The mighty Fraser River and its estuary

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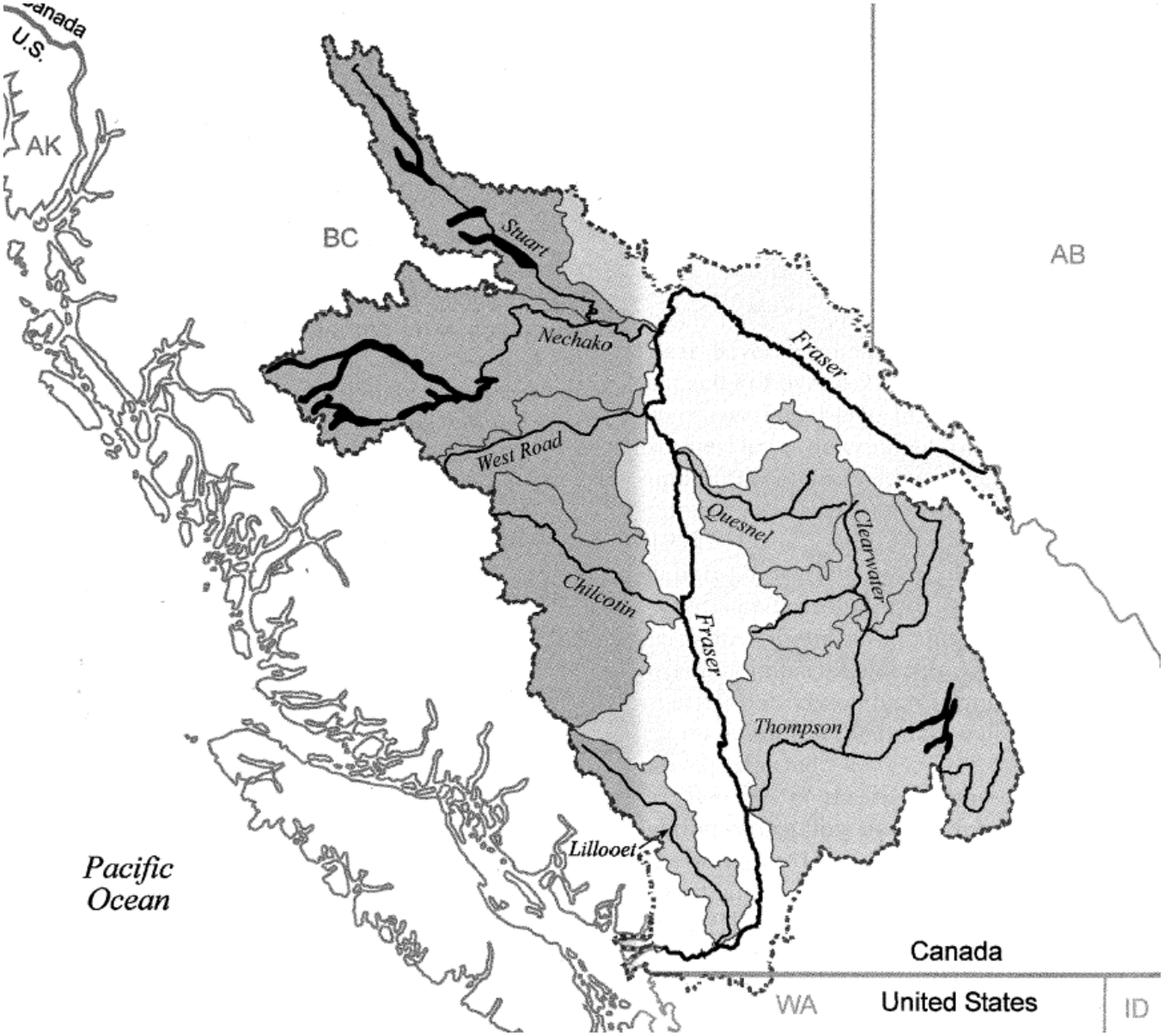


