

Assessing risks of hydroelectric project on Nuyakuk River

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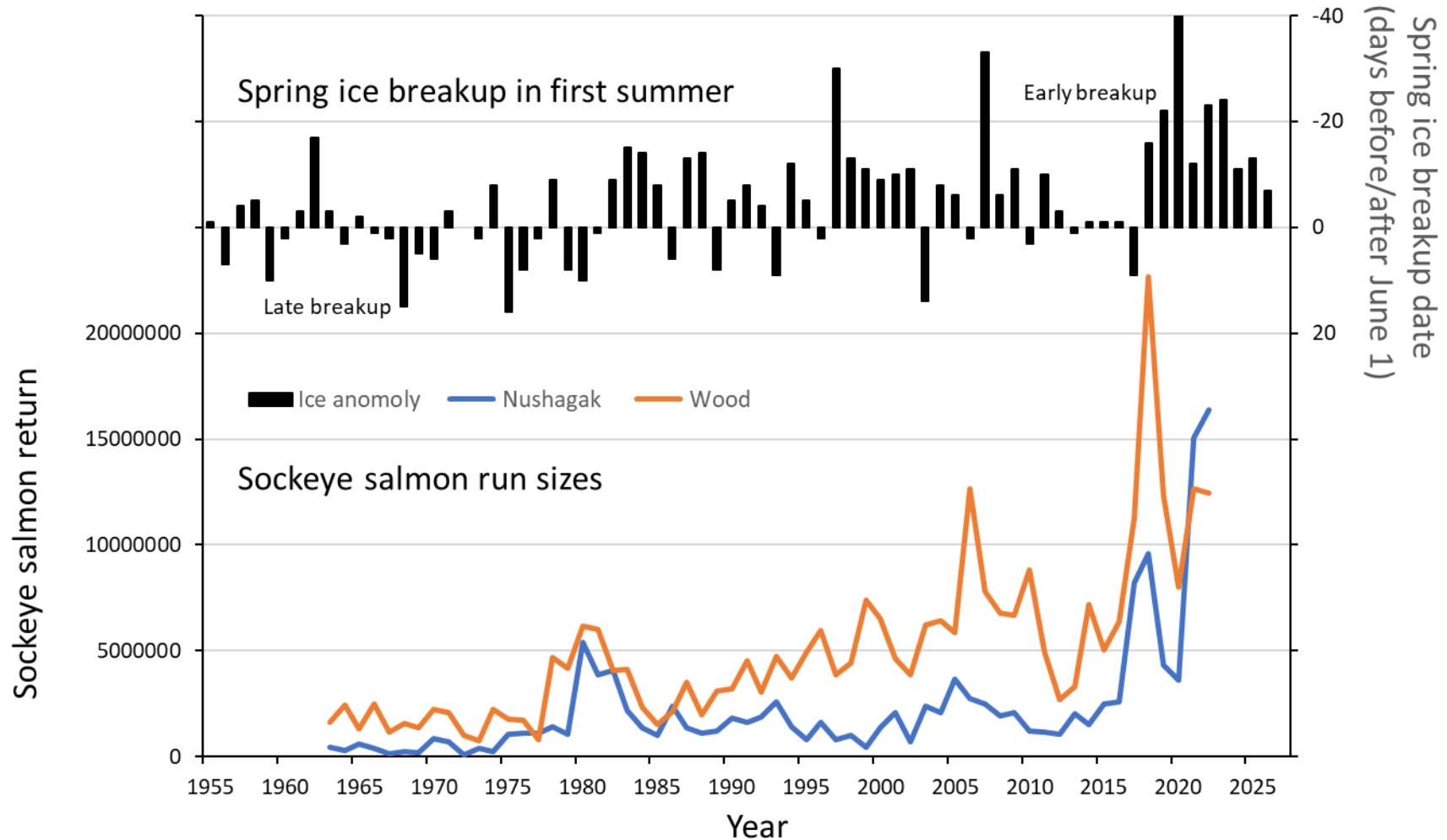
December 12, 2023

Hydro project has some clear benefits

- but what are the risks?

