

# Data Driven Approach: Using GIS for Environmental Decision Making



# GeoSpatial Services (GSS) vs. GIS

- SMUMN Project Center
  - Experiential Learning
- National Wetland Inventory Mapping
- Wetland Functional Assessment
- Hydro-Conditioning
- Climate Change Vulnerability Assessments
- Academic Support to SMUMN Programs
  - GSS Staff provide instruction and support
  - Student employment (internships)
  - Field-based research initiatives (biology, ecology)

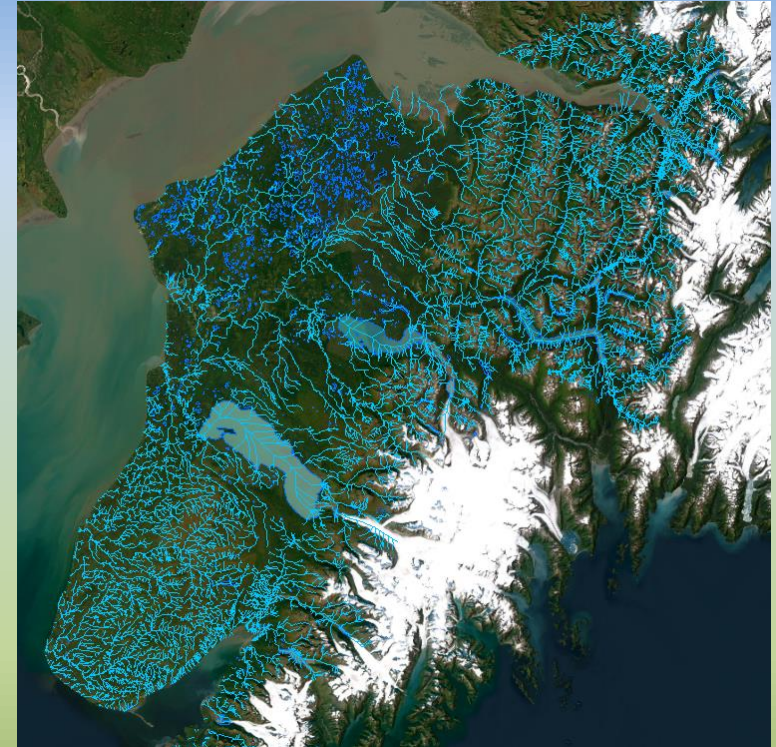
Geographic Information System (GIS) -

A geographic information system (GIS) is a system that creates, manages, analyzes, and maps all types of data. GIS connects data to a map, integrating location data (where things are) with all types of descriptive information (what things are like there).

