ecology reviewed recent (2023-present) bioassay results from quarterly effluent testing performed on effluent obtained from the U.S. Environmental Protection Agency (EPA) Wyckoff/Eagle Harbor Superfund Site groundwater treatment plant (CH2M 2023-2024). As part of this review, Ecology sought to determine:

Do the recent, and periodic, reductions in the chronic growth endpoint represent an exceedance of testing criteria?

To answer this question Ecology reviewed relevant documents and discussed regulations and current Site effluent monitoring procedures with Ecology, EPA, and Jacobs Engineering Group, Inc. staff. The 2000 Record of Decision (ROD, EPA 2000) stipulates that EPA and Ecology will “evaluate the results to determine whether they indicate the occurrence of chronic toxicity outside the mixing zone.” Ecology’s review and discussions resulted in recommended determinations, presented below.

Findings and recommended determinations:

- Quarterly bioassay memos have inappropriately referred to an NPDES permit (CH2M 2023-2024). There is no historical or current NPDES permit for this outfall.

- Recommended Determination: EPA maintains that an NPDES permit is not needed since the outfall is within the boundary of the Superfund Site (42 U.S.C. § 9621 (e)(1)). Ecology concurs with EPA's position. However, Ecology also maintains that this outfall must still comply with Washington's regulations on effluent discharging to the Puget Sound, i.e., waters of the state (WAC 173-205-040).
- No documented chronic criteria are currently available for this outfall. While a dilution study was completed in 1995 (CH2M 1995), Ecology has not found documentation that the study was used to establish criteria.
 - Recommended Determination: Chronic critical effluent concentrations should be established for the outfall consistent with Ecology water permitting regulations (WAC 173-205-070).
- Past chronic bioassays have used hypersaline brine (HSB) as the method to increase the salt content of the effluent prior to testing. Ecology was unable to find any documentation as to why HSB was utilized over artificial sea salt. Both EPA's Effluent Toxicity Testing Methodologies (EPA 1995) and Ecology's guidance (Ecology 2016) allow for either HSB or artificial sea salt to be used.
 - Recommended Determination: Future effluent bioassays should rely on artificial sea salt to increase salinity as it allows for testing to higher effluent concentrations where reductions in endpoints have periodically been observed in chronic tests.
- The existing dilution study is from 1995 (EPA 1995). Ecology subject matter experts reviewed the dilution study for sufficiency. Some of the methodologies employed in the 1995 dilution study (CH2M 1995) are inconsistent with current best practices.
 - Recommended Determination: Differences in methodology between the 1995 dilution study and current best practices are unlikely to materially alter the findings of the study or impact the resulting chronic criteria. Therefore, a new dilution study is not needed at this time and the 1995 study is sufficient for the determination of acute and chronic critical effluent concentrations. The modeling results provide minimum dilution estimates of 56:1 at the acute zone boundary and 141:1 at the mixing zone (chronic) boundary. However, if the point of discharge changes in the future (i.e., pipe moved or shortened) and or the volume of discharge changes a new dilution study should be conducted, and new acute and chronic critical effluent concentrations established.
- The ROD (EPA 2000) includes concentrations of effluent to be used in acute bioassay tests but not chronic bioassay tests. Instead, the ROD includes requirements for a control and dilution series.

- Concentrations of effluent historically (and currently) assessed during quarterly chronic bioassays appear to have been picked using the following rationale:
 - Control (0 percent effluent)
 - Maximum concentration: max value feasible using HSB (typically ~65-70% effluent).
 - Dilution series (i.e., 2, 4, 9, 18, 35, max conc.)
- Recommended Determination: Effluent concentrations should be established, and rationale documented, for chronic bioassay tests. Ecology recommends the following concentrations based on a review of the effluent dilution study (56:1 acute, 141:1 chronic), standard use of 5 effluent concentrations, quarterly bioassay results (CH2M 2023-2024), and lack of observed toxicity in acute testing:
 - Salt Control,
 - Control (0% Effluent),
 - 0.7% (acute critical effluent concentration),
 - 1.8% (chronic critical effluent concentration),
 - 6.25%,
 - 50%,
 - 100%.
- The current test species used are:
 - Chronic: *Mytilus galloprovincialis* [mussel]), and
 - Acute: *Menidia beryllina* [inland silverside fish]
 - The 2000 ROD required chronic testing on *Strongylocentrotus purpuratus* (purple sea urchin), or *Dendraster excentricus* (sand dollar) AND *Mytilus edulis* (mussel) or *Crassostrea gigas* (Pacific oyster) larvae. Ecology has been unable to find documentation that discusses the deviation from assessing two species for chronic tests, to one (mussel).
 - The 2022 QAPP identifies 1 chronic (*Mytilus* Sp. Or *Crassostrea gigas*)) and 1 acute (*Menidia beryllina*) test species. A deviation from the ROD, which requires 2 species for chronic tests is not discussed.
 - *Mytilus galloprovincialis* is an alternative test species to *Mytilus edulis*, *Mytilus trossulus* and *Crassostrea gigas* for the bivalve survival and development test. All three *Mytilus* species used for WET are native to the west coast. They are only distinguishable through DNA testing. Ecology guidance allows for any of these species to be used (the method is the same regardless of the species used).

- Ecology assumes that the decision to use only one species for chronic testing was made, in part to run the most sensitive of the four species identified in the ROD (EPA 2000, EPA 1995 and Ecology 2016).
- Recommended Determination: Ecology recommends maintaining the same test species currently being used during quarterly bioassays. If additional information on the selection of *Mytilus galloprovincialis* as the only chronic test species becomes available, this determination should be re-evaluated.

Please feel free to contact me at (360) 742-2595 or kristen.reed@ecy.wa.gov if you have any questions regarding these recommended determinations.

Sincerely,

Kristen Reed

Toxics Cleanup Program

Headquarters Cleanup Section

Cc: Bernadette Wright, EPA
Erik Snyder, Ecology
Rachel McDermott, Ecology
Amy Hargrove, Ecology
Kevin Kalefern, Ecology

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Washington Administrative Code (WAC) 173-205-070, “*Monitoring for compliance with whole effluent toxicity limits*.” Available at: <https://app.leg.wa.gov/WAC/default.aspx?cite=173-205-070>

Appendix B: Wyckoff Regulatory Buoys Report

Department of Ecology

Bainbridge Island, WA USA



Wyckoff Regulatory Buoys Inspections & Vinyl Replacement November 2025



Seattle Diving Services

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Introduction

Seattle Diving Services completed an underwater cleaning & inspection of the four (4) No Anchoring Regulatory Buoys located in Eagle Harbor for The Department of Ecology. The cleaning was performed by a dive team under the direction of Seattle Diving Services.