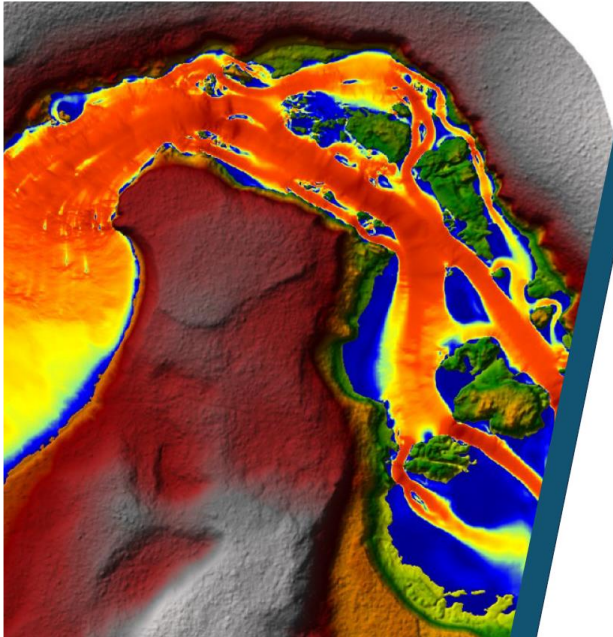
- ARWG (Aquatic Resources Working Group has had biweekly meetings for over a year to discuss design of studies to assess risks of project)
- Involves consultants (McMillen) doing most of the work,
ADF&G, UW-FRI, WTSP, others

Sockeye production in the Nushagak has increased in last decade as climate has warmed



Lots of different dimensions of the risk studies

- For example:



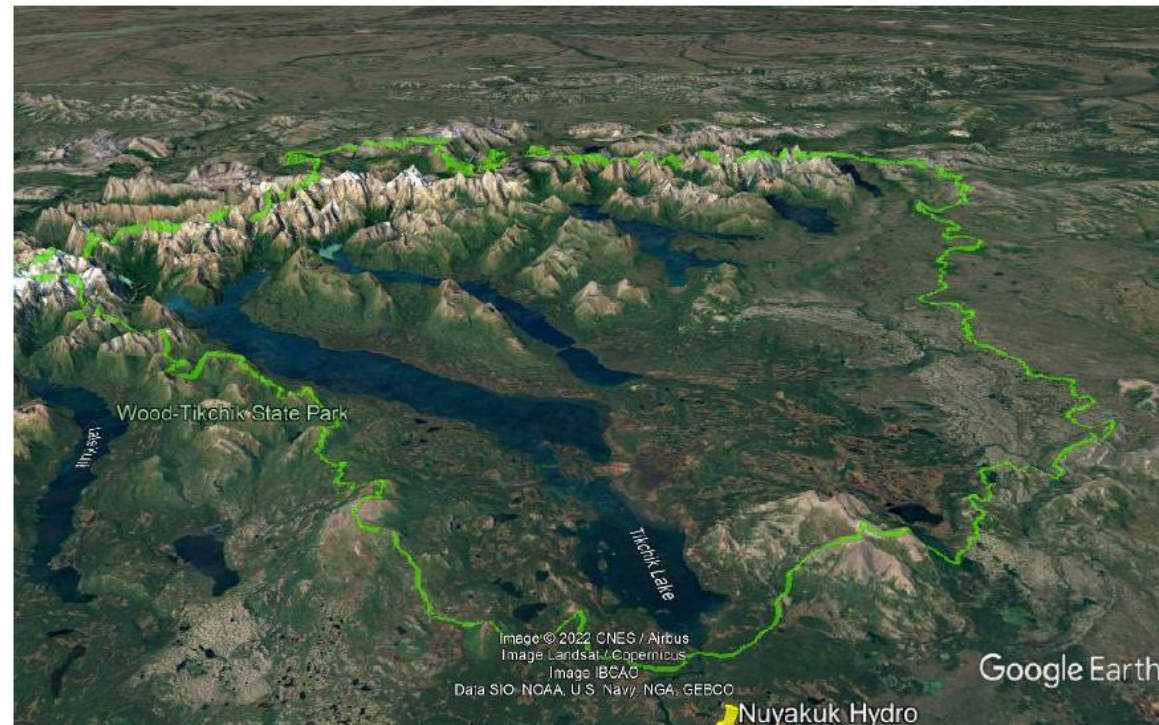
**2D Hydraulic
Model Update**



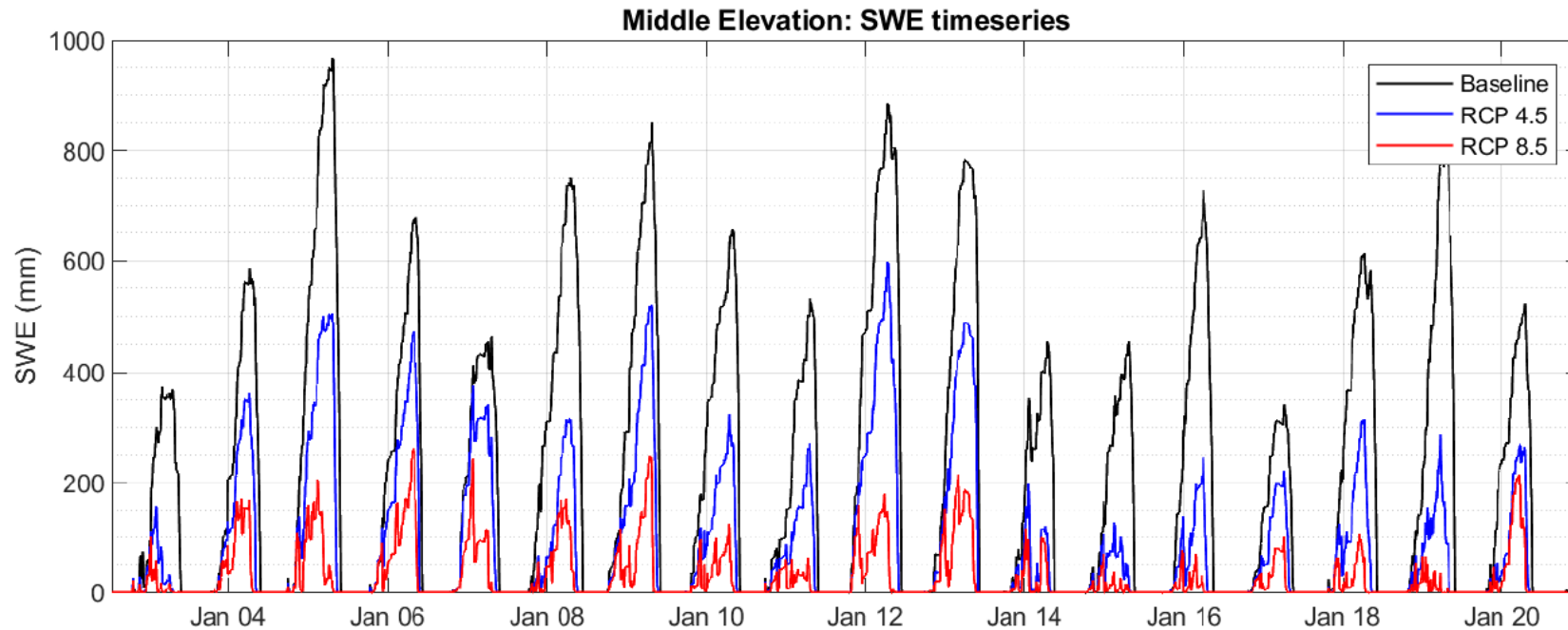
**Nuyakuk Hydro
Fish Passage
Agent Based
Model**