*ESRI 2023*

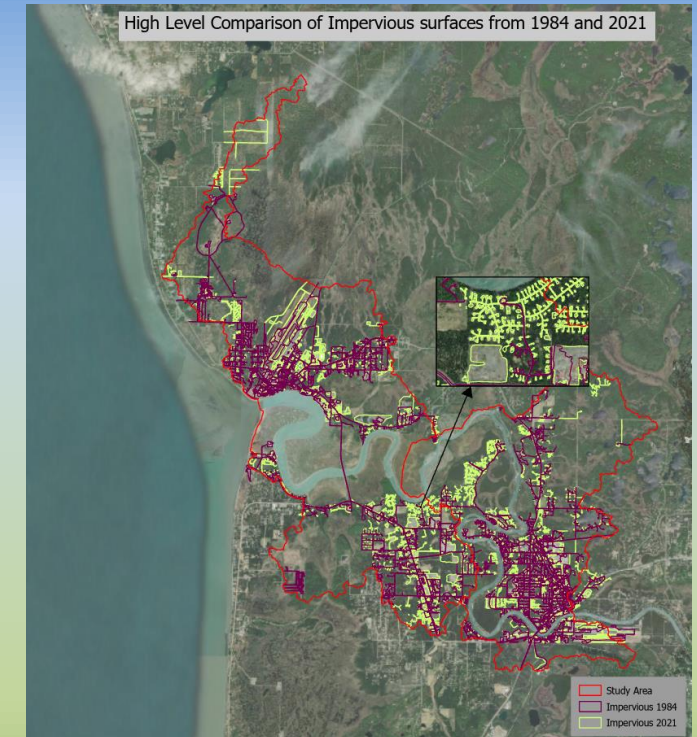
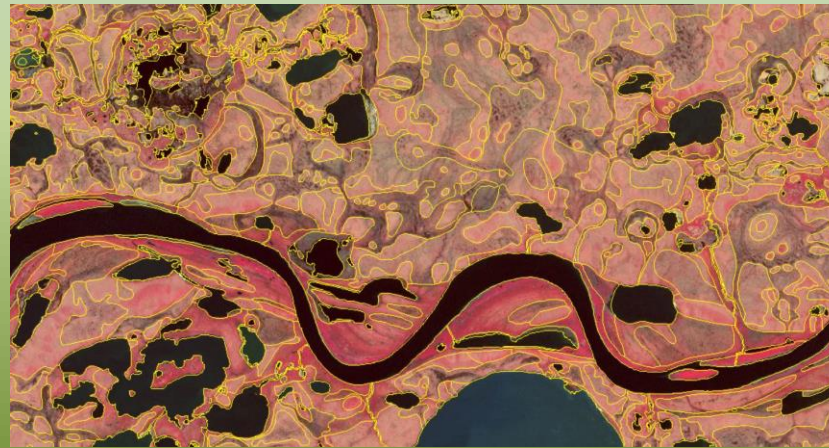
# Alaska Projects

- National Hydrography Dataset
  - Updates throughout Alaska
- Kenai Peninsula Data Mining
  - Research and identify data gaps



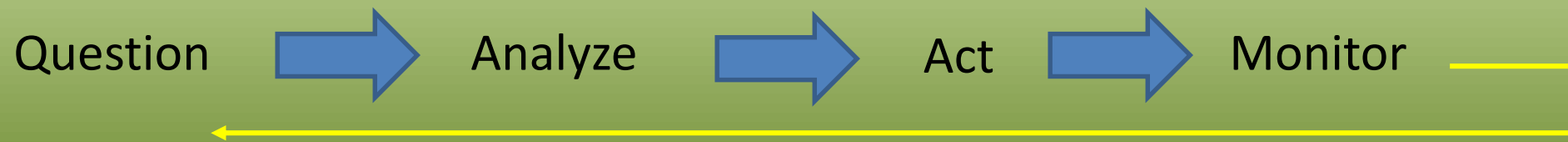
# Alaska Projects

- Kenai Impervious Surface Mapping
  - Identify impervious surface in 2 HU12's
- Wetland Mapping
  - Wetland functions



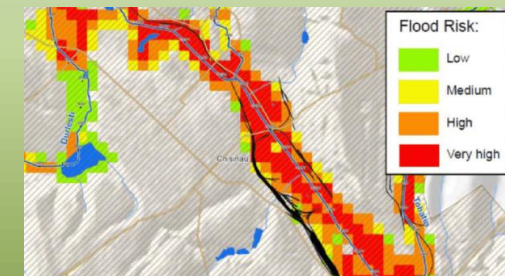
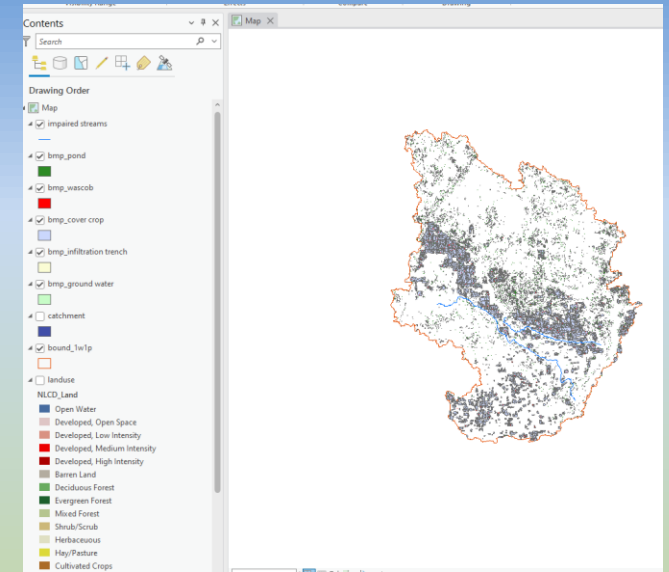
# Phases of Decision Making

