Alaska Section

AMERICAN WATER RESOURCES ASSOCIATION

2011 ANNUAL CONFERENCE
APRIL 4TH – 6TH
CHENA HOT SPRINGS, ALASKA

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Sources of Drinking Water in Alaskan Villages

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2011

Presentation Outline

1. Specifics about Alaska and significance of our analysis
2. Criteria for analysis – Database and AWRVI
3. Statewide data – maps and graphs of types of sources
4. Examples of village municipal water systems in Alaska
5. Vulnerabilities of water supply and delivery systems
6. Statewide correlations of source types and environmental characteristics
7. Agencies and Organizations involved
8. Resilience or Vulnerability?
9. Future work: Socioeconomic analysis and Kotzebue case study

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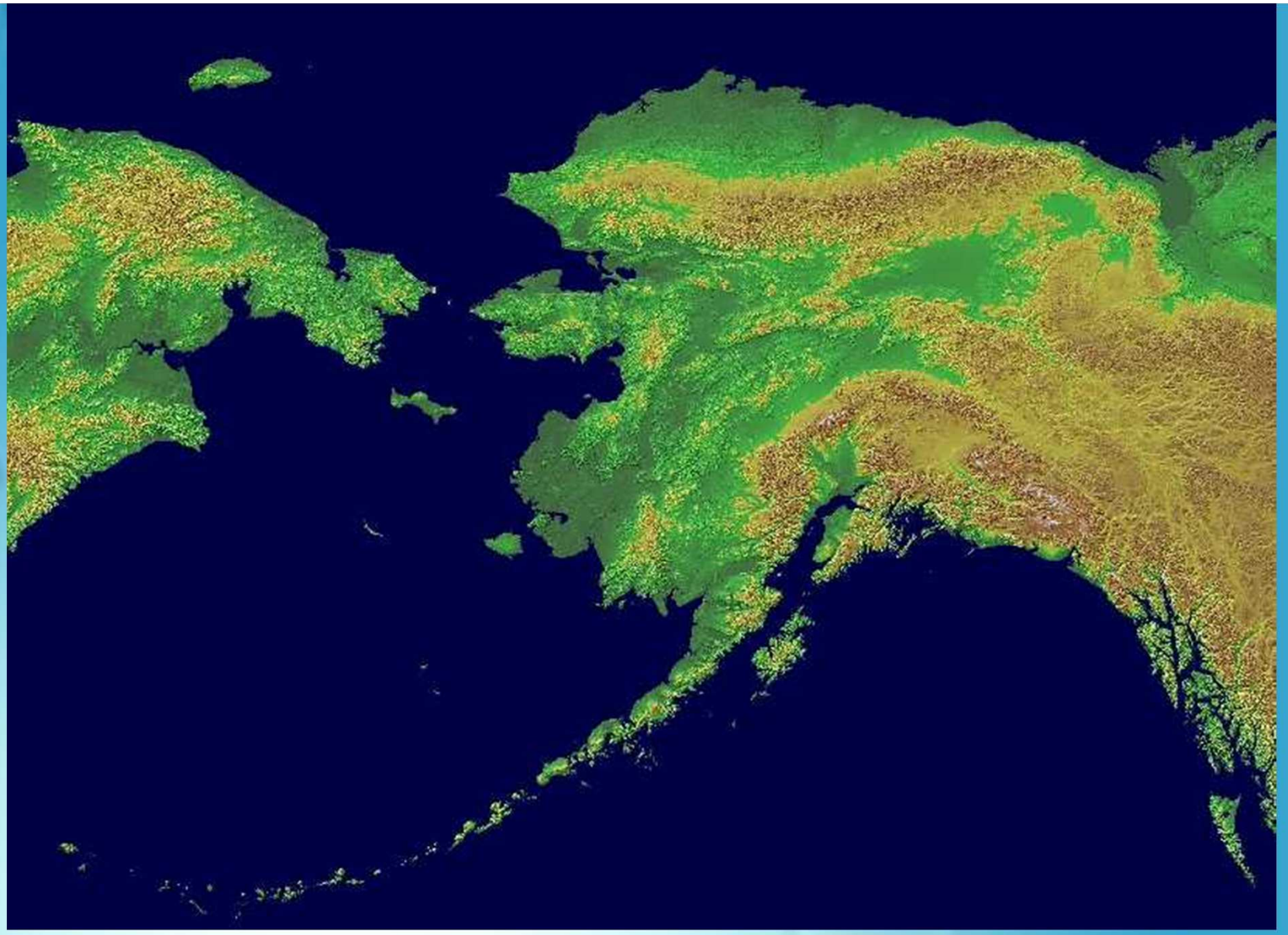