Nuyakuk Falls Hydro Climate Change Simulations

Cameron Wobus, CK Blueshift LLC
Bob Prucha, Integrated Hydro Systems LLC

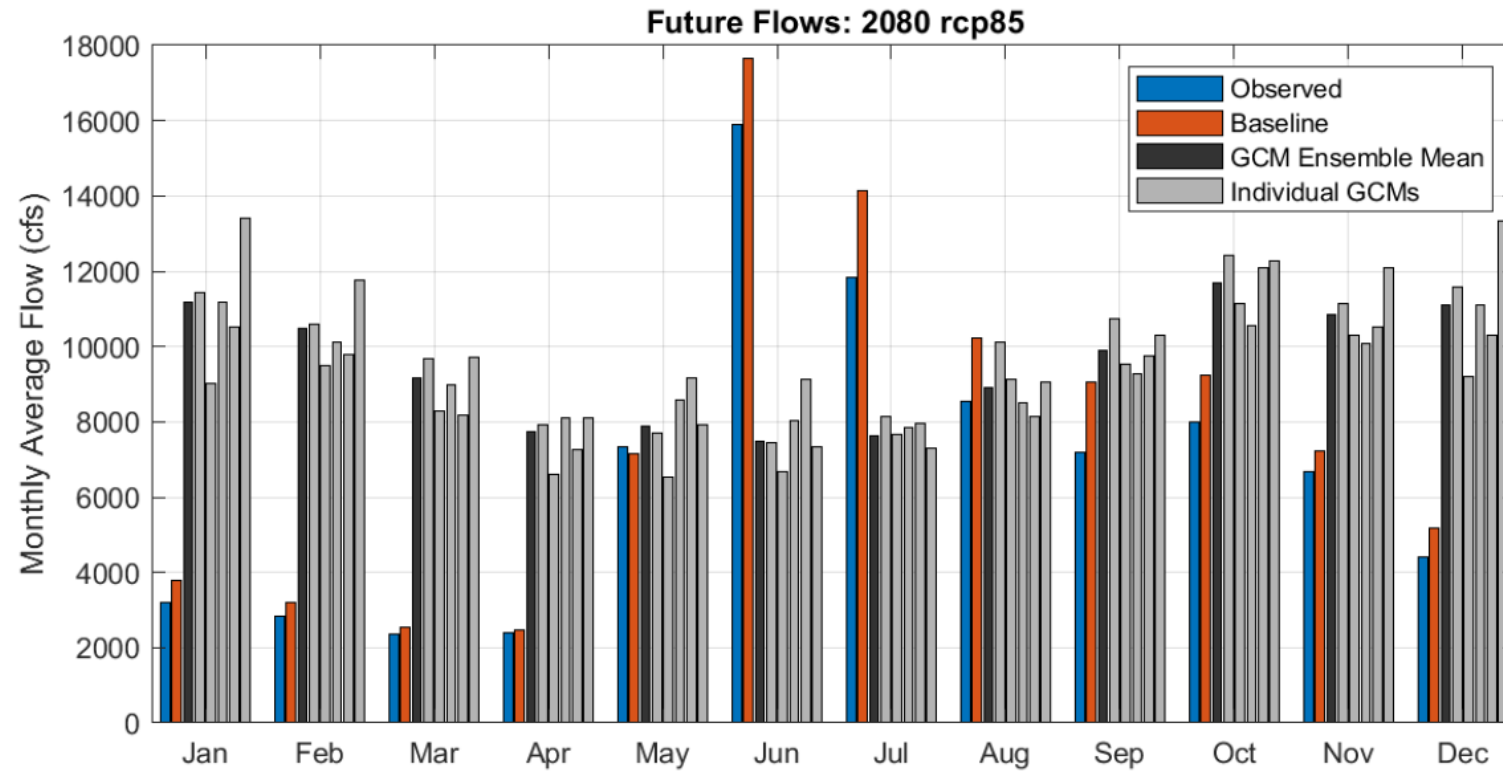


Climate Change Results – Mid-Elevation Snow



- Both RCP scenarios REDUCE snowpack (SWE).
- Lower elevation SWE is affected more than higher elevation SWE

Monthly Flows – 2090 RCP 8.5



Sockeye salmon “Life Cycle Model”

