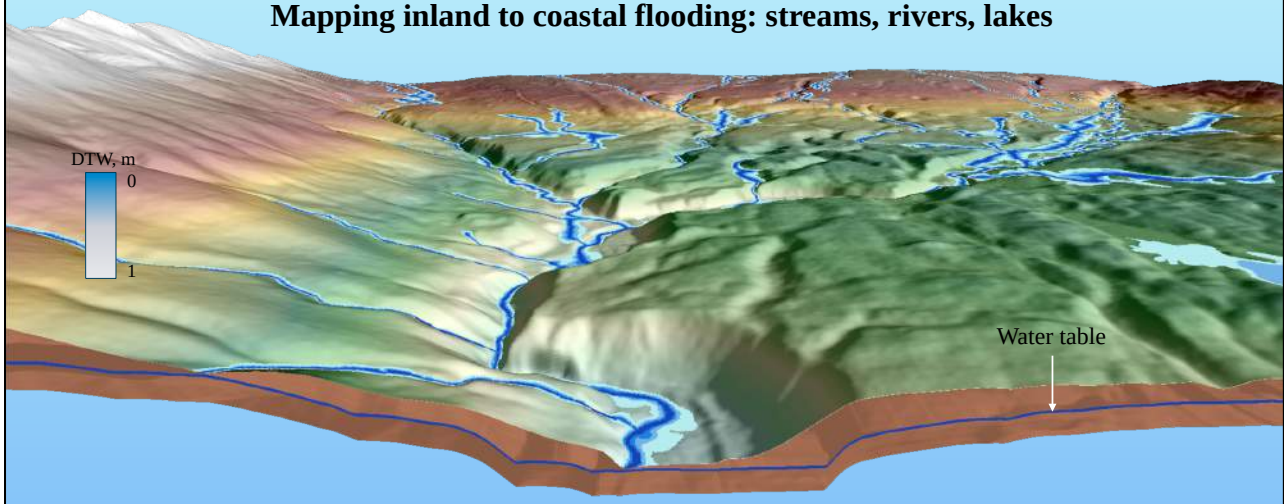
Mapping inland to coastal flooding: streams, rivers, lakes



P. A. Arp, Mark Castonguay, Jae Ogilvie, Marie-France Jones
Faculty of Forestry and Env. Management

Flood Risk Modeling & Ecosystem-based Adaptation
Université de Moncton
Moncton, Oct. 26, 2015

NB-WAM Initiative: Forest watershed Research Centre (FoREM, UNB; ACASA; ETF; JDI; WWF)

with facilitations from

NBELG, NB-DNR, NB-EMO, NB-DTI

and NGOs

via

Jeff Hoyt, Reid McLean, Paul Jordan, Mark Miller, Lee Swanson, Nelda Craig, Kevin Christine Ward, Kevin Connor (NB Government)

Sabine Dietz, Kim Reeder, Simon Mitchell, Malcolm McLeod, Denis Roussel (NGOs)

John-Paul Arp (Flood Animation Programming)

Environmental Trust Fund
Environment and Local Government

Atlantic Climate Adaptation Solutions

1. How can your work contribute to better decision-making in landuse planning?

Digital elevation modelling improves

- land-use planning,
- wet-area, wetland, and flood extent mapping,
- assessing of hydrological infrastructure capacity and connectivity to accommodate severe flood & stream discharge events

All at 10 m and 1 m resolution:

