

The Next Water Temperature Action Plan

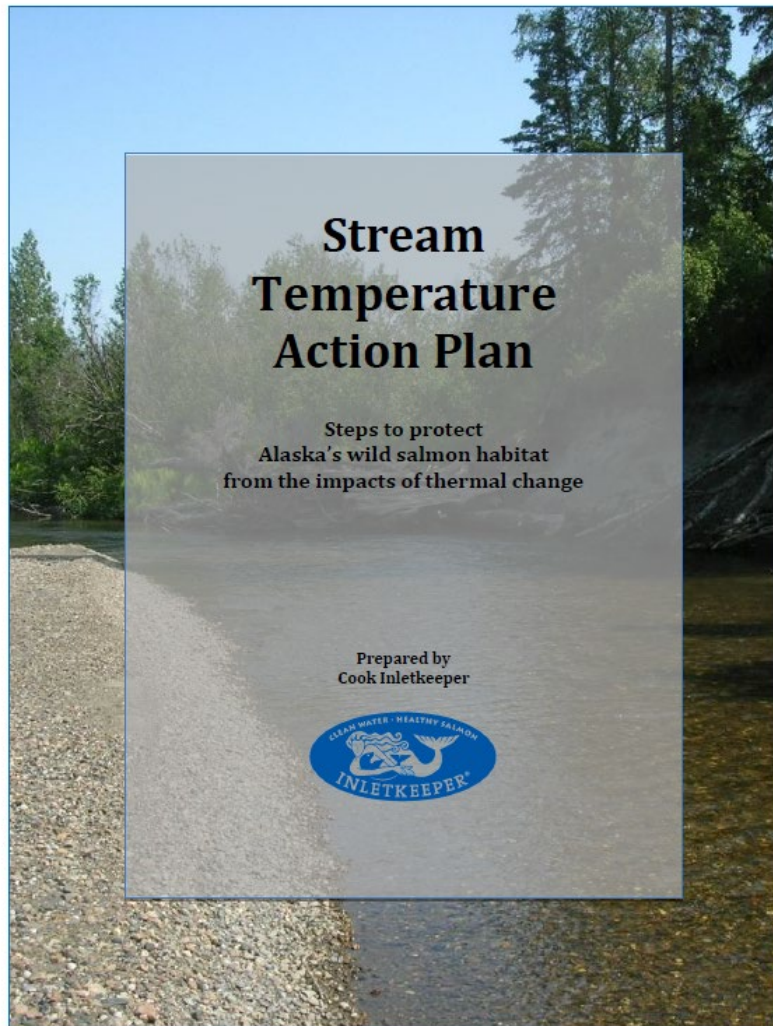
Building on a Decade of Collaboration and Strategic Actions

November 19, 2024





The Action Plan



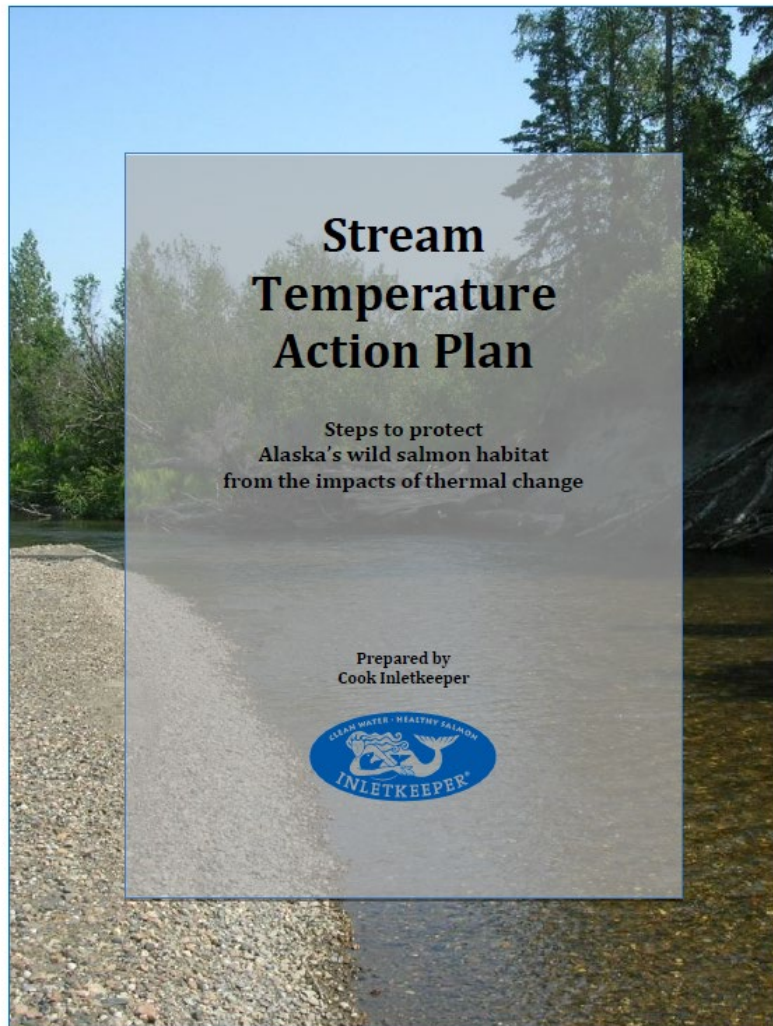
Developed with working group input in 2012

