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Th10b

CD-0006-200
(National Park Service)

September 8, 2022

CORRESPONDENCE

Received between

8:00am, August 1, 2022 and 4:30pm, September 2, 2022

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CD-0006-200

(National Park Service)

September 8, 2022

CORRESPONDENCE

Letters from groups and organizations

United States Department of the Interior

NATIONAL PARK SERVICE
Point Reyes National Seashore
1 Bear Valley Road
Point Reyes Station, CA 94956
Department of the Interior Region 10

IN REPLY REFER TO:

L7617

September 2, 2022

John Ainsworth, Executive Director
California Coastal Commission
455 Market Street, Suite 300
San Francisco, CA 94105

Subject: Agenda Item 10b. CD-0006-20, Consideration of Water Quality Strategy developed by National Park Service as specified in Conditions I and IV of the Commission's conditional concurrence.

Dear Mr. Ainsworth:

The National Park Service (NPS) submits this letter as follow up to our submittal of the Water Quality Strategy for the Management of Ranching Operations (Strategy) and the August 19, 2022 staff report on the review and consideration of the Water Quality Strategy scheduled for hearing by the California Coastal Commission (Commission) on September 8, 2022.

The revised Strategy is strongly informed by the feedback from the Commission and Commission staff, as well as through our ongoing coordination with staff from the San Francisco Bay Regional Water Quality Control Board (Regional Water Board) and Marin County Environmental Health Services (Marin EHS). The Strategy uses an iterative approach to identify and address management issues using focused inspection, assessment monitoring and long-term water quality monitoring.

The Strategy incorporates ongoing actions that are being taken to address priority issues now, not as a condition of a future permit. The NPS has already taken the steps to implement inspection and repair of infrastructure, including septic systems and to begin addressing larger scale dairy systems within the Seashore. We have implemented many elements of the program over the past year and identified timelines for implementation of the remaining programs (e.g. Assessment Monitoring) that will begin this winter. As indicated in the Strategy, the NPS has taken actions to require reduced stocking rates in response to drought conditions and require mothballing, maintenance and/or replacement of septic systems under current permits. The NPS is finalizing the process of issuing 2-year interim leases which are aligned maintenance and reporting actions identified through our Section 7 Consultation with US Fish and Wildlife and National Marine Fisheries Service, and initiate changes identified in the ROD, and discussed previously with the Commission.

As part of the water quality monitoring program, the NPS incorporated additional parameters and added monitoring triggers that will be used to initiate follow up and more focused assessments through the Assessment Monitoring Program. Collectively the monitoring programs will inform priority for implementation of Management Activities while maintaining a long-term dataset to document response over time.

NPS appreciates the diligent review and consideration by staff on this item, including their outreach to other agencies the NPS has been coordinating with on these matters. The NPS has reviewed the Staff Findings and Recommendations and by this letter would like to address some of the items raised in the staff report.

Annual Updates to the Strategy and Timeline:

Specific to Element 5 discussed in the Staff Report, the NPS is committed to updating the Strategy and Timeline on an annual basis based on assessment and monitoring information. Updates to the Strategy would be communicated through ongoing coordination with Commission staff as well as through the Annual Report. As discussed in the Strategy, the approach is iterative, and will continue to be updated based on a range of information inputs, including but certainly not limited to inspections and monitoring results. The basis of the Strategy is that it will be adapted based on information; as Management Activities are implemented, assessment and monitoring will be used to identify new priorities. Annual adaptation and updates are a tenant of this Strategy as it has been developed and articulated and the NPS is committed to update the Strategy and working timelines annually as part of the Annual Report.

Commitment to Implement the Monitoring Program:

The staff discussion on Element 8 reviews the discussion for a revenue generation plan as part of the Strategy. The NPS can affirm that it is committed to funding the NPS staffing and analysis by water quality labs to implement the inspection, monitoring and reporting conditions as established through the Strategy. The Seashore received additional operational funding beginning in 2021 that is and will continue to support programs such as these. As indicated, the NPS has already initiated elements of the long-term monitoring program and will initiate the Assessment Monitoring Program this winter. The NPS will maintain these programs consistent with the Strategy.

The Record of Decision (ROD) for the General Management Plan Amendment (GMPA) and the Strategy are clear that ranch operators are responsible for the implementation of the Management Activities identified through the Strategy. The GMPA identifies that the NPS and each operator would identify and annually review operations through the Ranch Operating Agreement (ROA). Management Activities identified through the Strategy would be incorporated into the ROAs and would include implementation timelines based on the funding approach for each operation. The timelines for implementation would be established in coordination with operators and informed by available grant resources through Natural Resources Conservation Service and others, but ultimately the responsibility of implementation is assigned to the operator through the lease. As indicated in our communication to the Commission staff, the responsibilities for the actions identified in Objective 1 this year, namely maintenance, repair or replacement of septic systems, or requirements identified through the Regional Water Board Confined Animal Operation Inspection Reports, are the obligation of the ranch operator. While the responsibilities may not have been clear in the past, the ROD clearly establishes the operators as responsible for meeting conditions of the permits. The NPS will work with operators to understand funding constraints and timelines; however the ultimate obligation rests with the operator.

The NPS also plans to obtain new appraisals for operations before issuing long term agreements. It is anticipated that these appraisals will provide additional funding for ranch oversight, water quality monitoring, range management, and other ranch related needs. The appraisals will be informed by the conditions set out in the ROA.

Ongoing Coordination and Implementation of Recreational Beach Monitoring:

Element 6 of the Staff Report identifies that the ongoing coordination of the Recreational Beach Monitoring Program with the Environmental Action Committee of West Marin (EAC) raises questions about the long-term sustainability of this monitoring program. The NPS has appreciated the coordination with EAC and their funding of the water quality sampling in 2020 and 2021. The NPS took on the water quality monitoring costs beginning in November 2021 and has continued to partner with EAC on the sample collection and lab delivery as part of the Recreational Beach Monitoring Program. The NPS understands that priorities of EAC may change and commits to maintaining the program either in partnership with EAC or independently.

Incorporating Long-term Data into Annual Reporting:

Element 7 of the Staff Report suggests the Strategy may not incorporate all previous years of water quality data into the Annual Report. Element 3 of the Strategy intended to articulate how the data would be used for analysis, but the NPS can and will incorporate previous years' data into the annual report. As an example, the fecal indicator bacteria results through August 2022 for Monitoring Programs 2 and 4 were presented in Attachment 1 to the Strategy. Monitoring Programs 2, 4, 5 and 6 are collected on a regular basis as identified in the Strategy and in a manner that may be incorporated into a comprehensive analysis. Data collected from Assessment Monitoring (Monitoring Program 1) and Dairy Regulatory Monitoring (Monitoring Program 3) are collected on a more intermittent basis and for a different purpose (e.g. to help identify site specific source areas) and would be presented in the context of previous data from that specific station.

As identified, the tenants of the Strategy are to be adaptive and to inform management so that priority items are addressed. The NPS has reviewed the Staff Report and has identified our commitment to resolve the items raised in the findings to further address the Commission conditions. We have initiated many elements and will continue to coordinate with Commission, Regional Water Board and EHS as appropriate through implementation of the Strategy.

The NPS appreciates the Commission staff review and coordination throughout this process and looks forward to presenting the Strategy to the Commission on September 8, 2022.

Sincerely,

Acting for

Craig Kenkel
Superintendent

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September 2, 2022

Chair Donne Brownsey
California Coastal Commissioners
John Ainsworth, Executive Director
Kate Huckelbridge, Senior Deputy Director
Cassidy Teufel, Manager
Alexis Barrera, Environmental Scientist
California Coastal Commission
45 Fremont Street, Suite 2000
San Francisco, CA 94105

Subject: Agenda item TH10b – Coastal Commission consideration of Water Quality Strategy developed by National Park Service (NPS) as specified in Conditions I and IV of the Coastal Commission's conditional concurrence on Consistency Determination No. CD-0006-20 for the 2020 General Management Plan Amendment for Point Reyes National Seashore and the north district of Golden Gate National Recreation Area, Marin County

Dear Ms. Brownsey:

In its submitted Water Quality Strategy, the National Park Service (NPS) continues to demonstrate the commitment to protecting and improving water quality that it advanced in the General Management Plan Amendment (GMPA) and corresponding Environmental Impact Statement (EIS) for the Point Reyes National Seashore and north district of Golden Gate National Recreation Area, Marin County. As I explained in my April 1, 2022 submitted and attached comments for agenda item TH18a (Condition Compliance for Consistency Determination No. CD-006-20, National Park Service, 2020 General Management Plan Amendment for Point Reyes National Seashore and the North District of Golden Gate National Recreation Area:

- The GMPA and EIS have been rigorously prepared, including the comprehensive documentation of management practices for resource conservation in Appendix F and the longitudinal analysis of coastal watershed water quality conditions in Appendix L.
- NPS in its draft Water Quality Strategy effectively integrated and aligned multiple water quality monitoring programs into the submitted water quality strategy to facilitate regulatory compliance and adaptive management of ambient water quality conditions in the historical ranch zone and for recreational beaches in the planning area.
- It also continues to be important and relevant to advance the learning and understanding of watershed conditions and background levels for constituents like indicator bacteria as described in the attached April 1, 2022 comments. Specifically, when sampling and analyzing indicator bacteria in surface waters, the documented influence of background environmental

bacteria must be considered. This includes the fate and transport of that background environmental bacteria relative to precipitation amounts and intensity and stream discharge rates (See tables and graphs in April 1, 2022 comments attached).

In reviewing NPS' submitted Water Quality Strategy "Version 2.0" and the California Coastal Commission (CCC) Staff report providing review of that submission, it is evident that the NPS has incorporated its significant on-the-ground management to achieve the GMPA water quality management goals. This management is happening real time, is practical and proven to be effective by a body of research and scientific literature, is having the intended beneficial impacts to water quality in the planning area, and includes:

- Assessment monitoring and the active use of resulting water quality data to identify and implement management practices up watershed that are improving water quality conditions downstream.
- Agricultural operation inspections by San Francisco Regional Water Quality Control Board (CRWQCB) and NPS staff resulting in operational changes and implementation of additional management practices to improve and protect water quality.
- Coordination with CRWQCB and CCC Staff to fully understand and implement the respective state agencies mandates and jurisdictions, including the CRWQCB General Order and Conditional Waiver for operating dairies[1] and livestock grazing[2] operations.
- Implementation of two-year interim leases that accurately represent those same CRWQCB orders and waivers, recently completed Biological Opinions from the United States Fish and Wildlife Service[3] and National Marin Fisheries Service[4], and most importantly the GMPA's zoning approach, modifications, and restrictions in the GMPA for agricultural operation and management.

There is an underlying nexus between the California Coast Act and corresponding CCC policies and determinations to protect California's coastline from development. That nexus is in the County of Marin Local Coast Program (LCP) Land Use Plan[5] and Implementation Plan[6] that were certified by the CCC on February 6, 2019. As

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[1] CRWQCB Conditional Order for Confined Anima Feed Operations - https://www.waterboards.ca.gov/sanfranciscobay/water_issues/programs/agriculture/CAF.html

[2] CRWQCB Conditional Waiver for Livestock Grazing - https://www.waterboards.ca.gov/sanfranciscobay/water_issues/programs/agriculture/grazing/tomalesbay_grazing.html

[3] Appendix O in GMPA EIS, pages 301-448 - https://parkplanning.nps.gov/document.cfm?documentID=106632

[4] Appendix N in GMPA EIS, pages 449-530 - https://parkplanning.nps.gov/document.cfm?documentID=106632

[5] https://www.marincounty.org/-/media/files/departments/cd/planning/local-coastal/2021/marin-county-2019-certified-land-use-plan-except-envhazards.pdf?la=en

[6] https://www.marincounty.org/-/media/files/departments/cd/planning/local-coastal/2021/marin-county-2019-certified-implementing-program-except-envhazards.pdf?la=en

stated in the Land Use Plan, “the Coastal Act protects coastal agriculture as a high priority coastal resource and supports the renewal and continuation of agriculture on suitable lands in Sections 30241, 30241.5, and 30242.” To achieve this goal and orientation to working landscapes as a solution to conservation, the Agriculture and Natural Resources chapter in the Land Use Plan establishes standards for agricultural operations to safeguard natural resources through sustainable management practices and restrictions. In every way, the NPS GMPA matches and goes beyond the standards in the Marin County LCP through its prescriptions and restrictions for agricultural management practices to protect natural resources. As a result, the NPS GMPA is aligned with the Marin County LCP and NPS is a direct partner with Marin County and the CCC for the advancement and achievement of California Coast Act goals.

The submitted Water Quality Strategy meets the CCC’s conditions in its conditional concurrence with Consistency Determination No. CD-0006-20 and furthermore the GMPA is aligned with the California Coastal Act and CCC’s policies and goals for protecting California’s coastal zone from development. Thank you for your consideration of these comments and approving the submitted strategy.

Thank you,

David J. Lewis

David J. Lewis
Watershed Management Advisor

Attachments:
Comment letter dated April 1, 2022 to California Coastal Commission

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San Francisco, CA 94105

Subject: Agenda item TH18a – Condition Compliance for Consistency Determination No. CD-006-20. National Park Service, 2020 General Management Plan Amendment for Point Reyes National Seashore and the North District of Golden Gate National Recreation Area.

Dear Ms. Brownsey:

Introduction

Thank you for the opportunity to provide comment on this agenda item. On April 16, 2021, I provided written comment for the Commission's consideration in its original consistency determination of the National Park Service, 2020 General Management Plan Amendment (GMPA) for Point Reyes National Seashore (PRNS) and the North District of Golden Gate National Recreation Area (attached).

Based upon my professional expertise and experience as the UC Cooperative Extension Watershed Management Advisor, the GMPA and accompanying Environmental Impact Statement (EIS) were rigorously prepared to achieve the multiple integrated resources goals for PRNS and the planning area. In particular, and relevant to the Water Quality Monitoring Strategy that is before you on April 7, 2022, the GMPA EIS integrates a comprehensive catalogue of USDA Natural Resources Conservation District practices (GMPA Appendix F) into the development of Ranch Operating Agreements (ROAs). These practices have been researched and confirmed to protect and conserve soil and water resources. By incorporating them into the GMPA and planning for their specific implementation through ROAs and a zone framework for land use, the NPS has identified the tools that staff and agricultural producers on the PRNS need to successfully contribute to obtaining the GMAP resource goals. These tools and planning approach are in keeping with the tenets of adaptive management used successful by state and federal resource managers to achieve natural resource objectives and goals on multi-use landscapes.

Submitted Strategies

Nearly on-year later, the NPS is presenting its First Year Version of the Water Quality Strategy and Climate Action Strategy for the GMPA. These strategies are consistent with Conditions I, II, and IV of the Commission's conditional concurrence with Consistency Determination No. CD-0006-20 and should be approved. In the

water quality monitoring strategy, NPS is building upon an existing NPS water quality monitoring framework that includes reviewed and approved sampling and analysis protocols and transparent data compilation and reporting. It also is integrating into that framework six monitoring programs to account for and be responsive to multiple mandates and monitoring requirements within the planning area. NPS has reinitiated its Coastal Watershed Monitoring (Program 1), from which came the long-term trend analysis presented in GMPA Appendix L, documenting improvements in water quality related to conservation practice implementation. This requires well planned routine monitoring at the same locations over time and with a frequency to account for annual and seasonal variability in precipitation and stream flow. Program 1 and Tomales Bay watershed Monitoring (Program 5), with their long-term monitoring design, achieve this. Program 1, coupled with Short-term Assessment Monitoring (Program 2) is an approved and recommended approach to conduct rapid one-time assessments to information management and conservation practices implementation in a watershed and simultaneously monitoring long-term water quality trends.

Additionally, NPS is conducting or supporting other regulatory monitoring that include Regulatory Dairy Monitoring (Program 3), Recreational Beach Sampling (Program 4), and Olema Creek watershed – Regulatory Bacterial Monitoring (Program 6). In each case, NPS is leading or collaborating on sample collection and analysis with local and state agencies to confirm conditions and safeguard water quality relative to California water quality regulations and public health policies.

The Climate Manage Strategy focused primarily on the changes to the GMPA preferred alternative. In the strategy, NPS notes that GMPA EIS “analysis concluded that emissions from the preferred alternative were below the de minimis levels. The GMPA and ROD further found that the primary driver of air quality in the GMPA planning area was and would continue to be regional sources.” This is consistent with the recently developed and approved Marin Climate Action Plan (CAP) 2030, a precedent setting, local jurisdiction climate management plan that includes a comprehensive agriculture chapter with the opportunities and solutions for climate management that working landscapes represent. Coordinating and integrating the NPS Climate Management Strategy with the Marin CAP 2030 will provided increased beneficial impacts through implementation of research proven practices to sequester carbon.

Water Quality Background Levels

The in-depth discussion and focus on water quality during the April 16, 2021, Commission’s all-day hearing and this agenda item on April 7, 2022 present wonderful opportunities to continue public engagement and learning about watershed conditions and background levels for constituents like indicator bacteria. This discussion and learning occurred as part of the San Francisco Bay Regional Water Quality Control Board’s (SFRWQCB) development of the Tomales Bay Pathogen Total Maximum Daily Load (TMLD) in 2005. As part of the TMDL development, I provided analysis and comment to the SFRWQCB on background environmental levels of fecal coliform (attached). A portion of those comments regarding control watersheds, akin to the NPS reference monitoring sites, has been edited and inserted here to contribute to the discussion and learning.

In 1995 and 1996 the Tomales Bay Shellfish Technical Advisory Committee (TBSTAC) conducted an *Investigation of Pollution Sources Impacting Shellfish Growing Areas in Tomales Bay.* I have included a portion of the data from the TBSTAC report that represents the fecal coliform concentrations from three identified "control watersheds" (Table 1). Two of these are on the east shore of the bay: 1) Milepost 36.17 entering Marconni cove; and 2) Milepost 38.54 entering cove on which Hog Island Oyster Company sits. The third site is White Gulch on the west shore of the Bay. In each case, the concentrations of fecal coliform are consistently greater than targets and allocations of 43 MPN/100ml. This is the allocation assigned to meet the in-bay water quality standards for shellfish harvesting beneficial use. Note that in addition to this TMDL requirement, the concentrations also exceed the standards for contact recreation beneficial uses. If water quality conditions in these control watersheds are above the proposed allocations, then it seems unrealistic to expect that values in watersheds with identified source categories could meet them. It is useful to note that these results provide an indication of what background concentrations for fecal coliform could be within Bay tributaries.

Table 1: Fecal concentration (MPN/100ml) results from the Tomales Bay Shellfish Technical Advisory Final Report of its 1995-1996 study.

Date	Milepost 36.17	Milepost 38.54	White Gulch
9/12/95	511	78	170
12/4/95	2,200	1,663	
12/5/95	33	79	700
12/6/95	17	33	
12/9/95	230	11	46
1/16/96	3,300	490	
1/17/96	790	110	130
1/18/96	4,600	2,300	
1/31/96	330	110	
2/11/96	120	18	33
3/11/96	490	78	33
3/12/96	3,704	1,300	230
3/13/96	330	78	34
3/18/96	2,200	20	13
4/1/96	30,298	8,400	490
4/2/96	790	790	130
4/3/96	490	55	79
4/8/96	1,100	1,300	43
7/9/96	45	3,300	230

From 1999 to 2004, the University of California Cooperative Extension conducted water quality research on 11 dairy and ranch facilities within the Bay watershed. As part of this study, water from the Milepost 36.17 site, studied in the TBSTAC investigation, was sampled and analyzed. Because the study objective was to determine links between upland sources of fecal coliform and Bay conditions, the majority of sampling was conducted during storm events and stormflow conditions. Additionally, a number of samples between storms during baseflow conditions were collected. Results from this five-year study indicate that baseflow fecal coliform concentrations are lower than stormflow values. However, baseflow and stormflow concentrations are consistently higher than the TMDL one-sample targets and allocations of 43 MPN/100ml (Figure 1). Additionally, these results document the

direct relationship between stream discharge and fecal coliform concentration (Figure 2).

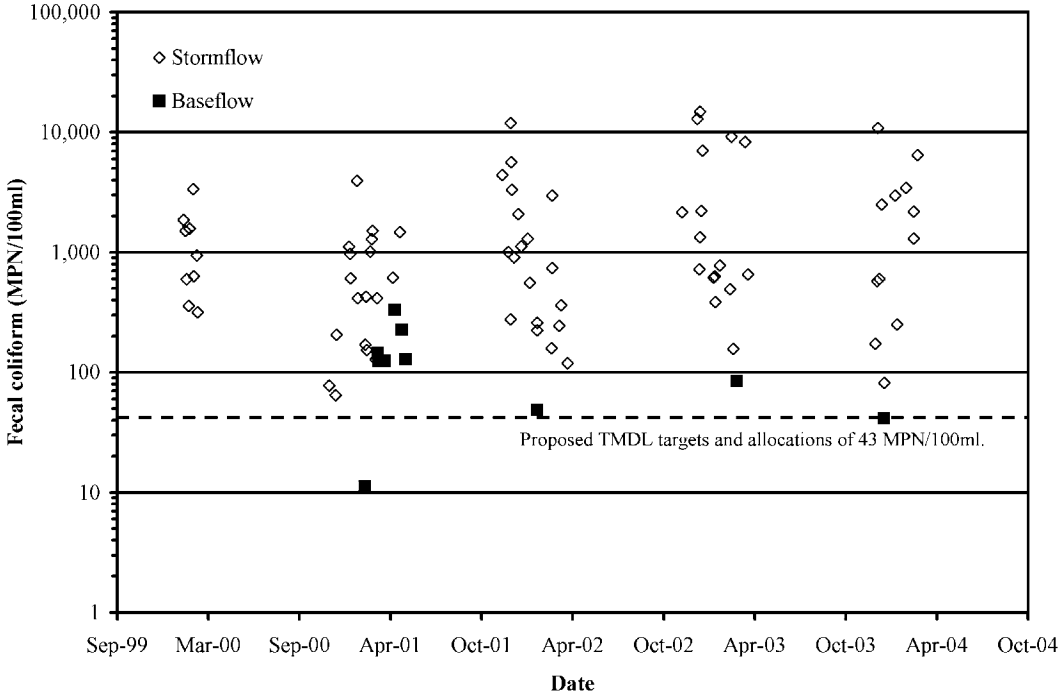

Figure 1: Fecal coliform concentrations from samples collected at Milepost 36.17 on the east shore of the Tomales Bay watershed from 1999 to 2004.

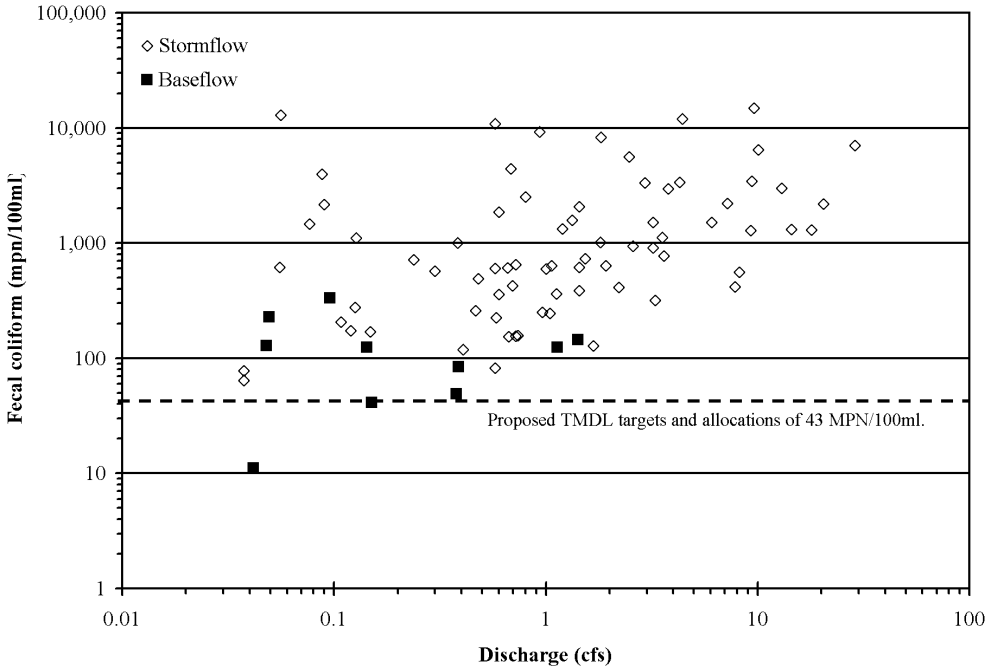

Figure 2: Relationship between fecal coliform concentrations and stream discharge for samples collected at Milepost 36.17 on the east shore of the Tomales Bay watershed from 1999 to 2004.

Using the watershed above Milepost 36.17 and others like as controls or comparisons, to watersheds with more intense land use, provides us with an indication of background fecal coliform levels that can be used to set achievable water quality targets and allocations.

Summary

I am grateful for this opportunity to provide comments on the NPS First Year Version of the Water Quality Strategy and Climate Action Strategy for the GMPA EIS. There will continue to be community discussions and learning around water quality and other resources and their interactions with land uses. Background environmental levels and conditions are always useful contexts in these discussions.

The submitted strategies meet the Coastal Commissions Conditions I, II, and IV of the Commission's conditional concurrence with Consistency Determination No. CD-0006-20. They also contribute to the research proven adaptive management plan that NPS has developed and approved in the GMPA EIS to achieve the multiple and integrated resource management goals mandated for PRNS and the planning area. Thank you for your consideration of these comments and approving the submitted strategies.

Thank you,

David J. Lewis

David J. Lewis
Watershed Management Advisor

Attachements:
Comment letter dated April 16, 2021 to California Coastal Commission
Comment letter dated April 18, 2005 to San Francisco Bay Regional Water Quality Control Board.

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April 16, 2021

Chair Steve Padilla
c/o Mr. John Weber
Federal Consistency Program
California Coastal Commission
45 Fremont Street, Suite 2000
San Francisco, CA 94105

Subject: Coastal Commission Staff Report recommending conditional concurrence for the Point Reyes National Seashore and North District Golden Gate National Recreation Area General Management Plan Amendment and Environmental Impact Statement

Dear Mr. Padilla:

This letter is to share my support of the National Park Service's (NPS) request for a Coastal Consistency Determination (CCD) for the Point Reyes National Seashore (PRNS) and Northern District of the Golden Gate National Recreation Area (GGNRA) General Management Plan Amendment Environmental Impact Statement (GMPA EIS). UC Cooperative Extension Marin has participated actively throughout the National Environmental Policy Act (NEPA) process conducted by NPS staff to the develop the GMPA EIS, providing scoping comments (attached) and comments on the Draft EIS (attached) offering our organization as a resource for NPS staff and affected agricultural producers ranching on the PRNS and GGNRA.

This letter also communicates technical and evidenced-based information from my professional experience and expertise in the region and the field of watershed management. There exists a broad body of literature, long-term local implementation of conservation practices with corresponding documented beneficial impacts, and a regulatory framework that can inform California Coastal Commission (CCC) staff's recommendation for conditional concurrence and Commissioner consideration of this recommendation for the proposed action.

Watershed Management

Dr. Kenneth Brooks and co-authors share a working definition for watershed management explaining that it "is the process of organizing and guiding land, water, and other natural resource use on a watershed to provide desired goods and services to people without affecting adversely soil and water resources.[1]" This definition is complemented by the concept and definition of ecosystem services from the United Nations Millennium Ecosystem Assessment[2] explaining that:

[1] Brooks et al. 2012 Hydrology and the Management of Watersheds, Fourth Edition
[2] UN MEA. 2003. Millennium Ecosystem Assessment, Ecosystems and Human Well-being; A Framework for Assessment.

"ecosystem services are the benefits people obtain from ecosystems, which the MA (*Millennium Ecosystem Assessment*) describes as provisioning, regulating, supporting, and cultural services. Ecosystem services include products such as food, fuel, and fiber; regulating services such as climate regulation and disease control; and nonmaterial benefits such as spiritual or aesthetic benefits."

The National Park Service has been engaged in adaptive watershed management in the proposed action planning area since the formation of PRNS and GGNRA. The originating legislation of 1962 and 1972, followed by amendments in 1976 and 1978, subsequent directive by Secretary of the Interior Ken Salazar in 2012, and lastly the Consolidated Appropriations Act of 2019 combine to establish PRNS' uniqueness in integrating grazing livestock and dairy farms into its mandate and mission to manage multiple resources.

The GMPA EIS and the requested action is a continuation of PRNS legislated and active implementation of watershed management including protection against adverse impacts to soil and water and facilitation of ecosystem services. From the outset, the preferred alternative B forms Ranchland and Scenic Landscape zones, and further employs a sub-zoning framework within the Ranchland zone, to support the management and protection of multiple resources and provision of goods and services. It goes on to set "desired conditions" for natural and cultural resources in each zone, combining 20-year leases, ranch operating agreements, and the comprehensive list of field-tested conservation practices in Appendix F to achieve those desired conditions. Confirmation that these practices support attainment of desired conditions in general is available through the US Department of Agriculture Natural Resources Conservation Service Conservation Effectiveness Assessment Program[3]. The proposed leases, ranch operating agreements and ranch subzoning are further underpinned and supported to achieve desired conditions by the application of Residual Dry Matter Mapping and Monitoring in Appendix E and Forage Model in Appendix K. The analysis conducted in each directly informs grazing livestock management prescriptions for PRNS staff and ranchers to use in achieving desired conditions for soil and grasslands in respective subzones.

Of specific interest and focus, given CCC staff's recommendation for conditional concurrence, is obtainment of water quality desired conditions. Here again it useful to share that conservation practice effectiveness on grazing livestock ranches and dairies have been confirmed to improve water quality. A comprehensive scientific review of the conservation effectiveness of all range management practices funded through United States Department of Agriculture (USDA) conservation initiative programs provides a research synthesis to address specific hypotheses about the effectiveness of stocking rate moderation, grazing system selection, timing of grazing and rest from grazing, as well as a suite of riparian management practices to improve hydrologic function and water quality[4]. Similar summaries on the factors and benefits of conservation approaches and practices to manage waterborne pathogens in agricultural watersheds have been completed by the USDA Natural Resources Conservation Service[5] and the World Health Organization[6]. These summaries present the considerable amount of research conducted

[3] USDA NRCS CEAP 2021 - https://www.nrcs.usda.gov/wps/portal/nrcs/main/national/technical/nra/ceap/.
[4] Briske, D.D. 2011 - https://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/technical/nra/ceap/?cid=stelprdb1045811
[5] Atwill et al 2012 - https://directives.sc.egov.usda.gov/OpenNonWebContent.aspx?content=32935.wba
[6] WHO, 2012 - https://www.who.int/water_sanitation_health/publications/animal_waste/en/

on the efficacy of beneficial management practices (BMPs) for both extensive (i.e., cow-calf rangeland grazing) and intensive (i.e., dairy farms) livestock production systems to reduce microbial contamination from these facilities. These on-farm BMPs typically rely on several common strategies that endeavor to be practical, affordable, and adoptable, such as the strategic use of vegetative buffers between grazing sites and adjacent bodies of water, riparian exclusion to livestock grazing several months prior to and during the rainfall season, adequate storage time and drying of manure solids prior to land application, vegetating or use of straw to cover the surface of cattle loafing areas during the rainfall season, and appropriate setback distances between sites receiving manure solids and adjacent downslope bodies of water. The GMPA EIS is in alignment with these summary findings, building upon longstanding stewardship efforts and conservation practices that have already occurred in the planning area with a clear process for PRNS staff and ranchers to collaborate on additional conservation practice planning and implementation of practices with documented effectiveness.

Confirmation of watershed scale improvements to water quality from conservation practice implementation on working farms and ranches is also available from regional and local watersheds. This includes published research in the planning area for both the Tomales Bay[7] and coastal watersheds[8][9]. These longer-term repeated measures studies of the relationship of indicator bacteria and un-ionized ammonia to conservation practice implementation demonstrate a decrease in both as practice implementation on working farms and ranches is executed. These longitudinal investigations of basin scale outcomes require forethought and a commitment of resources to be accomplished. Natural resource management agencies and entities often face budget constraints requiring them to forego these endeavors. Conventional wisdom when making fiscal decision to allocate available funds for implementation or long-term monitoring in watershed management leans toward implementation once that implementation has been confirmed to be effective. To have three of longitudinal studies in the region, two of which are in the planning area, is a unique opportunity. Combined, they provide confirmation that the GMPA EIS process is on track to maintain and increase improvements to surface water quality and in keeping with conventional wisdom for financial resource allocation, should prioritize that implementation.

Regulation of grazing livestock ranches and dairy farms in the planning area to protect water quality is the jurisdiction of the San Francisco Bay Region California Regional Water Quality Control Board (CRWQCB). Foundationally, this begins with the CRWQCB Basin Plan and protection of identified beneficial uses for respective waterbodies and watersheds. In 2004, the State Water Resources Control Board approved its Nonpoint Source Implementation and Enforcement Policy, providing the framework for the nine CRWQCB in the state to addresses NPS sources, including agriculture. Subsequently, the San Francisco Bay Region CRWQCB has approved the Conditional Waiver of Waste Discharge Requirements for Grazing Operations in the Tomales Bay Watershed[10] and General Waste Discharge Requirements for Confined Animal Facilities Within the San Francisco Bay Region[11]. Respectively, these regulatory programs require water quality management planning and implementation to be conducted by the grazing

[7] Lewis et al 2019, https://www.mdpi.com/2071-1050/11/19/5516/htm
[8] Voeller et al 2020, https://doi.org/10.1016/j.rama.2021.02.011
[9] Meyer et al. 2019, http://calag.ucanr.edu/archive/?article=ca.2018a0042
[10] CRWQCB 2018, https://www.waterboards.ca.gov/sanfranciscobay/water_issues/programs/agriculture/grazing/tomalesgrazing/2018webpageupdate/Tomales_Bay_Grazing_Waiver_Res_10-16-18.pdf.
[11] CRWB 2016, https://www.waterboards.ca.gov/sanfranciscobay/water_issues/programs/agriculture/CAF/CAF%20General%20WDRs%20Order%20R2-2016-0031%20(Complete%20with%20attachments).pdf

operations and dairy farms in the planning area, including annual reports of progress made in adopting practices that are confirmed to contribute to water quality improvements. In the case of dairies, this also includes nutrient management plans determining how manure is handled and utilized as a fertilizer through best practices. At the San Francisco Region CRWQB meeting on April 14, 2021, these requirements and programs were summarized in a presentation to the Board and in the Executive Officer's Report, pages 5 through 8 (attached). This presentation and report describe how CRWCB staff conduct ranch and dairy inspections, how the ranches and dairies are complying with these regulatory programs, and the recommendations and plans for increased collaboration between CRWQCB staff, NPS staff, and ranchers through the implementation of the GMPA EIS. In addition to the CRWQCB role in regulating water quality, Tomales Bay and Drakes Bay Estero, are or have been regulated for water quality to meet the more stringent water quality requirements for shellfish production by the National Shellfish Protection Program and the California Department of Public Health (DPH). That commercial shellfish production and harvest is allowed is indicative that these water bodies meet water quality conditions, during a significant portion of the year, to allow for consumption of raw shellfish as confirmed by DPH annual sanitary surveys.