Additional tasks included upgrading the previous “No Anchoring” stickers, Buoy line #1, & the swivel on Buoy # 3. In addition, the Dept. asked SDS if to confirm coordinates of the 4 buoys.

The purpose of these tasks was to provide an annual inspection of the Wyckoff buoy Systems, ensuring the buoys are clearly labeled and marked, mitigate the potential of the 4 systems from breaking free, & respond to an emergency buoy breakaway during the contract period.

Summary

The underwater portions of the buoy components were found to be in overall Fair condition. There are no immediate concerns. However, there are some issues that should be addressed within the next two years.

Visual representation is provided of the general conditions and specified problem areas. The information contained within this report is based on the conditions at the time of inspection.

General Conditions

The components for each mooring system were generally the same. Anchor, chain, midline float & buoy. There was heavy marine growth on each system.

Each helical anchor has a 3/4" Galvanized screw pin anchor shackle connected to a 3/4" eye-eye swivel. Another 3/4" Shackle connects the swivel to the 1/2" galvanized chain. The chain varied in lengths and connects to the mooring eye at the bottom of each buoy via a 3/4" shackle.

The mid-line float is an 18-inch rod-type mooring buoy attached to the chain via a 5/8" shackle 10' from the anchor. Most of the shackles had stainless seizing wire. To prevent the possibility of the screw pins backing out, SDS added additional seizing wire to every shackle on all 4 buoy systems.

In general, the galvanizing on the chain, shackles, and buoy hardware is beginning to fail, leaving the steel exposed to corrosion.

The Regulatory buoys are Gilman Corporation USCG 5CFR, 5th class lonomer foam can buoys. Each buoy assembly contains a 72" pipe with a mooring eye & steel ballast at the bottom. As it comes up through the float & can sections of the assembly, the top of the pipe is threaded to secure the top plate completing the assembly. **Two** of these pipes were in fair condition and should be replaced within 3 years.

Vinyl

The peeling of the buoy lettering has been a recurring issue. The Dept. of Ecology requested single sticker sheets or alternatively two large sheets per buoy. SDS removed the can portions of the buoys in order to properly clean them and install the new vinyl markings. Dimensions were taken of the existing stickers in order to match the new vinyl markings.

Each buoy received two white 25" x 30" vinyl sheets with the following specifications.

2" Orange Retroreflective Band

3" Black Lettering: "NO ANCHORING"

Symbol: 14" x 11" Orange Closed Diamond

1" Black Lettering: "REGULATED NAVIGATION AREA
33-CFR-165.1309"

2" Orange Retroreflective Band

Photos of buoy & artwork attached.

On-site work

October 22nd, 2025

On October 22nd, Seattle Diving Services was notified a buoy had broken free. SDS mobilized the dive barge to Eagle harbor to determine which buoy had broken free & search for the missing buoy. The search began at 9am from the Ferry & shore as SDS mobilized the dive barge to eagle harbor. Once on site SDS determined the buoy that was missing was buoy #1. SDS was informed that the buoy was reported found on-shore on Sunday October 19th in Hawley Cove. At 12pm SDS met with the City of Bainbridge who had the buoy in their possession & began the underwater search for the anchor until 6pm.

SDS searched two coordinates. Most of the time was spent at location: 47° 37' 27.103" N 122° 30' 16.819" W which was provided by the Dept. of Ecology via email. The second location which is on the USCG permit & EPA website was: 47°37'25.1"N 122°30'16.8"W. Less time was spent at the second location & due to poor visibility, the conditions for a visual search were less than ideal.

November 14th, 2025

On November 14th, SDS completed the inspection of Buoys 2, 3, & 4. At this time, the can portions of the buoys were removed so SDS could properly clean & apply the new vinyl stickers.

November 19th, 2025

SDS returned to reinstall them on 11/19/2025. At this time, the anchor location for buoy #1 was determined to be:
47°37'29.2"N 122°30'22.0"W.

During the 2nd search for buoy 1's anchor, SDS discovered the unused original anchor 30'+ to the east. This anchor location more accurately lines up with buoy 1 coordinate. However, the coordinate is accurate enough for navigation & if the buoy anchor ever needs to be located again in the future.

At this time, SDS also replaced the swivel on buoy 3 with a ¾" galvanized eye-eye swivel. The existing swivel was a 5/8" jaw-eye swivel which are prone to premature failure. During the inspection, the cotter pin securing the clevis pin was deteriorated and on the verge of causing failure.

General Conditions

There was heavy marine growth on each system. The bottom of the buoy, chain, and rope were fully encrusted with mussels, tube worms, & barnacles. All growth was removed with an underwater pressure washer.

The galvanizing on all hardware besides buoy 1 is beginning to fail leaving the steel exposed to corrosion.

Coordinates

SDS was also given the task of confirming coordinates for each buoy. Below are the buoys numbers provided by the Department & corresponding buoy letter, light #, coordinates as printed on the permit, converted coordinates, and coordinates confirmed onsite.

Buoy #	Light #	Permit Coordinates	Converted Coordinates	Onsite Coordinates
Buoy 1/ Buoy S	18013	47-37-25.103N / 122-30-16.819W	47°37'25.1"N 122°30'16.8"W	Confirmed
Buoy 2/ Buoy A	18012	47-37-24.185N / 122-30-01.918W	47°37'24.2"N 122°30'01.9"W	Confirmed
Buoy 3/ Buoy C	18014	47-37-03.327N / 122-30-15.344W	47°37'03.3"N 122°30'15.3"W	Confirmed
Buoy 4/ Buoy D	18014.5	47-37-03.600N / 122-30-25.686W	47°37'03.6"N 122°30'25.7"W	Confirmed

Note: New buoy 1 anchor 30' West of original anchor & coordinate.

Recommendations

The buoys occasionally breaking free has been a recurring issue. Since one rough winter season can put a lot of stress on the underwater systems, the chain and shackles should continue to be monitored on an annual basis. SDS added additional seizing wire to all shackles & there are currently no compromised components in any of the systems.

Although the chain and shackle conditions in 2026 are to be determined. SDS does not anticipate any replacement of shackles, swivels or chain at that time.