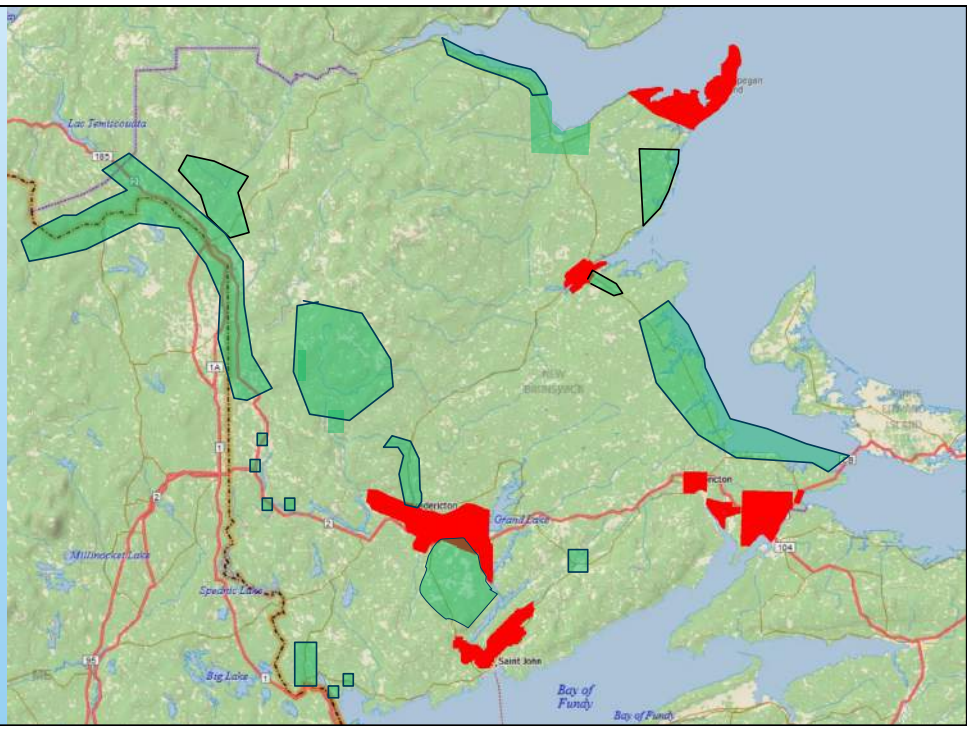
10 m resolution: comprehensive across provinces and large watersheds.
1 m resolution: increases precision and accuracy for target areas.

Provision of planning tools: TRAIL, SPILL, FLOOD, LOCATE

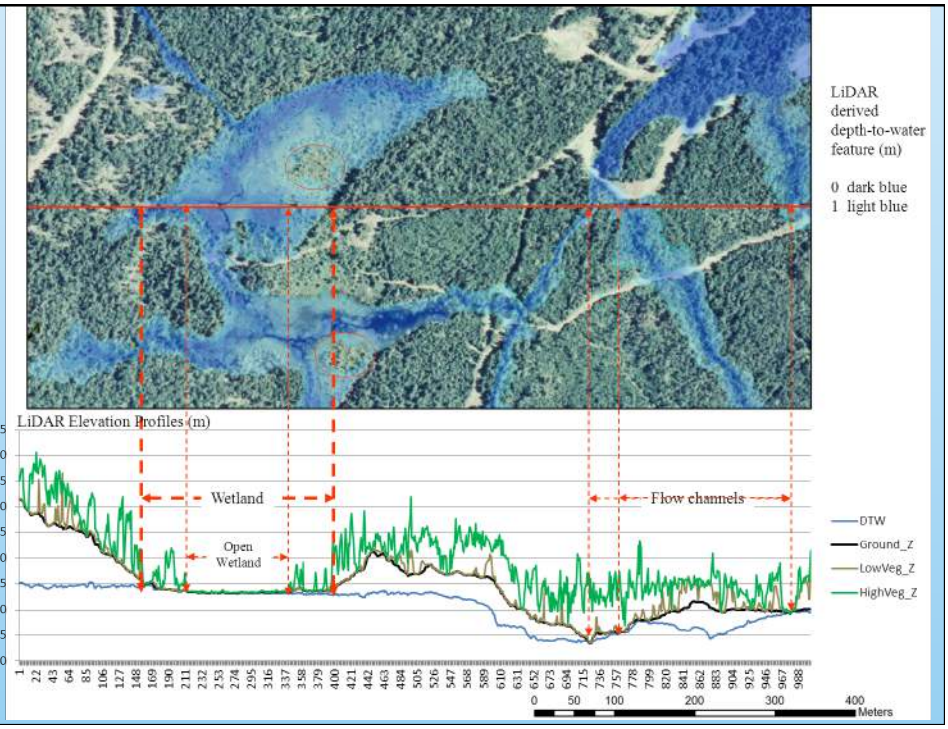
NB LiDAR

WAM Initiative

Coverage to-date



Wet-areas mapping



2. What do we know, and what do we need to better manage inland flooding?

Provision of data layers:

Depression, stream channel, flood plain and wet-area map updates
- 10 m resolution: comprehensive across NB and adjacent watersheds
- 1 m resolution: 15 % coverage for NB; moving to 100 % within 2 to 3 years

geoNB: properties, road, train tracks, pipelines, conservation areas, municipal borders etc.