Purpose: to identify highest priority actions for the next 5-10 years that will lead to greater protection of Alaska's salmon habitat as thermal change continues

How: to be accomplished through collaboration and coordinated discussion!



Goals



1. Improve our understanding of current thermal regimes in Alaska's salmon streams.
2. Refine data collection for fisheries management and modeling applications.
3. Target cold water habitat protection efforts.
4. Fill stream network data gaps.
5. Direct relevant fisheries and habitat research.



Goals

Stream Temperature Action Plan

Steps to protect
Alaska's wild salmon habitat
from the impacts of thermal change

2024 Progress Report

Prepared by
Cook Inletkeeper



How are we doing?

What still needs to
be done?

February 2024

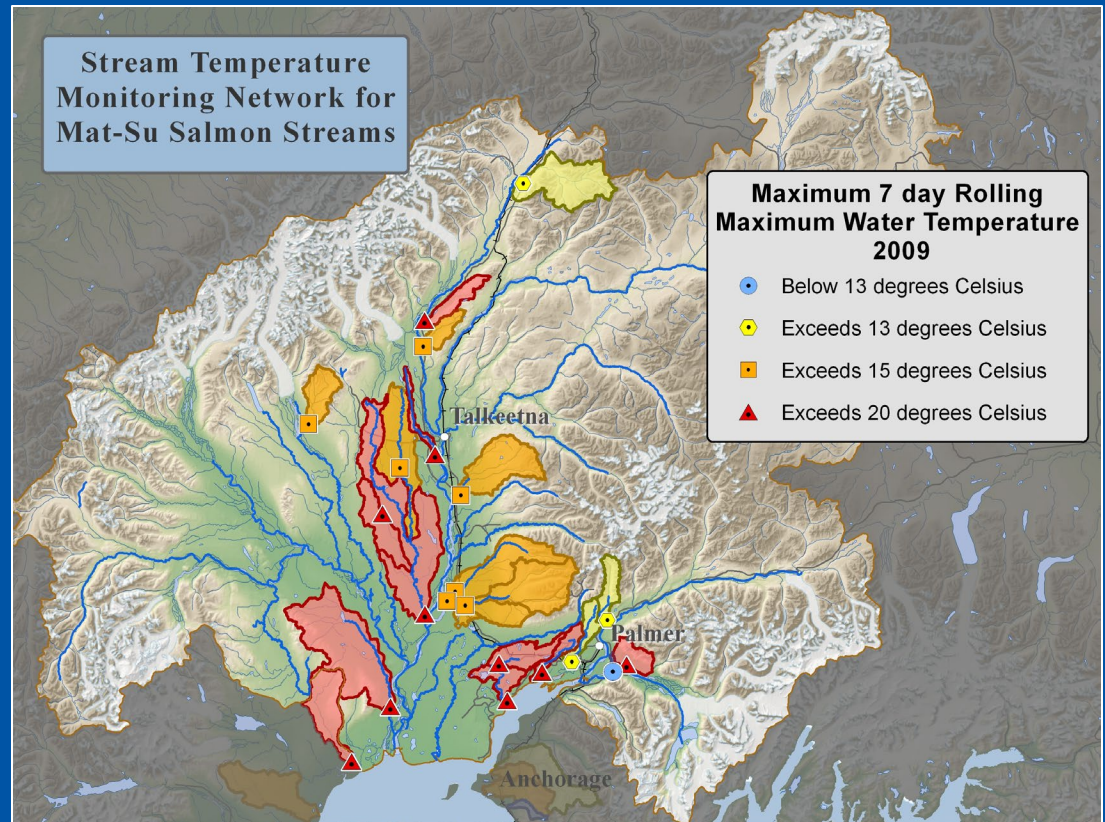




Goal 1: Describe thermal regimes

OBJECTIVE #1:

Monitor temperatures across the full range of the most important environmental gradients that affect thermal regimes to understand current variation among streams.





