



Engaging Youth and Educators Across Maine in Authentic Science Experiences

Leigh Peake
Chief Education Officer
lpeake@gmri.org



**Gulf of Maine
Research Institute**

Science. Education. Community.



Rufus Deering
LUMBER

GALEO MARINE RESEARCH INSTITUTE

Y1

Y4

Y3

GLOBAL OCEAN CHALLENGES

Seafood Sustainability



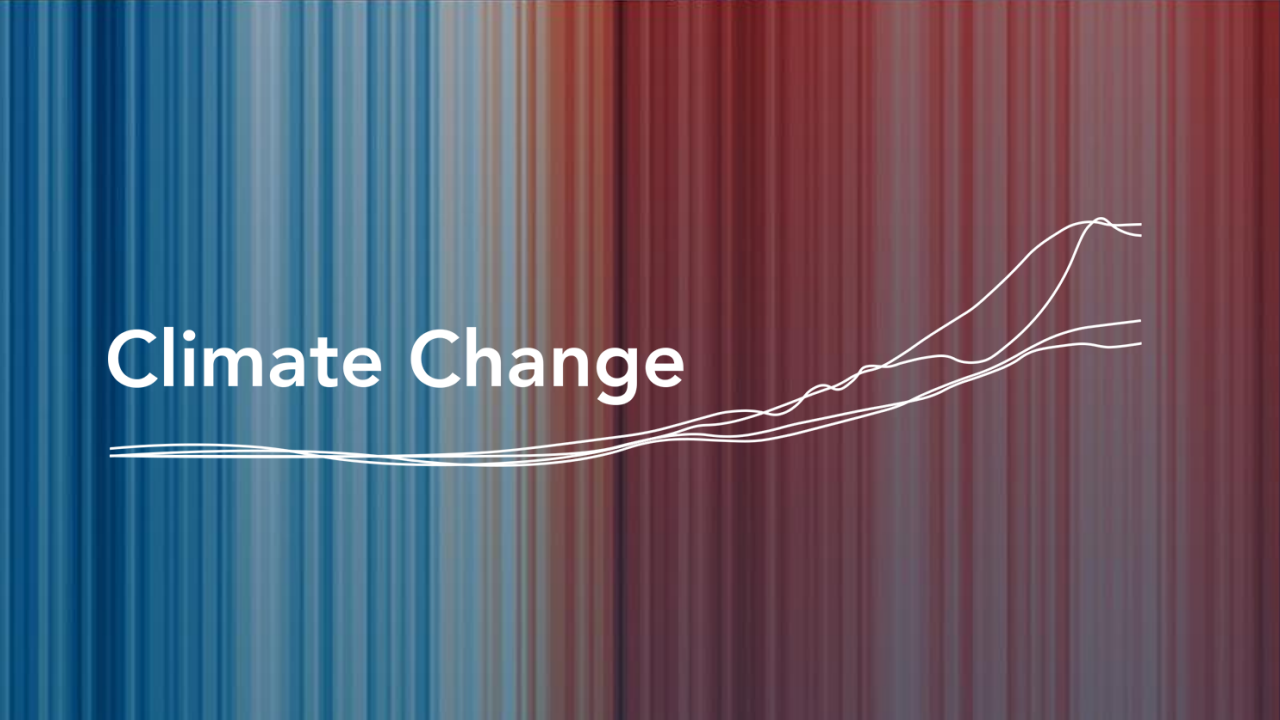
Healthy Ocean Ecosystems



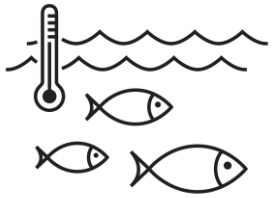
Climate Change



Marine Economy

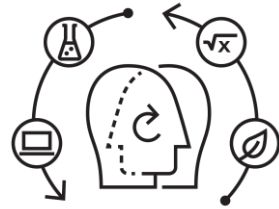


Core Capacities



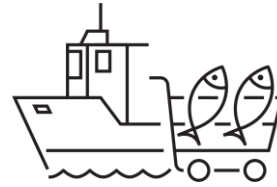
Science

Research that deepens our scientific understanding of the Gulf of Maine ecosystem and economy.



