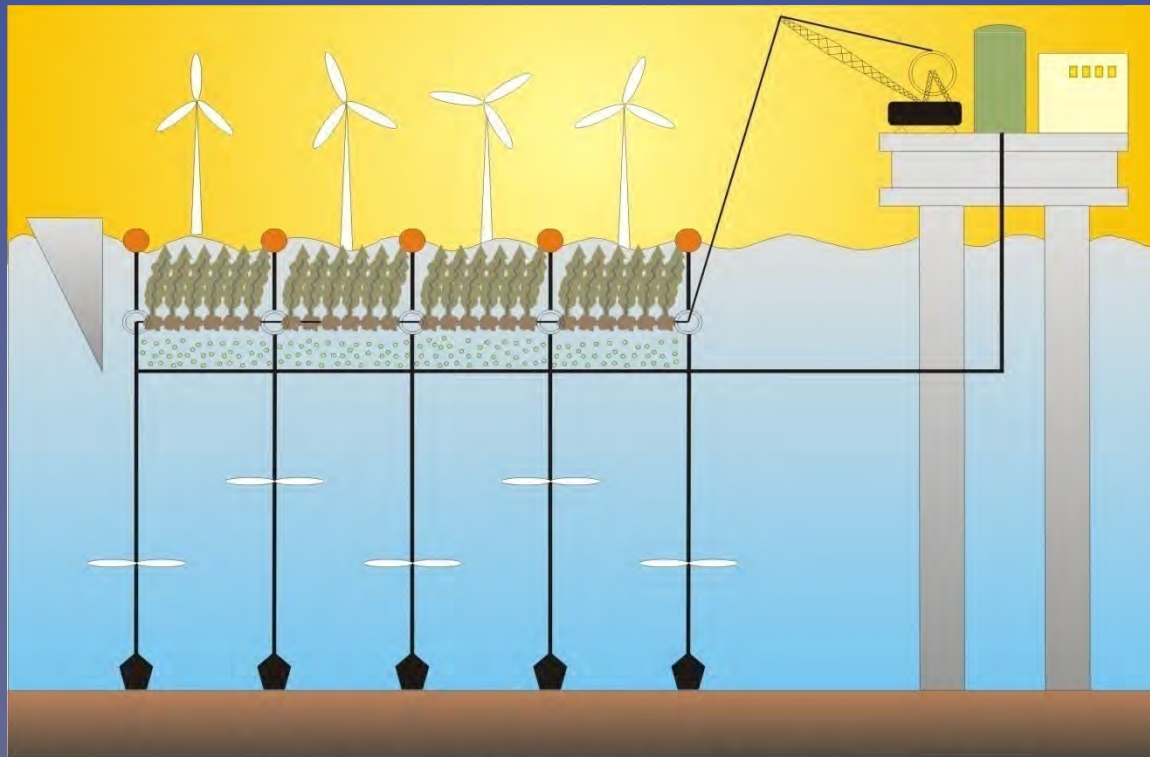


**Combining these activities will also
reduce their cumulative footprint, and
help gaining increased societal acceptance.**



**Turquoise revolution
bioproduction**
at integrated food and
renewable energy
parks (IFREP)



Biomass



Harvesting

Dewatering

Pre-treatment

Transportation



Separation

Fractionation

**Integrated sequential
biorefinery (ISBR)**

Sequential processing



Bio-based, high-valued molecules

- Food and feed products/ingredients/supplements (from nori, kombu, wakame, etc. to protein substitutions in aquaculture feed)
- Biopolymers (alginates, carrageenans, agars)
 - Fine and bulk chemicals
 - Agrichemicals, fertilizers, biostimulants
 - Pharmaceuticals, cosmetics, cosmeceuticals
- Nutraceuticals, functional foods, antioxidants, biooils (DHA, EPA, etc.)
- Botanicals, pigments, colorants, aromatics

Low-valued commodity energy carrying molecules

- Biofuels
- Biodiesels, gasoline, waxes, olefins
- Biogases (biomethane, biohydrogen)
 - Bioalcohols, aldehydes, acids
 - Biomaterials, biocomposites, thermoplastics, adhesives
- Heat/steam
- Power/electricity

Ecosystem services (IMTA)



