



Web Application Design for the Maine Cooperative Snow Survey

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GEOG 596A

Overview

- Background
 - Maine Cooperative Snow Survey
 - Current Workflow
- Goals and Objectives
- Proposed Methodology
- Challenges/Limitations
- Anticipated Results
 - User Interface Prototype Preview
- Project Timeline

Background



The screenshot shows the website for the State of Maine River Flow Advisory Commission. The header features the state seal and the text "STATE of MAINE River Flow Advisory Commission". Navigation tabs include "Home", "Snow Survey", and "River Watch". The breadcrumb trail reads "Home → Snow Survey → About the Survey".

RFAC Information

- About Us
- Reports
- Maine Cooperative Snow Survey
- River Watch
- MEMA Home
- USGS (Maine) Home

The Maine Cooperative Snow Survey

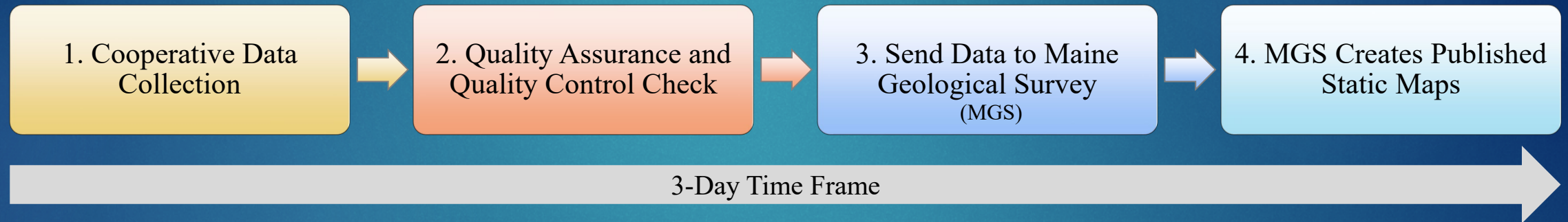
The Maine Cooperative Snow Survey collects, interprets, and distributes information on the depth and water content of Maine's snowpack in the late Winter and early Spring, when the danger of flooding in Maine's rivers and streams is greatest. The data are obtained from a number of cooperating sources, including:

- Allagash Wilderness Waterway
- Brookfield Renewable Energy Group
- Cobbossee Water District
- College of the Atlantic
- Great River Hydro, LLC
- Maine Environmental Science Academy - Fryeburg
- Maine Forest Service
- Maine Geological Survey
- National Weather Service Forecast Office, Caribou
- National Weather Service Forecast Office, Gray
- Nestle - Poland Spring Water Company
- New Brunswick Environment and Local Government
- New Hampshire Department of Environmental Services
- SAPPI Limited
- U.S. Geological Survey, New England Water Science Center, Maine Office
- University of Maine - Earth and Climate Science

