

**HUDSON RIVER ECOSYSTEM
MONITORING PROGRAM(HREMP)
REQUEST FOR PROPOSALS
FOR THE
INTERIM LOWER FOOD WEB
SURVEY (2024-2026)**

Release Date: February 2, 2024
Notice of Intention to Apply (Optional): February 16, 2024
Proposal Due Date and Time: 5:00 pm on March 15, 2024

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Section I. Background and Introduction

The closure and decommissioning of the Indian Point Nuclear Power Plant ended more than 40 years of fisheries monitoring conducted by the plant’s operating utilities. In 2021, stakeholders (including a 2020-2021 HRBMP workgroup¹) tasked with making recommendations about the future of the historical Hudson River Biological Monitoring Program agreed that a sustained comprehensive biological monitoring program on the Hudson River was essential to inform future management decisions. That consensus was instrumental during discussions regarding the use of funds made available for community and environmental benefit projects as part of the Indian Point decommissioning process. In February 2022, the New York State Energy Research and Development Authority, the NYS custodian of the Indian Point Community Fund provided the Hudson River Foundation (HRF) with \$6.5M to work in close collaboration with New York State Department of Environmental Conservation (DEC) and other fisheries scientists and stakeholders to initiate a multi-year effort to provide ecological data and analysis that would be the basis of a new monitoring program — the Hudson River Ecosystem Monitoring Program (HREMP). As envisioned, the HREMP would build where possible on the historical data sets but would also fill important data and information gaps that could enhance management of the Hudson River fisheries and understanding of the ecosystem they depend upon.

A. Hudson River Ecosystem Monitoring Program (HREMP):

Over the past year, HRF and NYSDEC have worked with scientists (including the Hudson River Ecosystem Monitoring Program Panel² and other stakeholders to develop an interim solution to conduct essential monitoring activities in the Hudson River. Two primary fisheries surveys, funded separately by DEC, are currently being conducted under the Interim HREMP: (1) DEC Beach Seine Survey (BSS); and (2) DEC contracted Fall Juvenile Survey (FJS). This Request for Proposals (RFP) is to conduct monitoring activities under a third (3) survey - the interim Lower Food Web (ILFW) survey.

B. Scope of Services

The Hudson River Foundation seeks a (“**Consultant**”) to implement a three-year monitoring program in the Hudson River through data collection, analysis, and reporting. The requested monitoring activities (“**Scope of Services**”) are outlined in **Section II**. The Scope of Services provides a condensed summary of the monitoring activities to be conducted under the ILFW survey. The Consultant is requested to develop and describe their approach including the data collection methods and protocols needed to successfully provide the various services outlined herein.

C. Available Budget

The total budget to implement the three-year monitoring effort described in the Scope of Services and fulfill the project’s reporting and other obligations cannot exceed **Two Million Dollars (\$2,000,000)**.

¹ 2020 – 20201 HRBMP Workgroup: Yong Chen, Michael Frisk, George Jackman, Karin Limburg, Eric Shultz, Dave Secor, Chris Solomon, Dave Strayer, Patrick Sullivan, and John Waldman

² Hudson River Ecosystem Monitoring Program (EMP) Panel: Chris Solomon, Patrick Sullivan, Nina Overgaard Therkildsen, Brian Weidel

Section II. Scope of Services.

Components and structure of the Interim Lower Food Web Monitoring Program (ILFW (2024-2026))

1 Phytoplankton and Zooplankton Freshwater Tidal Hudson River

A. Study Area: The original lower food web survey (CLFW³) focused on the freshwater tidal Hudson River with samples collected at six “cardinal” stations (Table 1). The ILFW-FW-Plankton surveys will collect phytoplankton and zooplankton samples from the same locations as the CLFW survey.

B. Survey Frequency and Timing:

- 5 sites sampled every other month from April to October.
- 1 site: (Kingston) sampled twice a month from April to November.