Nutrient and CO₂ sequestration

O₂ supply

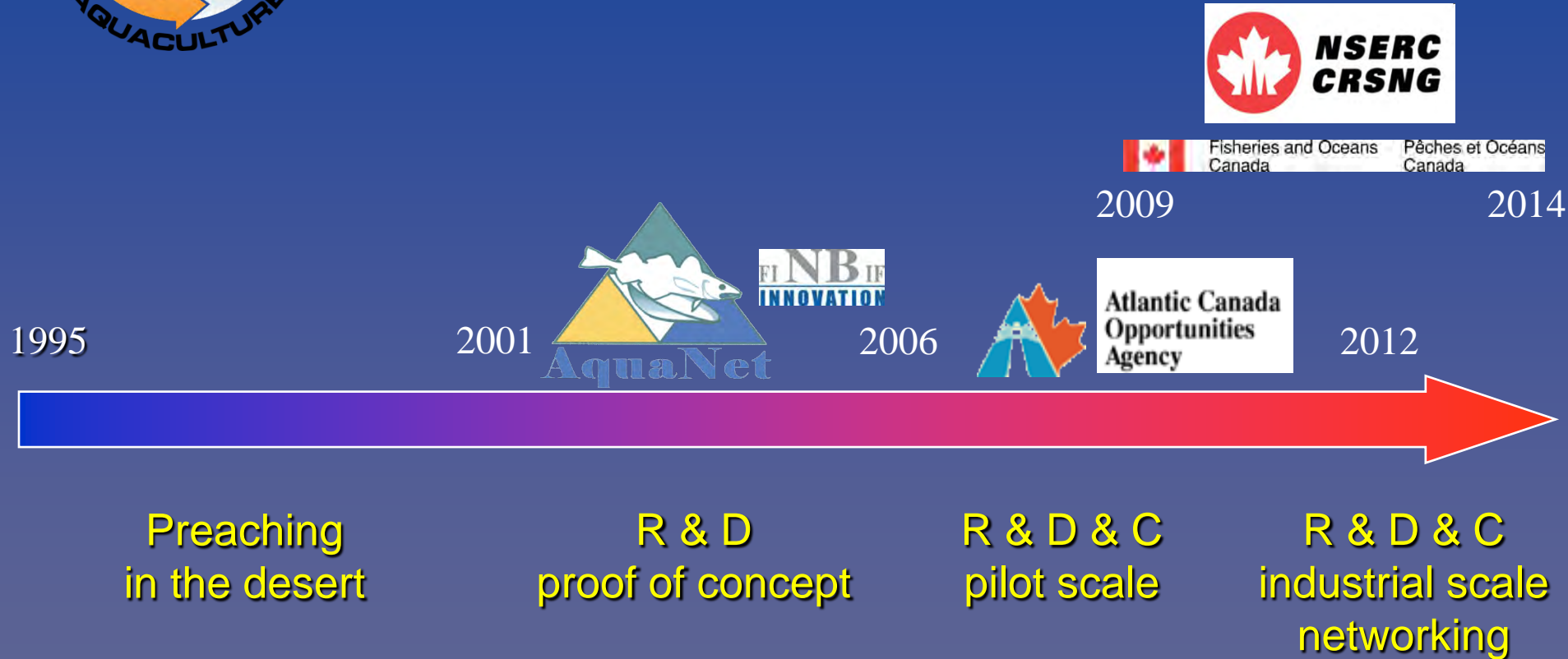
Species interactions

Integrated sequential biorefinery (ISBR)

But all that takes time to develop...