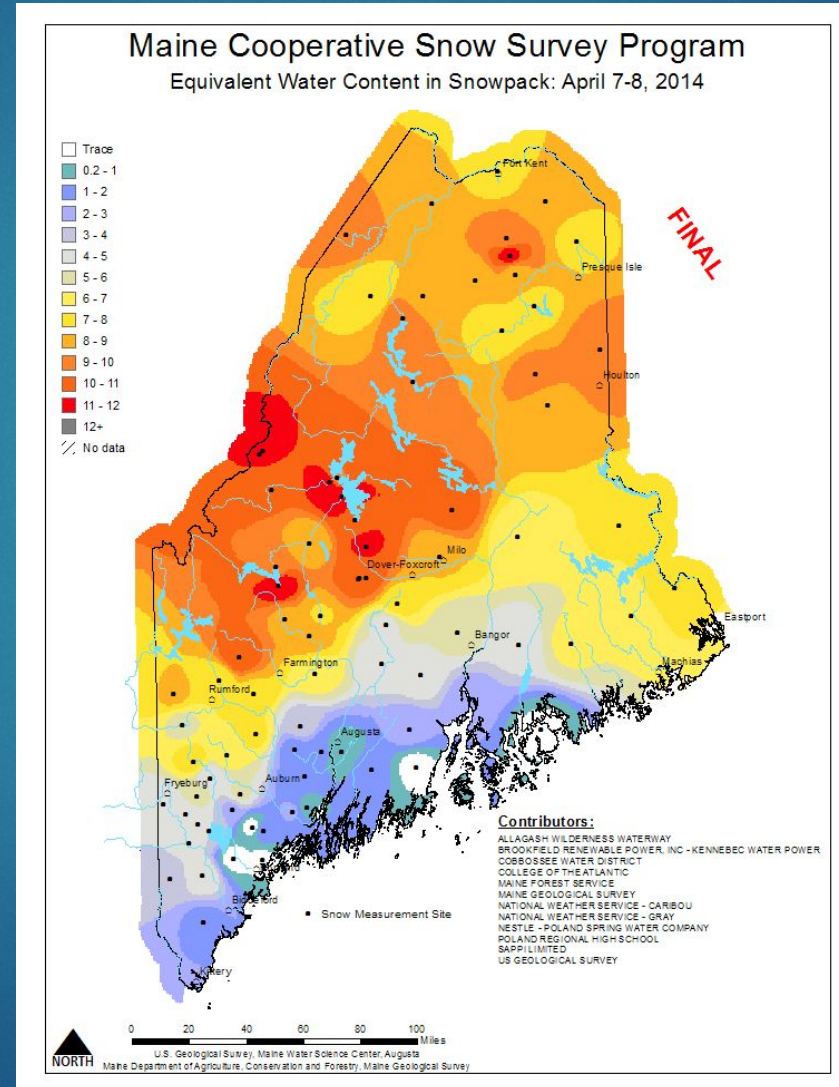


*How Much Snow is Out There?
See the maps posted periodically throughout the late winter and early spring.*

Current Workflow



Current Products



Current Products

Maine Cooperative Snow Survey - Map Comparison

Maps

Map Compare

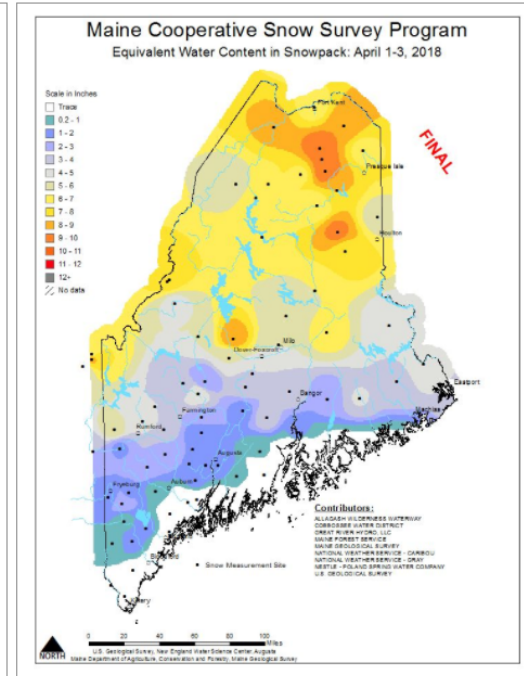
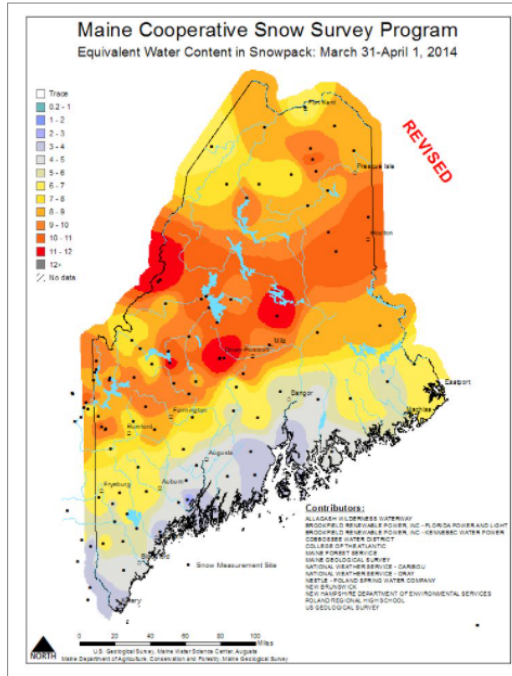
Data

Graphs

The [Maine Cooperative Snow Survey](#) maps and data are provided by a partnership with [Maine Geological Survey](#) and the [U. S. Geological Survey New England Water Science Center, Maine Office](#) for the [Maine River Flow Advisory Council](#).

