Fish & Fish Habitat Research & Modelling
in support of the Huron-Erie Corridor

Susan Doka, Andrew Doolittle,

Kathy Leisti, Carolyn Bakelaar

Huron-Erie Corridor Initiative Annual Meeting
USGS -- February 2010

Fisheries and Oceans   Pêches et Océans
Canada   Canada

Currently Funded DFO Projects in HEC

- Aquatic Invasive Species rapid assessment monitoring (mainly Lake Ontario; Brousseau)

- Habitat surveys and system habitat modelling, including submerged vegetation (Doka/Leisti)

Related Sampling in 2007/08

- AOC electrofishing transects in Detroit and St. Clair rivers (Mandrak)

- Habitat surveys, substrate and SAV acoustics in same areas (Doka/Leisti)
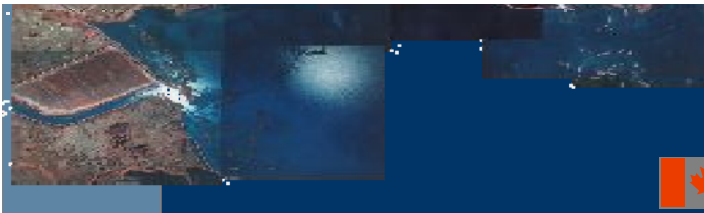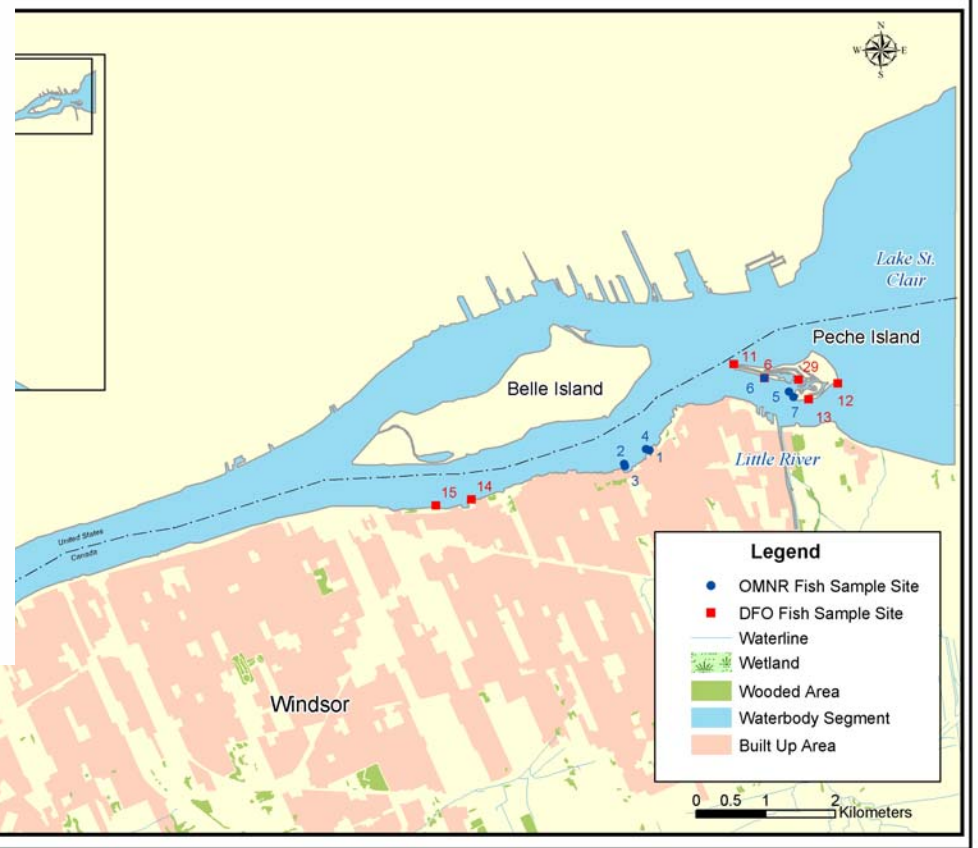
Fisheries and Oceans Pêches et Océans
Canada   Canada

DFO HEC Sample Sites

DFO – GLAP Goal Statement (2006+)

Conduct research and assessment in Areas of Concern to develop an ecosystem approach, including fish-habitat modelling, to quantify the impacts of human activities in AOCs to:

➢ Develop and evaluate targets for remediation,

➢ Guide restoration programs, and

➢ Predict the factors that could facilitate successful recovery of the following beneficial uses:

- Fish populations, and

- Fish habitat (incl. Water Quality / Vegetation)

Fisheries and Oceans Pêches et Océans
Canada   Canada

Habitat-Based Assessment Models

Map, Interpolate & Model in a GIS

Physical, Chemical & Biological Characteristics

Predictive Physical / Spatial Models

Background

Associations or Vital Rate Effects
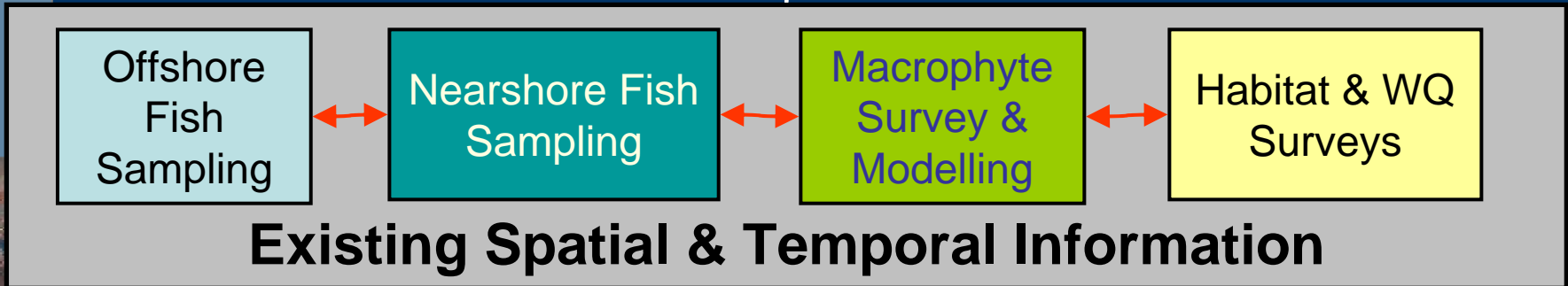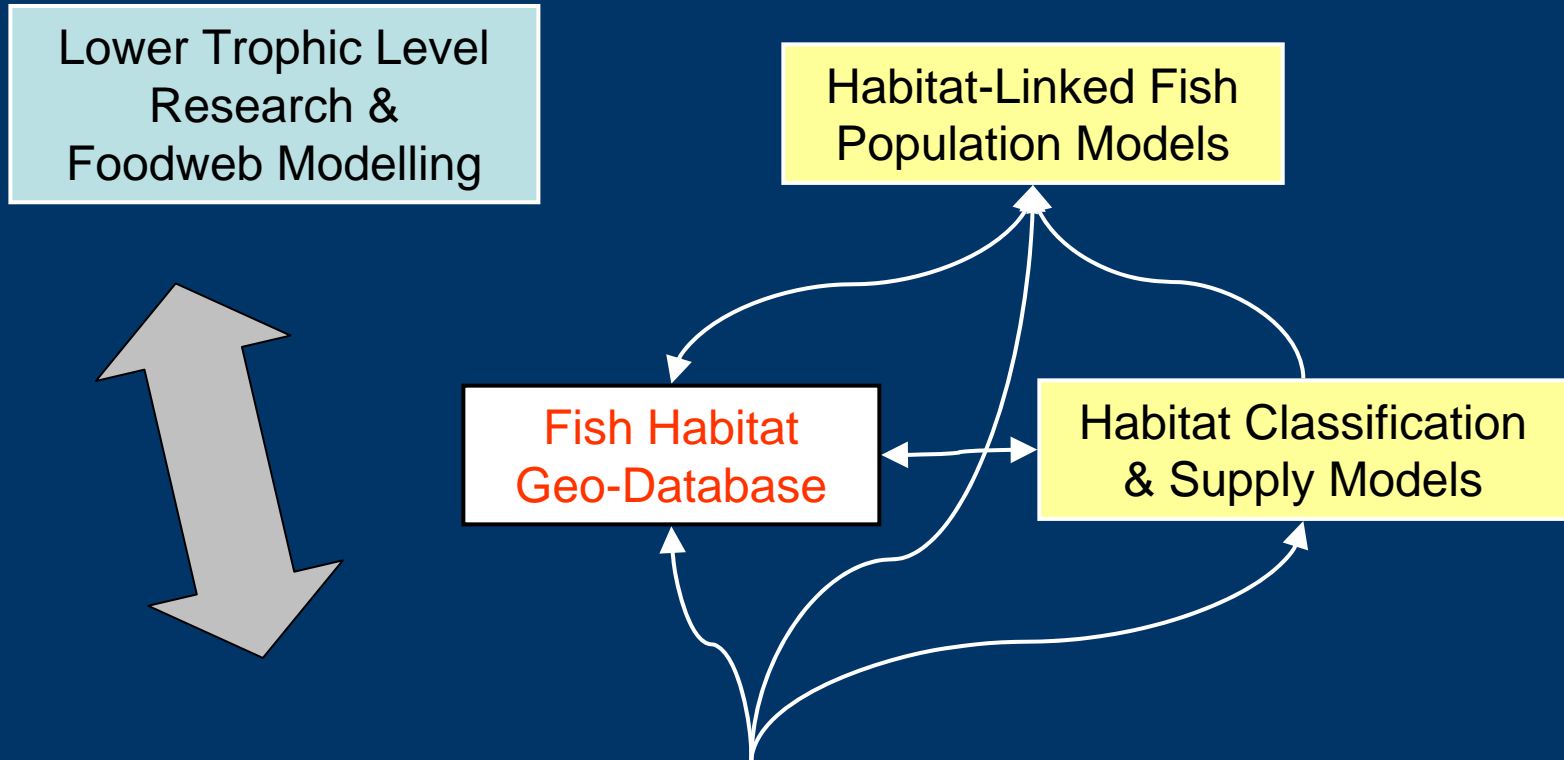
Ecosystem