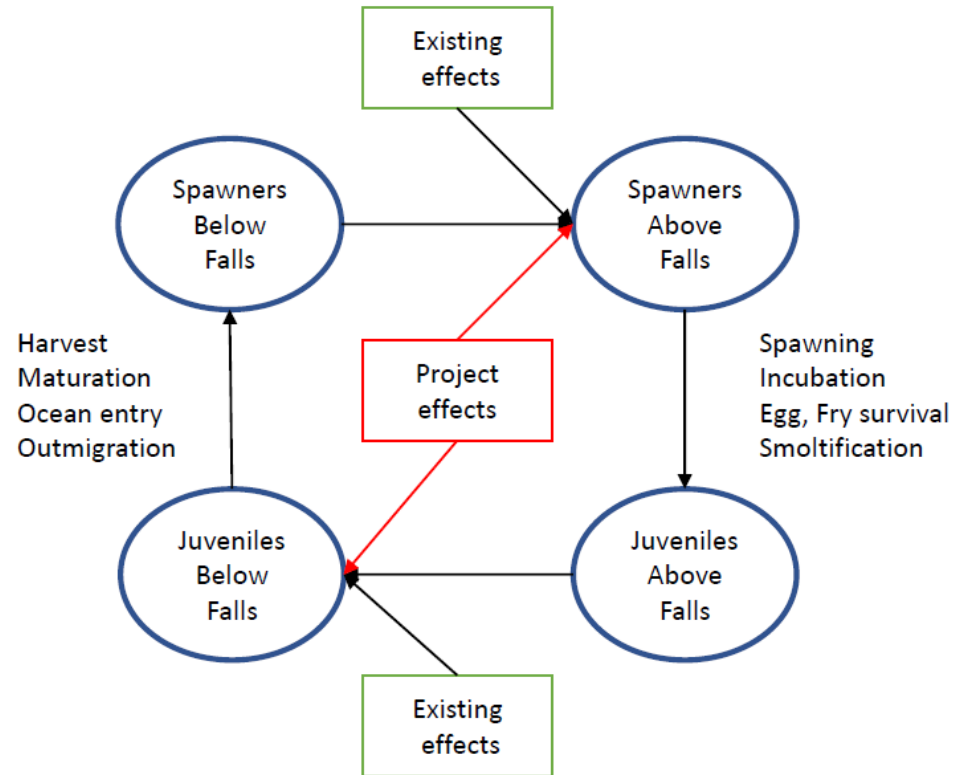
Sockeye LCM Update

25 Oct 2023

Noble Hendrix

QEDA Consulting, LLC

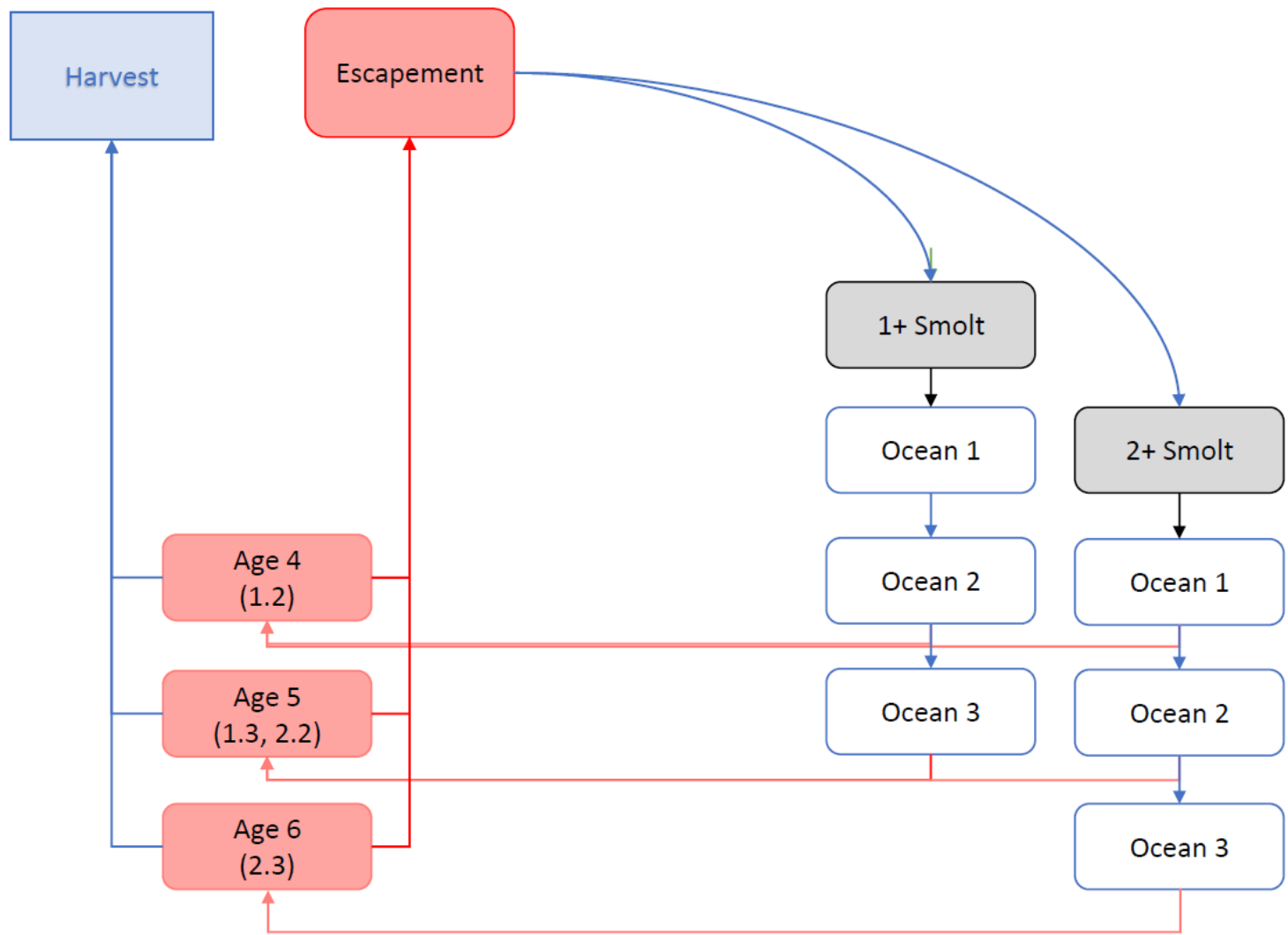
Simple life cycle – including direct project effects