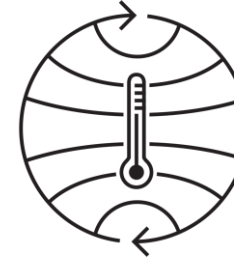
Education

Science learning experiences for students and educators as an investment in the next generation of climate- and data-literate ecosystem stewards.



Community

Support for the communities that depend on the Gulf of Maine, including fishermen, aquaculturists and seafood supply chain businesses.



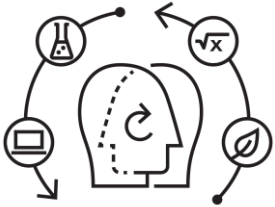
Climate Center

Local, state, national and global climate actions to help coastal communities thrive in a warmer world.



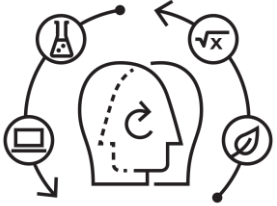
Gulf of Maine Ventures

Creating, scaling, and investing in high-impact companies that advance GMRI's nonprofit mission.



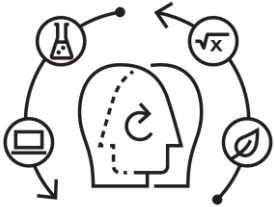
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Build Maine middle school students' critical thinking skills and understanding of the nature of science through participation in authentic science experiences.



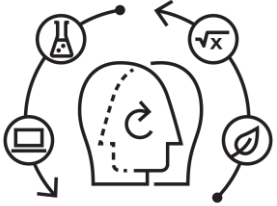
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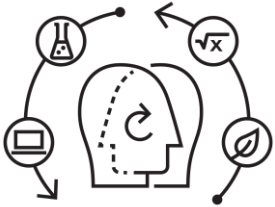
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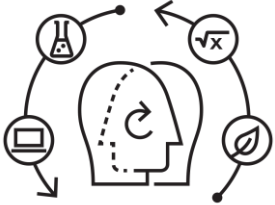
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Science learning experiences for students and educators as an investment in the next generation of climate- and data-literate ecosystem stewards.

Increase **students'** access to and participation in learning experiences that increase their climate literacy, data literacy, and understanding of the nature of science

Increase **educators'** access to and participation in high-quality, locally relevant professional learning experiences to increase their content knowledge, pedagogical strategies, and confidence guiding students' learning about the nature of science

Conduct regular **learning research** to understand the impact of programs and understand the nature of knowledge construction in science

Connecting Formal & Informal Learning Experiences

Educator Peer Communities

Teacher Professional Learning

Classroom Curriculum



Education Program Areas



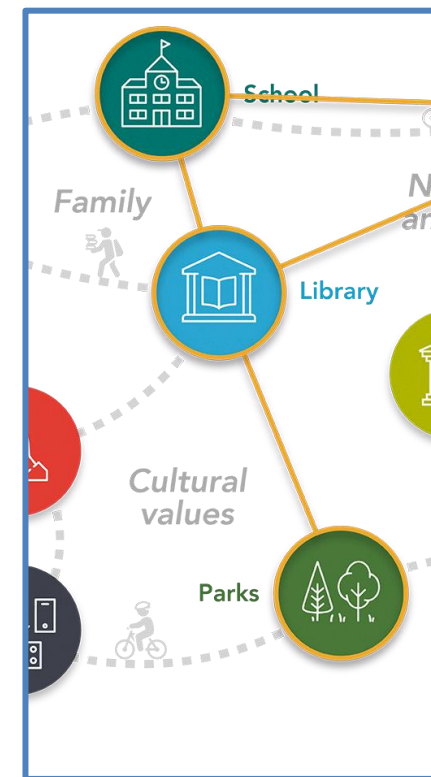
Field Trips



**Community
Science**



**Teacher
Professional
Learning**



**Educator Peer
Communities**



LabVenture





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Gulf of Maine
Research Institute

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Gulf of Maine
Research Institute

Science. Education. Community.