Goal 1: Describe thermal regimes

OBJECTIVE #1 PROGRESS:

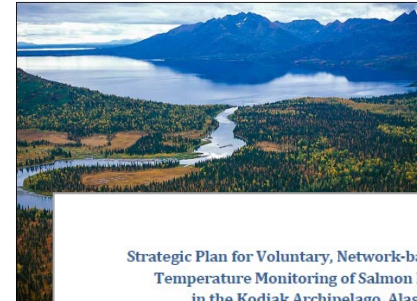
Completed/published regional analyses

- Cook Inlet, Mat-Su

Regional networks implemented

- Bristol Bay
- Kodiak Archipelago
- Southeast AK
- Copper River

IMPLEMENTATION PLAN: BRISTOL BAY REGIONAL WATER TEMPERATURE MONITORING NETWORK



Strategic Plan for Voluntary, Network-based Water Temperature Monitoring of Salmon Habitat in the Kodiak Archipelago, Alaska



Photo: USFWS

Prepared by:

Bill Pyle, USFWS/Kodiak National Wildlife Refuge
in collaboration with
Heather Finke, Alaska Department of Fish and Game
Trenten Dodson, Kodiak Regional Aquaculture Association, and
Thomas Lance, Sui'aa Tribe of Kodiak

For the:

Western Alaska Landscape Conservation Cooperative

November 2014



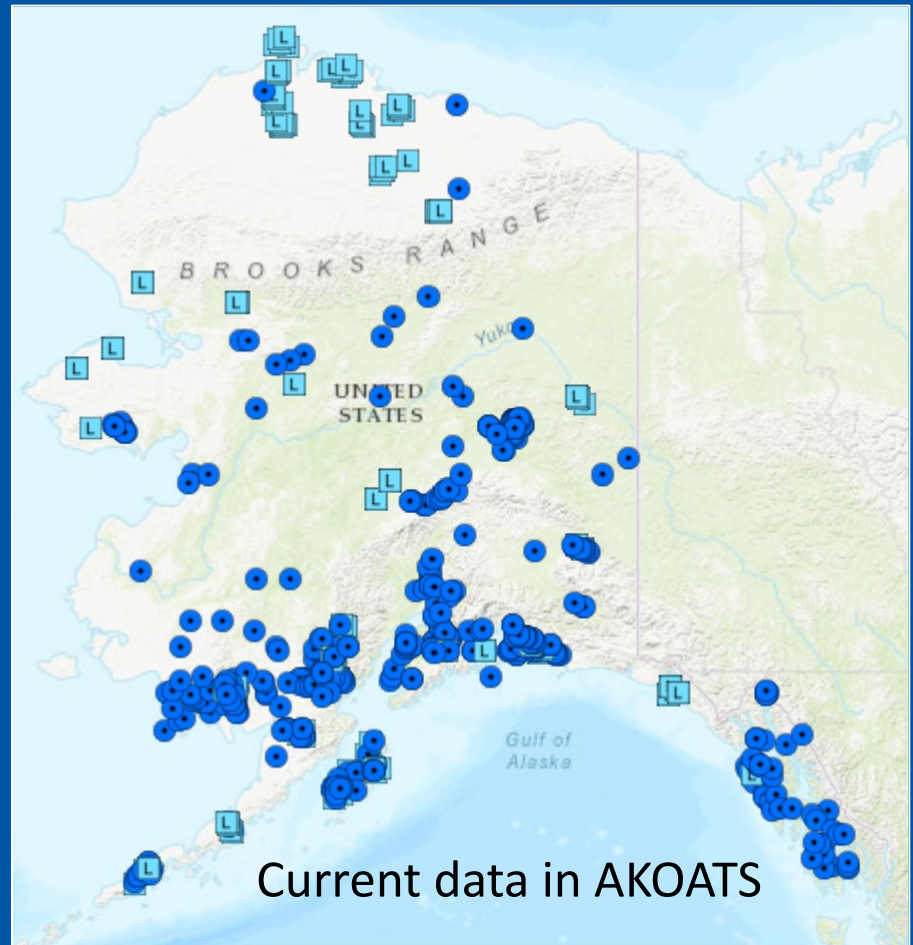
Goal 1: Describe thermal regimes

FUTURE NEEDS:

Complete regional analyses when 5-year data collection goals are met.

Regional priorities for coordinated network:

- Yukon
- Kuskokwim



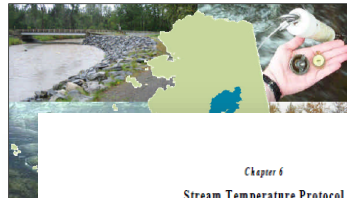


Goal 1: Describe thermal regimes

OBJECTIVE #2:

Develop minimum standards to ensure sufficient data quality and facilitate more data sharing among agencies and organizations.