Evolution of the IMTA project



**We should realize that we are still
in the infancy of western IMTA**

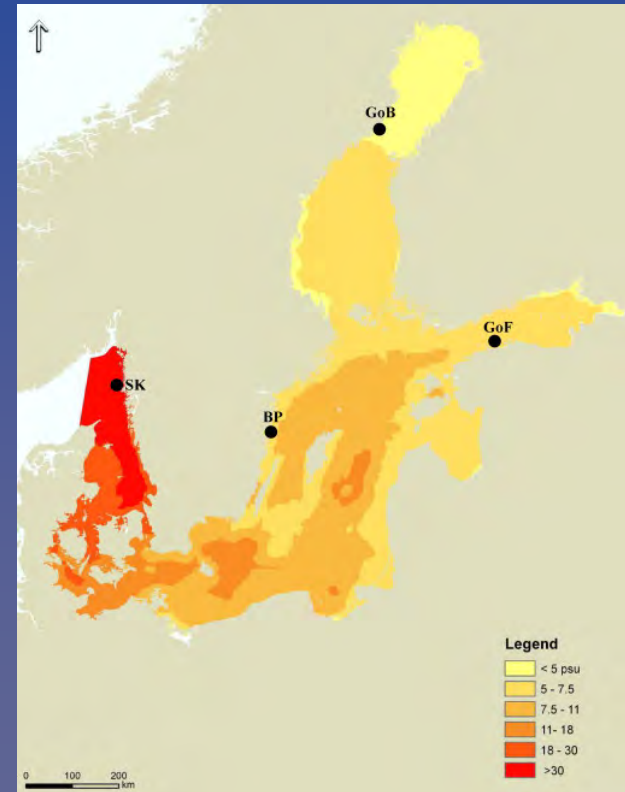
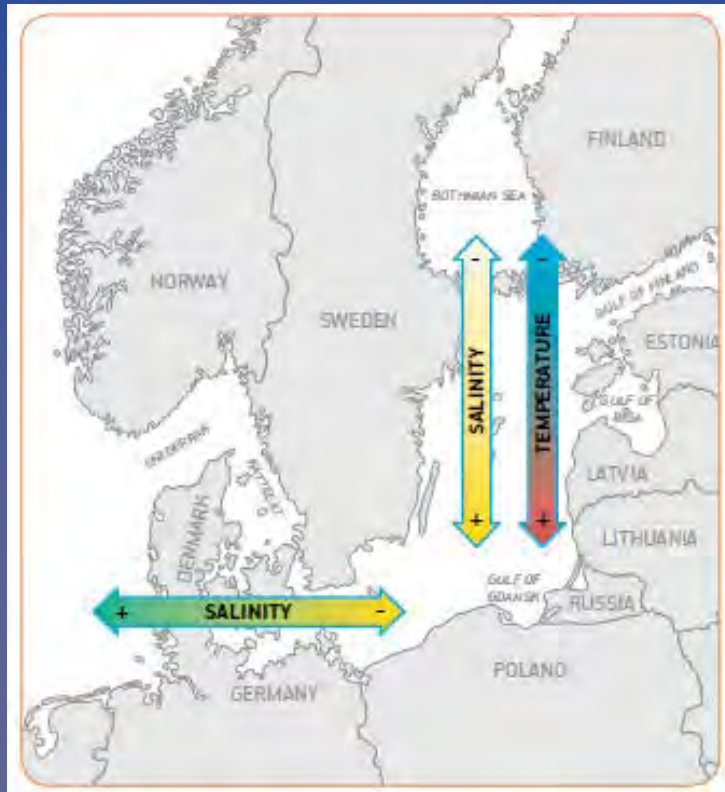


**Science and society need time
to think and evolve...**

... IMTA will not happen overnight

The Baltic Sea Region...

Salinity and temperature gradients (and their changes) are real, key elements to consider for the sustainable production and management of bioresources