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FOSTERING THE NEXT
GENERATION OF
WATER STEWARDS

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Team Puffin
Sherwood Elementary School
Jesse, Hannah, James



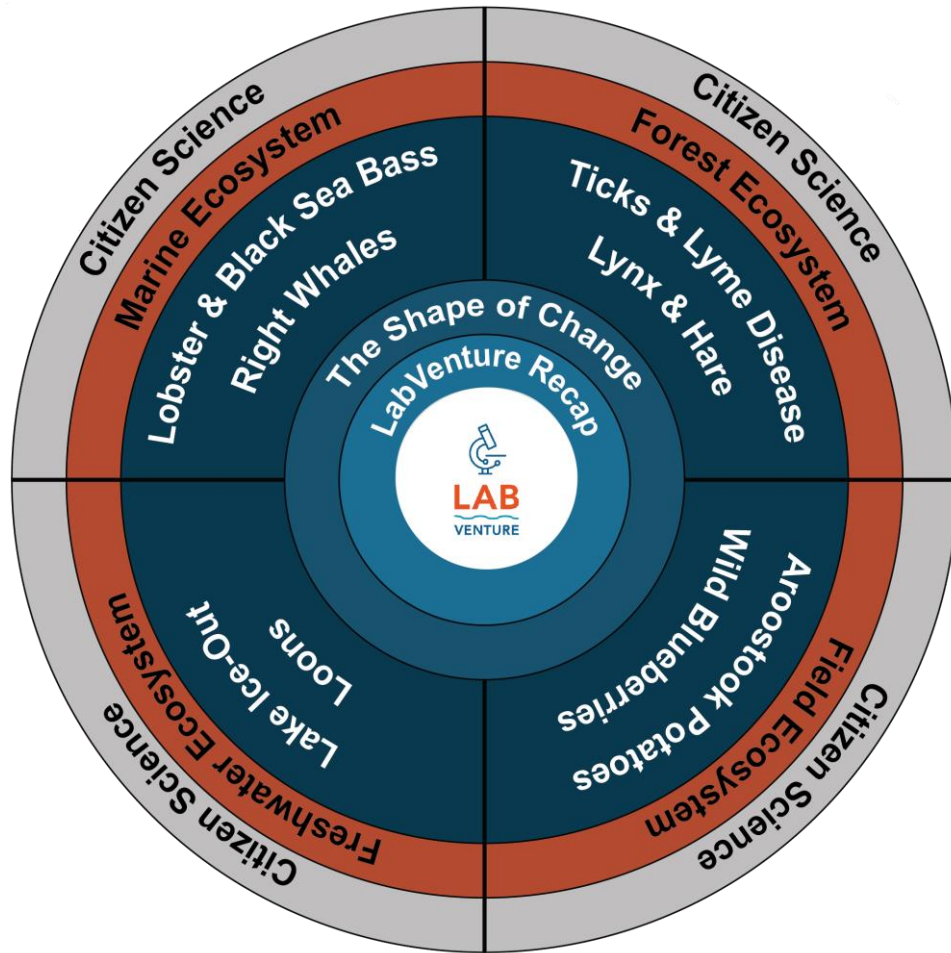
LabVenture Field Notebook

Enter the access code provided by your teacher:

8w3Fn8!g|

Let's Go

Curriculum: Localizing Climate Change



Curriculum focuses on supporting investigations of local climate change in both in- and out-of-school environments.

While other departments in GMRI focus primarily on climate impacts in the marine ecosystem, the Education team supports investigations in field, forest, freshwater, and marine ecosystems.

We aim to make it possible for youth and educators to engage locally.

A photograph showing three individuals engaged in field research on a rocky, seaweed-covered shore. On the left, a woman in a pink hoodie and blue jeans stands looking at a yellow handheld device. In the center, a person in a blue jacket and black pants is bent over, using a long metal tool to probe the ground. On the right, a person in a black hooded jacket is kneeling, also observing the ground. The background shows the ocean with some rocks and seaweed. The text 'Ecosystem Investigation Network' is overlaid in white on the lower-left portion of the image.