Other:
- Sparse on historic inland and coastal flood events (geoNB, DTI, JDI)
- Sparse on hydrological infrastructure, decreases from urban to rural centres
- Sparse onflow blockages (culverts, bridges, hydro dams, river and stream narrows)

Needs: comprehensive compilation of hydrological infrastructure, upgraded with DEM-modelled flow capacity and flood expectations

Workshops to discuss/adopt emerging planning tools,
including geoportal to compile and display emerging data, images, maps, etc.

Floodplain mapping for the general Sussex area, NB:

Provincial. DEM (latest version, 10 m resolution),

hill-shaded and

coloured from

11 m (lightest green)

to 180 m (deepest brown)

Floodplains: shaded dark to light blue

up to 4 m in elevation away

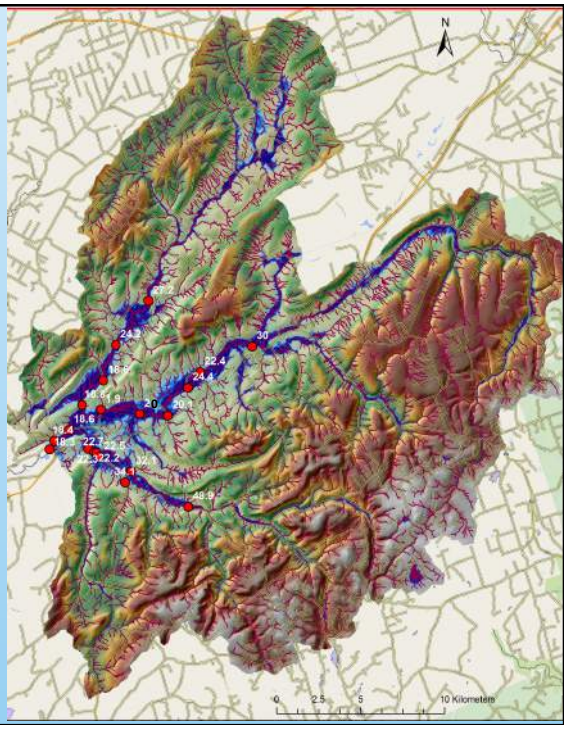
from the flood plain channels

Also shown:

Stream flow channel network

(each stream starting with 4 ha flow initiation)

Bridge locations by elevation



Checking

hydrological infrastructure:

bridges

Rated by capacity to

accommodate 100mm discharge

(appr. 100 year storm event)