WATER TEMPERATURE DATA LOGGER PROTOCOL FOR COOK INLET SALMON STREAMS



Chapter 6

Stream Temperature Protocol

Background

Water temperature is a key factor affecting the growth and survival of all aquatic organisms. The effect of stream temperature on fish, amphibians, macroinvertebrates, etc. varies between species and within the life cycle of a given species (Armour 1991; Beechie et al. 1987; Bjorn and Kasser 1991; Lauer 1971; DQ 1995). Preferred temperature ranges for major fish species and if particular life stages are shown in Table 6-1.

Increases in stream temperature cause an increase in an organism's metabolic rate (Warner 1971) enough food is available, growth rates can actually increase with some increase in temperature. For salmonids, temperature ranges of 40-66°F support healthy growth. Outside this temperature range salmon and trout generally don't grow in size, extreme temperatures can be lethal. Research has found that elevated stream temperatures often result in increased competition for a limited food supply, with young salmonids forced into habitat areas where they are under prey (Keeves, Evers and Flitt 1987). As food availability goes down so does the growth rate. In addition, elevated stream temperatures increase the risk of disease-related mortality.

As stream temperatures increase, the amount of dissolved oxygen (DO) available to aquatic biota decreases. As a result, even if food is abundant at higher temperatures, decreases in DO may metabolically stress salmonids. Further increases

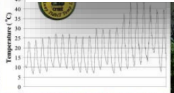
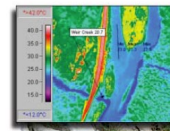


United States
Department
of Agriculture
Forest Service
Rocky Mountain
Research Station
General Technical
Report RMRS-GTR-150WWW
March 2005



Measuring Temperature Data Logger Guide

Jason Dunham
Gwynne Chandler
Bruce Riemann
Don Martin



* The term "dissolved oxygen" (DO) refers to the amount of a
amount of dissolved oxygen available to the stream in reports

Stream Temperature Protocol
Version 2.0

PROTOCOL FOR PLACEMENT AND RETRIEVAL OF TEMPERATURE DATA LOGGERS IN IDAHO STREAMS



Continuous Temperature Sampling Protocols for the Environmental Monitoring and Trends Section

December 2003

Publication No. 03-03-052
printed on recycled paper





Goal 1: Describe thermal regimes


OBJECTIVE #2 PROGRESS:

Minimum data standards for Alaska

- Mauger et al. 2015

New Alaska protocols available

- NPS; Shearer et al. 2015
- USGS/USFWS; Toohey et al. 2014
- Guidance for placement, maintenance, and retrieval of loggers; Mauger et al. 2014




Contents lists available at [ScienceDirect](#)

Journal of Hydrology: Regional Studies

journal homepage: www.elsevier.com/locate/ejrh

Stream temperature data collection standards for Alaska:
Minimum standards to generate data useful for regional-scale analyses


National Park Service
U.S. Department of the Interior



Natural Resource Stewardship and Science

Monitoring Freshwater Systems in the Southwest Alaska Network

Standard Operating Procedures



science for a changing world

Prepared in cooperation with the U.S. Fish and Wildlife Service

Guidelines for the Collection of Continuous Stream Water-Temperature Data in Alaska

Stream Temperature Data Collection Standards and Protocol for Alaska:

Minimum Standards to Generate Data Useful for Regional-scale Analyses



Goal 1: Describe thermal regimes

FUTURE NEEDS:

Generate recommendations for effective deployment methods, sampling designs, and analysis tools to facilitate successful monitoring networks.

