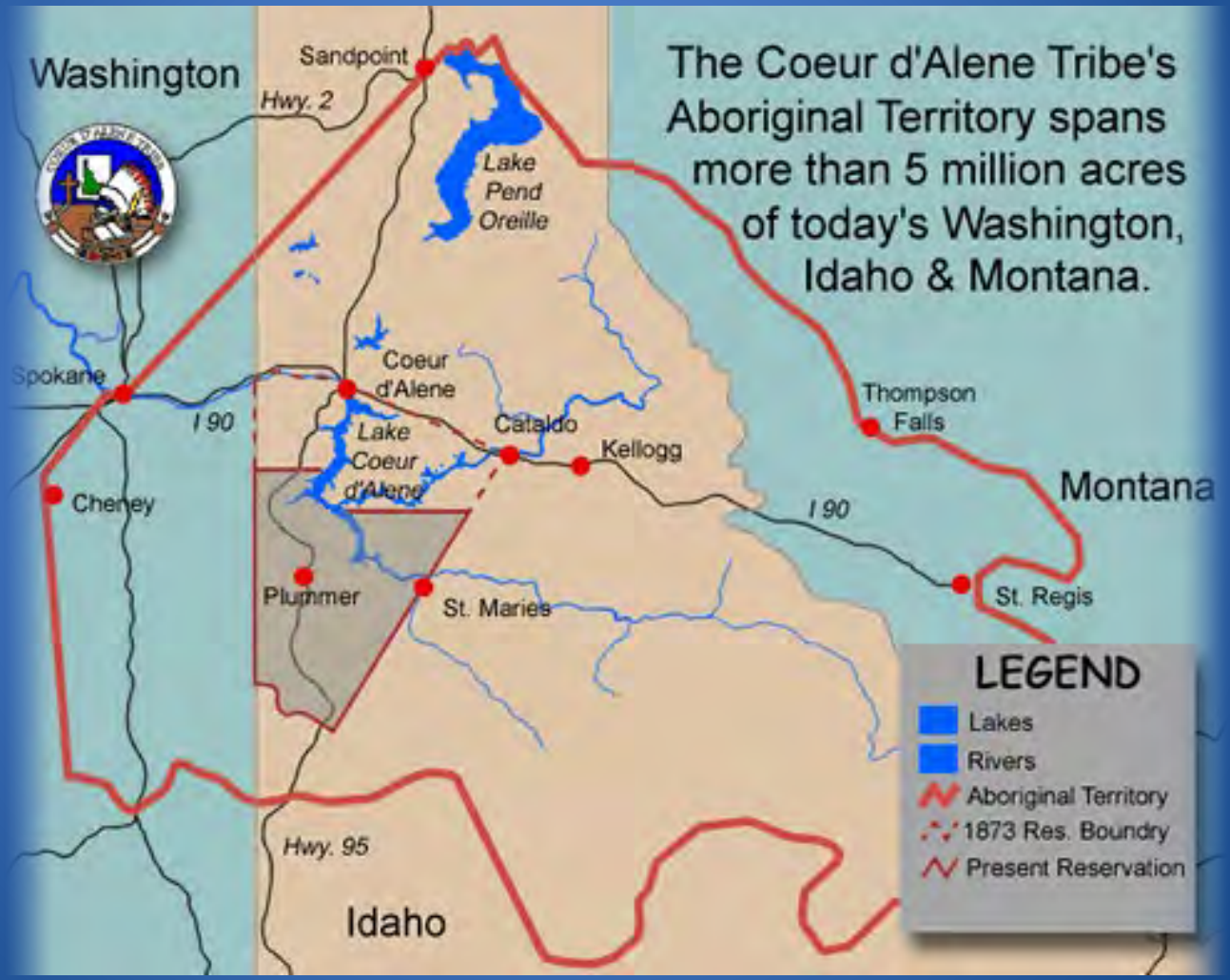
Coeur d'Alene Climate Adaptation and Resilience Planning

Spokane River Forum

April 27, 2023

The schitsu’umsh People




Moons & Seasons
JAN
FEB
MAR
APR
MAY
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DEC
sit.sitkw
(winter)
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(spring)
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(late Fall)
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SETQAPS
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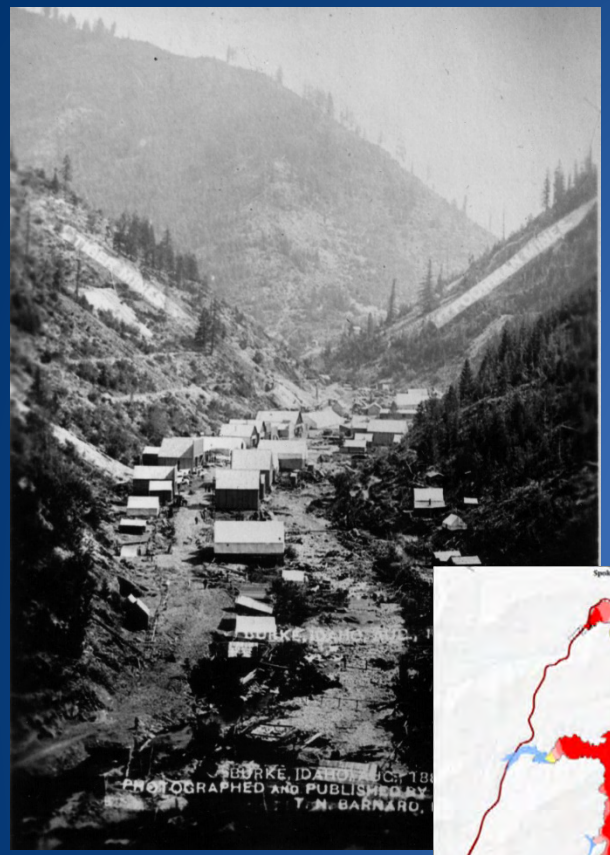
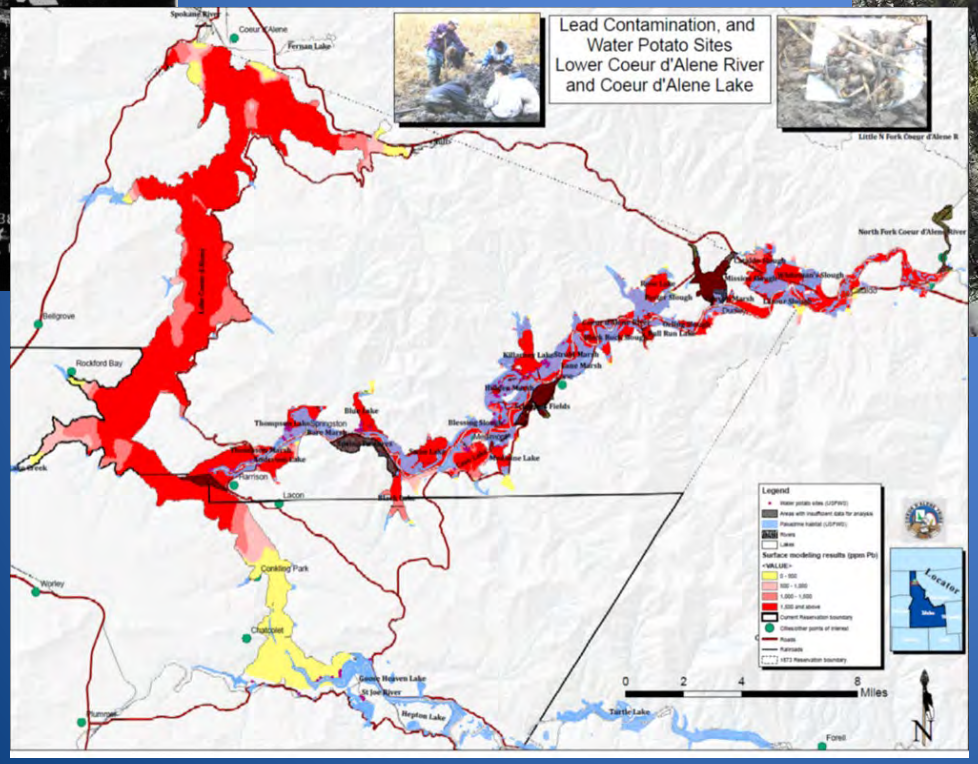
Historical damages



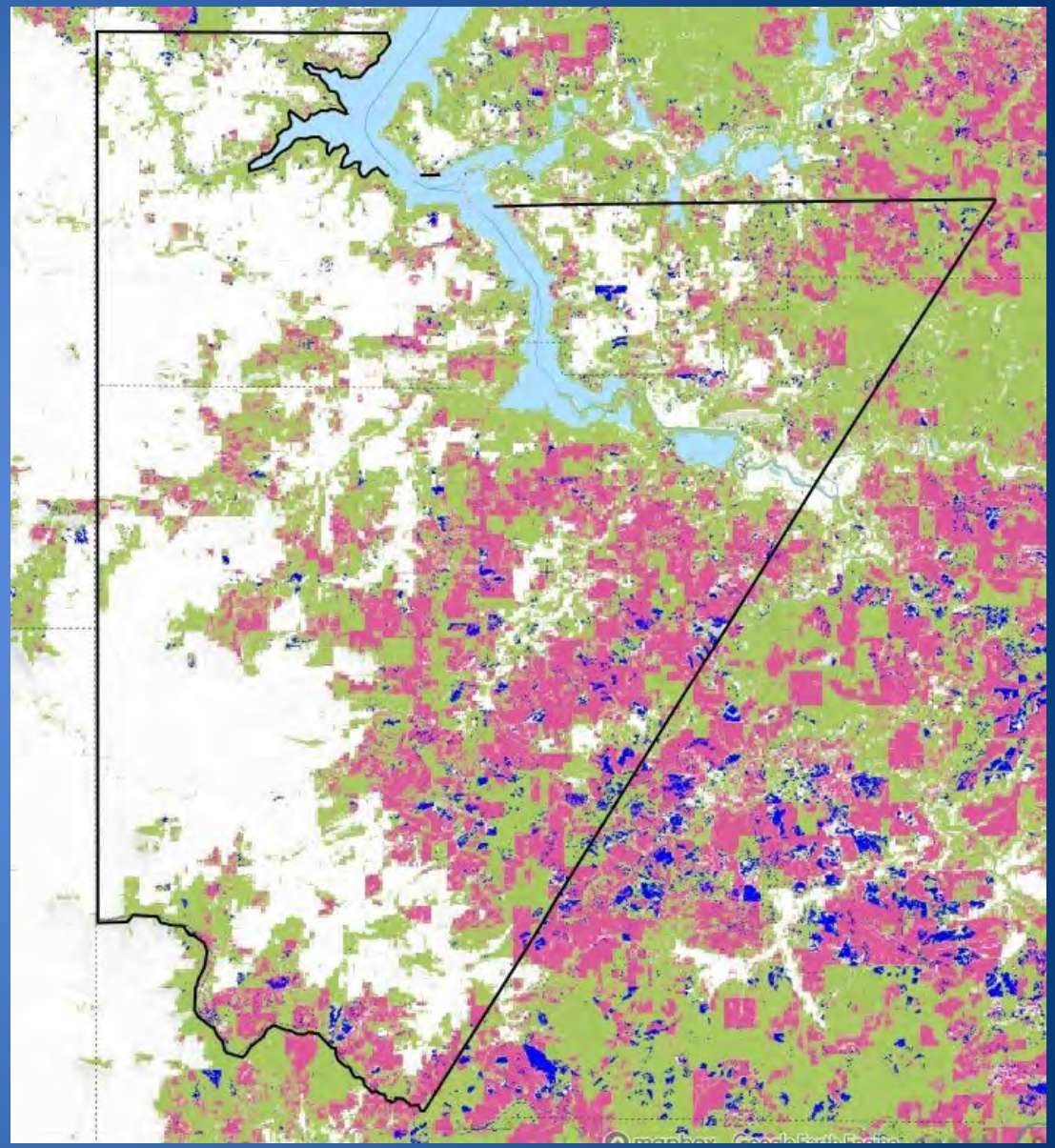


Our native fisheries: ełtumish and snparq'qn (Coeur d'Alene Lake), smlich and sp't'aswel (Hangman Creek)

