Overview of Canadian Atlantic Herring

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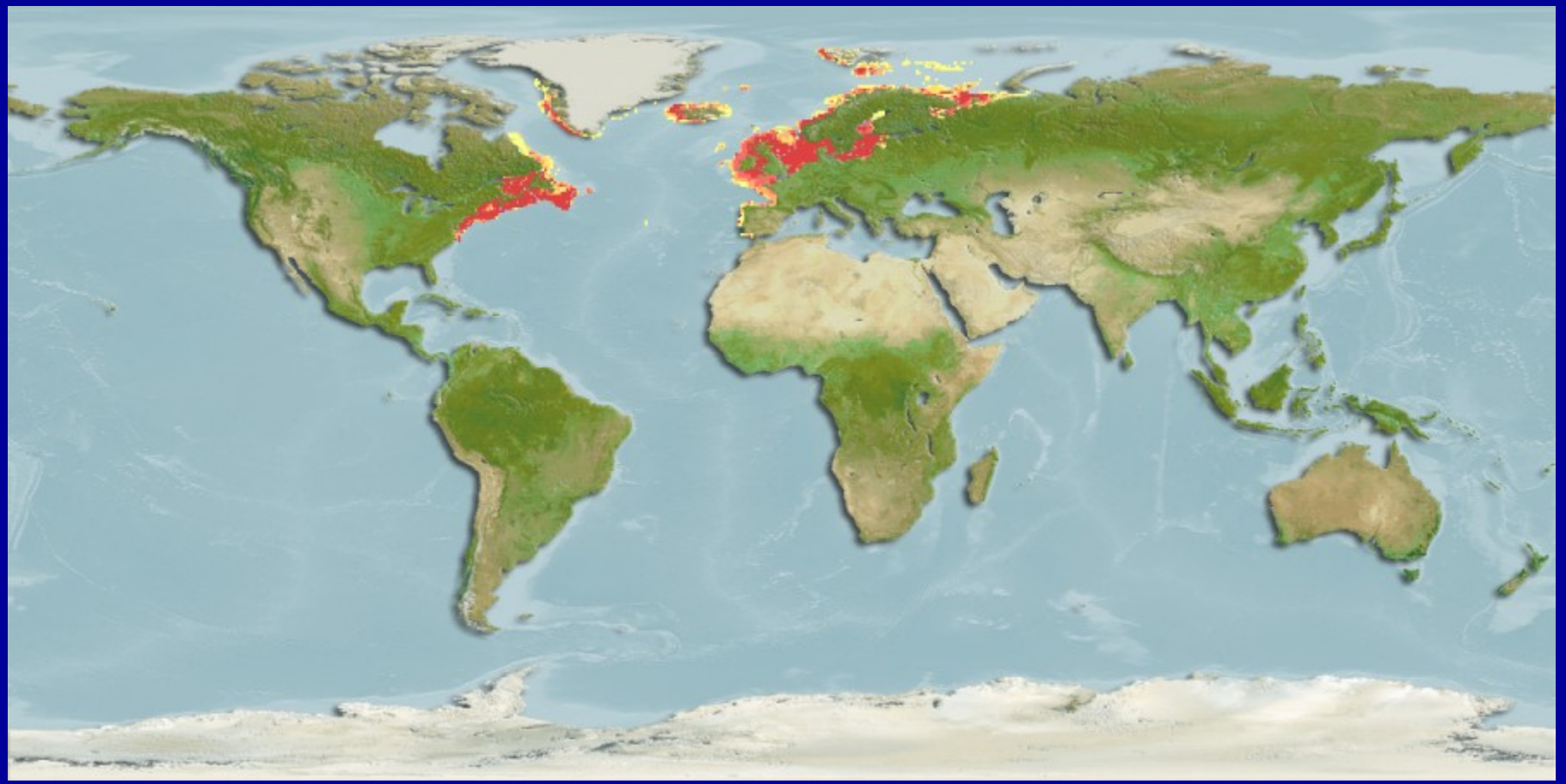
Herring in the world

- The Atlantic herring *(Clupea harengus)* is one of nearly 200 herring species in the family Clupeidae.
- *Clupea harengus* are closely related to the Pacific herring *Clupea pallasii*, which resides mainly in the northern Pacific Ocean. Some genetic evidence indicates that these two species diverged roughly 1.3 million years ago (Domanico, et al., 1996).