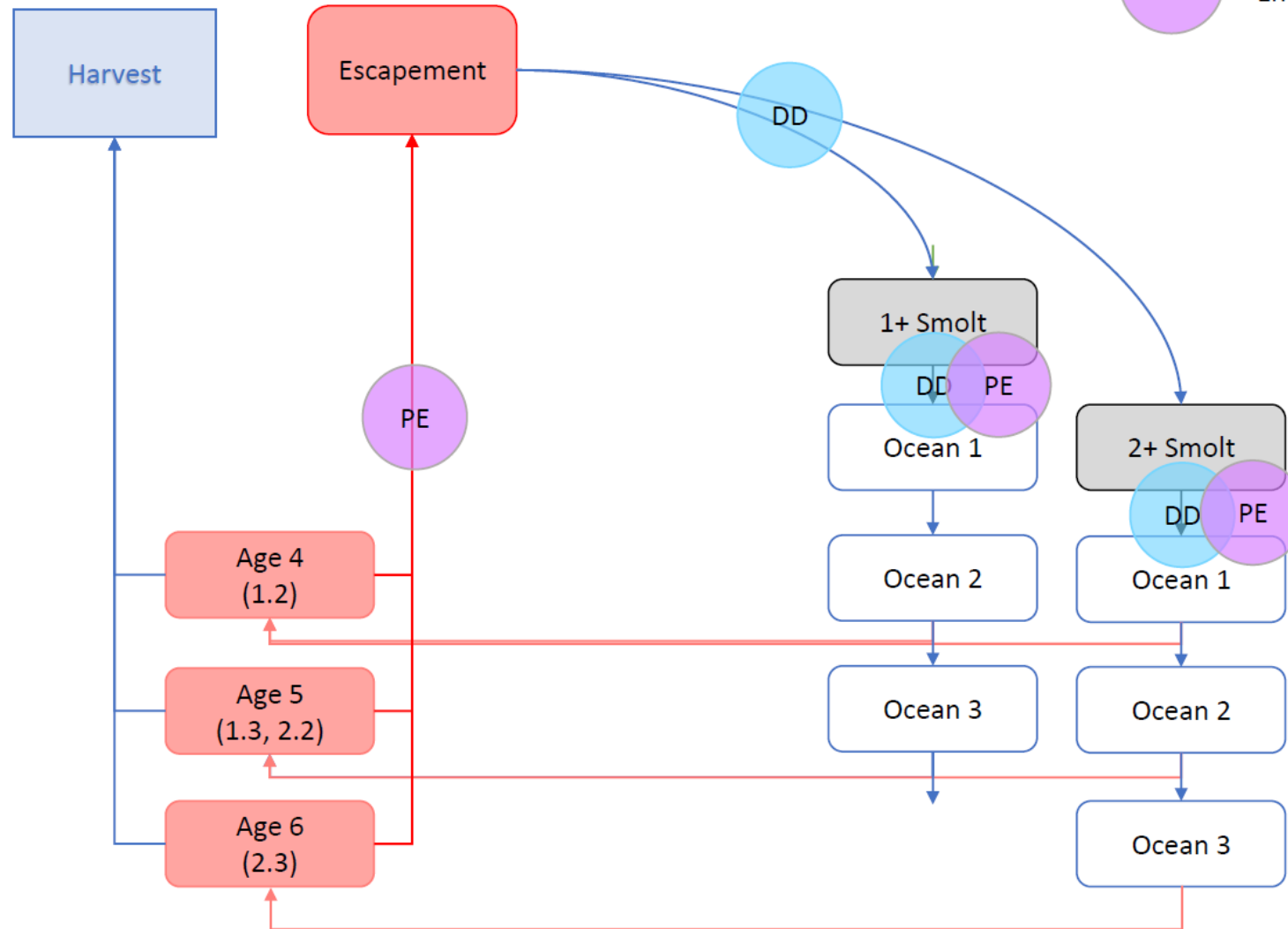
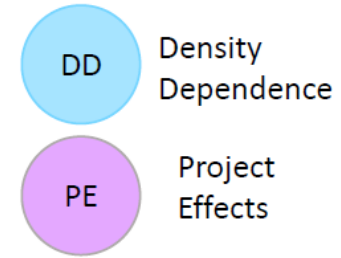
Project Effects -