Summary

CCC staff, in its analysis of the proposed action, has been disciplined in its understanding and application of the California Coastal Act. Particularly, in its recognition of PRNS and GGNRA as reserved federal lands and its inquiry into potential "spillover effects". The GMPA EIS directly addresses CCC staff concerns for water quality and will be effective in achieving desired conditions for water quality, and other resources, because it will implement conservation practices that are confirmed at the practice scale to be effective and at the basin scale to result in beneficial impacts. The regulatory framework by the CCC's counterpart California Agency, CRWQCB, already is requiring annual reporting and direct interaction to confirm water quality improving practice implementation with PRNS staff and ranchers. Furthermore, Tomales Bay and Drakes Bay Estero, one of the planning area's coastal watershed, have documented conditions meeting stringent water quality to safeguard human health and support the beneficial uses of contact and non-contact recreation and raw shellfish consumption. For these reasons, the proposed action deserves your consideration and approval.

Thank you,

David J. Lewis

David Lewis
Director

Attachments:

Scoping comments dated November 30, 2018
Draft EIS review comments dated September 23, 2019
SFR CRWQCB Executive Officer Report dated April 14, 2021

UNIVERSITY *of* CALIFORNIA
Agriculture & Natural Resources
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April 18, 2005

John Muller, Chair
San Francisco Bay Regional Water Quality Control Board
1515 Clay St., Suite 1400
Oakland, CA 94612

Subject: Pathogens in Tomales Bay Watershed: Proposed Basin Plan Amendment.

Dear John Muller:

Introduction

Thank you and the staff of the San Francisco Bay Regional Water Quality Control Board (RWQCB) for the opportunity to provide comment on the *Pathogens in Tomales Bay Watershed – Proposed Basin Plan Amendment* referred to as the Pathogen Total Maximum Daily Load (TMDL). Since the release of this draft document, I have participated in several public meetings to discuss its purpose and content. Your staff is to be complimented on their efforts to explain the document's intent and content, listen to community member concerns, and search for solutions to those concerns. This effort, and the ability of the Board to direct revisions to the TMDL, will be instrumental in creating a policy that is supportive of a community based approach to improve water quality within the Tomales Bay Watershed. I offer the following comments toward that aim.

Implementation Plan

The appropriate balance of flexibility and authority has been put forth in the TMDL Implementation Plan such that source category stakeholders know that compliance is mandatory through a number of self-selected options. Getting 100 % compliance with the implementation plan will require an inspection process similar to that already conducted by RWQCB staff on dairies for the RWQCB's Minimum Waste Discharge Guidelines. In the majority of cases, stakeholders have and are implementing practices to improve water quality with documentation of these efforts available through on-farm visits. In this way the stakeholders could have the option to be their own "third party" in a compliance inspection.

The TMDL contains a series of important and unanswered questions on page eight of the draft document. These questions speak to the uncertainty in this process regarding the proposed targets and allocations and the ability of the implementation plan to meet them. Only through monitoring of water quality and implementation activities can the RWQCB and the watershed community answer these questions and clear up this uncertainty. Therefore, it is critical that the RWQCB continue its monitoring program as described in the 2005 staff report.

Numeric Targets

The California Shellfish Protection Act of 1993 does not identify a shellfish harvesting area as threatened until it is closed more than 30 days a year. California Department of Health Services has designated the Tomales Bay shellfish harvesting areas as "conditionally approved" recognizing the seasonal nature of water quality conditions within the Bay. Through the Tomales Bay Shellfish Technical Advisory Committee (TBSTAC) and other watershed community based forums there has been public acknowledgement that a reduction in the number of closures days is the objective not "zero closures." Given the alignment of these policies and approaches within the watershed, the TMDL should strive to support the TBSTAC by aligning targets and allocations.

A TMDL is admittedly developed with minimal scientific information and in a relatively short period of time. Because of these limitations, the resulting numeric targets should be considered and presented with the greatest acknowledgement of the inherent uncertainty. Unfortunately in the case of this TMDL, even with this uncertainty acknowledged, it is difficult to ignore or feel comfortable with the targets and load allocations. They are the basis for determining compliance and pose a significant risk to source category members and RWQCB from litigation if they are not met.

The concern over the targets and allocations could be removed if they could be written in a way that recognizes that beneficial use of shellfish harvesting can not be met 365 days a year. Staff has given much attention to the question of what concentration of indicator bacteria within tributary streams will provide for the required standard of 14 mpn/100ml for shellfish harvesting areas in the Bay (Figure 1). This includes the development and application of a hydrodynamic model to answer this question as presented in the March 2005 staff report. This is a logical line of questioning to ascertain values for the targets and allocations, with the determined value of 43 MPN/100ml based on the model results.

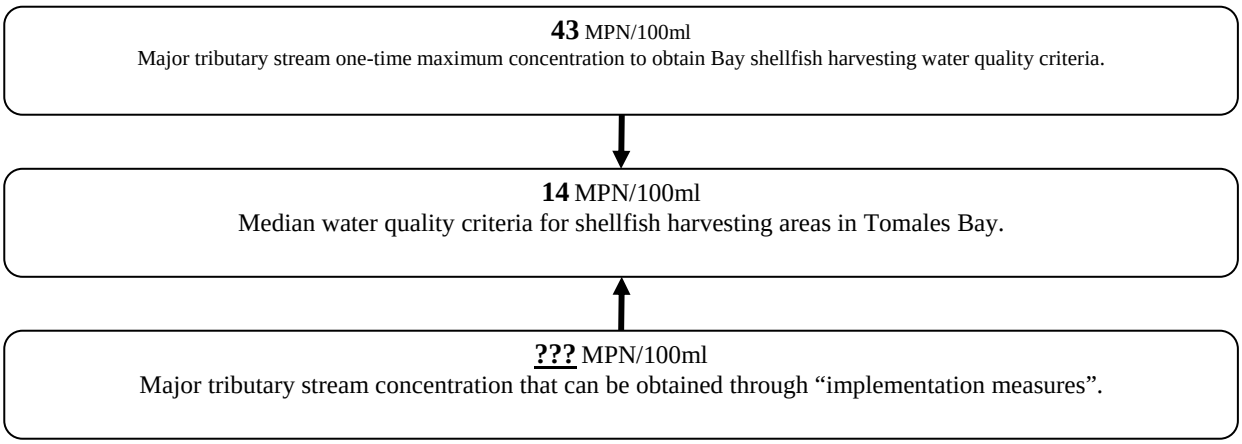


Figure 1: Framework for determining water quality targets and allocations for the Tomales Bay pathogen TMDL.

This number is daunting, not because of its low value, but because it is unattainable based on existing water quality data. In 1995 and 1996 the Tomales Bay TBSTAC conducted an *Investigation of Pollution Sources Impacting Shellfish Growing Areas in Tomales Bay.* I have included a portion of the data from the TBTAC report that represents the fecal coliform

concentrations from three identified "control watersheds" (Table 1). Two of these are on the east shore of the bay: 1) Milepost 36.17 entering Marconni cove; and 2) Milepost 38.54 entering cove on which Hog Island Oyster Company sits. The third site is White Gulch on the west shore of the Bay. In each case, the concentrations of fecal coliform are consistently greater than targets and allocations of 43 MPN/100ml. If water quality conditions in these control watersheds are above the proposed allocations, then it seems unrealistic to expect that values in watersheds with identified source categories could meet them. It is useful to note that these results provide an indication of what background concentrations for fecal coliform could be within Bay tributaries.

Table 1: Fecal concentration (MPN/100ml) results from the Tomales Bay Shellfish Technical Advisory Final Report of its 1995-1996 study.

Date	Milepost 36.17	Milepost 38.54	White Gulch
9/12/95	511	78	170
12/4/95	2,200	1,663	
12/5/95	33	79	700
12/6/95	17	33	
12/9/95	230	11	46
1/16/96	3,300	490	
1/17/96	790	110	130
1/18/96	4,600	2,300	
1/31/96	330	110	
2/11/96	120	18	33
3/11/96	490	78	33
3/12/96	3,704	1,300	230
3/13/96	330	78	34
3/18/96	2,200	20	13
4/1/96	30,298	8,400	490
4/2/96	790	790	130
4/3/96	490	55	79
4/8/96	1,100	1,300	43
7/9/96	45	3,300	230

From 1999 to 2004, the University of California Cooperative Extension conducted water quality research on 11 dairy and ranch facilities within the Bay watershed. As part of this study, we sampled and analyzed water from the Milepost 36.17 site studied in the TBSTAC investigation. Because our study objective was to determine links between upland sources of fecal coliform and Bay conditions we conducted the majority of our sampling during storm events and stormflow conditions. We did, however, collect a number of samples between storms during baseflow conditions. Results from this five-year study indicate that baseflow fecal coliform concentrations are lower than stormflow values. Both, however, are consistently higher than the TMDL one-sample targets and allocations of 43 MPN/100ml (Figure 2). Additionally, these results document the direct relationship between stream discharge and fecal coliform concentration (Figure 3). Using the watershed above Milepost 36.17 and others like as controls

or comparisons, to watersheds with more intense land use, provides us with an indication of background fecal coliform levels that can be used to set achievable TMDL targets and allocations.

Both the SWRCB and RWQCB have at their disposition the latitude to conduct a Use Attainability Analysis or set a Site Specific Criteria for Tomales Bay. This or other methods of setting targets and load allocations, such as the loading approach, could be used to answer the question: what major tributary concentrations for indicator bacteria can be obtained in the watershed (Figure 1). Answering this question will assist in setting targets and allocations that are realistic and achievable. It will also help form realistic expectations for the number of shellfish harvesting closures days that will exist if these targets and allocations are achieved. It most definitely would mean more effort, time, and collaboration between the California Department of Health Services and representatives of the source category stakeholders. In the end, however, the targets and allocations would be goals that the community would be motivated to achieve because they would believe that they could and should.

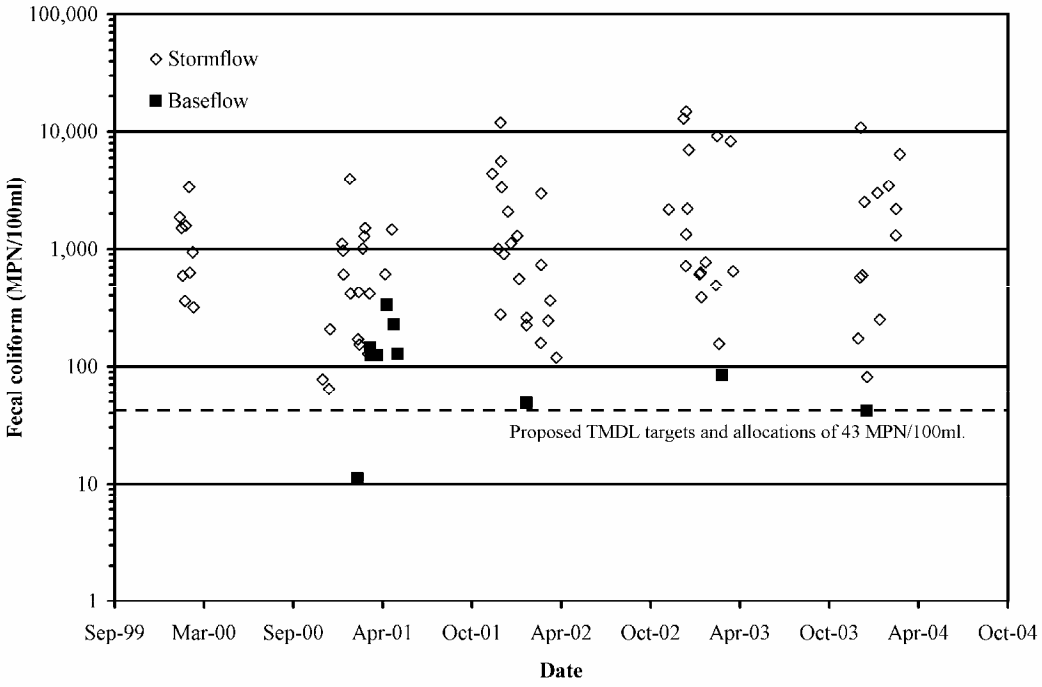


Figure 2: Fecal coliform concentrations from samples collected at Milepost 36.17 on the east shore of the Tomales Bay watershed from 1999 to 2004.

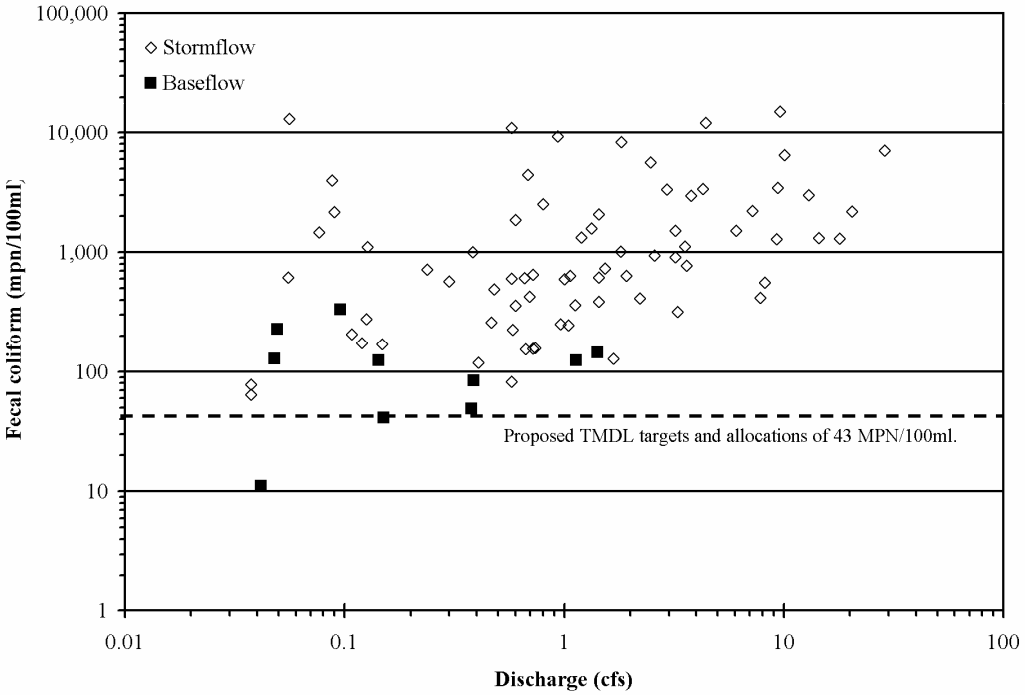


Figure 3: Relationship between fecal coliform concentrations and stream discharge for samples collected at Milepost 36.17 on the east shore of the Tomales Bay watershed from 1999 to 2004.

Thank you again for the opportunity to offer input on the draft basin plan amendment. Advisors from the University of California Cooperative Extension have partnered with RWQCB staff, the Natural Resources Conservation Service, and the Marin Resource Conservation District to develop and provide education on water quality improving practices and documentation methods. Additionally, we have directed research and facilitated group decisions toward the larger community goal of improving the Bay environment and community viability. We will continue to function in that collaborative role and look forward to working with the Board and its staff as you proceed with this TMDL.

Sincerely,

David J. Lewis
Watershed Management Advisor

xc: Farhad Ghodrati
Rebecca Tuden
Dyan Whyte

San Francisco Bay Regional Water Quality Control Board

September 1, 2022 *Agenda item: TH10b*

Coastal Commission
455 Market Street, Suite 300
San Francisco, CA 94105
Sent via email to EORFC@coastal.ca.gov

Subject: Water Board Review of the National Park Service's First Year Version of the Water Quality Strategy for Management of Ranching Operations

Dear California Coastal Commissioners:

San Francisco Regional Water Quality Control Board (Water Board) appreciates the opportunity to review and comment on the National Park Service (NPS) Water Quality Strategy for Management of Ranching Operations (Strategy), developed in accordance with the California Coastal Commission's (Commission) conditional Consistency Determination concurrence for the 2020 General Management Plan Amendment for Point Reyes National Seashore and the North District of Golden Gate National Recreation Area.

At the request of NPS staff, we have reviewed the Strategy (first draft received on April 27, 2022) and provided guidance to help align the Strategy with our current regulatory approaches for ranching and water quality sampling methodology standards. As a first-year monitoring plan that will be refined as NPS implements the Strategy, we agree that it provides an adequate framework to assess and monitor current ranching activities and their potential impacts to water quality, and to inform management decisions.

Our Role and Responsibilities

The Water Board's overall mission is to protect all surface water and groundwater within the nine-county San Francisco Bay Region by developing and implementing water quality plans and/or policies and by adopting and enforcing permits in accordance with the California Water Code or Clean Water Act. We do not have the authority to determine local land-use zoning and commercial business permitting outcomes.

In accordance with the 1990 amendments to the federal Coastal Zone Management Act, the State and Regional Water Boards partner with the Commission to implement a State-wide Coastal Nonpoint Source Water Pollution Control Program (CA Nonpoint Source Program). This program requires Water Boards to regulate all nonpoint sources of pollution, including agriculture sources, using our administrative permitting authority, utilizing "economically achievable" management measures.

Each dairy in our region, including the five operating within the Park, must comply with our General Waste Discharge Requirements for Confined Animal Facilities (CAF Order). The CAF Order regulates all discharges to land and prohibits any waste discharges to surface or groundwaters. It contains specific terms and conditions that must be met, including structural and non-structural management measures for minimizing impacts to water quality from confined animal areas, land application areas, and grazing lands.

Additionally, 10 of 18 NPS grazing operations are located within the Tomales Bay watershed and must comply with a Conditional Grazing Waiver for the Tomales Bay Watershed (Grazing Permit).The Grazing Permit includes the development of Ranch Water Quality Plans, implementation of conservation practices to minimize delivery of pathogens, nutrients and sediments to surface waters, annual monitoring, and annual adaptive management adjustments to the plans. We are currently revising our Grazing permitting program which will be applicable to all NPS grazing operations by next year.

As the issuing agency, we have the responsibility to enforce the CAF Order and Grazing Permit. We do this with periodic inspections and review of reports and plans. As the landowner, the National Park Service has the responsibility to hold its facility operators to standards that ensure compliance with water quality regulations and permits, assisting whenever possible.

Recent Actions

In February, our staff conducted comprehensive inspections of the six NPS dairy ranches and assessed their CAF Order compliance status. One dairy has closed, three were determined to be complying, and the other two can meet the CAF Order standards by completing short- and long-term improvements identified during the inspections. The revised Strategy and interim ranch lease agreements incorporate these required actions and reflects an improved commitment by NPS staff to coordinate with us on timely corrective action implementation.

We continue to partner with NPS and Marin County staff to support the implementation of ranch improvement projects in response to our inspections and the recent identification of certain septic system inadequacies. However, it’s important to note that CA Water Code Section 13360 prohibits us from specifying the design, location, type of construction, or particular manner of permit compliance and allows a permitee to comply in any lawful manner. Thus, we review proposed Ranch and Dairy plans and reports along with inspections to determine permit compliance.

We have reviewed the Strategy and find the proposed sampling methodologies, protocols, parameters and action triggers to be based on and consistent with the latest available regulatory approaches and standards.

In support of the CA Nonpoint Source Program, we help to administer the federal 319(h) grant program aimed to control nonpoint source pollutant sources such as agriculture, grazing and animal production. We intend to support and encourage local agencies to

apply for this and other available funding to help expedite and facilitate NPS ranch improvement plans to protect and enhance water quality.

Summary

Water quality impacts from dairies and grazing operations continue to be a Water Board priority. We appreciate the multi-agency collaboration to ensure the quality and use of our water resources is protected. We support the NPS in their implementation of this important Water Quality Strategy for Management of Ranching Operations and expect to actively engage with staff on a regular basis.

It has been demonstrated that collaboration between multiple agencies and landowners/operators to implement best management practices and monitoring programs can minimize and mitigate animal agriculture water quality issues. We are committed to continuing this focused effort in coordination with Commission staff, NPS staff and other partners such as the Marin Resource Conservation District, Marin Agricultural Land Trust, University of California Cooperative Extension, and the National Resource Conservation Service.

Sincerely,

Thomas Mumley
Assistant Executive Officer

VIA ELECTRONIC SUBMISSION
PointReyesManagementPlan@coastal.ca.gov
EORFC@coastal.ca.gov

California Coastal Commission
455 Market St, Suite 223
San Francisco, Ca 94105- 2219

September 2, 2022

Turtle Island Restoration Network is a non-profit organization based in Marin County, representing over 150,000 members across the globe. Over the last thirty years, our organization has mobilized people in local communities to protect the oceans and inland watersheds that sustain them.

The Water Quality Strategy proposed by the Park Service does not comply with Condition I Consistency Determination No. CD-0006-20. This Water Quality Strategy is missing critical components for enforcement of egregious water quality violations and various requirements that fulfill Condition I in the Commission Staff Report. Commission staff acknowledges the Strategy does not satisfy all 8 Elements and characterizes the Strategy as "a thorough effort to meet the requirements of Condition I." This assessment is accurate; however, compliance is a binary measurement, not an interpretive one.

The sum of these Elements is greater than their parts. Various elements depend on the existence of another for this Water Quality Strategy to be an effective tool for fulfilling the requirements of § 30230 of the Coastal Zone Act. Given that not all the Elements are represented in this iteration of the National Park Service's Water Quality Strategy, this iteration is not in compliance with Condition I for Consistency Determination No. CD-0006-20.

We request that Commissioners vote no on this Water Quality Strategy and ask the National Park Service to come back with a Strategy that addresses the following missing components and shortcomings of the Water Quality Strategy.

The Required Timeline Component of Element 2 is Absent from the Strategy

Commission staff identified the fulfillment of Element 2 with "A timeline for the Water Quality Strategy that reflects short- and long-term ranch management priorities related to water quality." Element 2 does not have a timeline but defines and describes the short and long-term ranch management priorities.

The only date associated with deliverable action items is "November 1, 2022", requiring completion of Corrective Actions for Dairy with water quality issues. This deadline/timeline was set forth by the Regional Water Board, not the strategy, and the public, not the park, triggered the Inspections. The other semi-deadline/timeline associated with an action item is regarding failing septic systems leaking raw human sewage under ranch workers' homes in

the park. This deadline was set forth by Marin County Environmental Health Services in response to the county receiving complaints about sewage issues and had nothing to do with the Strategy.

These are standalone incidents that do not contribute to an overall Strategy or systematic approach to dealing with water quality Issues in the park.

The concern of stakeholders is that there has been little to no precedent of Ranchers being held accountable for pollution. The function of a timeline is to create a consistent pathway to enforcement of Water Quality violations. Yet, the Strategy remains ambiguous and does not define when corrective actions must occur following exceedances.

In Objective 2 - *Ongoing Inspection and Compliance Monitoring,* the strategy does not address the dates associated with enforcement actions but instead mentions they will send "a timeline for implementation." Furthermore, in Objective 5, under the *Implementation of Ranch Management Activities for Water Quality Improvement* section, the Strategy admits that timing for Management Activities (site-specific corrections) will be "developed by NPS in coordination with ranch operators." Acknowledging that a timeline will be created does not fulfill the requirements of creating a timeline, especially if a ranch operator has committed a Water Quality Exceedance.

Given the lack of a timeline associated with the development of various Objectives, coupled with no timeline for enforceable actions triggered by violations, the requirements of Element 2 are not met.

The Strategy Does Not Commit to Updating The Strategy and Timeline as Required in Element 5

Element 5 asks for "a commitment to updating the strategy and timeline on an annual basis based on data and analysis from the previous year."

Commission staff points out, "The Strategy does not include a commitment to an annual update cycle of the Strategy and timeline." It is impossible to update a timeline when there was never one, to begin with. The lack of a timeline required in Element 2 innately makes accomplishing Element 5 impossible.
.
Commission Staff assumes that the missing Element was an "oversight" and "ongoing coordination efforts would *likely* provide staff the ability to request updates." It's worth remembering that the origins of this Water Quality Strategy came from NPS not describing "where and on what timeline measures would be implemented" in their consistency determination. NPS has set a precedent of not establishing clear timelines to hold polluters and enforcers accountable, which is why the CCC must require NPS to commit in this Water Quality Strategy to the creation and annual updates of timelines.

The Severity of Fines and Management Actions Must Correlate to the Frequency and Scale of Exceedances

If a tenant consistently exceeds state health standards, fines and penalties must also increase and scale per violation. This type of enforcement is typical in my facets of society. Take Cal. Vehicle Code §42001.7, which regulates littering in California. The penalty should escalate with the scale and frequency of violations:

First conviction: fine between $100 and $1,000, and at least eight hours of litter cleanup.
Second conviction: fine between $500 and $1,000, and at least 16 hours of litter cleanup.
Subsequent convictions: fine between $750 and $1,000, and at least 24 hours of litter cleanup.

Similarly, the Water Quality Strategy should have standardized fees and Management Actions that correlate with the severity or frequency of polluters. This may seem obvious, but the CCC must explicitly require NPS to define this in its strategy due to its poor history of holding polluters accountable.

For example, a rancher bulldozed over 150 feet of riparian habitat, including a creek bed that feeds into Drakes Estero. In what should have resulted in the maximum penalty, the rancher's lease instead states, "in lieu of voiding and terminating this Permit, assess a penalty of $100.00 per day for any failure by Permittee to keep and perform any of the provisions of this Permit." A similar fee to what one receives for littering in California.

Using the *Water Quality Benchmarks and Thresholds for Additional Actions*, the Water Quality Strategy must set quantitative tiers that trigger different levels of enforcement that increase with repeated offenses.

Lack of Funding Source for Corrective Actions and Monitoring Program Renders This Strategy Ineffective

Element 2

Objective 5 of Element 1 integrates mandatory requirements for all ranches under the interim 2-year leases, including improvement projects to address water quality.

However, the strategy does not indicate a responsible party, stating, "NPS and ranch operations continue active engagement in securing funding and planning for additional management activities identified by inspections". Furthermore, the strategy lacks the explicit language to obtain funding for corrective actions, as seen in Objective I, which asks dairy operators to *"pursue*" funding.

Consistent testing in the park will correlate with an increase in violations and, thus, the cost of enforcement actions. Establishing a revenue generation plan that does not use public dollars is an essential component that needs to be clearly defined in this Strategy.

Element 6

The Water Quality Strategy Beach Monitoring Program assumes that the Environmental Action Center of West Marin will continue to donate its resources to monitor for contaminated waters caused by ranching. Commission staff acknowledges that this component is a "critical piece of the strategy…to protect public health in high recreation areas". Without a proposed funding plan, it is not pragmatic or fair to assume EAC will continue this program into perpetuity and should not be relied upon as a part of the Water Quality Strategy.

Element 8

In the April 2022 CCC meeting, Commissioners and stakeholders shared concerns over funding sources, which led to the request for a revenue generation plan to be integrated into this Strategy. Staff acknowledges that "this current proposed Strategy does not adequately address the Commission's request for a revenue generation plan" and "Commission staff recommends that NPS staff develop a revenue generation plan before the 2022 annual report, detailing potential funding sources and responsible parties."

Commissioners should still require NPS to develop a revenue generation program in the final version of the Water Quality Strategy to ensure the burden shifts away from the public and onto the polluters.

Recommendations

The Strategy, while well intended, lacks actionable language that would trigger real enforcement in response to exceedances of state health standards. Multiple components of various elements are absent in this Water Quality Strategy. Thus this iteration of the Water Quality Strategy does not fulfill the requirements to comply with Condition I.

We request that the CCC require NPS to come back with an updated Water Quality Strategy that adopts the following recommendations, addressing the shortcomings of this draft Strategy.

1. **Require that NPS to create a timeline for short and long-term priorities with the inclusion of an enforcement pathway timeline for water quality exceedances and lease violations.**

2. **Require that NPS to include Element 5.**

3. **Require that NPS to submit an enforcement plan that quantifiably establishes the magnitude and frequency of action triggers correlated with the severity of Management Actions.**

4. **Require that NPS to submit a revenue generation plan that requires polluters pay for additonal Management Actions and additional resources to stay within compliance**

5. **Require that NPS to post all data collected from the Water Quality Strategy on their website to allow transparency of conditions in the park.**

These requests are consistent with the requirements of Elements 1-8, which represent Condition I. If NPS can not fulfill Condition I for the third time, We ask the CCC to reopen the Consistency of Determination for Point Reyes National Seashore and allow stakeholders to present new information that has come to light since the narrow 5-4 decision in April 2021.

Respectfully,

Scott Webb
Advocacy & Policy Director
Turtle Island Restoration Network

Teufel, Cassidy@Coastal

From: Scott Webb <swebb@seaturtles.org>
Sent: Tuesday, August 30, 2022 9:57 AM
To: Coastal Point Reyes Management Plan; Energy@Coastal
Subject: Agenda Item 10b: Water Quality Report_Point Reyes National Seashore_Surface Water Monitoring_Lovell 2022
Attachments: Agenda Item 10b_Water Quality Report_Point Reyes National Seashore_Surface Water Monitoring_Lovell 2022.pdf

Dear California Commissioners and Commission Staff,

My name is Scott Webb, and I am the Advocacy Manger with Turtle Island Restoration Network. We are a West Marin County-based nonprofit that works on international, federal, and state marine issues. We also focus on local salmonid and riparian habitat restoration efforts in the Golden Gate National Recreation Area.

Our organization contracted Doug Lovell to conduct one of the most rigorous independent water quality studies for Point Reyes National Seashore. Objectives promulgated by the San Francisco Bay Regional Water Quality Control Board (SFBRWQCB 2022) were employed to assess compliance.

- For a description of exceedance objectives of Fecal Indicator Bacteria, as well as the testing methodology, see Page 4.
- For a summary of water quality exceedances, please direct your attention to Table 6 on pages 25 and 26.

We will incorporate additional comments about this report into our organization's Comments regarding agenda item 10b; CD-0006-20 (National Park Service, Marin Co.)

Please let me know that you have received this report, and do not hesitate to contact me with comments, questions, or clarifications.

We hope this report can further inform the Commissioners, Commission staff, and the public about the degree of water pollution caused by private ranching practices in the National Seashore and the need to create the most robust Water Quality Strategy possible.

Thank you for defending the places we love the most,

Scott

--

Scott Webb (he/him)
Advocacy & Policy Manager
Turtle Island Restoration Network

Douglas W Lovell
1514 Hearst Avenue
Berkeley CA 94703
doug.streamborn@gmail.com

28 August 2022

VIA EMAIL
Scott Webb
Turtle Island Restoration Network
PO Box 370
Forest Knolls CA 94933

Report
Planning and Conduct of the October 2021-January 2022 Surface Water Monitoring
Kehoe, Abbotts, Drakes Estero, and Drakes Bay Watersheds
Point Reyes National Seashore
Marin County CA

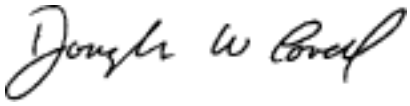
Dear Mr. Webb:

At your request, I have prepared the subject report. The report describes the considerations I employed in planning and conducting the October 2021-January 2022 surface water monitoring, along with a summary of selected monitoring results. Discussion of the monitoring results will be presented in a subsequent report.

I understand you will use the attached report to aid your review of the National Park Service's proposed surface water monitoring strategy.

Please contact me with any questions or comments.

Sincerely,



Douglas W Lovell
Geoenvironmental Engineer

Attachment

Report

Planning and Conduct of the October 2021 through January 2022 Surface Water Monitoring

Kehoe, Abbotts, Drakes Estero, and Drakes Bay Watersheds
Point Reyes National Seashore
Marin County CA

Prepared for
Turtle Island Restoration Network
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INTRODUCTION

This report documents surface water monitoring conducted 25 October 2021 through 26 January 2022 at selected locations within Point Reyes National Seashore, Marin County CA. This report also includes January 2021 monitoring results that were previously reported (Lovell 2021).

During the October 2021-January 2022 monitoring, fourteen locations were monitored in four watersheds (Figures 1 and 2, Table 1, Appendix A):

- Kehoe Watershed - including North Kehoe Creek, South Kehoe Creek, and Kehoe Lagoon.
- Abbotts Watershed - including North Abbotts Creek, Abbotts Creek, the outflow from Upper Abbotts Lagoon, and the outflow from Middle Abbotts Lagoon.
- Drakes Estero Watershed - including the confluence of Schooner Creek with Schooner Bay and the confluence of Home Ranch Creek with Home Bay.
- Drakes Bay Watershed - including three unnamed creeks.

The monitored locations are within watersheds containing dairy cattle and beef cattle operations that "contribute to poor water quality through bacteria and nutrient loading from animal waste and runoff" (Pawley and Lay 2013).

During the October 2021-January 2022 monitoring period, 14 monitoring events were conducted and 125 samples were collected (additional field duplicates and field blanks were collected). Twelve of the events were performed during a single day; two of the events were 2-day events. The typical monitoring frequency for many locations was weekly.

Environmental Action Committee of West Marin conducts surface water monitoring of one location in Drakes Bay Watershed (Drakes Beach) and one location in the Drakes Estero Watershed (MEHS 2022). Surface water monitoring of several locations in the Kehoe, Abbotts, and Drakes Estero watersheds was conducted in January 2021 (Lovell 2021). The National Park Service monitored several locations in the Kehoe, Abbotts, and Drakes Estero watershed circa December 2021 (National Park Service 2022c). Apart from these efforts, the Kehoe, Abbotts, Drakes Estero, and Drakes Bay watersheds have not been monitored since 2013 when the National Park Service suspended surface water monitoring. The National Park Service suspended surface water monitoring despite significant and frequent exceedances of water quality objectives.

The current-day water quality objectives for Fecal Indicator Bacteria in surface water (Table 5) were promulgated by the San Francisco Bay Regional Water Quality Control Board and State Water Resources Control Board in 2019, and by the US Environmental Protection Agency in 2012. To assess compliance with the objectives, all three agencies require (1) the collection of at least 5 samples over 42-day and/or 30-day intervals and (2) calculation of the Geometric Mean and Statistical Threshold Value. For the locations described in this report, the October 2021-January 2022 monitoring, along with the National Park Service's December 2021 monitoring,

provide the first set of Fecal Indicator Bacteria measurements allowing a valid comparison to current-day water quality objectives.

The historical Fecal Indicator Bacteria data set (collected in 2013 and prior years) lacks the requisite number of samples over the requisite time intervals; accordingly, valid assessments regarding compliance with current-day Fecal Indicator Bacteria objectives are not possible using the historical data. Despite this limitation, the National Park Service and its employees assessed compliance using the historical data set and current-day objectives (National Park Service 2020, National Park Service 2021, Voeller et al. 2020a, Voeller et al. 2020b, Voeller et al. 2021); these assessments are not valid.

BACKGROUND

For surface water in the Kehoe, Abbotts, Drakes Estero, and Drakes Bay watersheds, concerns regarding cattle manure discharge include, but are not limited to:

- Human health endangerment from exposure to Fecal Indicator Bacteria.
- Hazardous algal blooms (HABs) and hazardous cyanobacteria blooms (HCBs) from macronutrient (nitrogen and phosphorus) loading.

