

What Is Our Water Worth and What Does Our Water Cost?

A Review of economic data on water in New Hampshire

New Hampshire Lives on Water: A Public-Private Partnership

Tom O'Brien, Alison Watts, Shannon Rogers



Background on NHLOW and the Project

Building on the New Hampshire Water Sustainability Commission's 2012 Commission Report

The Creation of a Public/Private Partnership to Advance the Report Recommendations

Water Quality is Very Important to the Economy and Well-Being of New Hampshire

Recognition that Water Infrastructure has been Suffering from Under-Investment

Build on earlier work (2002-2007) Done by Rivers and Lakes Coalition on the Value of Water

Some of the Challenges:

- Create and Support a new Entity or just Co-Manage the Project?
- Public versus private; for profit versus not for profit cultures, goals, and politics
- Availability of data
- Resources and researchers



Project Goals

The goal of this Project was to gather and develop information regarding the cost and value of water services and resources in New Hampshire in order to enable all water-related stakeholders to advocate for:










- Increasing and expanding investments in the state's water resources and water infrastructure
- Enhancing the protection of public health by ensuring adequate supplies of clean and safe drinking water
- Protecting public safety by ensuring protection from floods
- Protecting and supporting biodiversity and ecosystem integrity
- Supporting and enhancing the economic vitality provided by the state's recreation and tourism industry and other businesses that depend on high-quality water resources and infrastructure



Project Approach - Broad Survey and Summary of Information

Reviewed over 100 documents, websites, presentations, news articles etc.

- Most of the easy to find data is national
- There's a lot 'dark data' on your desks!

Keyword	Documents reviewed in each sector
 Drinking Water	20
 Ecosystem Services	19
 Energy	6
 Employment	12
 Infrastructure <i>Gray Infrastructure</i> <i>Green Infrastructure</i>	60 54 13
 Recreation	20
 Stormwater	19
 Surface Water	23
 New Hampshire	35

Results and Products - Synthesis of selected data

Summarized in report

What Is Our Water Worth and What Does Our Water Cost?

A review of economic data on water in New Hampshire

Prepared for

New Hampshire Lives on Water: A Public-Private Partnership

Prepared by

Alison W. Watts, [Ph.D.](#)