Select Year:
 Select Survey:
 Select Map/File:

Select Year:
 Select Survey:
 Select Map/File:



Updated: April 28, 2021

Maine Geological Survey. (2021b, April 28). *Maine Cooperative Snow Survey – Maps*. Maine Department of Agriculture, Conservation & Forestry. https://www.maine.gov/dacf/mgs/hazards/snow_survey/

Maine Cooperative Snow Survey - Graphs

Maps

Map Compare

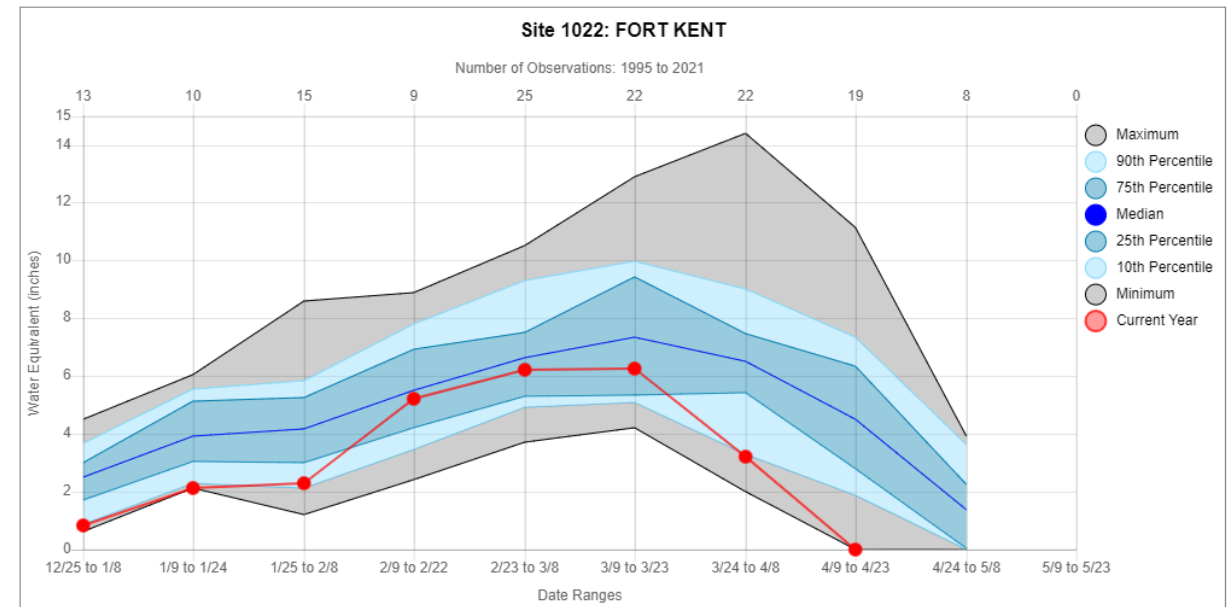
Data

Graphs

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Historical Record Mean Water Content Graph

Select Survey Site:



Updated: April 28, 2021

Maine Geological Survey. (2021a, April 28). *Maine Cooperative Snow Survey – Graphs*. Maine Department of Agriculture, Conservation & Forestry. https://www.maine.gov/dacf/mgs/hazards/snow_survey/snow_graphs.shtml

Data Access Limitations

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Maine Geological Survey

Maine Cooperative Snow Survey - Maps

The [Maine Cooperative Snow Survey](#) maps and data are provided by a partnership with [Maine Geological Survey](#) and the [U. S. Geological Survey New England Water Science Center, Maine Office](#) for the [Maine River Flow Advisory Council](#).