*Table 1. ILFW-FW-Plankton sampling stations. * Denotes twice monthly seasonal (April – October) sampling stations, the other stations are sampled every other month.*

| Station Name | River Mile | Annual Sampling Events |
|-----------------|------------|------------------------|
| Castleton | 138 | 4 |
| Hudson | 117 | 4 |
| Kingston* | 90 | 16 |
| Poughkeepsie | 75 | 4 |
| Fort Montgomery | 50 | 4 |
| Haverstraw | 35 | 4 |

C. Survey Methods:

1. **Phytoplankton (PP):** The **ILFW-FW-PP** survey will generally follow the methods used in the CLFW³ survey. In brief, phytoplankton biomass will be monitored *in vitro* by estimating chlorophyll a (Chla) concentration using the CLFW methods. *In vivo* Chla fluorescence monitoring will generally follow the methods used by Connecticut Department of Energy and Environmental Protection (CT DEEP) and the Interstate Environmental Commission (IEC) for the Long Island Sound (LIS)^{4,5} monitoring.

³ See Appendix 1 for references for additional information on CLFW sampling locations and methods.

⁴ The Connecticut Department of Energy and Environmental Protection (CT DEEP) and the Interstate Environmental Commission (IEC) have monitored key water quality parameters in Long Island Sound since 1991. See here: <https://portal.ct.gov/DEEP>, and here: <https://www.iec-nynjct.org>.

⁵ CT DEEP. 2017. CTDEEP Long Island Sound Ambient Water Quality Monitoring Program Quality Assurance Project Plan, May 2017. Connecticut Department of Energy and Environmental Protection, Bureau of Water Protection and Land Reuse. Hartford, CT 06106.

2. **Micro-Zooplankton: The ILFW-FW-MicroZP** survey will generally follow the methods used in the CLFW surveys. In brief, micro-zooplankton (35µm to 75 µm) will be identified to the lowest practicable classification level using a dissecting microscope. The abundance of identified taxa (individuals/L) and biomass (µg/L) by taxa and in total for each sample will be assessed.
3. **Macro-Zooplankton: The ILFW-FW-MacroZP** survey will generally follow the methods used in the CLFW surveys. In brief, macro-zooplankton (> 75µm) will be identified to the lowest practicable classification level using a dissecting microscope as described for micro-zooplankton above.

2 Phytoplankton and Zooplankton Brackish Water Tidal Hudson River

A. Study Area: The **ILFW-BW-Plankton** survey will collect monthly surface (1 meter below surface) and bottom (1 meter above the bottom) water samples from three middle river stations between Sleepy Hollow and the George Washington Bridge for phytoplankton community analyses (Table 2).

Table 2. Brackish Water Plankton Sampling Stations and Sampling Events

| Station Name | River Mile | Annual Sampling Events |
|---------------|------------|------------------------|
| Sleepy Hollow | 30 | 12 |
| Yonkers | 20 | 12 |
| GW Bridge | 10 | 12 |

B. Survey Frequency and Timing:

- 3 sites sampled once per month.

C. Survey Methods:

1. **Phytoplankton (ILFW-BW-PP)** In brief, phytoplankton biomass will be monitored *in vitro* through extraction analysis and *In vivo* through Chla fluorescence analysis as described above.
2. **Micro-Zooplanktonm (ILFW-BW-MicroZP).** In brief, micro-zooplankton (35µm to 75 µm) will be identified to the lowest practicable classification. The abundance of identified taxa (individuals/L) and biomass (µg/L) by taxa and in total for each sample will be assessed as described above.
3. **Macro-Zooplankton Abundance and Biomass (ILFW-BW-MicroZP).** In brief, macro-zooplankton (> 75 µm) will be identified to the lowest practical classification level. The abundance of identified taxa (individuals/L) and biomass (µg/L) by taxa and in total for each sample will be assessed as described above.

3 Water Chemistry and Physical Characteristics

The **ILFW-WCPC** survey will collect water samples to measure water chemistry and physical properties.

A. Study area: Water samples will be collected alongside the plankton survey samples taken at the six freshwater sites (Table 1) and the three brackish water stations (Table 2).

B. Survey Frequency and Timing: Same frequency and timing as the plankton samples (Table 4).

C. Survey Methods: Standard sampling protocols, generally as describe in the QAPP for LIS⁵, will be used to assess the following parameters:

- Water temperature, dissolved oxygen, light extinction, water clarity (secchi depth, turbidity), conductivity, pH, total alkalinity, seston, TOC, DOC, DIC, NPOC, ammonia, nitrate, phosphate, total nitrogen, total phosphorous, current speed, and direction.