Department of Civil and Environmental Engineering, University of New Hampshire

Shannon H. Rogers, [Ph.D.](#) and Jared Reynolds, MS

Community & Economic Development Team

University of New Hampshire Cooperative Extension

Paige McKibben

Environmental & Resource Economics, University of New Hampshire

February 2019



Results and Products - Synthesis of selected data

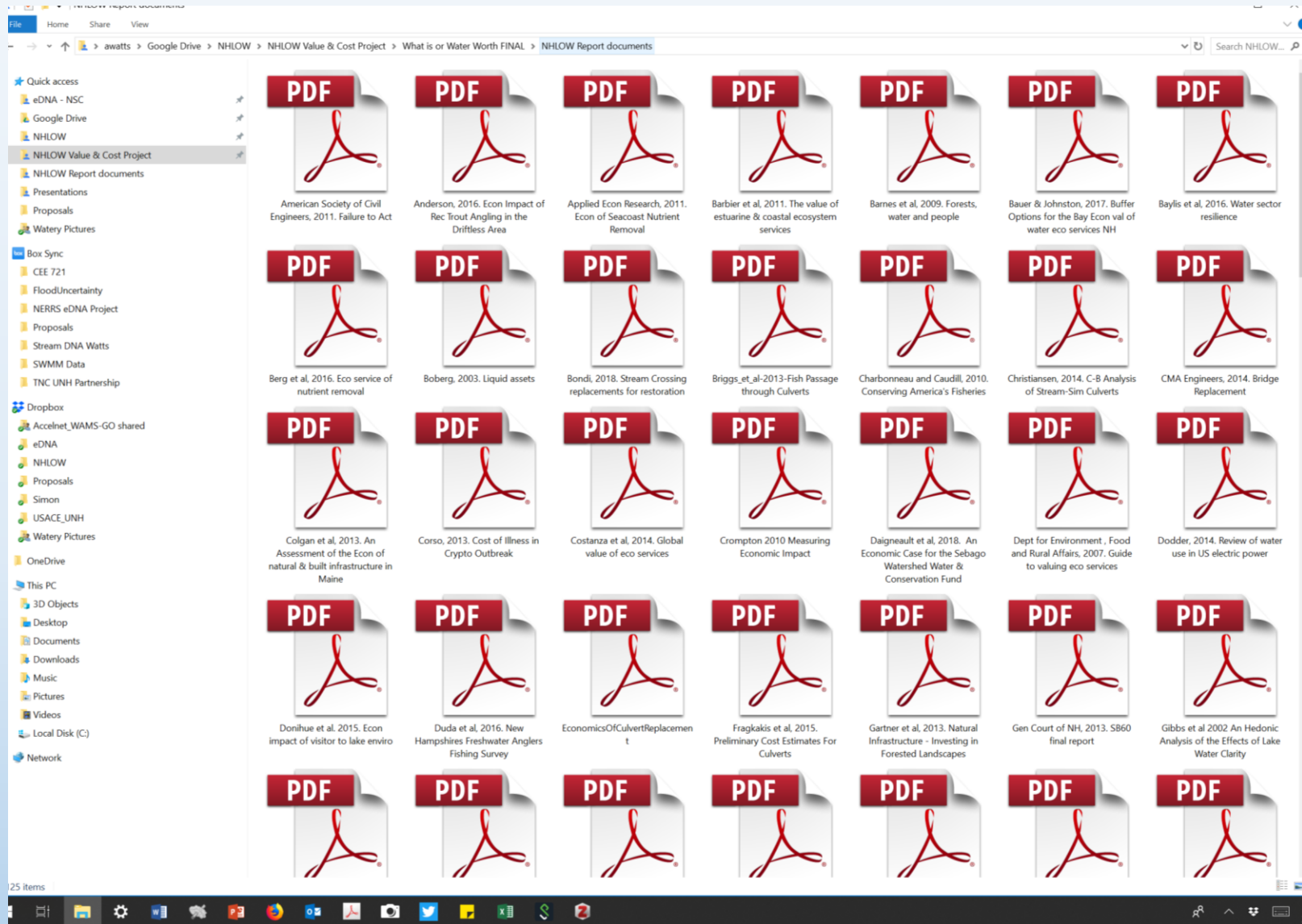
Summary of resources in searchable excel database

Most significant information in each category summarized by Value, Cost, and Gaps & Opportunities

Item	Description	Agriculture	Conservation	Energy	Industry	Infrastructure	Recreation
1	Barbier, E. B., Hacker, S. D., Kennedy, C., Koch, E. W., Stier, A. C., & Silliman, B. R. (2011). The value of estuarine and coastal ecosystem services. <i>Ecological Monographs</i> , 81 (2), 169-193.		Conservation			Infrastructure	
2	Barnes, M., Todd, A., Lija, R., & Barten, P. (2009). Forests, Water and People: Drinking water supply and forest lands in the Northeast and Midwest United States. <i>United States Department of Agriculture, United States Forest Service</i> , 84.		Conservation			Infrastructure	
3	Bauer, D., & Johnston, R. (2017). Buffer Options for the Bay: Economic Valuation of Water Quality Ecosystem Services in New Hampshire's Great Bay Watershed. George Perkins Marsh Institute, Clark University.		Conservation			Infrastructure	
4	Berg, C. E., Mineau, M. M., & Rogers, S. H. (2016). Examining the ecosystem service of nutrient removal in a coastal watershed. <i>Ecosystem Services</i> , 20, 104-112.		Conservation				
5	Costanza, R., de Groot, R., Sutton, P., van der Ploeg, S., Anderson, S. J., Kubiszewski, I., ... Turner, R. K. (2014). Changes in the global value of ecosystem services. <i>Global Environmental Change</i> , 26, 152-158.		Conservation			Infrastructure	
6	Daigneault, Adam, and Aeron L. Strong. (2018). <i>An Economic Case for the Sebago Watershed Water &</i>		Conservation			Infrastructure	