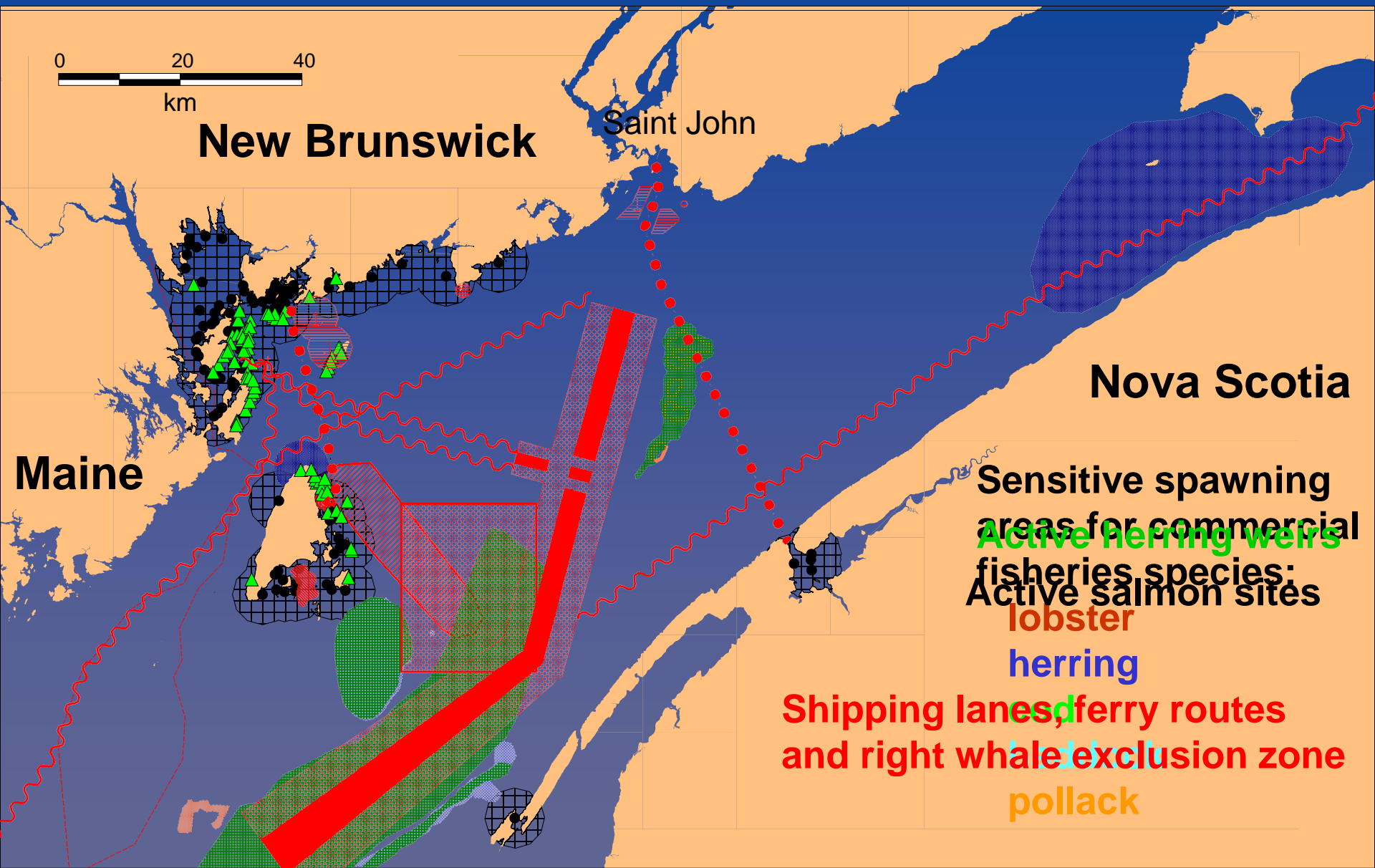


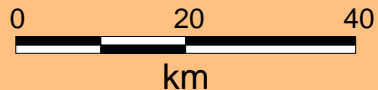
No single solution will work everywhere...

**If you think the Baltic Sea Region
is/will be a busy place... at the
transnational level...**



**look at the Bay of Fundy
at the transprovincial level,
with its linear infrastructures
and patches...**





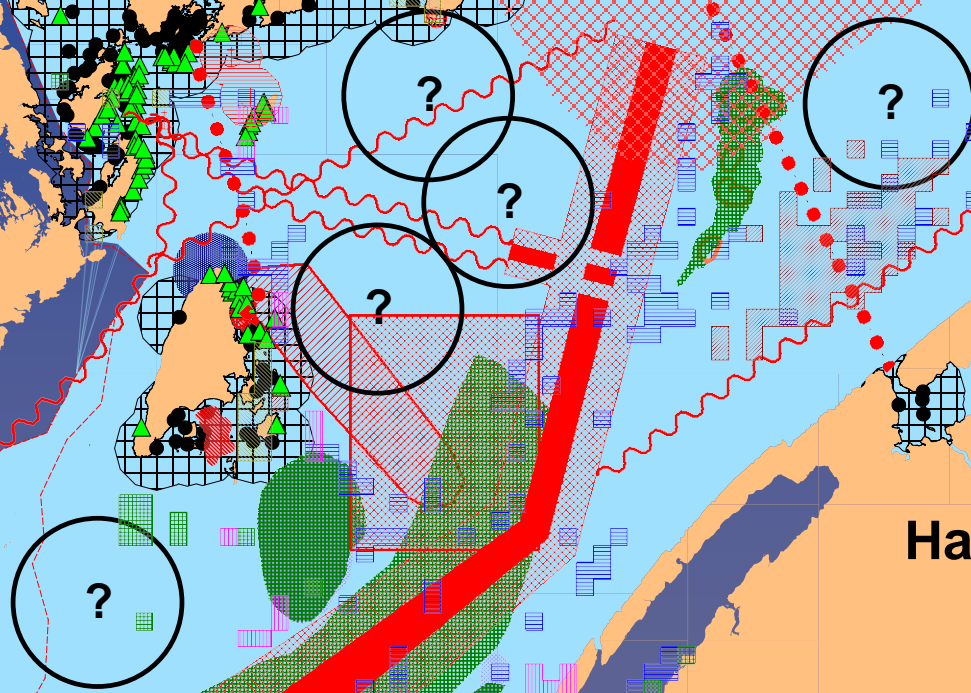
New Brunswick

Saint John

Area of potential salmon temperature winter kill

Nova Scotia

Maine



Commercial landings 2000-03

Habitat loss breaks offundy
exposed beach shore
(in 2000 only 200 fish
returned to 32 rivers)

Large ecosystem thinking
Spatial efficiency thinking
Connectivity thinking...

... MSP will be key,
but will not happen overnight



Thank you



very much!

