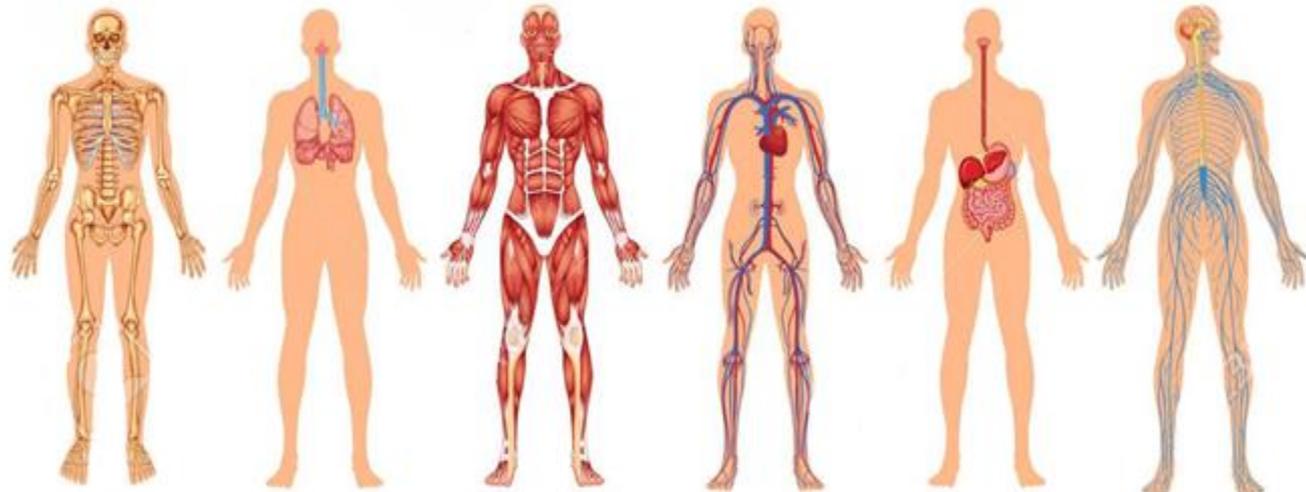

Assessing river health in the North Saskatchewan River basin

Craig Emmerton, Aquatic Scientist
December 6th, 2023



Human health and diagnostics

- Concept of health is vague, but complex
- How do we assess health? Simple to complex activities
- Measurements and tests as guidelines