Distribution Map of *Clupea harengus harengus* (REYES 2007)

Distribution: North Atlantic: northern Bay of Biscay northward to Iceland and southern Greenland, eastward to Spitsbergen and Novaya Zemlya, including the Baltic; southwestern Greenland and Labrador southward to South Carolina.

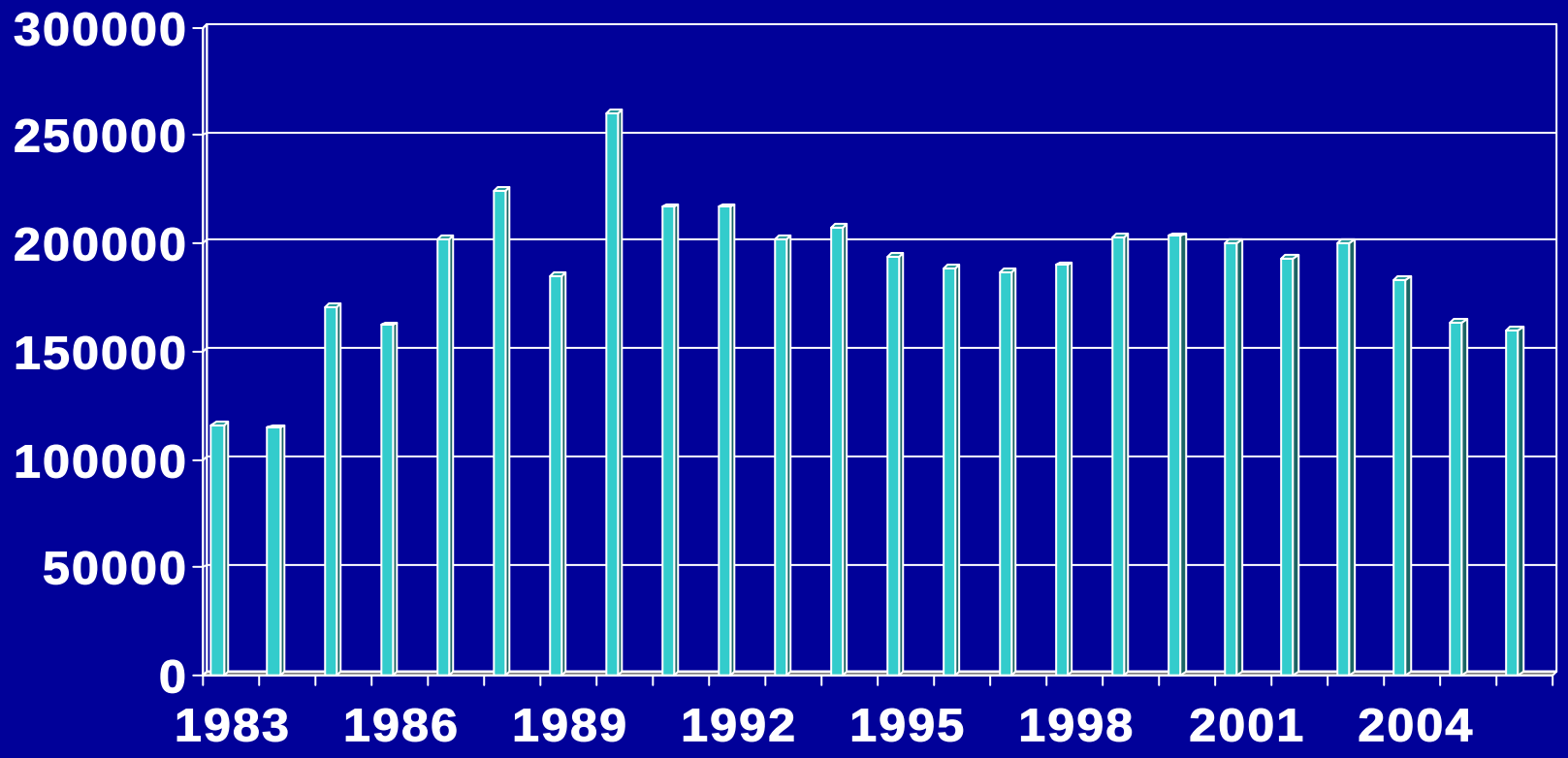


Herring in the world

- Eastern Canada : TAC 160,000 t*
- Eastern U.S. : TAC 145,000 t *
- North East Atlantic : TAC 1,500,000 t *
- Western Canada *(Clupea pallasii)* : TAC 50,000 t*

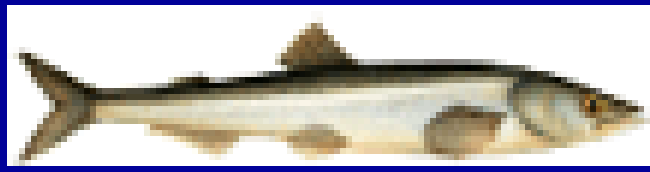
* Some fisheries are not managed by TAC. Therefore these number are approximated