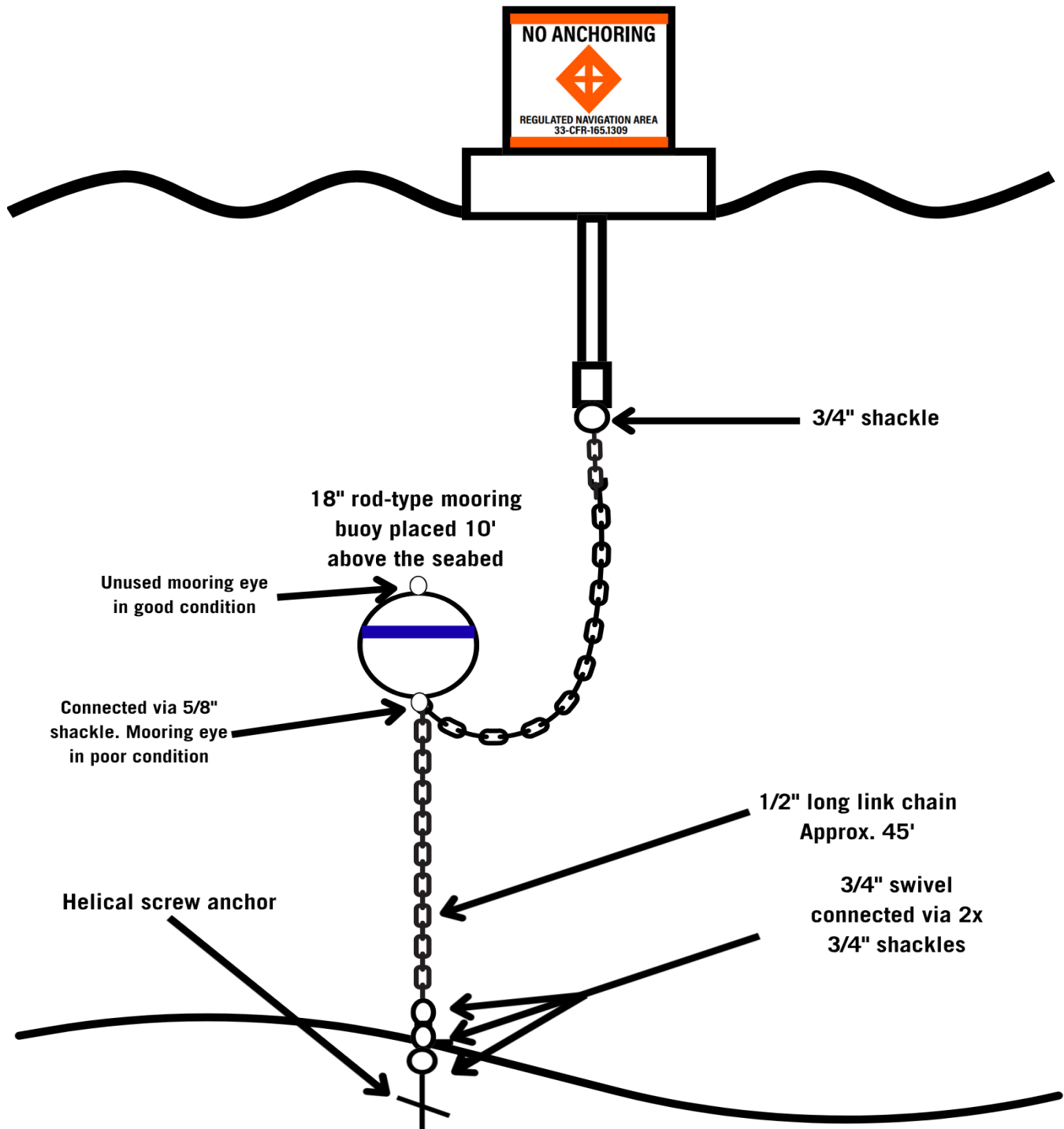
The chain on buoys 2 & 3 should also considered for replacement within 2 years. At this time, associated shackles should be replaced as well.

The pipes on buoys 1, 2, & 4 should be monitored next year and considered for replacement in 2-4 years.

The mid-line floats are rod-type mooring buoys with an eyelet at the top and bottom of the buoys. The lower eye is connecting the buoy to the chain & is beginning to deteriorate from typical underwater conditions. These mid-line floats should be flipped over when the chains are replaced so the fresher eye can be used, prolonging the life the buoys for another 2+ years.