Skeletal System

Respiratory System

Muscular System

Circulatory System

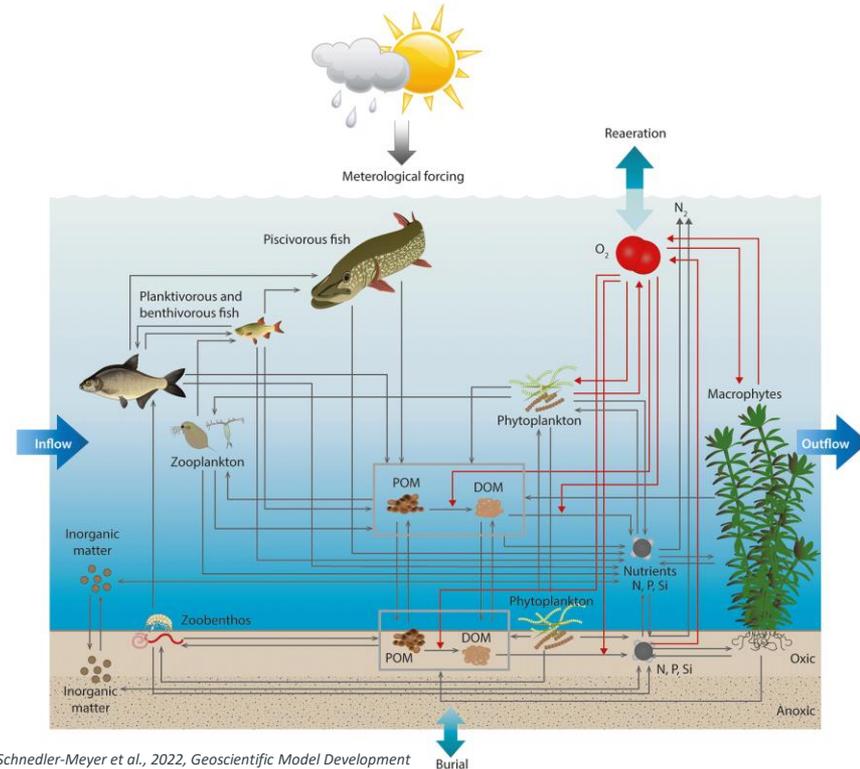
Digestive System

Nervous System

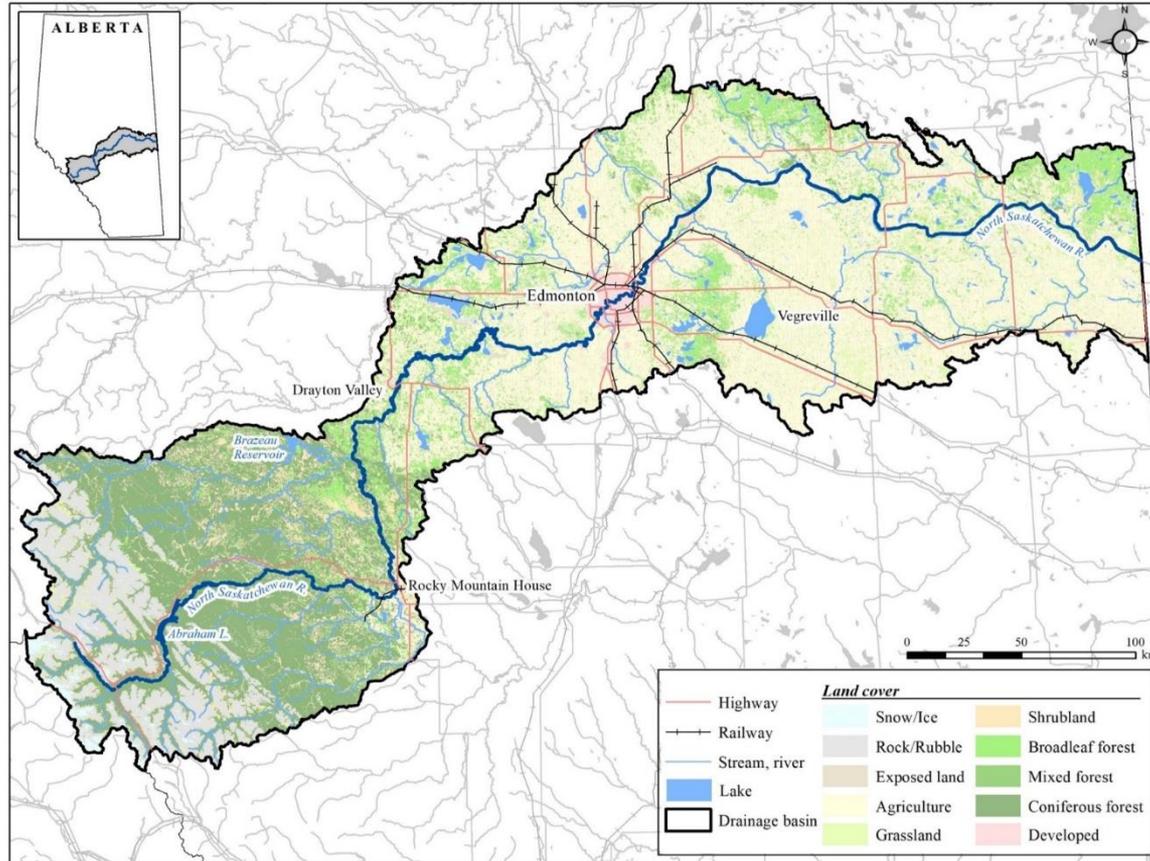
https://www.123rf.com/photo_79651336_medical-education-chart-of-biology-for-human-body-organ-system-diagram-vector-illustration.html

Aquatic ecosystem health

- Aquatic ecosystems as a parallel to human health systems
- Water quality as a tool to assess aquatic ecosystem health
 - Relatively cheap and easy
 - Results echo baseline processes
 - Some guidance on environment
- Parameters of importance



