

# 2022 State of Salmon Water Analysis Project

## #2 -- Freeze Level (ft.) and Rain Falling as Snow (%)

### Analysis Methods

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Content and methods for 2022 State of Salmon [Water Analysis Project](#) were developed and uploaded ([here](#)) under RCO contract #22-1587 with SBGH-Partners, dated April 18, 2022.

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### FREEZE LEVEL METHODS

Freeze level was determined as the elevation of a geographical location's coordinates at which air temperature reached standard freezing temperature (0° C) for a specified point in time. Explicitly, this refers to the mean height of freezing temperature over the pre-determined 6-month timespan ending in April for each year specified in the resulting dataset. The geographical location of a centralized water gauge for each salmon recovery region was used when calculating the freezing level for that region.

#### **Methodology For Analyzing Freeze Levels**

1. Input the latitudinal and longitudinal coordinates for the centralized gauge of the salmon recovery region being assessed into the [North American Freezing Level Tracker](#) tool's Monthly/seasonal Time Series listings.

2. Input the span of time within which mean freezing elevation is being calculated (6 months, ending in April).
3. Allow the tool to calculate the mean freezing elevation for its entire database given the manual inputs. This will give you the mean freezing elevation for the years 1949 - 2022.

### **FINDING CHANGE OVER TIME FOR MEAN ANNUAL FREEZE LEVEL**

1. Calculate a linear regression for the annual mean freezing elevation for the dataset.
2. Input the dataset's first year analyzed into the equation for the resulting linear regression, then, separately input the dataset's last year analyzed into the same equation.
3. Calculate the change between the equation's solution for the first and last year. The result will represent the change in the average annual freezing elevation for the dataset.

### **RAIN FALLING AS SNOW METHODS**

Rain falling as snow was determined as the ratio of rain falling as snow versus rain in percentage form for a designated geographical location over the pre-determined 6-month timespan ending in April for each year specified in the resulting dataset. The gauge used to determine the geographical location measured for each salmon recovery region was the same as the gauge used for the freeze level calculation.

#### **Methodology For Analyzing Rain Falling As Snow**

1. Input the latitudinal and longitudinal coordinates for the centralized gauge of the salmon recovery region being assessed into the [North American Freezing Level Tracker](#) tool's Monthly Rain Falling as Snow calculator.
2. Input the span of time within which the percentage of rain falling as snow is being calculated (6 months, ending in April).
3. Allow the tool to calculate the percentage of rain falling as snow for its entire database given the manual inputs. This will give you the mean percentage of rain falling as snow for the years 1949 - 2022.

### **FINDING CHANGE OVER TIME FOR MEAN ANNUAL PERCENTAGE OF RAIN FALLING AS SNOW**

1. All steps for finding change over time for the mean annual percentage of rain falling as snow are congruent with those described in the methodology for finding change over time for the mean annual freeze level.