4 Bivalve and Large Benthos Freshwater Tidal

The **ILFW-FW-BLB** surveys will track the large benthos in the freshwater Hudson River including the population densities of native pearly mussels (three species of Unionidae) and invasive Dreissenid mussels (two species: the zebra mussel *Dreissena polymorpha* and the quagga mussel *Dreissena rostriformis bugensis*).

4.1 Bivalve Community in Soft Substrates (SS)

A. Study Area: The **ILFW-FW-BLB-SS** survey will collect sediment samples from the same locations as the CLFW survey (Newburgh to the Troy Dam, see Appendix 1).

B. Survey frequency and timing: The survey will collect 44 sediment samples across 11 cross-channel transects (4 samples per transect). Samples will be collected once per year in the summer (between late June to July) (Table 4).

C. Survey Methods: Samples will be taken using a standard (9" x 9") PONAR grab, sieved in the field through a 2.8 mm mesh, and sorted in the laboratory. All taxa will be identified to the lowest practical identification level using a dissecting microscope.

4.2 Bivalve Community in Rocky Substrates (RS)

The **ILFW-FW-BLB-RS** survey will sample the large benthos populations in the freshwater reaches of the Hudson living on rocky substrates too coarse to be sampled with a PONAR sampler.

A. Study Area: The BLB-RS survey will deploy divers to sample 6 sites between Newburgh to the Troy dam. The sampling locations will be same as in the CLFW survey (see Appendix 1).

B. Survey frequency and timing: The rocky substrate samples will be collected from 6 sites twice per year (June and August) .

C. Methods: In brief, at each sampling location, divers will haphazardly toss a 1m quadrat and excavate all hard substrates within each quadrat. Rocky substrates will be scraped and sieved through a 2.8mm sieve and all taxa will be identified to the lowest practical identification level.

5 Benthic Community Brackish Water

The ILFW-BW-BC surveys will monitor the composition of the benthic infaunal communities living in the sediments of the brackish reaches of the Hudson River.

5.1 Benthic Community in Soft Substrates (SS)

A. Study Area: The **ILFW-BW-BC-SS** survey will sample 8 sites (**Table 3**) between Haverstraw Bay and the Battery. Sampling locations will be located outside of the navigation channels, alternating on the east and west side of the navigation channels, in depths between 5M and 8M (MLW).

Table 3 Benthic Community Sampling Stations (ILFWW-BW-BC-SS)

| Station Name | River Mile | Annual Sampling Events (spring and fall) |
|-------------------------|------------|--|
| Haverstraw Bay (W) | 35 | 2 |
| Sleepy Hollow(E) | 30 | 2 |
| Irvington (W) | 25 | 2 |
| Yonkers (E) | 20 | 2 |
| Riverdale (W) | 15 | 2 |
| GW Bridge (E) | 10 | 2 |
| Manhattan (72nd St) (W) | 5 | 2 |
| Battery (E) | 0 | 2 |

B. Survey Frequency and Timing: The survey will sample each station twice a year (May and October) (Table 4).

C. Survey Methods: Samples will be taken using a standard (9" x 9") PONAR grab, sieved in the field through a 0.5 mm mesh, preserved in the field and sorted in the laboratory. All taxa will be identified to the lowest practical identification level using a dissecting microscope. A second PONAR grab sample at each location will be taken for sediment grain size analysis following standard methods⁶.

5.2 Epibenthic Community

A. Study Area: The ILFW epibenthic settlement **ILFW-BW-BC-EB** surveys will focus on the brackish water reaches of the Hudson, extending from Newburgh to the Battery. Sample collection plates will be deployed at 20 sampling sites spatially distributed across the area.

⁶ EMAP-Estuarines Laboratory Methods Manual (US EPA 1995).

B. Survey Frequency and Timing: Two settlement plates will be deployed in May at each location. One plate will be collected after a three-month soak period (July) the other plate will be collected after a six-month soak period (October) (Table 4).

C. Methods: 0.1 m² (31.6 cm x 31.6 cm) settlement plates will be constructed of dark colored, lightly sanded, 2mm PVC. The settlement plates will be weighed to position the plates parallel to, and 0.5 m (MLW) from the river bottom. All taxa will be identified to the lowest practical identification level using a dissecting microscope.

