

**Department of Environmental Services  
2022-2023 Capital Budget Request  
Water Quality and Coastal Flooding**

**Project Summary:**

This project includes three aspects of ensuring the health and safety of New Hampshire's environment. The request includes database and equipment replacement and important models/analyses. Each of these is expected to have a lifespan of at least 10 years.

- 1) Development of a modernized web-capable, multi-user, and secure database for the NHDES Jody Connor Limnology laboratory (JCLC). The request will enable all the programs that use the lab to intake water samples to accurately track those samples and to enter analytical results into the Environmental Monitoring Database. The current database is over two decades old and is not capable of handling the number of samples that enter the lab. (\$150,000)
- 2) Purchase of equipment and development of a comprehensive dataset that characterizes the frequency and magnitude of toxic pollution concentrations in fish and shellfish tissue. The resulting data would be used to assess consumptive risks and inform development of new, or justification of existing, water quality criteria. (\$344,000)
- 3) Right now, the state lacks available, accurate flood risk data for coastal areas. This request would support the development and distribution of a high resolution, dynamic coastal flood risk model and map set to inform floodplain management, state and local infrastructure design, emergency preparedness, and natural resource management. (\$350,000)

**Justification:**

The mission of NHDES covers both public and environmental health. Often these two aspects overlap. This is certainly the case on both contaminants in the water and coastal flooding. This request will allow the state to make significant strides in protecting the public and important ecological resources from degradation. This request is broken down into three parts – 1) Limnology Lab Database; 2) Assessment of health risk from fish and shellfish contamination, and 3) Coastal Flooding Model.

**1) Limnology Lab Database**

Decision making is informed by good data; key to good data is excellent data management. The Jody Connor Limnology Center (JCLC) at NHDES receives thousands of water samples each year, and is responsible for tracking those samples and ensuring quality assurance/quality control (QA/QC) protocols are followed. The data created from these samples are used for a variety of planning, regulatory and legal purposes by NHDES, municipalities and the public.

The JCLC database was written in 2000 in Microsoft Access. While it has been updated over time, it remains in Access and has reached its capacity. The original purpose of the database was to allow for logging and tracking the laboratory samples during internal analysis processes as well as recording and tracking of all quality control sample data. The database also includes a number of QA/QC processes that help to catch human errors, mark suspect results, and track the data review.

Finally, there are two satellite labs (Plymouth State University and Colby-Sawyer College) that also use the database to enter data from those labs to deliver to NHDES.

The JCLC lab has become the laboratory for many NHDES program which encompasses lake, river, beach, cyanobacteria, TMDL, and pool programs. These extra programs bring extra sample load to the JCLC to the point where last year the JCLC logged over 5500 individual samples, with 14,636 chemical records. JCLC analyzed 395 biological samples and made 2,368 species-specific identifications. The database is slow and overburdened because of the sample load placed upon it. It has also endured three MS Access version upgrades to stay on a supported secure software platform the last of which caused severe database stability issues which took many weeks to fix. More recently, other programs such as the MTBE and PFAS investigations have begun intensely using the lab for sampling preparation and processing for analysis.

The new database will allow for satellite labs to manage the data they generate, have adequate security, be compatible with multiple programs and other databases, allow for many users, and make data entry as quick and easy as possible.

**Benefits and Cost:**

Currently, NHDES uses a variety of funds (federal, general and other) to cover the costs of the JCLC personnel, consumables, travel for inspections, lab supplies and overhead costs (rent, IT, etc), thus leaving nothing for new software or data system procurement. Further, the State's DOIT database development staff do not have sufficient time to accommodate this need. Based on prior experience with data system procurement, NHDES estimates that the cost of the new system will be about \$150,000.

The current database is temperamental and is unlikely to survive additional hardware and security updates. If the system were to fail, especially in the middle of the field season, the resulting amount of paper tracking would become overwhelming and consume enormous staff time. In addition, the likelihood of error would expand dramatically which could be detrimental for ongoing regulatory and legal proceedings. Finally, the database will allow for data to be in the hands of the public and decision makers who need it, much more quickly.

**2022-2023 Capital Budget Request:                    \$150,000**

**2) Assessment of health risk from fish and shellfish contamination**

Under the authority of RSA 485-A:8 NHDES is responsible for establishing water quality criteria and assessing the condition of the State's waters, including the concentration of toxicants in fish and shellfish tissue. To NHDES' knowledge there has never been a statewide effort to test fish and shellfish for toxicants, except for mercury, that present a risk to humans and wildlife. There is an urgent need to understand the presence of historic toxicants, such as DDT, PCBs and mercury, and newer toxicants, such as per- and polyfluroalkyl (PFAS), in the tissue of these commonly consumed natural resources. A collaborative multi-agency effort to collect, process, and analyze toxicant data

from fish and shellfish tissue would inform the development of more comprehensive and updated consumption guidelines. This issue was recently made very apparent in the iconic Squam Lake where the Loon Preservation Committee discovered PCB and DDT contamination in loon eggs and lake sediment. Subsequent analysis of the fish in the lake by NHDES revealed that the risk to humans from eating fish warranted a new consumption advisory. NHDES has almost no data to determine if this situation is unique to Squam Lake.

The effort described above would represent a collaborative effort between NHDES, NHF&G, and NH DHHS. In addition, NHDES will work with the UNH Jackson Estuarine Laboratory to sample toxicants in shellfish from coastal waters. The requested funds will be used primarily to cover new mercury analyzing equipment and laboratory sample processing costs. Toxicant samples typically range from \$500 - 2,000 per sample depending on what tests are run. The results from the effort will be made publically discoverable and summarized in a non-technical report. There is a large number of legacy and emerging chemical compounds that we know little about and failure to complete the recommended toxicant testing presents an unknown risk to human health and wildlife. The project will replace the mercury analyzer which is 15 years old and no longer repairable.