Ecosystem Investigation Network



Ecosystem
Investigation
Network

Projects ▾ About FAQ Partners

Log in

Welcome to the Ecosystem Investigation Network

[View Projects](#)

Working together to understand change in the Gulf of Maine and its watershed

Our network connects and supports a community of people and organizations who are working to understand how climate change is impacting the species, habitats, and communities in our region.

The Ecosystem Investigation Network is:



Engaging everyone--from school groups to seasoned solo observers to beginners--in scientific discovery

We welcome everyone's participation — from middle



Designed to support science, learning, and community priorities

Our project design supports help ensure strong scientific results, good experiences for participant,



Intertidal Crabs

Research Questions: How do populations of Asian shore, European green, and native crabs compare up and down the coast of the Gulf of Maine? Are crab populations changing over time and in response to warming temperatures? Where will Asian shore, European green, and native crabs be most abundant in the future?

Why this matters

Invasive crabs are ravaging intertidal zones across the Gulf of Maine. We need more data to understand how these populations are changing and where they could have the greatest impact in the future.



Partner	Season
Manomet	All

Project Overview

Prep & Collect

Contribute

View Data

Discussion

	Field Site	Habitat	Substrate	Green	Asian Shore	Native	Unidentified
2023-09-22	Gilpatrick's cove	Rocky intertidal	Mostly seaweed	18	0	0	0
2023-09-22	Gilpatrick's Cove	Rocky intertidal	Mostly seaweed	0	0	0	0
2023-09-22	Gilpatrick's Cove	Rocky intertidal	Mostly seaweed	8	0	0	1
2023-09-21	Little Moose, Tremont, Group C	Rocky intertidal	Mostly movable rock	3	0	0	0
2023-09-21	Little Moose, Tremont, Group A	Rocky intertidal	Mostly seaweed	5	0	0	11
2023-09-21	Little Moose, Tremont, Group D	Rocky intertidal	Mostly ledge (solid rock)	7	0	0	0



Intertidal Crabs



Northeast Ticks



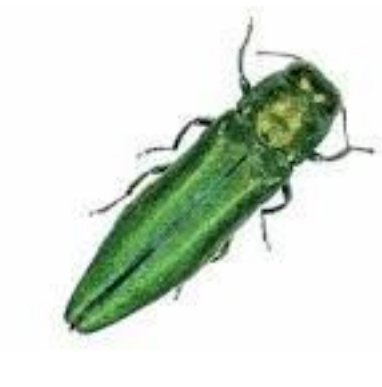
**Vernal Pool
Macroinvertebrates**



Coastal Flooding



**Hemlock Woolly
Adelgid**

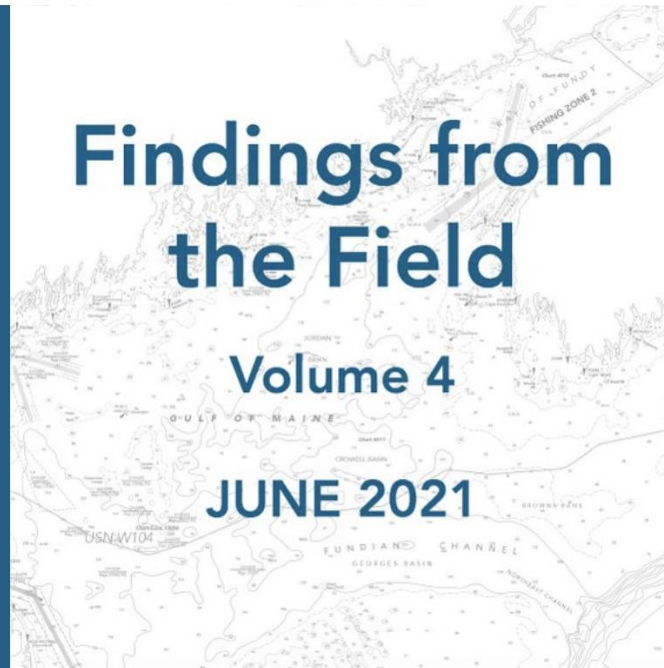


**Emerald Ash
Borer**

Findings from the Field, Volume 4

Explore the most recent volume of our Findings from the Field student journal. This volume had 95 submissions and over 155 peer-reviews completed from 15 schools.