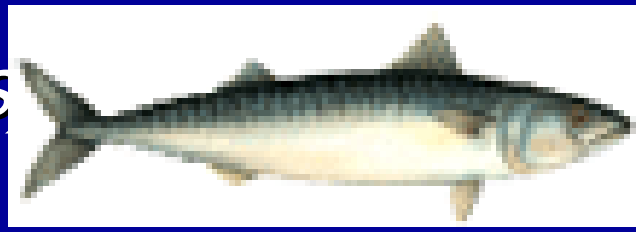
Herring Atlantic coast commercial landings 1983-2006 (metric tonnes, live weight)

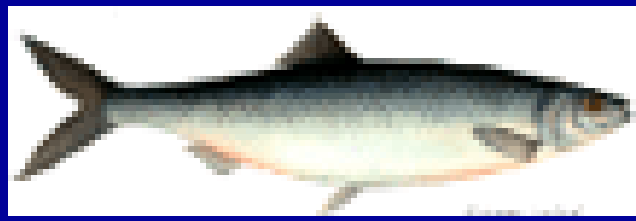


Small Pelagics Eastern Canada

- Capelin *(Mallotus villosus)*
  - $ 11,5 M*
- Mackerel *(Scomber scombrus)*
  - $ 20,3 M*
- Herring *(Clupea harengus)*
  - $ 34,1 M*







*(2006)

Snow crab: $209M; Shrimp: $231M; Lobster: $618M.

Herring

- Distributed in the northwest Atlantic from Cape Hatteras to southern Labrador
- Travel in tight schools, feeding primarily on plankton
- Can live in excess of 11 years
- Sexual maturity around four years (25 cm)