This report focuses on human health endangerment and macronutrient loading. Wildlife endangerment from cattle manure discharge is not addressed.

Hazardous algal blooms and hazardous cyanobacteria blooms are of significant concern in the following waterbodies (Figures 1 and 2, Figures A1 and A2 in Appendix A):

- Kehoe Lagoon, Kehoe Marsh, the lower reaches of South Kehoe Creek Marsh.
- Upper Abbotts Lagoon, the upstream portions of Middle Abbotts Lagoon.
- The upstream portion of Schooner Bay, the upstream portion of Home Bay, Home Ranch Lagoon.

Surface water monitoring locations PAC3 (Kehoe Lagoon), PAC1S (South Kehoe Creek), ABB5 (Outflow from Upper Abbotts Lagoon), DES6B (Schooner Creek at Sir Francis Drake Blvd), and DES7 (Home Ranch Lagoon at Estero Trail Bridge) (Figures 1 and 2) provide suitable locations to measure macronutrients for the waterbodies. Sampling and analysis for hazardous algal blooms and hazardous cyanobacteria blooms in these waterbodies has yet to be performed. Global warming, along with the consequent extremes in meteorological and hydrological conditions, is expected to exacerbate hazardous algal blooms and hazardous cyanobacteria blooms (ITRC 2021, ITRC 2022, Gobler 2020, Schulhof and Shore 2020, Anderson-Abs et al. 2016, US Environmental Protection Agency 2022).

Assessment of human health endangerment from exposure to Fecal Indicator Bacteria has been based on surface water beneficial uses and associated water quality objectives promulgated by the San Francisco Bay Regional Water Quality Board (Appendix A) (Table 5). Suitable surface water monitoring locations (Table 1, Figures 1 and 2) were selected for comparison to the objectives.

The selection of monitoring locations was based on the following considerations (Appendix A):

- Cattle manure sources, including localized sources such as dairy cow milking complexes, confined cattle feeding areas, and manure retention ponds.
- Public access and public use.
- Compliance monitoring requirements for confined animal facilities (CAFs - dairy ranches) (SFBRWQCB 2016).

Historical monitoring locations were preferred unless other considerations were more important. Locations with well-mixed (unstratified) water, along with locations that could be sampled without disturbing the substrate, were preferred (Appendix A). The selection of monitoring locations was constrained by the National Park Service's access closures for areas surrounding the dairy ranch milking complexes, which precluded monitoring of strategic locations in the North Kehoe Creek drainage and Drakes Bay Watershed.

Practice norms and confined animal facility regulations require monitoring of the first significant precipitation event of the rainy season which, for water year 2021-2022, began on 19 October 2021 with a 2-year recurrence interval precipitation event. Surface water monitoring began on 25 October 2021. Thereafter, monitoring was performed at the frequencies required to compare Fecal Indicator Bacteria concentrations to surface water quality objectives (at least 5 samples or 42-day and/or 30-day intervals). Monitoring was performed by volunteers trained and directed by Douglas Lovell, PE. Monitoring was performed Monday-Wednesday to facilitate normal laboratory turnaround for Fecal Indicator Bacteria analyses.

FIELD MONITORING

Table 2 summarizes the field observations and field measurements. Field observations included flowrate, visual turbidity, visual color, odor, and (sand size or larger) particulates. Field meters were calibrated prior to monitoring and calibration checks were performed upon return from the field. A full suite of field parameters (temperature, pH, specific conductance, salinity, oxidation-reduction potential, dissolved oxygen, turbidity) was measured during monitoring events that included macronutrient analyses. During other monitoring events, selected field parameters were measured subject to time constraints.

Particular attention was directed toward collecting samples without disturbing the substrate at each monitoring location. Appendix A describes the specific sampling procedures for each monitoring location.

LABORATORY ANALYSES

Tables 3 and 4 summarize the laboratory analyses. Fecal Indicator Bacteria analyses consisted of Total Coliform, Fecal Coliform, *E. coli*, and Enterococci. All four Fecal Indicator Bacteria were not needed at each location; Table 1 shows the Fecal Indicator Bacteria analyses required for comparison to the appropriate beneficial use objectives. Macronutrient analyses consisted of ammonia, nitrate, nitrite, Total Kjeldahl Nitrogen, dissolved nitrogen, total nitrogen, orthophosphate, dissolved phosphorus, and total phosphorus. Total Suspended Solids analyses were performed on selected samples.

EXCEEDANCES OF OBJECTIVES FOR FECAL INDICATOR BACTERIA

The objectives promulgated by the San Francisco Bay Regional Water Quality Control Board (SFBRWQCB 2022) (Table 5) were employed to assess compliance. To assess compliance with these objectives, two statistical parameters were calculated using the measured Fecal Indicator Bacteria concentrations:

- An "averaging" parameter. Either geometric mean, arithmetic mean, or median, with calculation intervals of either 42 days (geometric mean) or 30 days (arithmetic mean and median).
- An "upper limit" parameter. Representing the 90th percentile upper limit, termed the Statistical Threshold Value (STV), with a calculation interval of 30 days. The calculation of a numeric Statistical Threshold Value implicitly assumed normality of the mean; an assumption that is generally supported by the data.

Compliance with water quality objectives requires the "averaging" parameter be less than the "averaging" objective and the "upper limit" parameter be less than the "upper limit" objective. Noncompliance results if either or both parameters exceed the objectives.

For each monitoring location, rolling values of the two statistical parameters were calculated using sequential 42-day and/or 30-day intervals. A minimum of 5 samples were employed for each interval. To comply with the 5-sample minimum, some calculation intervals exceeded the stipulated 42 days or 30 days, which generally resulting in a lower estimate of the parameter. Each rolling value was then compared to the appropriate objective.

Table 6 presents a compilation of the comparisons for each monitoring location that exceeded objectives. A discussion of the exceedances will be presented in a subsequent report.

Monitoring Locations

Kehoe, Abbotts, Drakes Estero, and Drakes Bay Watersheds
Point Reyes National Seashore
Marin County CA

Location ID	Location Name	Watershed	Description	Cattle Manure Sources	Beneficial Uses of Surface Water	Required Fecal Indicator Bacteria Analyses	Public Use	Wildlife Use	Comments
PAC1S	South Kehoe Creek Downstream of I-Ranch and L-Ranch	Kehoe	PAC1S was within a marshy area with abundant terrestrial and aquatic vegetation, including emergent aquatic macrophytes.	I-Ranch CFA, GL. L-Ranch MC, CFA, GL, PMP.	WET, WARM, WILD, REC-2	Total Coliform, Fecal Coliform, *E. coli*	Hiking, wildlife observation.	Tule Elk (±4 animals), various bird species.	Freshwater.
PAC1Z	South Kehoe Creek Downstream of L-Ranch	Kehoe	South Kehoe Creek immediately downstream of the confluence of the watercourses impacted by the L-Ranch milking complex.	L-Ranch MC, CFA, GL, PMP.	WARM, WILD, REC-2	Total Coliform, Fecal Coliform, *E. coli*	Hiking, wildlife observation.	Tule Elk (±4 animals), coyotes, various bird species.	Freshwater.
PAC2	North Kehoe Creek at Pierce Point Road	Kehoe	Upstream end of the culvert.	J-Ranch MC, CFA, GL, PMP, SMP.	WET, WARM, WILD, REC-2	Total Coliform, Fecal Coliform, *E. coli*	Frequent vehicle parking immediately adjacent to PAC2.	Various bird species.	Freshwater.
PAC3	Kehoe Lagoon	Kehoe	Immediately downstream of Kehoe Marsh, at the upstream end of the standing/quiescent lagoon water.	I-Ranch CFA, GL. J-Ranch MC, CFA, GL, PMP, SMP. L-Ranch MC, CFA, GL, PMP. K-Ranch GL.	WET, WARM, WILD, REC-1, REC-2	Total Coliform, Fecal Coliform, *E. coli*	Frequent public use. Hiking, wildlife observation, wading within Kehoe Lagoon, and wading in the outflow from Kehoe Lagoon. Swimming and shellfish harvesting at Kehoe Beach.	River otters, various bird species including Great Blue Herons and other shorebirds, coyotes.	Freshwater.
ABB1	Abbotts Creek at Pierce Point Road	Abbotts	Downstream end of the culvert.	I-Ranch GL.	WET, WARM, WILD, REC-2	Total Coliform, Fecal Coliform, *E. coli*	Hiking, wildlife observation.	Deer, coyotes, various bird species.	Freshwater. The EcoAtlas shows REC-1 beneficial use at ABB1; however, based on field observations of public access and public use, ABB1 has been assigned REC-2.
ABB2/3	North Abbotts Creek Downstream of I-Ranch	Abbotts	Immediately upstream of Upper Abbotts Lagoon. ABB2/3 was downstream of the confluence of the three drainages exiting the I-Ranch milking complex.	I-Ranch MC, CFA, GL, PMP.	WET, WARM, WILD, REC-2	Total Coliform, Fecal Coliform, *E. coli*	Hiking, wildlife observation.	Deer, coyotes, various bird species.	Freshwater. The EcoAtlas shows REC-1 beneficial use at ABB2/3; however, based on field observations of public access and public use, ABB2/3 has been assigned REC-2.
ABB4	Outflow from Middle Abbotts Lagoon	Abbotts	Abbotts Lagoon trail footbridge at the downstream end of Middle Abbotts Lagoon (upstream end of Lower Abbotts Lagoon).	I-Ranch MC, CFA, GL, PMP. H-Ranch GL.	MAR, WILD, REC-1, REC-2	Enterococci	Frequent public use. Hiking, wildlife observation, wading in Middle and Lower Abbotts Lagoons, and wading and swimming at Abbotts Beach.	Deer, coyotes, rabbits, river otters, various bird species including shorebirds.	Saltwater. Depending on tide stage, water flowed to/from Lower Abbotts Lagoon or from/to Middle Abbotts Lagoon.
ABB5	Outflow from Upper Abbotts Lagoon	Abbotts	Outflow from Upper Abbotts Lagoon to Middle Abbotts Lagoon.	I-Ranch MC, CFA, GL, PMP.	MAR, WILD, REC-1, REC-2	Total Coliform, Fecal Coliform, *E. coli*	Hiking, wildlife observation, wading in Upper and Middle Abbotts Lagoons.	Deer, coyotes, rabbits, river otters, various bird species including shorebirds.	Freshwater.
DES2*	East Schooner Creek at Sir Frances Drake Blvd	Drakes Estero	Upstream end of the culvert.	M/N/D Rogers Ranches GL.	SHELL, COLD, MIGR, RARE, SPWN, WARM, WILD, REC-1, REC-2	Total Coliform, Fecal Coliform, *E. coli*	Hiking, wildlife observation including salmon/steelhead observation.	Various bird species and small mammals. Salmon and steelhead spawning and rearing in East Schooner Creek.	Freshwater.

Monitoring Locations

Kehoe, Abbotts, Drakes Estero, and Drakes Bay Watersheds
Point Reyes National Seashore
Marin County CA

Location ID	Location Name	Watershed	Description	Cattle Manure Sources	Beneficial Uses of Surface Water	Required Fecal Indicator Bacteria Analytes	Public Use	Wildlife Use	Comments
DES3*	Home Ranch Creek Downstream of Ranch Buildings	Drakes Estero	Downstream of the ranch building complex and upstream of the mouth of Home Ranch Creek (where Home Ranch Creek discharges to Home Ranch Lagoon).	Home Ranch GL.	COLD, MIGR, RARE, SPWN, WARM, WILD, REC-1, REC-2	Total Coliform, Fecal Coliform, *E. coli*	Hiking, wildlife observation including salmon/steelhead observation.	Tule Elk, deer, small mammals, various bird species including shorebirds.	Freshwater.
DES6B*	Schooner Creek at Sir Francis Drake Blvd	Drakes Estero	Schooner Creek at the Sir Francis Drake Blvd bridge.	H/M/N/D Rogers Ranches GL.	COMM, SHELL, MAR, MIGR, RARE, SPWN, WILD, REC-1, REC-2	Total Coliform, Fecal Coliform, Enterococci	Hiking, wildlife observation. Kayaking/canoeing/paddle-boarding in Schooner Bay (Drakes Estero) immediately downstream of DES6B. Designated launch area for watercraft ±1/2 mile south of DES6B at the location of the former Drakes Bay Oyster Company. Watercraft can be launched at DES6B.	River otters, Tule Elk, deer, small mammals, various bird species including Great Blue Herons, other shorebirds, ducks.	Saltwater.
DES7*	Home Ranch Lagoon at Estero Trail Bridge	Drakes Estero	Footbridge along the Estero Trail, downstream end of Home Ranch Lagoon.	Home Ranch GL.	COMM, SHELL, MAR, MIGR, RARE, SPWN, WILD, REC-1, REC-2	Total Coliform, Fecal Coliform, Enterococci	Frequent public use. Hiking, wildlife observation. Kayaking/canoeing/paddle-boarding in Home Ranch Lagoon and Home Ranch Bay (Drakes Estero).	Small mammals and various bird species including shorebirds and ducks.	Saltwater. Home Ranch Lagoon (saltwater marsh) immediately upstream of the bridge. Home Bay (of Drakes Estero) immediately downstream of the bridge. DES7 located at the edge of the Phillip Burton Wilderness.
DBY1*	C-Ranch Unnamed Creek	Drakes Bay	±100 yards downstream of the stock pond.	C-Ranch MC, CFA, GL, PMP.	WARM, WILD, REC-2	Total Coliform, Fecal Coliform, *E. coli*	Hiking, wildlife observation. Kayaking/canoeing/paddle-boarding, wading, and swimming in Drakes Bay downstream of DBY1.	Tule Elk, deer, coyotes, small mammals, various bird species.	Freshwater.
DBY2	B-Ranch Unnamed Creek	Drakes Bay	Metal culvert discharge. ±150 feet upstream of the beach at Drakes Bay.	B-Ranch MC, CFA, GL, PMP.	WET, WARM, WILD, REC-2	Total Coliform, Fecal Coliform, *E. coli*	Hiking, wildlife observation. Kayaking/canoeing/paddle-boarding, wading, and swimming in Drakes Bay immediately downstream of DBY2.	Deer, coyotes, small mammals, various bird species. At DBY2 and at the Drakes Bay beach, Northern Elephant Seal resting, mating, birthing, and pup rearing occur. Northern Elephant Seals were observed in the creek channel at DBY2.	Freshwater.
DBY3	A-Ranch Unnamed Creek	Drakes Bay	Immediately downstream of a set of rocky cascades. ±100 yards upstream of the beach at Drakes Bay.	A-Ranch MC, CFA, GL, PMP.	WARM, WILD, REC-2	Total Coliform, Fecal Coliform, *E. coli*	Hiking, wildlife observation. Kayaking/canoeing/paddle-boarding, wading, and swimming in Drakes Bay downstream of DBY3.	Deer, coyotes, small mammals, various bird species.	Freshwater.

Monitoring Locations

Kehoe, Abbotts, Drakes Estero, and Drakes Bay Watersheds
Point Reyes National Seashore
Marin County CA

General Notes

(a) * = in addition to cattle manure, this monitoring location was potentially influenced by other manure sources (elk, chickens, etc.).

(b) Required Fecal Indicator Bacteria Analyses = analyses needed to evaluate compliance with the objectives promulgated by the San Francisco Bay Regional Water Quality Control Board (SFBRWQCB 2022).

(c) EcoAtlas = California EcoAtlas (EcoAtlas 2022). https://www.ecoatlas.org

(d) Salinity classified according to the State Water Resources Control Board (SWRCB 2019a): Freshwater = "salinity is equal to or less than 1 part per thousand (ppth) 95 percent or more of the time during the CALENDAR YEAR." Saltwater = "salinity is greater than 1 ppth more than 5 percent of the time during the CALENDAR YEAR."

(e) A-Ranch, B-Ranch, C-Ranch, J-Ranch, L-Ranch = active dairy. I-Ranch = inactive dairy. I-Ranch historically operated as an actively milking dairy. Circa July 2021, prior to the October 2021-January 2022 monitoring, I-Ranch liquidated the milking herd. A herd of approximately 165 cattle was maintained during the October 2021-January 2022 monitoring.

(f) MC = dairy cow milking complex. CFA = confined cattle feeding area(s) (including dairy cattle feeding stations/troughs). GL = cattle grazing land. PMP = primary cattle manure retention pond(s). SMP = secondary cattle manure retention pond. Cattle manure was applied to land; however, documentation regarding land application was not available.

(g) Beneficial Use Definitions are verbatim from (SWRCB Undated).

COLD Cold Freshwater Habitat - Uses of water that support cold water ecosystems, including, but not limited to, preservation or enhancement of aquatic habitats, vegetation, fish, or wildlife, including invertebrates.

COMM Commercial and Sport Fishing - Uses of water for commercial or recreational collection of fish, shellfish, or other organisms, including, but not limited to, uses involving organisms intended for human consumption or bait purposes.

MAR Marine Habitat - Uses of water that support marine ecosystems including, but not limited to, preservation or enhancement of marine habitats, vegetation such as kelp, fish, shellfish, or wildlife (e.g., marine mammals, shorebirds).

MIGR Fish Migration - Uses of water that support habitats necessary for migration, acclimatization between fresh water and salt water, and protection of aquatic organisms that are temporary inhabitants of waters within the region.

RARE Rare, Threatened, or Endangered Species - Uses of waters that support habitats necessary for the survival and successful maintenance of plant or animal species established under state and/or federal law as rare, threatened, or endangered.

REC-1 Water Contact Recreation - Uses of water for recreational activities involving body contact with water, where ingestion of water is reasonably possible. These uses include, but are not limited to, swimming, wading, water-skiing, skin and scuba diving, surfing, white water activities, fishing or use of natural hot springs.

REC-2 Non-Contact Water Recreation - Uses of water for recreational activities involving proximity to water, but not normally involving body contact with water, where ingestion of water is reasonably possible. These uses include, but are not limited to, picnicking, sunbathing, hiking, beachcombing, camping, boating, tidepool and marine life study, hunting, sightseeing, or aesthetic enjoyment in conjunction with the above activities.

SHELL Shellfish Harvesting - Uses of water that support habitats suitable for the collection of filter-feeding shellfish (e.g., clams, oysters, and mussels) for human consumption, commercial, or sport purposes.

SPWN Spawning, Reproduction, and/or Early Development - Uses of water that support high quality aquatic habitats suitable for reproduction and early development of fish.

WARM Warm Freshwater Habitat - Uses of water that support warm water ecosystems including, but not limited to, preservation or enhancement of aquatic habitats, vegetation, fish, or wildlife, including invertebrates.

WET Wetland Habitat - Uses of water that support natural and man-made wetland ecosystems, including, but not limited to, preservation or unique wetland functions, fish, shellfish, invertebrates, insects, and wildlife habitat (North Coast Regional Board (Region 1).

WILD Wildlife Habitat - Uses of water that support terrestrial ecosystems including, but not limited to, preservation and enhancement of terrestrial habitats, vegetation, wildlife (e.g., mammals, birds, reptiles, amphibians, invertebrates), or wildlife water and food sources.

Field Observations and Field Parameter Measurements

Kehoe, Abbotts, Drakes Estero, and Drakes Bay Watersheds
Point Reyes National Seashore
Marin County CA

Location	Date	Sample Time	Field Measure-ment Time	Estimated Flowrate [F] (cfs)	Water Temp (˚C)	pH	Specific Conductance (µS/cm)	Salinity (o/oo) (ppt)	Oxidation-Reduction Potential (mV)	Dissolved Oxygen (mg/L)	Turbidity (NTU)	Salinity Classification	Visual Turbidity	Visual Color	Odor of the Water (observed in the field)	Was Representative Monitoring Performed within a Well-Defined, Well-Mixed Channel?	Comments
PAC1S [1] South Kehoe Creek Downstream of I-Ranch and L-Ranch	27 Jan 21	9:40 am		4	9.9	7.0	650	0.3	230	9.6	22	Freshwater	Translucent	Light brown	None	Yes	
	28 Jan 21	9:00 am		4	9.6	7.4	630	0.3	210	9.4	18	Freshwater	Translucent	Light brown	None	Yes	
	25 Oct 21	11:45 am		2	15.5	6.3	710	0.3	40	7.3	16	Freshwater	Translucent	Light brown	None	Yes	Field calibration check of pH meter: standard = 7.00, measured = 6.96.
	3 Nov 21	10:06 am										Freshwater	Clear	Very light brown	None	Yes	
	9 Nov 21	10:02 am										Freshwater	Translucent	Brown	None	Yes	
	17 Nov 21	9:56 am										Freshwater	Clear	Very light brown	None	Yes	
	22 Nov 21	10:17 am										Freshwater	Clear	Very light brown	None	Yes	
	8 Dec 21	10:27 am										Freshwater	Opaque	Brown	None	Yes	
	14 Dec 21	10:05 am			10.1	7.0	530	0.3	170	8.8	15	Freshwater	Clear	Very light yellow	None	Yes	
	22 Dec 21	8:50 am			8.4	7.7	540	0.3				Freshwater	Clear	Light brown	None	Yes	
	29 Dec 21	9:43 am	10:44 am		9.4	7.3	530	0.3				Freshwater	Clear	Yellow-brown	None	Yes	
	5 Jan 22	9:38 am	10:27 am		12.3	7.2	540					Freshwater	Clear	Light yellow	None	Questionable [2]	
	12 Jan 22	9:55 am	10:36 am		13.2	6.9	520	0.3	200	10.0	11	Freshwater	Clear	Light brown	None	Questionable [2]	
PAC1Z South Kehoe Creek Downstream of L-Ranch	29 Dec 21	8:50 am	10:20 am	3	8.9	7.9	920	0.5	220	11.4		Freshwater	Clear	Light yellow	None	Yes	
	5 Jan 22	8:43 am	10:20 am	0.9	12.6	7.4	970					Freshwater	Clear	Light yellow	None	Yes	
	12 Jan 22	8:40 am	10:40 am	0.7	12.6	7.3	930	0.5	200	11.4	4.4	Freshwater	Clear	Very light yellow	None	Yes	
	19 Jan 22	8:10 am	8:50 am	1	9.4	7.4	970	0.5				Freshwater	Clear	Light yellow	None	Yes	
	26 Jan 22	8:35 am	9:25 am	0.4	10.2	7.4	990	0.5				Freshwater	Clear	Very light yellow	None	Yes	
PAC2 North Kehoe Creek at Pierce Point Road	21 Oct 21			0													North Kehoe Creek was dry.
	25 Oct 21	11:00 am		2	15.1	6.8	950	0.5	50	8.3	19	Freshwater	Translucent	Light brown	Manure	Yes	Strong manure odor was observed in the sample container upon return to the office.
	3 Nov 21	9:30 am										Freshwater	Clear	Very light brown	None	Yes	
	9 Nov 21	9:30 am		3	13.8	7.37 (H)						Freshwater	Opaque	Light brown	Strong manure	Yes	Temperature measured with pocket thermometer. Field pH paper measured 7.0 to 7.5. Strong manure odor was observed in the sample container upon return to the office.
	17 Nov 21	9:27 am										Freshwater	Clear	Very light brown	None	Yes	
	22 Nov 21	9:47 am		0.4								Freshwater	Translucent	Light yellow-brown	None	Yes	
	8 Dec 21	9:47 am										Freshwater	Clear	Yellow tint	None	Yes	
	14 Dec 21	9:15 am		2	10.2	7.3	820	0.4	190	9.6	11	Freshwater	Clear	Very light yellow	None	Yes	
	22 Dec 21	8:20 am		2	8.4	7.8	1,030	0.5				Freshwater	Clear	Very light yellow	None	Yes	Duplicate sample collected by a different person at a different time.
	22 Dec 21	10:34 am										Freshwater	Clear	Light yellow-brown		Yes	Duplicate sample collected by a different person at a different time.
	29 Dec 21	9:09 am	10:48 am		9.7	7.4	730	0.4				Freshwater	Clear	Light yellow-brown	Slight manure	Yes	
	5 Jan 22	9:14 am	10:25 am	<0.3	12.2	7.3	740					Freshwater	Clear	Light yellow	None	Yes	
	12 Jan 22	9:18 am	10:42 am		12.2	7.5	740	0.4	190	10.4	4	Freshwater	Clear	Light yellow	None	Yes	

Field Observations and Field Parameter Measurements

Kehoe, Abbotts, Drakes Estero, and Drakes Bay Watersheds
Point Reyes National Seashore
Marin County CA

Location	Date	Sample Time	Field Measure-ment Time	Estimated Flowrate [F] (cfs)	Water Temp (˚C)	pH	Specific Conductance (µS/cm)	Salinity (o/oo) (ppt)	Oxidation-Reduction Potential (mV)	Dissolved Oxygen (mg/L)	Turbidity (NTU)	Salinity Classification	Visual Turbidity	Visual Color	Odor of the Water (observed in the field)	Was Representative Monitoring Performed within a Well-Defined, Well-Mixed Channel?	Comments
PAC3	28 Jan 21	9:47 am	10:05 am		10.8	7.5	990	0.5	90	11.8	14	Freshwater	Translucent	Light brown	None	No [3]	
Kehoe Lagoon	26 Oct 21	9:10 am	9:50 am		14.2	6.5	1,810	0.6	40	4.2	5	Freshwater	Clear	Light brown	Manure	No [3]	
	3 Nov 21	9:00 am										Freshwater	Clear	Very light brown	None	No [3]	
	9 Nov 21	8:56 am										Freshwater	Clear	Very light brown	Strong manure	No [3]	
	17 Nov 21	8:49 am										Freshwater	Clear	Light yellow-brown	None	No [3]	
	22 Nov 21	8:41 am										Freshwater	Clear	Light yellow-brown	None	No [3]	
	8 Dec 21	9:10 am										Freshwater	Clear	Yellow tint	None	No [3]	Duplicate sample collected by the same person at a different time.
	14 Dec 21	10:48 am										Freshwater	Clear	Very light yellow	None	No [3]	Duplicate sample collected by the same person at a different time.
	22 Dec 21	9:53 am										Freshwater	Clear	Very light yellow	None	No [3]	
	29 Dec 21	10:26 am	10:46 am		9.1	7.3	800	0.4				Freshwater	Clear	Yellow-brown	None	No [3]	
	29 Dec 21	10:31 am										Freshwater	Clear	Yellow-brown	None	No [3]	
	2-3 Jan 22																“King Tides” caused ocean water to enter Kehoe Lagoon.
	5 Jan 22	8:29 am	10:28 am		12.5	7.0	3,490	1.9				Freshwater	Clear	Yellow-brown	None	No [3]	Kelp fragments in the lagoon.
	12 Jan 22	8:39 am	10:48 am		13.0	7.1	750	0.4	190	8.8	6	Freshwater	Clear	Light yellow	None	No [3]	
	19 Jan 22	8:24 am	9:10 am		9.7	7.1	940	0.5				Freshwater	Clear	Light yellow	None	No [3]	
	26 Jan 22	8:34 am	9:29 am		9.9	7.2	790	0.5				Freshwater	Clear	Light yellow	None	No [3]	
ABB1	21 Oct 21			0													Abbotts Creek was dry.
Abbotts Creek at Pierce Point Road	25 Oct 21	9:30 am		5	15.0	5.9	520	0.3	130	10.2	6	Freshwater	Clear	Very light brown	None	Yes	Field calibration check of pH meter: standard = 7.00, measured = 6.91.
	14 Dec 21	11:15 am										Freshwater	Clear	Very light yellow	None	Yes	Staff gauge = 4.68.
	22 Dec 21	9:50 am		1	8.7	7.6	330	0.2				Freshwater	Clear	Light brown	None	Yes	
	12 Jan 22	10:00 am	10:51 am	0.6	12.2	7.0	300	0.2	160	11.5	3	Freshwater	Clear	None	None	Yes	Staff gauge = 4.30.
ABB2/3	27 Jan 21	10:10 am		3	10.6	7.0	650	0.3	190	10.9	12	Freshwater	Translucent	Light brown	None	Yes	
North Abbotts Creek Downstream of I-Ranch	28 Jan 21	10:38 am		3	11.3	7.7	610	0.3	50	10.8	10	Freshwater	Translucent	Light brown	None	Yes	
	25 Oct 21	10:30 am		2	15.1	6.5	740	0.3	60	9.8	6	Freshwater	Translucent	Light brown	None	Yes	
	3 Nov 21	10:45 am		1								Freshwater	Clear	Light brown	None	Yes	
	9 Nov 21	9:00 am		1								Freshwater	Translucent	Brown	None	Yes	
	17 Nov 21	7:40 am		0.5								Freshwater	Clear	Very light brown	None	Yes	
	22 Nov 21	7:20 am		0.4								Freshwater	Clear	Very light brown	None	Yes	
	8 Dec 21	10:44 am										Freshwater	Clear	Very light brown	None	Yes	
	14 Dec 21	10:45 am			10.0	7.5	670	0.4	150	10.4	11	Freshwater	Translucent	Light brown	None	Yes	
	22 Dec 21	9:20 am		0.8	8.9	7.7	680	0.3				Freshwater	Clear	Brown	None	Yes	
	29 Dec 21	9:50 am	10:37 am	1	9.5	7.7	660	0.3				Freshwater	Clear	Yellow-brown	None	Yes	
	5 Jan 22	9:51 am	10:23 am	1	12.3	7.4	610	0.3				Freshwater	Clear	Light brown	None	Yes	
	12 Jan 22	9:34 am	10:45 am	0.7	12.9	7.3	570	0.3	180	10.9	14	Freshwater	Translucent	Light yellow-brown	None	Yes	

Field Observations and Field Parameter Measurements

Kehoe, Abbotts, Drakes Estero, and Drakes Bay Watersheds
Point Reyes National Seashore
Marin County CA

Location	Date	Sample Time	Field Measure-ment Time	Estimated Flowrate [F] (cfs)	Water Temp (˚C)	pH	Specific Conductance (µS/cm)	Salinity (o/oo) (ppt)	Oxidation-Reduction Potential (mV)	Dissolved Oxygen (mg/L)	Turbidity (NTU)	Salinity Classification	Visual Turbidity	Visual Color	Odor of the Water (observed in the field)	Was Representative Monitoring Performed within a Well-Defined, Well-Mixed Channel?	Comments
ABB4 [T] Outflow from Middle Abbotts Lagoon	26 Oct 21	9:30 am	10:10 am	2	15.8	7.5	4,890	2.6	120	10.6	3	Saltwater	Clear	Very light brown	None	Yes	
	3 Nov 21	9:00 am										Saltwater	Clear	Very light yellow	None	Yes	
	9 Nov 21	8:50 am										Saltwater	Clear	Very light yellow	None	Yes	
	17 Nov 21	9:00 am										Saltwater	Clear	Very light yellow	None	Yes	
	22 Nov 21	8:58 am		1								Saltwater	Clear	Very light yellow	None	Yes	
	8 Dec 21	9:10 am										Saltwater	Clear	Very light yellow	None	Yes	Many tadpoles in the water.
	14 Dec 21	9:21 am										Saltwater	Clear	Very light yellow	None	Yes	
	22 Dec 21	8:50 am	10:13 am		9.4	8.0	6,780	3.8				Saltwater	Clear	Light yellow	None	Yes	White foam along water edge. Field calibration check of pH meter: standard = 7.00, measured = 6.95.
	29 Dec 21	8:42 am	10:40 am		9.3	7.7	4,340	2.3				Saltwater	Clear	Very light yellow	None	Yes	Vegetation detritus on water surface.
	2-3 Jan 22																“King Tides” caused significant amounts of ocean water to enter Lower Abbotts Lagoon.
	5 Jan 22	8:33 am	10:16 am	6	12.6	7.4	4,220					Saltwater	Clear	Very light yellow	None	Yes	
	12 Jan 22	8:40 am	10:29 am	8	12.5	7.2	5,490	5.7	210	12.0	3	Saltwater	Clear	Very light yellow	None	Yes	
	19 Jan 22	8:40 am	9:25 am	10	10.2	7.8	4,730	2.6				Saltwater	Clear	Very light yellow	None	Yes	
	26 Jan 22	8:30 am	9:28 am		10.6	7.7	4,900	2.7				Saltwater	Clear	Very light yellow	None	Yes	
ABB5 Outflow from Upper Abbotts Lagoon	26 Oct 21	11:00 am	10:55 am	2	16.4	6.2	600	0.3	90	5.2	4	Freshwater	Translucent	Light brown	None	Yes	
	3 Nov 21	10:00 am										Freshwater	Clear	Very light yellow	None	Yes	
	9 Nov 21	9:50 am										Freshwater	Translucent	Light yellow-brown	None	Yes	
	17 Nov 21	10:15 am										Freshwater	Clear	Very light yellow	None	Yes	
	22 Nov 21	9:55 am										Freshwater	Clear	Very light yellow	None	Yes	
	8 Dec 21	10:10 am		0.7								Freshwater	Clear	None	None	Yes	Heavy vegetation in flow channel.
	14 Dec 21	10:08 am										Freshwater	Clear	Light yellow	Slight sulfur	Yes	Heavy vegetation in flow channel.
	22 Dec 21	9:31 am	10:18 am	1	9.1	7.3	450	0.2				Freshwater	Clear	Light yellow	None	Yes	
	29 Dec 21	9:30 am	10:42 am		9.2	7.4	370	0.2				Freshwater	Clear	Very light yellow	None	Yes	Heavy vegetation in flow channel.
	5 Jan 22	9:16 am	10:18 am	±0	11.9	6.6	380					Freshwater	Clear	Very light yellow	None		Heavy vegetation in flow channel.
	12 Jan 22	9:50 am	10:43 am	±0	12.2	7.0	420	0.2	220	8.9	3	Freshwater	Clear	Very light yellow	None		Heavy vegetation in flow channel.
DES2 East Schooner Creek at Sir Francis Drake Blvd	28 Jan 21	11:22 am		4	10.6	7.9	370	0.2	340	11.6	12	Freshwater	Clear	Very light brown	None	Yes	

Field Observations and Field Parameter Measurements

Kehoe, Abbotts, Drakes Estero, and Drakes Bay Watersheds
Point Reyes National Seashore
Marin County CA