6 Striped Bass Eggs and Larval Fish Survey

The ILFW Striped Bass eggs and larval fish (**ILFW-BW-SB-EL**) survey will collect striped bass eggs and larvae to develop complimentary estimates of striped bass spawning stock biomass.

A. Study Area: The ILFW-BW-SB-EL survey will target the spawning grounds of striped bass. The historic Utilities Long River Survey (ULRS) data analysis provide by SBU indicated three prominent spawning locations. Thus, sampling will occur within three focal spawning areas: river miles 52-60, 70-120, and 134-139^{7,8,9}.

B. Survey Frequency and Timing: The ILFW-BW-SB-EL survey will target the spawning season of striped bass, collecting data weekly from mid to late April and to mid to late June for a collective of 8 sampling events (Table 4).

C. Methods: The ILFW-BW-SB-EL will generally follow the methods used in the ULRS, but must be optimized to capture striped bass eggs and larvae by sampling during the daylight hours using a 1 m² epibenthic sled. The samples will be processed following the methods used in the ULRS¹⁰. In brief, eggs and larvae will be separated, sorted by major taxonomic group and life stage, counted, and measured. During each sampling event, 48 to 52 samples will be collected for a total of ~ 500 samples.

⁷ Xindong Pan, Stephanie Arsenaault, Katrina Rokosz and Yong Chen, Spatial variability of striped bass spawning responses to climate change, *Global Ecology and Conservation*, (2022) <https://doi.org/10.1016/j.gecco.2023.e02405>

⁸ Chang H-Y, McKown K and Chen Y (2023) A long-term ichthyoplankton monitoring program suggests climate-induced environmental variabilities changed fish communities in the Hudson River estuary. *Front. Mar. Sci.* 9:1077997. doi: 10.3389/fmars.2022.1077997

⁹ Secor, D.H, O'Brien MHP, Gahagan BI, Fox DA, Higgs AL, and Best JE. 2020. Multiple spawning run contingents and population consequences in migratory striped bass *Morone saxatilis*. *PLoS ONE* 15(11): e0242797. <https://doi.org/10.1371/journal.pone.0242797>

¹⁰ ASA, Analysis and Communications, Normandeau Associates, LWB Environmental, AKRF. 2019. Hudson River Biological Monitoring Program 1974-2017 Final Report.

7 Molecular Sampling

Molecular techniques have emerged as promising tools that can complement traditional monitoring techniques. The ILFW molecular sampling (**ILFW-MS**) survey will collect and archive (for a period not to exceed one year post collection) samples for analysis under two complimentary HREMP projects: 1) eDNA investigation of the spatial and temporal variability in eDNA signals; and 2) Development of DNA barcoding and metabarcoding techniques to improve the accuracy of species identification and estimate the taxonomic composition and relative proportions of the various taxa present in composite samples.

- A. **Study Area:** The ILFW-MS survey samples will be collected alongside the ILFW-FW-Plankton, ILFW-BW-Plankton, and ILFW-BW-SB-EL surveys.
- A. **Survey Frequency and Timing:** Samples will be collected on three occasions (spring, summer, and fall) at each of the nine plankton sampling sites, for a total of 27 plankton comparison samples. Samples will also be collected weekly from mid to late April and to mid to late June (8 sampling events) corresponding with ILFW-SB-EL survey sites for a total of 498 samples (Table 4).
- B. **Methods:** Methods will generally follow the protocols established for the NYS DEC Round Golby Survey¹¹. In brief, two water samples (one sample for each of the two complimentary programs) will be collected from each site during each survey. A pump will be used to vacuum 2 L of water through a 47-mm glass-fiber filter (1.5- μ m pore size). The filter and the 2-liter sample will be placed on ice in the field and stored at -16C until authorized for transfer or disposal by HRF.