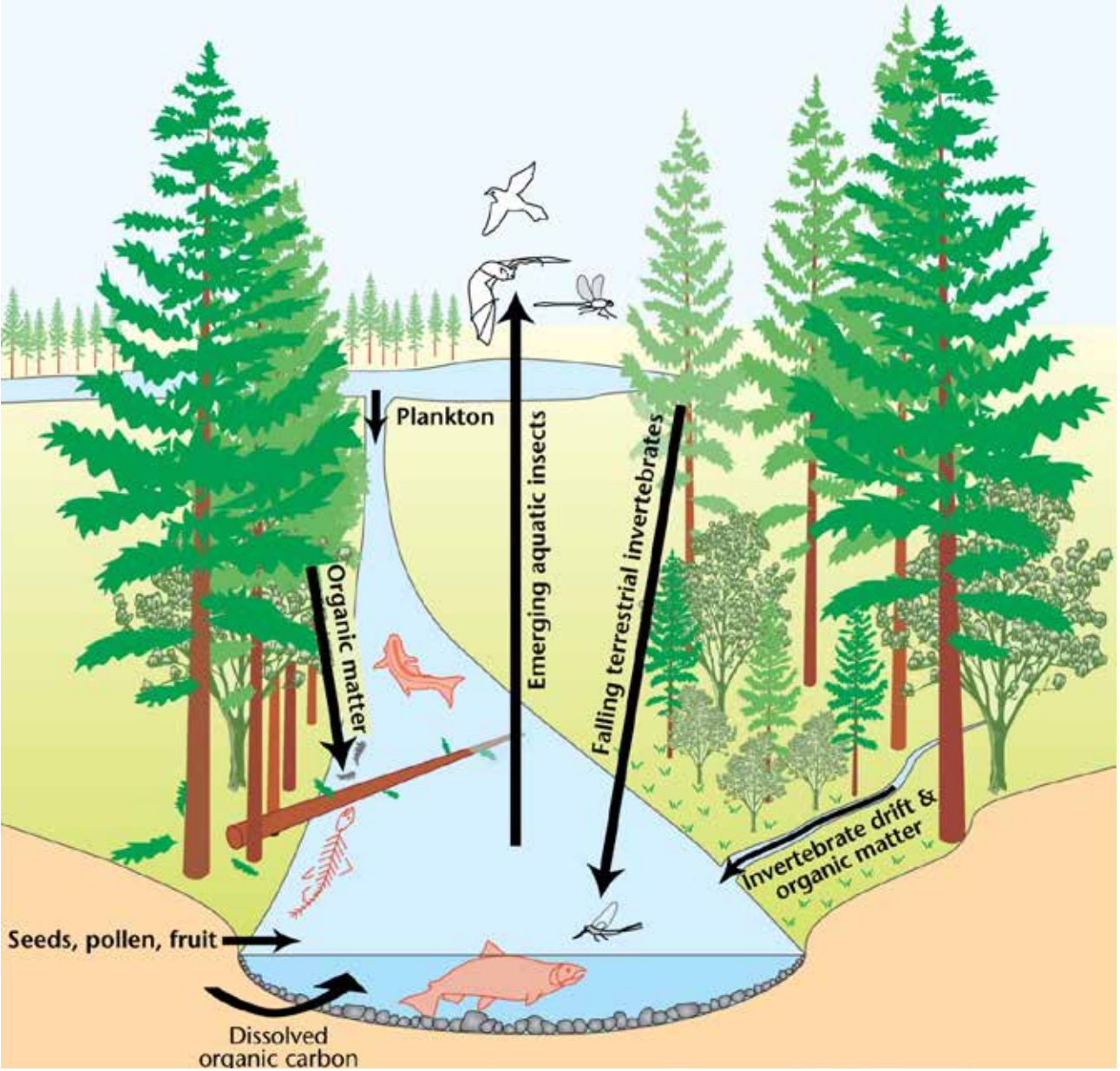
Fraser River

234,000 km^2

~3972 m^3/s

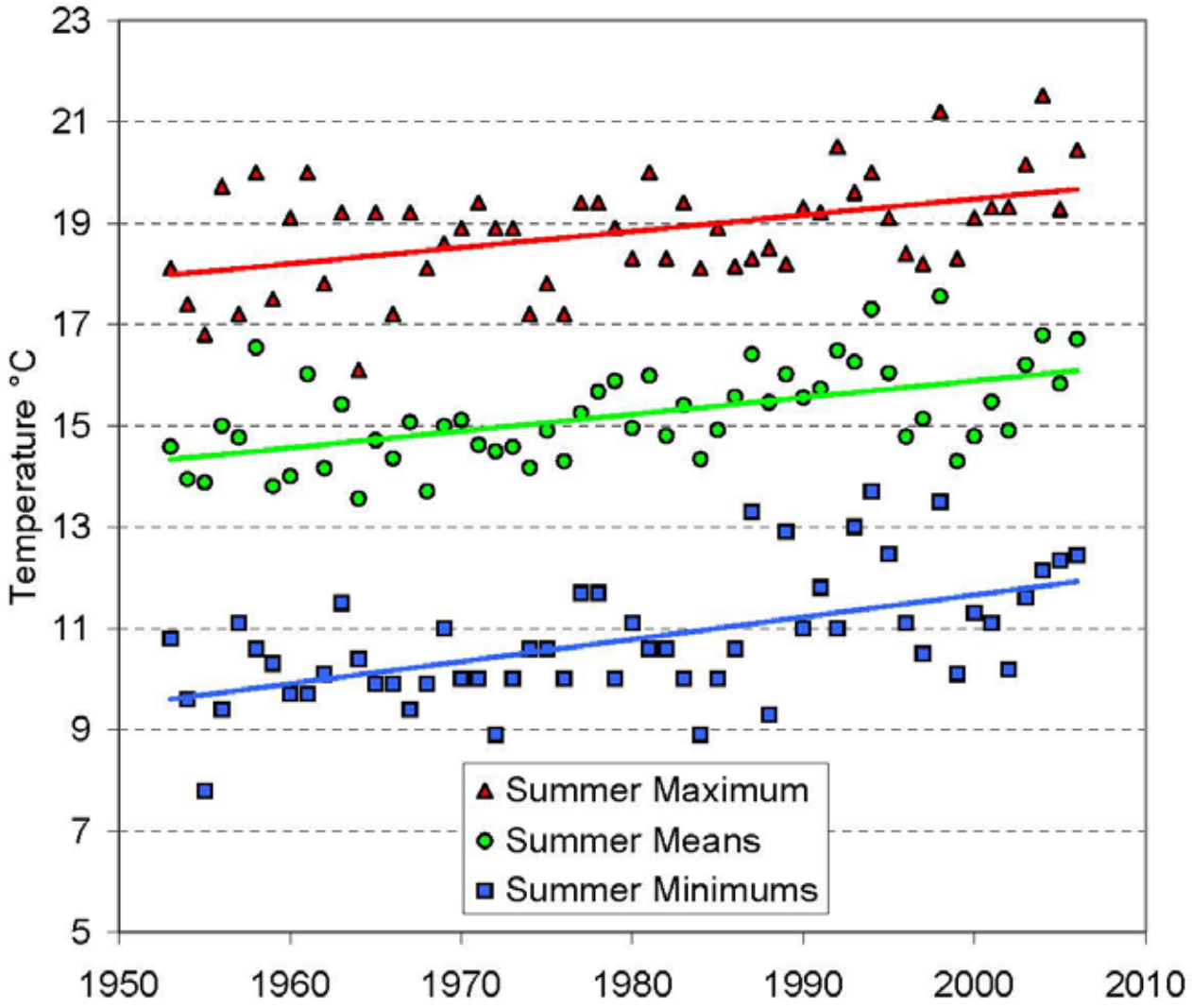
7th largest in North America, by discharge and 25th in the world

Reynoldson TB, Culp J, Lowell R & Richardson JS. 2005. Chapter 15. The Fraser River. Pp. 697–732 In: Benke, AC. & C.E. Cushing (eds) *Rivers of North America*. Elsevier, Burlington, MA.