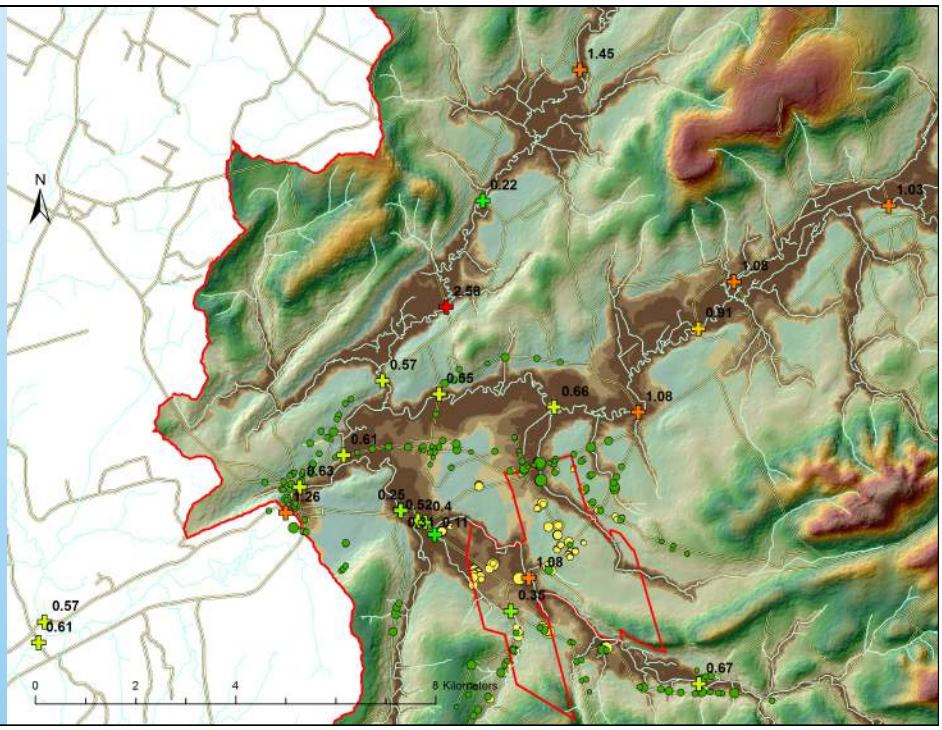
according to upstream

watershed area

Location conformance

to LiDAR-derived

road-stream crossings



Depression mapping

for the general Sussex area, NB

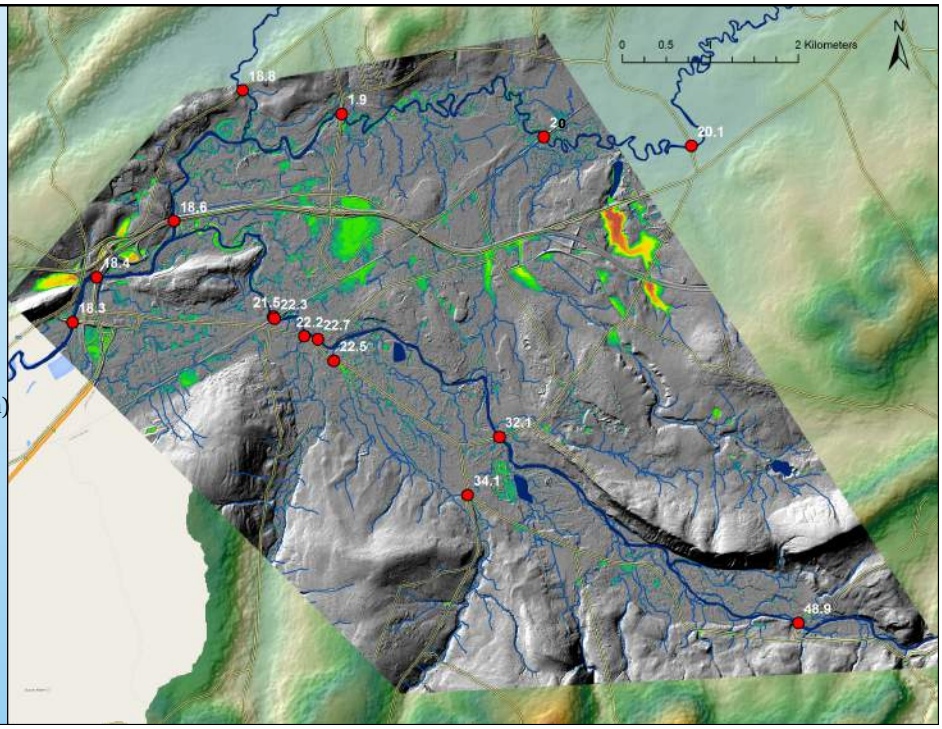
based on LiDAR DEM
(1 m resolution)

Showing depression depths

up to 6 m (shaded green to brown)