Table 4. ILFW Annual Sampling Events Summary

| Survey | # of Stations | Annual Sampling Events |
|-------------------------------------|---------------|------------------------|
| ILFW-FW-Plankton | 5 | 4 |
| ILFW-FW-Plankton (cardinal station) | 1 | 16 |
| ILFW-BW-Plankton | 3 | 12 |
| ILFW-WCPC | 6 | 20 |
| ILFW-FW-BLB-SS | 44 | 1 |
| ILFW-FW-BLB-RS | 6 | 2 |
| ILFW-BW-BC-PS | 8 | 2 |
| ILFW-BW-BC-EB | 20 | 2 |
| ILFW-BW-SB-EL | 3 | 8 |
| ILFW-MS | 9 | 35 |

¹¹ George, S.D., Baldigo, B.P., Rees, C.B., Bartron, M.L. and Winterhalter, D. (2021), Eastward Expansion of Round Goby in New York: Assessment of Detection Methods and Current Range. *Trans Am Fish Soc*, 150: 258-273.
<https://doi.org/10.1002/tafs.10290>

Section III. Deliverables and Timelines

Required Pre-Survey Planning Documents. The following pre-survey planning documents are required to be completed prior to initiating any data collection or analysis activities. HRF will issue a “Notice to Proceed” only after the Consultant has submitted and HRF has approved all three documents.

1. HREMP Interim Lower Food Web (ILFW) Monitoring Plan.

The Scope of Services (Section II) outlines the monitoring activities to be implemented under the ILFW monitoring program. The Consultant is responsible for reviewing the Scope of Services and proposing the most appropriate sampling protocols and analysis methods. Given the spatial and temporal overlap of the monitoring activities, the Consultant is expected to optimize the overall monitoring program and, where possible, identify cost and time savings opportunities.

Deliverable Due Dates: 4 weeks after signed contract

2. Quality Assurance Plan

The Consultant will develop a Quality Assurance Plan (QAP) that established quality assurance (QA) and quality control (QC) standards and procedures to be applied to the collection and analysis of the data under the ILFW survey. The QAP must be approved by HRF and DEC prior to undertaking any data collection activities.

Deliverable Due Dates: 4 weeks after signed contract

3. Data Management Plan

New York State shall own the data collected under the program and all the data will be considered open access. The Consultant will develop a Data Management Plan (DMP) that describes the policies and procedures for handling, processing, and documenting the recorded and derived observations and measurements. The DMP will describe the appropriate metadata for each of the survey components and document the entire data management workflow, from collection to data submission to the Hudson River Foundation. The Hudson River Foundation, under a separate program, will make the data available to the public.

Deliverable Due Dates: 4 weeks after signed contract.

Annual Deliverables:

4. Annual and Final Report of Activities

At the end of each calendar year, the Consultant will provide an annual report detailing the data collected under each survey program. The report will document any deviation from the planned monitoring and any recommendations for changes in the following years. Note: The reports are not intended to interpret, summarize or visualize any of the data collected under this survey.

Deliverable Due Dates:

- 2024 Annual Report, March 31, 2025
- 2025 Annual Report, March 31, 2026
- 2026 Final Report, March 31, 2027

5. Data Deliverables

At the end of each calendar year, in the format and delivery method described in the DMP, the Consultant will provide the data collected under each survey program.

- 2024 Data Delivery, March 31, 2025
- 2025 Data Delivery, March 31, 2026
- 2026 Final Data Delivery, March 31, 2027

Section IV. Qualifications

The Consultant and team members must meet the following qualifications:

1. Demonstrated experience and capacity to successfully implement the full suite of activities outlined in the Scope of Services.
2. Access to a vessel(s) that is suitable to implement the required data collection activities.
3. Access to the laboratory and field equipment needed to successfully implement the full suite of activities outlined in the Scope of Services.
4. References that confirm the Consultant's experience with the activities outlined in the Scope of Services. The consultant should provide a list of three (3) applicable references, including name, title, and contact information for each as well as a brief description of the specific services provided.

Section V. Submission

1. Notice of intent to apply (optional, due February 16, 2024)
HRF welcomes a brief notice of intent to apply, including your expected project lead, and primary team members. Please send the Notice of intent to James Lodge via email to: Jlodge@hudsonriver.org.
2. Questions about the RFP (optional)
You may submit questions about the RFP to James Lodge via e-mail to: Jlodge@hudsonriver.org. All responses will be posted on the HRF Website:
<https://www.hudsonriver.org/article/hudson-river-ecosystem-monitoring-project-hrempe>
3. Full Proposal (due March 15, 2024)
Proposals must be submitted by 5:00 PM March 15, 2024 to Jlodge@hudsonriver.org as a single PDF document. The file name should be in the following format: "HREMP_ILFW_Proposal_NAME OF YOUR ORGANIZATION." You will receive an email confirming your submission with the subject line "RFP Submission Confirmation."