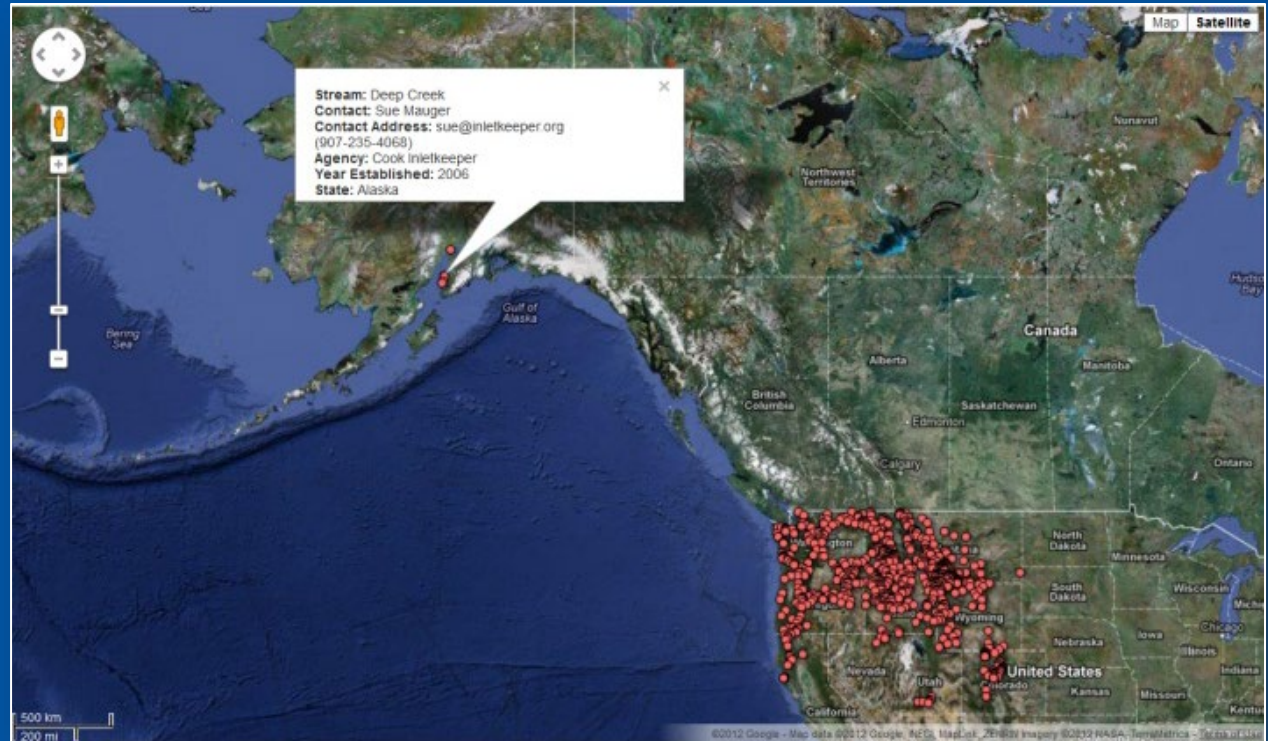




Goal 1: Describe thermal regimes

OBJECTIVE #3:

Create a state-wide online resource to identify where temperature data are available.



Example of a Google-map interface developed by the Rocky Mountain Research Station – Boise Aquatics Sciences Lab to identify full-year stream temperature monitoring sites.