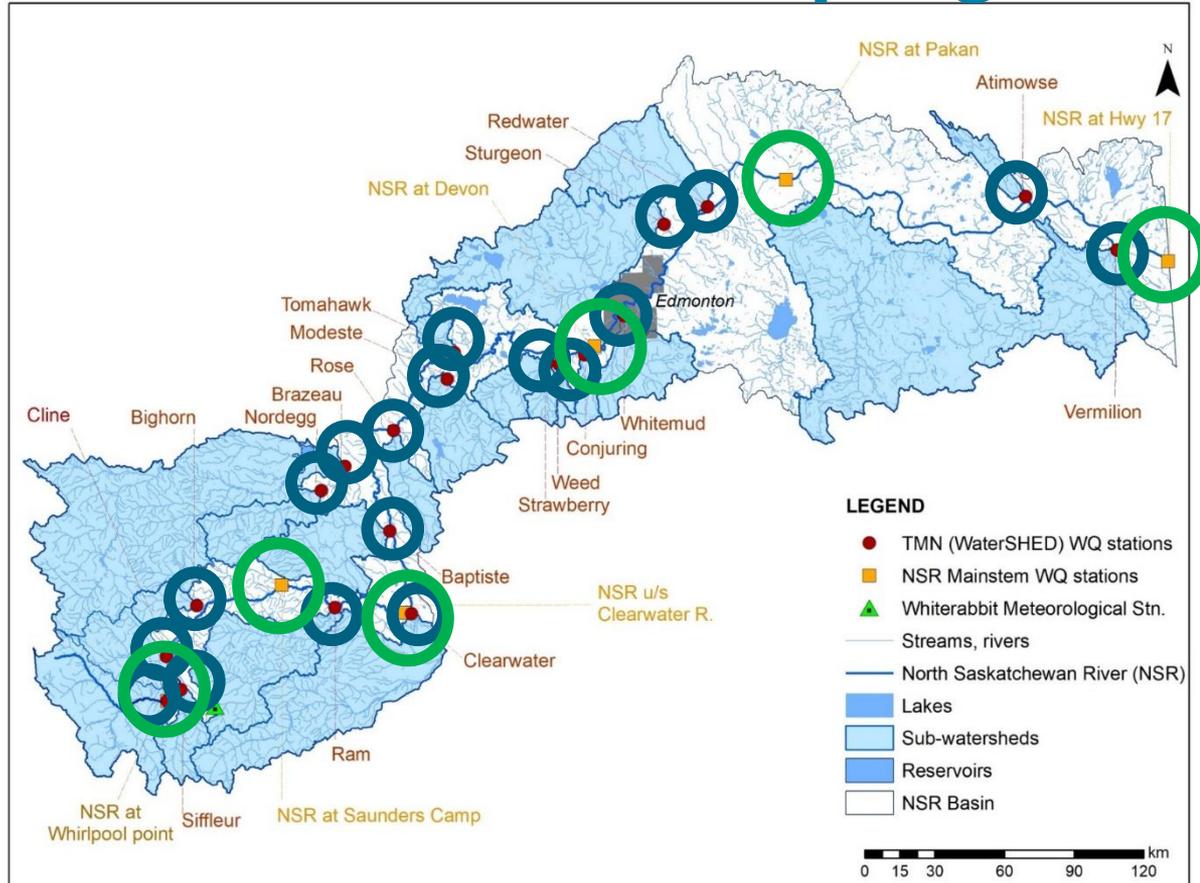
North Saskatchewan River Basin



The WaterSHED and LTRN programs

Long Term
River
Network or
ECCC

WaterSHED

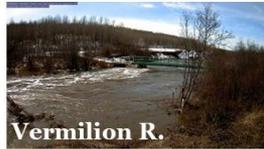


Alberta



THE CITY OF
Edmonton

Variety of rivers & landscapes



Data: Water quality and river flow



- Physical chemistry
- Nutrients
- Metals (dissolved/total)
- Trace metals (dissolved/total)
- Biologicals (bacteria/photo. pigments)



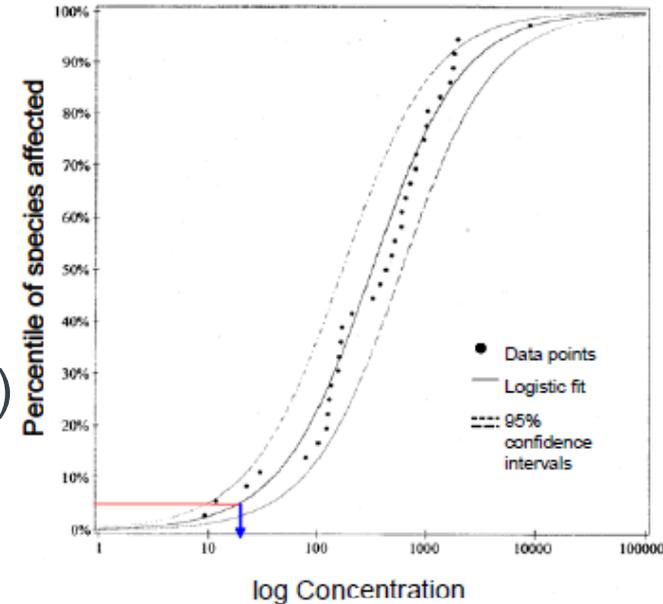
- Water level
- Discharge (calculated)



