Estimating the effects of forest disturbance and regeneration on summertime low flows in Skagit River tributary streams

Gus Seixas and Curt Veldhuisen
Skagit River System Cooperative
Climate Dialogue lecture series, Skagit Climate Science Consortium
1/21/2021
Predicted decreasing summertime low flows at locations throughout Skagit River watershed.
Predicted decreasing summertime flows
Summer streamflow deficits from regenerating Douglas-fir forest in the Pacific Northwest, USA

Timothy D. Perry | Julia A. Jones
Summer streamflow deficits from regenerating Douglas-fir forest in the Pacific Northwest, USA

Timothy D. Perry | Julia A. Jones
Fisheries impacts of low flow deficits:

- Temporarily lost habitat
- Stream temperature hazards
- Temporarily inaccessible habitat
- Diminished food resources
What would this plot look like extrapolated across the landscape?
Goals:
Goals:

• Create an analysis tool that can be used to estimate forest age structure at the watershed scale
Goals:

• Create an analysis tool that can be used to estimate forest age structure at the watershed scale

• Estimate summertime low flow changes in important salmon streams in the Skagit River basin
Low Flow Hazard Assessment Tool
L.F.H.A.T.
Methods

lidar first returns

lidar tree height
Methods

Stand year of origin data from Mount Baker Snoqualmie National Forest
Methods

![Diagram showing a neural net and training data with a score of 0.88. The diagram includes a legend for different tree age categories (0-10 yr, 10-30 yr, 30-100 yr, 100+ yr, alpine).]
Stand year of origin data from Mount Baker Snoqualmie National Forest

Methods
Methods
Modified from Coble et al., 2020
Using the empirical record of flow change from the HJ Andrews Experimental Forest
Application: Skagit River tributary streams

The Skagit River valley
Application: Skagit River tributary streams
Application: Skagit River tributary streams
Application: Skagit River tributary streams

Estimated flow change in three land ownership classes
Summary
Summary

• A new screening tool allows for estimation of stand age class structure throughout watersheds
Summary

- A new screening tool allows for estimation of stand age class structure throughout watersheds.

- Mean flow change scenario illustrates a possible response of flow to stand conditions in each watershed:
  - Wide range of responses due to mix of stand conditions on the ground.
Summary

• A new screening tool allows for estimation of stand age class structure throughout watersheds

• Mean flow change scenario illustrates a possible response of flow to stand conditions in each watershed:
  • Wide range of responses due to mix of stand conditions on the ground.

• Mixed ownership basins tend to have greater flow deficits due to history of extensive Forest Service harvest combined with little current harvest in the National Forest.
Summary

• A new screening tool allows for estimation of stand age class structure throughout watersheds

• Mean flow change scenario illustrates a possible response of flow to stand conditions in each watershed:
  • Wide range of responses due to mix of stand conditions on the ground.

• Mixed ownership basins tend to have greater flow deficits due to history of extensive Forest Service harvest combined with little current harvest in the National Forest.

• Private and state forests have a wide range of forestry-related flow impacts due to diverse land use history.
Thank you!

Contact: gseixas@skagitcoop.org