PHOTO LOG

TYPICAL SIDE PROFILE





Buoy Artwork & Dimensions



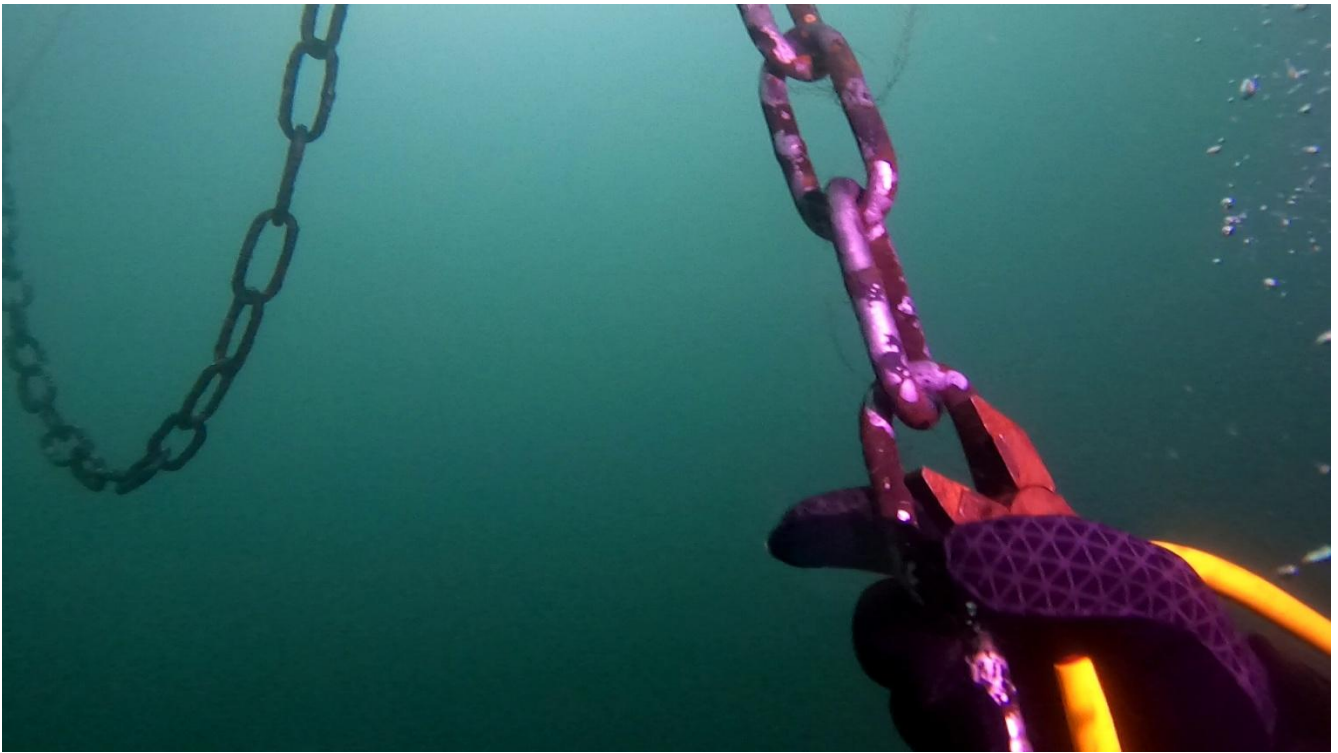
Buoy 1: Onsite with markings installed



Buoy 1: Typical previous stickers peeling. Letting unclear.



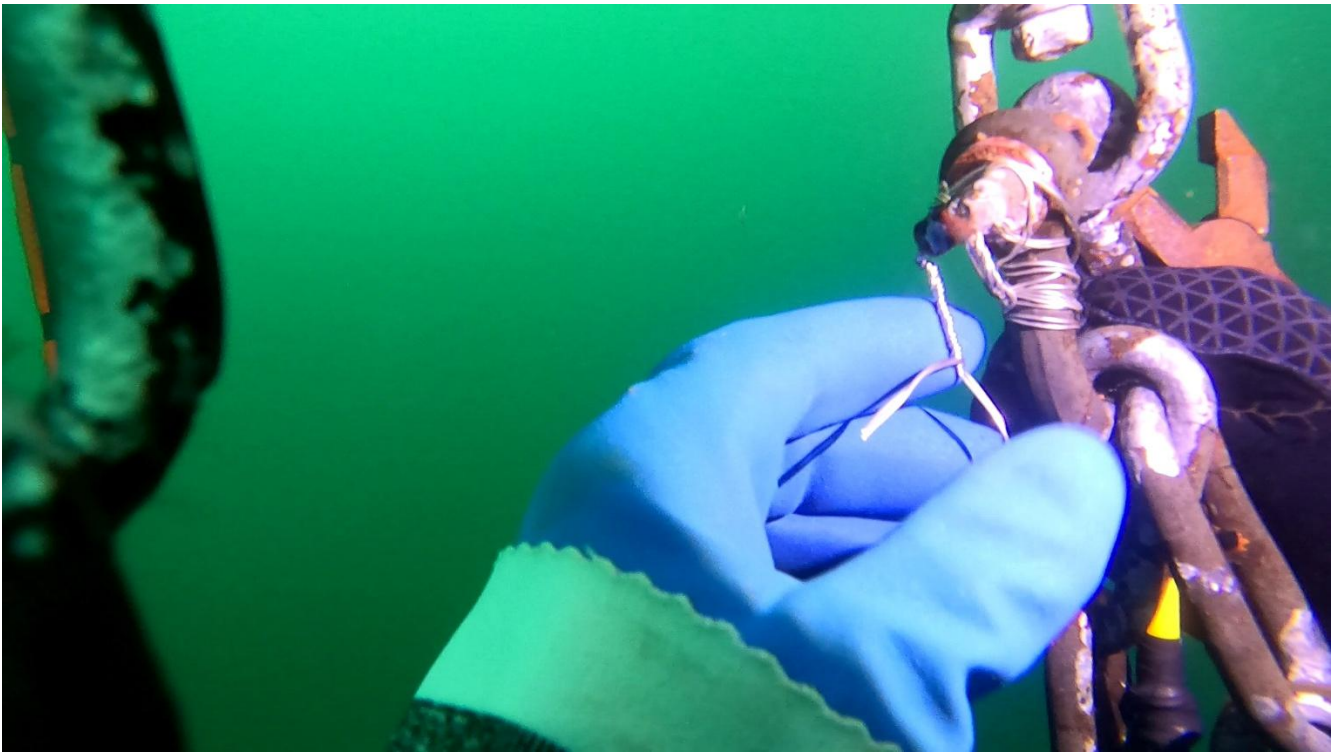
Buoy 4: New vinyl markings installed.