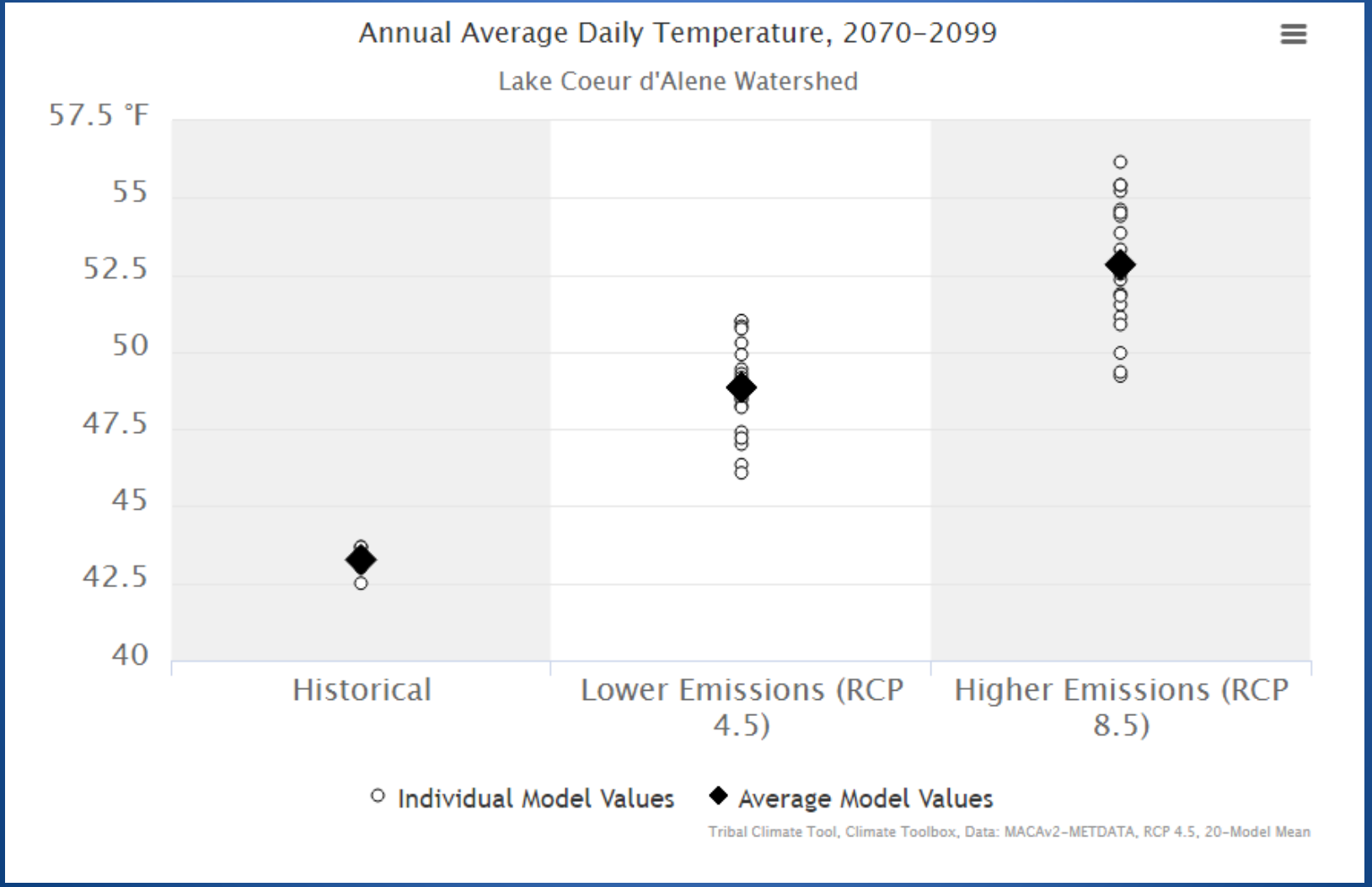
- In 1950s, cutthroat declined to about 30% of the catch in CDA Lake; by 1975 only 1% of catch, and mostly in southern waters
- 20th century decline: predation, competition, loss of spawning grounds
- Westslope cutthroat trout a species of special concern
- Bull trout listed as threatened under ESA (1998)
- Salmon and anadromous steelhead extirpated from Coeur d'Alene

Ongoing damages

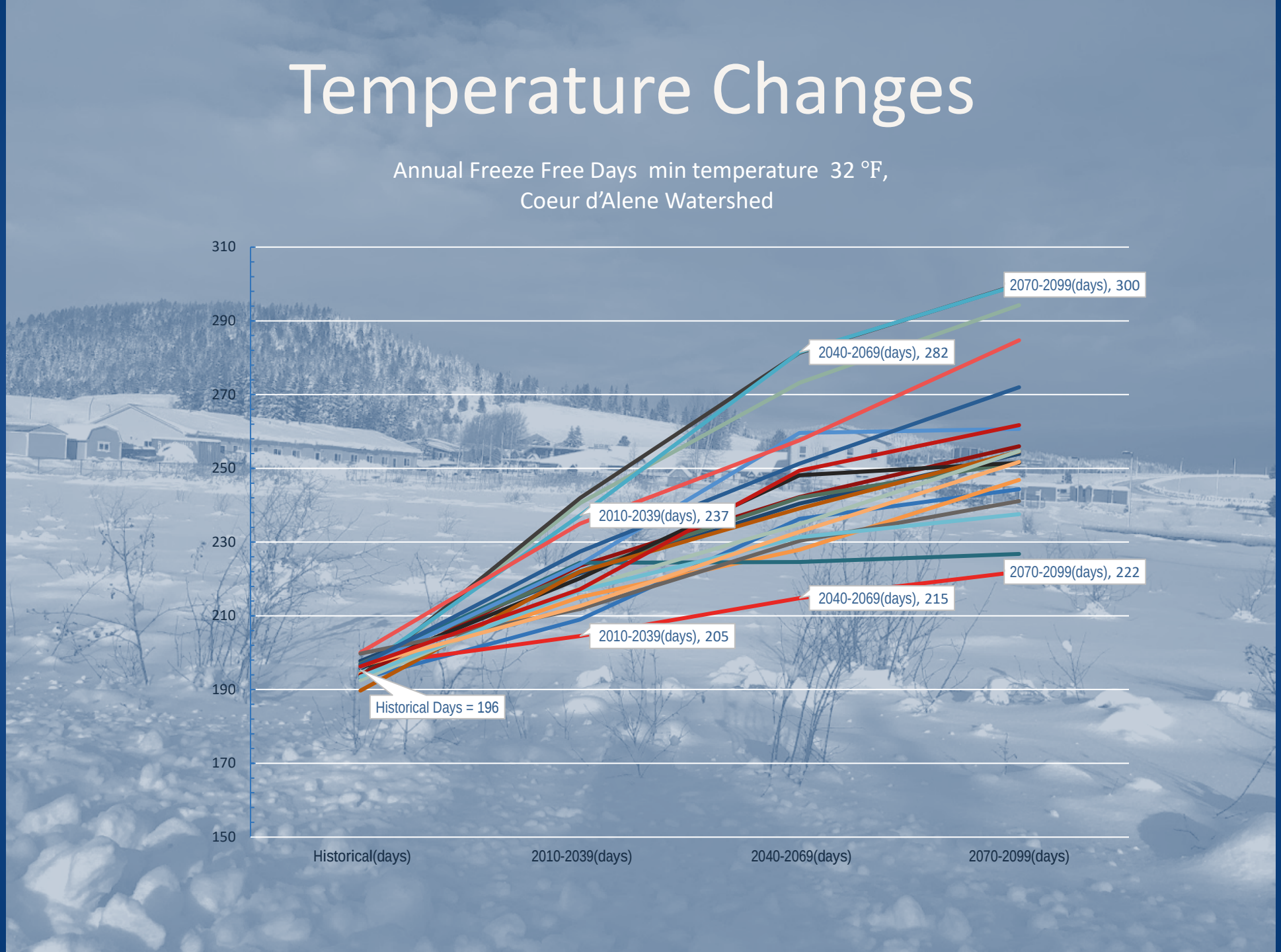
- Kootenai County has grown 23.7% since 2010, adding 33,000 people who are increasingly trying to develop Reservation lands.
- According to Global Forest Watch, the Coeur d'Alene Reservation lost 59,306 acres of tree cover between 2000 and 2021 (pink), while gaining just 5,609 acres (purple). Most of this is on industrial timber lands.
- Loss of tree = loss of habitat and biodiversity and increases in runoff.