- Turbidity
- Water temperature
- Dissolved oxygen
- Specific conductivity
- pH
- Redox potential

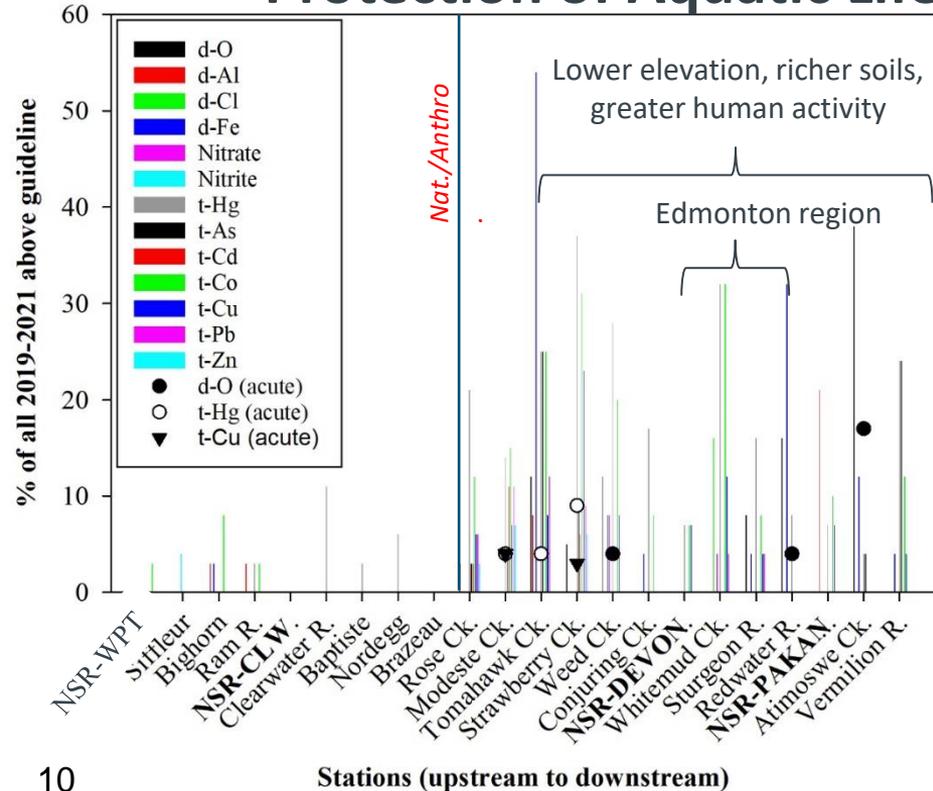
Water quality as a diagnostic tool

- Water quality concentrations need context
- Guidelines link water to organisms
- River water quality index tool:
 - % parameters beyond guidelines (scope)
 - % samples beyond guidelines (frequency)
 - Cumulative guideline exceedance (amplitude)
- Other statistical assessments alerting before guidelines crossed (frameworks)