Inputs and changes to source areas (headwaters) leads to cumulative impacts downstream

Richardson JS, Zhang Y & Marczak LB. 2010. Resource subsidies across the land-freshwater interface and responses in recipient communities. *River Research and Applications* 26:55-66.

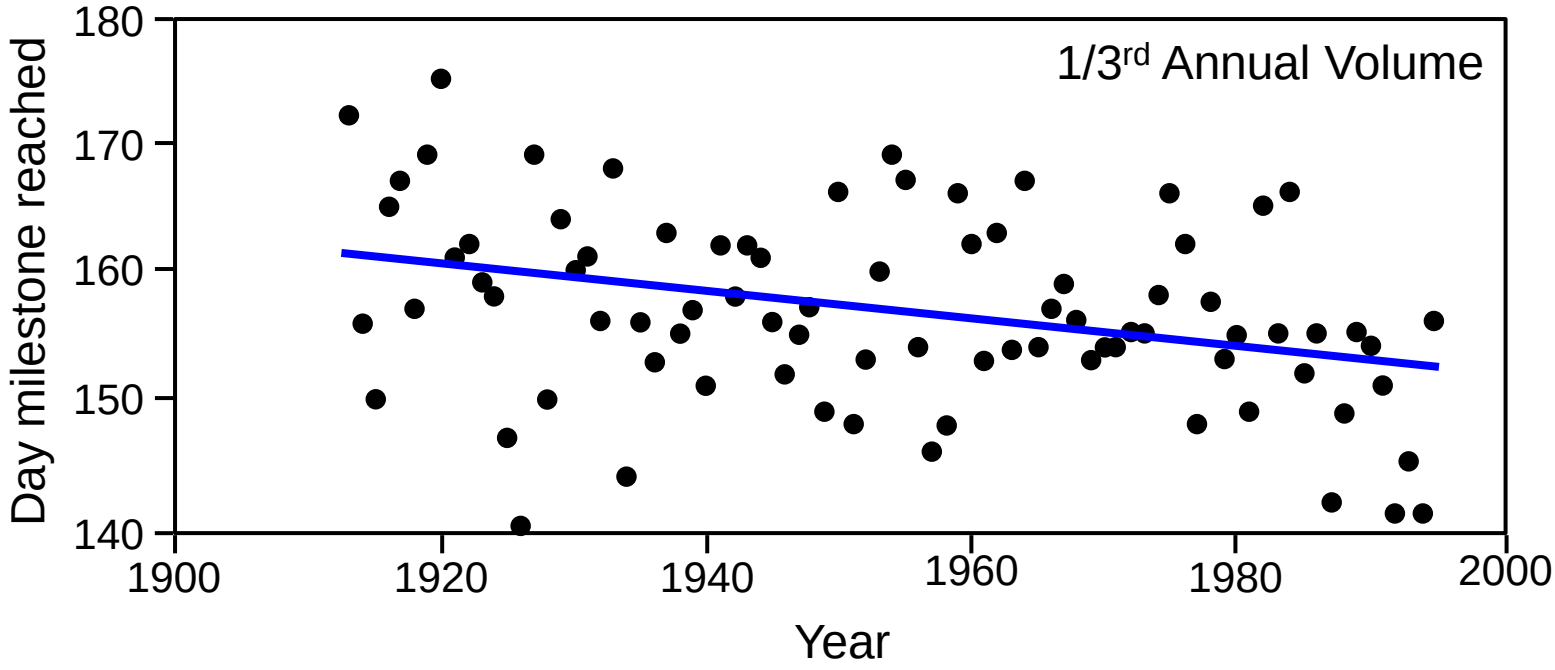


Fraser River at Hell's Gate

June through September

figure from: Canadian Technical Report of Fisheries and Aquatic Sciences 2724

Fraser River at Hope



Temperature increases and flow timing lead to:

- Problems with migration timing and success
- Water supplies for industry
- Changes in water quality
- Increased oxygen demand in the depositional reaches

Morrison J, Quick MC & Foreman MGG. 2002. Climate change in the Fraser River watershed: flow and temperature projections. *Journal of Hydrology* 263:230-244.

Sakamaki T & Richardson JS. 2008. Retention, breakdown and biological utilisation of deciduous tree leaves in an estuarine tidal flat of southwestern British Columbia, Canada. *Can J Fish Aquatic Sci* 65:38-46.

Sakamaki T, JYT Shum & JS Richardson. 2010. Watershed effects on chemical properties of sediment and primary consumption in estuarine tidal flats: importance of watershed size and food selectivity by macrobenthos. *Ecosystems* 13:328-337.


Changes to Habitat

Low flow channels of the Fraser River

A poorly studied ecosystem – falling between the “cracks”

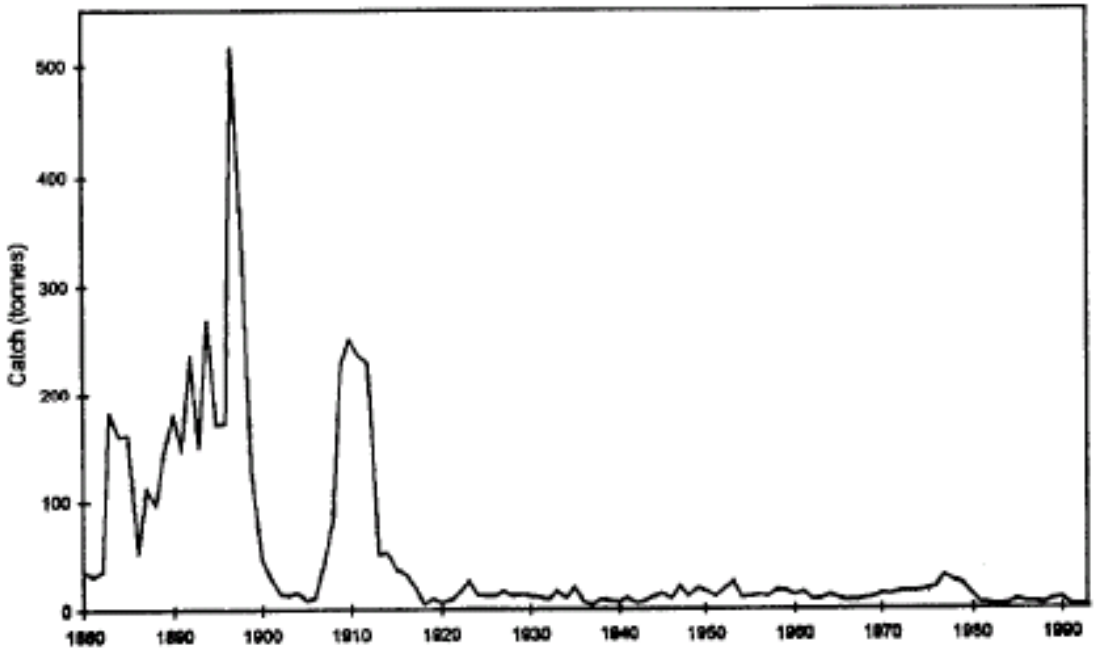
42 species known from the lower Fraser (below Hope)