- ❖ Identify Issue – Define the issue, question(s), prioritize
- ❖ Analyze – Data mining, create GIS data, GIS spatial analysis
- ❖ Collaboration with stakeholders to initiate action
- ❖ Monitor and evaluate outcomes



# Watershed Planning

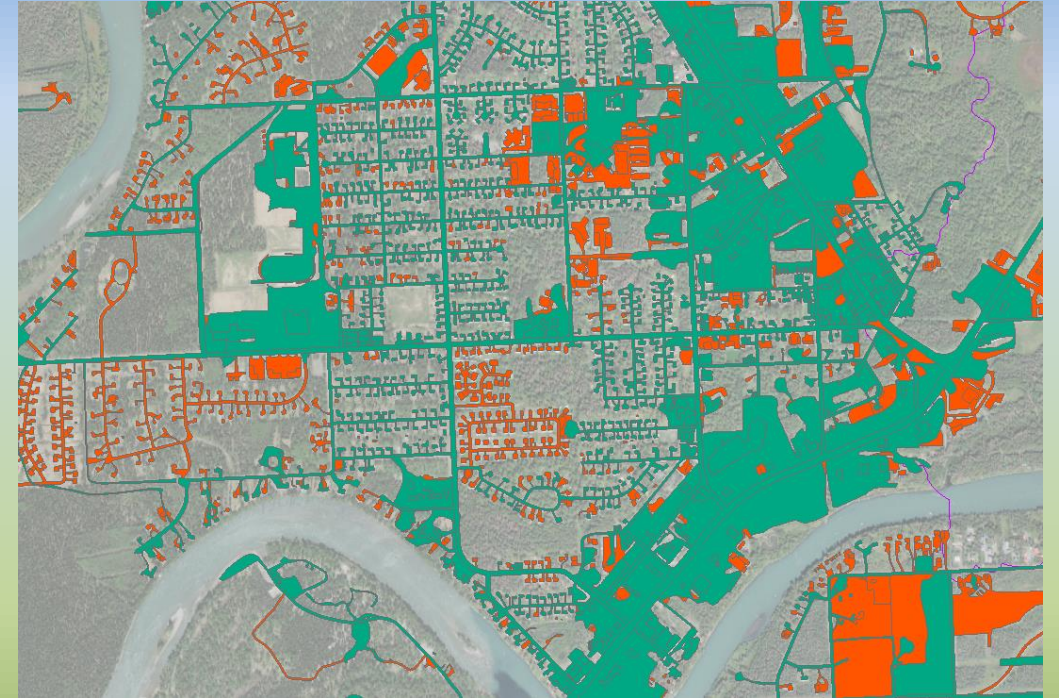
- Monitor loading to streams
- Identify origins of pollution
- Flood risk assessment
- Effects to stream biodiversity
- Sedimentation rate
- Land use planning



# Change Detection

**Change detection** (Temporal analysis) - forest fire prevention, deforestation, water management, **urbanization**

**Risk assessment** – Forecasting the effects of change. Attempt to reduce negative effects



# Wetland Functional Assessment

Main goal of a wetland functional assessment:

Prioritize wetland preservation, enhancement, and restoration sites based on:

- Ecological and social needs
- Functional assessment data
  - Available opportunities
  - Mitigation requirements
- Local input (**partnerships are essential!**)