Results and Products - Synthesis of selected data

All resources available in a zip drive



Results and Products - Synthesis of selected data

For each category the key points related to Value, Cost, Gaps and Opportunities were summarized

For example:

Drinking Water (Quantity, Cost and Public Health)

Value – Public health is the highest value provided by drinking water, but health is also extremely difficult to quantify economically. A recent study by UNH and NHDES estimated an annual willingness to pay of \$0.216-0.576 million for the reduced risk of cancer provided by a lowered (5 parts per billion) maximum contaminant level for arsenic (New Hampshire Department of Environmental Services 2018). Indirect value includes jobs provided by the water utility sector (289,000 jobs from 30 water utilities, Quinn et al 2014) and avoided costs to business from service disruptions (up to \$5,800 per day per employee for water intensive industries, Value of Water Campaign 2016)

Cost – Drinking water supply rates have increased by 100% in 15 years (NH Department of Environmental Services 2015), but our state's water infrastructure is still severely underfunded, with an estimated 10 year investment of \$857 million needed for drinking water services. This cost will increase if substantial investments are needed to protect health through increased treatment for arsenic or emerging anthropogenic contaminants.

Gaps and Opportunities – Specific data on value and cost from New Hampshire businesses could be aggregated to develop local information on value, at least in terms of jobs and other economic outputs, and costs.

Users can highlight summary information in o

FAILURE TO ACT
THE ECONOMIC IMPACT
OF CURRENT INVESTMENT TRENDS IN
WATER AND WASTEWATER TREATMENT
INFRASTRUCTURE ★★★★★

Value of water nationally:

The water sector contributes \$53 billion and 289,000 jobs annually



Cost of water nationally:

The cost of maintaining water infrastructure is estimated at over \$125 billion in 2020



2017
REPORT CARD FOR
NEW HAMPSHIRE'S
INFRASTRUCTURE



with a funding need in NH of \$857 million for drinking water alone

New Hampshire Section of the American Society of Civil Engineers
INFRASTRUCTUREREPORTCARD.ORG/NEW-HAMPSHIRE



Results and Products - Synthesis of selected data

Focus on Culverts

Value – Improved aquatic passage supports New Hampshire's \$200+ million recreational fishing industry, and reduces the risk of flooding.

Perched culvert on Slide Brook, NH, blocked passage for all fish species. When the culvert was replaced with an open span in 2010, the number of brook trout upstream of the crossing increased significantly within 2 months (Magee, 2013, photo: NH Fish and Game).



Transportation and Culverts

Cost – Flooding has caused over \$100 million in property damage in the state since 2001, much of it due to major road washouts (Hazards and Vulnerability Research Institute).