Section VI. Evaluation

Proposals should respond to the requirements of this RFP in a straightforward and concise manner. Proposals will be evaluated based on staff qualifications, experience, project cost, and technical approach to completing the requested Scope of Services. All proposals will be reviewed and evaluated by a review panel consisting of HRF and NYSDEC staff and relevant experts. Revisions may be requested before or after reaching a final decision, and in consideration of the amount of funding available. Criteria for proposal evaluation include:

- Responsiveness to the Request for Proposals
- Technical Approach to the requested Scope of Services
- Experience and capacity to implement the Scope of Services
- Cost Effectiveness

Section VII. Terms and Conditions

1. The term of the Contract is expected to be May 1, 2024 to March 31, 2027.
2. Insurance Requirements. The successful applicant will be required to obtain and maintain continuous insurance coverage in the manner, form, and limits specified by HRF. The following is a summary of the coverage requirements:
 - a. Commercial General Liability Insurance with a limit of not less than Two Million Dollars (\$2,000,000) per occurrence
 - b. Comprehensive Business Automobile Liability Insurance with a limit of not less than One Million Dollars (\$1,000,000) Combined Single Limit.
 - c. Protection and Indemnity Insurance including Jones Act coverage with a limit of not less than Five Million Dollars (\$5,000,000).
 - d. Workers Compensation in statutory amounts for all persons employed in connection with this Project.
 - e. Disability Benefits in statutory amounts for all such persons who come within the provisions of the disability benefits law.

Appendix 1. References for the Cary Lower Food Web (CLFW) survey

Caraco, N. F., J. J. Cole, P. A. Raymond, D. L. Strayer, M. L. Pace, S. E. G. Findlay, and D. T. Fischer. 1997. Zebra mussel invasion in a large, turbid river: phytoplankton response to increased grazing. *Ecology* 78:588-602.

Findlay, S., M. L. Pace, and D. Lints. 1991. Variability and transport of suspended sediment, particulate and dissolved organic carbon in the tidal freshwater Hudson River. *Biogeochemistry* 12:149-169.

Findlay, S., M. L. Pace, D. Lints, J. J. Cole, N. F. Caraco, and B. Peierls. 1991. Weak coupling of bacterial and algal production in a heterotrophic ecosystem, the Hudson Estuary. *Limnol. Oceanogr.* 36:268-278.

Findlay, S., M. L. Pace, and D. Lints, and K. Howe. 1992. Bacterial metabolism of organic carbon in the tidal freshwater Hudson estuary. *Mar.Ecol.Prog.Ser.* 89:147-153.

Findlay, S., M. L. Pace, and D. Fischer. 1996. Spatial and temporal variability in the lower food web of the tidal freshwater Hudson River. *Estuaries* 19:866-873.