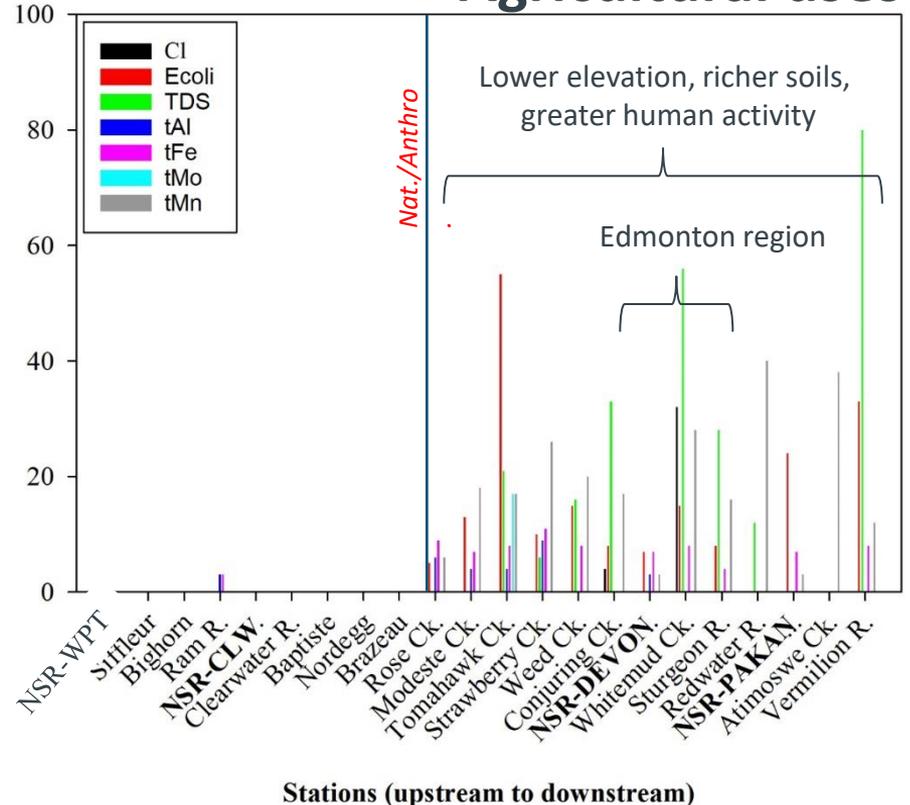


Guidelines

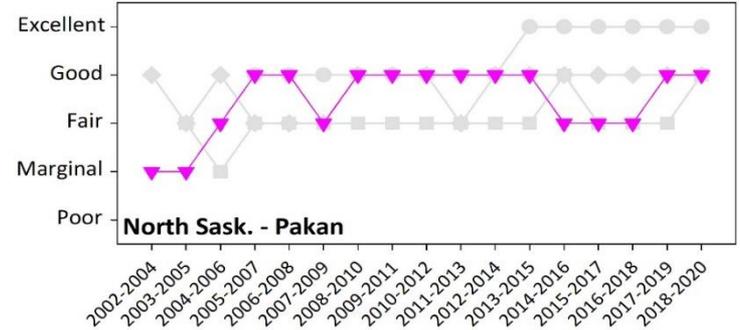
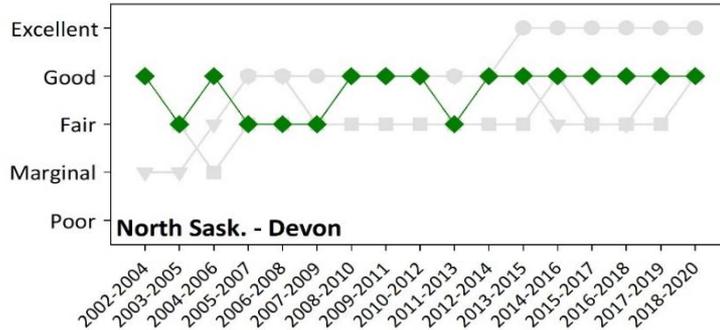
Protection of Aquatic Life