Select Survey Year:

Upcoming Scheduled Surveys - Publication Dates:

Select Completed Survey:

- **Survey Status:** Final
- **Comments:** Only two snow measurements, both from the White Mountains of New Hampshire, were recorded this week.

Select Map/File:

- **File Description:** An ASCII text file of the data used in preparing the maps for the current survey. Includes the site id, site name, site latitude and longitude (in decimal degrees), site elevation (feet above mean sea level), the survey date, and the depth, equivalent water content, and density of the snowpack.

```
MAINE COOPERATIVE SNOW SURVEY
DATA FOR SNOW SURVEY: 20210428

*** Final ***

NOTE: Stations with an asterisk "*" were not used in producing the maps for this snow survey

C NAME          DATE      LONGITUDE  LATITUDE    ELEV  DEPTH  WATER DENSITY CHECK
GRAY KNOB NH    04/27/2021 -71.30931  44.33260    4379  24.40  11.30  0.46  1
HERMIT LAKE     04/27/2021 -71.28300  44.26130    3742  35.00  12.90  0.37  1

FOR ADDITIONAL INFORMATION CONTACT:
```

Data Access Limitations

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Maine Geological Survey

Maine Cooperative Snow Survey - Maps

Maps Map Compare Data Graphs

The [Maine Cooperative Snow Survey](#) maps and data are provided by a partnership with [Maine Geological Survey](#) and the [U. S. Geological Survey New England Water Science Center, Maine Office](#) for the [Maine River Flow Advisory Council](#).

Select Survey Year: 2010 ▾

Upcoming Scheduled Surveys - Publication Dates:

Select Completed Survey: March 17, 2010 ▾

- Survey Status:** Provisional
- Comments:** With one hundred and fifteen sites visited so far this week we have a good picture of how much snow is remaining across the state. The range in depth was 0 to 34.2 inches of snow and the range in water is from 0 to 10.6 inches. Highest amount of snow and the highest water content were at the Parlin Pond site in Somerset County.

Select Map/File: Equivalent Water Content in Snowpack ▾

- Map Description:** Maps of equivalent water content in the snowpack in 1-inch increments based on measurements obtained from the sources listed above.

Maine Cooperative Snow Survey Program

Equivalent water content in snowpack (in inches) – March 15–16, 2010

Legend:
No data
Trace
0.2–1 inches
1–2 inches

PROVISIONAL

Goals and Objectives

- Create a geovisualization that transforms the Maine Cooperative Snow Survey's snowpack depth, water content, and density data from static maps into an interactive web application.
- Provide a more engaging user interface for data exploration through an interactive web application.
- Enhance user exploration of the data to prompt questions that have yet to be asked.
- Enhance the usability of this web application by incorporating user-centered design methods into the GIS design process.
- Explore programmatic automation to push quality checked data into the web application within a three-day time frame to create these maps on a recurring basis.

Proposed Methodology

Process of GIS design stages with user-centered design methods

- Needs Assessment
- Concept Development
 - Low-Fidelity Prototypes
- Prototyping
 - High-Fidelity Prototype
- Proposed Implementation
- Evaluation

Beta Web Application Details

Target Audience

- Primary Audience
 - River Flow Advisory Commission
 - Maine Geological Survey
- Secondary Audience
 - 16 organizations involved in the Maine Cooperative Snow Survey

Data Retrieval

- Storage
 - Maine Snow Survey Data ArcGIS Hub website
- Access Options
 - ArcGIS REST API
 - Data download
 - Export from Maine Geological Survey SQL Server database
- Explore programmatic automation to meet three-day time frame requirement

Beta Web Application Details

Expected User Task Components

- A single map view to explore snowpack depth, water content, and density data based on a survey year and date
- A map comparison view that compares maps of different survey years, dates, and snowpack data types
- A graphical view that shows the “historical record mean water content” (Maine Geological Survey, 2021a) for selected survey sites