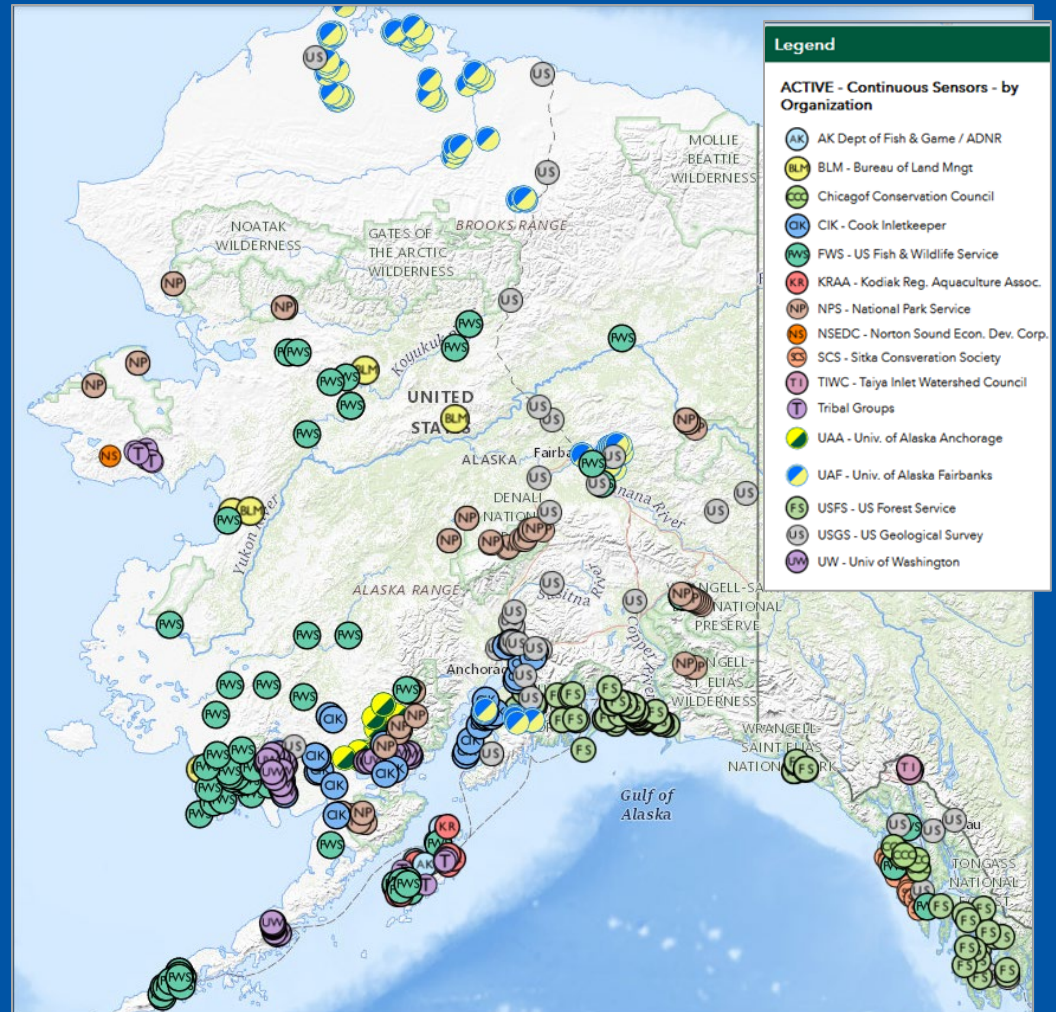


Goal 1: Describe thermal regimes

OBJECTIVE #3 PROGRESS:

AKOATS - Alaska Online Aquatic Temperature Site (meta-database)

- Developed in 2014
- Annual updates managed by Marcus, ACCS-UAA through 2021



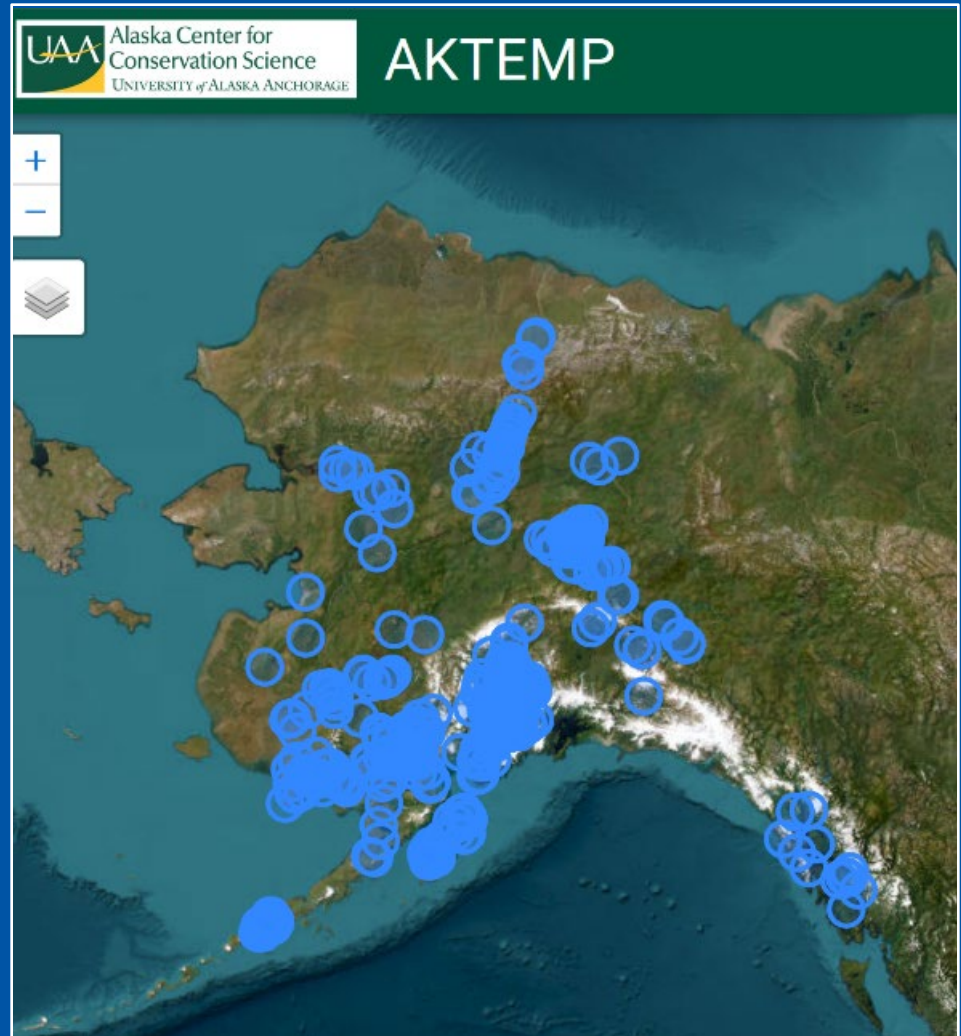
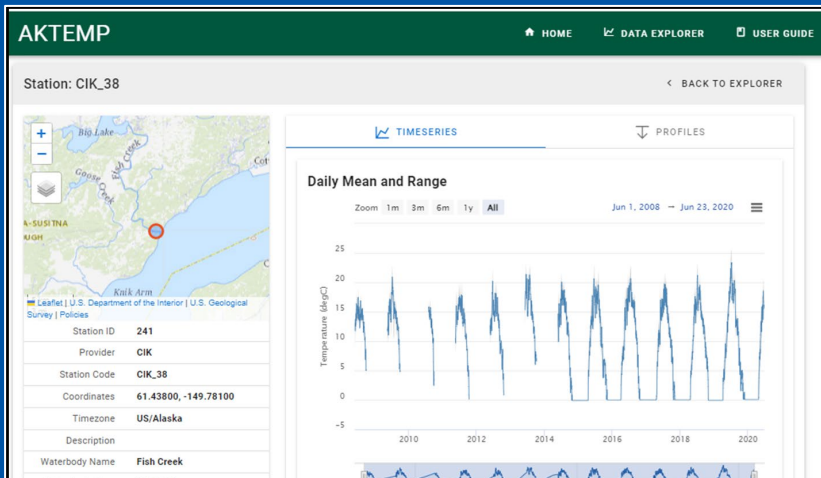