Change to Environment

Fish Habitat Requirements

Change of Fish Response

Stressor or Effect

Suitability, Supply & Population Models

Links between monitoring & modelling

Background

Lower Trophic Level Research & Foodweb Modelling

Habitat-Linked Fish Population Models

Fish Habitat Geo-Database

Habitat Classification & Supply Models

Offshore Fish Sampling

Nearshore Fish Sampling

Macrophyte Survey & Modelling

Habitat & WQ Surveys

Existing Spatial & Temporal Information

Fisheries and Oceans Canada   Pêches et Océans Canada

Data Layers in HEC Habitat Modelling

Layer	Historic	Current
Shoreline	In Progress	Completed
DEM (land/bathymetry)	In Progress, Coordinated Effort	Completed
Substrate	In Progress	Completed, Coordinated Effort
Sample Sites	Completed	Completed
Vegetation	Completed, Coordinated Effort	Completed, Coordinated Effort
Contaminants	In Progress, Coordinated Effort	In Progress, Coordinated Effort
Temperature	In Progress, Coordinated Effort	In Progress, Coordinated Effort
Orthophotos	Not Applicable	Completed
Digital Photos	Not Applicable	Completed
Baseline & Fish Data	Completed	Completed

Not Applicable   Completed   In Progress   Coordinated Effort

Fisheries and Oceans Pêches et Océans
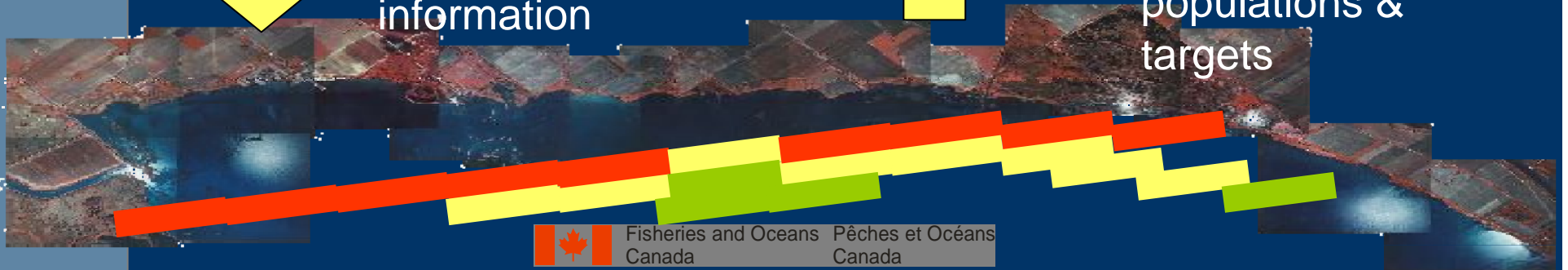Canada   Canada