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Importance of our analysis

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Criteria for Analysis and Vulnerabilities Assessment

- Geophysical characteristics
- Social characteristics
- Economic characteristics
- Drinking water source and system characteristics

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Community Database Online provided by Alaska Division of Community and Regional Affairs

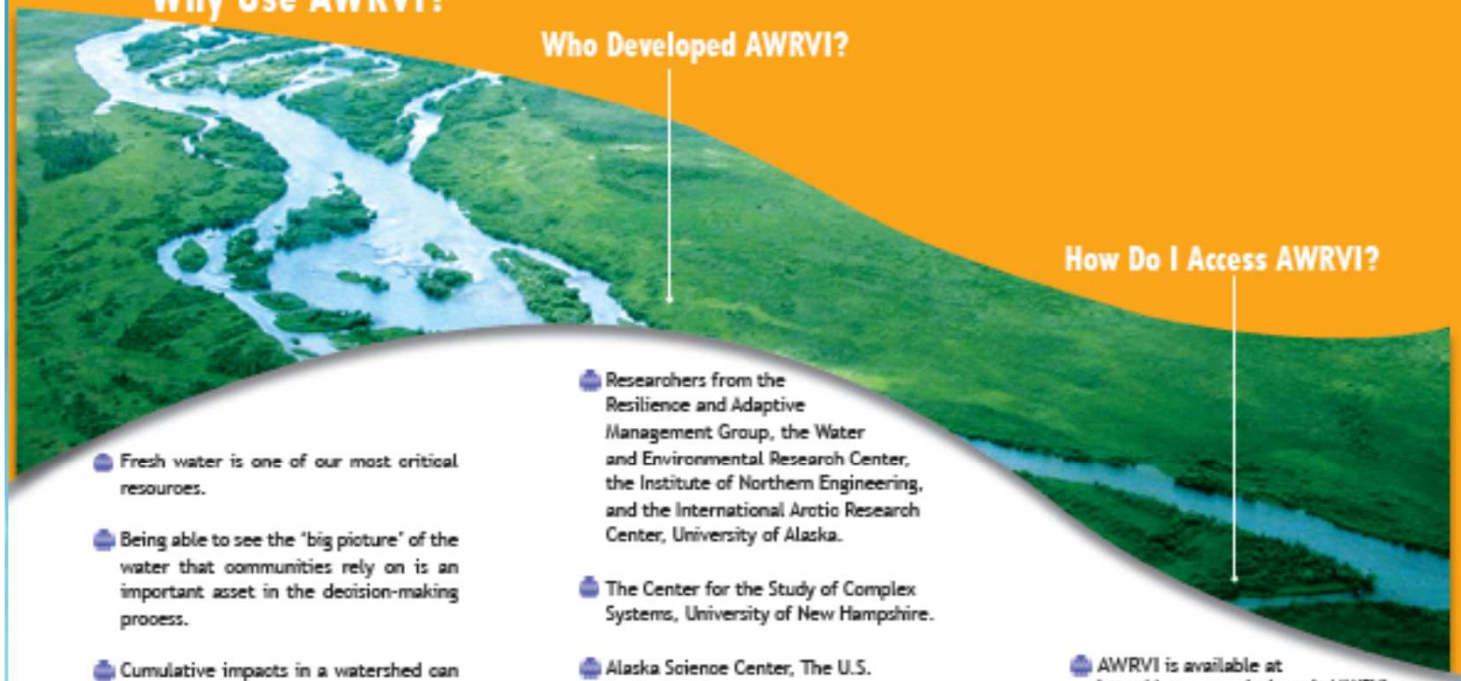
Community Database Online

AWRVI

- Vulnerability/Resilience Evaluation
- AWRVI assesses watersheds at local scales where land use is more important than climate

Arctic Water Resources Vulnerability Index

Why Use AWRVI?



- Fresh water is one of our most critical resources.
- Being able to see the "big picture" of the water that communities rely on is an important asset in the decision-making process.
- Cumulative impacts in a watershed can be assessed through this decision-support and community-building tool.
- It provides a framework to map and access water resources, use-values and potential vulnerabilities under certain conditions.
- It is designed to be used specifically in the Arctic's varied and unique environment.

Who Developed AWRVI?

- Researchers from the Resilience and Adaptive Management Group, the Water and Environmental Research Center, the Institute of Northern Engineering, and the International Arctic Research Center, University of Alaska.
- The Center for the Study of Complex Systems, University of New Hampshire.
- Alaska Science Center, The U.S. Geological Survey.
- The developers came from diverse cultural backgrounds, including small, resource-dependent communities.

How Do I Access AWRVI?