The deeper depressions occur

when -road crossings are blocked



Soil drainage (DTW) mapping

for the general Sussex area, NB

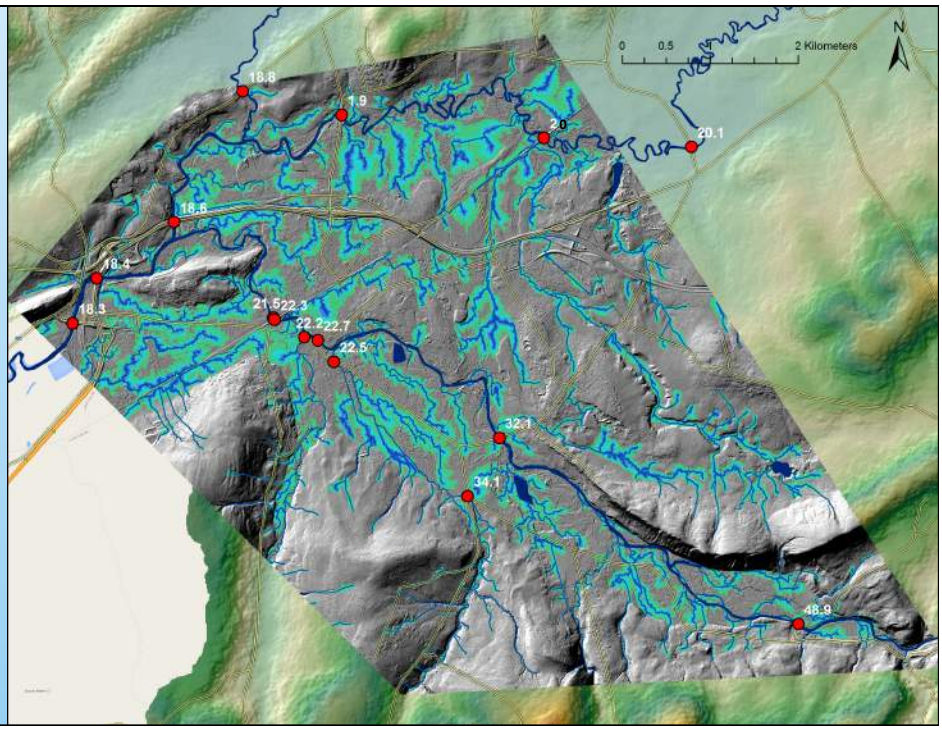
based on LiDAR DEM
(1 m resolution)

Showing the elevation rise

away from all streams

with 4 ha flow initiation,

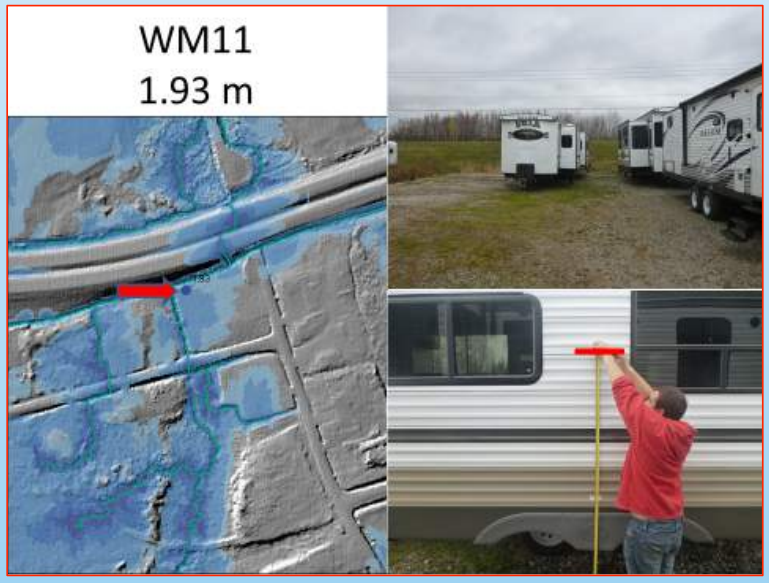
up to 1 m (shaded green)