Herring *(con't)*

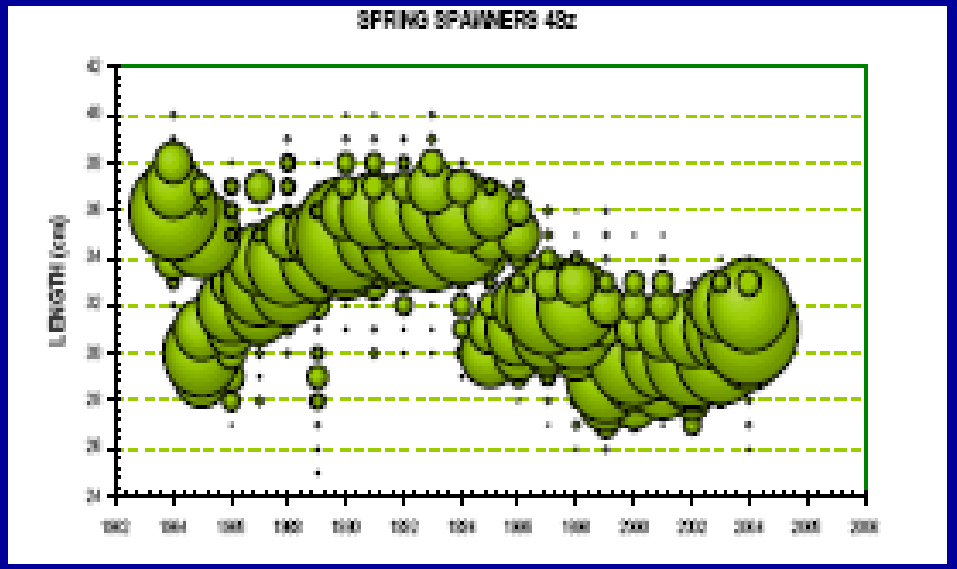
- Time and place of spawning depend on the stock
  - In general, spring spawning takes place in inshore shallows while summer and fall spawning occur in deeper, offshore water
  - Spring spawning is more prevalent in the northern part of the range (2J3KL), whereas fall spawning is more common in the southern part of the range (4WX). Both are present in the Gulf.
- Herring are thought to return to the same spawning, feeding and wintering sites year after year

Herring *(con't)*

- At spawning, eggs attach themselves to the sea floor, forming a carpet of a few centimetres
- The egg incubation time and larval growth are linked to ambient characteristics of the environment such as water temperature
- Egg and larval mortalities are high, so only a small percentage of fertilized eggs survive to become adult herring

Herring *(con't)*

- As many other fish species, herring stocks are characterised by weak and strong year classes.
- Strong recruitment is much more sporadic for stocks in the northern part of the range



Herring *(con't)*

- Herring are important as prey for many species including other fish, sea birds and marine mammals
  - Predation is one of the main cause of herring mortality (Savenkoff & al., 2006)
- Herring are also predator for small and large zooplankton and benthic invertebrates (Savenkoff & al., 2006)

Herring *(con't)*
Fishery

- Herring have been prized as human food for centuries
- Small or juvenile herring are known as "sardines"
- Mature herring are sold fresh, frozen, smoked, salted, pickled and canned.
- The eggs or roe have recently found a ready market as a delicacy in Japan
- Herring support also a bait fishery
- During the 50s and 60s, the use of herring for fish meal (a bit of resurgence in recent years) and oil production was important, but ceased with the decline in world herring stock (at one time herring populations were considered inexhaustible).

Herring *(con't)*
Fishery

- Herring are commercially fished by gill nets, trap nets, weirs and purse seines
- Generally, inshore vessels harvest herring on spawning grounds and offshore vessels harvest on feeding and migrating aggregations of herring