6 of them are introduced species

Only 9 of them are salmonids, and only 5 of those are harvested commercially

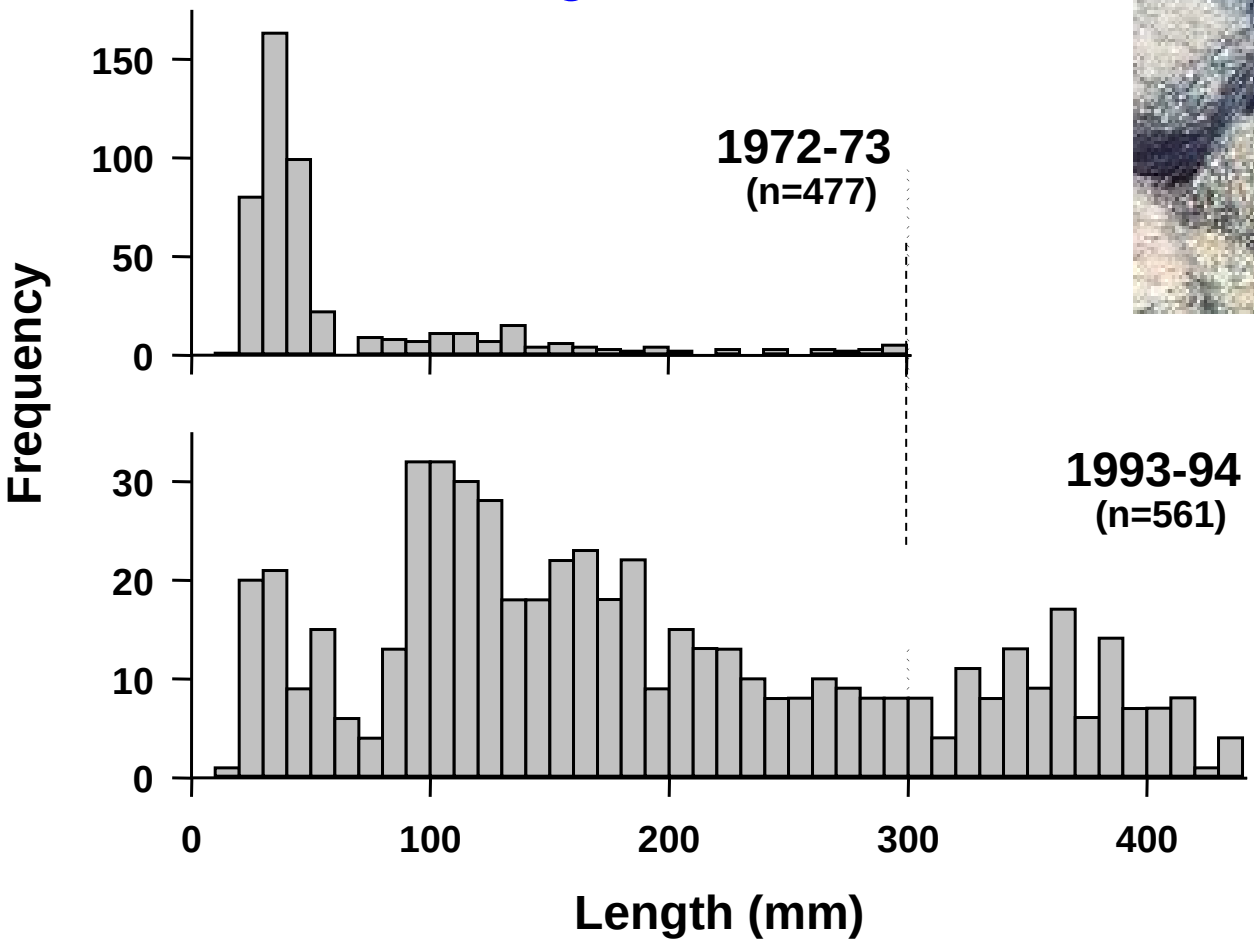
Redside shiner

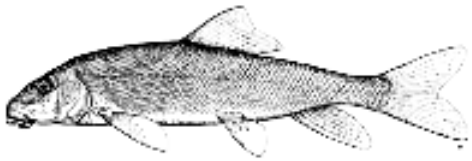
White sturgeon Endangered!



