Web Application Design for the Maine Cooperative Snow Survey

PRESENTED BY: KATHERINE TRICKEY
ADVISOR: JAMES O'BRIEN
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
Current Workflow

1. Cooperative Data Collection
2. Quality Assurance and Quality Control Check
3. Send Data to Maine Geological Survey (MGS)
4. MGS Creates Published Static Maps

3-Day Time Frame
Current Products

[Map of Maine Cooperative Snow Survey Program showing equivalent water content in snowpack on April 7-8, 2014.]
Current Products

Maine Cooperative Snow Survey - Map Comparison

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: 2014  Select Survey: April 1, 2014  Select Map/Files: Equivalent Water Content in Snow

Maine Cooperative Snow Survey Program
Equivalent Water Content in Snowpack, March 31, April 1, 2014

Maine Cooperative Snow Survey Program
Equivalent Water Content in Snowpack, April 1, 2018

Updated: April 28, 2021

Maine Cooperative Snow Survey - 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.

Historical Record Mean Water Content Graph

Select Site: FORT KENT

Site 1022: FORT KENT
Number of Observations: 1995 to 2021

Updated: April 28, 2021
Data Access Limitations
Data Access Limitations
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
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.
A map from April 21, 2021 showing snowpack water content.

Map of Snowpack Data Type
A graph showing the historical record mean water content at the ______ survey site.
A map from April 14, 2021 showing snowpack depth.

A map from April 21, 2019 showing snowpack depth.
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.
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 of Snowpack Data Type
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.

2020

2019

Map of Snowpack Data Type
A map from April 21, 2019 showing snowpack water content.

Map of Snowpack Data Type
A map from April 21, 2021 showing snowpack water content.
# Project Timeline

<table>
<thead>
<tr>
<th>DATE RANGE</th>
<th>PROJECT TASKS</th>
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| December 2021- February 2022 | Needs Assessment Stage  
• 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  
• 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  
• 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 |
References


Questions?

THANK YOU!

KATHERINE TRICKEY
KVT13@PSU.EDU