Challenges/Limitations

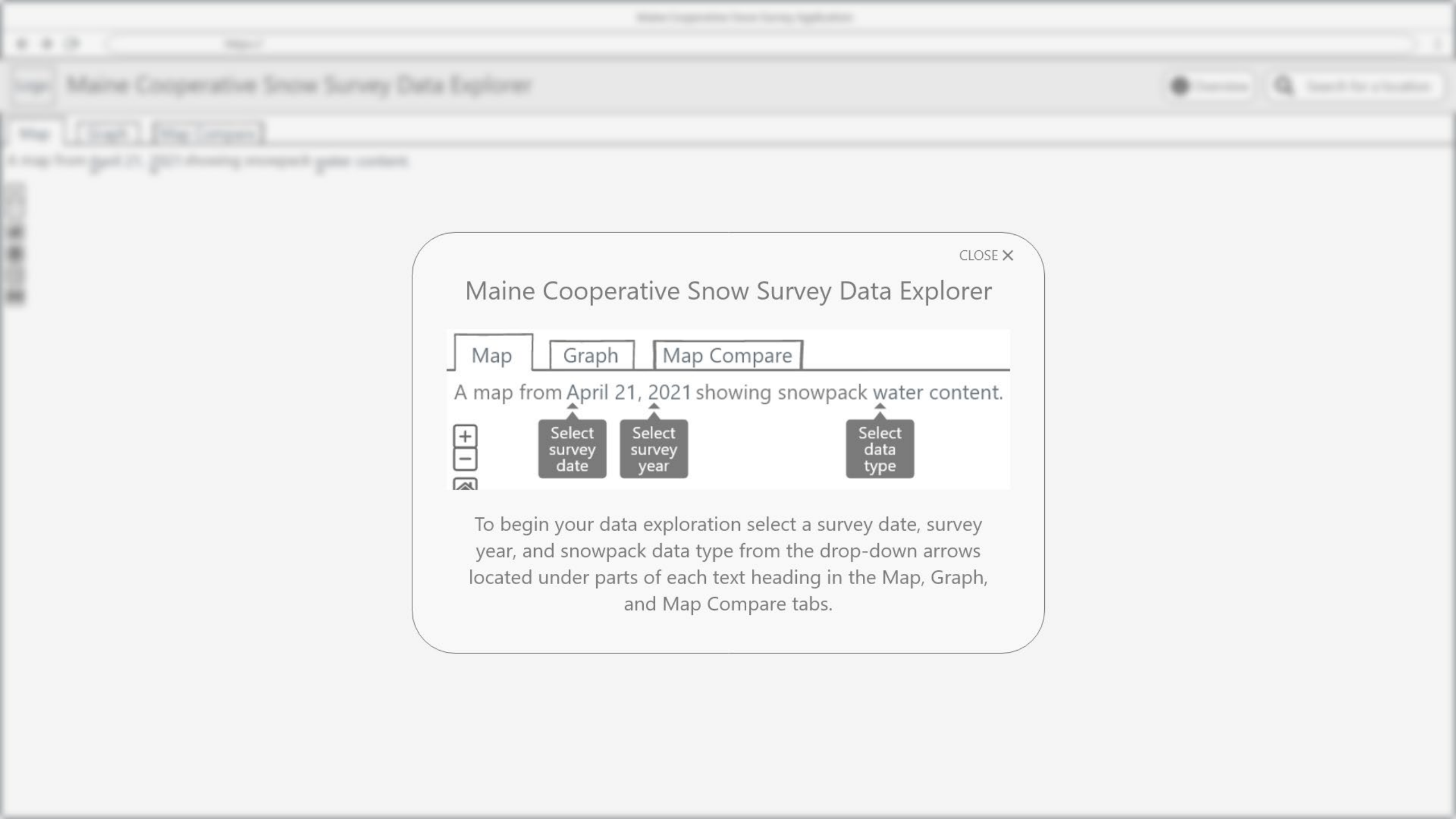


- Unknown Maine Geological Survey requirements, restrictions, and standards
 - Hosting platform
 - Code structure
 - Data connectors
 - Publishing requirements

Anticipated Results

- Beta web application built using Esri's ArcGIS API for JavaScript
- Incorporation of front-end development tools to provide an intuitively designed user interface
 - Examples: Bootstrap, Vue.js, D3.js
- Inclusion of programmatic automation to push quality checked data into the web application within a three-day time frame to create these maps on a recurring basis
- Potential for this beta product to be publicly available on the Maine Cooperative Snow Survey website

User Interface Prototype Preview



CLOSE X

Maine Cooperative Snow Survey Data Explorer

Map Graph Map Compare

A map from April 21, 2021 showing snowpack water content.