Location	Date	Sample Time	Field Measure-ment Time	Estimated Flowrate [F] (cfs)	Water Temp (˚C)	pH	Specific Conductance (µS/cm)	Salinity (o/oo) (ppt)	Oxidation-Reduction Potential (mV)	Dissolved Oxygen (mg/L)	Turbidity (NTU)	Salinity Classification	Visual Turbidity	Visual Color	Odor of the Water (observed in the field)	Was Representative Monitoring Performed within a Well-Defined, Well-Mixed Channel?	Comments
DES3 Home Ranch Creek Downstream of Ranch Buildings	26 Oct 21	9:25 am	10:50 am	4	15.9	6.9	330	0.1	40	10.5	0.1	Freshwater	Clear	Very light brown	None	Yes	
	3 Nov 21	10:23 am		3								Freshwater	Clear	Very light brown	None	Yes	
	9 Nov 21	10:12 am		4								Freshwater	Translucent	Light brown	None	Yes	
	17 Nov 21	8:50 am										Freshwater	Clear	None	None	Yes	
	22 Nov 21	8:53 am										Freshwater	Clear	None	None	Yes	
	8 Dec 21	9:30 am		2								Freshwater	Clear	None	None	Yes	
	14 Dec 21	9:37 am		5								Freshwater	Translucent	Yellow	None	Yes	
	22 Dec 21	9:10 am	10:27 am	3	9.5	7.4	250	0.2				Freshwater	Clear	Light yellow	None	Yes	
	12 Jan 22	8:55 am	10:57 am	2	13.7	7.3	430	0.2	150	11.0	6	Freshwater	Clear		None	Yes	
DES6B [T] Schooner Creek at Sir Francis Drake Blvd	28 Jan 21	2:40 pm			12.3	7.1	12,100	14	50	9.6	10	Saltwater	Clear	None	None	Yes	
	25 Oct 21	8:10 am			13.8	6.4	1,520	0.9	250	7.4	24	Saltwater	Clear	Light brown	None	Yes	
	3 Nov 21	8:35 am										Saltwater	Clear	Very light brown	None	Yes	
	9 Nov 21	9:30 am										Saltwater	Clear	Very light brown	None	Yes	
	17 Nov 21	10:08 am										Saltwater	Clear	Light yellow-brown	None	Yes	
	17 Nov 21	10:08 am										Saltwater	Clear	Light yellow-brown	None	Yes	
	22 Nov 21	10:00 am										Saltwater	Clear	None	None	Yes	
	8 Dec 21	8:37 am										Saltwater	Clear	None	None		
	14 Dec 21	10:35 am										Saltwater	Clear		None	Yes	
	22 Dec 21	10:00 am	10:34 am		9.7	7.2	2.940	1.6				Saltwater	Clear	Light yellow	None		
	29 Dec 21	10:18 am	10:56 am		10.6	7.2	6,730	4				Saltwater	Clear	Yellow	None	Yes	
	12 Jan 22	9:45 am	10:55 am		13.3	6.9	17,500	11	150	10.7	8	Saltwater	Clear	Yellow	None		
DES7 [T] Home Ranch Lagoon at Estero Trail Bridge	26 Oct 21	9:39 am	10:40 am		15.6	6.4	17,800	10	50	9.6	3	Saltwater	Clear	Very light brown	None	Yes	
	3 Nov 21	9:24 am										Saltwater	Clear	Very light brown	None	Yes	
	9 Nov 21	9:00 am										Saltwater	Translucent	Light brown	None	Yes	
	17 Nov 21	8:57 am										Saltwater	Clear	None	None	Yes	
	22 Nov 21	9:00 am										Saltwater	Clear	None	None	Yes	
	8 Dec 21	9:10 am										Saltwater	Clear	None	None	Yes	
	14 Dec 21	9:30 am										Saltwater	Clear	Light yellow-brown	None	Yes	
	22 Dec 21	8:30 am	10:40 am		10.1	7.8	29,700	20				Saltwater	Clear	Very light yellow	None		
	29 Dec 21	8:40 am	11:23 am		11.0	7.0	5,320	3				Saltwater	Clear	Light yellow	None	Yes	Vegetation detritus observed in water.
	12 Jan 22	8:45 am	11:00 am		16.3	7.8	43,500	30	140	11.4	4	Saltwater	Clear	None	None	Yes	

Field Observations and Field Parameter Measurements

Kehoe, Abbotts, Drakes Estero, and Drakes Bay Watersheds
Point Reyes National Seashore
Marin County CA

Location	Date	Sample Time	Field Measure-ment Time	Estimated Flowrate (F) (cfs)	Water Temp (˚C)	pH	Specific Conductance (µS/cm)	Salinity (o/oo) (ppt)	Oxidation-Reduction Potential (mV)	Dissolved Oxygen (mg/L)	Turbidity (NTU)	Salinity Classification	Visual Turbidity	Visual Color	Odor of the Water (observed in the field)	Was Representative Monitoring Performed within a Well-Defined, Well-Mixed Channel?	Comments
DBY1 C-Ranch Unnamed Creek	14 Dec 21	10:45 am		0.7								Freshwater	Opaque	Yellow-brown	None	Yes	White foam on water surface. Sample contained dark brown sand-size particles (fecal matter and/or soil).
	15 Dec 21	8:35 am	9:00 am	0.5	9.6	7.7	1,610	0.9	230	10.2	31	Freshwater	Opaque	Yellow-brown	None	Yes	No foam.
	22 Dec 21	9:52 am	11:05 am	1	10.6	8.1	1,460	0.8				Freshwater	Translucent	Yellow	None	Yes	
	29 Dec 21	9:35 am	10:50 am	0.7	10.4	7.8	1,190	0.6				Freshwater	Translucent	Yellow	None	Yes	
	5 Jan 22	9:50 am	11:04 am	1	13.2	7.7	1,190					Freshwater	Translucent	Yellow	None	Yes	
	12 Jan 22	9:34 am	11:03 am	1	15.8	7.5	1,650	0.9	140	11.1	10	Freshwater	Clear	Light Yellow	None	Yes	
DBY2 B-Ranch Unnamed Creek	14 Dec 21	11:00 am		4								Freshwater	Clear	Yellow-brown	None	Yes	White foam on water surface.
	15 Dec 21	10:53 am	11:10 am	2	10.0	7.6	1,580	0.8	160	11.2	12	Freshwater	Translucent	Yellow-brown	None	Yes	White foam on water surface.
	22 Dec 21	9:45 am	10:44 am		10.8	7.5	1,800	0.9				Freshwater	Clear	Yellow-brown	None	Yes	
	29 Dec 21	10:10 am	11:20 am		10.4	7.2	1,170	0.6				Freshwater	Clear	Yellow-brown	Slight ammonia	Yes	White foam covered the entire water surface of the channel below the culvert discharge.
	5 Jan 22	9:15 am	10:31 am		12.8	7.2	1,820	0.9				Freshwater	Clear	Yellow-brown	None	Yes	
	12 Jan 22	9:22 am	11:09 am		14.3	7.2	1,910	1.0	160	10.3	8	Freshwater	Clear	Yellow-brown	None	Yes	
DBY3 A-Ranch Unnamed Creek	14 Dec 21	9:50 am		5								Freshwater	Clear	Very light brown	None	Yes	White foam on water surface.
	15 Dec 21	9:30 am	9:50 am	4	10.1	8.5	1,040	0.5	210	12.0	8	Freshwater	Clear	Very light yellow	None	Yes	No foam.
	22 Dec 21	8:50 am	10:55 am		11.1	8.4	1,210	0.6				Freshwater	Clear	Yellow-brown	None	Yes	White foam on water surface.
	29 Dec 21	8:45 am	10:53 am		11.4	8.1	1,010	0.5				Freshwater	Clear	Yellow	None	Yes	White foam on water surface.
	5 Jan 22	8:50 am	11:02 am		14.9	7.9	1,090	0.5				Freshwater	Clear	Yellow	None	Yes	
	12 Jan 22	8:37 am	11:06 am		15.1	7.9	1,080	0.5	150	11.6	8	Freshwater	Clear	Light yellow	None	Yes	

General Notes

(a) Monitoring was performed by and/or under the direction of Douglas Lovell (Berkeley CA). All samples were grab samples.

(b) In addition to surface water monitoring conducted October 2021-January 2022, monitoring was conducted in January 2021 (Lovell 2021). The January 2021 results are included herein.

(c) Field Measurement Time = time when field parameters were measured. Unless otherwise noted, field parameters were measured within 15 minutes of sample collection. Significant time between sample collection and field measurement resulted in (1) temperature measurements biased toward ambient air temperature and (2) slight change for pH and dissolved oxygen measurements.

(d) In this table, a blank cell for Flowrate, Water Temperature, pH, Specific Conductance, Salinity, Oxidation-Reduction Potential, Dissolved Oxygen, or Turbidity indicates the observation/measurement was not made.

(e) cfs = cubic feet per second. 0/00 = ppt = parts per thousand. NTU = Nephelometric Turbidity Unit.

(f) Visual turbidity, visual color, and visual particulates were observed in a ±120 mL clear plastic container (the container for bacteria analysis). Visual turbidity was classified as either clear, translucent, or opaque. Visual particulates were noted for sand-size and larger particulates.

(g) Estimated Flowrate = volumetric discharge of the entire water flow, rounded to one significant digit. The estimate is approximate, based on visual observations and rudimentary estimates of flow velocity and channel dimensions. The estimate is likely accurate within ±50%.

(h) Salinity Classification: Freshwater = "salinity is equal to or less than 1 part per thousand (ppth) 95 percent or more of the time during the CALENDAR YEAR." Saltwater = "salinity is greater than 1 ppth more than 5 percent of the time during the CALENDAR YEAR." (SWRCB 2019a).

(i) Quality Assurance/Quality Control review indicates the following accuracies: Temperature within ±0.1˚ C, pH within ±0.2, Specific Conductance within ±1%, Salinity within ±0.1 o/oo, Oxidation/Reduction Potential within ±10%, Dissolved Oxygen within ±0.4 mg/L, Turbidity within ±10%.

Footnotes

(1) Monitoring was performed in a marshy area with prevalent aquatic vegetation. A well-mixed, reasonably well-defined flow channel existed within the vegetation. Monitoring was performed in this channel.

(2) The sample was collected from relatively quiescent water and a well-mixed flow channel was not observed.

(3) Monitoring of quiescent water was performed within a lagoon with little to no observable flow. The monitored water was collected approximately 8 feet from shore at a depth of approximately 1 foot (below water surface). The total water depth at the monitoring location was approximately 6 feet.

(F) Monitoring was performed on the falling portion of the hydrograph – the flowrate was decreasing at the time of monitoring.

(H) The pH was analyzed in the laboratory beyond the accepted holding time.

(T) The monitoring location is tidally influenced.

Table 3 (page 1 of 5)

Laboratory Analytical Results for Fecal Indicator Bacteria

Kehoe, Abbotts, Drakes Estero, and Drakes Bay Watersheds
Point Reyes National Seashore
Marin County CA

Location	Date	Total Coliform (mpn/100 mL)	Fecal Coliform (mpn/100 mL)	*E. coli* (mpn/100 mL)	Enterococci (mpn/100 mL)	Comments
PAC1S South Kehoe Creek Downstream of I-Ranch and L-Ranch	27 Jan 21	54,000	22,000	17,000	12,000	
	28 Jan 21	22,000	14,000	11,000	14,000	
	25 Oct 21	11,000	2,100	1,700	1,600	
	3 Nov 21	9,200	700	460	200	
	9 Nov 21	28,000	3,900	2,000	2,000	
	17 Nov 21	9,200	460	230	260	
	22 Nov 21	3,500	460	230	130	
	8 Dec 21	9,200	140	68	220	
	14 Dec 21	5,400	700	330	920	
	22 Dec 21	16,000	700	210	210	
	29 Dec 21	1,600	46	33	60	
	5 Jan 22	9,200	320	170	56	
	12 Jan 22	3,500	170	93	14	
PAC1Z South Kehoe Creek Downstream of L-Ranch	29 Dec 21	3,500	1,100	790	2,000	
	5 Jan 22	5,400	170	45	130	
	12 Jan 22	14,000	680	200	120	
	19 Jan 22	160,000	1,400	400	870	
	26 Jan 22	9,200	700	460	130	
PAC2 North Kehoe Creek at Pierce Point Road	25 Oct 21	22,000	11,000	4,600	>2,419.6	
	3 Nov 21	7,000	4,600	1,400	470	
	9 Nov 21	160,000	11,000	7,900	20,000	
	17 Nov 21	14,000	2,100	920	280	
	22 Nov 21	9,200	700	460	180	
	8 Dec 21	2,800	320	170	140	
	14 Dec 21	22,000	11,000	4,600	3,300	
	22 Dec 21	11,000	4,600	3,300	1,300	Collected by a different person at a different time
	22 Dec 21	14,000	3,300	2,700	1,500	Collected by a different person at a different time
	29 Dec 21	2,200	940	460	650	
	5 Jan 22	5,400	470	330	98	
	12 Jan 22	4,300	700	460	67	

Table 3 (page 2 of 5)

Laboratory Analytical Results for Fecal Indicator Bacteria

Kehoe, Abbotts, Drakes Estero, and Drakes Bay Watersheds
Point Reyes National Seashore
Marin County CA

Location	Date	Total Coliform (mpn/100 mL)	Fecal Coliform (mpn/100 mL)	*E. coli* (mpn/100 mL)	Enterococci (mpn/100 mL)	Comments
PAC3	28 Jan 21	17,000	11,000	9,400	17,000	
Kehoe Lagoon	26 Oct 21	160,000	35,000	17,000	1,200	
	3 Nov 21	3,500	940	700	1,600	
	9 Nov 21	17,000	3,200	1,700	2,600	
	17 Nov 21	11,000	1,400	920	600	
	22 Nov 21	5,400	1,700	700	1,100	
	8 Dec 21	3,500	700	490	1,200	
	14 Dec 21	17,000	4,600	3,300	3,700	
	22 Dec 21	9,200	700	490	930	
	29 Dec 21	1,500	400	120	390	Collected by the same person at a different time
	29 Dec 21	1,600	280	170	430	Collected by the same person at a different time
	5 Jan 22	3,500	700	220	1,200	
	12 Jan 22	2,200	330	140	250	
	19 Jan 22	4,300	330	220	170	
	26 Jan 22	2,200	470	210	150	
ABB1	25 Oct 21	9,200	390	210	1,100	
Abbotts Creek at Pierce Point Road	14 Dec 21	5,400	700	490	370	
	22 Dec 21	1,600	110	70	230	
	5 Jan 22	540	110	79	28	
ABB2/3	27 Jan 21	35,000	17,000	13,000	8,700	
North Abbotts Creek Downstream of I-Ranch	28 Jan 21	17,000	7,000	920	11,000	
	25 Oct 21	16,000	1,400	700	3,900	
	3 Nov 21	3,500	470	170	10	
	9 Nov 21	92,000	3,900	2,100	2,200	
	17 Nov 21	14,000	680	200	200	
	22 Nov 21	1,700	400	260	170	
	8 Dec 21	4,300	260	130	340	
	14 Dec 21	11,000	1,400	450	820	
	22 Dec 21	22,000	1,100	200	280	
	29 Dec 21	5,400	260	170	200	
	5 Jan 22	9,200	320	68	58	
	12 Jan 22	9,200	170	93	120	

Table 3 (page 3 of 5)

Laboratory Analytical Results for Fecal Indicator Bacteria

Kehoe, Abbotts, Drakes Estero, and Drakes Bay Watersheds
Point Reyes National Seashore
Marin County CA

Location	Date	Total Coliform (mpn/100 mL)	Fecal Coliform (mpn/100 mL)	*E. coli* (mpn/100 mL)	Enterococci (mpn/100 mL)	Comments
ABB4 Outflow from Middle Abbotts Lagoon	26 Oct 21	920	140	94	390	
	3 Nov 21	1,600	40	33	<10	
	9 Nov 21	3,500	460	170	52	
	17 Nov 21	2,200	240	140	<10	
	22 Nov 21	1,400	200	68	20	
	8 Dec 21	2,200	170	40	31	
	14 Dec 21	2,200	260	140	120	
	22 Dec 21	1,600	94	70	27	
	29 Dec 21	540	94	70	32	
	5 Jan 22	1,400	40	20	39	
	12 Jan 22	540	32	21	15	
	19 Jan 22	540	20	12	2.0	
	26 Jan 22	920	70	46	5.2	
ABB5 Outflow from Upper Abbotts Lagoon	26 Oct 21	540	46	33	200	
	3 Nov 21	5,400	260	110	75	
	9 Nov 21	5,400	110	68	63	
	17 Nov 21	11,000	400	200	10	
	22 Nov 21	2,200	140	40	7.4	
	8 Dec 21	5,400	110	45	11	
	14 Dec 21	5,400	700	460	650	
	22 Dec 21	3,500	92	68	36	
	29 Dec 21	540	130	79	57	
	5 Jan 22	3,500	140	40	21	
	12 Jan 22	9,200	110	20	6.3	
DES2 East Schooner Creek at Sir Francis Drake Blvd	28 Jan 21	1,600	920	540	550	

Table 3 (page 4 of 5)

Laboratory Analytical Results for Fecal Indicator Bacteria

Kehoe, Abbotts, Drakes Estero, and Drakes Bay Watersheds
Point Reyes National Seashore
Marin County CA

Location	Date	Total Coliform (mpn/100 mL)	Fecal Coliform (mpn/100 mL)	*E. coli* (mpn/100 mL)	Enterococci (mpn/100 mL)	Comments
DES3 Home Ranch Creek Downstream of Ranch Buildings	26 Oct 21	540	110	79	320	
	3 Nov 21	1,400	200	140	110	
	9 Nov 21	22,000	1,400	680	390	
	17 Nov 21	1,600	110	70	120	
	22 Nov 21	2,800	140	78	82	
	8 Dec 21	2,800	260	170	35	
	14 Dec 21	2,800	490	230	610	
	22 Dec 21	2,200	260	210	220	
	12 Jan 22	1,600	170	79	45	
DES6B Schooner Creek at Sir Francis Drake Blvd	28 Jan 21	5,400 (H)	1,700 (H)	1,100 (H)	1,400 (H)	
	25 Oct 21	11,000	4,600	3,300	2,000	
	3 Nov 21	3,500	170	140	52	
	9 Nov 21	22,000	9,400	3,300	2,000	
	17 Nov 21	3,500	170	120	63	
	22 Nov 21	1,700	110	20	37	
	8 Dec 21	5,400	210	92	88	
	14 Dec 21	4,300	940	330	980	
	22 Dec 21	5,400	200	140	86	
	29 Dec 21	2,800	1,100	790	73	
	12 Jan 22	1,700	45	20	11	
DES7 Home Ranch Lagoon at Estero Trail Bridge	26 Oct 21	350	94	70	150	
	3 Nov 21	540	46	33	<10	
	9 Nov 21	28,000	2,100	1,700	1,400	
	17 Nov 21	540	220	110	<10	
	22 Nov 21	920	46	21	31	
	8 Dec 21	540	46	26	56	
	14 Dec 21	7,000	920	680	730	
	22 Dec 21	920	70	46	86	
	29 Dec 21	920	170	130	52	
	12 Jan 22	920	70	26	38	

Table 3 (page 5 of 5)

Laboratory Analytical Results for Fecal Indicator Bacteria

Kehoe, Abbotts, Drakes Estero, and Drakes Bay Watersheds
Point Reyes National Seashore
Marin County CA

Location	Date	Total Coliform (mpn/100 mL)	Fecal Coliform (mpn/100 mL)	*E. coli* (mpn/100 mL)	Enterococci (mpn/100 mL)	Comments
DBY1 C-Ranch Unnamed Creek	14 Dec 21	17,000 (b1)	3,300 (b1)	2,300 (b1)	1,300 (b1)	
	22 Dec 21	14,000	2,100	1,300	1,200	
	29 Dec 21	4,300	1,400	940	490	
	5 Jan 22	4,300	330	210	290	
	12 Jan 22	3,500	260	140	180	
DBY2 B-Ranch Unnamed Creek	14 Dec 21	21,000	9,400	7,000	4,400	
	22 Dec 21	12,000	2,000	1,400	1,700	
	29 Dec 21	9,200	2,200	1,400	470	
	5 Jan 22	1,100	260	170	250	
	12 Jan 22	9,200	390	270	230	
DBY3 A-Ranch Unnamed Creek	14 Dec 21	22,000	11,000	7,900	3,100	
	22 Dec 21	11,000	2,600	1,700	1,400	
	29 Dec 21	9,200	2,800	1,700	2,400	
	5 Jan 22	9,200	320	170	1,100	
	12 Jan 22	9,200	940	460	100	

General Notes

(a) Monitoring was performed by and/or under the direction of Douglas Lovell (Berkeley CA). All samples were grab samples. Samples were analyzed by McCampbell Analytical (Pittsburg CA).

(b) In addition to surface water monitoring conducted October 2021-January 2022, monitoring was conducted in January 2021 (Lovell 2021). The January 2021 results are included herein.

(c) ">" denotes measurement above the laboratory reporting limit.

(d) "<" denotes measurement below the laboratory reporting limit.

(e) mpn = most probable number. cfu = colony forming units. Common practice treats these as equivalent units although they are not equivalent under certain conditions.

Footnotes

(b1) The laboratory reported that the sample contained greater than 1% sediment by volume.

(H) The laboratory reported that the sample was prepared/analyzed beyond the accepted holding time. However, the reported concentrations are believed accurate.

Laboratory Analytical Results for Total Suspended Solids, Nitrogen, and Phosphorus

Kehoe, Abbotts, Drakes Estero, and Drakes Bay Watersheds
Point Reyes National Seashore
Marin County CA

Location	Date	Total Suspended Solids (mg/L)	Ammonia as Nitrogen (mg N/L)	Un-ionized Ammonia as Nitrogen [C] (mg N/L)	Nitrate as Nitrogen (mg N/L)	Nitrite as Nitrogen (mg N/L)	Nitrate + Nitrite as Nitrogen [C] (mg N/L)	Total Kjeldahl Nitrogen (mg N/L)	Dissolved Nitrogen (lab filtered) (mg N/L)	Total Nitrogen (mg N/L)	Orthophosphate (PO_4) as Phosphorus (mg P/L)	Dissolved Phosphorus (lab filtered) (mg P/L)	Total Phosphorus (mg P/L)	Comments
PAC1S South Kehoe Creek Downstream of I-Ranch and L-Ranch	27 Jan 21		0.18	<0.001	4.1	<0.10	4.1	3.1		7.1 [C]	0.48		0.83	
	28 Jan 21		0.14	0.001	3.3	<0.10	3.3	2.4		5.7 [C]	0.20		0.37	
	25 Oct 21	18.4	<0.20	<0.001	4.0 [H]	<0.10 [H]	4.0 [H]	1.3	4.2	4.8	0.51 [H]	0.52	0.58	
	14 Dec 21	12.0	0.63 [B]	0.001	3.7	0.11	3.8	3.9	4.6	4.6	0.52	0.77	0.71	
PAC1Z South Kehoe Creek Downstream of L-Ranch	29 Dec 21	4.80	2.0	0.032	5.4	0.17	5.57	7.4	7.4	7.7	0.43	0.57	0.64	
	12 Jan 22									4.8				
PAC2 North Kehoe Creek at Pierce Point Road	25 Oct 21	16.0	0.75	0.002	7.7 [H]	0.28 [H]	8.0 [H]	6.9	8.5	9.5	1.4 [H]	1.5	1.6	
	9 Nov 21		6.4	0.045										A manure odor and high turbidity were observed; a sample was collected for ammonia analysis.
	14 Dec 21	6.0	0.39 [B]	0.002	3.3	<0.10	3.3	3.0	4.0	3.8	<0.10	0.18	0.85	
	22 Dec 21		0.29	0.004				1.9		4.2			0.46	
PAC3 Kehoe Lagoon	28 Jan 21		0.14	0.001	2.5	<0.10	2.5	3.0		5.5 [C]	0.59		0.87	
	26 Oct 21		<0.10	<0.001						3.6			0.60	
	12 Jan 22									1.6			0.13	
ABB1 Abbotts Creek at Pierce Point Road	25 Oct 21		<0.20	<0.001	1.8 [H]	<0.10 [H]	1.8 [H]	0.6		2.3	<0.1 [H]		0.11	
	22 Jan 22									<0.70			<0.50	
ABB2/3 North Abbotts Creek Downstream of I-Ranch	27 Jan 21		0.24	<0.001	5.2	<0.10	5.2	3.4		8.6 [C]	0.51		0.83	
	28 Jan 21		0.18	0.002	3.9	<0.10	3.9	2.9		6.8 [C]	0.45		0.70	
	25 Oct 21	11.2	<0.20	<0.001	4.0 [H]	<0.10 [H]	4.0 [H]	3.3	4.8	5.4	0.96 [H]	0.97	1.0	
	14 Dec 21	18.0	0.42 [B]	0.003	3.1	<0.10	3.1	4.2	4.1	4.0	0.60	0.77	0.80	
	12 Jan 22									4.8			0.45	
ABB4 Outflow from Middle Abbotts Lagoon	26 Oct 21		<0.10	<0.001						1.2			0.66	
	12 Jan 22									<0.70			0.26	
ABB5 Outflow from Upper Abbotts Lagoon	26 Oct 21		<0.10	<0.001						2.3			0.59	
	12 Jan 22									0.94			0.18	

Laboratory Analytical Results for Total Suspended Solids, Nitrogen, and Phosphorus

Kehoe, Abbotts, Drakes Estero, and Drakes Bay Watersheds
Point Reyes National Seashore
Marin County CA

Location	Date	Total Suspended Solids (mg/L)	Ammonia as Nitrogen (mg N/L)	Un-ionized Ammonia as Nitrogen (C) (mg N/L)	Nitrate as Nitrogen (mg N/L)	Nitrite as Nitrogen (mg N/L)	Nitrate + Nitrite as Nitrogen (C) (mg N/L)	Total Kjeldahl Nitrogen (mg N/L)	Dissolved Nitrogen (lab filtered) (mg N/L)	Total Nitrogen (mg N/L)	Orthophosphate (PO_4) as Phosphorus (mg P/L)	Dissolved Phosphorus (lab filtered) (mg P/L)	Total Phosphorus (mg P/L)	Comments
DES2 East Schooner Creek at Sir Francis Drake Blvd	28 Jan 21		0.12	0.002	1.9	<0.10	1.9	0.76		2.6 (C)	<0.10		0.14	
DES3 Home Ranch Creek Downstream of Ranch Buildings	26 Oct 21		<0.10	<0.001	1.4	<0.10	1.4	<0.40		1.7	<0.1		0.054	
DES6B Schooner Creek at Sir Francis Drake Blvd	28 Jan 21		<0.10	<0.001	<2.0 (2)	<2.0 (2)	<2.0	0.90		<2.8 (C)	<2.0 (2)		0.20	
	25 Oct 21	10.6	<0.20	<0.001	3.8 (H)	<0.10 (H)	3.8 (H)	1.2	3.6	4.1	0.13 (H)	0.19	0.20	
DES7 Home Ranch Lagoon at Estero Trail Bridge	26 Oct 21		<0.10	<0.001						1.7			0.11	
DBY1 C-Ranch Unnamed Creek	15 Dec 21	50.0	0.24	0.003	4.9	<0.20	4.9	9.1	6.2	6.0	0.68	0.98	1.0	
DBY2 B-Ranch Unnamed Creek	15 Dec 21	9.33	0.63	0.006	2.5	<0.20	2.5	6.1	5.5	5.4	0.53	0.75	0.82	
DBY3 A-Ranch Unnamed Creek	15 Dec 21	<2.50	0.35	0.024	9.3	<0.20	9.3	5.3	9.2	9.0	0.51	0.64	0.89	

General Notes

(a) Monitoring was performed by and/or under the direction of Douglas Lovell (Berkeley CA). All samples were grab samples. Samples were analyzed by McCampbell Analytical (Pittsburg CA).

(b) In addition to surface water monitoring conducted October 2021-January 2022, monitoring was conducted in January 2021 (Lovell 2021). The January 2021 results are included herein.

(c) "<" indicates the result was below the cited laboratory reporting limit.

(d) Un-ionized ammonia was calculated using the Florida Department of Environmental Protection spreadsheet. https://floridadep.gov/waste/district-business-support/documents/un-ionized-ammonia-calculator

Footnotes

(2) For Nitrate, Nitrite, and Orthophosphate analyses, the reporting limit was raised (the sample was diluted) due to the physical nature (salinity) of the sample; consequently, the surrogate recovery was outside accepted limits.

(B) According to the laboratory QA/QC report, this analyte was detected in the associated method blank at a concentration greater than 10% of the reported sample result.

(C) Calculated concentration.

(H) The laboratory reported that the sample was prepared/analyzed beyond the accepted holding time; however, the reported concentrations are believed accurate.

Surface Water Bacteria Objectives for Protection of Human Health

Kehoe, Abbotts, Drakes Estero, and Drakes Bay Watersheds
Point Reyes National Seashore
Marin County CA

Water Contact Recreation (REC-1) Beneficial Use in Freshwater (Applicable to Monitoring Locations PAC3, ABB5, DES3)

Citation	Applicability	Geometric Mean *E. coli* (cfu/100 mL)	Statistical Threshold Value (STV) *E. coli* (logarithmic transformed) (cfu/100 mL)	Geometric Mean Enterococci (cfu/100 mL)	Statistical Threshold Value (STV) Enterococci (logarithmic transformed) (cfu/100 mL)	Sampling Requirements	Calculation Interval	Comments
SFBRWQCB Basin Plan. Table 3-1	"Water quality objectives for bacteria in Table 3-1 shall be strictly applied except when otherwise provided for in a TMDL" The objectives are identical to the State Water Resources Control Board's objectives for Inland Surface Waters, Enclosed Bays, and Estuaries (see below).	100	320			"Based on a minimum of five consecutive samples equally spaced over a 30-day period."	42 days for Geometric Mean. 30 days for STV.	
SWRCB Inland Surface Waters. Table 1	"The bacteria water quality objective for all waters where the salinity is equal to or less than 1 part per thousand (ppth) 95 percent or more of the time during the CALENDAR YEAR is: a six-week rolling GEOMETRIC MEAN of *Escherichia coli* (*E. coli*) not to exceed 100 colony forming units (cfu) per 100 milliliters (mL), calculated weekly, and a STATISTICAL THRESHOLD VALUE (STV) of 320 cfu/100 mL not to be exceeded by more than 10 percent of the samples collected in a CALENDAR MONTH, calculated in a static manner." (1)	100	320			At least 5 consecutive samples over 42 days for the Geometric Mean. Not specified for the STV.	42 days for Geometric Mean. 30 days for STV.	The objectives correspond to an estimated gastrointestinal illness rate of 32 per 1,000 water contact recreators.
USEPA RWQC. Table 1	"The term 'criteria,' as used in §303(c)(2), refers to elements of state water quality standards (WQS), expressed as constituent concentrations, levels, or narrative statements, representing a quality of water that supports a particular use. When criteria are met, water quality will generally protect the designated use." "EPA recommends using the fecal indicator bacteria (FIB) enterococci and Escherichia coli (E. coli) as indicators of fecal contamination for fresh water and enterococci for marine water." "The sample sizes in the epidemiological data were not large enough to evaluate potential differences for persons over 55 years of age, pregnant women, or other vulnerable individuals. EPA's 2012 RWQC recommendations are based on the general population, which includes children."	100	320	30	110	At least weekly sampling over 30 days.	30 days	The objectives correspond to an estimated gastrointestinal illness rate of 32 per 1,000 water contact recreators.

Water Contact Recreation (REC-1) Beneficial Use in Saltwater (Applicable to Monitoring Locations ABB4, DES6B, DES7)

Citation	Applicability	Geometric Mean Enterococci (cfu/100 mL)	Statistical Threshold Value (STV) Enterococci (logarithmic transformed) (cfu/100 mL)	Sampling Requirements	Calculation Interval	Comments
SFBRWQCB Basin Plan. Table 3-1	"Water quality objectives for bacteria in Table 3-1 shall be strictly applied except when otherwise provided for in a TMDL" The objectives are identical to the State Water Resources Control Board's objectives for Inland Surface Waters, Enclosed Bays, and Estuaries (see below).	30	110	"Based on a minimum of five consecutive samples equally spaced over a 30-day period."	42 days for Geometric Mean. 30 days for STV.	
SWRCB Inland Surface Waters. Table 1	"The bacteria water quality objective for all waters where the salinity is greater than 1 ppth more than 5 percent of the time during the CALENDAR YEAR is: a six-week rolling GEOMETRIC MEAN of enterococci not to exceed 30 cfu/100 mL, calculated weekly, with a STV of 110 cfu/100 mL not to be exceeded by more than 10 percent of the samples collected in a CALENDAR MONTH, calculated in a static manner." (1)	30	110	At least 5 consecutive samples over 42 days for the Geometric Mean. Not specified for the STV.	42 days for Geometric Mean. 30 days for STV.	The objectives correspond to an estimated gastrointestinal illness rate of 32 per 1,000 water contact recreators.
USEPA RWQC. Table 1	"The term 'criteria,' as used in §303(c)(2), refers to elements of state water quality standards (WQS), expressed as constituent concentrations, levels, or narrative statements, representing a quality of water that supports a particular use. When criteria are met, water quality will generally protect the designated use." "EPA recommends using the fecal indicator bacteria (FIB) enterococci and Escherichia coli (E. coli) as indicators of fecal contamination for fresh water and enterococci for marine water."	30	110	At least weekly sampling over 30 days.	30 days	The objectives correspond to an estimated gastrointestinal illness rate of 32 per 1,000 water contact recreators.

Surface Water Bacteria Objectives for Protection of Human Health

Kehoe, Abbotts, Drakes Estero, and Drakes Bay Watersheds
Point Reyes National Seashore
Marin County CA

Shellfish Harvesting (SHELL) Beneficial Use in Either Freshwater or Saltwater (Applicable to Monitoring Locations DES6B, DES7)

Citation	Applicability	Median Total Coliform (mpn/100 mL)	Statistical Threshold Value (STV) Total Coliform (not logarithmic transformed) (mpn/100 mL)	Median Fecal Coliform (mpn/100 mL)	Statistical Threshold Value (STV) Fecal Coliform (not logarithmic transformed) (mpn/100 mL)	Sampling Requirements	Calculation Interval	Comments
SFBRWQCB Basin Plan. Table 3-1	"Water quality objectives for bacteria in Table 3-1 shall be strictly applied except when otherwise provided for in a TMDL"	70	230	14	43	"Based on a minimum of five consecutive samples equally spaced over a 30-day period."	30 days	The Total Coliform objectives are identical to the State Water Quality Control Board's Water Quality Control Plan for Ocean Waters of California (SWRCB 2019b). The State Water Quality Control Board's Water Quality Control Plan for Ocean Waters of California does not have objectives for Fecal Coliform.

Non-Contact Water Recreation (REC-2) Beneficial Use in Either Freshwater or Saltwater (Applicable to Monitoring Locations PAC1S, PAC1Z, PAC2, ABB1, ABB2/3, DBY1, DBY2, DBY3 – the locations where REC-1 and/or SHELL do not apply)

Citation	Applicability	Mean Fecal Coliform (mpn/100 mL)	Statistical Threshold Value (STV) Fecal Coliform (not logarithmic transformed) (mpn/100 mL)	Sampling Requirements	Calculation Interval	Comments
SFBRWQCB Basin Plan. Table 3-1	"Water quality objectives for bacteria in Table 3-1 shall be strictly applied except when otherwise provided for in a TMDL"	2,000	4,000	"Based on a minimum of five consecutive samples equally spaced over a 30-day period."	30 days	REC-1 and SHELL objectives are more stringent than REC-2 objectives. REC-2 objectives have been compared to measured Fecal Indicator Bacteria concentrations at locations where REC-1 and/or SHELL objectives do not apply.