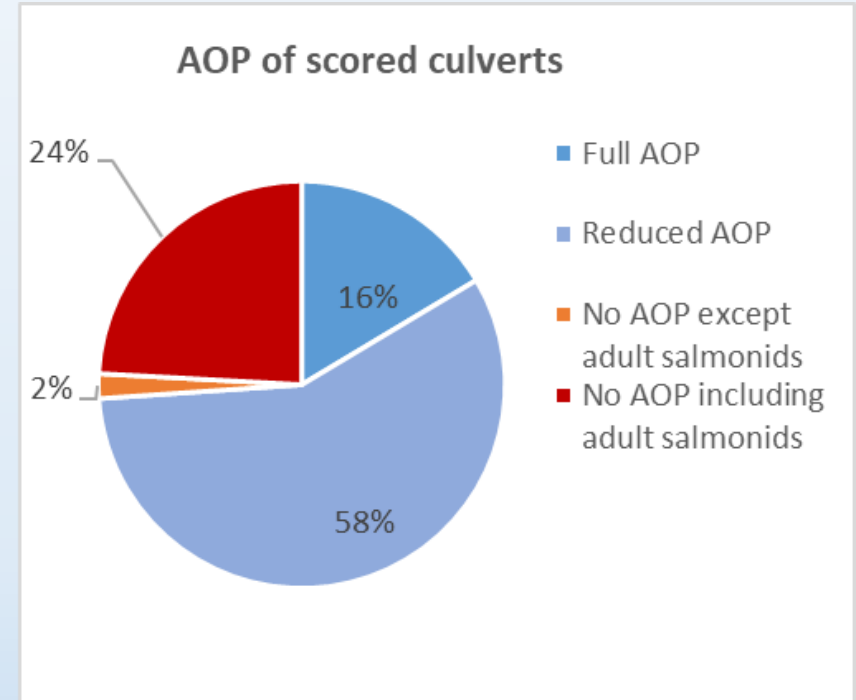
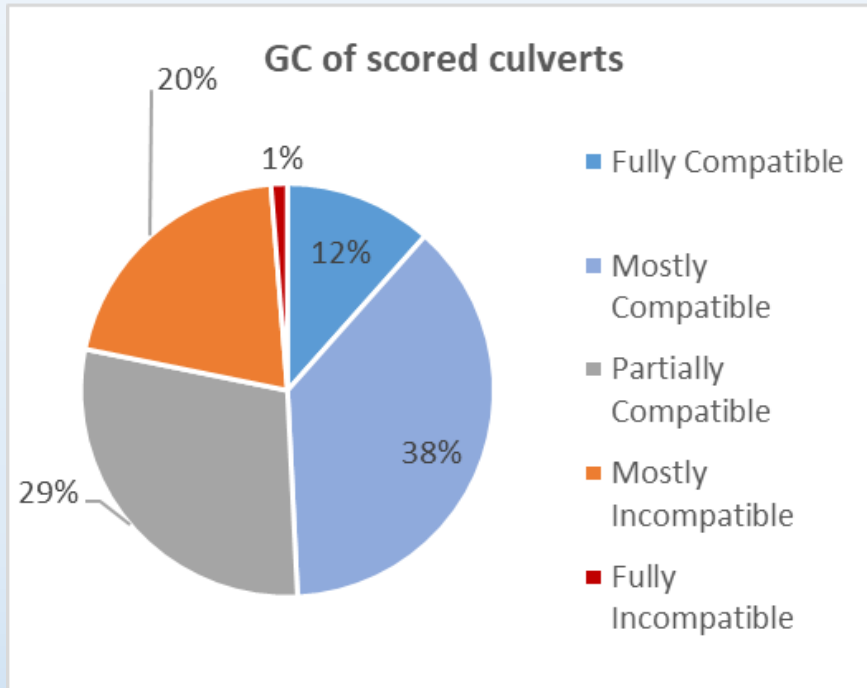
The estimated life-cycle cost of a stream simulation culvert is less than the cost of installing a corrugated pipe (RBouvier Consulting, LLC 2017).



Holderness NH, July 2017

Transportation and Culverts

Gaps and Opportunity – Statewide culvert assessment presents an opportunity to assess culvert resilience



Approximately 50% of culverts in NH are mostly or fully incompatible with river form (geomorphic compatibility- GC), 25% fully block fish movement (aquatic organism passage – AOP)

Results and Products Synthesis:

Transportation and Culverts

– Are upgraded culverts more resilient in flood events?

There are no quantitative studies in NH, but numerous qualitative accounts.