+
-
📄

Select survey date

Select survey year

Select data type

To begin your data exploration select a survey date, survey year, and snowpack data type from the drop-down arrows located under parts of each text heading in the Map, Graph, and Map Compare tabs.



https://



Logo Maine Cooperative Snow Survey Data Explorer

Overview

Search for a location

Map Graph Map Compare

A map from April 21, 2021 showing snowpack water content.



Map of Snowpack Data Type



https://



Logo Maine Cooperative Snow Survey Data Explorer

Overview

Search for a location

Map

Graph

Map Compare

A graph showing the historical record mean water content at the survey site.



Graph of Snowpack Water Content



https://



Logo Maine Cooperative Snow Survey Data Explorer

Overview

Search for a location

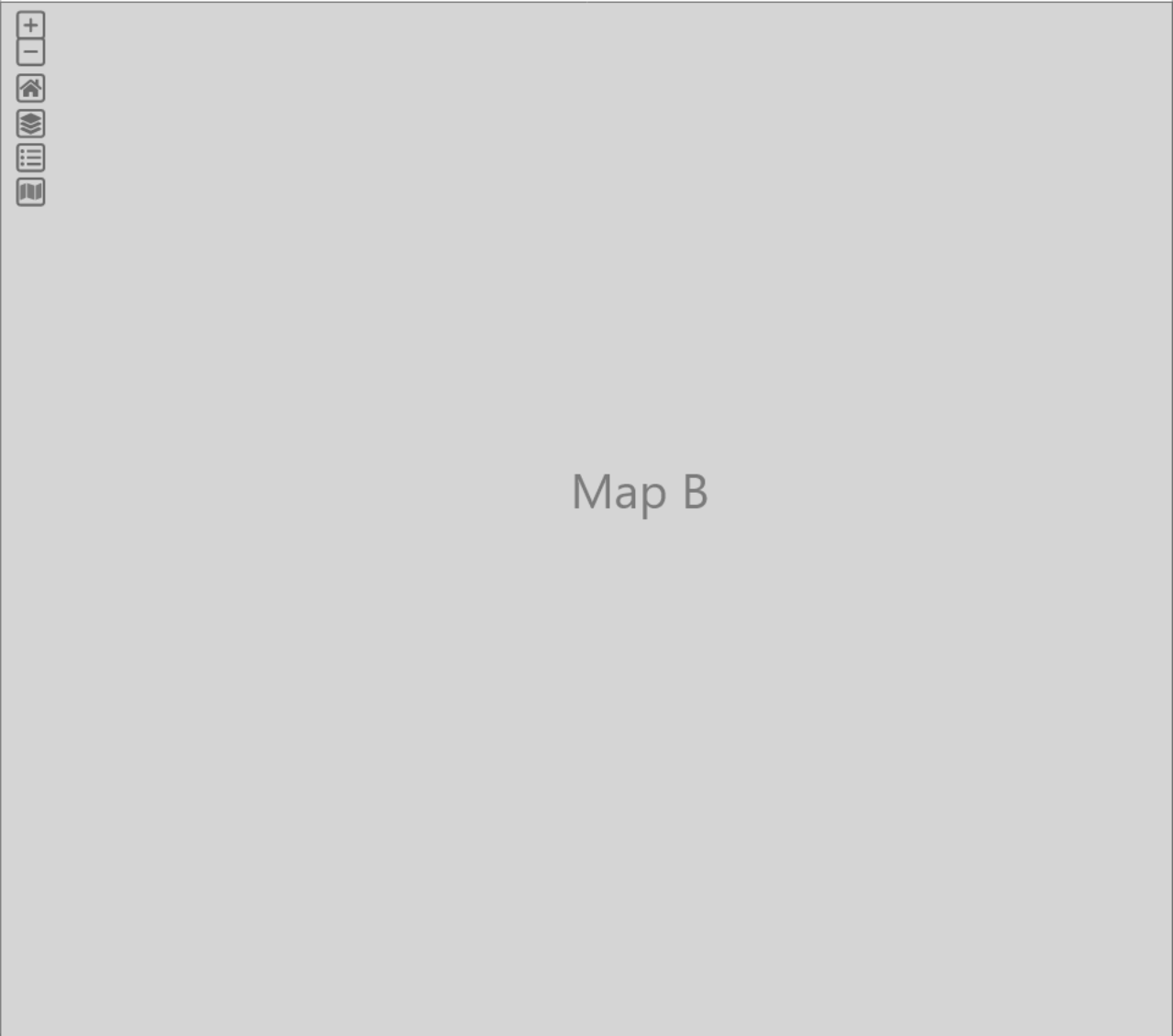
Map

Graph

Map Compare

A map from April 14, 2021 showing snowpack depth.

A map from April 21, 2019 showing snowpack depth.





https://



Logo Maine Cooperative Snow Survey Data Explorer

Overview

Search for a location

- Map
- Graph
- Map Compare

A map from April 21, 2021 showing snowpack water content.



Map of Snowpack Data Type

A map from April 21, 2021 showing snowpack water content.

Map navigation controls: +, -, Home, **Add or remove map layers**, Layers, Full Screen

Map of Snowpack Data Type



https://



Logo Maine Cooperative Snow Survey Data Explorer

Overview

Search for a location

- Map
- Graph
- Map Compare

A map from April 21, 2021 showing snowpack water content.

- Zoom in a level
- Zoom out a level
- Home view
- Add or remove map layers
- Explanation of layers shown in the map
- Show or hide available basemaps

Map of Snowpack Data Type



https://



Logo Maine Cooperative Snow Survey Data Explorer

Overview

Search for a location

Map Graph Map Compare

A map from April 21, 2021 showing snowpack water content.



Map of Snowpack Data Type

A map from April 21, 2021 showing snowpack water content.