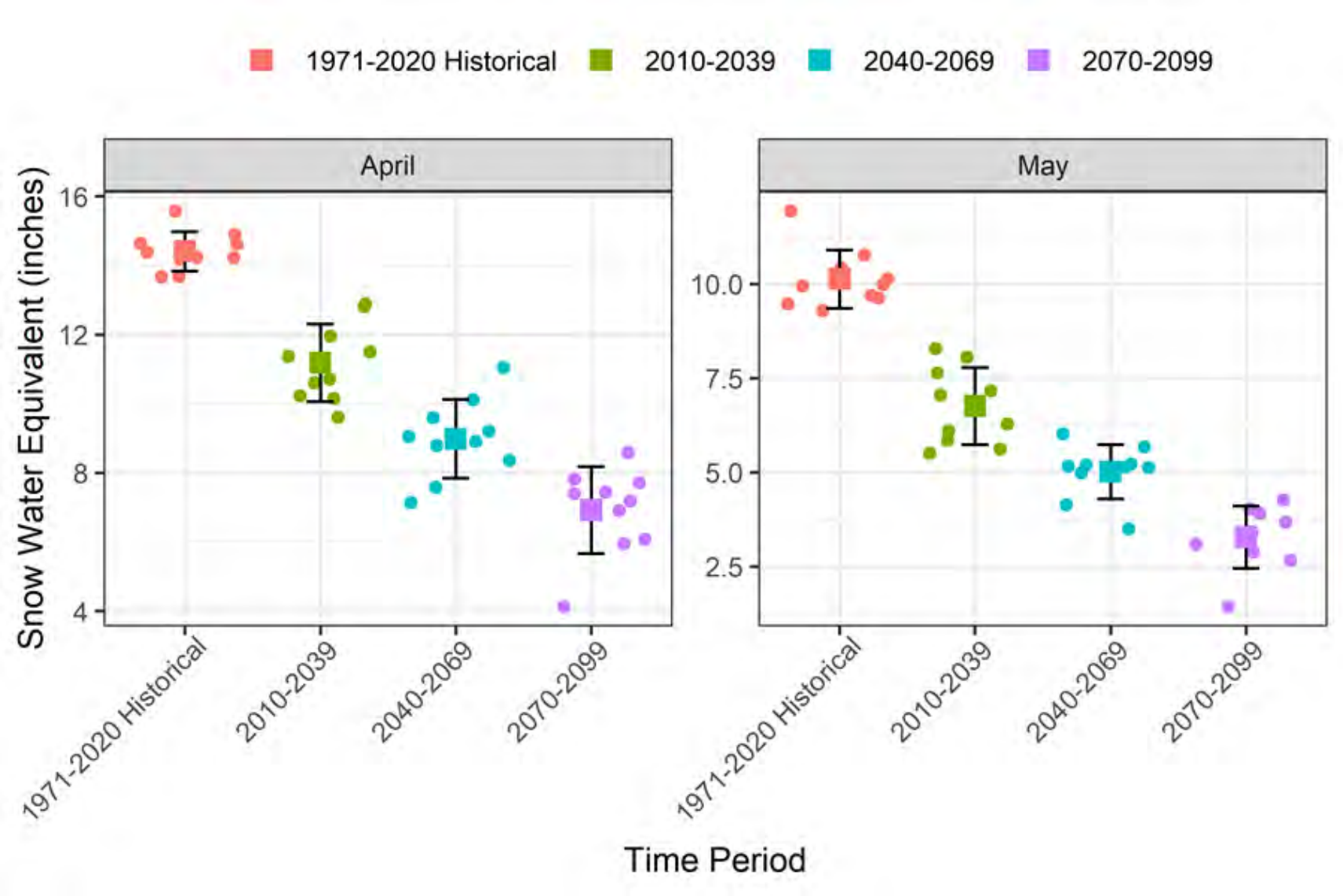
Coeur d'Alene Watershed

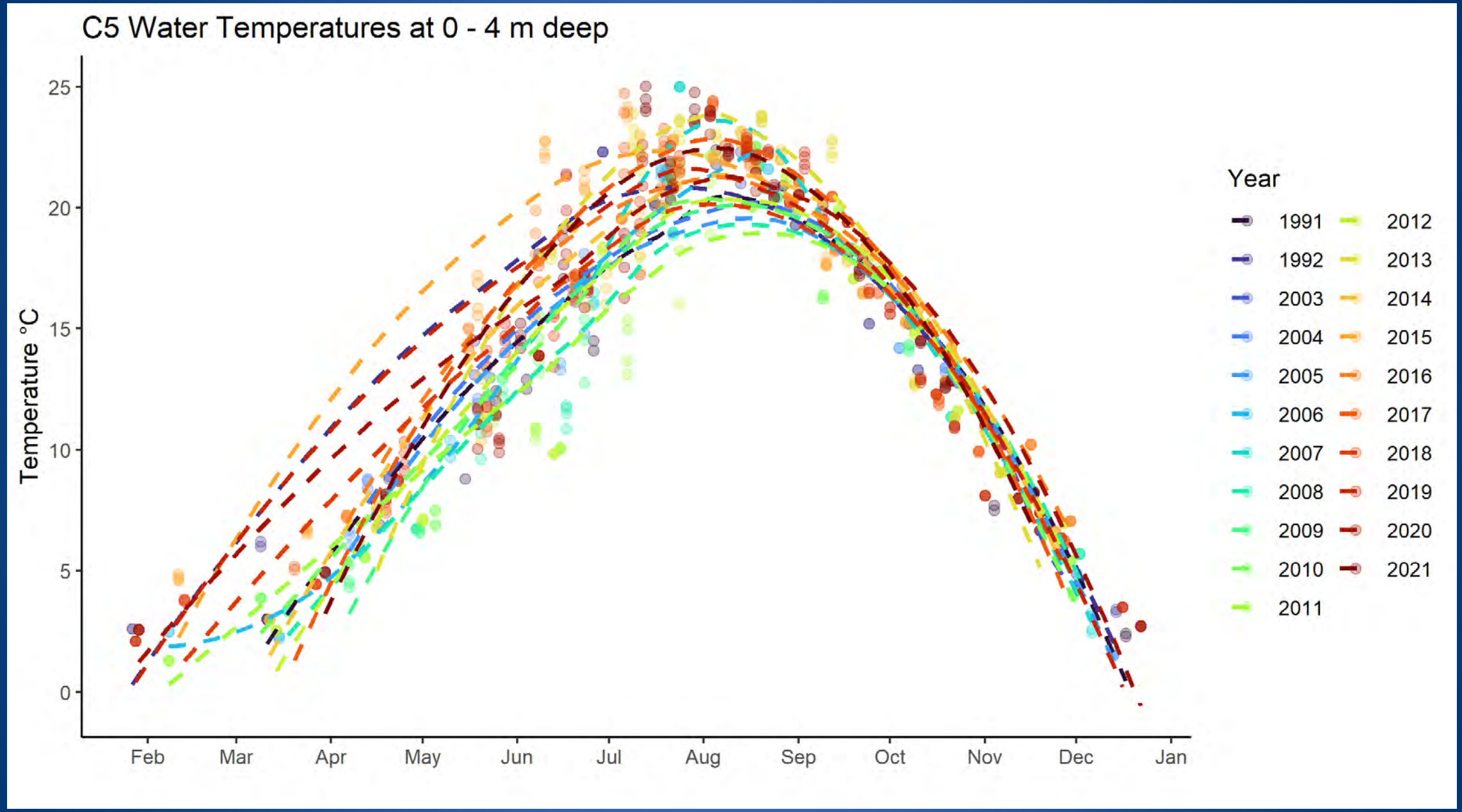


Temperature Changes



Regional Snow Water Equivalent Changes




C5 Water Temperatures at 0 - 4 m deep
Temperature °C
25
20
15
10
5
0
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Jan
Year
1991
1992
2003
2004
2005
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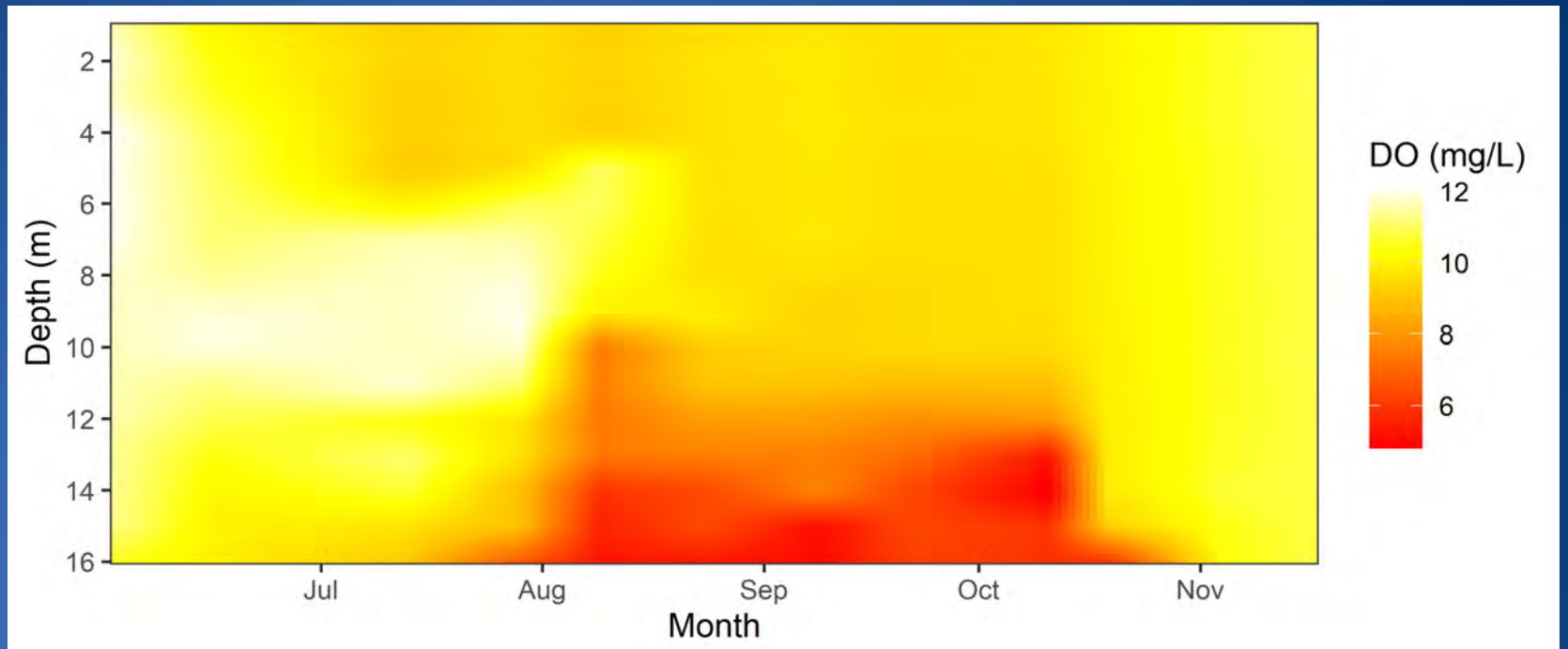
2015
2016
2017
2018
2019
2020
2021

Site C5
2021


Depth (m)
2
4
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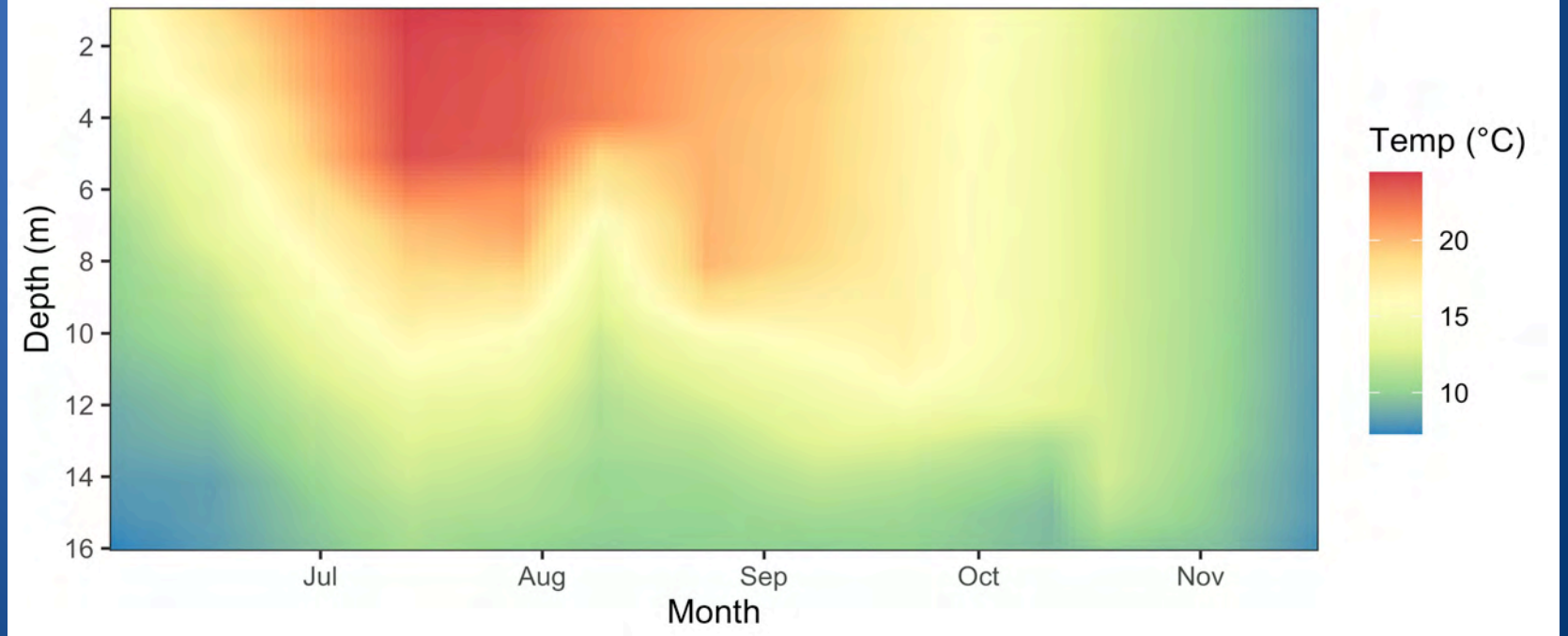
Depth (m)
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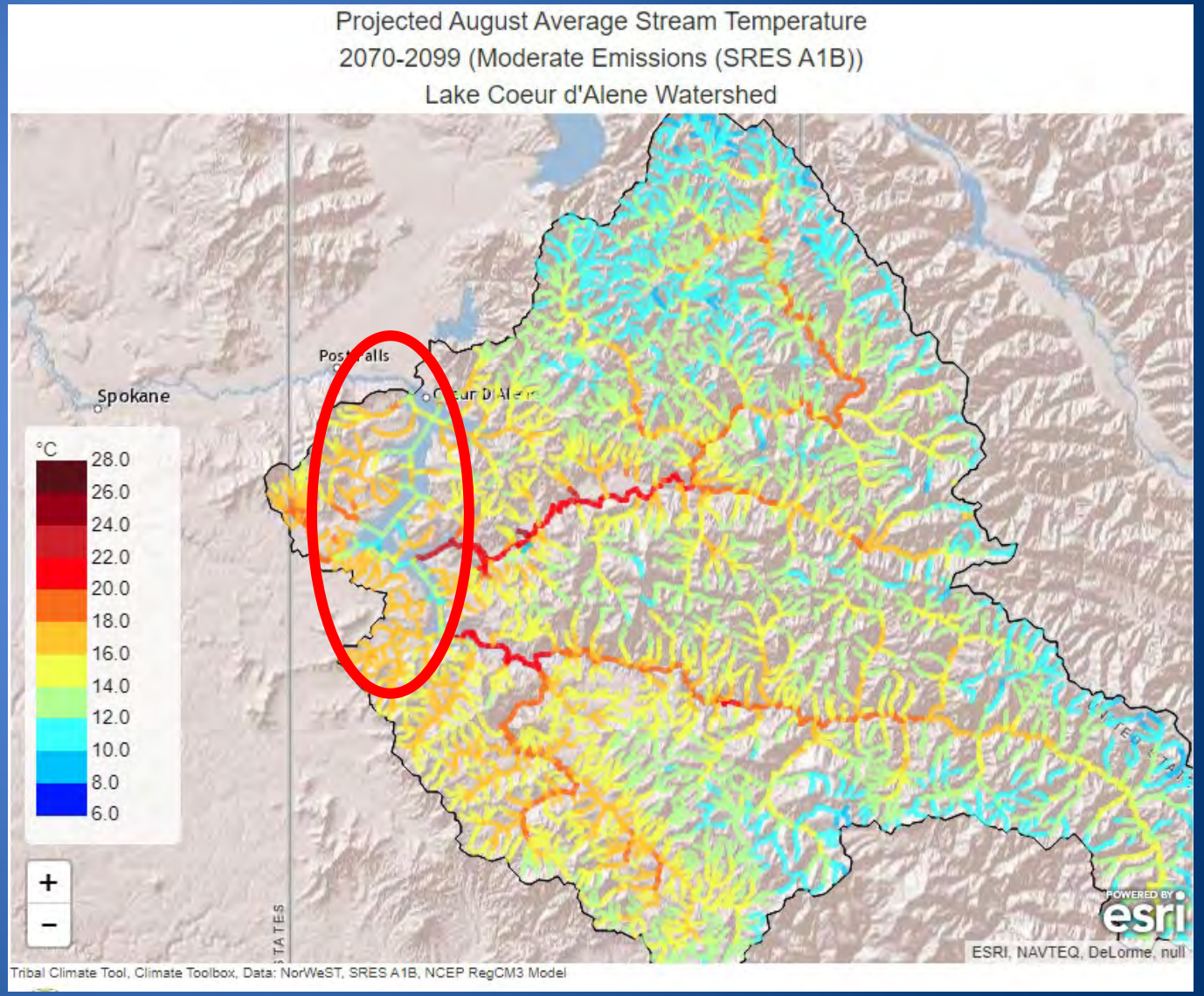
Month
Temp (°C)
20
15
10

Stream temperatures



October 3, 2020

Sentinel-2 L2A, EO Browser

Sentinel-2 L2A, EO Browser

March 5, 2022

- 16,000 CFS flow event in St. Joe and CDA Rivers
- Considered “moderate” flow
- Nutrient contributions persist

Climate Planning

How the Coeur d'Alene Tribe is already adapting:

sye’us’uslsh

Photo: Jesse Tinsley, Spokesman Review, July 13, 2022

Groundwater Modeling Study: Potential Climate-Change Influences on Groundwater Levels at City of Spokane Production Wells

Prepared by John Porcello, LHG

April 27, 2023

GSI Water Solutions, Inc.