# Wetland Functions for Assessment

## Water Quality Functions

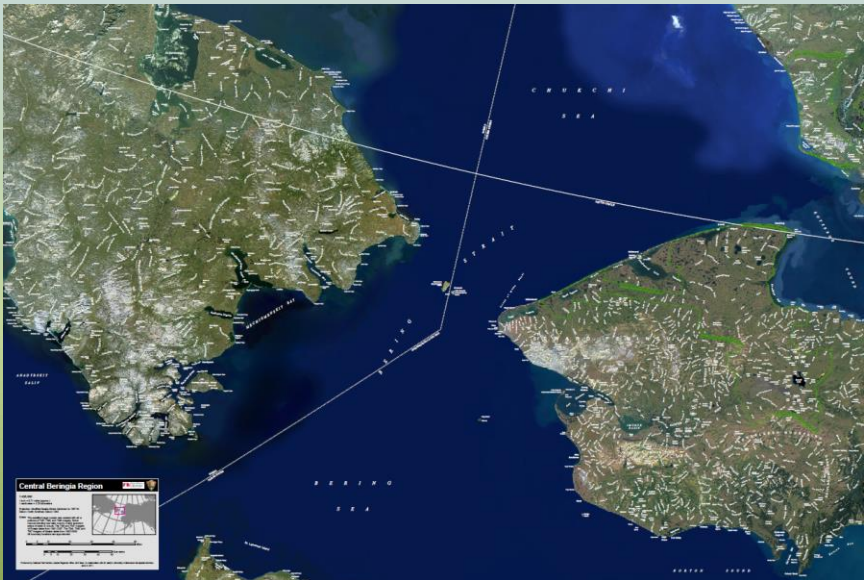
- Surface Water Detention
- Streamflow Maintenance
- Energy Dissipation
- Groundwater Recharge
- Shoreline Stabilization
- Nutrient Transformation
- Carbon Sequestration
- Sediment or Particulate Retention

## Habitat Functions

- Fish Habitat
- Aquatic Invertebrate Habitat
- Waterfowl Habitat
- Shore Bird Habitat
- Amphibian Habitat
- Other Wildlife Habitat
- Conservation of Biodiversity

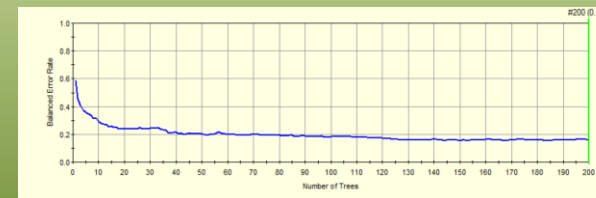
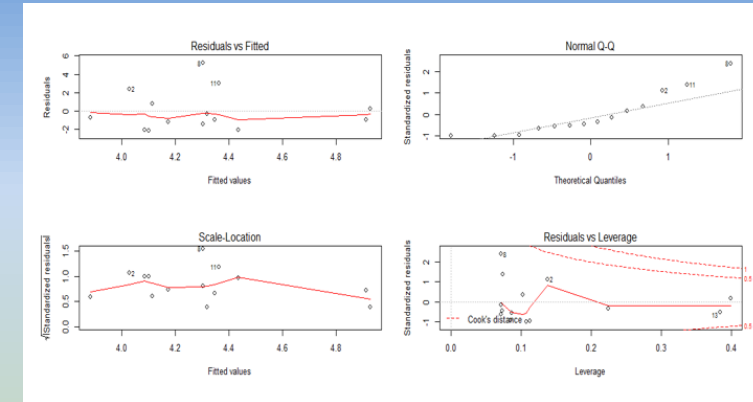
# Visualizing Data

Maps, web pages, interactive application (Field Maps), Story Maps



# Monitoring Progress

- Data gathered after mitigation practices have been implemented can be used to assess if action taken is working
- Data can be added back into the GIS and run through the analysis tools for more comprehensive information



# Conclusion

The importance of GIS technology and quality GIS data cannot be underestimated

GIS provides the platform where multiple data layers can be created, manipulated, analyzed and displayed to better inform the management of environmental issues

GIS technology provides a simple, adaptive, and cost-effective way to present data to inform stakeholders and initiate action

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