Checking flood levels

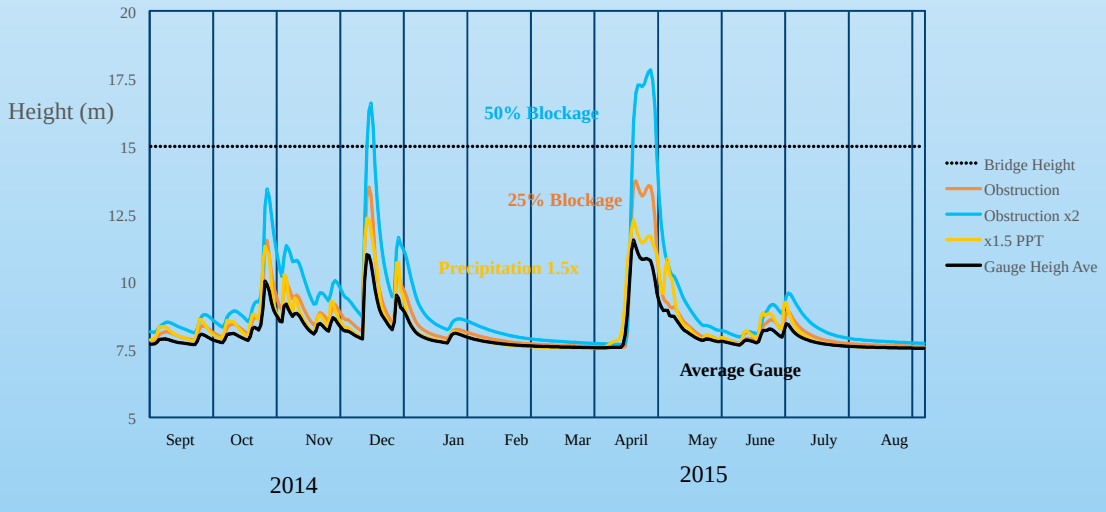
(the hard way)

April 2014 flood



Water backing up in a depression towards Highway 1 along Leonard Drive. Flooding was aggravated by culvert blocking; April 2014.

Average gauge height and potential obstruction scenarios



3. **How can we manage the challenge of uncertainty (future flood scenarios, precautionary principle)?**

Using maps layers that locate flood vulnerabilities within specific community and property contexts

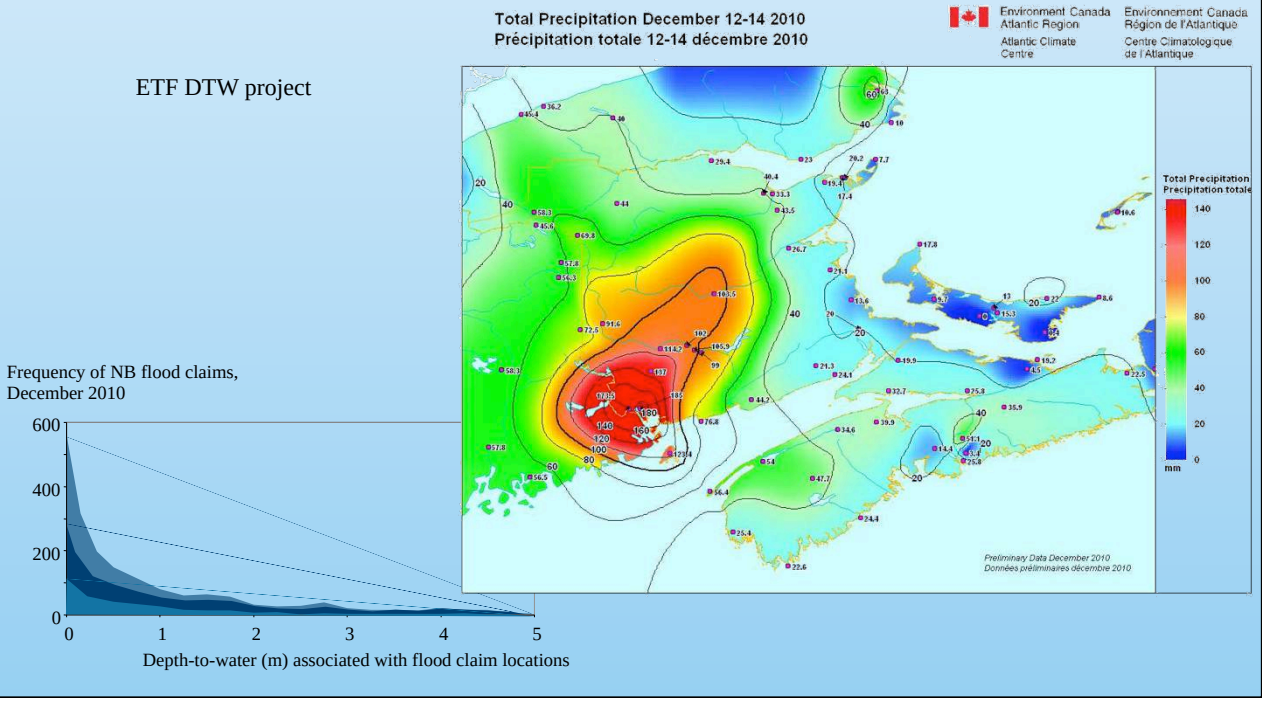
Systematically locate, quantify and risk-prioritize flow blockages:
- depressions,
- eroding slopes and stream channels,
- flow blockages (roads, dams, dykes, culverts, bridges, stream and river narrows)