Buoy 2: Typical chain condition



Buoy 2: Typical chain condition



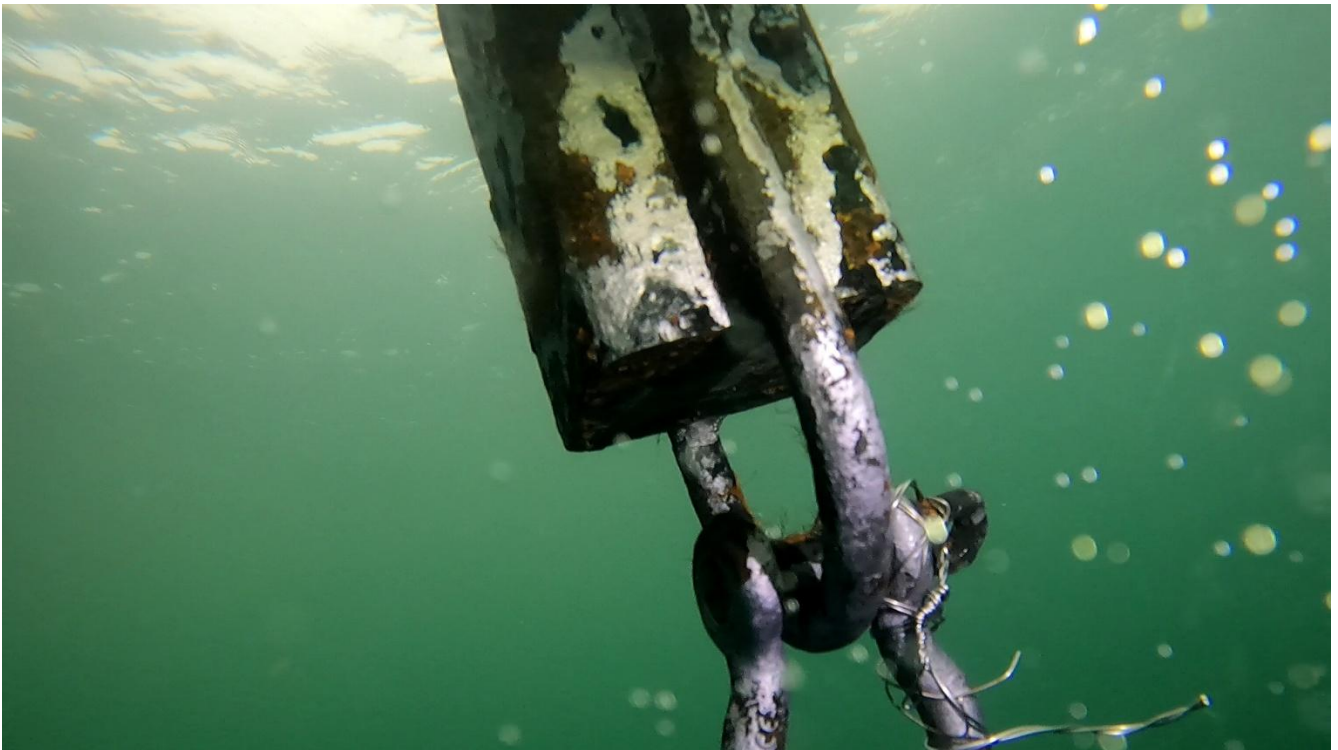
Buoy 2: Typical mid-line float eye condition (deterioration present). Diver installing additional seizing wire.



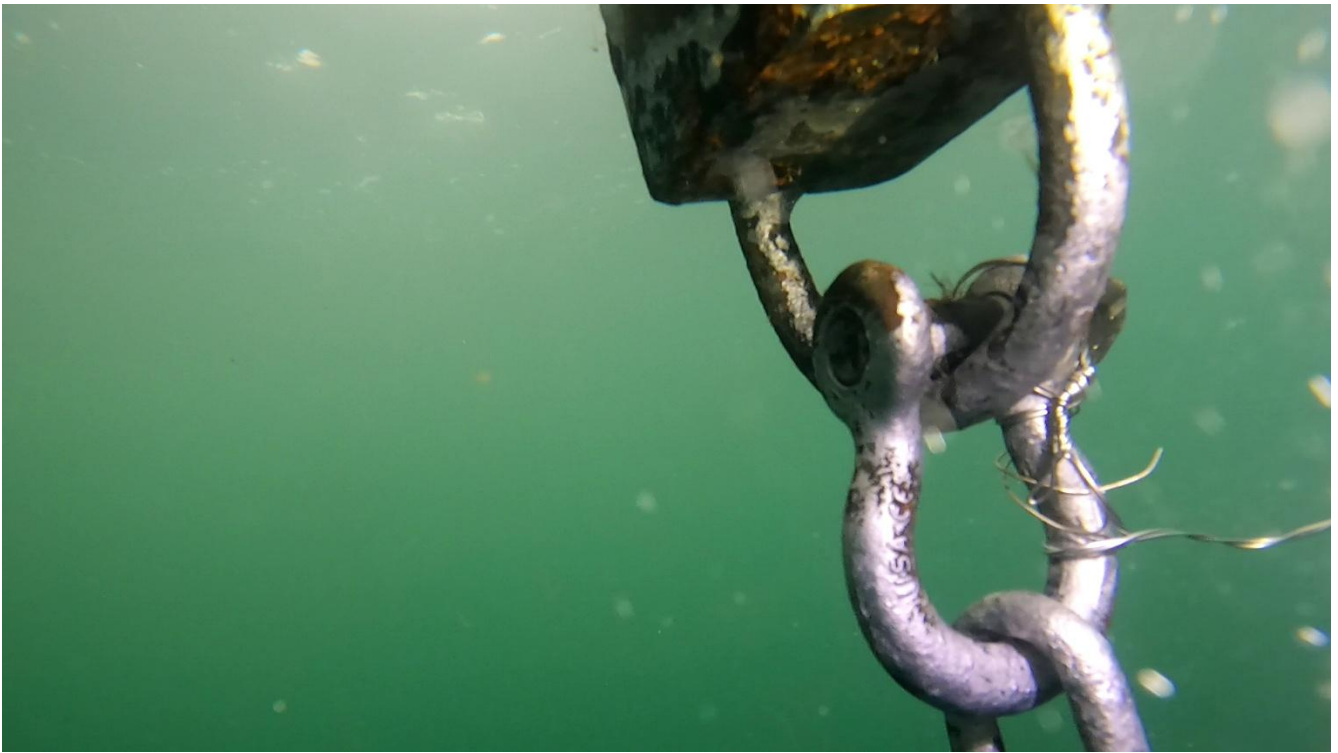
Buoy 2: Can removed. Threads bent likely from vessel impact