- Spawner passage delay and fallback
- Smolts have delayed passage and lower survival relative to baseline (e.g., increased predation above baseline)

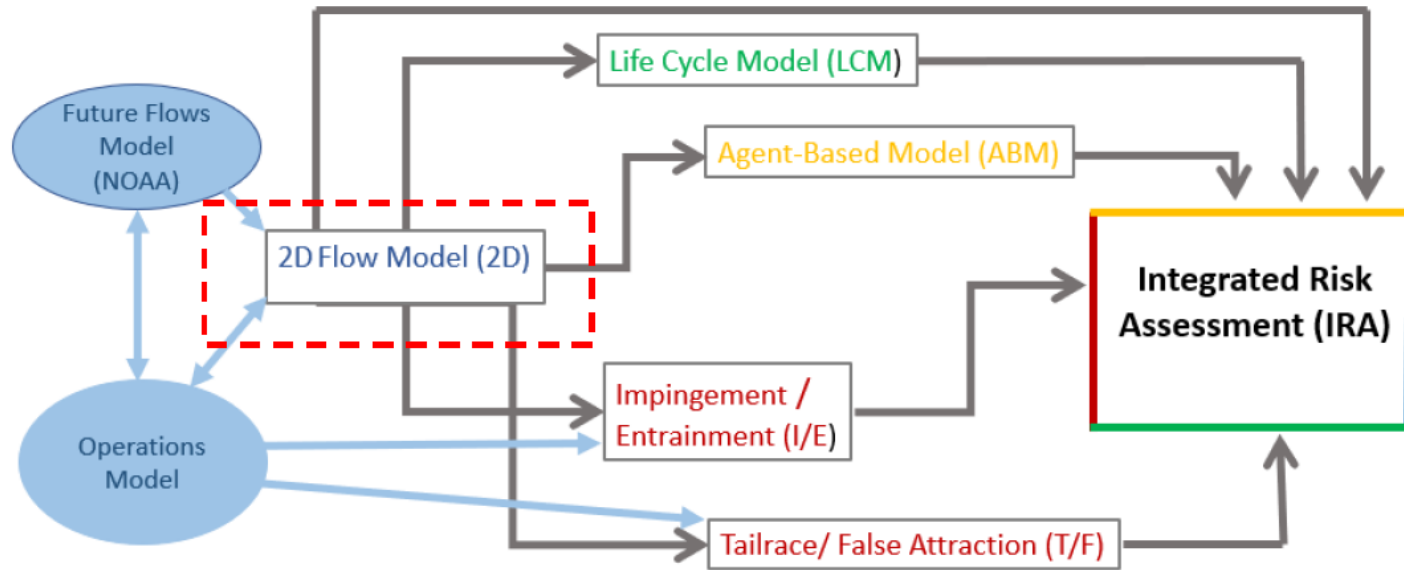
Stage-structured Nuyakuk sockeye LCM



Data driven Nuyakuk LCM with density dependence and project effects



Model Coordination



Other considerations for assessing risk

- Effects of project on downstream passage of smolts?
- Species other than sockeye salmon?
- Unknown changes to watershed and climate forcing?
- Is timeline of baseline studies long enough to understand the river and how it might respond to development of the hydro project?
- Impacts of infrastructure on other ecological risks (for example, opening up access via powerlines etc)?