

ROYAL RIVER MONITORING COORDINATION FRAMEWORK

Prepared by FB Environmental Associates
In collaboration with Casco Bay Estuary Partnership

May 2026

Coordination Partners:

Casco Bay Estuary Partnership (CBEP) • Friends of Casco Bay (FOCB)

Gulf of Maine Research Institute (GMRI) • Royal River Alliance (RRA)

Town of Yarmouth • U.S. Fish and Wildlife Service (USFWS) Gulf of Maine Coastal Program

Maine Department of Marine Resources (DMR) • Maine Department of Environmental Protection (DEP)

University of Southern Maine (USM) • American Rivers



Purpose and Background

This Royal River Monitoring Coordination Framework provides a shared guide for the multiple partner organizations conducting monitoring related to the anticipated removal of two mainstem dams on the Royal River in Yarmouth, Maine. The framework ensures efficient use of resources, minimizes duplication of effort, identifies monitoring gaps, and positions partners for collaborative data sharing and joint deliverables.

The Town of Yarmouth and American Rivers are pursuing the Bridge Street dam removal through the Maine Natural Resource Conservation Program (MNRCP) pathway, with a target of completing removal by the end of the 2026 low-water season, pending permitting and approval of a restoration plan. American Rivers has hired Base Flow, LLC to develop the required mitigation and restoration plan for the MNRCP grant. The East Elm Street dam removal may follow if NOAA funding is secured (pending decision, potentially in spring 2026). Alternative funding avenues are also being pursued to ensure removal of the East Elm dam can happen, targeting removal by the end of the 2027 low-water season. The listed timelines are targets and may shift based on permitting, funding, and construction progress.

This framework was developed through a facilitated coordination process led by FB Environmental Associates (FBE) and Casco Bay Estuary Partnership (CBEP), beginning in March 2026. It is intended to be a living document, updated as monitoring activities evolve and the dam removals progress.

Guiding Questions

The coordination group has aligned around six core research questions that guide monitoring design and data collection priorities:

- Will dam removal facilitate upstream movement of anadromous fish?
- Will water quality improve in the impoundments post-removal?
- Will removal change estuarine water quality and nutrient loading in Casco Bay?
- How will the work of this collaboration support the grant requirements? (MNRCP, NOAA)
- What are the patterns of juvenile fish outmigration timing and fish community composition in the estuary?
- Can target fish species access the river past Middle Falls?

These questions require coordinated, multi-partner monitoring efforts to answer effectively. Each monitoring activity in this framework is tied to one or more of these questions (see below). While the group recognizes these are important questions, there is also an understanding that due to resource limitations, not all questions will be answered during this 2026 monitoring year.

Partner Monitoring Inventory

The following table summarizes each partner organization's monitoring contributions. A detailed inventory with parameters, methods, timing, and research question crosswalk is provided in the companion spreadsheet.

Organization	Contact(s)	Monitoring Activities	Locations	Timing
Royal River Alliance (RRA)	Debbie Landry	Freshwater eDNA (metabarcoding); fish community surveys <i>(eDNA sampling will need to be timed around DMR river herring stocking events)</i>	Seven sites: head of tide to Wescustogo Park	Mid-May start; Seven events
Gulf of Maine Research Institute (GMRI)	Sam Bengs, Graham Sherwood, Zach Whitener	Estuary eDNA (alewife qPCR); seine surveys; HOBO loggers collecting temperature at each seine site <i>(eDNA sampling will need to be timed around DMR river herring stocking events)</i>	~six estuary sites (TBD)	June–Sept; biweekly
Royal River Fish Passage (RRFP)	Mike Brandimarte	Fish ladder operations; camera monitoring of fish presence; temperature loggers	Bridge St. & Elm St. ladders	Migration season; ongoing
Friends of Casco Bay (FOCB)	Mike Doan	Estuary WQ: profiles, nutrients; potential continuous data collection during dam removal <i>(Contingent on timing/equipment availability, Yankee Marina coordination)</i>	Confluence of Cousins & Royal Rivers	Monthly May–Oct
Casco Bay Estuary Partnership (CBEP)	Janelle Goeke, Matt Craig	River WQ: continuous temp, DO, conductivity	Two sites around Bridge St. Dam	Continuous May–Oct
US Fish and Wildlife Service (USFWS)	Bill Bennett	Flow/velocities at Middle Falls; geomorphic monitoring; adaptive management. <i>(actual flow data and flow distribution evaluation around the factory channel and Middle Falls should be collected, as American Rivers flagged MNRCP may want this rather than relying solely on model results).</i>	Middle Falls; dam areas	Pre/post removal

