NWI Unfinished Business: The Current State of Wetland Mapping In Alaska

Part 2

Wetland Mapping Consortium Webinar
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ASWM

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A Big Issue...
An Even Bigger Issue...
And Its Complicated...
And The Landscape is Changing...
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And The Landscape is Changing...
Target Mapping Unit

5 acre TMU

1 acre TMU

Both are NWI Compliant Products
Selawik Wildlife Refuge Update
What is NWI 2.0

– Sometimes called the Surface Waters and Wetland Inventory

– Provides more inclusive geospatial data of all wetlands and surface water features.

– An interpreted dataset that depicts all surface water and wetland features in a single feature class
  • Retains the wetland and deepwater polygons from NWI
  • Reintroduces linear wetlands as narrow polygonal features
  • Completes segmented connections
  • Provides consistency by applying Cowardin classification to all features
Combined NWI and NHD Update
Integrating NHD and NWI

An example of NHD data (flowlines). The linear features were buffered 6-8 meters depending on the width of the riverine system and then saved to the NWI wetland polygon feature class.
Integrating NHD and NWI

NHD Data Integrated into NWI Dataset

NHD (blue flowlines) with newly created NWI features (yellow polygons).
Integrating NHD and NWI

NWI wetland features after NHD flowlines were buffered and integrated into the wetland polygon feature class.
Hillshade and Derived Hydro

**HILLSHADE**

IfSAR 5 meter elevation data is a critical collateral dataset to ensure accuracy of the hydrography flowlines. Elevation data functions as a base dataset for hydrography updates in Alaska which is achieved through the creation of contours and hillshade layers from the IfSAR. Each IfSAR tile delivered by the USFWS contained a digital terrain model (DTM), Orthorectified Radar Intensity image (ORI) and hydro breaklines.
Additional Collateral Data

Methods for NWI Wetland Mapping

The imagery and collateral datasets used for mapping, classification and validation of both hydrography and wetland features include the following:

1. SDMI Système Pour l'Observation de la Terre Satellite (SPOT) 5 Imagery
2. Alaska Hydrography Dataset
3. Alaska Anadromous Waters Catalog
4. IFSAR Digital Terrain Model (DTM)
5. IFSAR Orthorectified Image (ORI)
6. IFSAR Hillshade
7. Digital Raster Graphics (DRG's)
8. Contours
9. Synthetic Flowline Networks

Fieldsite photo: Selawik Lake
Surface Water Fraction

Researchers from the University of Maryland - Dr. Chengquan (Cheng) Huang and collaborators:

- Temporal analysis of Sentinel 1 and Sentinel 2 radar and sensors to map surface inundation change over time
- Multiple return periods in the same year and over multiple years
- Better characterize annual hydro period and inform water regime decisions
- Combine with high resolution optical imagery to inform vegetation classes
- Perhaps provide wetland delineation and classification for 5 acre TMU
Surface Water Fraction

Details for Individual Wetlands

52 10-m Image

Photo taken on 7/16/2019

ESRI image, 8/11/2014
Surface Water Fraction

SWF Dynamics Along River Beds

Jun.

Jul.

Aug.

Sep.
Surface Water Fraction

SWF Dynamics of Individual Wetlands/Waterbodies

Jun.  

Jul.  

Aug. 

Sep.
Fieldwork Checksites

There were a total of 175 check sites that were investigated.

Click on the Explore button in the lower right corner to make map active. Zoom in/out to see check sites in more detail.
Check sites were selected in advance for areas that could not be clearly identified as upland or wetland or classified accurately on the imagery and with the aid of the available NWI database coverage, Digital Raster Graphic (DRG) topographic maps, five meter resolution elevation data, hillshade DEMs and collateral imagery (e.g., Google Earth).
Final NWI and NHD GeoDatabase
Final NWI and NHD GeoDatabase

12,095 miles of streams, 19,571 waterbodies, 110,000 wetlands
Further attribution of National Wetlands Inventory data

- National Hydrography update
- National Wetlands Inventory
- Current elevational data (IFSAR)

ModelBuilder (ArcGIS)

Wetland mapping with hydrogeomorphic attributes

Scale – 1:24,000
Outcomes of LLWW classification

**Landscape** position – marine, estuarine, lotic (along rivers and streams), lentic (in basins and lakes and reservoirs)

**Landform** – description of the physical shape of the wetland – basin, flat, floodplain, fringe, island, slope and peatland.

**Waterflow** path - throughflow, inflow, vertical flow and tidal descriptors for those tidal wetlands

**Waterbody** – as informed by current NHD – lake, river, stream, pond
Wetland Functions Informed by LLWW

• Surface water detention
• Coastal storm surge detention
• Streamflow maintenance
• Nutrient transformation
• Sediment/pollutant storage
• Carbon sequestration
• Bank and shoreline stabilization
• Fish and aquatic invertebrate habitat
• Waterfowl and waterbird habitat
• Provision of habitat for other wildlife
• Habitat for unique, uncommon or highly diverse wetland plant communities
Customized Functional Assessment

Salmon Habitat Support Function

– Develop a Quantitative Assessment
  • Better suited for decision support in wetland and watershed planning and management.
    – Triggers, modifiers, spatial context/position
  • Scoring based on an algorithm instead of spatial queries
    – More efficient, repeatable, transparent
    – Attribute based data inputs
    – Normalized

– Can the data inputs to the algorithm be derived from landscape-level data
  • LLWW
  • Typical collateral and derived datasets
Salmon Habitat Support Function

Algorithm for map units that satisfied Condition 1 (waterbody)

\[
\left( \left( \frac{AV + Gr + WR}{3} \right) \times FP \right) \times FR
\]

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<thead>
<tr>
<th>Where</th>
<th>Definition</th>
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<tbody>
<tr>
<td>AV</td>
<td>Aquatic vegetation (NWI Class)</td>
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<tr>
<td>FP</td>
<td>Fish passage barrier</td>
</tr>
<tr>
<td>FR</td>
<td>Flow regime</td>
</tr>
<tr>
<td>Gr</td>
<td>Stream segment gradient</td>
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<tr>
<td>WR</td>
<td>Water regime</td>
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<table>
<thead>
<tr>
<th>Lookup Table for AV</th>
<th>NWI Class</th>
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<tbody>
<tr>
<td>AB</td>
<td>EM</td>
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Salmon Habitat Support Function
Questions?

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