CITY OF SPOKANE

Study Purpose and Methods

1. How might climate change affect groundwater levels at each of the City's eight well stations?
    a. Focus on water level changes arising from natural hydrologic influences alone
        - Flows in the Spokane River and river gains/losses
        - Flows into the aquifer from tributary valleys
        - Precipitation recharge over the aquifer

Study Purpose and Methods

2. Methodology

a. Keep climate change analysis at a screening-level

- Use available climate change scenarios (Climate Toolbox)
- Bracket the possibilities
  - 25th percentile for low emissions scenario RCP 4.5
  - 75th percentile for high emissions scenario RCP 8.5

b. First step: develop an updated groundwater flow model

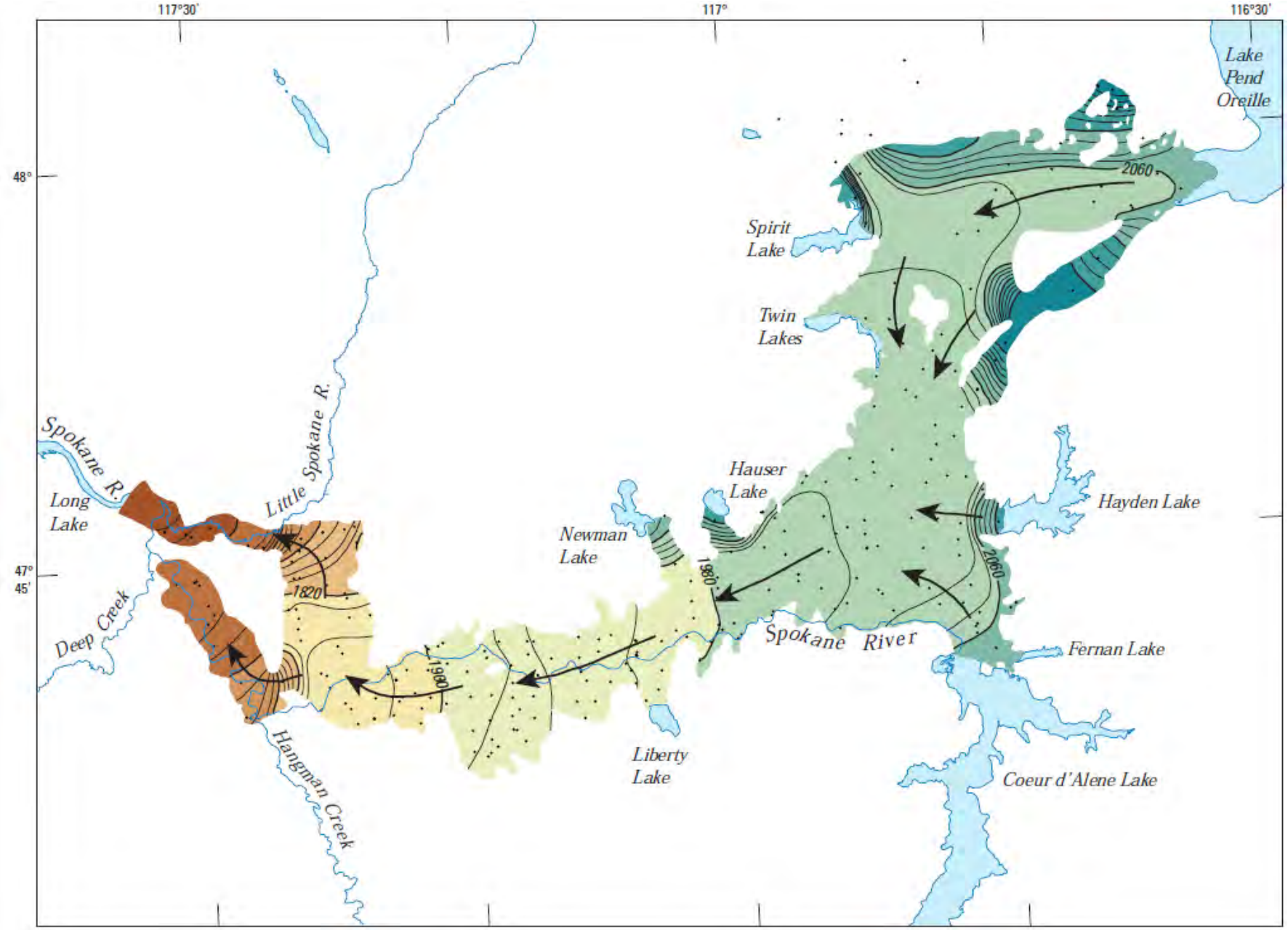
- Use knowledge from prior modeling studies (USGS, City, SAJB)
- Use new software, with refined gridding and layering
- Regional-scale calibration to data from prior studies
  - Spokane River gains/losses
  - Groundwater elevation contours
- First step to a modern model; not the model to end all models

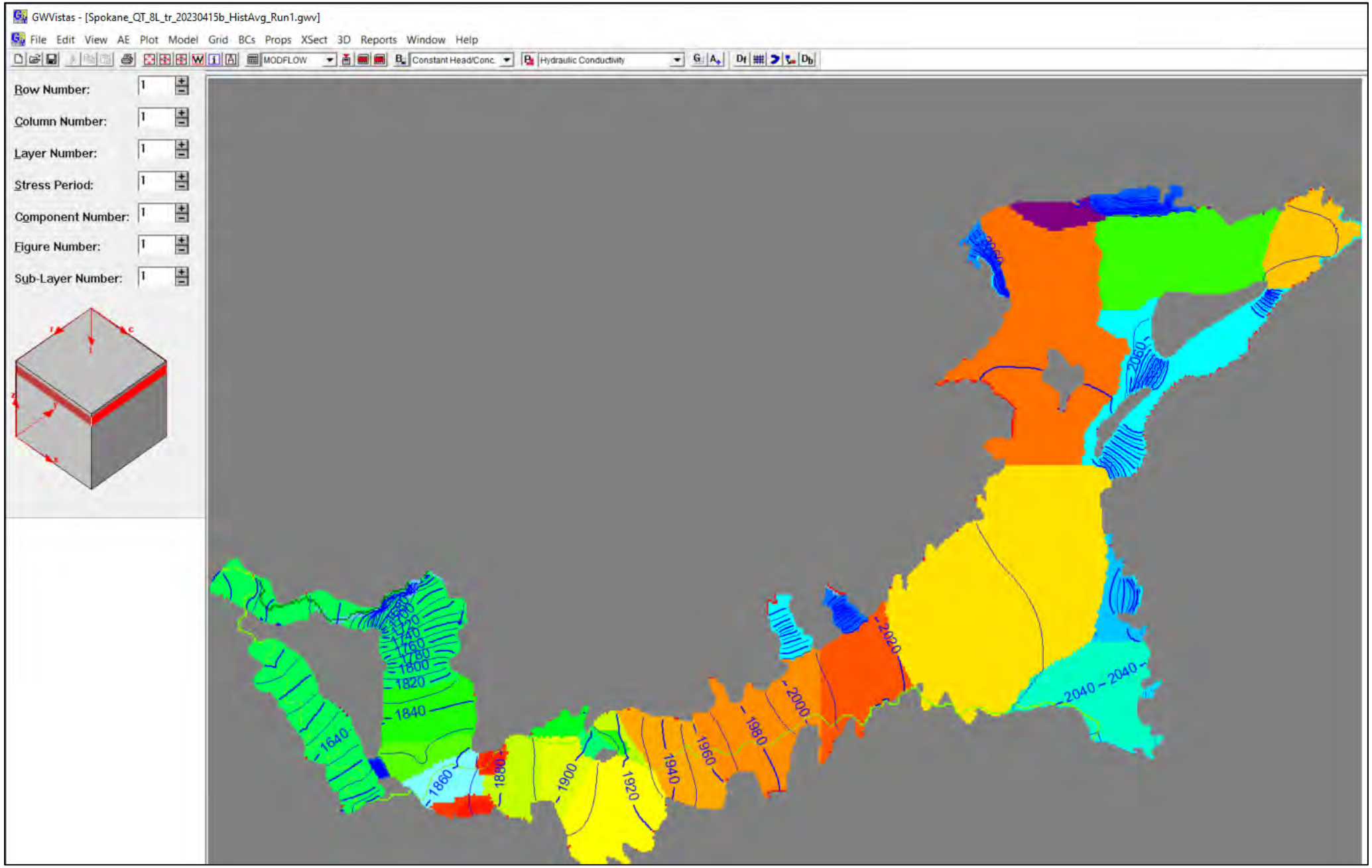
Spokane River Gains/ Losses During Low-Flow Months

Reach	Current Version of New City Model	USGS Model Sept 2004	USGS Measured Sept 2004	Miller 1995
Post Falls to Sullivan Road	-409	-377	-606	-207 to -319
Sullivan Road to Greene Street	+905	+623	+593	+415 to +537
Greene Street to Monroe Street	+278		-112	+63 to +122
Monroe Street to 9-Mile Falls	+103	+283	+268	-57 to -80

USGS GW Contour Map from Field Data *(September 2004)*

Source:
Kahle, S.C., and Bartolino, J.R., 2007. *Hydrogeologic Framework and Ground-Water Budget of the Spokane Valley-Rathdrum Prairie Aquifer, Spokane County, Washington, and Bonner and Kootenai Counties, Idaho.* U.S. Geological Survey Scientific Investigations Report 2007-5041, 48 p., 2 pls.