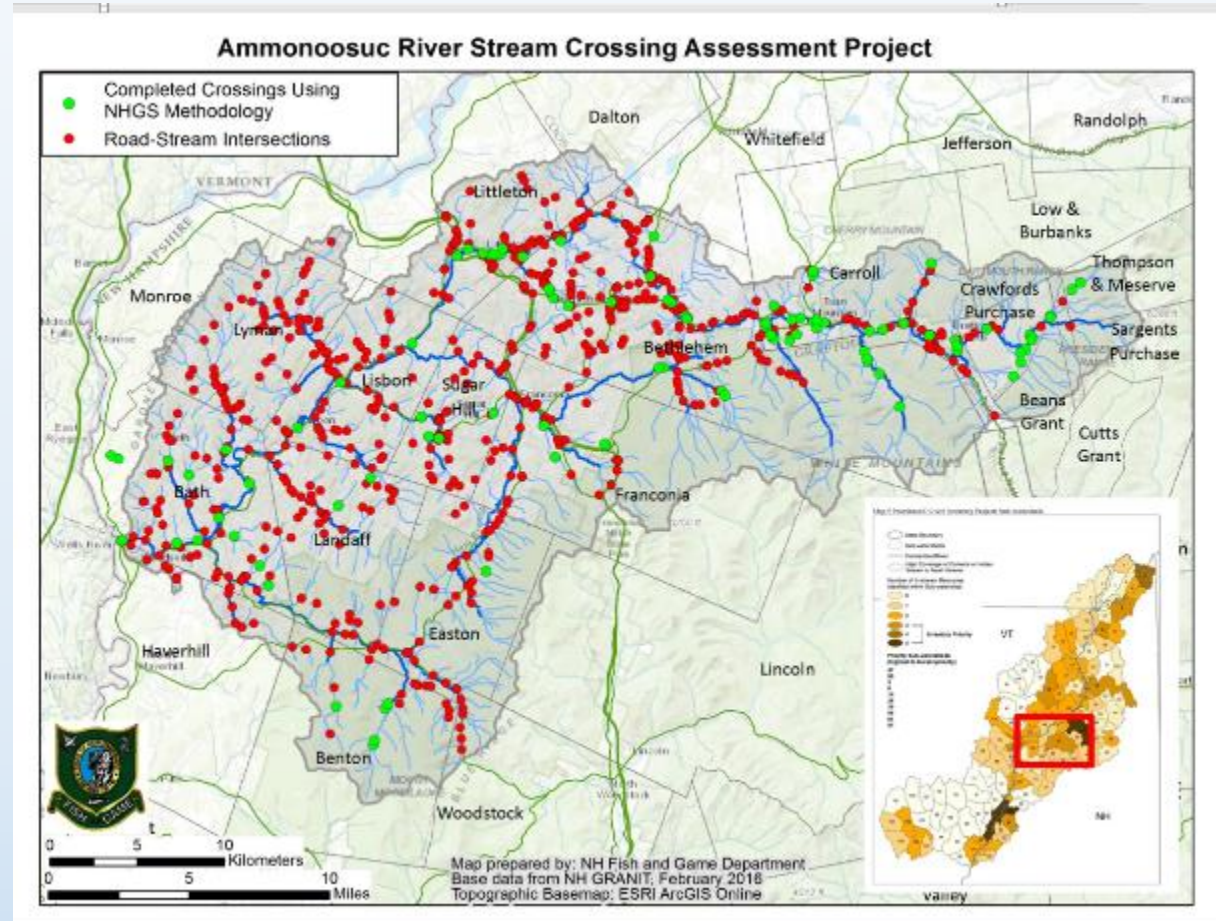
Irene: An example from Vermont

- In 2011 tropical storm Irene brought over 30 cm of rain to much of New England
- Upper White River Region in VT, where 70 culverts were destroyed or damaged, including one failure that resulted in \$1 million in direct damages (Gillespie et al. 2014).
- Of the four stream crossings in the region that were considered adequately sized, only one failed, and that was primarily due to large debris.
- This is not a large enough study to present statistical correlation, it supports the effectiveness and sustainability of adequately designed infrastructure.

Transportation and Culverts – Are upgraded culverts more resilient in flood events?

Example: 2016 Ammonoosuc River Stream Crossing assessment

Estimated the resilience of a crossing at 2, 10, 25, 50, and 100-year flow events