Goal 1: Describe thermal regimes

PROGRESS:

AKTEMP Water Temperature Database

- online in 2023
- public access to data!

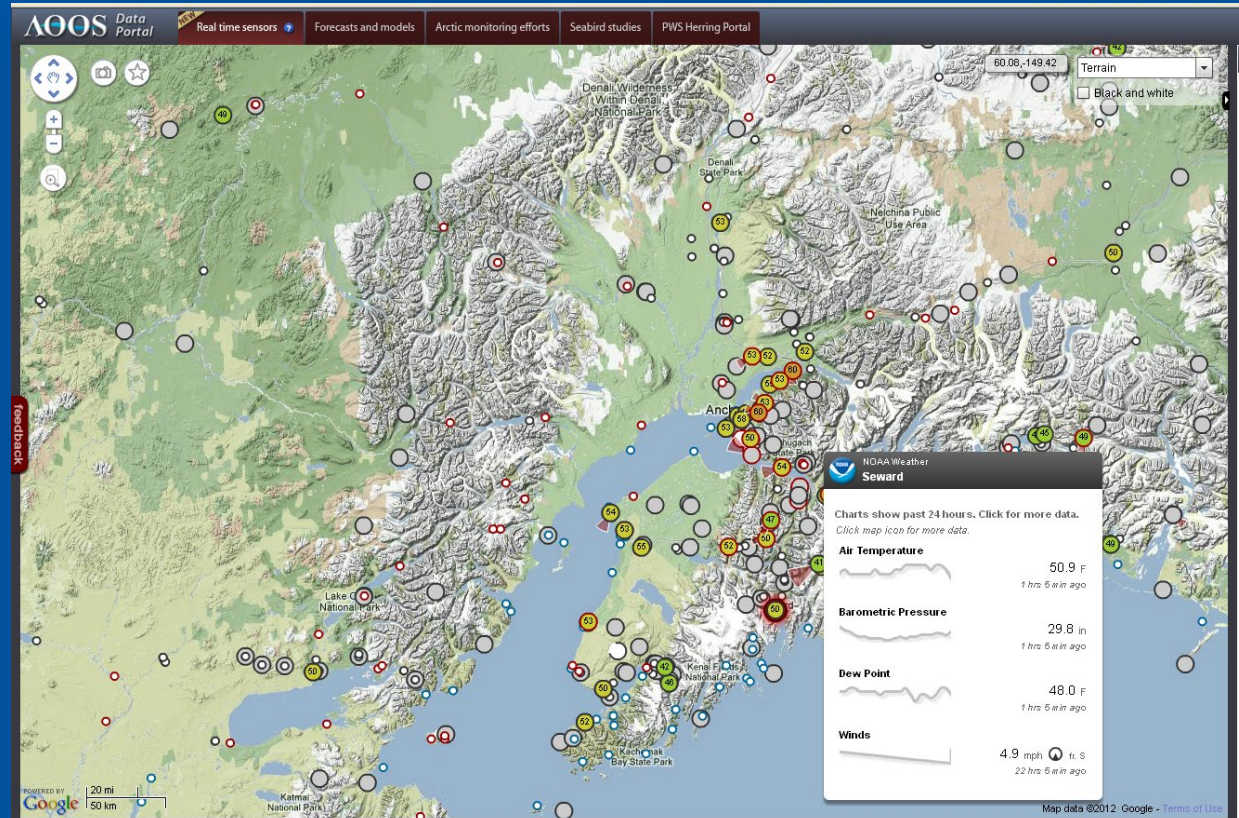




Goal 2: Refine data collection

OBJECTIVE #2:

Provide long-term datasets for climate and hydrologic modeling applications.



Example of the AOOS online data portal with real time sensors (shown) and forecast and model output maps.



Goal 2: Refine data collection

OBJECTIVE #2 PROGRESS:

Dense monitoring design in the Deshka, Little Su and Gulkana to allow modeling of thermal networks

Many 10-20 year datasets across the state





Goal 2: Refine data collection

FUTURE NEEDS:

Convene meetings between data collectors and large-scale physical modelers of water temperature to discuss (a) their data products, (b) how our products are being used for ground-truthing, (c) where they see data gaps that need filling, and (d) where we see gaps in modeling products.



