Possible strategy for breaking up study into multiple publications

Proposed manuscript(s):

1. Short term effects of wildfire on juvenile Chinook rearing habitat
2. Integration of high-precision drift sampling technology to estimate drift energy density
3. Use of remote sensing for rapid assessment of wildfire effects on juvenile Chinook salmon rearing habitat

**Short term effects of wildfire on juvenile Chinook rearing habitat**

Introduction

Methods

*Study Area*

The Chena River drains an area of XXXX km2 in interior Alaska, USA, running XXX km to meet the Tanana river near the city of Fairbanks. It supports the second largest escapement of Chinook salmon of all tributaries of the Yukon River basin (Brown et al. 2017). In summer 2019, two wildfires in the South Fork of the Chena River drainage bisected an area identified as the core rearing area for juvenile Chinook salmon (REF): the Nugget Creek fire (7082 ha) and the Beaver fire (5249 ha), resulting in 2019 burn scars covering XX% of the South Fork Chena drainage area.

*Main Stem Drift Sampling Procedures*

We collected drift debris samples at weekly intervals in summer 2020 in the main stem Chena River at one site each upstream and downstream of the influence of 2019 fire scars (Table X). For mainstem sites we used a custom designed suction filter system intended to facilitate collection of large-volume quantitative drift samples in separate fractions of ≥250 um and ≥80 um. The system consisted of a suction intake tube of XX length and XX cm diameter entrance fed through a diaphragm pump, which fell horizontally through a 1.5 m high table in to mesh nets of ≥250 um (inner net) and ≥80 um (outer net). Discharge through the sampler was determined by recording six replicates of the time taken to fill a container of known volume at the beginning of each sampling session. A mean was calculated, and this value was used to determine the density of invertebrates and detritus in each size fraction.

*Headwaters Drift Sampling Procedures*

We collected drift debris samples at the mouths of nine small (define “small”) headwater tributaries during two weeklong sessions of July and August 2020. We employed methods similar to those described in (Wiplfi and Gregovich 2002). We deployed 250-um nets attached to one end of a 75 cm long, 10 cm diameter plastic pipe frame, which rested on a sandbag of 5-10 cm height above the stream bottom. The frame with attached net was secured in the middle of each stream with sandbags, one per stream. We captured seston (suspended particulate organic matter) as well as bedload particulate organic matter, which we collectively labelled detritus, and macroinvertebrates in the drift as well as those moving downstream along the streambed. We selected sites such that the downstream end of each horizontal pipe rested above the stream surface. Discharge through the sampler was determined by recording the average of five replicates taken to fill a container of known volume. Streams were sampled continuously over a 24-h period. Discharge was measured at the beginning and end of each sampling period, a mean calculated, and this value was used to determine the density of invertebrates (individuals m-3) and detritus (≥ 250 um diameter, g m-3). Most of the streams were sufficiently small for the entire streamflow to pass through the pipe. Replicates were streams within each study area (within the Nugget Creek Fire scar, n = 5; outside the Nugget Creek Fire scar, n = 5).

*Sample processing*

Invertebrates were sorted from detritus after being preserved in 70% EtOH. They were identified to the lowest reliable taxon (family or order), their body lengths measured, and dry mass determined using taxon-specific length-mass regression equations (internal lab database). The remainder of the sample (detrital component) was oven-dried (18 C for 24 hrs) and weighed to determine debris dry mass.

* Subsampling technique

*Water Quality Measurements*

* Water temp, turbidity

Drift Energy Density

Drift Debris Density

Results

Discussion

Bibliography

Brown,R.J., von Finster,A., Henszey,R.J., and Eiler,J.H. 2017. Catalog of Chinook Salmon Spawning Areas in Yukon River Basin in Canada and United States. J. Fish Wildl. Manag. **8**(2): 558–586. doi:10.3996/052017-JFWM-045.

Wiplfi,M.S., and Gregovich,D.P. 2002. Export of invertebrates and detritus from fishless headwater streams in southeastern Alaska: implications for downstream salmonid production. Freshw. Biol. **47**(5): 957–969. John Wiley & Sons, Ltd. doi:10.1046/j.1365-2427.2002.00826.x.