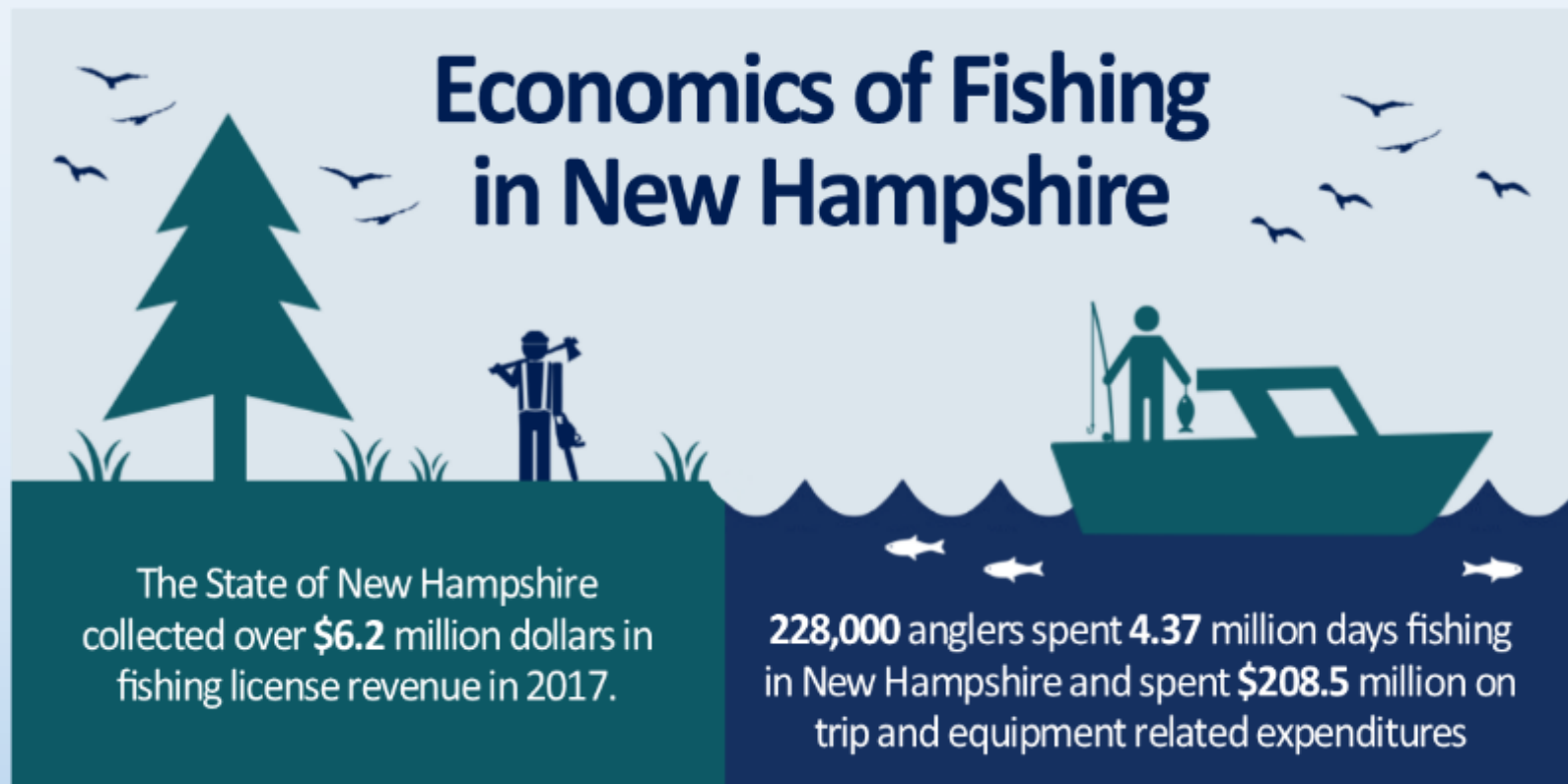


Gaps and Opportunities – A review of specific culvert failures compared to stream compatibility would present a relatively low cost analysis of the relationship between assessed viability and real failure. There are several locations in New Hampshire where damage from recent severe storms could be assessed.

Results and Products - Analysis of selected economic impacts related to water in NH (based on existing data sets)

Recreation -

The economic impact of recreational fishing in New Hampshire is approximately \$215 million dollars per year. (Based on a national survey, aggregated to New England).



Data from National survey of Fishing, Hunting and Wildlife-Associated Recreation and NH Fish and Game

Results and Products - Analysis of selected economic impacts related to water in NH (based on existing data sets)

Recreation

We used IMPLAN (Impact Analysis for Planning) economic model to estimate the value of several forms of recreation.