General Notes

(a) Objectives in this table include Water Quality Objectives, Water Quality Criteria, and Water Quality Standards as cited in the referenced documents.

(b) SFBRWQCB Basin Plan = *San Francisco Bay Basin (Region 2), Water Quality Control Plan (Basin Plan)* (SFBRWQCB 2022).

(c) SWRCB Inland Surface Waters = *Part 3 of the Water Quality Control Plan for Inland Surface Waters, Enclosed Bays, and Estuaries of California - Bacteria Provisions and a Water Quality Standards Variance Policy* (SWRCB 2019a).

(d) USEPA RWQC = *Recreational Water Quality Criteria* (US Environmental Protection Agency 2012).

(e) Statistical Threshold Value (STV) = Upper 90th Percentile Value. For *E. coli* and Enterococci bacteria, calculations used logarithmic transformations. For Total Coliform and Fecal Coliform bacteria, no logarithmic transformation was performed.

(f) mpn = most probable number. cfu = colony forming units. Common practice treats these as equivalent units although they are not equivalent under certain conditions.

(g) TMDL = Total Maximum Daily Load. During the October 2021-January 2022 monitoring, TMDL regulations were not applicable to the Kehoe, Abbotts, Drakes Estero, and Drakes Bay watersheds.

(h) Mean = arithmetic mean. Logarithmic transformed = the statistical parameter was calculated using logarithmically transformed values.

(i) Salinity classified according to the State Water Resources Control Board (SWRCB 2019a): Freshwater = "salinity is equal to or less than 1 part per thousand (ppth) 95 percent or more of the time during the CALENDAR YEAR." Saltwater = "salinity is greater than 1 ppth more than 5 percent of the time during the CALENDAR YEAR."

(j) REC-1 = Water Contact Recreation "Uses of water for recreational activities involving body contact with water, where ingestion of water is reasonably possible. These uses include, but are not limited to, swimming, wading, water-skiing, skin and scuba diving, surfing, white water activities, fishing or use of natural hot springs."

REC-2 = Non-Contact Water Recreation "Uses of water for recreational activities involving proximity to water, but not normally involving body contact with water, where ingestion of water is reasonably possible. These uses include, but are not limited to, picnicking, sunbathing, hiking, beachcombing, camping, boating, tidepool and marine life study, hunting, sightseeing, or aesthetic enjoyment in conjunction with the above activities."

SHELL = Shellfish Harvesting "Uses of water that support habitats suitable for the collection of filter-feeding shellfish (e.g., clams, oysters and mussels) for human consumption, commercial or sport purposes."

Table 6 (page 1 of 2)

Summary of Exceedances of Surface Water Bacteria Objectives

Kehoe, Abbotts, Drakes Estero, and Drakes Bay Watersheds
Point Reyes National Seashore
Marin County CA

Water Contact Recreation (REC-1) Beneficial Use

Watershed	Location ID	Location Description	Monitoring Period	Exceedances for 42-day Geometric Mean	Exceedances for 30-day Statistical Threshold Value (STV)	Comments
Kehoe	PAC3	Kehoe Lagoon	26 Oct 21 to 26 Jan 22 (61 Days)	• ***E. coli* was 3.2 to 14 times the objective.** • **The objective was exceeded during all calculation intervals.**	• ***E. coli* was 1.1 to 21 times the objective.** • **The objective was exceeded during all calculation intervals except 29 Dec 21 to 26 Jan 22.**	The Kehoe Beach/Kehoe Lagoon area receives frequent visitors who wade in Kehoe Lagoon and the outlet stream from Kehoe Lagoon. There are no postings at/near PAC3 warning the public of the health risks of water contact recreation. Visitors to the Kehoe Beach/Kehoe Lagoon area have likely contracted gastrointestinal illness from exposure to cattle manure. (1)
Abbotts	ABB4	Outflow from Middle Abbots Lagoon	26 Oct 21 to 26 Jan 22 (61 days)	• None	• **Enterococci was 1.6 times the objective during the calculation interval 26 Oct 21 to 22 Nov 21.** • The remaining calculation intervals did not exceed the objective.	ABB4 is located at the footbridge along the Abbotts Lagoon Trail. The Abbotts Lagoon Trail receives frequent visitors.
Drakes Estero	DES3*	Home Ranch Creek Downstream of Ranch Buildings	26 Oct 21 to 12 Jan 22 (47 days)	• ***E. coli* was 1.2 to 1.8 times the objective.** • **The objective was exceeded during all calculation intervals.**	• ***E. coli* was 1.1 to 1.4 times the objective.** • **The objective was exceeded during the three calculation intervals from 26 Oct 21 to 14 Dec 21.** • The remaining calculation intervals did not exceed the objective.	
Drakes Estero	DES6B*	Schooner Creek at Sir Francis Drake Blvd	25 Oct 21 to 12 Jan 22 (48 days)	• **Enterococci was 2.6 to 6.2 times the objective.** • **The objective was exceeded during all calculation intervals.**	• **Enterococci was 3.4 to 18 times the objective.** • **The objective was exceeded during all calculation intervals.**	DES6B is located at a parking area and wildlife display. There are no postings at/near DES6B warning the public of the health risks of water contact recreation.
	DES7*	Home Ranch Lagoon at Estero Trail Bridge	26 Oct 21 to 12 Jan 22 (47 days)	• **Enterococci was 1.5 to 3.2 times the objective.** • **The objective was exceeded during all calculation intervals.**	• **Enterococci was 2.8 to 10 times the objective.** • **The objective was exceeded during all calculation intervals.**	DES7 is located at the footbridge along the Estero Trail. The Estero Trail receives frequent visitors. DES7 is on the boundary of the Phillip Burton Wilderness. There are no postings at/near DES7 warning the public of the health risks of water contact recreation.

Shellfish Harvesting (SHELL) Beneficial Use

Watershed	Location ID	Location Description	Monitoring Period	Exceedances for Median	Exceedances for 30-day Statistical Threshold Value (STV)	Comments
Drakes Estero	DES6B*	Schooner Creek at Sir Francis Drake Blvd	25 Oct 21 to 12 Jan 22 (48 days)	• **Total Coliform was 50 to 61 times the objective.** • **Fecal Coliform was 12 to 15 times the objective.** • **Both objectives were exceeded during all calculation intervals.**	• **Total Coliform was 23 to 77 times the objective.** • **Fecal Coliform was 15 to 174 times the objective.** • **Both objectives were exceeded during all calculation intervals.**	DES6B is located at a parking area and wildlife display. There are no postings at/near DES6B warning the public of the health risks of shellfish harvesting.
	DES7*	Home Ranch Lagoon at Estero Trail Bridge	26 Oct 21 to 12 Jan 22 (47 days)	• **Total Coliform was 8 to 13 times the objective.** • **Fecal Coliform was 5.0 to 6.7 times the objective.** • **Both objectives were exceeded during all calculation intervals.**	• **Total Coliform was 20 to 75 times the objective.** • **Fecal Coliform was 14 to 31 times the objective.** • **Both objectives were exceeded during all calculation intervals.**	DES7 is located at the footbridge along the Estero Trail. The Estero Trail receives frequent visitors. DES7 is located on the boundary of the Phillip Burton Wilderness. There are no postings at/near DES7 warning the public of the health risks of shellfish harvesting.

Table 6 (page 2 of 2)

Summary of Exceedances of Surface Water Bacteria Objectives

Kehoe, Abbotts, Drakes Estero, and Drakes Bay Watersheds
Point Reyes National Seashore
Marin County CA

Non-Contact Water Recreation (REC-2) Beneficial Use

Watershed	Location ID	Location	Monitoring Period	Exceedances for Arithmetic Mean	Exceedances for 30-day Statistical Threshold Value (STV)	Comments
Kehoe	PAC2	North Kehoe Creek at Pierce Point Road	25 Oct 21 to 12 Jan 22 (48 days)	• **Fecal Coliform was 1.7 to 2.9 times the objective.** • **The objective was exceeded during all calculation intervals.**	• **Fecal Coliform was 2.0 to 2.8 times the objective.** • **The objective was exceeded during all calculation intervals.**	PAC2 is located at the parking area for Kehoe Beach/Kehoe Lagoon. The area receives frequent visitors. There are no postings at/near PAC2 warning the public of the health risks of non-contact water recreation. Based on the exceedances at PAC2, it is likely that North Kehoe Creek, from PAC2 upstream to the J-Ranch milking complex, also exceeded objectives for Non-Contact Water Recreation.
Drakes Bay	DBY2	B-Ranch Unnamed Creek	14 Dec 21 to 12 Jan 22 (29 days)	• **Fecal Coliform was 1.4 times the objective.** • **The objective was exceeded during the single calculation interval.**	• **Fecal Coliform was 1.6 times the objective.** • **The objective was exceeded during the single calculation interval.**	
	DBY3	A-Ranch Unnamed Creek	14 Dec 21 to 12 Jan 22 (29 days)	• **Fecal Coliform was 1.8 times the objective.** • **The objective was exceeded during the single calculation interval.**	• **Fecal Coliform was 1.9 times the objective.** • **The objective was exceeded during the single calculation interval.**	

General Notes

(a) Exceedances based on comparison to the surface water quality objectives promulgated by the San Francisco Bay Regional Water Quality Control Board (SFBRWQCB 2022).

(b) * = in addition to cattle manure, this monitoring location was potentially influenced by other manure sources (elk, chickens, etc.).

(c) Statistical Threshold Value (STV) = Upper 90th Percentile Value. For *E. coli* and Enterococci bacteria, the calculation used logarithmic transformation. For Total Coliform and Fecal Coliform bacteria, no logarithmic transformation was performed.

(c) For the October 2021-January 2022 monitoring, location ABB5 did not exhibit exceedances of REC-1 objectives. For the October 2021-January 2022 monitoring, locations PAC1S, PAC1Z, ABB1, ABB2/3, and DBY1 did not exhibit exceedances of REC-2 objectives.

(e) REC-1 = Water Contact Recreation - Uses of water for recreational activities involving body contact with water, where ingestion of water is reasonably possible. These uses include, but are not limited to, swimming, wading, water-skiing, skin and scuba diving, surfing, white water activities, fishing or use of natural hot springs.

REC-2 = Non-Contact Water Recreation - Uses of water for recreational activities involving proximity to water, but not normally involving body contact with water, where ingestion of water is reasonably possible. These uses include, but are not limited to, picnicking, sunbathing, hiking, beachcombing, camping, boating, tidepool and marine life study, hunting, sightseeing, or aesthetic enjoyment in conjunction with the above activities.

SHELL = Shellfish Harvesting - Uses of water that support habitats suitable for the collection of filter-feeding shellfish (e.g., clams, oysters and mussels) for human consumption, commercial or sport purposes.

Footnote

(1) The water quality objectives for REC-1 are based on a gastrointestinal illness rate of 32 per 1,000 primary contact recreators. The calculated bacteria statistics significantly exceeded the objectives. There is uncertainty regarding (1) the dose-response relationship for gastrointestinal illness, (2) frequency of water contact recreation, and (3) the degree of water contact/incidental water ingestion; however, gastrointestinal illness has likely occurred.

Monitoring Location (October 2021-January 2022)

Historical monitoring location

Actively Milking Dairy Ranch

Dairy Ranch Not Actively Milking (I-Ranch)

Beef Ranch

* In addition to cattle manure, this monitoring location was potentially influenced by other manure sources (elk, chickens, etc.)

I-Ranch historically operated as an actively milking dairy. Circa July 2021, prior to the October 2021-January 2022 monitoring, I-Ranch liquidated the milking herd. A herd of approximately 165 cattle was maintained during the October 2021-January 2022 monitoring.

0 5,000 10,000

Approximate Scale - Feet

0 1 2

Approximate Scale - Miles

Refer to the report appendix for notes and explanations regarding this figure

J-Ranch

Kehoe Watershed

North Kehoe Creek

PAC2 North Kehoe Creek at Pierce Point Road

PAC3 Kehoe Lagoon

I-Ranch

PAC1S South Kehoe Creek Downstream of I-Ranch and L-Ranch

South Kehoe Creek

L-Ranch

North Abbotts Creek

ABB2/3 North Abbotts Creek Downstream of I-Ranch

PAC1Z South Kehoe Creek Downstream of L-Ranch

ABB5 Outflow from Upper Abbotts Lagoon

ABB1 Abbotts Creek at Pierce Point Road

ABB4 Outflow from Middle Abbotts Lagoon

Abbotts Creek

Upper Abbotts Lagoon

Middle Abbotts Lagoon

Abbotts Watershed

North Schooner Creek

Lower Abbotts Lagoon

East Schooner Creek

RCA Meterological Station

DES2 East Schooner Creek at Sir Frances Drake Blvd

DES6B* Schooner Creek at Sir Francis Drake Blvd

Home Ranch Creek

Schooner Bay

DES7* Home Ranch Lagoon at Estero Trail Bridge

DES3* Home Ranch Creek Downstream of Ranch Buildings

Drakes Estero Watershed

Home Ranch Lagoon

Drakes Estero

Home Bay

C-Ranch

DBY1* C-Ranch Unnamed Creek

Estero de Limantour Watershed

Drakes Bay Watershed

B-Ranch

Except for the northern ±1/2 mile of Schooner Bay, the waters of Drakes Estero (including Home Bay) are part of the Phillip Burton Wilderness

Drakes Bay

DBY2 B-Ranch Unnamed Creek

A-Ranch

DBY3 A-Ranch Unnamed Creek

POINT REYES NATIONAL SEASHORE

POINT REYES NATIONAL SEASHORE

Figure 1

Monitoring Locations (Orthophoto Basemap)

Kehoe, Abbotts, Drakes Estero, and Drakes Bay Watersheds Point Reyes National Seashore Marin County CA

Monitoring Location (October 2021-January 2022)

Historical monitoring location

Actively Milking Dairy Ranch

Dairy Ranch Not Actively Milking (I-Ranch)

Beef Ranch

* In addition to cattle manure, this monitoring location was potentially influenced by other manure sources (elk, chickens, etc.)

I-Ranch historically operated as an actively milking dairy. Circa July 2021, prior to the October 2021-January 2022 monitoring, I-Ranch liquidated the milking herd. A herd of approximately 165 cattle was maintained during the October 2021-January 2022 monitoring.

0 5,000 10,000

Approximate Scale - Feet

0 1 2

Approximate Scale - Miles

Refer to the report appendix for notes and explanations regarding this figure

J-Ranch

Kehoe Watershed

PAC2
North Kehoe Creek at Pierce Point Road

North Kehoe Creek

PAC3
Kehoe Lagoon

PAC1S
South Kehoe Creek Downstream of I-Ranch and L-Ranch

I-Ranch

South Kehoe Creek

L-Ranch

North Abbotts Creek

ABB2/3
North Abbotts Creek Downstream of I-Ranch

PAC1Z
South Kehoe Creek Downstream of L-Ranch

ABB5
Outflow from Upper Abbotts Lagoon

ABB1
Abbotts Creek at Pierce Point Road

ABB4
Outflow from Middle Abbotts Lagoon

Abbotts Creek

Upper Abbotts Lagoon

Middle Abbotts Lagoon

Abbotts Watershed

North Schooner Creek

Lower Abbotts Lagoon

East Schooner Creek

RCA Meterological Station

DES2
East Schooner Creek at Sir Frances Drake Blvd

DES6B*
Schooner Creek at Sir Francis Drake Blvd

Home Ranch Creek

Schooner Bay

DES7*
Home Ranch Lagoon at Estero Trail Bridge

DES3*
Home Ranch Creek Downstream of Ranch Buildings

Drakes Estero Watershed

Home Ranch Lagoon

Drakes Estero

Home Bay

C-Ranch

DBY1*
C-Ranch Unnamed Creek

Estero de Limantour Watershed

Drakes Bay Watershed

B-Ranch

Except for the northern ±1/2 mile of Schooner Bay, the waters of Drakes Estero (including Home Bay) are part of the Phillip Burton Wilderness

Drakes Bay

DBY2
B-Ranch Unnamed Creek

A-Ranch

DBY3
A-Ranch Unnamed Creek

POINT REYES NATIONAL SEASHORE

GOLDEN GATE NATIONAL RECREATION AREA

Figure 2

Monitoring Locations (Topographic Basemap)

Kehoe, Abbotts, Drakes Estero, and Drakes Bay Watersheds Point Reyes National Seashore Marin County CA

APPENDIX A

Monitoring Locations and
Monitoring Frequency

APPENDIX A

SURFACE WATER MONITORING LOCATIONS AND MONITORING FREQUENCY

Location details are presented in Table A1. Sampling details are presented in Table A2. Surface water beneficial use details are presented in Table A3. Monitoring locations are shown on Figures A1 and A2. Three additional figures are provided showing the detailed hydrologic conditions at locations PAC1S, PAC1Z, and ABB2/3. Printouts from the California EcoAtlas (EcoAtlas 2022) geographic information system are provided for locations ABB1, ABB2/3, DES6B, and DES7 - the printouts show surface water beneficial uses at these locations. Maps showing the dairy ranch closure areas are provided at the end of this appendix.

Monitoring locations were selected to address the following water quality concerns related to the discharge of cattle waste:

- Macronutrient (nitrogen and phosphorus) loading contributing to hazardous algal blooms (HABs) and hazardous cyanobacteria blooms (HCBs).
- Human health endangerment from exposure to Fecal Indicator Bacteria.

Wildlife endangerment from cattle manure discharge was not a significant consideration for selecting the monitoring locations.

HABs and HCBs are of significant concern in the following waterbodies (Figures A1 and A2):

- Kehoe Lagoon, Kehoe Marsh, the lower reaches of South Kehoe Creek Marsh.
- Upper Abbotts Lagoon, the upstream portions of Middle Abbotts Lagoon.
- The upstream portion of Schooner Bay, the upstream portion of Home Bay, Home Ranch Lagoon.

Surface water monitoring locations PAC3 (Kehoe Lagoon), PAC1S (South Kehoe Creek), ABB5 (Outflow from Upper Abbotts Lagoon), DES6B (Schooner Creek at Sir Francis Drake Blvd), and DES7 (Home Ranch Lagoon at Estero Trail Bridge) provide suitable locations to measure macronutrients for the waterbodies. Sampling and analysis for HABs and HCBs in these waterbodies has yet to be performed.

Global warming, along with the consequent extremes in meteorological and hydrological conditions, is expected to exacerbate HABs and HCBs (ITRC 2021, ITRC 2022, Gobler 2020, Schulhof and Shore 2020, Anderson-Abs et al. 2016, US Environmental Protection Agency 2022).

Assessment of human health endangerment from exposure to Fecal Indicator Bacteria has been based on surface water beneficial uses and associated water quality objectives promulgated by the San Francisco Bay Regional Water Quality Board (SFBRWQCB 2022). The following considerations were employed to select monitoring locations suitable for assessing human health endangerment:

- Cattle manure sources, including localized sources such as dairy cow milking complexes, confined cattle feeding areas, and manure retention ponds.
- Public access and public use.
- Compliance monitoring requirements for confined animal facilities (CAFs - dairy ranches) (SFBRWQCB 2016).
- Historical monitoring locations were preferred unless other considerations were more important.

The selection of monitoring locations was constrained by the National Park Service's access closures for areas surrounding the dairy ranch milking complexes, which precluded monitoring of strategic locations in the North Kehoe Creek drainage and Drakes Bay Watershed. The document describing the closures is presented at the end of this appendix.

The collection of samples that accurately represent water quality was facilitated by selecting locations (1) with well-mixed water (without horizontal or vertical stratification), and (2) that allowed sampling without substrate disturbance (without entering the water). Exceptions included:

- Stratification potential existed at locations PAC1S and PAC3 (discussed below).
- Wading was employed at locations PAC1S and PAC3 (discussed below).

Beneficial uses were identified for each location (Table A3), conforming to the San Francisco Bay Regional Water Quality Control Board criteria. Beneficial uses are needed to compare measured concentrations of Fecal Indicator Bacteria to the corresponding objectives. Table 2-1 from the San Francisco Bay Basin Plan (SFBRWQCB 2022) is presented at the end of this appendix; this table identifies beneficial uses within the Abbotts, Drakes Estero, and Drakes Bay watersheds. The California EcoAtlas (EcoAtlas 2022) geographic information system was also employed to identify beneficial uses at each monitoring location.

The beneficial uses employed in this report conform to the San Francisco Bay Regional Water Quality Control Board and EcoAtlas designations with the following exceptions:

- The EcoAtlas shows Water Contact Recreation (REC-1) beneficial use at location ABB1 (Abbotts Creek at Pierce Point Road). However, based on observations of limited public access and use, Non-Contact

Water Recreation (REC-2) has instead been employed at location ABB1.

- The EcoAtlas shows Water Contact Recreation (REC-1) beneficial use at location ABB2/3 (North Abbotts Creek Downstream of I-Ranch). However, based on observations of limited public access and use, Non-Contact Water Recreation (REC-2) has instead been employed at location ABB2/3.
- The San Francisco Bay Regional Water Quality Control Board has not designated beneficial uses within the Kehoe Watershed and the EcoAtlas does not detail surface water beneficial use in this watershed. Based on field observations of frequent wading, ease of public access, and frequency of public use, Water Contact Recreation (REC-1) beneficial use has been employed at location PAC3 (Kehoe Lagoon).

During the October 2021-January 2022 monitoring period, 14 monitoring events were conducted and 125 samples were collected (additional field duplicates and field blanks were collected). Twelve of the events were performed during a single day; two of the events were 2-day events. The typical monitoring frequency for many locations was weekly. Because monitoring was performed by volunteers, not all locations were monitored weekly during the entire October 2021-January 2022 period. As monitoring progressed and as more volunteers were identified and trained, additional monitoring locations were added to the program. Location PAC1Z was (only) monitored for a single 30-day period, starting late-December 2021. Locations DBY1, DBY2, and DBY3 were (only) monitored for a single 30-day period starting mid-December 2021. To facilitate normal laboratory turnaround for Fecal Indicator Bacteria analyses, monitoring was performed Monday-Wednesday.

PAC1S (South Kehoe Creek Downstream of I-Ranch and L-Ranch)

A figure follows showing the hydrologic conditions at PAC1S.

At PAC1S, South Kehoe Creek flows through a marshy area with abundant terrestrial and aquatic vegetation, including emergent aquatic macrophytes. The reach of South Kehoe Creek downstream of PAC1S - to the culvert beneath Pierce Point Road - was blanketed with aquatic vegetation and reasonably accessible, repeatable sampling locations were not observed (open-water mixed-flow channels were not observed). The precise location of PAC1S was the furthest downstream location with an identifiable open-water mixed-flow channel.

PAC1S is located upstream of the primary unnamed creek draining most of the runoff from K-Ranch (beef). K-Ranch contributes a relatively small amount of runoff and fecal contamination to surface water at PAC1S.

PAC1S receives discharge from I-Ranch (inactive dairy) and L-Ranch (active dairy). At high flow, the relative contribution from L-Ranch is likely significant because the catchment area - along South Kehoe Creek upstream of the marshy area – is larger than the catchment area

discharging from I-Ranch. The abundant vegetation obscured precise determination of the flow paths of South Kehoe Creek through the marshy area.

Samples were typically collected from an open-water mixed-flow channel that was visible between the stems and leaves of the aquatic vegetation. The sampled channel was typically about 1 foot wide and up to 1 foot deep. Wading was necessary to sample PAC1S. To minimize disturbance of the substrate, wading was done slowly over a short distance, taking discrete steps, and not shuffling the feet.

Precipitation during January 2022 was less than 0.5 inches and flow through the marshy area in January 2022 at PAC1S was low. The January 2022 samples at PAC1S were collected from relatively quiescent water and a well-mixed flow channel was not observed.

PAC1Z (South Kehoe Creek Downstream of L-Ranch)

Surface water was not previously monitored at location PAC1Z; however, nearby location PAC1B (not shown on the figures of this report) was previously monitored.

A figure follows showing the hydrologic conditions at PAC1Z.

PAC1Z was located immediately downstream of the confluence of several watercourses draining the L-Ranch milking complex. PAC1Z was at the furthest upstream location capturing all the watercourses.

South Kehoe Creek at location PAC1Z was contained in a well-defined, well-mixed flow channel.

PAC2 (North Kehoe Creek at Pierce Point Road)

North Kehoe Creek flows beneath Pierce Point Road in a (reinforced-concrete pipe) culvert. South Kehoe Creek flows beneath Pierce Point Road in a separate culvert that is located south of PAC2; PAC2 samples represent the sole contribution from North Kehoe Creek.

North Kehoe Creek at location PAC2 was contained in a well-defined, well-mixed flow channel.

PAC3 (Kehoe Lagoon)

Kehoe Lagoon exists at the downstream end of a ±2,000-foot-long freshwater marsh and is the terminus of the Kehoe Creek drainage watershed before discharging to the Pacific Ocean. At high tide, approximately 200 feet of beach and dune (sand) separate Kehoe Lagoon from the ocean.

North Kehoe Creek and South Kehoe Creek flow beneath Pierce Point Road in two separate culverts; the confluence exists west of Pierce Point Road, within the freshwater marsh. Physical access difficulties make monitoring within the marsh (itself) impractical; accordingly, PAC3 has been located within the standing/quiescent water of Kehoe Lagoon.

Park visitors frequently wade Kehoe Lagoon proper, along with the (ephemeral) surface water outflow to the ocean from Kehoe Lagoon.

Three locations regarding Kehoe Lagoon were evaluated for monitoring:

- Outflow from Kehoe Lagoon The outflow from Kehoe Lagoon is intermittent and will not serve as a repeatable monitoring location.
- The downstream end of Kehoe Lagoon The downstream end of Kehoe Lagoon consists of the beach and dune of Kehoe Beach. The substrate at the downstream end is loose sand and wading at this precise location caused excessive turbidity, jeopardizing the representativeness of the samples.
- The upstream end of Kehoe Lagoon Vegetation along the edges of the lagoon provided bank stabilization and the substrate at this location was relatively consolidated sand. This precise location allowed sample collection without significant disturbance of the substrate; accordingly, this location was employed.

The substrate at the monitoring location was sand. The total water depth at the monitoring location was ±6 feet. To minimize disturbance of the substrate, wading was done slowly over a short distance, taking discrete steps, not shuffling the feet, and waiting several minutes after getting into position to collect the sample. The water samples were collected by submersing a closed sampling container to a depth of ±1 foot, opening the lid and filling the container, then closing the lid – all done below the water surface.

ABB1 (Abbotts Creek at Pierce Point Road)

Location ABB1 is also known as T1 in previous surface water investigations. Abbotts Creek flows beneath Pierce Point Road in a (reinforced-concrete pipe) culvert. Abbotts Creek at location ABB1 was contained in a well-defined, well-mixed flow channel.

ABB2/3 (North Abbotts Creek Downstream of I-Ranch)

Apart from monitoring in January 2021, surface water was not previously monitored at location ABB2/3; however, nearby, upstream locations ABB2 (also named T2) and ABB3 (also named T3) had been previously monitored.

A figure follows showing the hydrologic conditions at ABB2/3.

ABB2/3 is located on North Abbotts Creek immediately upstream of Upper Abbotts Lagoon. ABB2/3 is downstream of the confluence of several drainages from the I-Ranch milking complex. Water quality at ABB2/3 reflects the combined water quality that would otherwise be sampled at historical locations ABB2 and ABB3.

Regulations promulgated by the San Francisco Bay Regional Water Quality Control Board require collection of samples "at the point where the watercourses leave the lands used for CAF operation" (SFBRWQCB 2016)." Sampling at ABB2/3 satisfies this requirement. Sampling at ABB2 and ABB3 satisfies this requirement. However, sampling only at ABB2 or only at ABB3 does not satisfy this requirement.

North Abbotts Creek at location ABB2/3 was contained in a well-defined, well-mixed flow channel. At ABB2/3, North Abbotts Creek measured approximately 14-30 inches wide and 3-12 inches deep, depending on flow.

ABB4 (Outflow from Middle Abbotts Lagoon)

ABB4 is located between Middle and Lower Abbotts Lagoons, at a pedestrian footbridge. At the footbridge, the flow channel was approximately 10-20 feet wide and 3.5-6 feet deep at its center, depending on tide. Flow at ABB4 is tidally influenced – at times, water flowed to/from Lower Abbotts Lagoon and from/to Middle Abbotts Lagoon.

The outflow from Middle Abbotts Lagoon at location ABB4 was contained in a well-defined, well-mixed flow channel.

ABB5 (Outflow from Upper Abbotts Lagoon)

ABB5 is located between Upper and Middle Abbotts lagoons. Abundant aquatic vegetation covered most of Upper Abbotts Lagoon's surface and extended into the channel between Upper and Middle Abbotts lagoons where ABB5 is located. The flow channel was approximately 8-12 feet wide and 6-18 inches deep, depending on flow.

The outflow from Upper Abbotts Lagoon at location ABB5 was contained in a well-defined, well-mixed flow channel.

DES2 (East Schooner Creek at Sir Frances Drake Boulevard)

Surface water monitoring has historically been performed at DES2. Surface water monitoring was not performed during the October 2021-January 2022 investigation at location DES2.

DES3 (Home Ranch Creek Downstream of Ranch Buildings)

DES3 is in a wooded portion of the Home Ranch Creek watercourse, downstream of the Home Ranch building complex. Depending on flow, Home Ranch Creek at DES3 was approximately 5-15 feet wide and 4-18 inches deep.

Home Ranch Creek at location DES3 was contained in a well-defined, well-mixed flow channel.

DES6B (Schooner Creek at Sir Francis Drake Blvd)

Apart from monitoring in January 2021, surface water had not previously been monitored at location DES6B.

DES6B is located at the newly completed (circa late 2021) bridge where Sir Frances Drake Blvd crosses Schooner Creek. The bridge spans approximately 30 to 35 feet of water, with a water depth at midline of 3 to 8 feet, depending on the tide. DES6B is tidally influenced. The Phillip Burton Wilderness boundary is ±1/2 mile south of DES6B.

Schooner Creek at location DES6B was contained in a well-defined, well-mixed flow channel.

DES7 (Home Ranch Lagoon at Estero Trail Bridge)

DES7 is located along the Estero Trail at the footbridge separating Home Ranch Lagoon from Home Bay (part of Drakes Estero). The footbridge spans approximately 20 feet of water, with a water depth at midline of 2 to 7 feet. DES7 is tidally influenced. DES7 is located at the edge of the Phillip Burton Wilderness; the wilderness area is immediately downstream of the bridge.

DBY1 (C-Ranch Unnamed Creek)

DBY1 is located along the (unnamed) principal C-Ranch drainage, downstream of the C-Ranch milking complex. The unnamed creek discharges to Drakes Bay at the Ken Patrick Visitor Center, a popular destination of park visitors.

The unnamed creek at location DBY1 was contained in a well-defined, well-mixed flow channel.

DBY2 (B-Ranch Unnamed Creek)

DBY2 is located along the (unnamed) principal B-Ranch drainage, downstream of the B-Ranch milking complex.

DBY2 is located immediately downstream of a stock pond. The stock pond is mostly filled with sediment. DBY2 was sampled from a corrugated metal pipe draining the stock pond. The pipe discharge was located approximately 150 feet upstream of the beach at Drakes Bay. The creek channel at DBY2 was concrete-lined and, depending on flow, approximately 6-8 feet wide and 4-10 inches deep.

The stock pond proper, creek channel, beach, and nearby areas are frequented by Northern Elephant Seals and Harbor Seals. Seal resting and mating were observed during the October 2021-January 2022 monitoring. Birthing and pup rearing occur at DBY2.

The unnamed creek at location DBY2 was contained in a well-defined, well-mixed flow channel.

DBY3 (A-Ranch Unnamed Creek)

DBY3 is located along the (unnamed) principal A-Ranch drainage, downstream of the A-Ranch milking complex. Depending on flow, the creek channel was approximately 6 to 10 feet wide and 6 to 8 inches deep.

The unnamed creek at location DBY3 was contained in a well-defined, well-mixed flow channel.

Table A1 (page 1 of 2)

Location Details

Kehoe, Abbotts, Drakes Estero, and Drakes Bay Watersheds
Point Reyes National Seashore
Marin County CA

Location ID	Location Name	Watershed	GPS Latitude (degrees)	GPS Longitude (degrees)	Description	Cattle Manure Sources	Comments
PAC1S	South Kehoe Creek Downstream of I-Ranch and L-Ranch	Kehoe	38.1464	-122.9367	The reach of South Kehoe Creek upstream and downstream of PAC1S flowed through a marshy area with abundant terrestrial and aquatic vegetation, including emergent aquatic macrophytes. PAC1S was within a visually identifiable flow channel among the vegetation stems and leaves.	I-Ranch CFA, GL. L-Ranch MC, CFA, GL, PMP.	Downstream of PAC1S, vegetation blanketed the surface of the watercourse – visually identifiable, monitorable flow channels were not observed in this reach of South Kehoe Creek. PAC1S represented the furthest downstream location with a visually identifiable flow channel. PAC1S was upstream of the primary unnamed creek draining K-Ranch (beef); accordingly, K-Ranch contributes a relatively small amount of runoff and fecal contamination to surface water at PAC1S.
PAC1Z	South Kehoe Creek Downstream of L-Ranch	Kehoe	38.1352	-122.9227	South Kehoe Creek immediately downstream of the confluence of the watercourses impacted by the L-Ranch milking complex. One-way hike to PAC1Z was ±20 minutes from L-Ranch Road.	L-Ranch MC, CFA, GL, PMP.	
PAC2	North Kehoe Creek at Pierce Point Road	Kehoe	38.1524	-122.9390	Upstream end of the culvert beneath Pierce Point Road.	J-Ranch MC, CFA, GL, PMP, SMP.	K-Ranch (beef) contributes a relatively small amount of runoff and fecal contamination to surface water at PAC2.
PAC3	Kehoe Lagoon	Kehoe	38.1540	-122.9478	Immediately downstream of Kehoe Marsh, at the upstream end of the standing/quiescent lagoon water. One-way hike to PAC3 was ±20 minutes from the Kehoe Beach parking area.	I-Ranch CFA, GL. J-Ranch MC, CFA, GL, PMP, SMP. L-Ranch MC, CFA, GL, PMP. K-Ranch GL.	Three potential locations were scouted for monitoring Kehoe Lagoon: (1) lagoon overflow into the ocean – rejected because the flow was intermittent (i.e., not a repeatable location), (2) downstream end of the standing/quiescent water lagoon, on the upstream side of the Kehoe Beach sand dune – rejected because wading into the water disturbed the substrate, (3) upstream end of the standing/quiescent water lagoon – selected because wading did not disturb the substrate.
ABB1	Abbotts Creek at Pierce Point Road	Abbotts	38.1272	-122.9365	Downstream end of the culvert beneath Pierce Point Road.	I-Ranch GL.	ABB1 was named T1 in some previous surface water investigations. H-Ranch (beef) contributes a relatively small amount of runoff and fecal contamination to surface water at ABB1. The portions of L-Ranch upstream of ABB1 are not grazed by cattle (Voeller et al. 2021).
ABB2/3	North Abbotts Creek Downstream of I-Ranch	Abbotts	38.1290	-122.9396	Immediately upstream of Upper Abbotts Lagoon. ABB2/3 was downstream of the confluence of the three drainages exiting the I-Ranch milking complex. One-way hike to ABB2/3 was ±5 minutes from a pull-out along Pierce Point Road.	I-Ranch MC, CFA, GL, PMP.	Previous surface water investigations included locations ABB2 (also named T2) and ABB3 (also named T3), both of which were upstream of ABB2/3. ABB2/3 accounts for the combined water quality of ABB2 and ABB3. ABB2/3 is the furthest upstream location capturing the complete runoff of the I-Ranch milking complex.
ABB4	Outflow from Middle Abbotts Lagoon	Abbotts	38.1192	-122.9513	Abbotts Lagoon trail footbridge at the downstream end of Middle Abbotts Lagoon (upstream end of Lower Abbotts Lagoon). One-way hike to ABB4 was ±20 minutes from the Abbotts Lagoon parking area.	I-Ranch MC, CFA, GL, PMP. H-Ranch GL.	ABB4 is tidally influenced. Depending on tide stage, water flowed from Middle Abbotts Lagoon to Lower Abbotts Lagoon (downstream) or from Lower Abbotts Lagoon to Middle Abbotts Lagoon (upstream). The portions of L-Ranch upstream of ABB4 are not grazed by cattle (Voeller et al. 2021).