- Findlay, S., M. L. Pace, and D. T. Fischer. 1998. Effect of the invasive zebra mussel (*Dreissena polymorpha*) on the microbial food web in the tidal freshwater Hudson River. *Microb. Ecol.* 36:131-140.
- Findlay, S., M. L. Pace, and D. T. Fischer. 1998. Response of heterotrophic planktonic bacteria to the zebra mussel invasion of the tidal freshwater Hudson River. *Microb. Ecol.* 36:131-140.
- Findlay, S., R. L. Sinsabaugh, D. T. Fischer, and P. Franchini. 1998. Sources of dissolved organic carbon supporting planktonic bacterial production in the tidal freshwater Hudson River. *Ecosystems* 1(3):227-239.
- Limburg, K. E., M. L. Pace, D. Fischer, and K. K. Arend. 1997. Consumption, selectivity, and use of zooplankton by larval striped bass and white perch in a seasonally pulsed estuary. *Trans. Am. Fish. Soc.* 126:607-621.
- Lints, D., S. E. G. Findlay, and M. L. Pace. 1992. Biomass and energetics of consumers in the lower food web of the Hudson River. In: C. L. Smith (ed.). *Estuarine Research in the 1980's*. SUNY Press, Albany, New York. pp. 446-457.
- Pace, M. L., S. Findlay, and D. T. Fischer. 1998. Effects of an invasive bivalve on the zooplankton community of the Hudson River. *Freshwat. Biol.* 39:103-116.
- Pace, M. L., S. E. G. Findlay, and D. Lints. 1992. Zooplankton in advective environments: the Hudson River community and a comparative analysis. *Can. J. Fish. Aquat. Sci.* 49(5):1060-1069.
- Sinsabaugh, R. L., S. Findlay, P. Franchini, and D. Fischer. 1997. Enzymatic analysis of riverine bacterioplankton production. *Limnol. Oceanogr.* 42:29-38.
- Strayer, D.L. Hunter, D.C., Smith, L.C., and C. Borg. 1994. Distribution, abundance, and role of freshwater clams (*Bivalvia: Unionidae*) in the freshwater tidal Hudson River. *Freshwater Biology* 31: 239-248.
- Strayer, D.L., J. Powell, P. Ambrose, L.C. Smith, M.L. Pace, and D.T. Fischer. 1996. Arrival, spread, and early dynamics of a zebra mussel (*Dreissena polymorpha*) population in the Hudson River estuary. *Canadian Journal of Fisheries and Aquatic Sciences* 53: 1143-1149.
- Strayer, D.L., and L.C. Smith. 1996. Relationships between zebra mussels (*Dreissena polymorpha*) and unionid clams during the early stages of the zebra mussel invasion of the Hudson River. *Freshwater Biology* 36: 771-779.
- Strayer, D.L., and H.M. Malcom. 2006. Long-term demography of a zebra mussel (*Dreissena polymorpha*) population. *Freshwater Biology* 51: 117-130.
- Strayer, D.L., and H.M. Malcom. 2007. Effects of zebra mussels (*Dreissena polymorpha*) on native bivalves: the beginning of the end or the end of the beginning? *Journal of the North American Benthological Society* 26: 111-122.
- Strayer, D.L., N. Cid, and H.M. Malcom. 2011. Long-term changes in a population of an invasive bivalve and its effects. *Oecologia*. DOI 10.1007/s00442-010-1792-0.
- Vaqué, D., M. L. Pace, S. Findlay, and D. Lints. 1992. Fate of bacterial production in a heterotrophic ecosystem: grazing by protozoans and metazoans in the Hudson Estuary. *Mar. Ecol. Prog. Ser.* 89:155-163.

Vaqué, D., M. L. Pace, S. Findlay, and D. Lints. 1992. Fate of bacterial production in a heterotrophic ecosystem: grazing by protozoans and metazoans in the Hudson Estuary. *Mar. Ecol. Prog. Ser.* 89:155-163.

Appendix 2. Proposal Package and Budget

The proposal package should contain the following sections:

1. **Cover Letter.** Please include a cover letter, printed on an official letterhead and signed by an authorized representative of the lead organization that is applying. (2 page limit)
2. **Title Page.** The title page must adhere to the following format (1 Page Limit)
 - Project Title, as it appears throughout the proposal.
 - Project Leader: Provide the name, title, affiliation and complete contact information (mailing address, phone numbers, and email address) of the individual leading the project.
 - List of partner organizations, which are those that will materially contribute to the project and will appear in the budget, receiving funding and/or providing supporting match or in-kind contribution, and the names and contact information for notable individuals, if applicable.
 - Project cost: total amount of funds requested and the sources and any matching funds.
3. **Proposal Narrative.** Please start the proposal narrative on a new page. This section must include the following information (15 page limit):
 - a. **Workplan:** Please provide an outline of how you will accomplish the monitoring activities (“Scope of Services”) outlined in Section II. This description should reference each specific survey using the survey IDs from the Scope of Services (table 4). The Workplan should describe the data collection methods and protocols needed to successfully provide the various services outlined herein. At a minimum the workplan should describe the: Study Area, Survey Frequency, Data Collection Protocols, and Analytical Methods and Protocols. For clarity, please describe any changes to the proposed sampling areas, sampling frequency or timing or methods for each of the surveys. All modifications to the Scope of Services should be noted and justified.
 - b. **Timeline:** Provide a detailed timeline the completing the data collection and analysis of the full Scope of Services and the required deliverables. All timelines should be stated in terms of Week or Month #1, #2, #4, etc. rather than specific dates. Project start dates may change based on the date an agreement is established.
 - c. **Personnel:** Define the role of all individuals who will be involved in the project, including contractors and subcontractors, and briefly indicate their relevant experience/skills. Describe the role of partner organizations in the project and attach letters of commitment, if applicable. Note if these entities are contributing materially and are included in the budget, either as a recipient of funds or contributor of match.
4. **Budget Form:** Provide an itemized budget in the table format provided in Appendix 3. Please indicate the source of any matching funds or in-kind services. If matching funds are included, please specify if these have been secured or are being sought, and if they are from federal or non-federal sources. 2. Proposal Budget: The budget should follow the budget template,