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MODFLOW
Constant Head/Conc.
Hydraulic Conductivity
Row Number:
Column Number:
Layer Number:
Stress Period:
Component Number:
Figure Number:
Sub-Layer Number:
1640
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1860
1890
1900
1920
1940
1960
1980
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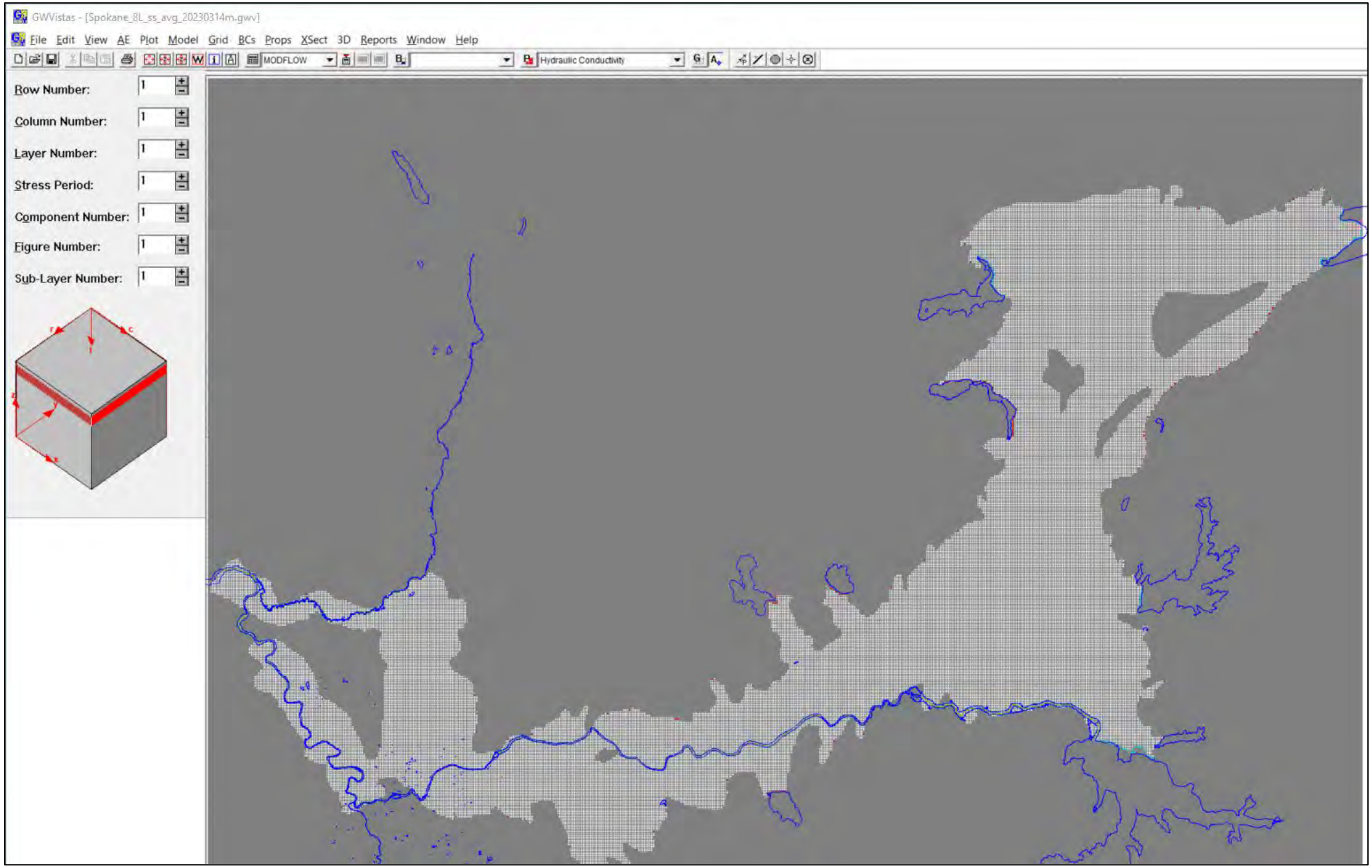
2020
2040
2060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Hydraulic Conductivity
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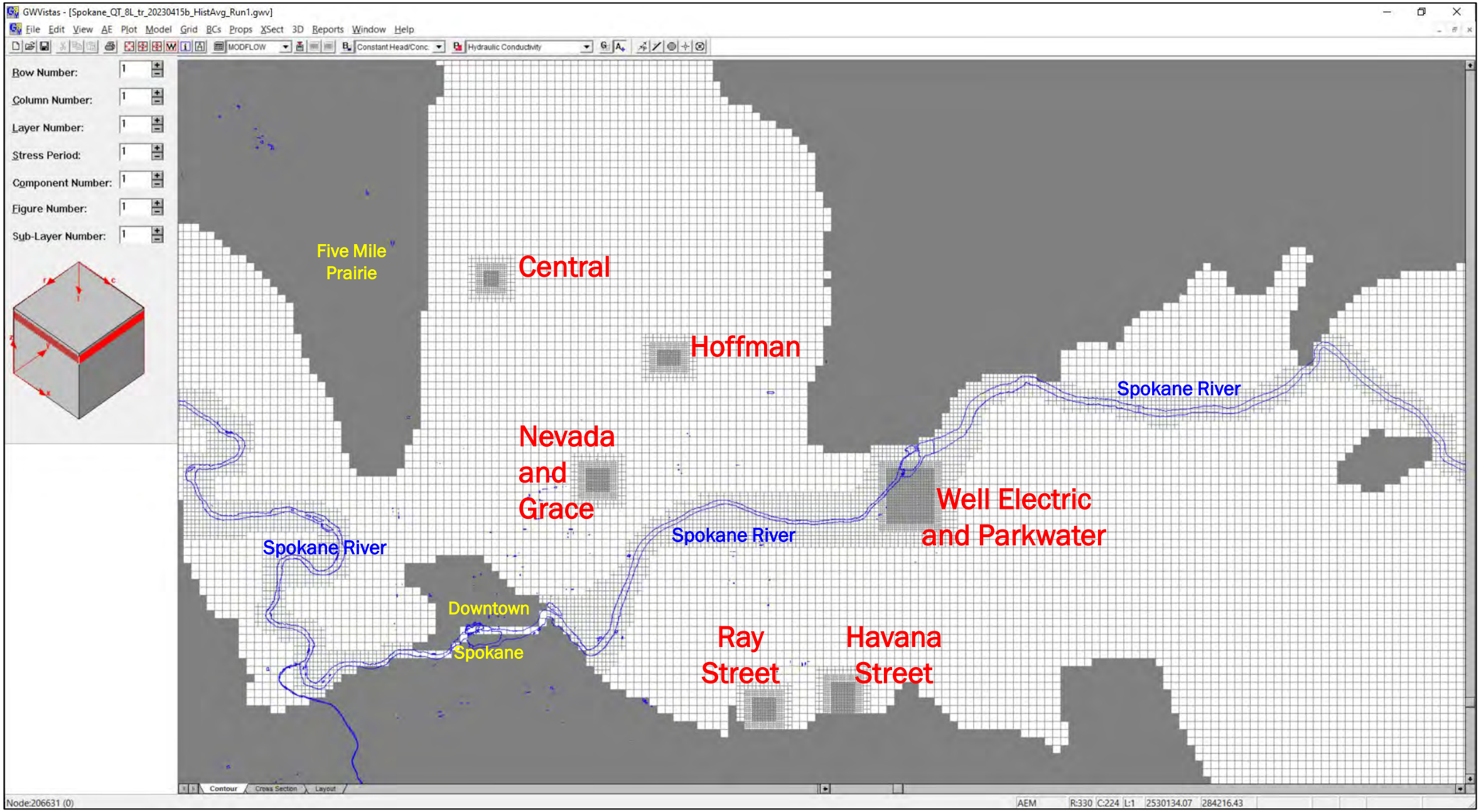
Column Number: 1
Layer Number: 1
Stress Period: 1
Component Number: 1
Figure Number: 1
Sub-Layer Number: 1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MODFLOW
Constant Head/Conc.
Hydraulic Conductivity
Row Number:
Column Number:
Layer Number:
Stress Period:
Component Number:
Figure Number:
Sub-Layer Number:
Five Mile Prairie
Central
Hoffman
Nevada and Grace
Spokane River
Spokane River
Spokane River
Well Electric and Parkwater
Downtown Spokane
Ray Street
Havana Street
Contour
Cross Section
Layout
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AEM
R:330 C:224 L:1
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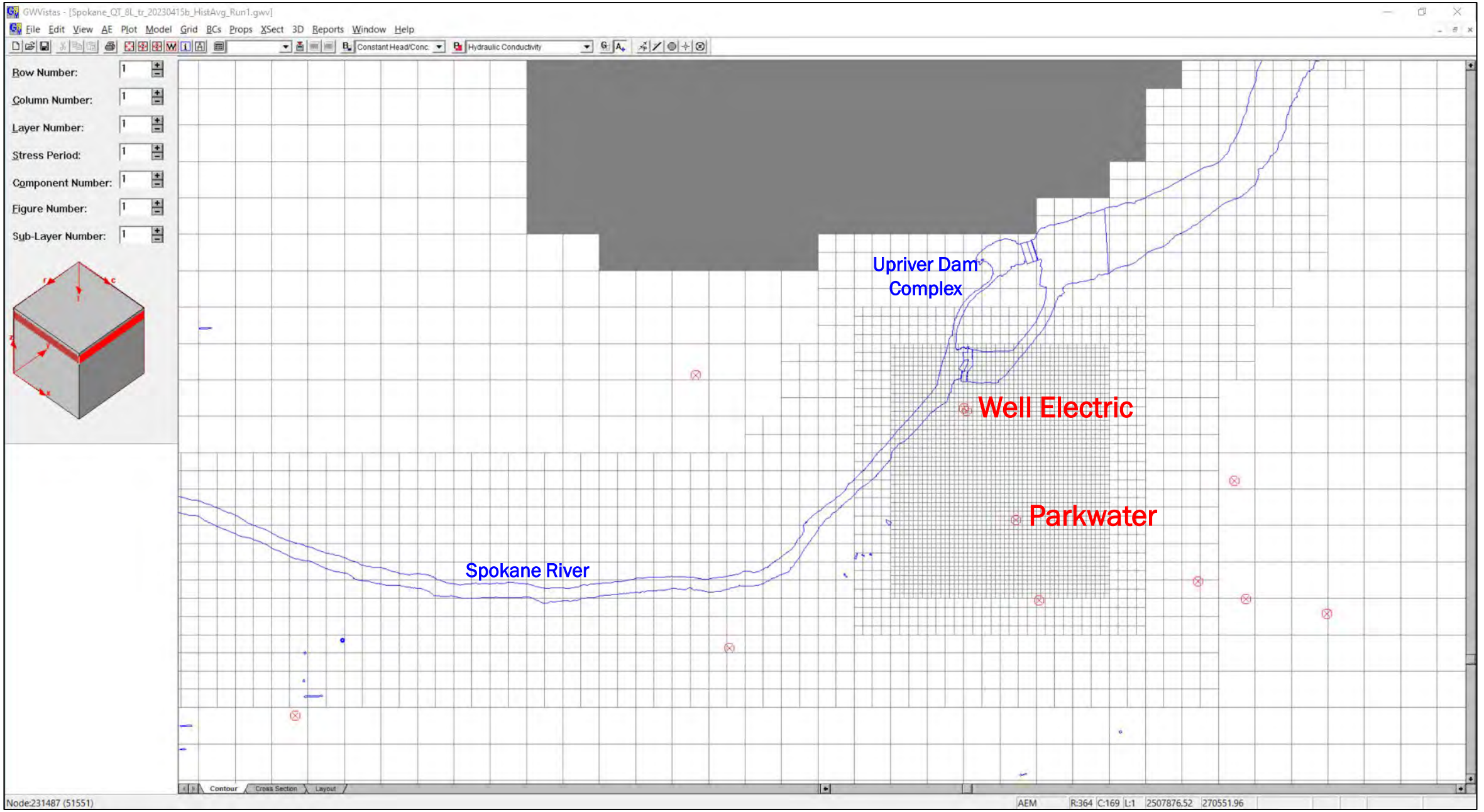
284216.43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Constant Head/Conc.
Hydraulic Conductivity
Row Number:
Column Number:
Layer Number:
Stress Period:
Component Number:
Figure Number:
Sub-Layer Number:
Upriver Dam Complex
Well Electric
Parkwater
Spokane River
Contour
Cross Section
Layout
Node:231487 (51551)
AEM
R:364 C:169 L:1
2507876.52
270551.96

Center for Climate, Society, *and the* Environment

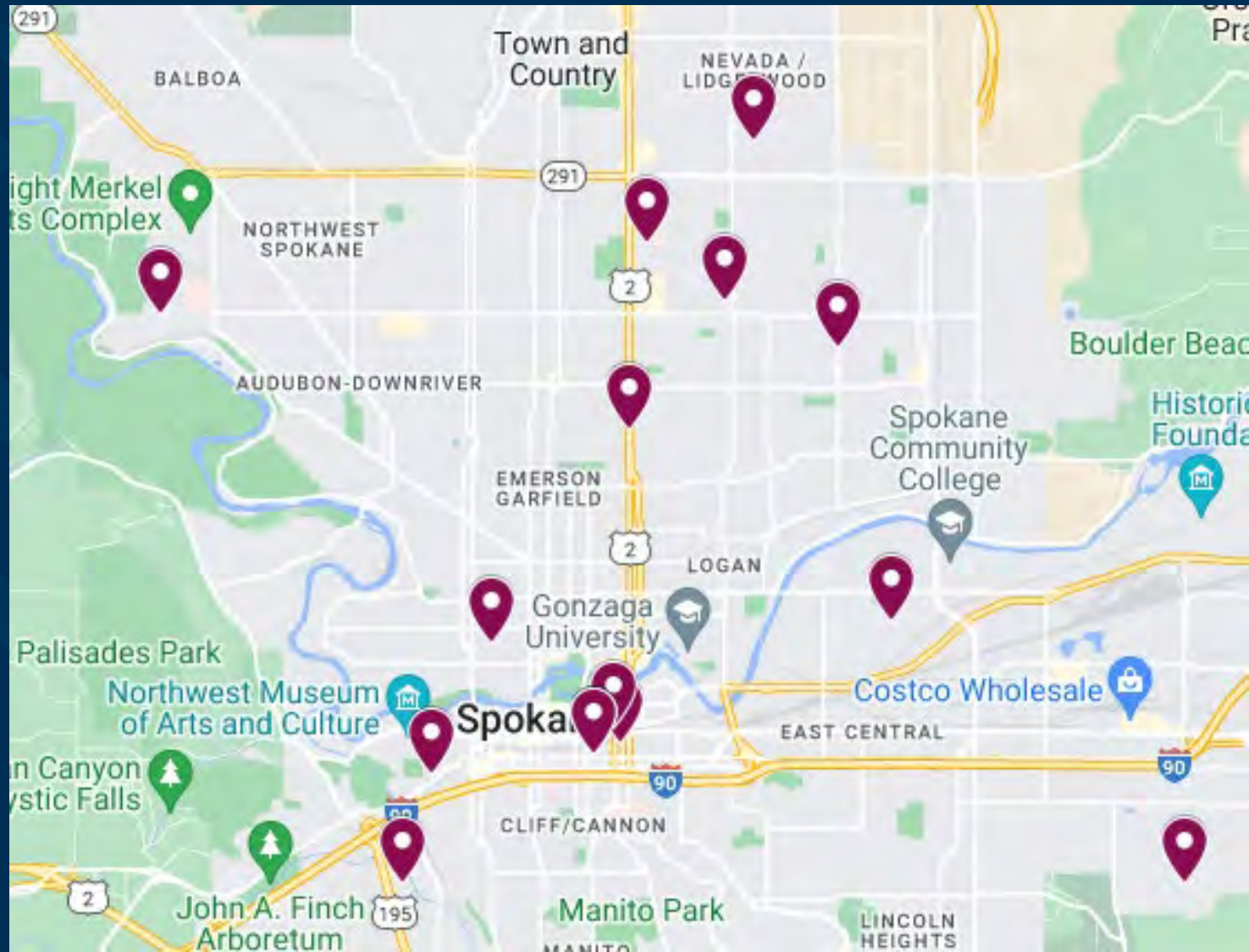
www.gonzaga.edu/ClimateCenter
ClimateCenter@gonzaga.edu