Estimated commercial gillnet harvest (tonnes) of sturgeon in the Fraser River, 1880-1993 (data from B.C . Commercial Catch Statistics; includes green and white sturgeon catches)

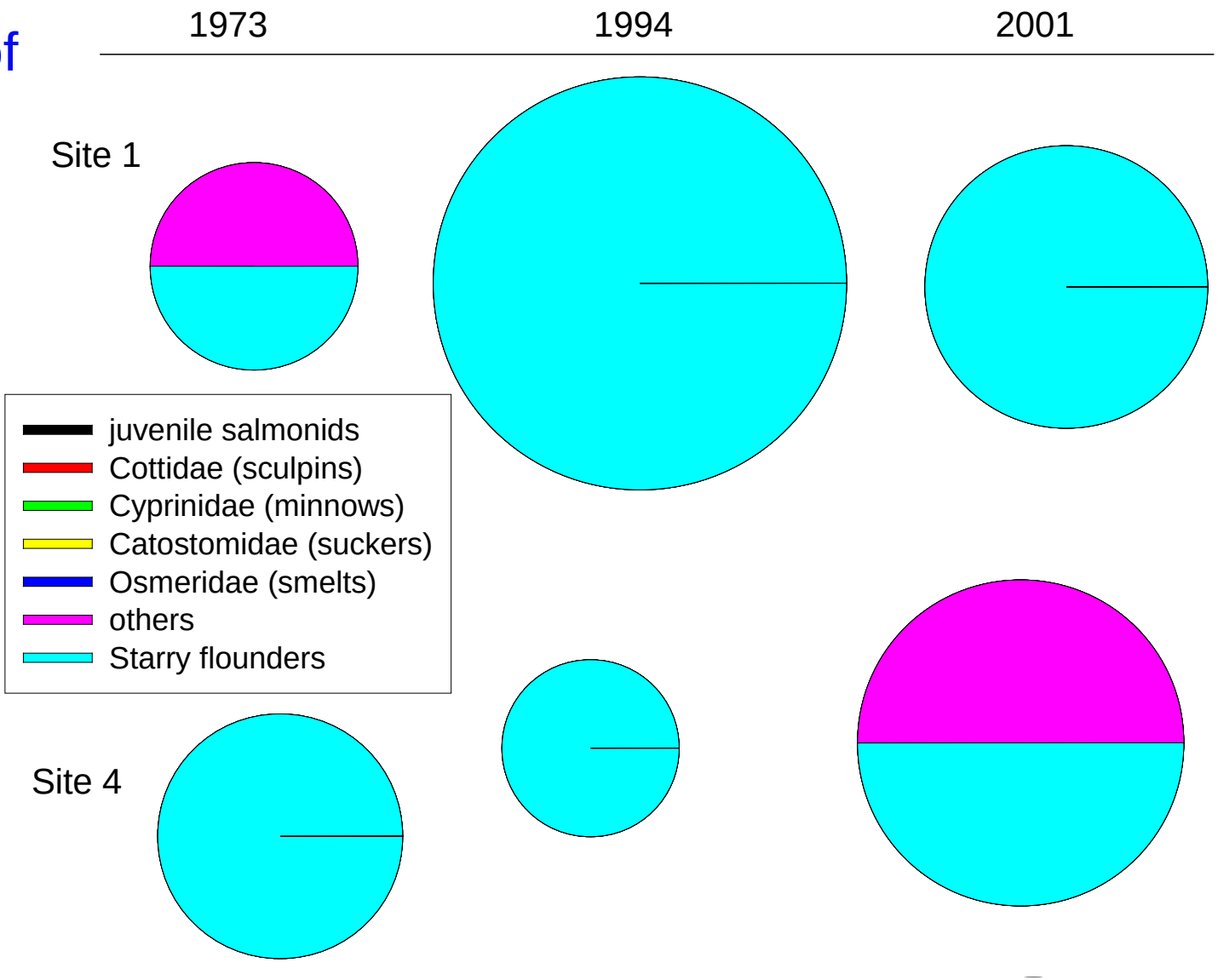
Largescale sucker





Richardson JS, Lissimore TJ, Healey MC & Northcote TG. 2000. Fish communities of the lower Fraser River (Canada) and changes through time. *Environmental Biology of Fishes* 59:125-140

Relative Biomass of fishes