[View Journal](#)



- Writing and publication as one way knowledge is shared and advanced in science
- Science writing across several genres (research papers, notes, posters)
- Curriculum to support science teachers to support writing
- Peer review = where the magic happens!



"The best part of this project was looking at the final product and realizing what I had just completed, which was a fully comprehensive research paper."

8th Grader
Falmouth Middle School

[Read Volume 6 – Hot off the press!](#)

Educator Professional Learning Experiences





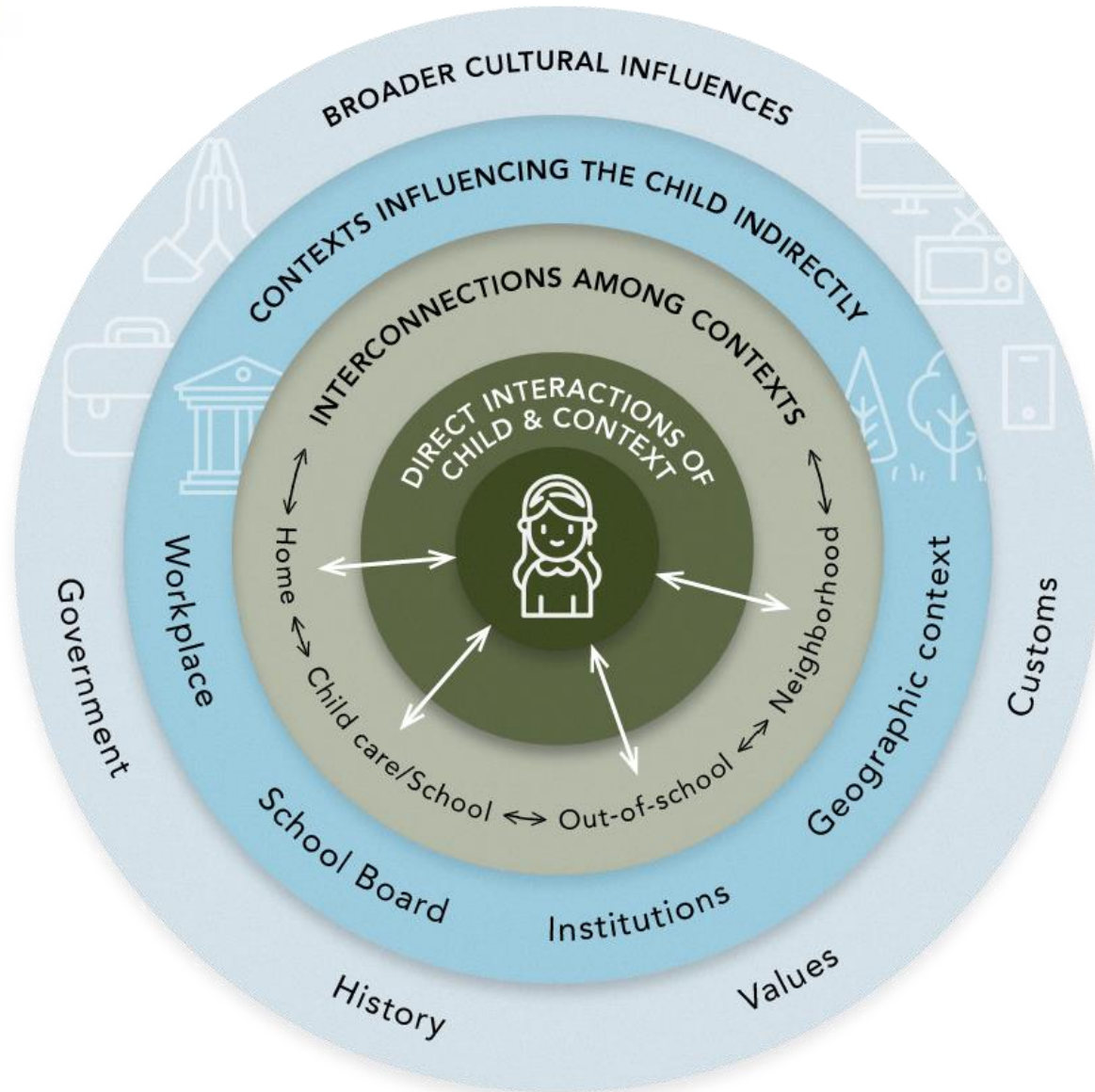
Learning Ecosystems Northeast

- Youth deserve as many entry points into STEM as communities can muster
- In order to increase those opportunities for youth, we first have to increase support and opportunity for the educators
- In order to increase the relevance of STEM for both youth and educators, we have to shift toward resources/experiences that are locally and culturally responsive
- The Connected Learning Ecosystem framework is our chosen approach to allow us to achieve those goals in Maine and across the northeast