Maine DMR	Lars Hammer, Theo Willis	Fish passage interest; upstream river stocking of blueback herring (from Lockwood). Future alewife stocking at Runaround Pond under consideration. <i>Blueback herring sometimes move downstream immediately after stocking as a stress response, before eventually spawning and leaving the system. Lars will try to give eDNA monitoring partners advance notice of stocking.</i>	System-wide	TBD-anticipated late May
Maine DEP (Marine Unit)	Angie Brewer	Discrete water quality monitoring for nutrients and water column optical properties.	Multiple sites along Royal and Cousins estuaries	May-Oct 2027
Maine DEP	Kristin Feindel, Jeanne DiFranco	Pre-dam removal benthic macroinvertebrate sampling was completed 2025. Results, including state aquatic life criteria attainment determinations available soon. There are plans for post-removal follow-up sampling.	Elm Street impoundment, Bridge Street impoundment, and below Bridge Street	Summer 2026 (results of 2025 sampling) Post removal sampling: TBD
University of Southern Maine (USM)	Karen Wilson	Potential student involvement: benthic invertebrate monitoring, wetlands	TBD	TBD

Synergies and Coordination Opportunities

eDNA Coordination (RRA & GMRI)

Debbie Landry's freshwater metabarcoding and GMRI's estuary qPCR work are complementary methods targeting overlapping questions about fish presence and distribution. The group should explore sample-sharing protocols, since metabarcoding and qPCR can yield different insights from the same water samples. Debbie's sampling timeline depends on Mike Brandimarte's temperature data, creating a natural coordination point.

Continuous Water Quality Co-Deployment (CBEP & FOCB)

CBEP's continuous river monitoring and FOCB's estuary monitoring can be strategically co-deployed around the dam removal window to maximize before/during/after data collection. GMRI also has HOBO loggers co-

deployed at seine sites that contribute instantaneous measurements. The group should agree on a shared deployment timeline linked to the dam removal schedule.

Dam Construction Logistics

- The Request for Proposals (RFP) for the dam removal is out, with the current plan addressing Bridge Street this year, and Elm Street and Middle Falls following later.
- Anticipated dam removal sequence: dewatering the impoundment, removing 20–30 feet of the penstock to drain water, working on timber mats below the dam, and removing the dam from river left to river right (starting with the fish ladder).
- Safety considerations for removal worksite: Group members present at the removal worksite should adhere to safety standards and use best professional judgement. At a minimum, group members are required to wear hard hats, high visibility vests, and steel-toe boots within 100 feet of the dam. Individuals should be aware of instable sediment and sudden flow changes, particularly in the river left fish ladder area during active removal. All group members are reminded that monitoring is prohibited within secured perimeters unless cleared by the Site Incident Lead.
- Partners must account for these construction impacts on water quality monitoring and fish passage, and a pre-removal site inspection should be done to ensure fish can pass the dam removal site while it is dewatered.

Fish Counts Integration (GMRI & Mike B.)

- Mike Brandimarte's camera-based counts provide data on fish presence and movement using stationary cameras at the fish ladder exit, though this method is highly turbidity-dependent.
- GMRI views their estuary seine counts as a separate, complementary effort that begins later in the season and will be more informative for tracking juvenile emigration.
- GMRI anticipates their seining will primarily capture young-of-year (YOY) and juveniles; they have never caught outmigrating adults on the Presumpscot River and do not expect to do so here.
- Additionally, the camera data helps inform the timing of Debbie's eDNA sampling.

Stocking and eDNA Coordination (DMR, RRA, and GMRI)

DMR's stocking of blueback herring in upstream lakes could confound eDNA results if herring stocking events overlap with sampling. Coordination is needed to ensure sampling and DMR river herring stocking schedules are aligned and that eDNA results can be properly interpreted.

Gap Analysis and Recommendations

The following monitoring gaps were identified in Meeting 1, ranked by priority. A detailed gap analysis is provided in the companion spreadsheet.

High Priority

- **PIT Tagging for River Herring:** This is the best available method to track individual fish origin and destination. It has high scientific value, but there is currently no confirmed lead or full funding. DMR and American Rivers have expressed interest, and Karen Wilson (USM) is also very interested in this effort. DMR noted they have some leftover equipment they may be able to offer, though a budget would still be required. Matt suggested that PIT tagging could be utilized as an "as needed" option if fish are getting stuck around Middle Falls; however, this need would not be evident for a few years until returning fish are expected in the system.
- **Benthic Invertebrate Monitoring:** Benthic invertebrates are a key water quality indicator. Maine DEP collected pre-removal baseline data at three sites in 2025 and is planning to conduct follow-up sampling post-removal. Remaining needs center on whether additional spatial coverage beyond these locations or interim-year monitoring prior to DEP's follow-up would strengthen understanding of system-wide responses. USM students and eDNA metabarcoding (Debbie) are potential low-cost approaches to expand coverage if needed. Action items below;
 - (1) Follow up with Karen Wilson at USM specifically regarding potential student involvement to support expanded spatial or interim monitoring if identified as a priority
 - (2) Stocking–eDNA Protocol: Formal coordination between DMR stocking schedule and RRA eDNA sampling needed to avoid confounding results.