Herring *(con't)*

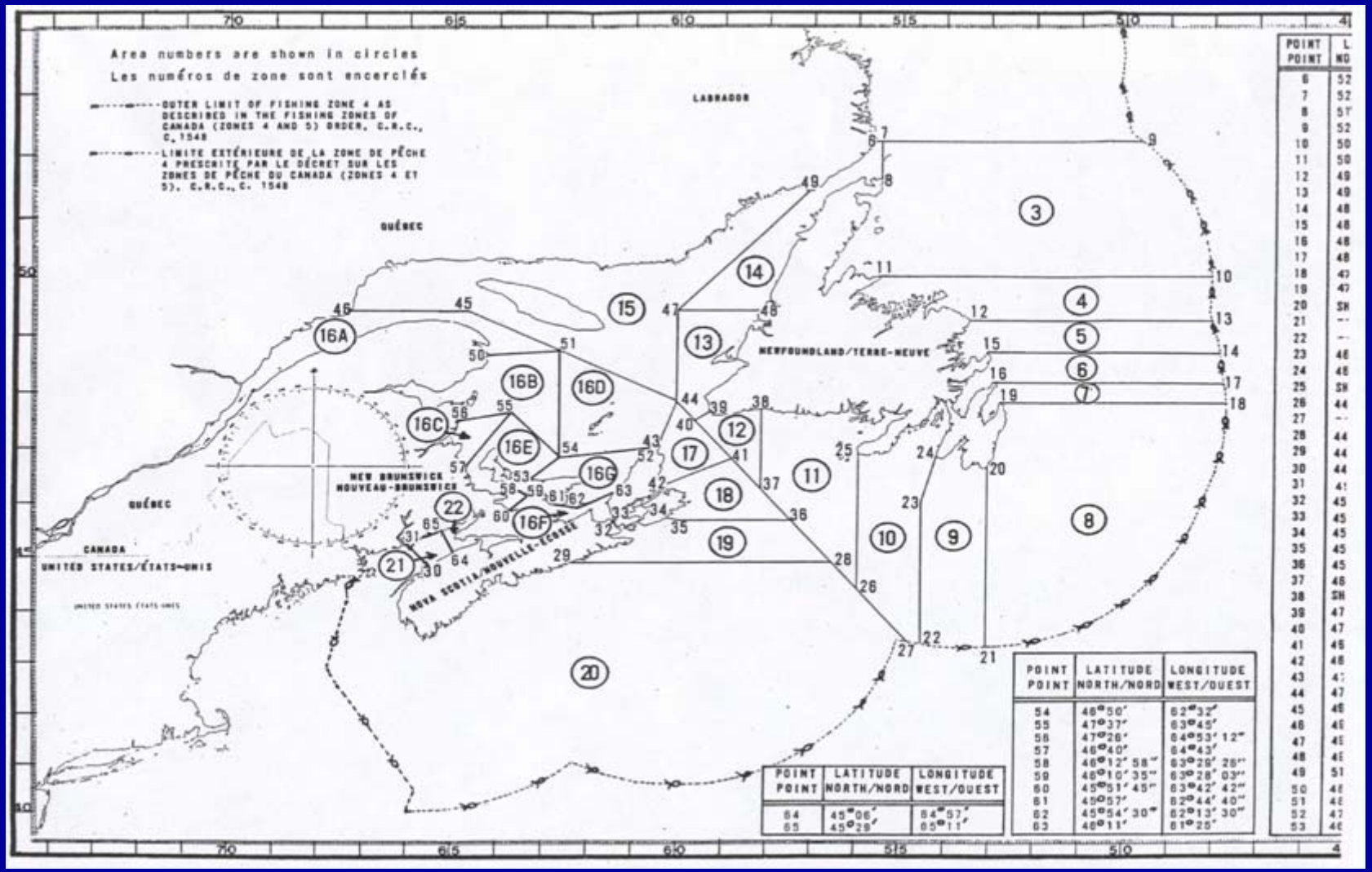
Fishery

- Fishery management is very complex due to numerous stocks determined by their spawning characteristics in time and space
- Fishing on a spawning ground tend to exploit an unique stock
- Fishing on feeding and migrating aggregations can exploit several stocks because of mixing

Herring *(con't)*
Assessment

- Stock assessment are done by four administrative regions
  - NL region : 2J3KL and 3Ps
  - Québec region : 4RS
  - Gulf region : 4T
  - Maritimes region : 4VWX
- Note that 4R herring is *managed* by NL Region and 4T is *managed* by Québec and Gulf Regions

Herring Fishing Zones



Herring *(con't)*

Multiple Assessment Approaches:

- Abundance indices
  - Multi species bottom trawl surveys (dispersion index)
  - CPUE (gill net catch rate)
  - Telephone survey (perception of abundance)
  - Acoustic survey (structured survey and fishing trip)
- Biological characteristics
  - Biological sampling from commercial fishery and research vessel surveys
- Assessment
  - Description of trends
  - Performance report (traffic light)
  - Sequential Population Analysis (SPA) or Virtual Population Analysis (VPA)

Herring *(con't)*

- Broad overview has been presented
- Next step:
  - 4 regional overviews
    - Science
    - Management