- AWRVI is available at http://ram.uaa.alaska.edu/AWRVI
- To request a hardcopy of the details of AWRVI, please contact:

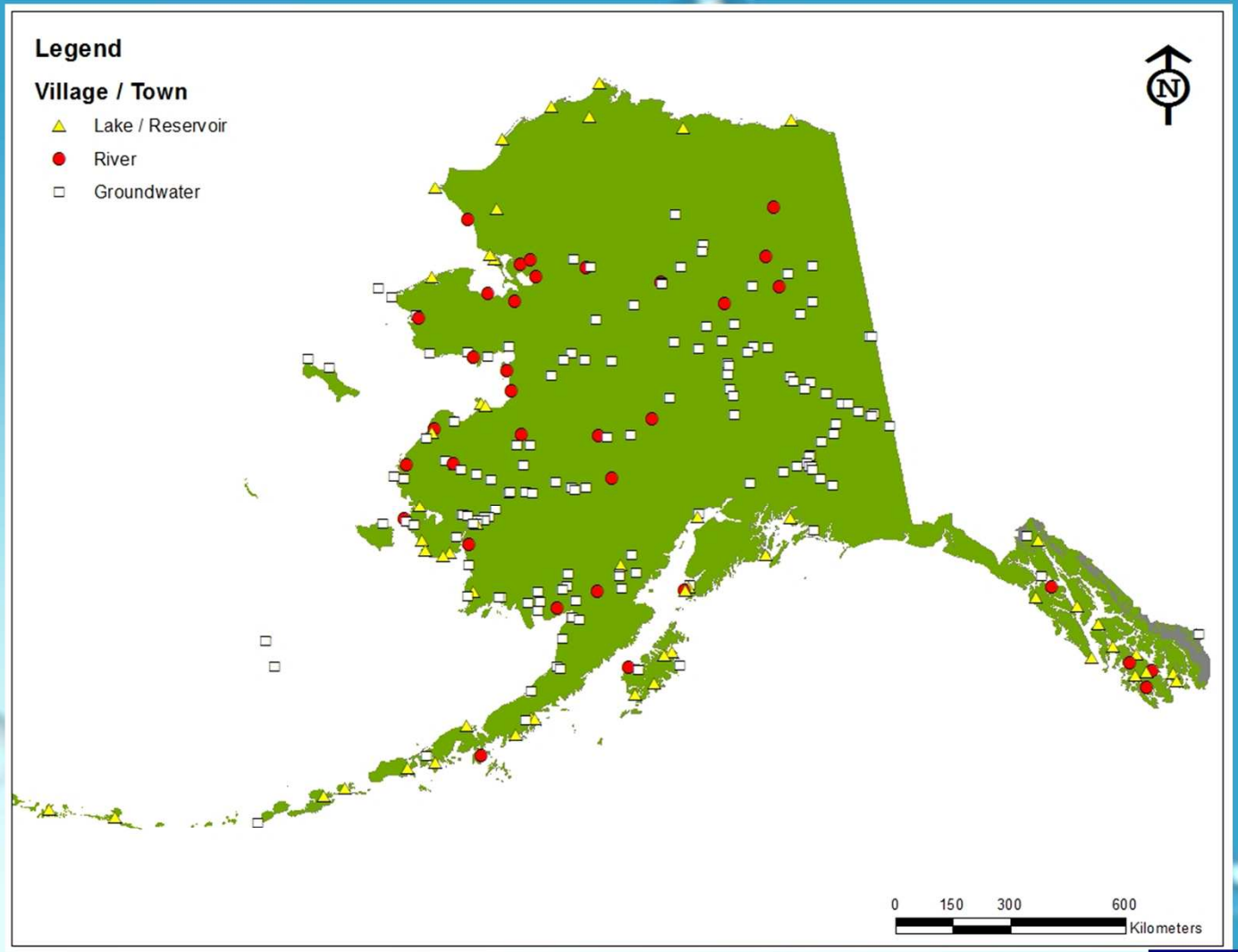
The Resilience and Adaptive Management Group,
University of Alaska Anchorage
3211 Providence Drive
Anchorage, AK 99508

Phone: 907-786-1136
Fax: 907-786-1314

Summary of AWRVI indicators:

Sub-Index	Component	Indicator
AWRVI Physical	Natural supply	Precipitation
		Surface water storage
		River runoff
	Municipal supply	Reservoir and well yield
		Treatment technology
		Hydraulic gradient
		Water source diversity
	Quality	Water quality
		Upstream development
	Permafrost status	Permafrost distribution
	Subsistence habitat	Aquatic subsistence habitat
		Terrestrial subsistence habitat
AWRVI Social	Knowledge	Traditional knowledge
		Education
		Residency
	Financial	Community wealth
	Information capacity	Land tenure
	Sensitivity to change	Community values
		Social network diversity
		Perception of change