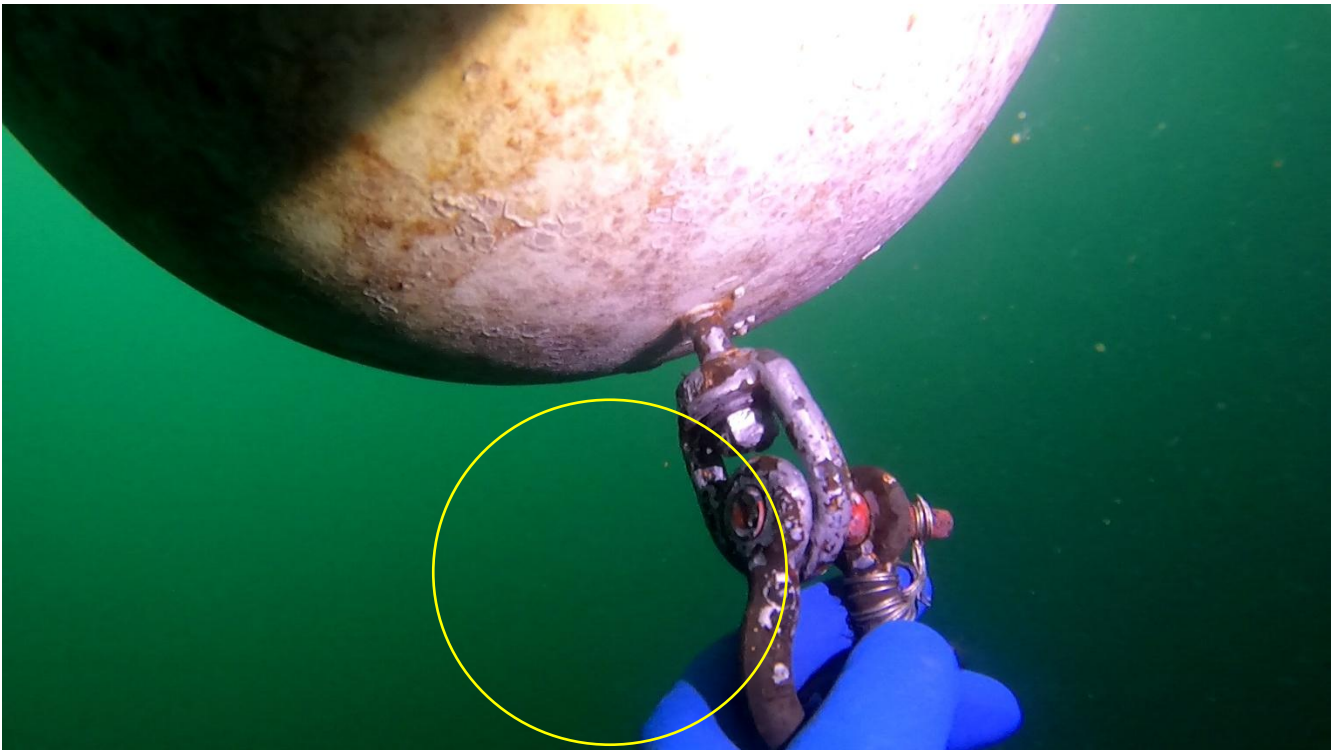
Buoy 3: Typical Anchor shackle and lower chain condition. Galvanizing intact, lower section of chain in good condition.



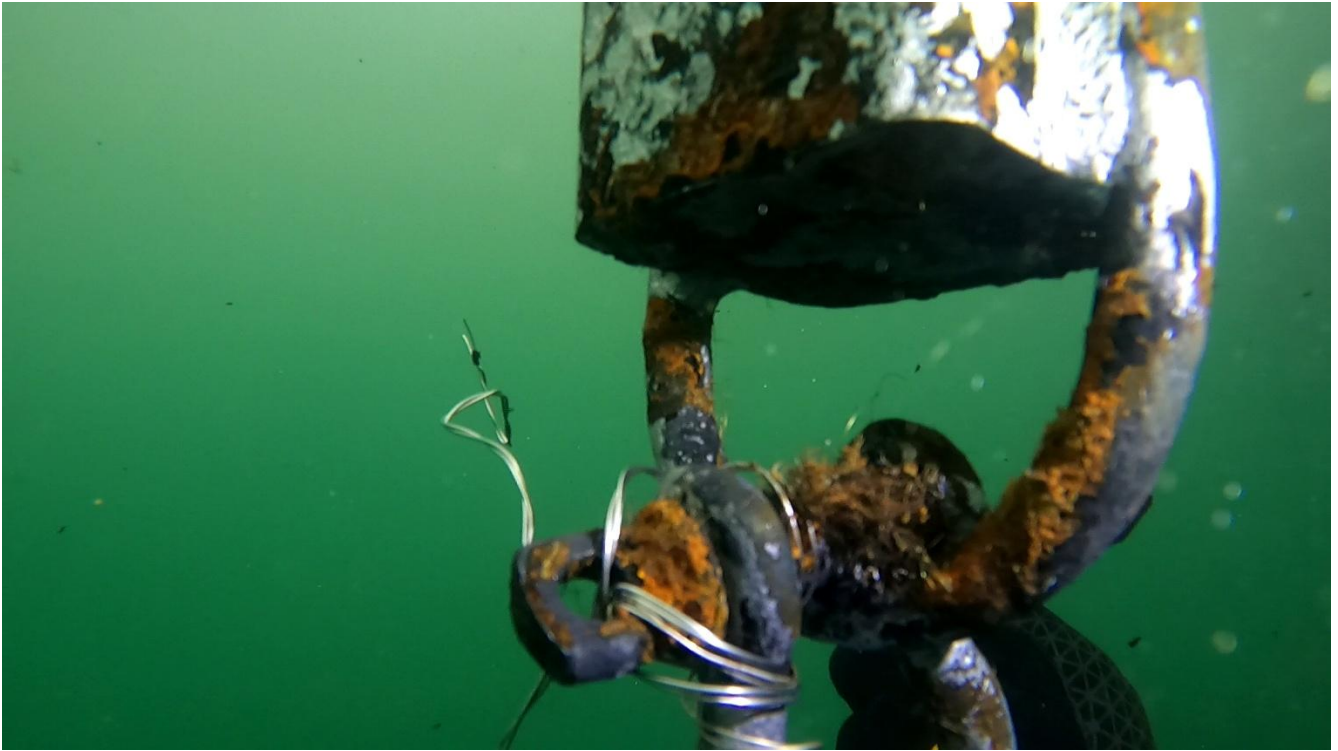
Buoy 4: Mooring eye at bottom of buoy pipe, deterioration present.



Buoy 4: Mooring eye at bottom of buoy pipe, deterioration present.



Buoy 2: Mooring eye at bottom mid-line float. Typical condition, eye deteriorating.