Table A1 (page 2 of 2)

Location Details

Kehoe, Abbotts, Drakes Estero, and Drakes Bay Watersheds
Point Reyes National Seashore
Marin County CA

Location ID	Location Name	Watershed	GPS Latitude (degrees)	GPS Longitude (degrees)	Description	Cattle Manure Sources	Comments
ABB5	Outflow from Upper Abbotts Lagoon	Abbotts	38.1262	-122.9431	Outflow from Upper Abbotts Lagoon to Middle Abbotts Lagoon. One-way hike to ABB5 was ±15 minutes from the Abbotts Lagoon parking area.	I-Ranch MC, CFA, GL, PMP.	Upper Abbotts Lagoon was overgrown with abundant terrestrial and aquatic vegetation, including emergent aquatic macrophytes. H-Ranch (beef) contributes a relatively small amount of runoff and fecal contamination to surface water at ABB5. The portions of L-Ranch upstream of ABB5 are not grazed by cattle (Voeller et al. 2021).
DES2*	East Schooner Creek at Sir Frances Drake Blvd	Drakes Estero	38.0927	-122.9160	Upstream end of the concrete culvert.	M/N/D Rogers Ranches GL.	
DES3*	Home Ranch Creek Downstream of Ranch Buildings	Drakes Estero	38.0710	-122.9076	Downstream of the ranch building complex and upstream of the mouth of Home Ranch Creek (discharge to Home Ranch Lagoon). One-way hike from the Estero Trail parking area was ±25 minutes.	Home Ranch GL.	
DES6B*	Schooner Creek at Sir Francis Drake Blvd	Drakes Estero	38.0917	-122.9292	Schooner Creek at the Sir Francis Drake Blvd Bridge.	H/M/N/D Rogers Ranches GL.	DES6B is tidally influenced. The terminus of East Schooner Creek ±20 feet upstream of the bridge. The downstream end of the bridge represented the upstream end of Schooner Bay (of Drakes Estero). G-Ranch (beef) contributes a relatively small amount of runoff and fecal contamination to surface water at DES6B.
DES7*	Home Ranch Lagoon at Estero Trail Bridge	Drakes Estero	38.0694	-122.9175	Footbridge along the Estero Trail, downstream end of Home Ranch Lagoon. One-way hike from the Estero Trail parking area was ±20 minutes.	Home Ranch GL.	DES7 is tidally influenced. Home Ranch Lagoon (saltwater marsh) is located immediately upstream of the bridge. Home Bay (of Drakes Estero) is located immediately downstream of the bridge. DES7 located at the edge of the Phillip Burton Wilderness.
DBY1*	C-Ranch Unnamed Creek	Drakes Bay	38.0374	-122.9755	±100 yards downstream of the stock pond. ±3/4 mile upstream of the Drakes Beach parking area. One-way hike to location DBY1 was ±20 minutes from a pull-out along Sir Frances Drake Blvd.	C-Ranch MC, CFA, GL, PMP.	
DBY2	B-Ranch Unnamed Creek	Drakes Bay	38.0108	-122.9816	Metal culvert discharge. ±150 feet upstream of the beach at Drakes Bay. One-way hike to location DBY2 was ±25 minutes from a pull-out along Sir Frances Drake Blvd.	B-Ranch MC, CFA, GL, PMP.	
DBY3	A-Ranch Unnamed Creek	Drakes Bay	37.9973	-122.9837	Immediately downstream of a set of rocky cascades. ±100 yards upstream of the beach at Drakes Bay. One-way hike to location DBY3 was ±15 minutes from a pull-out along Chimney Rock Road.	A-Ranch MC, CFA, GL, PMP.	

General Notes

(a) GPS coordinates measured using a smart phone (iPhone or similar).

(b) * = in addition to cattle manure, this monitoring location was potentially influenced by other manure sources (elk, chickens, etc.).

(c) I-Ranch = inactive dairy. A-Ranch, B-Ranch, C-Ranch, J-Ranch, L-Ranch = active dairy.

(d) MC = dairy cow milking complex. CFA = confined cattle feeding area(s) (including dairy cattle feeding stations/troughs). GL = cattle grazing land. PMP = primary cattle manure retention pond(s). SMP = secondary cattle manure retention pond. Cattle manure was applied to land; however, documentation regarding land application was not available.

(e) I-Ranch historically operated as an actively milking dairy. Circa July 2021, prior to the October 2021-January 2022 monitoring, I-Ranch liquidated the milking herd. A herd approximate 165 cattle was maintained during the October 2021-January 2022 monitoring.

Table A2

Sampling Details

Kehoe, Abbotts, Drakes Estero, and Drakes Bay Watersheds
Point Reyes National Seashore
Marin County CA

Location ID	Location Name	Description	Was the Sample Representative of Well-Mixed Flow?	Sampling Technique	Comments
PAC1S	South Kehoe Creek Downstream of I-Ranch and L-Ranch	PAC1S was accessed along the western edge of the watercourse using waders. The substrate at PAC1S was organic sand and silt. Depending on flow, the water depth at PAC1S was ±4-12 inches. Care was taken while wading into a position that allowed placement of the sampling container within a visible channel of well-mixed flow, without disturbing the substrate. An open sampling container was submerged to a depth that did not disturb the substrate.	Most of the time	Wading	In January 2022, low flow existed, and well-mixed water was not observed.
PAC1Z	South Kehoe Creek Downstream of L-Ranch	The substrate at PAC1Z was sand. An open sampling container was submerged to a depth that did not disturb the substrate.	Yes	Creekside, no water entry	
PAC2	North Kehoe Creek at Pierce Point Road	The substrate at PAC2 was sand. An open sampling container was submerged to a depth that did not disturb the substrate.	Yes	Creekside, no water entry	
PAC3	Kehoe Lagoon	PAC3 was accessed using waders. The substrate at PAC3 was sand. The total water depth was ±6 feet. Care was taken when wading into the water to minimize disturbance of the substrate – this was done by wading slowly, taking discrete steps, not shuffling the feet, and waiting several minutes after getting into position to collect the sample. The water sample was collected by submerging a closed sampling container ±1 foot below the water surface, opening the container and allowing the container to fill while at a depth of ± 1 foot, and closing the container while at a depth of ± 1 foot.	No	Wading	
ABB1	Abbotts Creek at Pierce Point Road	The substrate at ABB1 was sand and gravel. An open sampling container was submerged to a depth that did not disturb the substrate.	Yes	Creekside, no water entry	
ABB2/3	North Abbotts Creek Downstream of I-Ranch	The substrate at ABB2/3 was sand. An open sampling container was submerged to a depth that did not disturb the substrate.	Yes	Creekside, no water entry	
ABB4	Outflow from Middle Abbotts Lagoon	The substrate at ABB4 was sand and rock. An open sampling container was submerged to a depth that did not disturb the substrate.	Yes	Creekside, no water entry	Surface water at ABB4 was occasionally sampled by wading in calf-high boots. When wading, care was taken to sample water up-flow of any substate disturbance.
ABB5	Outflow from Upper Abbotts Lagoon	The substrate at ABB5 was sand. An open sampling container was submerged to a depth that did not disturb the substrate.	Yes	Creekside, no water entry	
DES2	East Schooner Creek at Sir Frances Drake Blvd	The substrate at DES2 was sand and gravel. An open sampling container was submerged to a depth that did not disturb the substrate.	Yes	Creekside, no water entry	
DES3	Home Ranch Creek Downstream of Ranch Buildings	The substrate at DES3 was sand. An open sampling container was submerged to a depth that did not disturb the substrate.	Yes	Creekside, no water entry	
DES6B	Schooner Creek at Sir Francis Drake Blvd	The substrate at DES6 was sand and rock. An open sampling container was submerged to a depth that did not disturb the substrate.	Yes	Creekside, no water entry	
DES7	Home Ranch Lagoon at Estero Trail Bridge	The substrate at DES7 was sand and rock. An open sampling container was submerged to a depth that did not disturb the substrate.	Yes	Creekside, no water entry	
DBY1	C-Ranch Unnamed Creek	The substrate at DBY1 was sand. An open sampling container was submerged to a depth that did not disturb the substrate.	Yes	Creekside, no water entry	
DBY2	B-Ranch Unnamed Creek	The substrate at DBY2 was a concrete-lined channel. An open sampling container was held beneath the culvert discharge.	Yes	Creekside, no water entry	
DBY3	A-Ranch Unnamed Creek	The substrate at DBY3 was sand and rock. An open sampling container was submerged to a depth that did not disturb the substrate.	Yes	Creekside, no water entry	

General Note

(a) The sampling container was a 1-L amber glass bottle.

Surface Water Beneficial Use Details

Kehoe, Abbotts, Drakes Estero, and Drakes Bay Watersheds
Point Reyes National Seashore
Marin County CA

Location ID	Location Name	Watershed	Public Access	Public Use	Wildlife Use	Beneficial Uses of Surface Water Designated in Table 2-1 of the *Basin Plan*	Assigned Beneficial Uses of Surface Water for Locations Not Designated in the *Basin Plan*	Comments (Including Rationale for Assigned Beneficial Uses)
PAC1S	South Kehoe Creek Downstream of I-Ranch and L-Ranch	Kehoe	Public access is limited by vegetation. Public access is limited along the east side of South Kehoe Creek by fencing.	Hiking, wildlife observation.	Tule Elk (±4 animals), various bird species.		WET, WARM, WILD, REC-2	WET based on observed vegetation type, WARM based on observed aquatic habitat, WILD based on observed adjacent wetland and terrestrial wildlife habitat, REC-2 based on observed hiking and wildlife observation.
PAC1Z	South Kehoe Creek Downstream of L-Ranch	Kehoe	Parking access along L-Ranch Road. Public access is limited by fencing.	Hiking, wildlife observation.	Tule Elk (±4 animals), coyotes, various bird species.		WARM, WILD, REC-2	WARM based on observed aquatic habitat, WILD based on observed adjacent wetland and terrestrial wildlife habitat, REC-2 based on observed hiking and wildlife observation.
PAC2	North Kehoe Creek at Pierce Point Road	Kehoe	PAC2 is immediately adjacent to the Kehoe Beach parking area. Toilets located adjacent to the Kehoe parking area.	Frequent vehicle parking immediately adjacent to PAC2.	Various bird species, including owls at the Kehoe Beach parking area.		WET, WARM, WILD, REC-2	WET based on observed vegetation type, WARM based on observed aquatic habitat, WILD based on observed adjacent wetland and terrestrial wildlife habitat, REC-2 based on observed hiking and wildlife observation.
PAC3	Kehoe Lagoon	Kehoe	Kehoe Lagoon and Kehoe Beach are popular destinations which are accessed with a ±20-minute one-way hike from the Kehoe Beach parking area. The Kehoe Beach/Lagoon trail is a designated trail.	Frequent public use. Hiking, wildlife observation, wading within Kehoe Lagoon, wading in the outflow from Kehoe Lagoon, swimming at Kehoe Beach, and removal of invasive vegetation including wading at the edges of Kehoe Lagoon. Shellfish harvesting at Kehoe Beach.	River otters, various bird species including Great Blue Herons and other shorebirds, coyotes.		WET, WARM, WILD, REC-1, REC-2	WET based on observed vegetation type, WARM based on observed aquatic habitat, WILD based on observed adjacent wetland and terrestrial wildlife habitat, REC-1 based on observed public wading, REC-2 based on observed hiking and wildlife observation. Beneficial Uses for the Pacific Ocean at Kehoe Beach include IND, COMM, SHELL, MAR, MIGR, RARE, SPWN, WILD, REC-1, REC-2, NAV.
ABB1	Abbots Creek at Pierce Point Road	Abbotts	Abbotts Lagoon parking area is ±100 yards from ABB1. Toilets located adjacent to the Abbotts parking area.	Hiking, wildlife observation.	Deer, coyotes, various bird species.		WET, WARM, WILD, REC-2	WET based on observed vegetation type, WARM based on observed aquatic habitat, WILD based on observed adjacent wetland and terrestrial wildlife habitat, REC-2 based on observed hiking and wildlife observation. The EcoAtlas shows REC-1 beneficial use at ABB1; however, based on field observations of public access and public use, ABB1 has been assigned REC-2.
ABB2/3	North Abbots Creek Downstream of I-Ranch	Abbotts	Public access from a pull-out along the west side of Pierce Point Road.	Hiking, wildlife observation.	Deer, coyotes, various bird species.		WET, WARM, WILD, REC-2	WET based on observed vegetation type, WARM based on observed aquatic habitat, WILD based on observed adjacent wetland and terrestrial wildlife habitat, REC-2 based on observed hiking and wildlife observation. The EcoAtlas shows REC-1 beneficial use at ABB2/3; however, based on field observations of public access and public use, ABB2/3 has been assigned REC-2.
ABB4	Outflow from Middle Abbots Lagoon	Abbotts	Abbotts Lagoons are popular destinations with a designated trail. ABB4 is at a footbridge that crosses the watercourse. ABB4 is accessed with a ±20-minute one-way hike from the Abbotts trailhead parking area.	Frequent public. Hiking, wildlife observation, wading in middle and lower Abbotts lagoons, and wading and swimming at Abbotts Beach.	Deer, coyotes, rabbits, river otters, various bird species including shorebirds.	Abbotts Lagoons: MAR, WILD, REC-1, REC-2		The EcoAtlas shows REC-1 beneficial use at ABB4. Beneficial Uses for the Pacific Ocean at Abbotts Beach include IND, COMM, SHELL, MAR, MIGR, RARE, SPWN, WILD, REC-1, REC-2, NAV.
ABB5	Outflow from Upper Abbots Lagoon	Abbotts	Abbotts Lagoons are popular destinations with a designated trail. ABB5 is accessed with a ±15-minute one-way hike from the Abbotts trailhead parking area.	Hiking, wildlife observation, wading in Middle Abbotts Lagoon.	Deer, coyotes, rabbits, river otters, various bird species including shorebirds.	Abbotts Lagoons: MAR, WILD, REC-1, REC-2		The EcoAtlas shows REC-1 beneficial use at ABB5.
DES2*	East Schooner Creek at Sir Francis Drake Blvd	Drakes Estero	Parking available at DES2.	Hiking, wildlife observation including salmon/steelhead observation.	Various bird species and small mammals. Salmon and steelhead spawning and rearing in East Schooner Creek.	East Schooner Creek: SHELL, COLD, MIGR, RARE, SPWN, WARM, WILD, REC-1, REC-2		The EcoAtlas shows REC-1 beneficial use at DES2. Salmon and steelhead spawning and rearing in East Schooner Creek.
DES3*	Home Ranch Creek Downstream of Ranch Buildings	Drakes Estero	Public access limited by fencing. DES3 is accessed by a ±25-minute one-way hike from the Estero Trail parking area. Toilets located at the Estero Trail parking area.	Hiking, wildlife observation including salmon/steelhead observation.	Tule Elk, deer, small mammals, various bird species including shorebirds.	Home Ranch Creek: COLD, MIGR, RARE, SPWN, WARM, WILD, REC-1, REC-2		Salmon and steelhead spawning and rearing in Home Ranch Creek.
DES6B*	Schooner Creek at Sir Francis Drake Blvd	Drakes Estero	Parking area immediately adjacent to DES6B. The parking area has interpretative displays regarding Drakes Estero.	Hiking, wildlife observation. Kayaking/canoeing/paddle-boarding in Schooner Bay (Drakes Estero) immediately downstream of DES6B. Designated launch area for watercraft ±1/2 mile south of DES6B at the former Drakes Bay Oyster Company location. Watercraft may be launched at DES6B.	River otters, Tule Elk, deer, small mammals, various bird species including Great Blue Herons, other shorebirds, ducks.	Drakes Estero: COMM, SHELL, MAR, MIGR, RARE, SPWN, WILD, REC-1, REC-2		The EcoAtlas shows REC-1 beneficial use at DES6B. Salmon and steelhead migration in Schooner Creek. The Phillip Burton Wilderness boundary is ±1/2 mile south of DES6B.

Surface Water Beneficial Use Details

Kehoe, Abbotts, Drakes Estero, and Drakes Bay Watersheds
Point Reyes National Seashore
Marin County CA

Location ID	Location Name	Watershed	Public Access	Public Use	Wildlife Use	Beneficial Uses of Surface Water Designated in Table 2-1 of the *Basin Plan*	Assigned Beneficial Uses of Surface Water for Locations Not Designated in the *Basin Plan*	Comments (Including Rationale for Assigned Beneficial Uses)
DES7*	Home Ranch Lagoon at Estero Trail Bridge	Drakes Estero	DES7 is located along the Estero Trail, at a footbridge crossing the outlet from Home Ranch Lagoon. The footbridge contains resting benches that are frequently used. Estero Trail is a popular, designated trail. DES7 is accessed with a ±20-minute one-way hike from the Estero Trail parking area. Toilets located at the Estero Trail parking area.	Frequent public use. Hiking, wildlife observation. Kayaking/canoeing/paddle-boarding in Home Ranch Lagoon and Home Ranch Bay (Drakes Estero).	Small mammals and various bird species including shorebirds and ducks.	Drakes Estero: COMM, SHELL, MAR, MIGR, RARE, SPWN, WILD, REC-1, REC-2		The EcoAtlas shows REC-1 beneficial use at DES7. Salmon and steelhead migration. DES7 is on the boundary of the Phillip Burton Wilderness.
DBY1*	C-Ranch Unnamed Creek	Drakes Bay	Parking at a pull-out along Sir Frances Drake Boulevard. Public access limited by fencing.	Hiking, wildlife observation. Kayaking/canoeing/paddle-boarding, wading, and swimming in Drakes Bay downstream of DBY1.	Tule Elk, deer, coyotes, small mammals, various bird species.		WARM, WILD, REC-2	WARM based on observed aquatic habitat, WILD based on observed adjacent wetland and terrestrial wildlife habitat, REC-2 based on observed hiking and wildlife observation. Beneficial Uses for the Pacific Ocean at Drakes Bay include IND, COMM, SHELL, MAR, MIGR, RARE, SPWN, WILD, REC-1, REC-2, NAV.
DBY2	B-Ranch Unnamed Creek	Drakes Bay	Parking at a pull-out along Sir Frances Drake Boulevard. Public access limited by fencing.	Hiking, wildlife observation. Kayaking/canoeing/paddle-boarding, wading, and swimming in Drakes Bay immediately downstream of DBY2.	Deer, coyotes, small mammals, various bird species. At DBY2 and at the Drakes Bay beach, ±150 feet downstream of DBY2, Northern Elephant Seal resting, mating, birthing, and pup rearing were observed. Northern Elephant Seals were observed in the creek channel at DBY2.		WET, WARM, WILD, REC-2	WET based on observed vegetation type, WARM based on observed aquatic habitat, WILD based on observed adjacent wetland and terrestrial wildlife habitat, REC-2 based on observed hiking and wildlife observation. Beneficial Uses for the Pacific Ocean at Drakes Bay include IND, COMM, SHELL, MAR, MIGR, RARE, SPWN, WILD, REC-1, REC-2, NAV.
DBY3	A-Ranch Unnamed Creek	Drakes Bay	Parking at a pull-out along Chimney Rock Road. Public access limited by fencing.	Hiking, wildlife observation. Kayaking/canoeing/paddle-boarding, wading, and swimming in Drakes Bay downstream of DBY3.	Deer, coyotes, small mammals, various bird species.		WARM, WILD, REC-2	WARM based on observed aquatic habitat, WILD based on observed adjacent wetland and terrestrial wildlife habitat, REC-2 based on observed hiking and wildlife observation. Beneficial Uses for the Pacific Ocean at Drakes Bay include IND, COMM, SHELL, MAR, MIGR, RARE, SPWN, WILD, REC-1, REC-2, NAV.

General Notes

(a) *Basin Plan* = the *Basin Plan* of the San Francisco Bay Regional Water Quality Control Board (SFBRWQCB 2022). All the beneficial uses specifically identified in the *Basin Plan* were "Existing" as opposed to "Potential."

(b) The determination of "Assigned Beneficial Uses" involved consideration of public access, observed public use, observed wildlife use, and those beneficial uses designated in the *Basin Plan* for abutting/nearby water bodies.

(c) Wildlife observation includes birdwatching and photography. Birdwatching and photography sometimes include incidental wading.

(d) EcoAtlas = California EcoAtlas (EcoAtlas 2022). https://www.ecoatlas.org

(e) SWRCB Salinity Classification: Freshwater = "salinity is equal to or less than 1 part per thousand (ppth) 95 percent or more of the time during the CALENDAR YEAR." Saltwater = "salinity is greater than 1 ppth more than 5 percent of the time during the CALENDAR YEAR." (SWRCB 2019a).

(f) * = in addition to cattle manure, this monitoring location was potentially influenced by other manure sources (elk, chickens, etc.).

(g) The following selected Beneficial Use Definitions are verbatim from (SWRCB Undated). https://www.waterboards.ca.gov/about_us/performance_report_1314/plan_assess/docs/bu_definitions_012114.pdf

COLD Cold Freshwater Habitat - Uses of water that support cold water ecosystems, including, but not limited to, preservation or enhancement of aquatic habitats, vegetation, fish, or wildlife, including invertebrates.

COMM Commercial and Sport Fishing - Uses of water for commercial or recreational collection of fish, shellfish, or other organisms, including, but not limited to, uses involving organisms intended for human consumption or bait purposes.

MAR Marine Habitat - Uses of water that support marine ecosystems including, but not limited to, preservation or enhancement of marine habitats, vegetation such as kelp, fish, shellfish, or wildlife (e.g., marine mammals, shorebirds).

MIGR Fish Migration - Uses of water that support habitats necessary for migration, acclimatization between fresh water and salt water, and protection of aquatic organisms that are temporary inhabitants of waters within the region.

RARE Rare, Threatened, or Endangered Species - Uses of waters that support habitats necessary for the survival and successful maintenance of plant or animal species established under state and/or federal law as rare, threatened, or endangered.

REC-1 Water Contact Recreation - Uses of water for recreational activities involving body contact with water, where ingestion of water is reasonably possible. These uses include, but are not limited to, swimming, wading, water-skiing, skin and scuba diving, surfing, white water activities, fishing or use of natural hot springs.

REC-2 Non-Contact Water Recreation - Uses of water for recreational activities involving proximity to water, but not normally involving body contact with water, where ingestion of water is reasonably possible. These uses include, but are not limited to, picnicking, sunbathing, hiking, beachcombing, camping, boating, tidepool and marine life study, hunting, sightseeing, or aesthetic enjoyment in conjunction with the above activities.

SHELL Shellfish Harvesting - Uses of water that support habitats suitable for the collection of filter-feeding shellfish (e.g., clams, oysters, and mussels) for human consumption, commercial, or sport purposes.

SPWN Spawning, Reproduction, and/or Early Development - Uses of water that support high quality aquatic habitats suitable for reproduction and early development of fish.

WARM Warm Freshwater Habitat - Uses of water that support warm water ecosystems including, but not limited to, preservation or enhancement of aquatic habitats, vegetation, fish, or wildlife, including invertebrates.

WET Wetland Habitat - Uses of water that support natural and man-made wetland ecosystems, including, but not limited to, preservation or unique wetland functions, fish, shellfish, invertebrates, insects, and wildlife habitat (North Coast Regional Board (Region 1).

WILD Wildlife Habitat - Uses of water that support terrestrial ecosystems including, but not limited to, preservation and enhancement of terrestrial habitats, vegetation, wildlife (e.g., mammals, birds, reptiles, amphibians, invertebrates), or wildlife water and food sources.

Monitoring Location (October 2021-January 2022)

Historical monitoring location

Actively Milking Dairy Ranch

Dairy Ranch Not Actively Milking (I-Ranch)

Beef Ranch

* In addition to cattle manure, this monitoring location was potentially influenced by other manure sources (elk, chickens, etc.)

I-Ranch historically operated as an actively milking dairy. Circa July 2021, prior to the October 2021-January 2022 monitoring, I-Ranch liquidated the milking herd. A herd of approximately 165 cattle was maintained during the October 2021-January 2022 monitoring.

0 5,000 10,000

Approximate Scale - Feet

0 1 2

Approximate Scale - Miles

Refer to the report appendix for notes and explanations regarding this figure

J-Ranch

Kehoe Watershed

PAC2
North Kehoe Creek at Pierce Point Road

North Kehoe Creek

South Kehoe Creek Marsh

Kehoe Marsh

PAC3
Kehoe Lagoon

PAC1S
South Kehoe Creek Downstream of I-Ranch and L-Ranch

I-Ranch

South Kehoe Creek

L-Ranch

North Abbotts Creek

ABB2/3
North Abbotts Creek Downstream of I-Ranch

PAC1Z
South Kehoe Creek Downstream of L-Ranch

ABB5
Outflow from Upper Abbotts Lagoon

ABB1
Abbotts Creek at Pierce Point Road

ABB4
Outflow from Middle Abbotts Lagoon

Abbotts Creek

Upper Abbotts Lagoon

Middle Abbotts Lagoon

Abbotts Watershed

North Schooner Creek

Lower Abbotts Lagoon

East Schooner Creek

RCA Meterological Station

DES2
East Schooner Creek at Sir Frances Drake Blvd

DES6B*
Schooner Creek at Sir Francis Drake Blvd

Home Ranch Creek

Schooner Bay

DES7*
Home Ranch Lagoon at Estero Trail Bridge

DES3*
Home Ranch Creek Downstream of Ranch Buildings

Drakes Estero Watershed

Home Ranch Lagoon

Drakes Estero

Home Bay

C-Ranch

DBY1*
C-Ranch Unnamed Creek

Estero de Limantour Watershed

Drakes Bay Watershed

B-Ranch

Except for the northern ±1/2 mile of Schooner Bay, the waters of Drakes Estero (including Home Bay) are part of the Phillip Burton Wilderness

Drakes Bay

DBY2
B-Ranch Unnamed Creek

A-Ranch

DBY3
A-Ranch Unnamed Creek

POINT REYES NATIONAL SEASHORE

POINT REYES NATIONAL SEASHORE

Figure A1

Monitoring Locations (Orthophoto Basemap)

Kehoe, Abbotts, Drakes Estero, and Drakes Bay Watersheds Point Reyes National Seashore Marin County CA

Monitoring Location (October 2021-January 2022)

Historical monitoring location

Actively Milking Dairy Ranch

Dairy Ranch Not Actively Milking (I-Ranch)

Beef Ranch

* In addition to cattle manure, this monitoring location was potentially influenced by other manure sources (elk, chickens, etc.)

I-Ranch historically operated as an actively milking dairy. Circa July 2021, prior to the October 2021-January 2022 monitoring, I-Ranch liquidated the milking herd. A herd of approximately 165 cattle was maintained during the October 2021-January 2022 monitoring.

0 5,000 10,000

Approximate Scale - Feet

0 1 2

Approximate Scale - Miles

Refer to the report appendix for notes and explanations regarding this figure

J-Ranch

Kehoe Watershed

PAC2 North Kehoe Creek at Pierce Point Road

North Kehoe Creek

South Kehoe Creek Marsh

Kehoe Marsh

PAC3 Kehoe Lagoon

PAC1S South Kehoe Creek Downstream of I-Ranch and L-Ranch

I-Ranch

South Kehoe Creek

L-Ranch

North Abbotts Creek

ABB2/3 North Abbotts Creek Downstream of I-Ranch

PAC1Z South Kehoe Creek Downstream of L-Ranch

ABB5 Outflow from Upper Abbotts Lagoon

ABB1 Abbotts Creek at Pierce Point Road

ABB4 Outflow from Middle Abbotts Lagoon

Abbotts Creek

Upper Abbotts Lagoon

Middle Abbotts Lagoon

Abbotts Watershed

North Schooner Creek

Lower Abbotts Lagoon

East Schooner Creek

RCA Meterological Station

DES2 East Schooner Creek at Sir Frances Drake Blvd

DES6B* Schooner Creek at Sir Francis Drake Blvd

Home Ranch Creek

Schooner Bay

DES7* Home Ranch Lagoon at Estero Trail Bridge

DES3* Home Ranch Creek Downstream of Ranch Buildings

Drakes Estero Watershed

Home Ranch Lagoon

Drakes Estero

Home Bay

C-Ranch

DBY1* C-Ranch Unnamed Creek

Estero de Limantour Watershed

Drakes Bay Watershed

B-Ranch

Except for the northern ±1/2 mile of Schooner Bay, the waters of Drakes Estero (including Home Bay) are part of the Phillip Burton Wilderness

Drakes Bay

DBY2 B-Ranch Unnamed Creek

A-Ranch

DBY3 A-Ranch Unnamed Creek

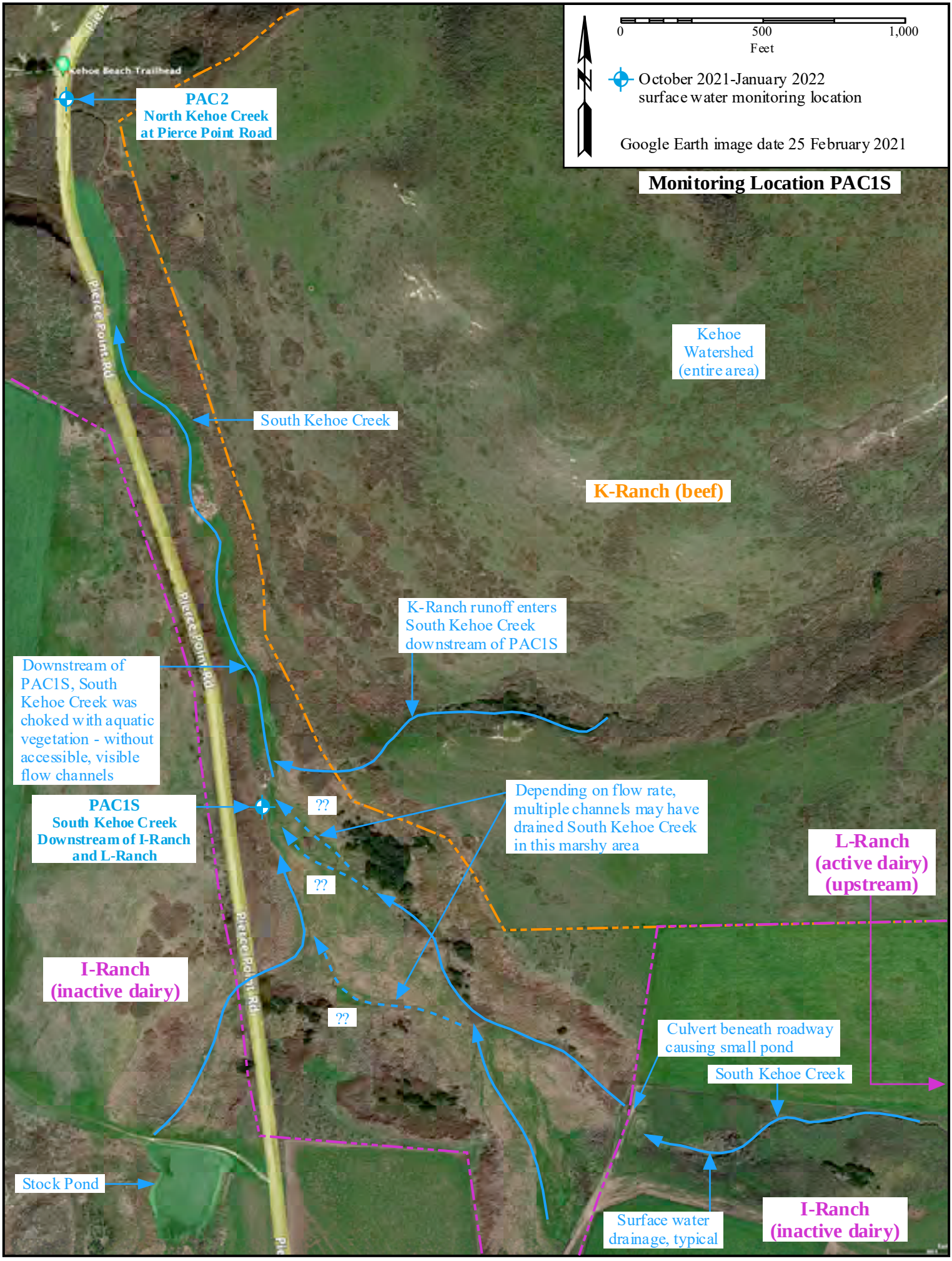
POINT REYES NATIONAL SEASHORE

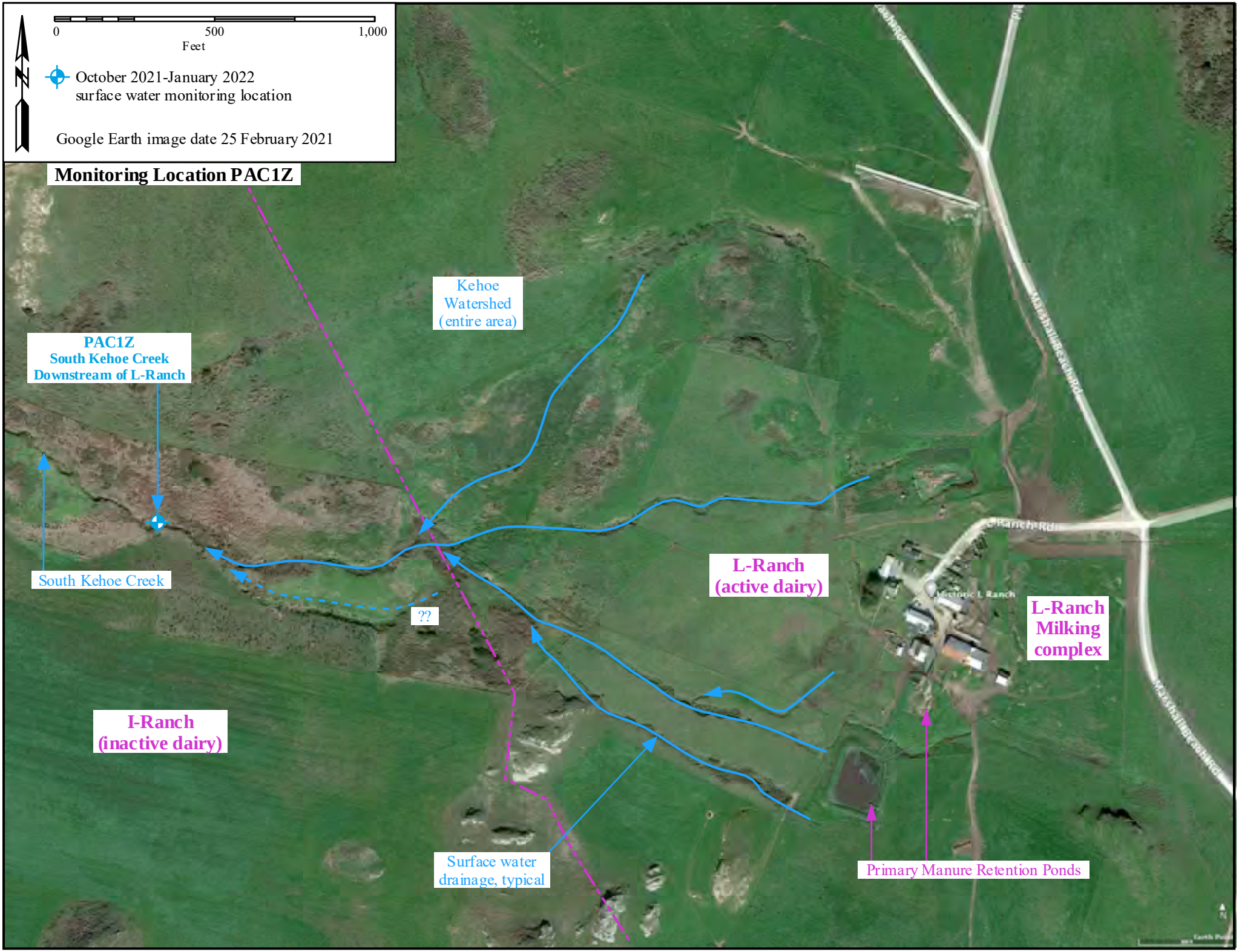
GOLDEN GATE NATIONAL RECREATION AREA

Figure A2

Monitoring Locations (Topographic Basemap)