Medium Priority

- **MNRCP Monitoring Requirements & American Rivers Participation:** American Rivers flagged that the Maine Natural Resource Conservation Program (MNRCP) may want to see an evaluation of flow distribution around the factory channel and Middle Falls. This aligns with USFWS's interest in potentially collecting actual flow data in that area rather than relying solely on model results.
- **NOAA Funding:** Monitoring requirements related to the East Elm Street dam removal remain pending the NOAA funding decision, which is potentially expected in spring 2026.
- **Runaround Pond & Stocking Implications:** DMR plans to stock blueback herring (sourced from Lockwood) in the upstream Royal River in late May and noted that future alewife stocking at Runaround Pond is under consideration. The implications of this stocking—alongside American Rivers' alternative analysis—need continued clarification to ensure they do not confound monitoring efforts like eDNA sampling.

Low Priority

- **Waterfowl / Acoustic Monitoring:** Aspirational; could leverage citizen science tools, but no lead identified.

Data Sharing and Communication

Data Sharing Platform

The group will use Google Drive maintained by CBEP as the central repository for shared data, documents, and meeting materials. All partners will have access to a shared folder structure organized by monitoring activity. Each group will upload shared data using the file naming convention "GroupName_DataType_Date" to ensure data discoverability across groups that are collecting data.

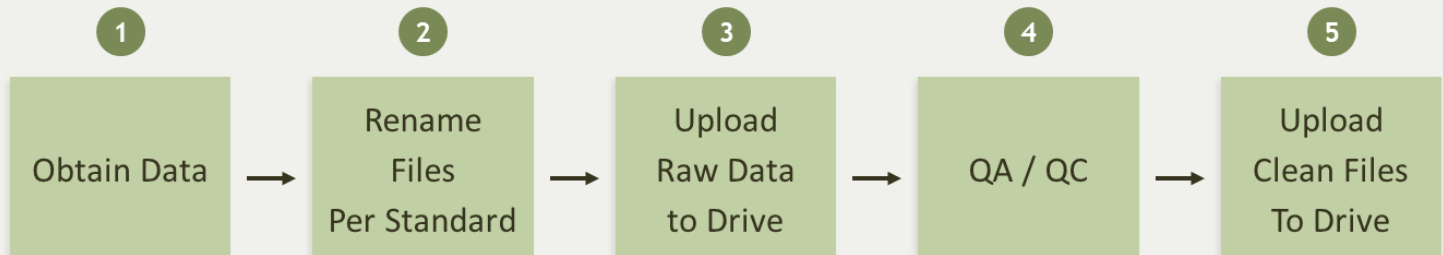


Figure 1. Data sharing workflow for the project

Communication Protocols

- Group email list for routine updates and coordination
- Partners share data at agreed-upon intervals

QA/QC Standards

Each partner organization will follow their own established QA/QC protocols. Protocols should be shared to allow data compatibility with others outside this group.

Collective Deliverables and Next Steps

The coordination group should consider the following potential joint products:

- This Monitoring Framework document (final version).
- Post-monitoring synthesis report: A collaborative publication or report documenting findings across all monitoring activities, timed to follow the first full season of post-removal monitoring. Synthesis report to include Elm Street removal as well if it occurs before 2028.
- Data repository: A shared, organized collection of monitoring data accessible to all partners and potentially to the public.
- Presentations and outreach: Joint presentations at conferences, community events, or to funders.

Summer 2026

Enhanced monitoring deployment around dam removal window. Co-deployed continuous loggers (CBEP + FOCB). Coordination check-ins as needed.

Post-Removal

These plans assume that Elm Street dam removal will follow Bridge Street removal soon.

Continued monitoring per partner plans, extended as needed to capture the combined response to both removals. Initial data synthesis and comparison to baseline. Planning for the post-monitoring report and long-term coordination mechanism. Adaptive management provisions for Middle Falls side channel.

Ongoing Coordination

CBEP will serve as the convening organization and will support with coordination moving forward between partners.