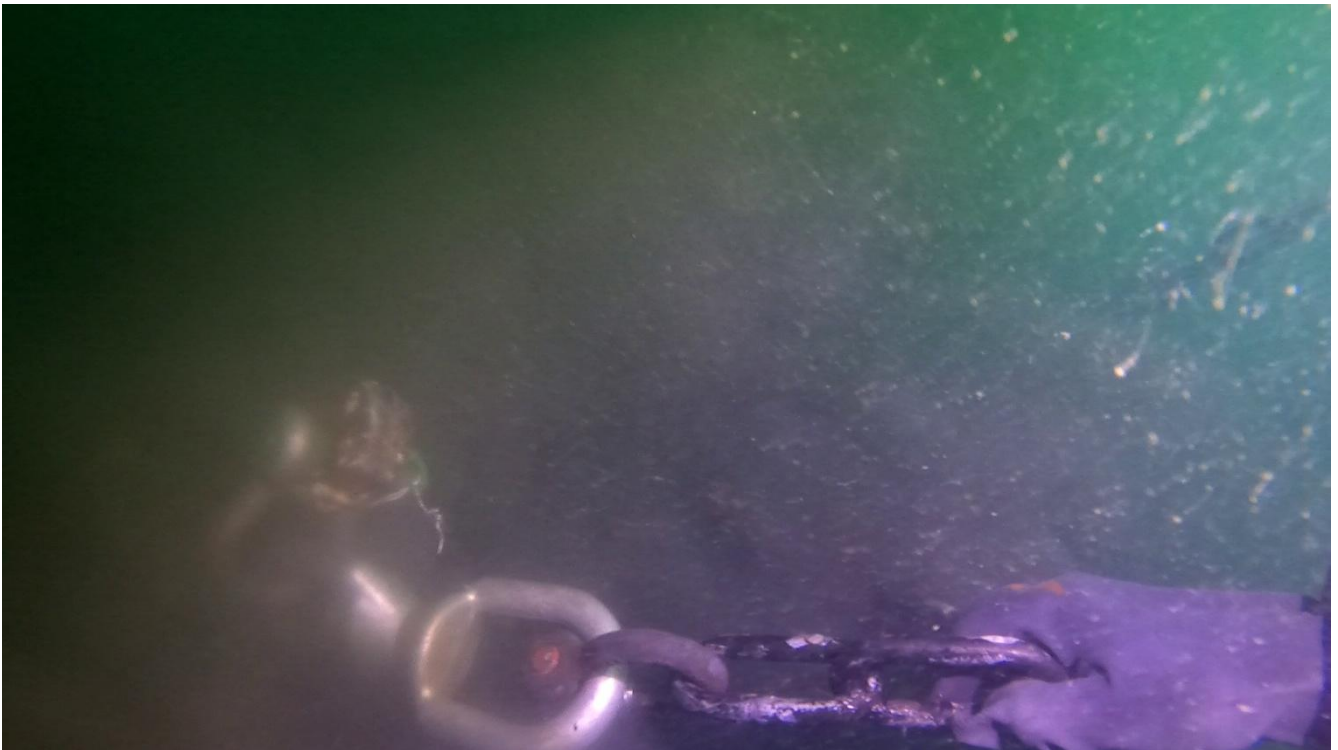
Buoy 2: Mooring eye & shackle at bottom of buoy pipe, deterioration present on both.



Buoy 3: Anchor eye, shackle, and swivel in good condition.



Buoy 3: New anchor shackle & swivel installed.



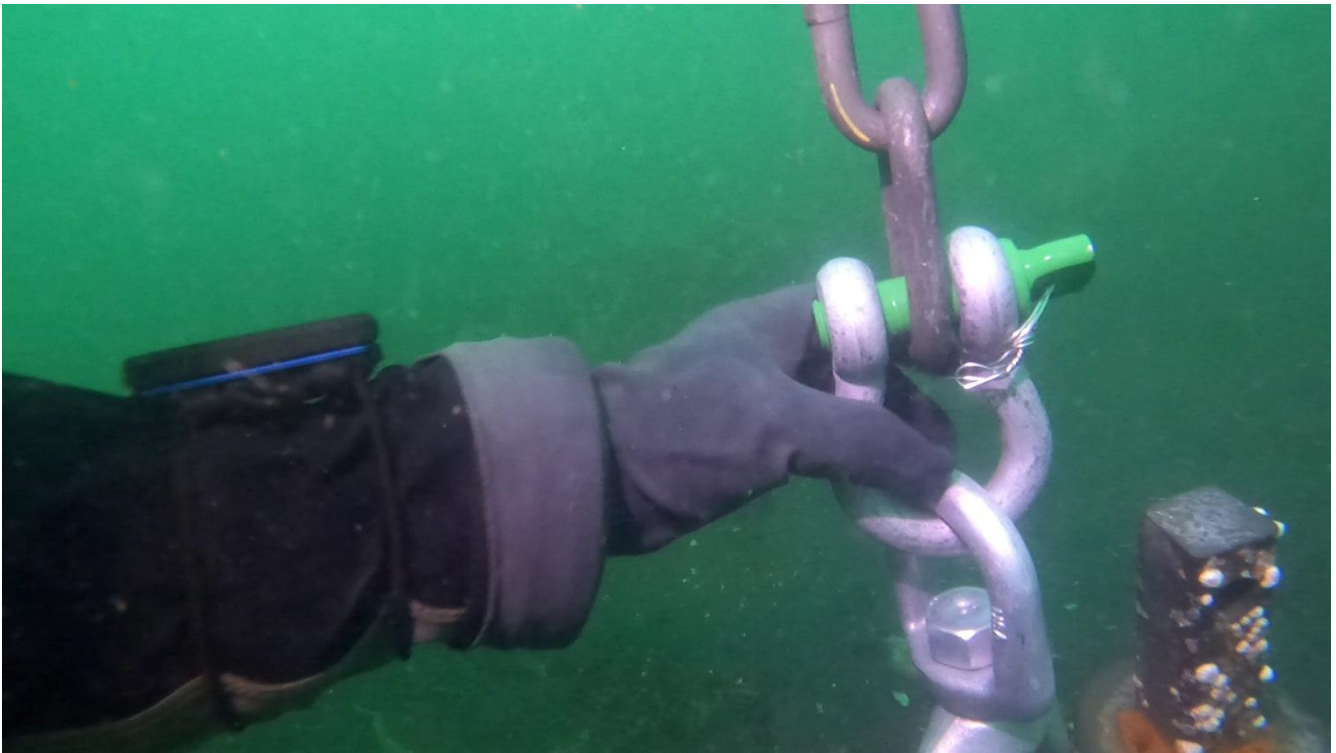
Buoy 3: New anchor shackle & swivel installed.



Buoy 1: Anchor & tubeworms located.