Learning Ecosystems Northeast



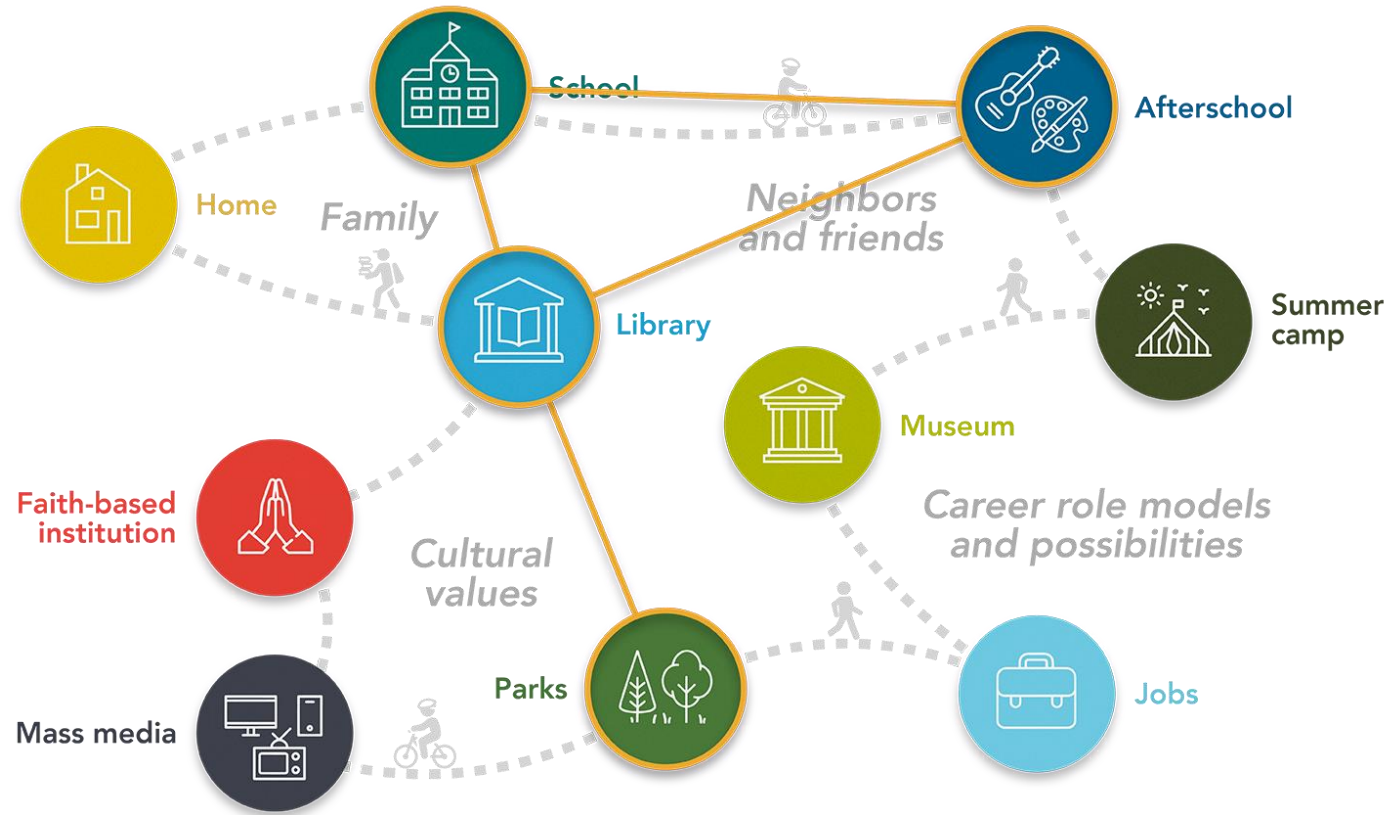


Learning Ecosystems Northeast





Learning Ecosystems Northeast





Planning Forward

Sea Level Rise Trend

Prepare for: 3.0

Commit to: 1.5

Prepare for 3.0ft at 2050

Commit to 1.5ft at 2050

ROUND 1 2020-2030

ROUND 2 2030-2040

ROUND 3 2040-2050

Predicted Sea Level Rise Impacts
Gradual changes we expect to see in our communities over time, driven by sea level rise.

First Decade

Second Decade

Third Decade

Community Context
Factors not related to sea level rise will have impacts on our resources.

Challenges Facing the Lobster Fishery

Reduced lobster harvest

None

Peaking Insurance Premiums

Property owners are paying higher rates for coastal insurance premiums.

- Increased and varied insurance rates
- Limited availability of insurance
- Limited ability to pay

500 Year Storm

An unprecedented storm surge could inundate the town with water reaching to the 500 year water level.

- All infrastructure (roadways, bridges, water lines, etc.) would be damaged.
- A significant number of buildings would be destroyed.
- Significant economic loss.

Dying Coastal Forest

As sea levels rise, coastal forests are being inundated and killed. This is a significant loss of natural resources and habitat.

- Loss of natural resources and habitat
- Loss of scenic views
- Loss of property values
- Loss of natural resources and habitat

Events
Events that occur over time as sea level rise impacts our resources.

Strategies
How we build community resilience in the face of sea level rise?

Acquire Experimental Grant

There is an opening for a demonstration project that will test the effectiveness of various strategies for building resilience.

Municipal Coastal Rental Program

A new program has been established for testing the effectiveness of various strategies for building resilience.

Resilience Impact: +5

Time to Execute: 5 years

Resilience Type: Retreat

Initiate Beach Clean-Ups

The town reserves, organizes, and provides supplies for community members to clean up the beach weekly. This program has been shown to reduce beach erosion.