Fish Habitat Classification and Supply – Hamilton Harbour example

Habitat Models
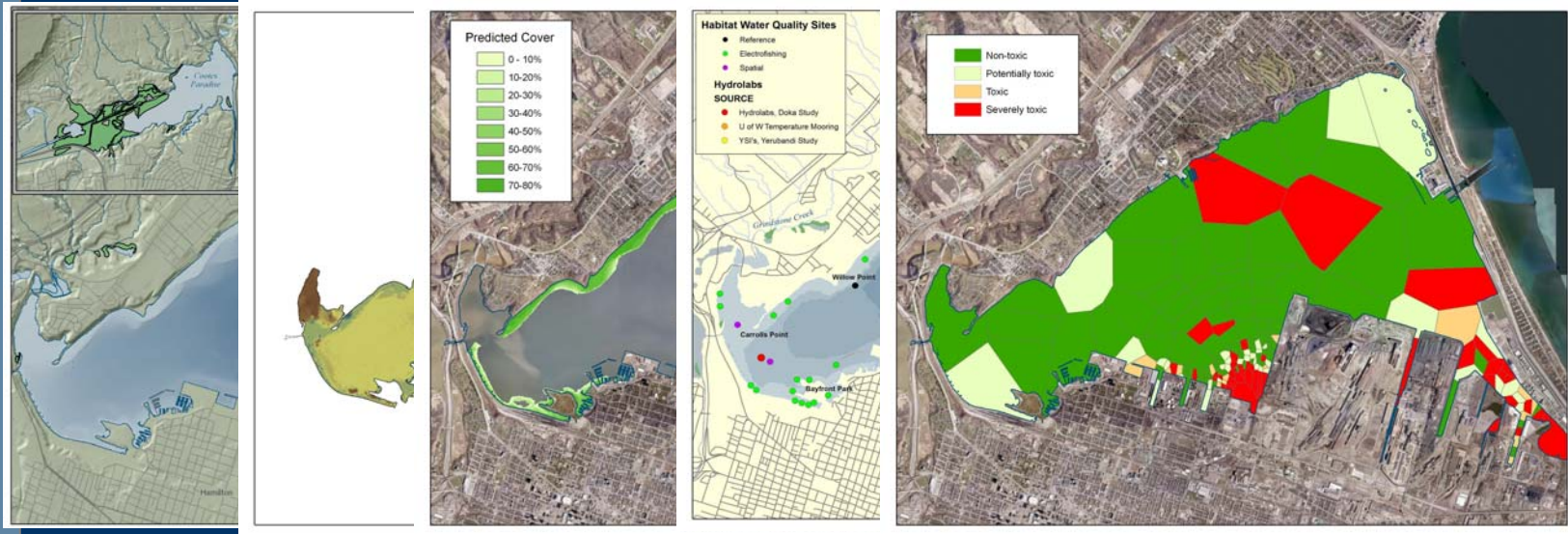
Matrix calculations using species information

Evaluation of relative supply for guilds / populations & targets

Fisheries and Oceans Canada Pêches et Océans Canada

Fish Habitat Supply in Mitchell's Bay

Base Case (High)   Base Case (Low)

DEPTH

VEGETATION

SUBSTRATE

Warm & Dry (High)   Warm & Dry (Low)