GONZAGA UNIVERSITY

2021 Northwest Heat Dome

119 Heat-Related Deaths in WA

19 Heat-Related Deaths in Spokane County



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Beat the Heat

A Climate Resilience Project

Urban Heat Island Mapping

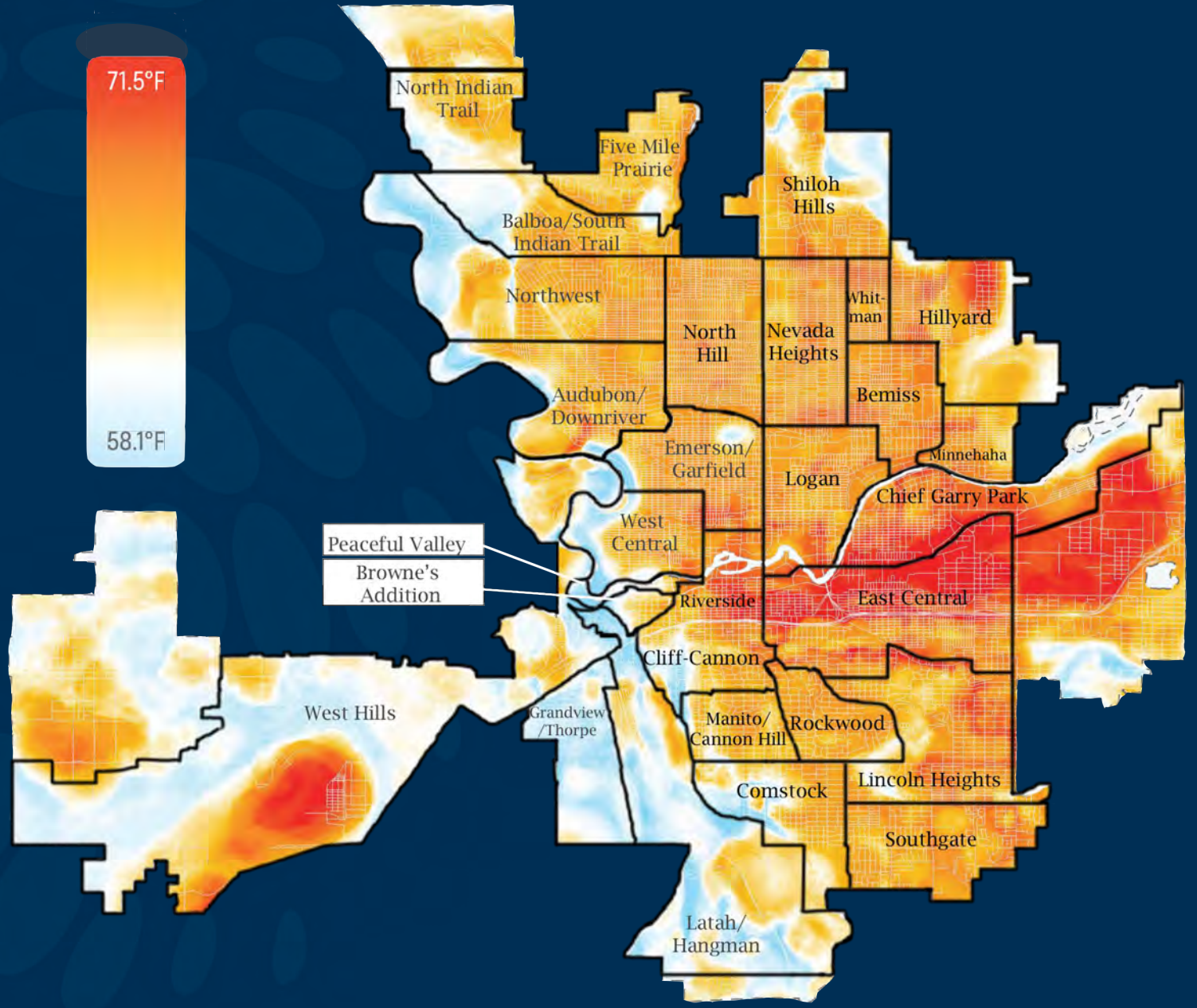
Perceptions & Experiences of Extreme Heat

Heat Education and Awareness

Want to learn more? Visit gonzaga.edu/BeatTheHeat

Morning Temperatures in Spokane from 6 - 7 AM

Urban heat island modeling by CAPA Strategies



Center for Climate, Society, and the Environment

gonzaga.edu/HeatMaps

Urban Heat Island Correlation Analysis

Significant and *Very Strong* Positive Correlation

Paved Surfaces

Significant and *Strong* Positive Correlation

% of Population Living Under the Poverty Line

URBAN HEAT

Significant and *Moderately* Strong Positive Correlation

% of Population that is Indigenous, Black, and Identifies their Race as Other

Significant and *Moderately* Strong Negative Correlation

% of Population that is White

Center for Climate, Society, and the Environment

Correlation analysis conducted with WA Department of Health.
www.gonzaga.edu/HeatMaps

2022 Community Survey

Statistically significant sample size: **1,799 Responses**

- **84.4%** said high heat events are a “severe” or “moderate” threat to Spokane community.

- **88%** said they intend to stay home during an extreme heat event.

- **23.3%** of respondents have no access to air-conditioning.
  - Of those who have A/C, **21.5%** indicate they have impediments to using it, with the majority citing cost.

Center for Climate, Society, and the Environment

Beat the Heat Research: Overall Conclusions

- Extreme heat events are likely to increase in the coming years.
- Extreme heat affects large segments of the Spokane.
- Extreme heat does not affect everyone equally.
- Extreme heat is an economic cost and opportunity.

Center for Climate, Society, and the Environment

Spokane Regional Health District Collaboration: Heat Education Campaign

Interviews with Public Health and Community Experts

Infographics, Factsheets, Ads, Videos, and Social Media

Web Content, Press Releases, and Blogs

Center for Climate, Society, and the Environment

SPOKANE REGIONAL HEALTH DISTRICT

What We Hope To Accomplish

- Equip Spokane residents with the skills to identify heat-related illness, knowledge of solutions to navigate extreme heat events, ability to help people experiencing heat-related symptoms, and ultimately foster community resilience.

- Fewer people becoming ill or dying as a result of heat events.

- Establish long-lasting and intentional partnerships to navigate this public health challenge together.

Learn more

- Climate Resilience Project: gonzaga.edu/ClimateResilience
- Beat the Heat: gonzaga.edu/BeatTheHeat
- Urban Heat Maps & Correlation Analysis: gonzaga.edu/HeatMaps

Join our email list to be notified of future research

Center for Climate, Society, and the Environment

Contact us: ClimateCenter@gonzaga.edu

Energy Resource Planning

Spokane River Forum

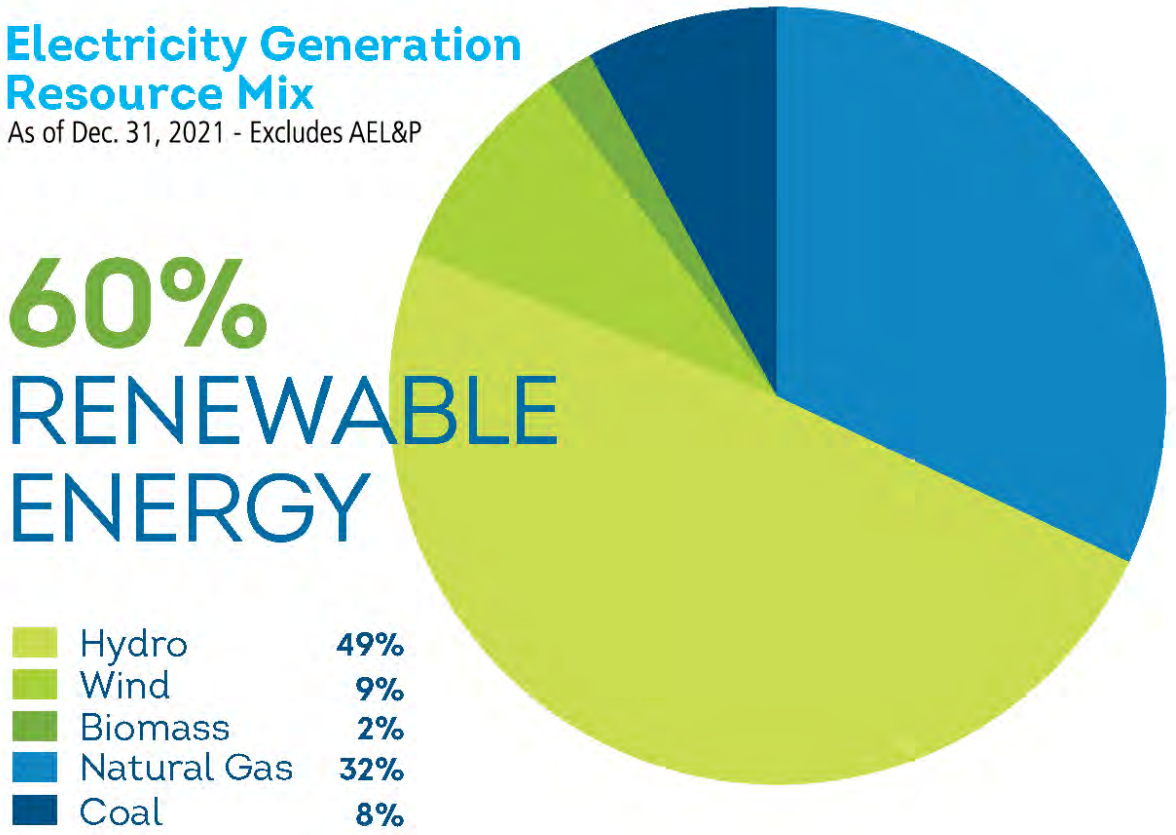
Meghan Lunney, April 27, 2023

Service Area

Avista Electric and Natural Gas Service Areas

Electric
Natural Gas
Electric and Natural Gas

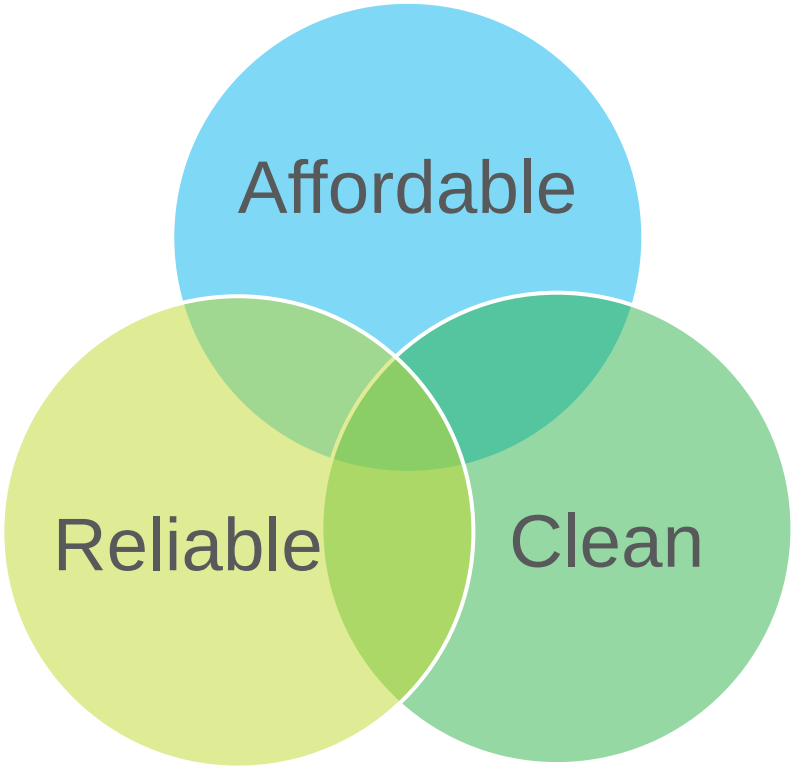
Energy Supply Mix



 (Source: *2021 Annual Report*)

Planning

- Integrated Resource Planning
  - Reliable energy supply to meet customer needs, in an affordable way throughout the entire year
  - Additional policies



What Does the Future Hold?

Non-Emitting Resources

Wind
Solar
Biomass
Hydro

Renewables

Storage

Pumped Hydro
Lithium-ion Batteries
Liquid Air
Flow Batteries
Hydrogen/Ammonia
Iron-Oxide

Storage Technologies

Demand Resources

Energy Efficiency
Load Control
Rate Programs
Solar/Storage

Efficiency & Conservation

Recent Resource Changes

Wind
Purchase wind from new wind farm

Columbia Basin Hydro
Purchase irrigation hydro power

Rocky Reach & Rock Island
Purchase Hydro Power with Chelan PUD

Kettle Falls Biomass
Increase plant capability with steam injection wood chips

Lancaster CT
Extend energy and capacity purchase from Rathdrum, ID NG CCCT facility

Colstrip
Transfer ownership of both coal units to Northwestern Energy on December 31, 2025

Regenerative Ag – Working with Nature

SPOKANE CONSERVATION DISTRICT

USDA Climate Smart Program

Addresses:

- Decreased Agricultural Productivity
- Threat to water quantity and quality
- Disproportionate impacts on vulnerable communities
- Shocks due to extreme climate events
- Stress on infrastructure & public lands

USDA Climate Smart Program

USDA will take cross-cutting adaptation actions to prepare the American agriculture and forestry sectors and rural and urban communities to be resilient in a changing climate. These actions aim to bridge the gap between innovative science and technology for climate adaptation and preparedness and in-field and on-site practices to build soil and forest health. (USDA - ACTION PLAN FOR CLIMATE ADAPTATION AND RESILIENCE)