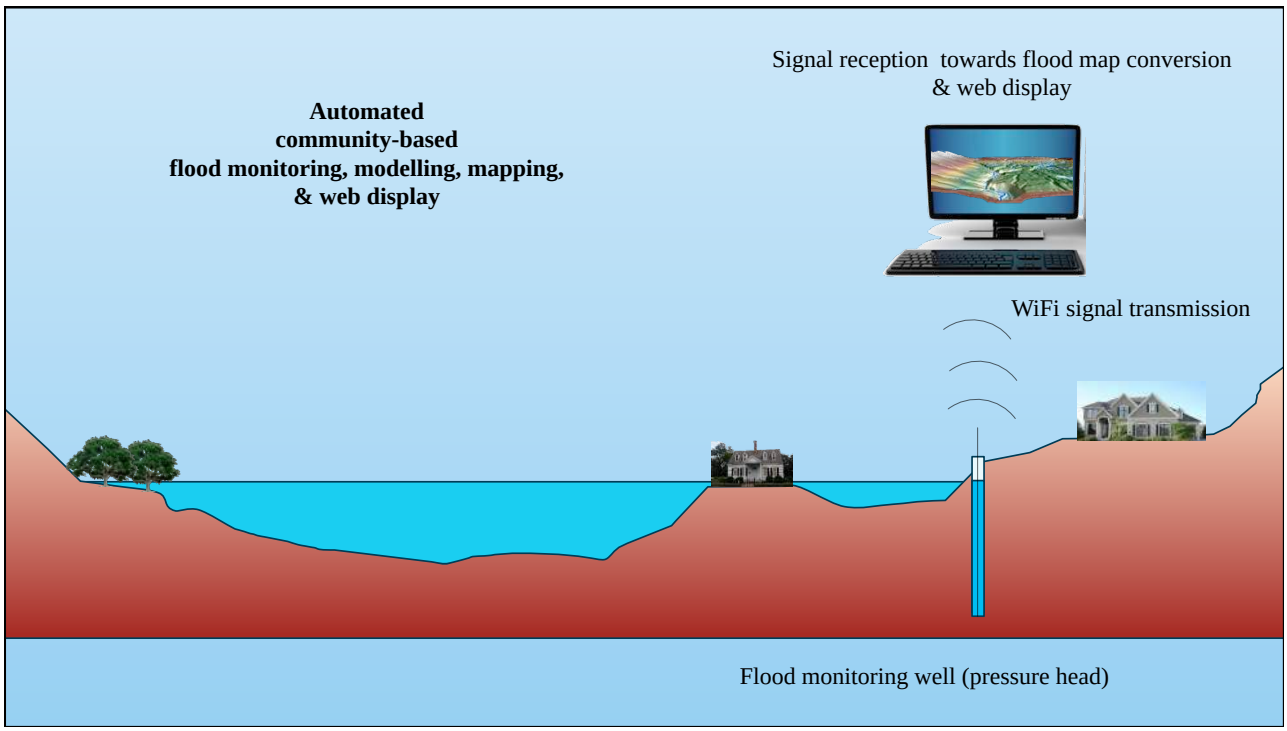
Reduce flow rates through
- trail and road decommissioning
- restrict developments in floodplains, wetlands and depression
- soil protection
- stretch snowmelt season through watershed-based management of forest / vegetation cover