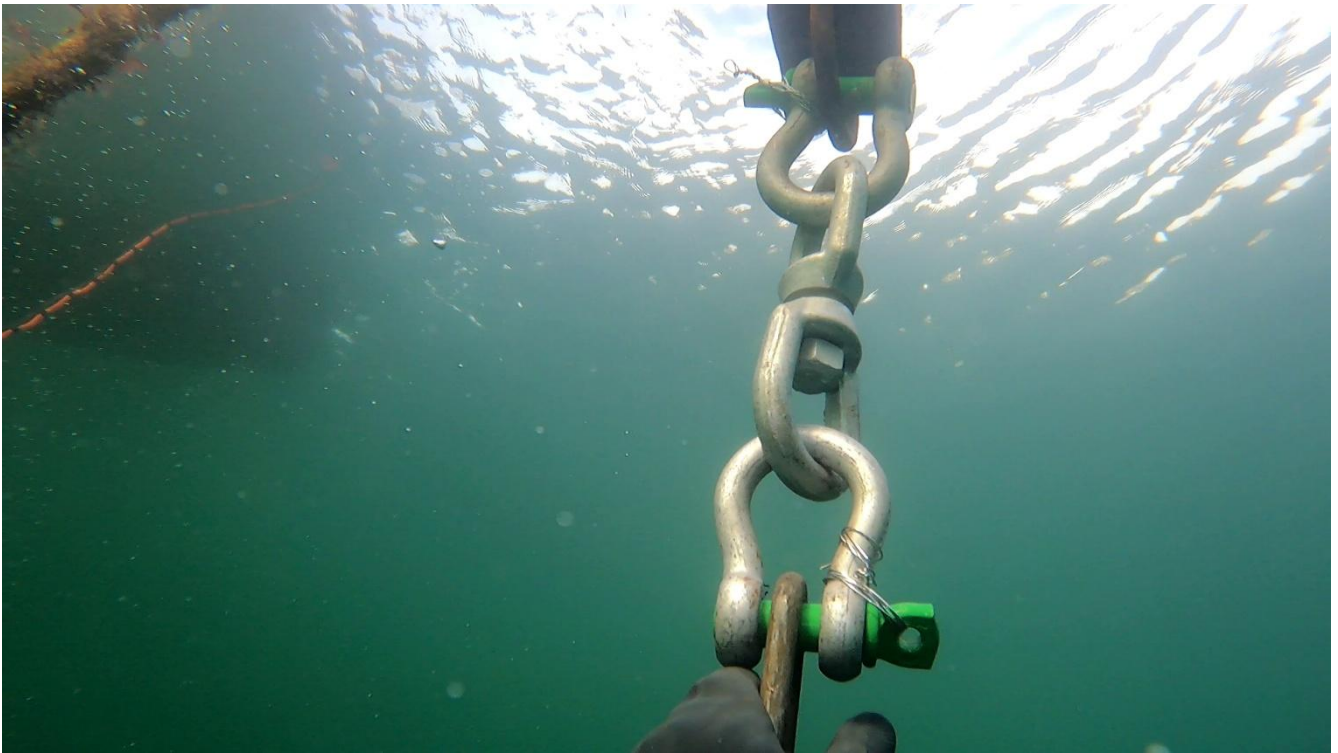
Buoy 1: Original anchor & rope. Not in use.



Buoy 1: New swivel & shackle installed on anchor.



Buoy 1: New midline float, 18" mooring buoy installed.



Buoy 1: Top swivel & shackles connecting chain to buoy.

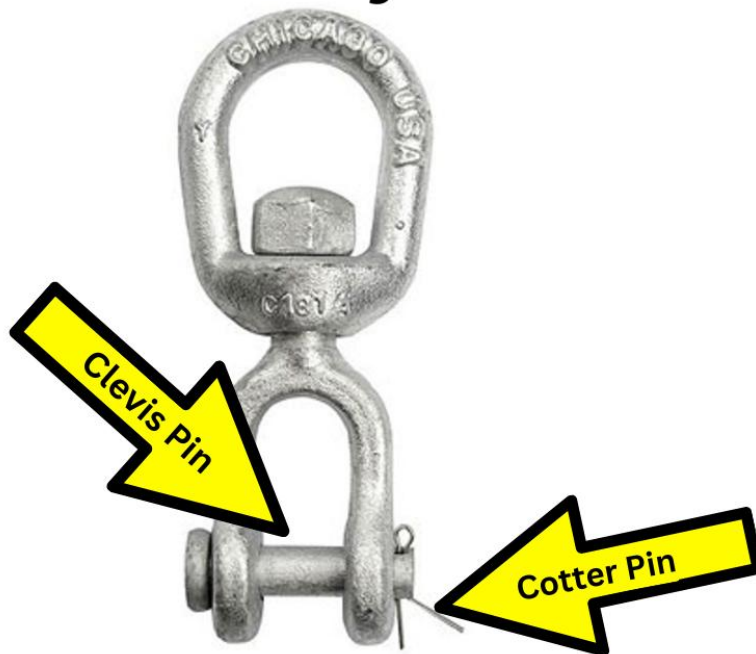


Buoy 1: Underwater wide view of system.



Buoy 1: Buoy & artwork installed.

Jaw-eye



Eye-eye



Jaw-eye swivel vs Eye-eye swivel for reference.

Buoy Condition Table

Buoy #	Buoy	Chain	Hardware
Buoy 1	Fair: Pipe corroded & deteriorating. May corrode through within 2 years. Ballast eye in fair condition.	Good: Rope failed at top thimble eye. Replaced with new ½” galvanized long link chain.	Good: Shackles, swivels & mid-line float are new. Heavy duty galvanized ¾” shackles & swivels used.
Buoy 2	Fair: Pipe corroded & deteriorating. May corrode through in some sections within 1 year. Ballast eye in fair condition. Buoy appeared to have been hit by a vessel as the top had a minor crack & top of threads were bent.	Fair: >50% of galvanizing gone. Chain is effectively bare steel with surface corrosion beginning to form.	Fair: All shackles seized with stainless wire. Bottom eyelet of mid-line float beginning to corrode. Swivel in good condition, minimal wear.
Buoy 2	Good: Buoy pipe had minor deterioration, >50% of galvanizing remaining.	Good: >50% of galvanizing intact. Chain is effectively bare steel with surface corrosion beginning to form.	Good: All shackles seized with stainless wire. Bottom eyelet of mid-line float beginning to corrode. Upper swivel in good condition, minimal wear. Lower jay-eye swivel replaced with eye-eye swivel.
Buoy 4	Fair: Pipe corroded & deteriorating. May corrode through within 2 years. Ballast eye in fair condition.	Fair: 100% of the chain is covered in surface rust with moderate deterioration. Estimated service life remaining: 2 years.	Fair: 100% of the shackles were covered in surface rust. The shackles & swivel are beginning to deteriorate. Estimated service life remaining: 2 years. Bottom eyelet of mid-line float beginning to corrode.