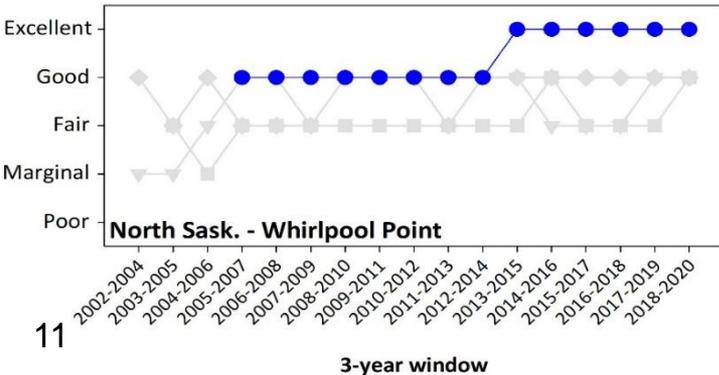
Agricultural uses



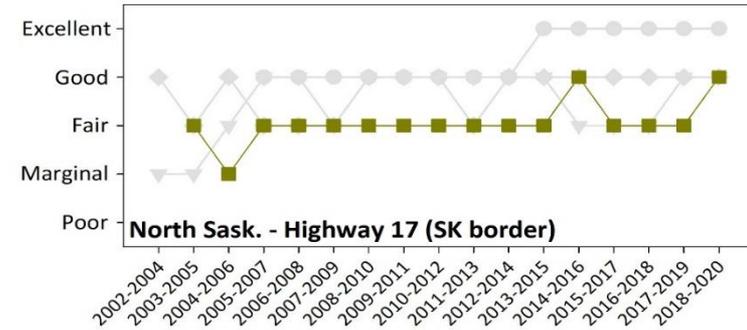
River Water Quality Index



3-year window



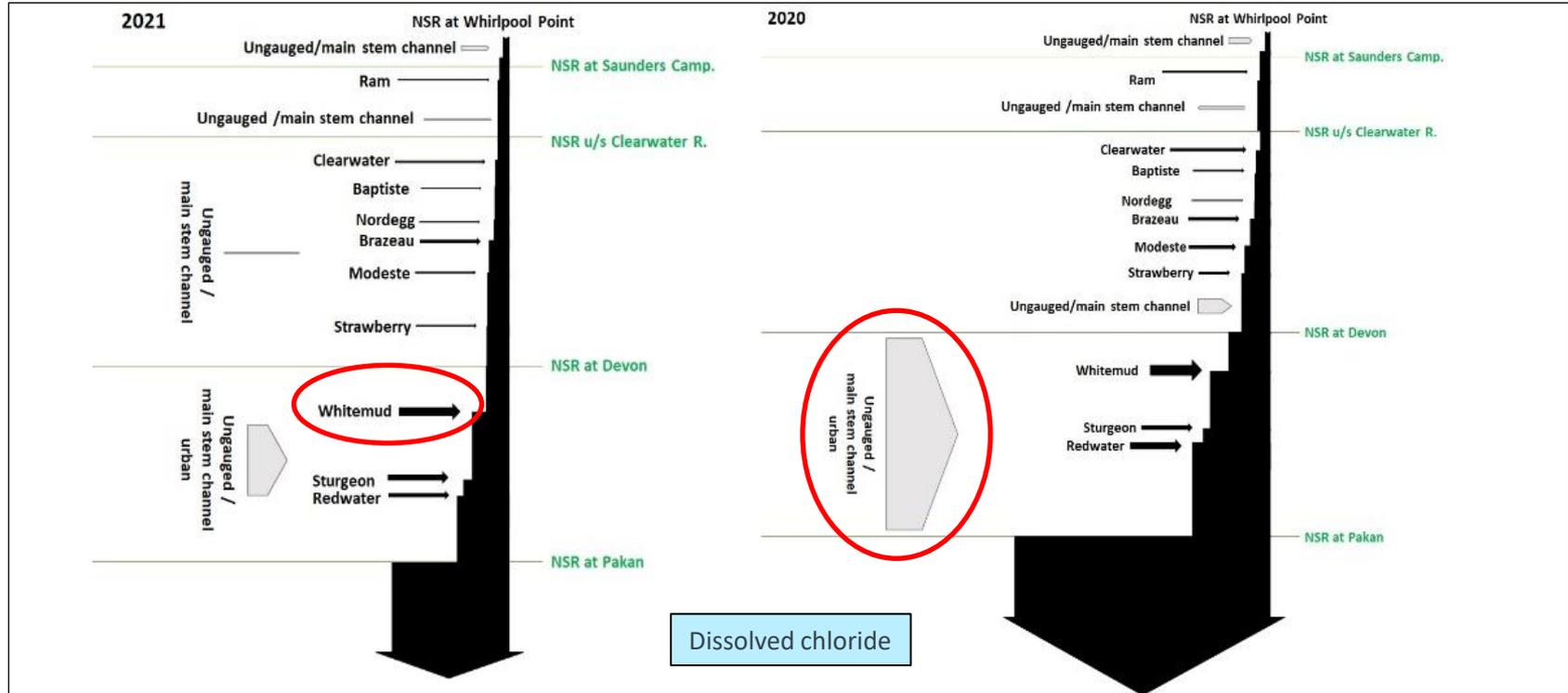
3-year window



3-year window

- Pattern drives stewardship
- Progress has been made
- Much more to do

Loads as an assessment tool



Expanding health assessments

- Water quality is a tool to infer conditions in the ecosystem, but coarse tool
- Assessing the biota in the river directly gives us another layer of health assessment, though massive effort
- Can be useful though, we can see major improvements in the NSR over time using benthic inverts, related to WWTP improvements
- eDNA ramping up quickly



Acknowledgements

- Hydrometric and water quality field staff at AEPA
- Science staff in AEPA
- Staff at NSWA, Epcor, City of Edmonton
- Network construction consultants
- Monitoring equipment providers
- Monitoring equipment providers
- WaterSHED steering committee
- Analytical laboratory staff
- Email: craig.emmerton@gov.ab.ca