COMBINED
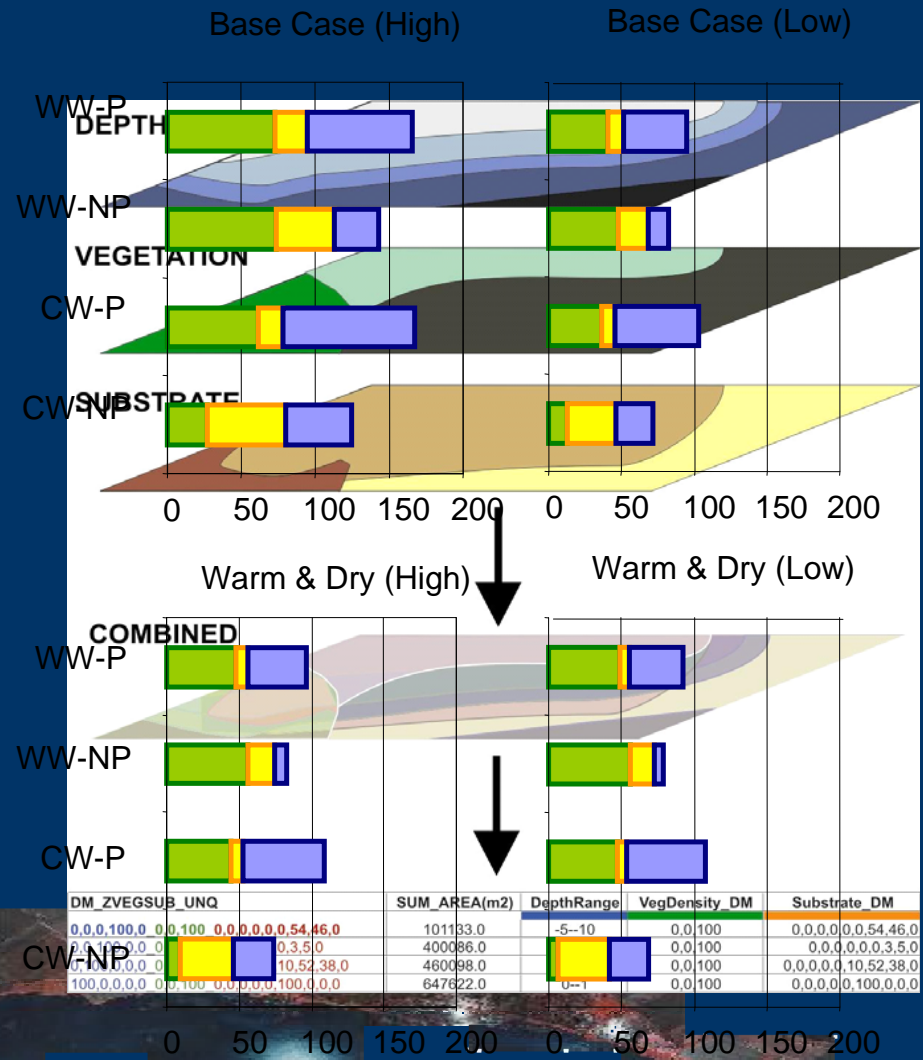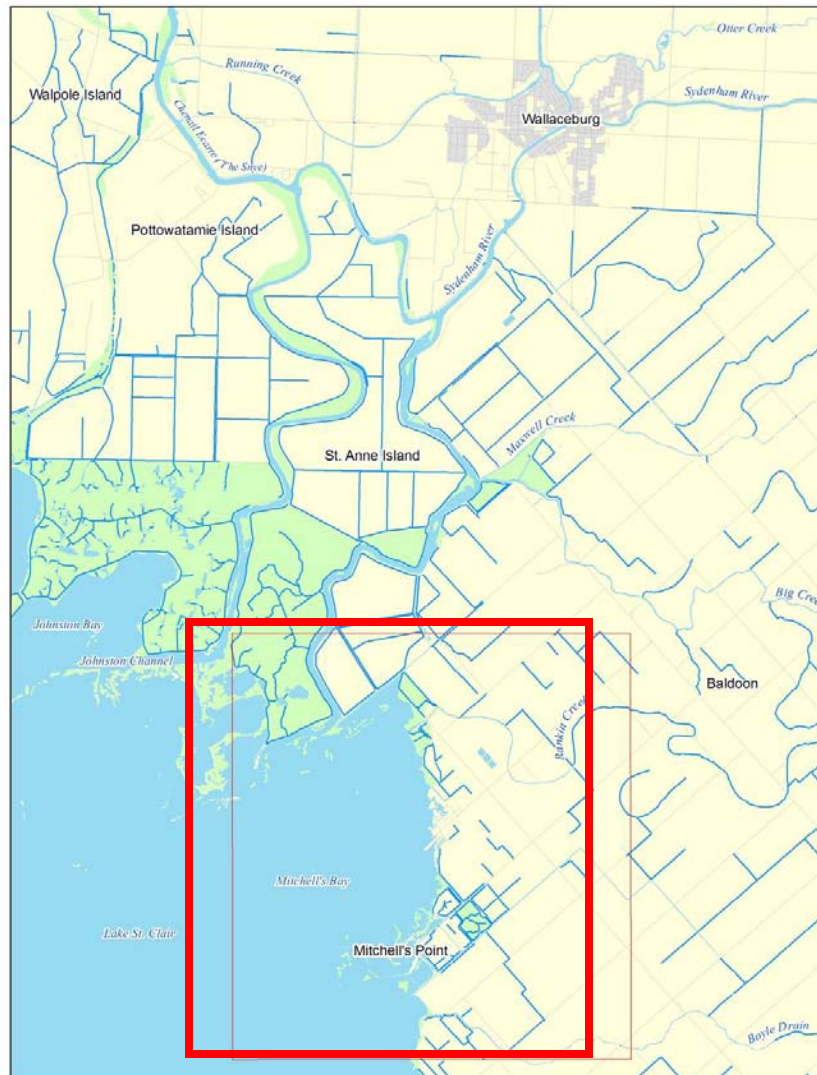
DM_ZVEGSUB_UNQ	SUM_AREA(m2)	DepthRange	VegDensity_DM	Substrate_DM
0,0,0,100,0 0,0,100 0,0,0,0,0,0,54,46,0	101133.0	-5--10	0,0,100	0,0,0,0,0,54,46,0
0,3,5,0	400086.0		0,0,100	0,0,0,0,0,0,3,5,0
10,52,38,0	460098.0		0,0,100	0,0,0,0,0,10,52,38,0
100,0,0,0,0 0,0,100 0,0,0,0,100,0,0,0	647622.0	0--1	0,0,100	0,0,0,0,0,100,0,0,0