- [+](#)
- [-](#)
- [Home](#)
- [Layers](#)
- [Legend](#)
- [Full Screen](#)

- [April 14](#)
- [April 28](#)

Map of Snowpack Data Type

A map from April 21, 2021 showing snowpack water content.

Map navigation controls: +, -, Home, Layers, Legend, Full Screen

2020
2019

Map of Snowpack Data Type



https://

Logo Maine Cooperative Snow Survey Data Explorer

Overview

Search for a location

Map

Graph

Map Compare

A map from April 21, 2019 showing snowpack water content.



Map of Snowpack Data Type



https://



Logo Maine Cooperative Snow Survey Data Explorer

Overview

Search for a location

Map Graph Map Compare

A map from April 21, 2021 showing snowpack water content.



CLOSE X

Overview Text

Project Timeline

DATE RANGE	PROJECT TASKS
December 2021 - February 2022	Needs Assessment Stage <ul style="list-style-type: none">• Research new front-end development tools for this web application, such as Node.js, Bootstrap, Vue.js, D3.js, to determine the best combination of tools for displaying this data• Meet with Maine Geological Survey cooperators to determine technical requirements• Explore programmatic automation to meet the three-day time frame requirement for creating these maps on a recurring basis
March 2022 – May 2022	Concept Development & Prototyping Stage <ul style="list-style-type: none">• Create a prototype of the beta web product to determine the best GUI to display this data, and placement of item selectors, such as survey year, survey date, and snowpack data type
June 2022 - September 2022	Implementation Stage <ul style="list-style-type: none">• Data Management• GIS analysis to display data as shown in the static maps• Programmatic Application Development• Completion of beta product
October 2022	Capstone presentation at the online virtual Penn State Conference or Fall NEARC Conference

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Questions?

THANK YOU!

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