Economic Impact of Visitor Spending:

Number
of Visitors

X

Average
Spending per
Visitor (\$)

X

Multiplier

Four Steps:

1. Define who counts as a visitor
2. Estimate the number of visitors attracted to the community by the activity
3. Estimate the average level of spending of visitors in the local area
4. Determine the ripple effects of this new money for the community by applying appropriate multipliers

Results and Products – Analysis of selected economic impacts related to water in NH (based on existing data sets)

Recreation



The economic impact of visitors who came to swim in New Hampshire's freshwater state parks during the summer of 2017 is approximately \$40 million dollars.

Results and Products – Analysis of selected economic impacts related to water in NH (based on existing data sets)

Recreation



The economic impact of non-New Hampshire registered boaters visiting New Hampshire during the summer of 2017 is estimated at over \$100 million dollars.

Number of visitors estimated from state park data, and a license plate survey. Economic impact of these visitors was modeled using IMPLAN.

Case study: The Value of Waterfront property



Hesky Park, Meredith, NH. Photo credit: NH LAKES



Cost – Recreation incurs indirect costs as a result of degraded water quality or habitat. This cost could be quantified through lost property values, or the cost to restore or maintain water quality to support recreation.

Value developed from town property assessments

Products:

Report – Summary of available information by category, recommendations for next steps

Data table and all documents - Will be accessible online (soon)!

Selected graphics and fact sheet:
Also online (soon)

Nature Economy

Values of Freshwater Recreation in NH

Written by Shannon Rogers, Nature Based Economic Development State Specialist with Alison Watts, Research Assistant Professor, UNH Civil & Environmental Engineering

Extension

New Hampshire
Lives on Water

Fact Sheet #2

January 2019

Introduction

New Hampshire's freshwater resources provide numerous values to both residents and visitors. New Hampshire has over 1,000 Lakes and 10,000 miles of rivers and streams that are part of New Hampshire's impressive "nature economy." Tourism is a large part of New Hampshire's economy and our water resources are one of the main attractions that bring visitors to our State. In 2017, visitors to NH spent over \$5 billion dollars at New Hampshire destinations. Recreation is also a part of the high quality of life residents of NH enjoy. In the following analysis, that was completed as part of larger study on the values and costs of New Hampshire's water resources with NH Lives on Water, we show select economic benefit of three types of freshwater recreation: swimming, boating, and fishing.



Key Findings:

- The economic impact of recreational fishing in New Hampshire is approximately \$215 million dollars per year
- The economic impact of visitors who came to swim in New Hampshire's freshwater state parks during the summer of 2017 is approximately \$40 million dollars
- The economic impact of non-NH registered boaters visiting New Hampshire in 2017 is estimated at over \$100 million dollars

The Economic Impact of Recreational Fishing in New Hampshire

According to the most recently available data, 228,000 people spent 4.37 million days fishing in New Hampshire and spent \$208.5 million on trip and equipment related expenditures. The majority of these anglers (over 90%) were fishing in New Hampshire's freshwater. These figures include both residents and nonresidents.

In addition to the spending by visitors and residents, the State also collects revenue in the form of fishing licenses. The State of NH collected over \$6.2 million dollars in fishing license revenue in 2017.



The State of New Hampshire collected over **\$6.2 million** dollars in fishing license revenue in 2017.

228,000 anglers spent **4.37 million** days fishing in New Hampshire and spent **\$208.5 million** on trip and equipment related expenditures

Additional research, editing and support provided by Jenni Reynolds, and Paige McElroy. Dr. Charlie French and Cass Porter reviewed this fact sheet. Graphic design by Molly Stanham.

What Do We Do Now?

- NH LOW Determines its Future as a Public/Private Partnership
- Decide which are the Most Important Data Gaps
- Is There Interest in Filling These Data Gaps?
- Determine the Audiences and the Messages
- Create the Outreach Materials
- Advocate for Water Protection and Investment



Thank You



New Hampshire
Lives on Water

NHLivesonWater.org

Project Approach