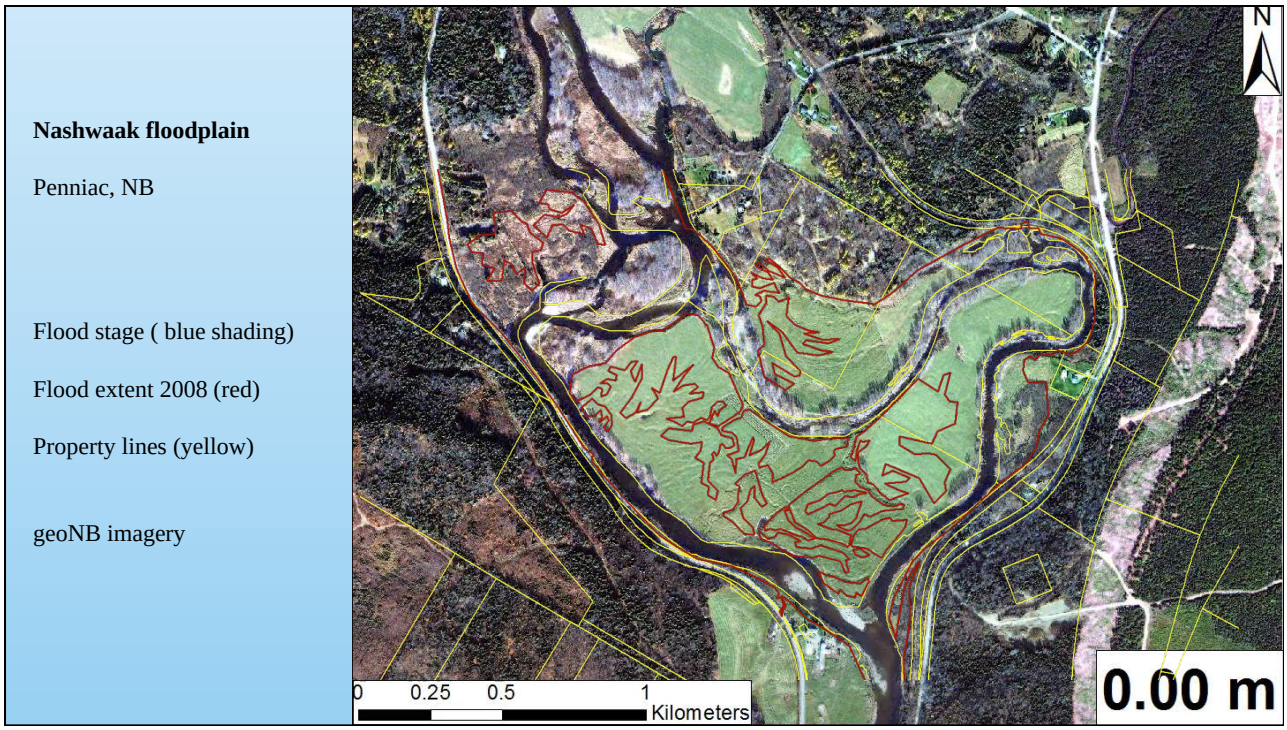
Improve flood forecasting and mapping through systematic GPS-GIS capture and analysis of flood events and damage reports; includes integration of river watch programs and activities

Flood monitoring and systematic reporting

ETF DTW project




Automated
community-based
flood monitoring, modelling, mapping,
& web display
Signal reception towards flood map conversion
& web display
WiFi signal transmission
Flood monitoring well (pressure head)


Nashwaak floodplain
Penniac, NB
Flood stage (blue shading)
Flood extent 2008 (red)
Property lines (yellow)
geoNB imagery
N
0 0.25 0.5 1
Kilometers
0.00 m

Nashwaak floodplain

Penniac, NB

Flood stage (blue shading)

Flood extent 2008 (red)

Property lines (yellow)

Hillshaded bare-earth DEM

(LiDAR, 1 m resolution)