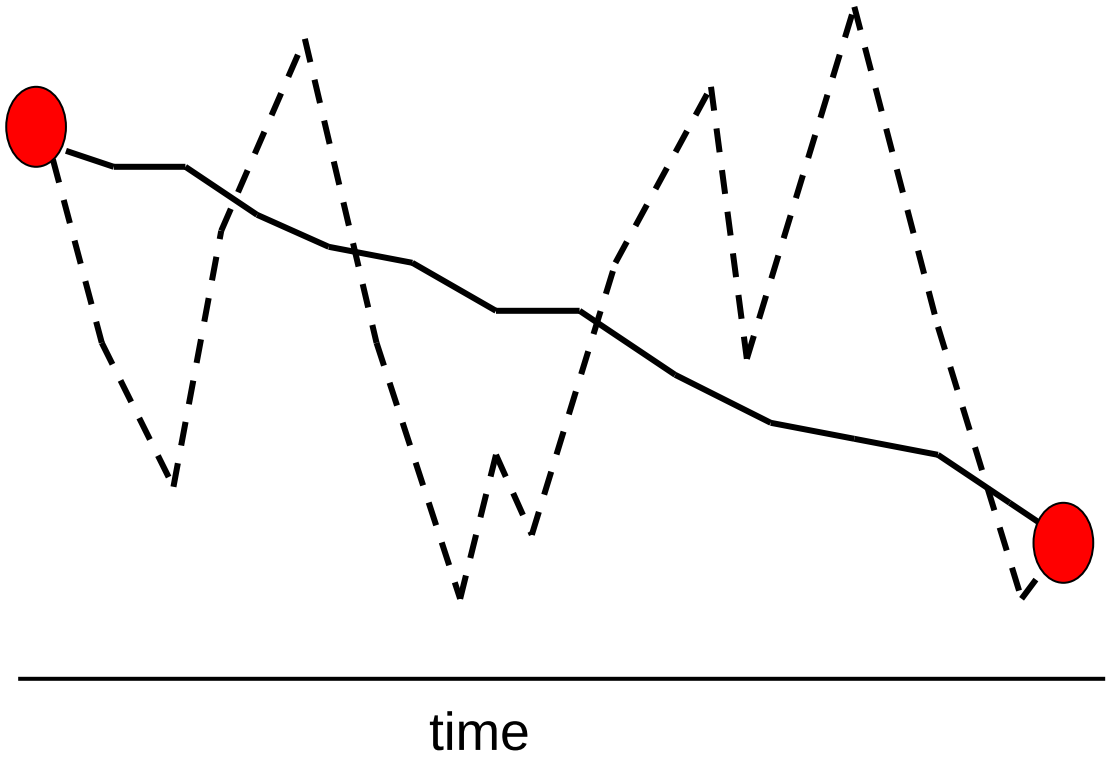


Circle size scaled to total biomass

Richardson et al. 2000.; plus unpublished data

How to compare?

Controls?	No
Reference sites?	No
Long-term records?	No



We need another way to determine how the ecosystem is faring – and some further monitoring

Conclusions

Basin-wide changes, linked to development in source areas

Habitat change – dykes, channel training, development

A lack of study of large rivers and estuaries