attached here as Appendix 3. Each of the following budget categories should be included on separate budget forms:

1. Pre-Survey Planning Activities
 - i. HREMP Interim Lower Food Web (ILFW) Monitoring Plan
 - ii. Quality Management Plan
 - iii. Data Management Plan
2. Year 1 Survey (Expected May 1 – December 31, 2024)
3. Year 2 Survey (January 1, 2025 – December 31, 2025)
4. Year 3 Survey (January 1, 2026 – December 31, 2026)
5. Combined Total Budget (not to exceed \$2,000,000)

5. Please include any **letters of support** from partnering organizations, including relevant government agencies, or other parties that support your proposed project. Letters of support do **not** count towards the page limit.

Appendix 3: Budget Template

| BUDGET CATEGORY <i>(Add/remove itemizing lines below major categories as necessary, but please do NOT delete major categories)</i> | FUNDS REQUESTED FROM HRF | FUNDS FROM OTHER SOURCES**** | TOTAL BUDGET |
|---|---------------------------------|-------------------------------------|---------------------|
| A. PERSONNEL (list individual staff member, task, and hours or % time) TOTAL: | \$ | \$ | \$ |
| | \$ | \$ | \$ |
| | \$ | \$ | \$ |
| | \$ | \$ | \$ |
| | \$ | \$ | \$ |
| B. FRINGE BENEFITS % of (e.g., 30% of total personnel costs) TOTAL: | \$ | \$ | \$ |
| | \$ | \$ | \$ |
| C. TRAVEL (estimate number/purpose of trips below) TOTAL: | \$ | \$ | \$ |
| | \$ | \$ | \$ |
| | \$ | \$ | \$ |
| D. EQUIPMENT* (Itemize below) TOTAL: | \$ | \$ | \$ |
| | \$ | \$ | \$ |
| E. SUPPLIES (itemize below) TOTAL: | \$ | \$ | \$ |
| | \$ | \$ | \$ |
| | \$ | \$ | \$ |
| F. CONTRACTS** (identify & itemize below) TOTAL: | \$ | \$ | \$ |
| | \$ | \$ | \$ |

| | | | |
|---|----|----|----|
| | \$ | \$ | \$ |
| G. SUBAWARDS*** (Identify & itemize below) TOTAL: | | | |
| | | | |
| | | | |
| H. CONSTRUCTION (Identify & itemize below) TOTAL: | \$ | \$ | \$ |
| I. OTHER (Identify & itemize below) TOTAL: | \$ | \$ | \$ |
| J. TOTAL DIRECT COSTS (SUM OF A-G) | \$ | \$ | \$ |
| K. INDIRECT COSTS % (e.g., 15% of total direct costs) TOTAL: | \$ | \$ | \$ |
| L. TOTAL PROJECT COST (SUM OF H+I) | \$ | \$ | \$ |

* Note that equipment refers to items that cost \$5,000 or more each. Items of lesser cost are considered supplies.

** F. Contracts refers to goods and services, generally from a for-profit vendor operating in a competitive environment, being delivered at the direction of the Consultant.

*** G. Subawards refers to funding being provided through grants or contracts to a project team member acting independently to address specific project objectives. Subawards should be listed here and should include separate project budgets sheets following the same project budget template.

****Please indicate the source of any matching funds or in-kind services. If matching funds are included, please specify if these have been secured or are being sought, and if they are from federal or non-federal sources.