Reality

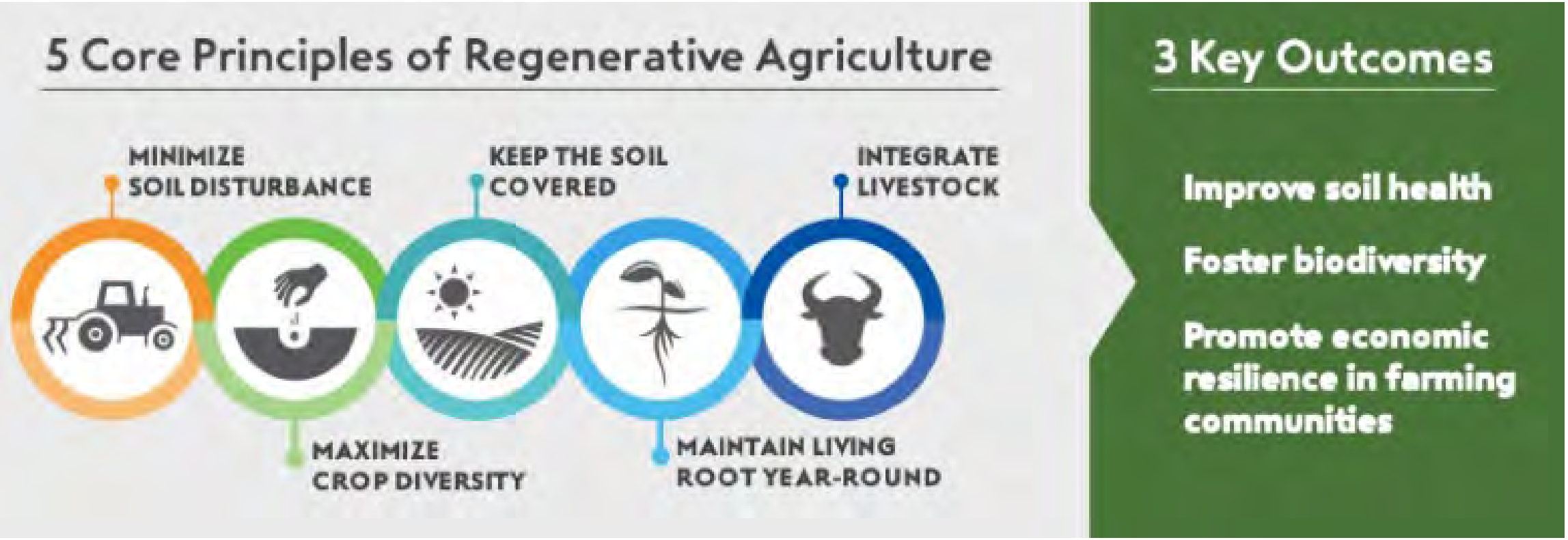
- Soil Ecosystem has been gradually degraded for decades
- Farm Input costs continue to rise
- Total farm net income continues to decline
- Farms in the region must get bigger or get out to survive.
- Local communities have dried up as dollars shift from local to regional and national companies.

What is the Solution to our problems?

The Soil!


REBUILD SOIL


REPLENISH
WATER SOURCES AND CYCLES
KISS THE GROUND


5 Core Principles of Regenerative Agriculture
MINIMIZE SOIL DISTURBANCE
KEEP THE SOIL COVERED
INTEGRATE LIVESTOCK
MAXIMIZE CROP DIVERSITY
MAINTAIN LIVING ROOT YEAR-ROUND
3 Key Outcomes
Improve soil health
Foster biodiversity
Promote economic resilience in farming communities

Spokane CD Bio-Farming Program

Spokane CD Bio-Farming Program

The next wave of disruption in Ag and Food is Regenerative Agriculture.

Spokane CD Bio-Farming Program

Regen Ag

Less Farm Consolidations

Higher Profits

More Kids returning to the farms

Spokane CD Bio-Farming Program

Higher Quality Food

Healthier People

The Revitalization of Rural America

The Bio-Farming Approach….

- To help develop a NEW (Back to the Old Days) agriculture production system based on home grown nutrients, higher margins, healthier soils and plants, more nutrient dense food production, the re-establishment of local food systems and the revitalization of rural America!

Reverse Osmosis and Water Structuring

Reducing
Chemistries by 50%

Increasing nutrient
efficiency by 50%

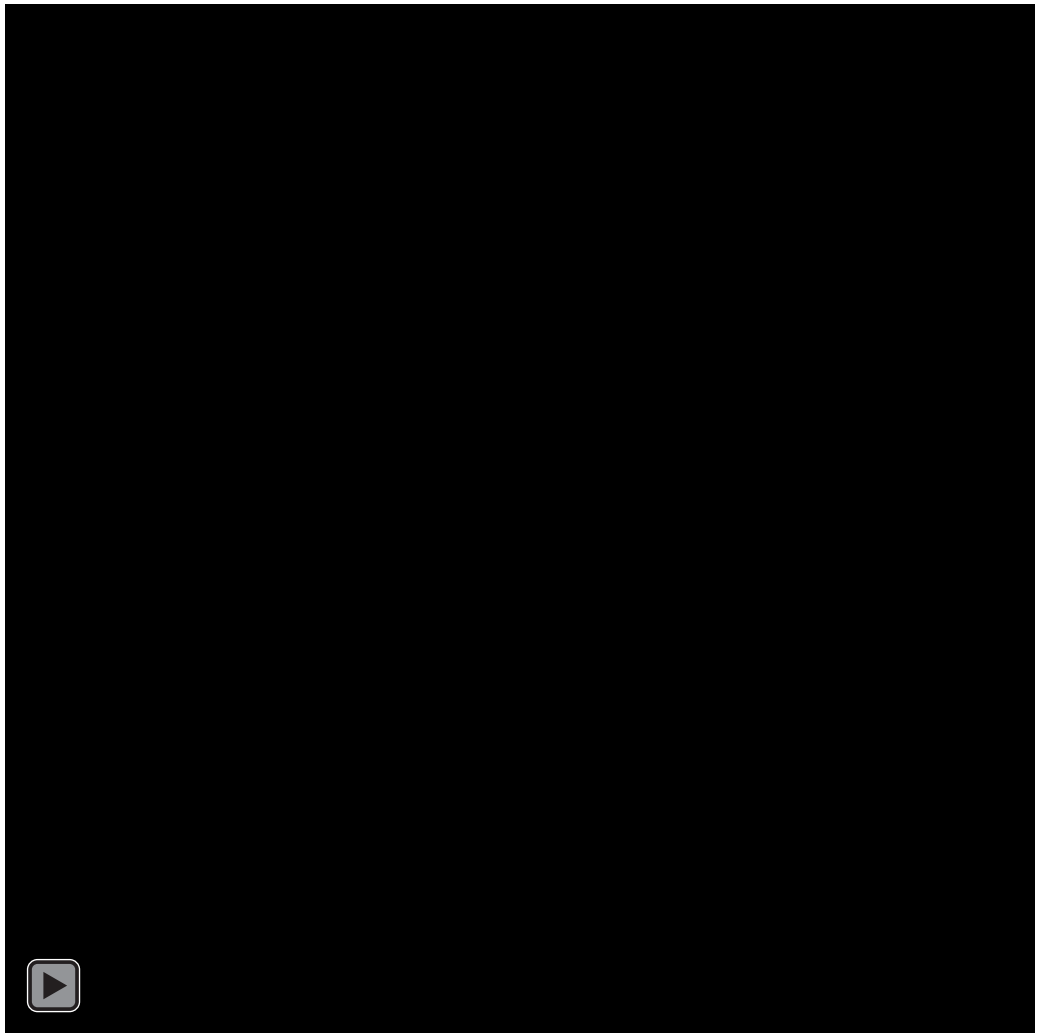
Regenerative Agriculture....Rebuilding Rural America

Farming is one of the only industries that purchases every input at retail and sells every product at wholesale.

THANK YOU!

Ty Meyer
Production Ag Manager
Spokane Conservation District
4422 E. 8th Ave
Spokane Valley, WA. 99212
Ty-meyer@spokanecd.org

University of Idaho



Authors: Tara Hudiburg, Eric Walsh, Kristina Bartowitz, Richard French, Michaele Armstrong, Laura Laumatia, Parker Mullins, Brad Ritts, Carly Cummings, Michael Maughan, Sophie Gilbert, George Tanner & Winslow Hansen

NSF Regional Innovation Engine

STIMULATE REGIONAL ECONOMIC GROWTH

- Regions of America that have not fully participated in the technology boom of the past several decades
- Culture of Innovation AND Diversity, Equity, Inclusion, & Accessibility
- Address an issue of national concern

climatesmart LAND NETWORK

manomet

FIERCE VISION

Science-Based. Climate-Smart. Equitable & Economically-Sustainable.

Leverage the Columbia River Basin's rich natural resources to develop sustainable, innovative products, practices, and a skilled workforce to fuel a resilient economy to combat climate change

Climate Smart Approach
Strategic Goals

1. *Use-Inspired Research & Development:* Development of climate-smart natural and technological solutions through integration of STEM research

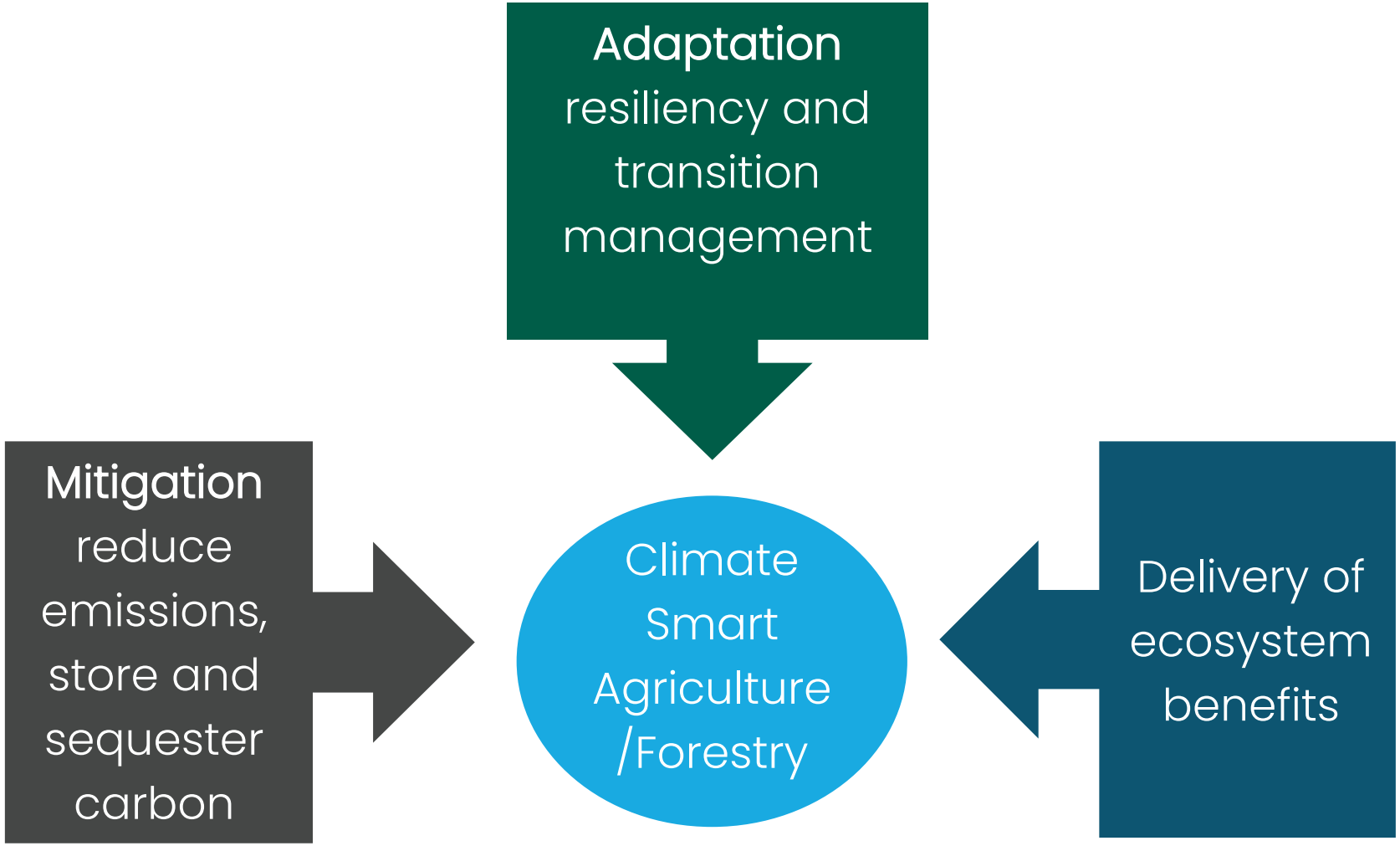
2. *Translation of Innovations to Practice:* Partnerships with economic development organizations, entrepreneur programs, and climate-smart incubators to deploy solutions and products

3. *Workforce Development:* Investment in a diverse STEM workforce development program that transcends traditional disciplinary, vocational, and educational boundaries

What is Climate Smart

- Introduced in 2010 at the FAO Hague Conference on Agriculture, Food Security and Climate Change
- “respond effectively to climate change”
- Climate smart forestry (CSF) evolved from CSA in Europe at the time of the Paris Climate Agreement