🟩 Spawning   🟨 Nursery   🟦 Adult

Fisheries and Oceans Canada   Pêches et Océans Canada

Assessment of restoration goals for fish habitat & fish populations
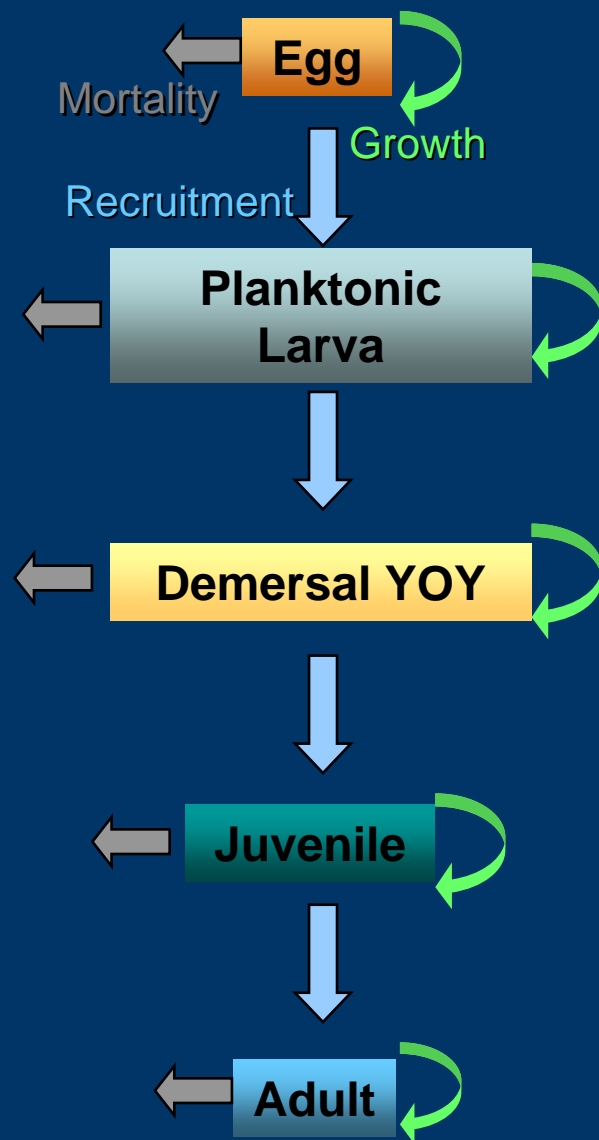
- Selected fisheries: yellow perch, northern pike, smallmouth & largemouth basses

- Evaluate physical, chemical and biotic information & improve population models

- Assess factors potentially limiting the populations in the AOC

- Evaluate restoration & rehabilitation activities to assess potential for improvements to production of the selected fishes

Next Steps

- Complete all habitat layers needed to run classification and supply models for the current assessment (conservation)

- Work with partners on historic assessment (restoration)

- Run future scenarios, if possible (restoration)

- Run or modify fish population models (conservation & restoration)

- Determine uncertainties, sensitivities, gaps

- Document methods and results, making recommendations for RAP targets on fish, habitat (& sometimes water/sediment quality)

Fisheries and Oceans   Pêches et Océans
Canada   Canada