Kehoe, Abbotts, Drakes Estero, and Drakes Bay Watersheds Point Reyes National Seashore Marin County CA


0
500
1,000
Feet
October 2021-January 2022
surface water monitoring location
Google Earth image date 25 February 2021
Monitoring Location PAC1S
Kehoe Beach Trailhead
PAC2
North Kehoe Creek
at Pierce Point Road
Pierce Point Rd
Kehoe
Watershed
(entire area)
South Kehoe Creek
K-Ranch (beef)
K-Ranch runoff enters
South Kehoe Creek
downstream of PAC1S
Downstream of
PAC1S, South
Kehoe Creek was
choked with aquatic
vegetation - without
accessible, visible
flow channels
PAC1S
South Kehoe Creek
Downstream of I-Ranch
and L-Ranch
??
??
??
Depending on flow rate,
multiple channels may have
drained South Kehoe Creek
in this marshy area
L-Ranch
(active dairy)
(upstream)
I-Ranch
(inactive dairy)
Culvert beneath roadway
causing small pond
South Kehoe Creek
Stock Pond
Surface water
drainage, typical
I-Ranch
(inactive dairy)


0
500
1,000
Feet
October 2021-January 2022
surface water monitoring location
Google Earth image date 25 February 2021
Monitoring Location PAC1Z
Kehoe
Watershed
(entire area)
PAC1Z
South Kehoe Creek
Downstream of L-Ranch
South Kehoe Creek
??
L-Ranch
(active dairy)
L-Ranch
Milking
complex
I-Ranch
(inactive dairy)
Surface water
drainage, typical
Primary Manure Retention Ponds

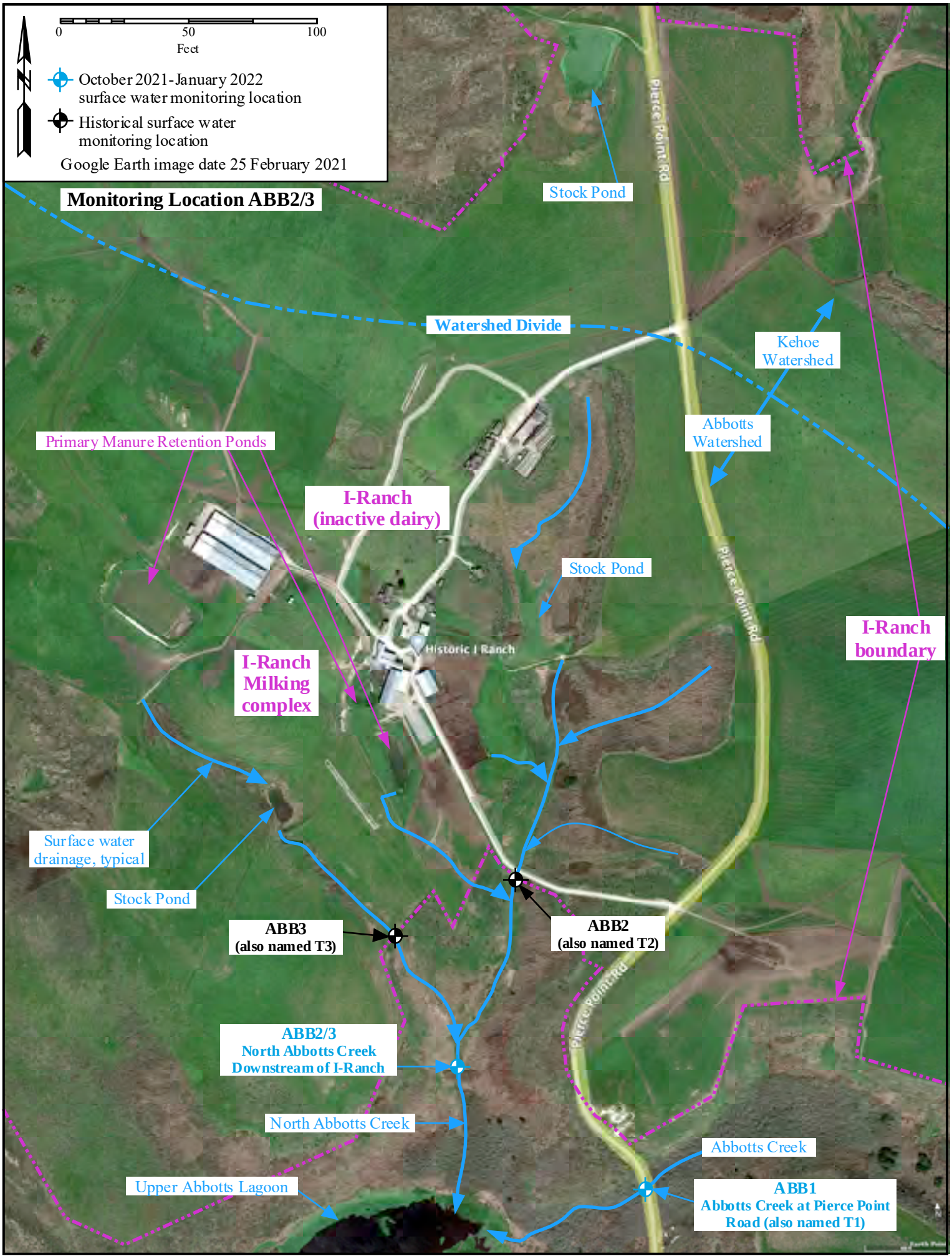

0
50
100
Feet
October 2021-January 2022
surface water monitoring location
Historical surface water
monitoring location
Google Earth image date 25 February 2021
Monitoring Location ABB2/3
Stock Pond
Pierce Point Rd
Watershed Divide
Kehoe
Watershed
Abbotts
Watershed
Primary Manure Retention Ponds
I-Ranch
(inactive dairy)
Stock Pond
Historic I Ranch
I-Ranch
Milking
complex
I-Ranch
boundary
Surface water
drainage, typical
Stock Pond
ABB3
(also named T3)
ABB2
(also named T2)
ABB2/3
North Abbotts Creek
Downstream of I-Ranch
North Abbotts Creek
Abbotts Creek
Upper Abbotts Lagoon
ABB1
Abbotts Creek at Pierce Point
Road (also named T1)

Table 2-1: Existing and Potential Beneficial Uses of Water Bodies in the San Francisco Bay Region

MARIN COASTAL BASIN

	← Human Consumptive Uses →						← Aquatic Life Uses →									← Wildlife Use	← Recreational Uses →		
COUNTY Waterbody	AGR	MUN	FRSH	GWR	IND	PROC	COMM	SHELL	COLD	EST	MAR	MIGR	RARE	SPWN	WARM	WILD	REC-1	REC-2	NAV
MARIN COUNTY																			
Pacific Ocean (Marin)					E		E	E			E	E	E	E		E	E	E	E
Abbotts Lagoon											E					E	E	E	
Drakes Estero							E	E			E	E	E	E		E	E	E	
East Schooner Creek								E	E			E	E	E	E	E	E	E	
Home Ranch Creek									E			E	E	E	E	E	E	E	
Limantour Estero							E	E			E	E	E	E		E	E	E	
Glenbrook Creek									E			E	E		E	E	E	E	
Muddy Hollow Creek									E			E	E	E	E	E	E	E	
Santa Maria Creek (Marin)									E			E	E	E	E	E	E	E	
Coast Creek								E	E			E	E	E	E	E	E	E	
Alamere Creek									E							E	E	E	
Wildcat Lake															E	E	E	E	
Crystal Lake									E					E	E	E	E	E	
Bass Lake							E								E	E	E	E	
Pelican Lake															E	E	E	E	
Arroyo Hondo (Marin)		E							E						E	E	E	E	
Bolinas Lagoon							E	E			E	E	E	E		E	E	E	E
Pine Gulch Creek		E							E			E	E	E	E	E	E	E	
Copper Mine Gulch Creek									E			E	E	E	E	E	E	E	
Wilkins Gulch Creek									E			E	E		E	E	E	E	

E: Existing beneficial use E*: Water quality objectives apply; water contact recreation is prohibited or limited to protect public health P: Potential beneficial use

EcoAtlas printout for location ABB1

-122.94721, 38.13028

EcoAtlas printout for location ABB2/3

Layers | Legends | Basemap | Overlays | Show Tools

At this location

CARI Wetlands

Type: Slope and Seep Wetlands
More..

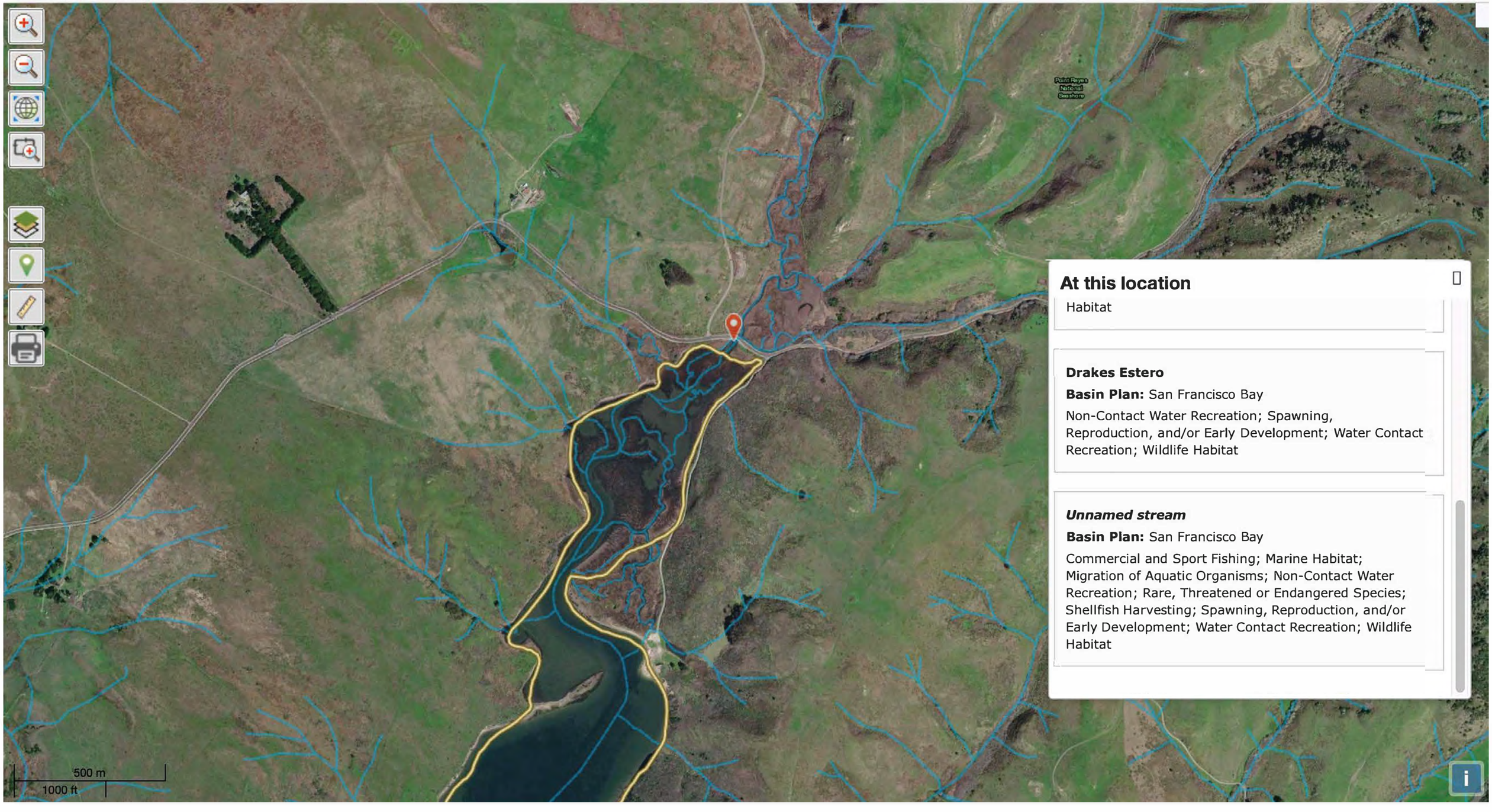
CARI Streams

Type: Fluvial Natural
More..

Beneficial Uses

Abbotts Lagoon
Basin Plan: San Francisco Bay
Marine Habitat; Non-Contact Water Recreation; Water Contact Recreation; Wildlife Habitat

EcoAtlas printout for location DES6B



At this location

Habitat

Drakes Estero

Basin Plan: San Francisco Bay

Non-Contact Water Recreation; Spawning, Reproduction, and/or Early Development; Water Contact Recreation; Wildlife Habitat

Unnamed stream

Basin Plan: San Francisco Bay

Commercial and Sport Fishing; Marine Habitat; Migration of Aquatic Organisms; Non-Contact Water Recreation; Rare, Threatened or Endangered Species; Shellfish Harvesting; Spawning, Reproduction, and/or Early Development; Water Contact Recreation; Wildlife Habitat

EcoAtlas printout for location DES7

Layers | Legends | Basemap | Overlays | Show Tools

At this location

Type: Tidal Flat and Marsh Panne

More..

CARI Streams

Type: Tidal Natural

More..

Beneficial Uses

Drakes Estero

Basin Plan: San Francisco Bay

Commercial and Sport Fishing; Marine Habitat; Migration of Aquatic Organisms; Non-Contact Water Recreation; Rare, Threatened or Endangered Species; Shellfish Harvesting; Spawning, Reproduction, and/or Early Development; Water Contact Recreation; Wildlife Habitat

Ranch Operation Public Closure Area Maps

Point Reyes National Seashore
Superintendent's Compendium

I. 36 CFR §1.5 – Visiting Hours, Public Use Limits, Closures, and Area Designations for Specific Use or Activities

(a)(1) The following visiting hours and public use limits are established for all or for the listed portions of the park, and the following closures are established for all or a portion of the park to all public use or to a certain use or activity:

Closures:

Ranch Complexes:

- The operational complexes for ranches with permitted agricultural activities are closed to public use. This includes, but is not limited to, areas of the developed ranch complex, feeding areas, equipment and feed storage areas, outbuildings, and access roads through the ranch complex. This closure shall not apply to residents of the permitted ranchlands, guests of the residents, or persons engaged in permitted agricultural business activities.

These areas are closed for public safety due to the presence of livestock, heavy machinery, etc., and to ensure that permitted ranch operations are conducted without impediment.

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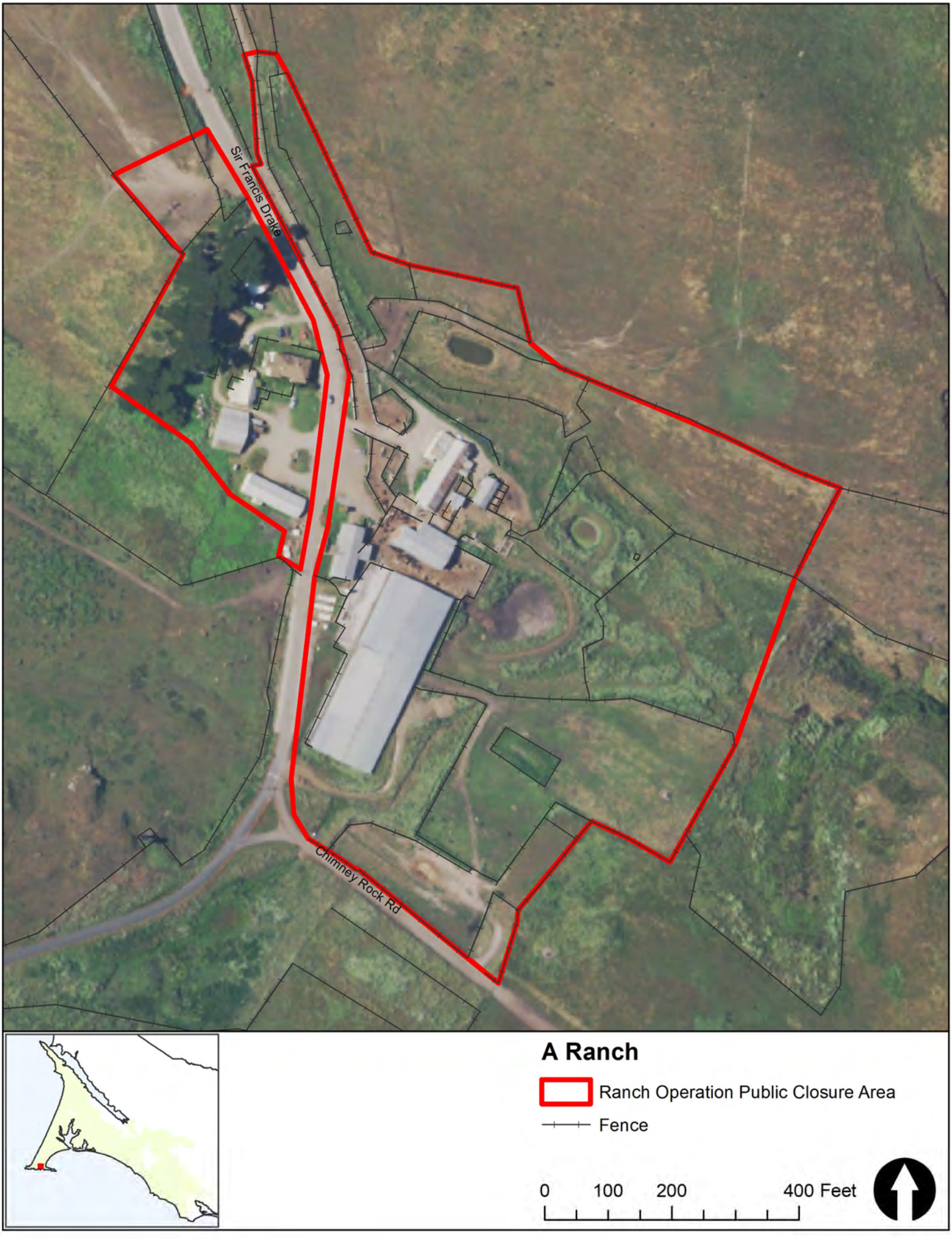
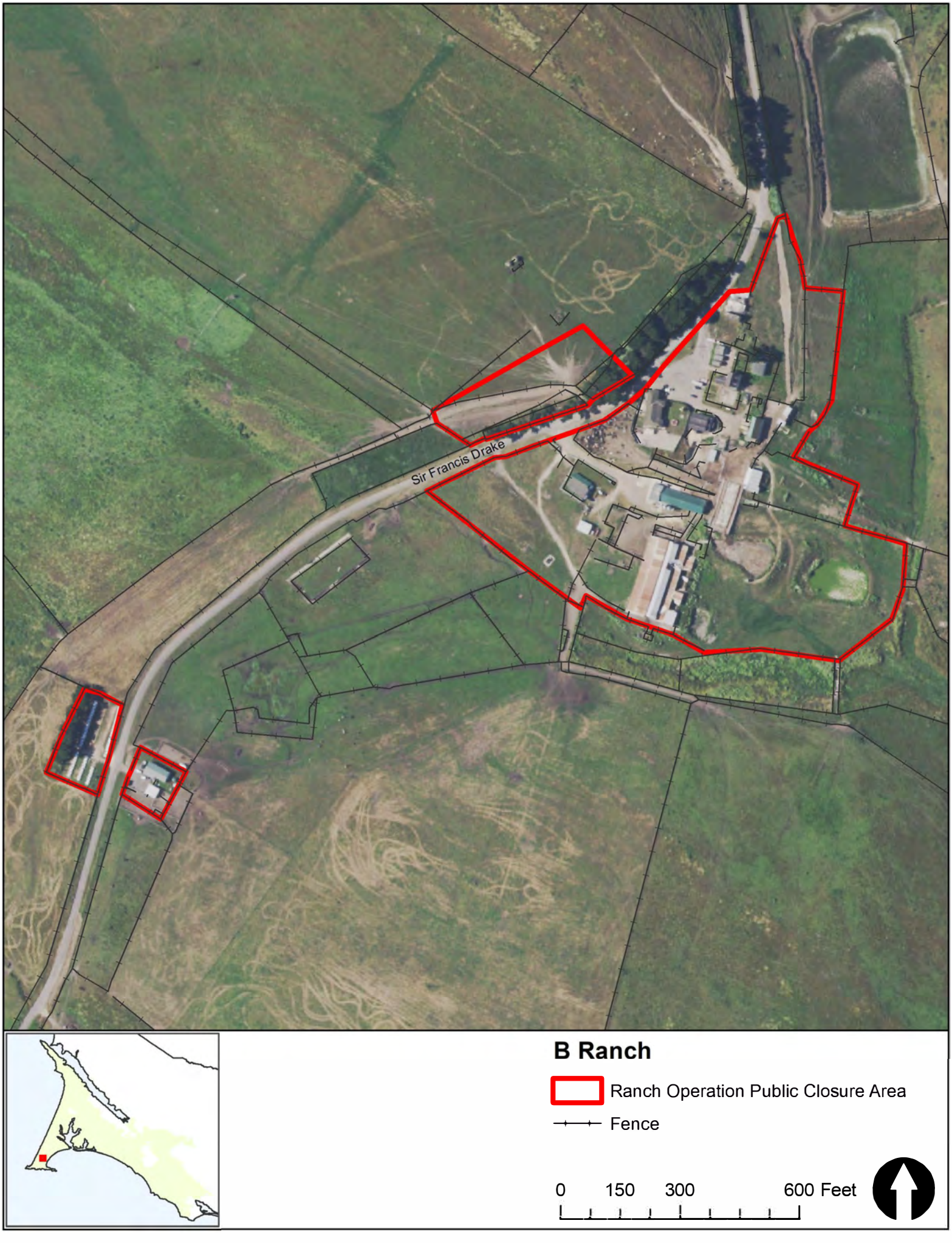
https://www.nps.gov/pore/learn/management/upload/lawsandpolicies_compendium_maps_ranch_operation_public_closure_areas.pdf

Updated circa July 2022


Sir Francis Drake
Chimney Rock Rd
A Ranch
Ranch Operation Public Closure Area
Fence
0
100
200
400 Feet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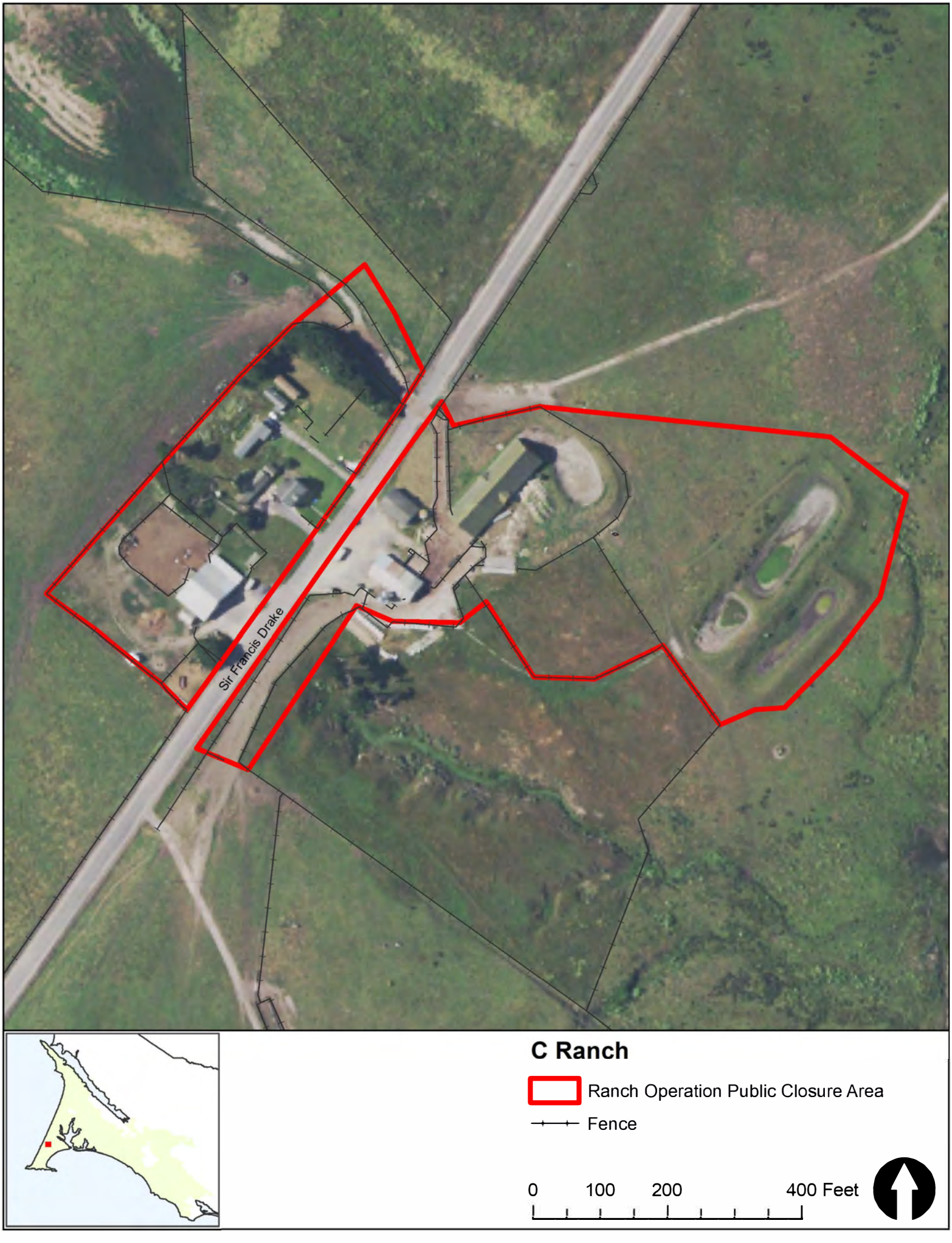
Ranch Operation Public Closure Area
Fence
0
150
300
600 Feet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Fence
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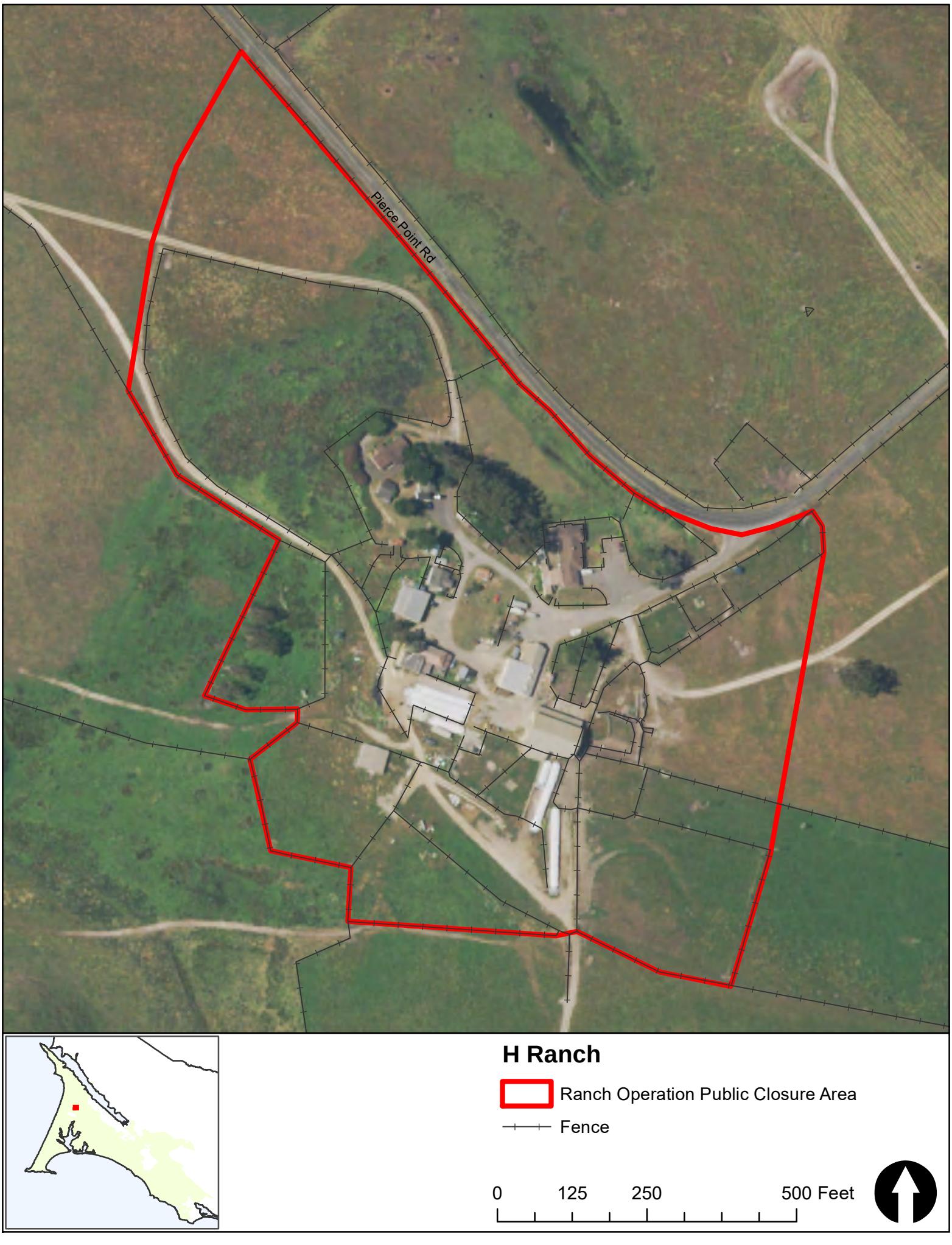
100
200
400 Feet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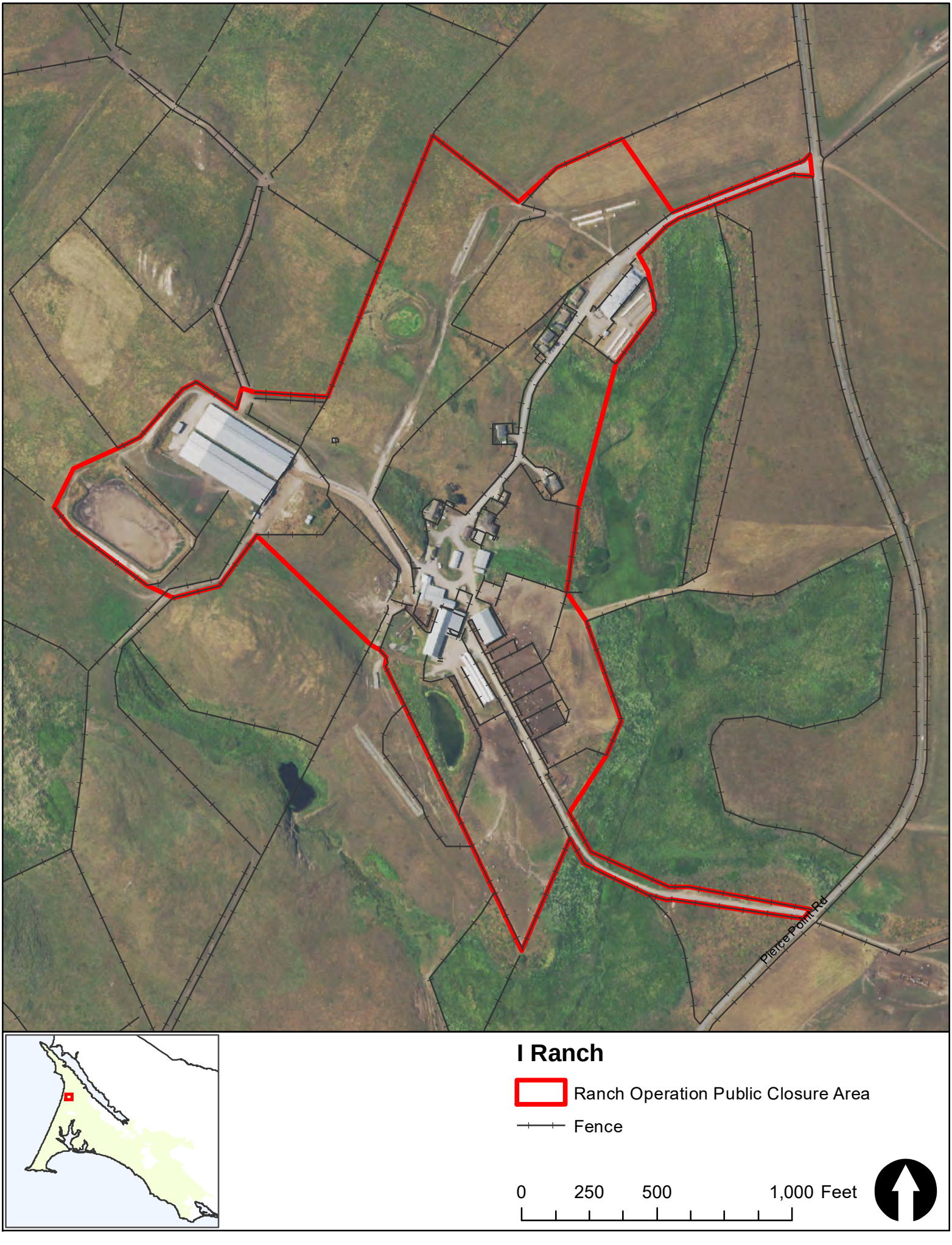
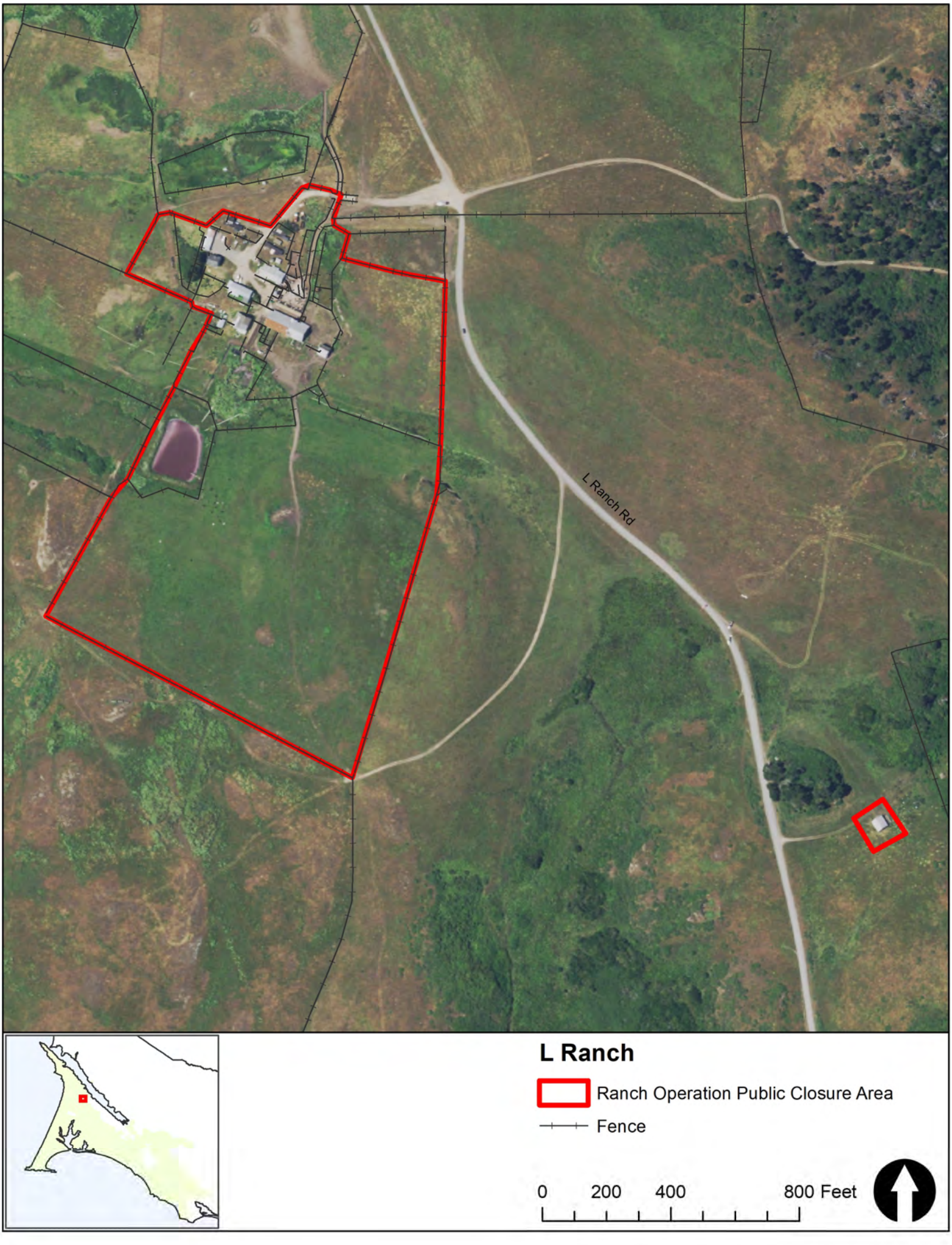
H Ranch
Ranch Operation Public Closure Area
Fence
0
125
250
500 Feet