Resilience Impact: +1

Time to Execute: 1 year

Resilience Type: Accommodate

Implement Living Shorelines Plan

The town is developing a project to improve coastal resilience by installing living shorelines. This project will help to reduce erosion and protect property values.

Resilience Impact: +3

Time to Execute: 3 years

Resilience Type: Accommodate

Piece strategy cards here

Resilience Budget
The variable nature of funding for climate resilience impacts how we make decisions.

-4 -3 -2 -1 0 +1 +2 +3 +4

Municipal Planning for Sea Level Rise

Budget





Management Strategy Evaluation



We provide curated, expertly vetted resources to inform decision-making for aquaculture businesses.



Seafood in Schools



- Education is the field of expertise specializing in the design of learning experiences that advance knowledge acquisition – partner, contract, or hire this expertise!
- In terms of engaging underserved communities, \$1 spent on transportation and participant stipends is worth \$5 on the experience or content
- Consider Community Science as an opportunity to partner with educators in meaningful ways
- Remember that you are part of an ecosystem of experiences
 - Actively connect to others in the learning ecosystem
 - Shift from transactional to relational interactions emphasizing co-design
- Meet educators where they are, literally and figuratively ... find the overlap between your science and community interests

Questions?



Play!

<http://lv-express.gmri.org/>



Welcome to LabVenture Express!

LabVenture Express is a virtual learning experience adapted from GMRI's LabVenture program. The interactive activities contained here are part of a suite of virtual lessons led by our LabVenture Educators that provide a rich and authentic exploration of how warming ocean temperatures are changing the Gulf of Maine. For more information on our offerings for Maine classrooms, please see the GMRI Home Delivery webpage.

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About LabVenture [→](#)