SUMMARY OF JUSTIFICATIONS FOR A REGIONAL WATER TEMPERATURE NETWORK

MANAGEMENT APPLICATION	JUSTIFICATION
Regional planning	Tool for setting conservation and restoration goals and planning for changing thermal patterns and the implications for freshwater resources
Regulatory context	Provides regulators, permit applicants, and the public with better information for decision-making during project design and the permitting process
Invasive species	Understanding the thermal landscape will help managers prioritize where rapid eradication actions are needed and where containing an infestation's distribution is more realistic
Riparian condition	Tool for assessing if riparian protection and/or restoration activities can mitigate future temperature increases in sensitive streams
Timing windows	Valuable for tracking whether shifts in salmon migration timing require that adjustments be made to the traditional timing windows for instream restoration or construction work
Fish passage	Improving fish passage to colder upstream habitat could be a key metric for prioritizing restoration projects or designing new stream crossings
Fisheries	Annual variation of instream temperatures may be a valuable parameter to model trends in freshwater survival of rearing and out-migrating fish as well as subsequent adult return years
Conservation	Protecting groundwater connections, which support cold-water refugia and overwintering habitat, can increase resilience to changing temperature patterns



Goal 5: Direct research

OBJECTIVE #2:

Encourage more watershed-based research on salmon productivity to better understand freshwater survival versus marine survival.





Goal 5: Direct research

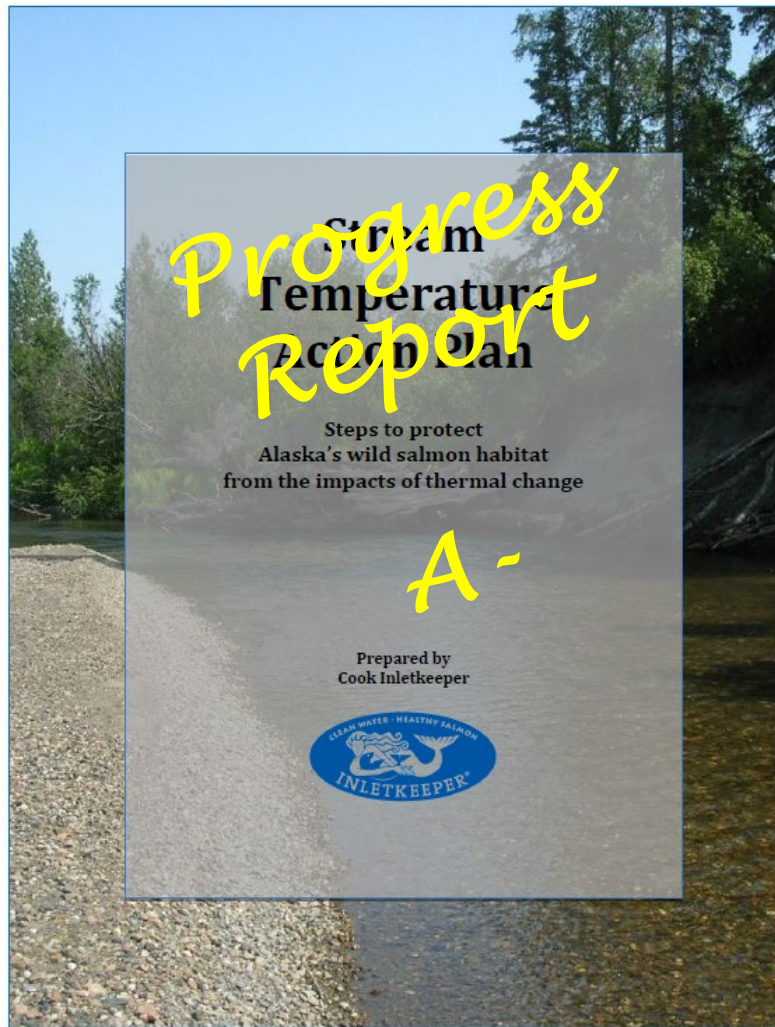
OBJECTIVE #2 Progress:

Significant volume of newly published literature linking temperature and salmon in Alaska

- Juvenile growth: Wood River System
- Intensive monitoring and modeling: Deshka, Little Su, Gulkana
- Heat shock proteins: Yukon, Ninilchik
- Chinook & chum declines: Cook Inlet, Yukon
- Retreating glaciers and habitat availability: Southeast
- Overwintering habitat: Big Lake Basin, Anchor River



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Onward!

The next Water Temperature Action Plan will be released before the end of the year and will set the stage for more successful collaboration and strategic action!