Pierce Point Rd
I Ranch
Ranch Operation Public Closure Area
Fence
0
250
500
1,000 Feet


Pierce Point Rd
J Ranch
Previous PORE Water Quality Sampling Stations
Ranch Operation Public Closure Area
Fence
0
150
300
600 Feet


L Ranch Rd
L Ranch
Ranch Operation Public Closure Area
Fence
0
200
400
800 Feet

APPENDIX B

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Chapter 2
https://www.waterboards.ca.gov/sanfranciscobay/water_issues/programs/planningtmdls/basinplan/web/docs/ADA_compliant/BP_chapter_2.pdf

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https://parkplanning.nps.gov/showFile.cfm?projectID=74313&MIMEType=application%252Fpdf&filename=Point%20Reyes%5FNorth%20District%20Golden%20Gate%20NRA%20GMP%20and%20EIS%20Appendices%5F508%20v21%2Epdf&sfid=440979

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September 2, 2022

California Coastal Commission
455 Market Street, Suite 300
San Francisco, CA 94105

Via email to: EORFC@coastal.ca.gov

Re: Agenda Item Th10b: Review and consideration of the National Park Service's First Year Version of the Water Quality Strategy submitted pursuant to the Commission's conditional concurrence on Consistency Determination No. CD-0006-20 for the 2020 General Management Plan Amendment for Point Reyes National Seashore and the North District of Golden Gate National Recreation Area

Dear Commissioners:

River Otter Ecology Project, based in Marin County, CA, engages the public in supporting conservation and restoration by linking river otter recovery to the health of our watersheds through research, education, and community science. River otters, although not a protected species, are sentinel apex predators whose habitat includes all parts of watersheds, including the coast. Their presence and success are important indicators of ecosystem function and environmental health, including the biological productivity and quality of coastal waters.

As a general observation, we note that faith in the National Park Service's (NPS) commitment to the Federal Consistency process has been undermined by the NPS's previous casual and dismissive approach to the public's and the Commission's concerns about water quality. While the submitted Water Quality Strategy represents a marked improvement in NPS's approach, the Commission should ensure that the NPS can be held meaningfully accountable now and in the future.

To that end, our specific comments are:

1. **The Annual Water Quality Reports to the Commission must ensure maximum transparency and public accountability.**

The Annual Reports should include specific information about management practices and the installation of ranching-related infrastructure, including detailed descriptions, precise locations,

and maps of the affected areas. This level of detail is critical for informing the Commission and the public about what particular resources are being prioritized for protection, as well as the effectiveness of measures taken.

2. **The NPS should make all supporting information and data publicly available and easily accessible.**

The NPS should make all information related to the execution and results of the Water Quality Strategy publicly available and easily accessible. This information should include detailed current and historic water quality data from all sources; and records of correspondence and contact with relevant agencies, including the Regional Water Quality Control Board, US Fish and Wildlife Service, National Marine Fisheries, and others. The interim leases should be made available, as should future Ranch Operating Agreements, and the Annual Report to the Coastal Commission.

Transparency and public accountability are critical to the success of the Water Quality Strategy, now and into the future. As this is likely the Commission's last real opportunity to exert influence on the content of the Strategy, we urge you to be rigorous to the maximum extent practicable in safeguarding the public's interest, and protecting the invaluable resources of Point Reyes National Seashore.

Thank you for your thoughtful attention to this very important issue.

Respectfully,

Megan Isadore
Executive Director

Laura Cunningham
California Director
Western Watersheds Project
PO Box 70
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(775) 513-1280
lcunningham@westernwatersheds.org
www.westernwatersheds.org

Working to protect and restore Western Watersheds and Wildlife

California Coastal Commission
1121 L St. #503
Sacramento, CA 95814

Via EORFC@coastal.ca.gov

August 28, 2022

RE: Public Comment on September 2022 Agenda Item Thursday 10b - CD-0006-20 (National Park Service, Marin Co.)

Dear Commissioners,

The National Park Service (NPS) proposes an updated water quality strategy for its General Management Plan Amendment (GMPA) for Point Reyes National Seashore and the North District of Golden gate National Recreation Area in order to comply with the California Coastal Commission (CCC) conditional consistency determination of 2021. We offer comments on the proposed water quality strategy.

Western Watersheds Project is a non-profit organization with more than 12,000 members and supporters. Our mission is to protect and restore western watersheds and wildlife through education, public policy initiatives, and legal advocacy.

Clarification of Regional Water Board Oversight

First, we must point out that although we are happy that the NPS proposed Water Quality Strategy for the Management of Ranching Operations (Strategy) now includes the Point Reyes peninsula outside of the Tomales Bay watershed, this has only been undertaken in our view after huge public outcry, letters, comments, our own 2021 water quality monitoring pilot project[1], plus data collection on the poor state of streams, beaches, and wetlands grazed by commercial livestock on these public lands.

The NPS water quality report admits that NPS is finally coordinating with the San Francisco Bay Regional Water Quality Control Board, after conservation groups and numerous individuals pushed for years for clarity on which regional water board was

[1] https://www.westernwatersheds.org/wp-content/uploads/2021/03/Pt-Reyes-Surface-Water-Monitoring-Conducted-27-28-Jan-2021-complete-report-dated-3-Mar-2021-ultra-low-resolution-images.pdf

overseeing the Point Reyes peninsula outside of the Tomales Bay watershed, and how these Pacific Ocean watersheds should be managed:

> NPS staff have coordinated with the San Francisco Bay Regional Water Quality Control Board (Regional Water Board) to ensure the Strategy is consistent with existing regulatory standards and approaches. NPS will continue to coordinate and collaborate with Regional Water Board staff to ensure that ranchers are responsive to monitoring conditions and findings from regulatory inspections and ongoing monitoring results. The Strategy intends to provide a consistent set of expectations for grazing operations across all watersheds on Point Reyes National Seashore managed lands (e.g. operations outside of Tomales Bay watershed are expected to meet the same conditions as those inside the watershed). Regional Water Board staff have indicated that a new permitting program is being developed for grazing operations which could be applicable to all park grazing allotments as early as summer of 2023.[2]
>
> NPS Exhibit 1 – Water Quality Strategy at 3.

This new permitting program is long overdue. We will continue to independently monitor this new strategy and how management is implemented by NPS and the regional water board.

Public Watchdogging Pushed Goals and Objectives for Water Quality Improvement

Again, public monitoring, citizen science, our own water quality sampling effort in 2021[3], and numerous comments and letters to agencies pushed the agencies to do better. The result is the Goals and Objectives section in the NPS Exhibit 1 – Water Quality Strategy at 5.

Local citizens and park visitors found and reported septic system lease violations and water quality pollution on ranch-leases in the Seashore, and reported these to the Superintendent and to Marin County Environmental Health Services. We have the documentation that we can provide to the CCC upon request. Confined Animal Facility contributions to water pollution in the Seashore were documented in numerous comment letters by conservation organizations and citizens for years, sent to the various land managing and oversight agencies.

Ranch and dairy inspections of water quality compliance have continued to be non-transparent, hidden from public review, and not even acquired by Freedom of Information Act requests, rendering the public in the dark concerning how livestock operations are measuring water quality, or mitigating impacts to water resources in these high value park lands. This is unacceptable.

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[2] https://documents.coastal.ca.gov/reports/2022/9/Th10b/Th10b-9-2022-exhibits.pdf at 3

[3] https://www.westernwatersheds.org/wp-content/uploads/2021/03/Pt-Reyes-Surface-Water-Monitoring-Conducted-27-28-Jan-2021-complete-report-dated-3-Mar-2021-ultra-low-resolution-images.pdf

Range Monitoring Needs Improvement to Improve Water Quality

NPS uses Residual Dry Matter (RDM) measures of annual grassland ranges and pastures to monitor range conditions, yet we have repeatedly sent comments with photos to NPS showing large areas of bare ground and almost no RDM at the end of the summer. We have suggested alternative range monitoring techniques that would better conserve soils from erosion, hold rainwater and decrease runoff, and increase deep-rooted perennial plants. Yet NPS has not considered these. RDM does not measure manure on pastures, rangelands, or silage fields, and thus manure applications seem not to be monitored.

Water Quality Monitoring

Again, only due to public outcry, citizen oversight and monitoring, organizational pressure, and independent water sampling efforts, did the park decide to restart water quality sampling in August 2022 across waterways in the Seashore that have been neglected and polluted:

> *Long-term monthly monitoring efforts have been expanded to reincorporate coastal watershed monitoring stations sampled on the Point Reyes peninsula from 2000 to 2013* (NPS Water Quality Strategy at 7)

This water sampling and watersheds/beach monitoring should have been ongoing since 2013. Only now after months and years of confusion and vague answers from agencies is some clarity in a water quality monitoring program beginning to appear.

Allotment-Specific Changes to Improve Water Quality Should Be Detailed Now

NPS again defers specific details of Best Management Practices (BMP) to a later date, not available at the California Coastal Commission September hearing, and hidden from public view.

> Objective 5: Integrate specific GMPA ROD changes and updates to mandatory requirements for continuing ranch operations into current NPS management to ensure expeditious implementation of priority actions to protect water quality and sensitive resources. Primary elements include allotment-specific changes identified in the GMPA ROD, updated requirements for all ranches continuing operations under 2-year Interim Leases, active implementation of improvement projects, and adaptive management on an ongoing basis.
>
> In Progress – status as of August 2022:
>
> • *Interim Leases for all ranch operations have been drafted and are under review by NPS to be executed by September 14, 2022. They incorporate updated terms and conditions to better address water quality and resource*

> *protection objectives identified in the ROD.* (NPS Water Quality Strategy at 7, underline emphasis ours.)

These interim leases need to be available now for public review. Site-specific updated terms and conditions that better address water quality need to be listed in the NPS Water Quality Strategy document, but they are not. This programmatic type of management analysis is too general, and the public is therefore denied the opportunity to review each BMP or site specific management change to decide whether these would be efficacious.

Interim leases would include Ranch Operating Plans (ROPs) which detail these management measures in a site-specific and ranch-specific manner. Yet we do not have access to these before the hearing in order to better review impaired water quality mitigation.

Targeted Grazing

The NPS Water Quality Strategy gives no water quality monitoring or management strategy specific to the approved "targeted grazing" which was approved in the GMPA Record of Decision. Targeted grazing falls outside of Interim Leases and ROPs.

> It is expected that two additional allotments may be seasonally grazed or managed at some level with targeted grazing based on resource objectives.
>
> NPS Exhibit 1 – Water Quality Strategy at 4.

Targeted grazing is a relatively new federal livestock range management method which takes livestock from normally permitted allotments or leases or normally permitted uses, and places them on lands for new and varied goals such as fire fuels reduction or "to maintain the characteristics of the historic pasturelands" (Final EIS at 31). NPS has approved targeted grazing even in the Resource Protection Zone (Final EIS at 37). These new goals have not been adequately analyzed with respect to impacts to water quality.

> NPS defines targeted grazing in its Final EIS as:
>
> The implementation of a zoning framework under alternatives B, C, D, and E, and specifically the Resource Protection and Range subzones would reduce impacts on water resources compared to existing conditions by only authorizing limited Management Activities, including Targeted Grazing, to meet NPS resource management goals and objectives. (Final EIS at vii)
>
> and,
>
> Targeted Grazing. Targeted Grazing prescriptions optimize the timing, frequency, intensity, and selectivity of grazing (or browsing) in combinations that purposely exert grazing/browsing pressure on specific plant species or portions of the

> landscape. Targeted Grazing differs from traditional grazing management in that the goal of Targeted Grazing is to apply defoliation or trampling to achieve specific resource management objectives, whereas the goal of traditional livestock grazing management is generally the production of livestock commodities (Bailey et al. 2019). Targeted Grazing can be used to improve or maintain the condition of natural resources such as desired species composition, structure, and/or vigor of plant communities; riparian and/or watershed function; and soil erosion and soil health. NPS, in coordination with ranchers has implemented Targeted Grazing to maintain and enhance rare plant species populations, ensure adequate vegetative cover in riparian areas, and control weeds. Under alternative A, NPS would continue to coordinate with ranchers to meet specific management goals and objectives. (Final EIS at 24 and 41)

In our experience, targeted grazing has been used only very selectively to graze during extremely brief periods some habitats with rare plants, and otherwise livestock grazing has been prohibited from these sensitive habitats. Other alternatives have been proposed for management of these sensitive habitats, such as cultural prescribed fire. The public needs to be consulted about these targeted grazing plans which introduce livestock grazing to areas which may normally not see water quality impacts.

Independent Water Quality Sampling Shows Exceedances and Human Health Hazards

Recent water quality sampling by Lovell (2022) shows that water quality in many locations is still impaired (see Table 6 from the report at 25-26, below). Kehoe Creek and Kehoe Beach in particular show fecal coliform level exceedances, yet no signs warning the public were observed. Beneficial uses of waters, including Water Contact Recreation, Non-Contact Water Recreation, and Shellfish Harvesting are shown to be threatened by water pollution, as the report details.

Table 6 (page 1 of 2)

Summary of Exceedances of Surface Water Bacteria Objectives

Kehoe, Abbotts, Drakes Estero, and Drakes Bay Watersheds
Point Reyes National Seashore
Marin County CA

Water Contact Recreation (REC-1) Beneficial Use

Watershed	Location ID	Location Description	Monitoring Period	Exceedances for 42-day Geometric Mean	Exceedances for 30-day Statistical Threshold Value (STV)	Comments
Kehoe	PAC3	Kehoe Lagoon	26 Oct 21 to 26 Jan 22 (61 Days)	• ***E. coli* was 3.2 to 14 times the objective.** • **The objective was exceeded during all calculation intervals.**	• ***E. coli* was 1.1 to 21 times the objective.** • **The objective was exceeded during all calculation intervals except 29 Dec 21 to 26 Jan 22.**	The Kehoe Beach/Kehoe Lagoon area receives frequent visitors who wade in Kehoe Lagoon and the outlet stream from Kehoe Lagoon. There are no postings at/near PAC3 warning the public of the health risks of water contact recreation. Visitors to the Kehoe Beach/Kehoe Lagoon area have likely contracted gastrointestinal illness from exposure to cattle manure. (1)
Abbotts	ABB4	Outflow from Middle Abbots Lagoon	26 Oct 21 to 26 Jan 22 (61 days)	• None	• **Enterococci was 1.6 times the objective during the calculation interval 26 Oct 21 to 22 Nov 21.** • The remaining calculation intervals did not exceed the objective.	ABB4 is located at the footbridge along the Abbotts Lagoon Trail. The Abbotts Lagoon Trail receives frequent visitors.
Drakes Estero	DES3*	Home Ranch Creek Downstream of Ranch Buildings	26 Oct 21 to 12 Jan 22 (47 days)	• ***E. coli* was 1.2 to 1.8 times the objective.** • **The objective was exceeded during all calculation intervals.**	• ***E. coli* was 1.1 to 1.4 times the objective.** • **The objective was exceeded during the three calculation intervals from 26 Oct 21 to 14 Dec 21.** • The remaining calculation intervals did not exceed the objective.	
Drakes Estero	DES6B*	Schooner Creek at Sir Francis Drake Blvd	25 Oct 21 to 12 Jan 22 (48 days)	• **Enterococci was 2.6 to 6.2 times the objective.** • **The objective was exceeded during all calculation intervals.**	• **Enterococci was 3.4 to 18 times the objective.** • **The objective was exceeded during all calculation intervals.**	DES6B is located at a parking area and wildlife display. There are no postings at/near DES6B warning the public of the health risks of water contact recreation.
	DES7*	Home Ranch Lagoon at Estero Trail Bridge	26 Oct 21 to 12 Jan 22 (47 days)	• **Enterococci was 1.5 to 3.2 times the objective.** • **The objective was exceeded during all calculation intervals.**	• **Enterococci was 2.8 to 10 times the objective.** • **The objective was exceeded during all calculation intervals.**	DES7 is located at the footbridge along the Estero Trail. The Estero Trail receives frequent visitors. DES7 is on the boundary of the Phillip Burton Wilderness. There are no postings at/near DES7 warning the public of the health risks of water contact recreation.

Shellfish Harvesting (SHELL) Beneficial Use

Watershed	Location ID	Location Description	Monitoring Period	Exceedances for Median	Exceedances for 30-day Statistical Threshold Value (STV)	Comments
Drakes Estero	DES6B*	Schooner Creek at Sir Francis Drake Blvd	25 Oct 21 to 12 Jan 22 (48 days)	• **Total Coliform was 50 to 61 times the objective.** • **Fecal Coliform was 12 to 15 times the objective.** • **Both objectives were exceeded during all calculation intervals.**	• **Total Coliform was 23 to 77 times the objective.** • **Fecal Coliform was 15 to 174 times the objective.** • **Both objectives were exceeded during all calculation intervals.**	DES6B is located at a parking area and wildlife display. There are no postings at/near DES6B warning the public of the health risks of shellfish harvesting.
	DES7*	Home Ranch Lagoon at Estero Trail Bridge	26 Oct 21 to 12 Jan 22 (47 days)	• **Total Coliform was 8 to 13 times the objective.** • **Fecal Coliform was 5.0 to 6.7 times the objective.** • **Both objectives were exceeded during all calculation intervals.**	• **Total Coliform was 20 to 75 times the objective.** • **Fecal Coliform was 14 to 31 times the objective.** • **Both objectives were exceeded during all calculation intervals.**	DES7 is located at the footbridge along the Estero Trail. The Estero Trail receives frequent visitors. DES7 is located on the boundary of the Phillip Burton Wilderness. There are no postings at/near DES7 warning the public of the health risks of shellfish harvesting.

Table 6 (page 2 of 2)

Summary of Exceedances of Surface Water Bacteria Objectives

Kehoe, Abbotts, Drakes Estero, and Drakes Bay Watersheds
Point Reyes National Seashore
Marin County CA

Non-Contact Water Recreation (REC-2) Beneficial Use

Watershed	Location ID	Location	Monitoring Period	Exceedances for Arithmetic Mean	Exceedances for 30-day Statistical Threshold Value (STV)	Comments
Kehoe	PAC2	North Kehoe Creek at Pierce Point Road	25 Oct 21 to 12 Jan 22 (48 days)	• **Fecal Coliform was 1.7 to 2.9 times the objective.** • **The objective was exceeded during all calculation intervals.**	• **Fecal Coliform was 2.0 to 2.8 times the objective.** • **The objective was exceeded during all calculation intervals.**	PAC2 is located at the parking area for Kehoe Beach/Kehoe Lagoon. The area receives frequent visitors. There are no postings at/near PAC2 warning the public of the health risks of non-contact water recreation. Based on the exceedances at PAC2, it is likely that North Kehoe Creek, from PAC2 upstream to the J-Ranch milking complex, also exceeded objectives for Non-Contact Water Recreation.
Drakes Bay	DBY2	B-Ranch Unnamed Creek	14 Dec 21 to 12 Jan 22 (29 days)	• **Fecal Coliform was 1.4 times the objective.** • **The objective was exceeded during the single calculation interval.**	• **Fecal Coliform was 1.6 times the objective.** • **The objective was exceeded during the single calculation interval.**	
	DBY3	A-Ranch Unnamed Creek	14 Dec 21 to 12 Jan 22 (29 days)	• **Fecal Coliform was 1.8 times the objective.** • **The objective was exceeded during the single calculation interval.**	• **Fecal Coliform was 1.9 times the objective.** • **The objective was exceeded during the single calculation interval.**	

General Notes

(a) Exceedances based on comparison to the surface water quality objectives promulgated by the San Francisco Bay Regional Water Quality Control Board (SFBRWQCB 2022).

(b) * = in addition to cattle manure, this monitoring location was potentially influenced by other manure sources (elk, chickens, etc.).

(c) Statistical Threshold Value (STV) = Upper 90th Percentile Value. For *E. coli* and Enterococci bacteria, the calculation used logarithmic transformation. For Total Coliform and Fecal Coliform bacteria, no logarithmic transformation was performed.

(e) For the October 2021-January 2022 monitoring, location ABB5 did not exhibit exceedances of REC-1 objectives. For the October 2021-January 2022 monitoring, locations PAC1S, PAC1Z, ABB1, ABB2/3, and DBY1 did not exhibit exceedances of REC-2 objectives.

(e) REC-1 = Water Contact Recreation - Uses of water for recreational activities involving body contact with water, where ingestion of water is reasonably possible. These uses include, but are not limited to, swimming, wading, water-skiing, skin and scuba diving, surfing, white water activities, fishing or use of natural hot springs.

REC-2 = Non-Contact Water Recreation - Uses of water for recreational activities involving proximity to water, but not normally involving body contact with water, where ingestion of water is reasonably possible. These uses include, but are not limited to, picnicking, sunbathing, hiking, beachcombing, camping, boating, tidepool and marine life study, hunting, sightseeing, or aesthetic enjoyment in conjunction with the above activities.

SHELL = Shellfish Harvesting - Uses of water that support habitats suitable for the collection of filter-feeding shellfish (e.g., clams, oysters and mussels) for human consumption, commercial or sport purposes.

Footnote

(1) The water quality objectives for REC-1 are based on a gastrointestinal illness rate of 32 per 1,000 primary contact recreators. The calculated bacteria statistics significantly exceeded the objectives. There is uncertainty regarding (1) the dose-response relationship for gastrointestinal illness, (2) frequency of water contact recreation, and (3) the degree of water contact/incidental water ingestion; however, gastrointestinal illness has likely occurred.

Removal of Commercial Livestock Will Improve Water Quality

Only the removal of livestock from the Seashore and Golden Gate National Recreation Area will halt the manure deposition, storm runoff of manure into water bodies, the trampling and erosion of soils, and impacts to natural resources.

NPS admits this in their water quality strategy on page 7, where RDM measures trigger the need to reduce stocking rates in order to improve water quality:

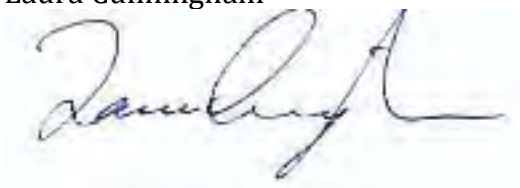
> In spring 2022, based on RDM results from the fall of 2021, NPS required five operators with pasture below RDM targets to reduce stocking levels, implement movement of cattle in a more strategic manner, or graze seasonally.

The less cattle on the land, the less trampling and grazing, the more vegetation, and this will result in improved water quality.

Thank you for considering these comments. Please keep Western Watersheds Project informed of all further substantive stages in this process by contacting me at lcunningham@westernwatersheds.org.

Thank you,

Laura Cunningham



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Reference:

Lovell, D. W. 2022. Report: Planning and Conduct of the October 2021-January 2022 Surface Water Monitoring Kehoe, Abbotts, Drakes Estero, and Drakes Bay Watersheds Point Reyes National Seashore. To Scott Webb, Turtle Island Restoration Network, 28 August 2022.

Submitted via email to EORFC@coastal.ca.gov.

September 1, 2022

Donne Brownsey
Chair, California Coastal Commission
455 Market Street, Suite 300
San Francisco, CA 94105

John Ainsworth
Director, California Coastal Commission
455 Market Street, Suite 300
San Francisco, CA 94105

Re: Agenda Item Th10b (Review and consideration of the National Park Service's First Year Version of the Water Quality Strategy submitted pursuant to the Commission's conditional concurrence on Consistency Determination No. CD-0006-20 for the 2020 General Management Plan Amendment for Point Reyes National Seashore and the North District of Golden Gate National Recreation Area)

Dear Chair Brownsey and Director Ainsworth:

The California Cattlemen's Association (CCA), California Cattlemen's Foundation (CCF), and Western United Dairies (WUD) appreciate the opportunity to provide feedback regarding the California Coastal Commission's (Commission) ongoing review of the National Park Service's (NPS) Water Quality Strategy for the General Management Plan Amendment (GMPA) for the Point Reyes National Seashore (PRNS) and North District Golden Gate National Recreation Area (GGNRA) subsequent to last year's conditional concurrence in the consistency determination for the GMPA. Our organizations and the Seashore ranchers we represent thank the NPS and Commission staff for their diligent efforts to produce a Water Quality Strategy in advancement of the GMPA process.

WUD is a statewide dairy farm trade association representing four dairies located within the PRNS. CCA is a statewide association of nearly 1,700 beef producers which represents the Point Reyes Seashore Ranchers Association and many of the individual beef producers located within the PRNS and GGNRA. CCF is a 501(c)(3) nonprofit organization which advocates on behalf of all beef cattle producers within California, including those within the PRNS and GGNRA. Our organizations have long been actively involved in issues of ranch management at PRNS and GGNRA, previously engaging throughout every phase of the now-superseded Ranch Comprehensive Management Plan (RCMP) process and throughout every phase of the present GMPA process, including last year's initial consistency determination hearing before the Commission.

On behalf of the dairy farmers and beef producers at the Point Reyes National Seashore, our organization ask that the Commission **adopt the staff recommendation, approving the NPS's August 15 Water Quality Strategy and finding the Strategy consistent with the conditions imposed under the Commission's 2021 conditional concurrence in Consistency Determination No. CD-0006-20 for the 2020 GMPA.** The Water Quality Strategy developed by NPS is robust, requiring the dairy and beef producers at the Seashore to submit to rigorous

ranch inspections, frequent and rigorous water quality monitoring, and requiring significant investments in the development and maintenance of additional ranch infrastructure. The Strategy will subject Seashore ranchers to immense scrutiny and onerous regulatory requirements, and a great deal of time, effort, and resources will be necessary to comply with the Water Quality Strategy. Nevertheless, the dairy and beef producers at the Seashore are committed to working with the National Park Service's Seashore staff to implement the Strategy, both because they are committed to the good stewardship of the water resources at Point Reyes and because approval of the Water Quality Strategy will provide additional regulatory and operational certainty for their dairies and ranches.

Since the 2014 initiation of the RCMP process and earlier, dairy and beef producers at the Seashore have been in a sort of regulatory and management limbo; approval of the Water Quality Strategy is a vital step in ensuring regulatory and operational certainty for Seashore producers, the NPS, and other Seashore stakeholders while ensuring continued stewardship of Seashore resources. As noted in the Staff Report, the Water Quality Strategy is substantively consistent with the Commission's conditional concurrence, while any potential defects are *de minimis* and can be easily cured via the annual reports submitted by NPS to the Commission.

Rancher and dairymen at PRNS and GGNRA recognize their responsibility to protect the diverse and unique resources of the Seashore and work tirelessly in partnership with many agencies and partners – including the National Park Service, San Francisco Bay Regional Water Quality Control Board, and University of California Cooperative Extension natural resource advisors, among others – in that endeavor. These farms and ranches are and continue to be forward thinking and innovative in the best practices they implement to sustain the coastal grasslands, provide a local food source to the communities of West Marin and the greater North Bay, and protect wildlife and fauna unique to the PRNS.

Approval of the Water Quality Strategy will ensure continuing best practices for environmental stewardship of the wonderful natural and cultural resources we treasure in the Point Reyes National Seashore. Accordingly, we respectfully request your adoption of the staff recommendation and approval of the Water Quality Strategy.

Sincerely,

Kirk Wilbur
Vice President of Government Affairs
California Cattlemen's Association

Lindsay McLaggan
Public Policy Advocate
California Cattlemen's Foundation

Anja Raudabaugh
Chief Executive Officer
Western United Dairies

CD-0006-200

(National Park Service)

September 8, 2022

CORRESPONDENCE

Form Letters

This item is a form letter from **17,154** separate contacts:

Remove polluting cattle ranchers from Point Reyes National Seashore — and free hundreds of Tule elk!

Dear California Coastal Commission California Coastal Commission,

I write to express how upset I am that beef and dairy ranchers are still being allowed to confine approximately 5,000 cattle in national parkland at Point Reyes National Seashore, grossly polluting our taxpayer-supported land for their own personal profit.

No matter what mitigation measures are implemented, the huge numbers of cattle who are unnaturally concentrated on this land will continue to produce gargantuan amounts of urine and feces — and emit massive amounts of methane. Inevitably some — or a lot — of this has and will continue to grossly contaminate the park's waterways, land, and atmosphere. This is unacceptable and deeply disturbing.

I respectfully implore you NOT to allow this unjustifiable pollution of Point Reyes to continue one day longer. Please retract your Conditional Consistency Determination granted last year. Put a long overdue end to the devastation of Point Reyes by commercial cattle operations that have for years been in violation of clean water regulations.

This item is a form letter from **740** separate contacts:

Public Comment on April 2022 Agenda Item Thursday 18a - CD-0006-20
(National Park Service, Marin County)

Message to California Coastal Commission:

I was shocked to see that the National Park Service (NPS) is pushing forward with an inhumane, ecologically unsound, and wildly unpopular amendment decision to extend ranch operating agreements at Point Reyes National Seashore. Allowing ranchers and dairies to raise livestock is slowly eliminating the protected and endangered tule elk in the national park by fencing them out of much of their natural grazing land, which is unthinkably cruel, particularly considering the current drought conditions.

It's vital for the health of the environment that ranching activities at Point Reyes be ended. Livestock ranching and farming operations not only consume immense amounts of water (1,799 gallons of water are required to produce a pound of cow flesh, and it takes 4.5 gallons to produce a gallon of cow's milk) but also emit massive amounts of toxic runoff, which contaminates the water supply with manure, antibiotics, and hormones. They're also responsible for overgrazing, loss of topsoil and erosion, and soil compaction. In addition, by some estimates, animal agriculture is responsible for more greenhouse-gas emissions than the entire transportation sector. These activities are so damaging that the sensitive and unique ecosystem at Point Reyes stands to be utterly destroyed.

Please determine the plans provided by the NPS in accordance with the conditions set by the California Coastal Commission (CCC) on April 22, 2021, insufficient and revoke the CCC's permission to conditionally allow the NPS' plan to keep a large portion of Point Reyes National Seashore in private ranching hands, as the NPS has not satisfactorily met these conditions.

This item is a form letter from **120** separate contacts:

Agenda Item 10b: September 8th CCC Meeting: Point Reyes

Dear California Coastal Commission ,
We need the California Coastal Commission to protect the only National Seashore on the west coast.

The cattle ranches cover over a third of Point Reyes National Seashore! They were supposed to be gone decades ago! Why are they still allowed to stay there? There are barbed wire and electric fences everywhere that block public access to tens of thousands of acres, and signs saying don't trespass, keep out.

Our planet needs to be saved from constant, known environmental impact, and the general public deserves the opportunity to visit this National Seashore and experience clean surface waters in the creeks and on the beaches, and public access to all of the park, rather than having over 300 miles of electric and barb-wire fences used for cattle ranching.

Hold the National Park Service – and especially the park management and staff – accountable to enforce environmental laws and regulations Get the cattle out of our National Seashore now!