<b>Estimated Fish and Shellfish Tissue Toxicant Testing Expenses</b>				
<b>Description</b>	<b>Quantity</b>	<b>Item Cost</b>	<b>Total</b>	<b>Comment</b>
Laboratory Toxicant Testing - Fish	150	\$1,500	\$225,000	Exact parameters to be determined. Fifty lakes and ponds will be sampled. Five fish from each pond will be analyzed separately
Laboratory Toxicant Testing - Shellfish	40	\$1,500	\$60,000	Exact parameters to be determined. Fifty shellfish will be analyzed separately from locations of choice. Each shellfish will be analyzed separately.
Laboratory Toxicant Testing – Quality Control	1	\$6,000	\$6,000	Repeat/duplicate samples to ensure data quality
Data Analysis Software	1	\$3,000	\$3,000	Statistical software to assist with data analysis and graphical summaries
Mercury Analyzer for DES Limnology Lab	1	\$50,000	\$50,000	The current mercury analyzer is over 15 years old, is failing and is no longer repairable.
<b>Total</b>			<b>\$344,000</b>	

### **Benefits and Cost:**

NHDES currently has no funding available to process samples for toxicants in fish tissue. Available funds available are fully expended in support of current monitoring programs targeted at tracking water quality status and trends, as well as making immediate public health decisions such as beach

advisories and shellfish harvest closures. The project and associated expenses described herein represent a one-time effort to characterize the current conditions of toxicants in fish and shellfish.

The project will benefit the state and its residents in many ways. First, it will provide a comprehensive and first-of-its-kind dataset on the concentration of a variety of toxicants in the tissue of fish and shellfish. The data will allow NHDES to expand on its ability to make water quality assessments, specifically with respect to the recreational designated use. Perhaps most importantly, the information will be available to make determinations on fish and shellfish consumption in specific waterbodies and for specific toxicants in order to minimize human health risks. Finally, this project will allow to public to make informed decisions regarding the consumption of fish and shellfish.

**2022-2023 Capital Budget Request:     \$344,000**

### **3) Coastal Flooding Model**

#### **Project Summary:**

The project requests funding to support the development and distribution of a high resolution, dynamic coastal flood risk model and map set to inform floodplain management, state and local infrastructure design, emergency preparedness, and natural resource management. The resulting data would help New Hampshire protect its valuable coastal economy by ensuring decisions are made using best available data methods on par with those used in Massachusetts and Rhode Island. NHDES has applied for a FEMA grant which would match these requested funds.

Consistent with recommendations in the 2016 New Hampshire Coastal Risk and Hazards Commission Final Report and Recommendations and in order to enable efficient, consistent compliance with the requirements of [S.B. 452 \(2016\)](#), this request supports New Hampshire's development of a science-based model and map set that improve the accuracy of coastal flood risk information under changing conditions. A dynamic, physics-driven approach, utilizing a probabilistic framework will be used to develop exposure risk data across the coastline, as well as extending upland through estuarine rivers; vastly improving upon the existing, static maps currently available. The data developed as part of the project would provide critical information to evaluate vulnerability of existing infrastructure and natural resources and to inform design of proposed development and future policies. Specifically, the project will build on newly acquired, more accurate LiDAR elevation data for the Seacoast and other available monitoring and climate data to produce probabilistic flood maps based on high-resolution, hydrodynamic storm surge and sea level rise modeling. It will also produce an updated accurate, shoreline file (which currently does not exist) for the State and map specific tidal datums that would provide detailed information on the potential future location of nuisance flooding. In addition, the project will assess key locations where geomorphic changes, such as erosion or accretion of sediment, would be likely to occur with changes in sea level and quantify the expected changes. This project is intended to support the work of multiple state agencies, including NHDES, NHDOT, NHDAS, NHFG, and others. NHDES will work in partnership with

interested state agency members of the State Environmental Resilience Group (SERG), including NHDOT, to solicit a consultant to complete and deliver the model and map products.

**Benefits and Cost:**

The State of New Hampshire currently has no funding allocated to develop dynamic coastal flood maps. Available map products present static flood data at low resolution that is unfit for detailed, parcel-scale vulnerability assessment and engineering design. This project would enable use of data in a multitude of decision contexts and limit the need for current conditions modeling at many sites. As agencies like NHDES and NHDOT attempt to implement the requirements of S.B. 452 (2016) and employ best practices for considering current and future coastal flood risk, they are stymied by the lack of high resolution data. The model can also be utilized to test the effectiveness of various engineering designs and adaptations. For example, green living shoreline alternatives, such as restoration of dunes, wetlands and reefs can be simulated, as well as traditional grey infrastructure, such as modular and adaptable seawalls, and combinations thereof.

A failure to fund the project as described will result in higher project-by-project costs to evaluate coastal flood risk and incorporate future conditions in designs in a piecemeal fashion. It will also result in decisions made based on low resolution data that may result in improper design or inefficient outcomes. This ultimately will lead to the possible construction of state, municipal or private facilities in harm's way given rising seas and harsh ocean storms.

**Impacts on External Entities:**

The funds requested to complete this project will allow the public to access improved data about current and future coastal flood risks.

**Total 2022-2023 Capital Budget Request: \$350,000**

<b>Project Cost Summary</b>	<b>Estimated Cost</b>
Limnology Lab Database	\$150,000
Fish & Shellfish Contamination Assessment	\$344,000
Coastal Flooding Model	\$350,000
<b>TOTAL:</b>	<b>\$844,000</b>