Climate Smart Approach



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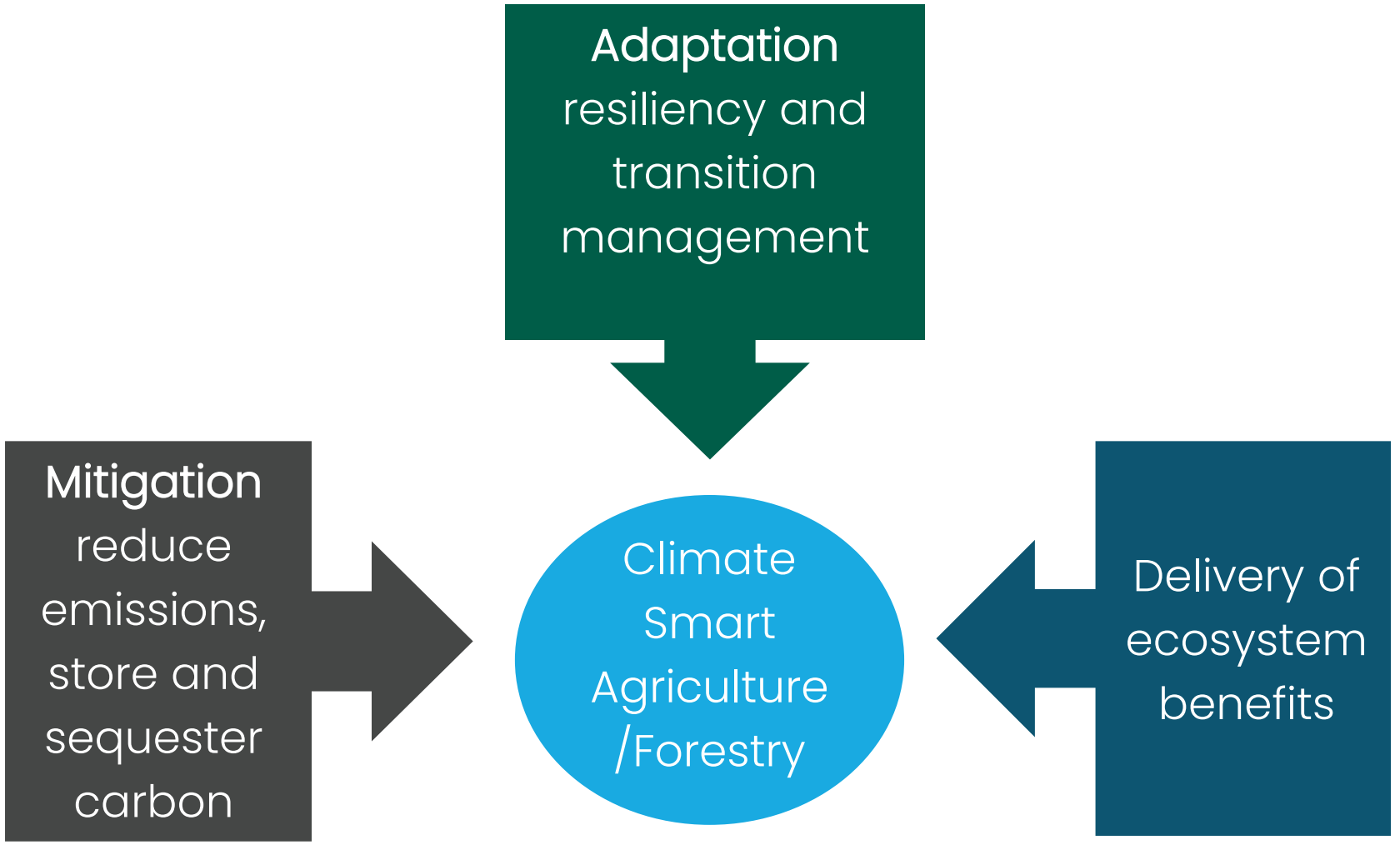
Climate Smart Approach

Enabling Environments

The conditions or factors that promote the success and sustainability of a particular activity or process. An enabling environment can refer to the social, economic, and political conditions that support the implementation and scaling up of sustainable practices and policies

Climate Smart Approach-EE



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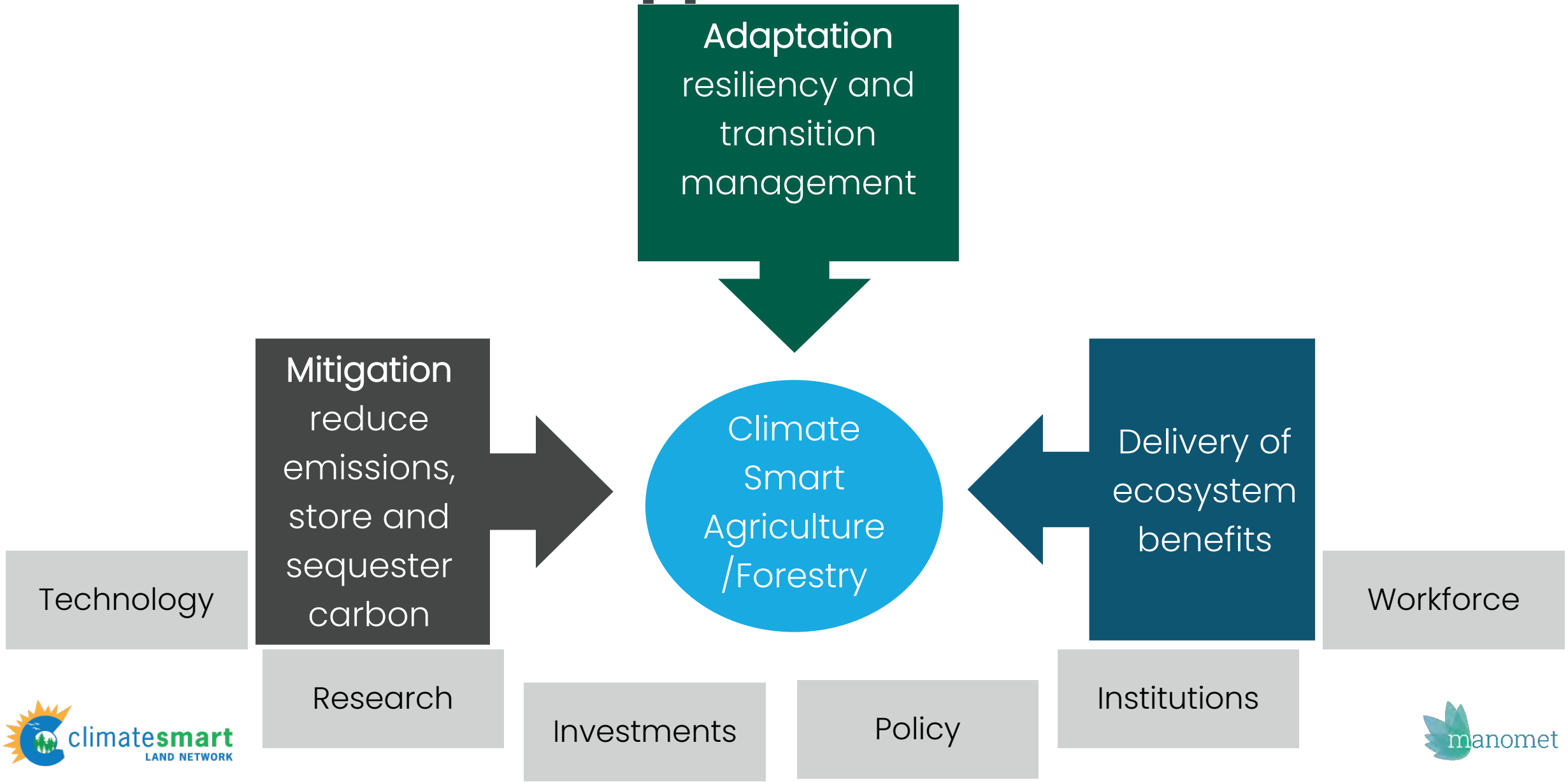
Climate Smart Approach-EE



How will FIERCE Do this?

Research & Development	Incubator & Accelerator	STEM Workforce Development	Verification, Certification & Policy
• Seed Grants • Natural Climate Solutions (NCS) • Climate-smart commodities(+) • Long-lived wood products • Wood-based substitution • Circular bio-economy	• Start-up Grants • Mentoring Program • Investor Linkages • Large-Scale Pilots • Company relocation grants • Pitch-fests	• Climate-smart certificates and training • Carbon accountants • BS/MBA • Integrated degrees • Application & Software certificates • NCS technicians	• Climate-smart certification • Offset-verification • Reaching net-zero • Modeling • Adaptation & Mitigation (FIRE)

Technology

Research

Investments

Institutions

Workforce

Diverse & Inclusive Participation

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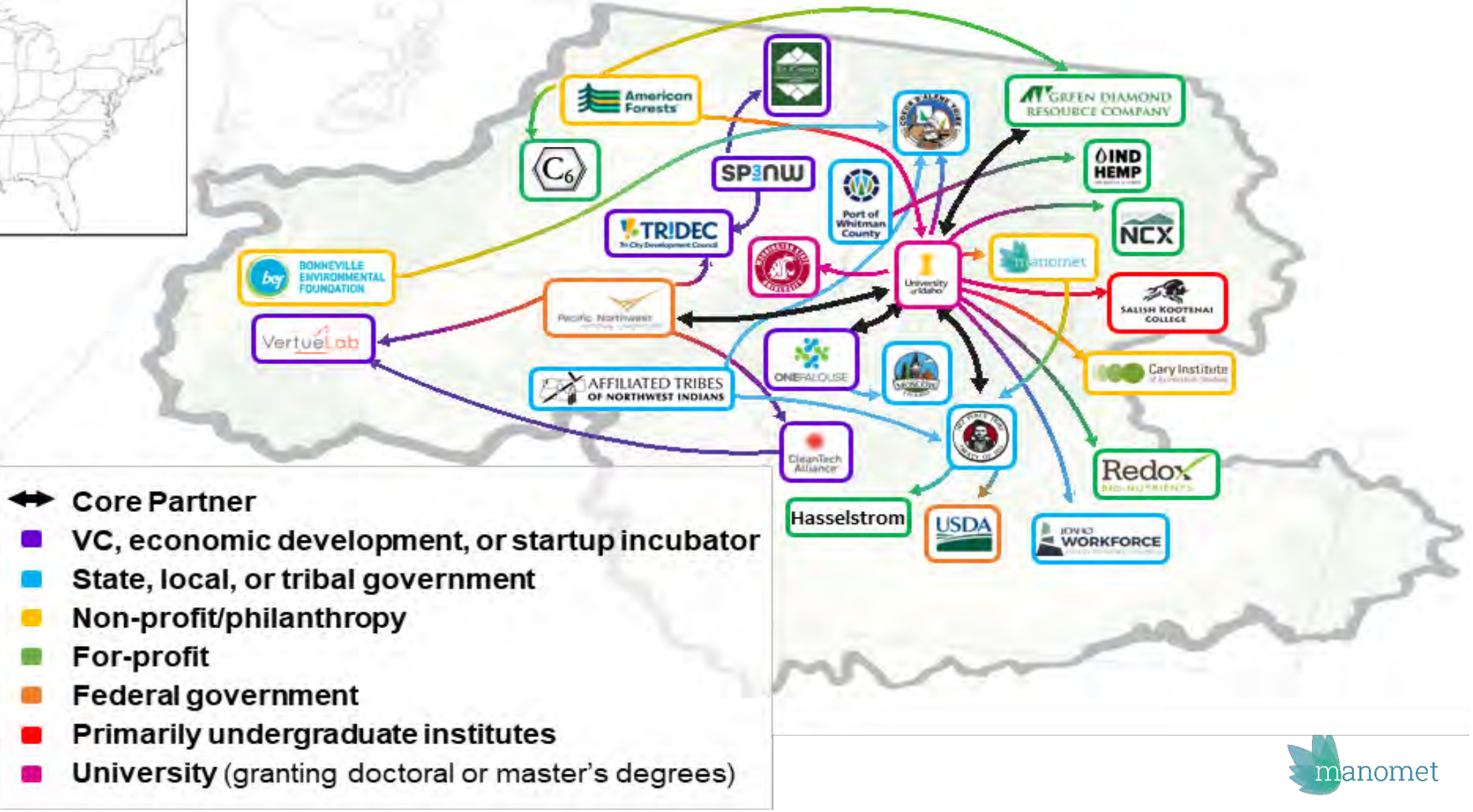
CRB Climate-Smart Innovation Ecosystem



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STEM Workforce Development

Innovation Ecosystem

Climate Change Challenges:

- Greenhouse gases lead to extreme weather: megafires & megadroughts.
- Negatively effects regional economy, community infrastructure, food and fiber, cultural resources, and human health.

Use-Inspired Research

Climate-Smart Products & Services Analysis

FIERCE

Fueling an Innovative, Equitable, & Resilient Climate-smart Economy

- Economic Development
- Academic Institutions
- Industry
- NGOs
- Workforce Development
- Gov't
- Tribal

Innovation to Practice

Fundamental Insights & Tech Advances

Climate-Smart Economy

⬆ 25%	VC investments in climate tech startups
⬆ 25%	Median HH income
⬆ 50%	Underrepre-sented groups in workforce

Climate Solutions

⬆ 25%	Carbon sequestered
⬇ 50%	Sector GHG emissions

Measure, Monitor, Report and Verify (MMRV)

Culture of Diversity, Equity, Inclusion and Accessibility (DEIA)

Culture of Innovation

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The FIERCE Team October 2022

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Thank you

Eric Walsh
CSLN Program Director
ewalsh@manomet.org
www.climatesmartnetwork.org
www.manomet.org
(207) 721-9040