Distribution of major source types for village water supply



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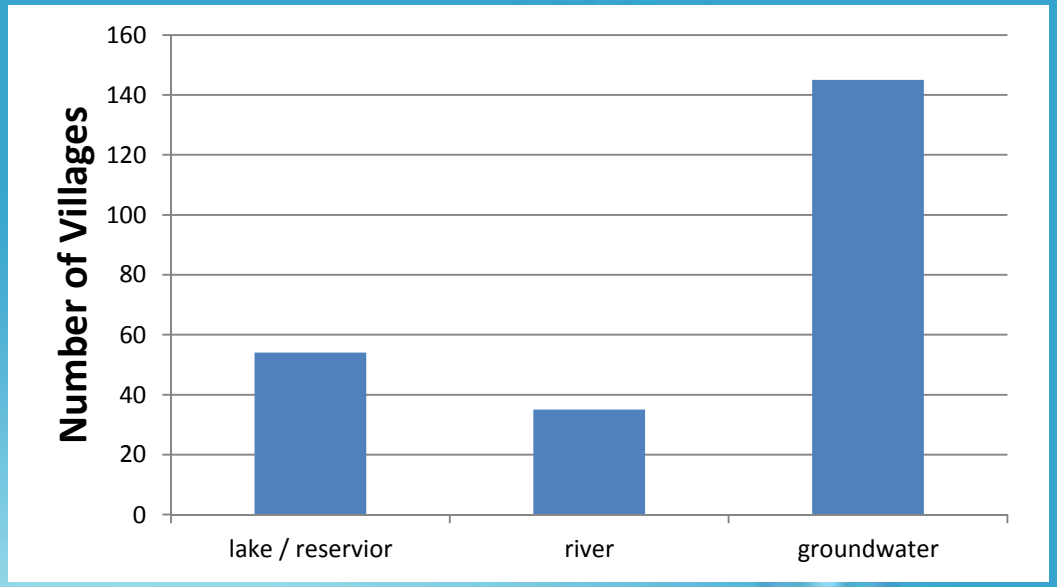

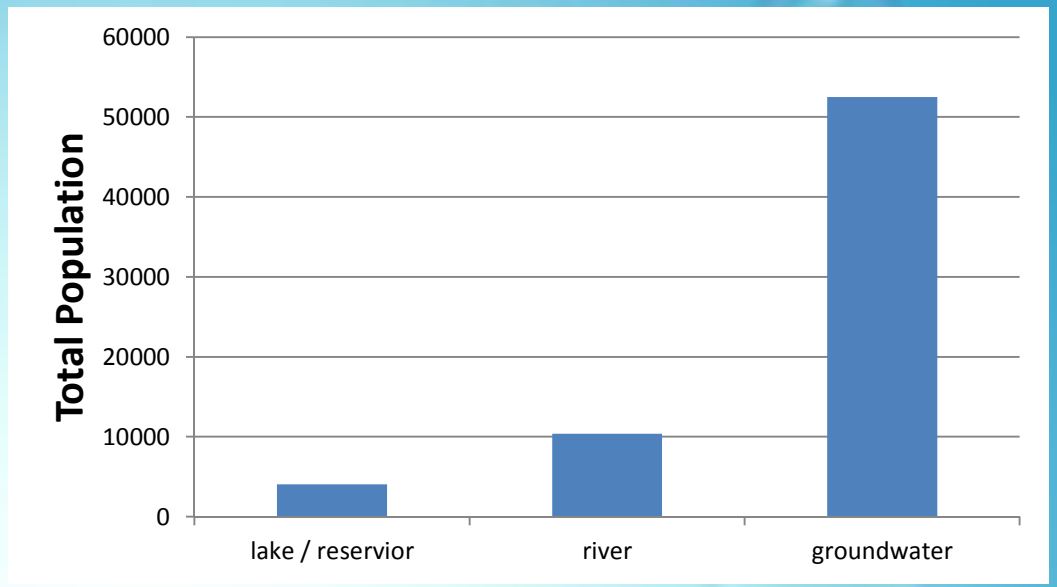

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LAKE water

Atqasuk:

233

Arctic

Continuous

-56 F – 78 F

5 “

$ 14,732

Inupiat

Subsistence

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Technology used

Standard setup for lake intakes

Submersible pump (Toolik)

Courtesy of Dan White

Submersible pump below floating deck

Courtesy of Dan White

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RIVER water

Eek:

296
Marine
Continuous
6 F – 57 F
22”
$11,756
Yup'ik
Subsistence

Courtesy of Dan White

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WELL water

Deering:

133

Transitional

Discontinuous

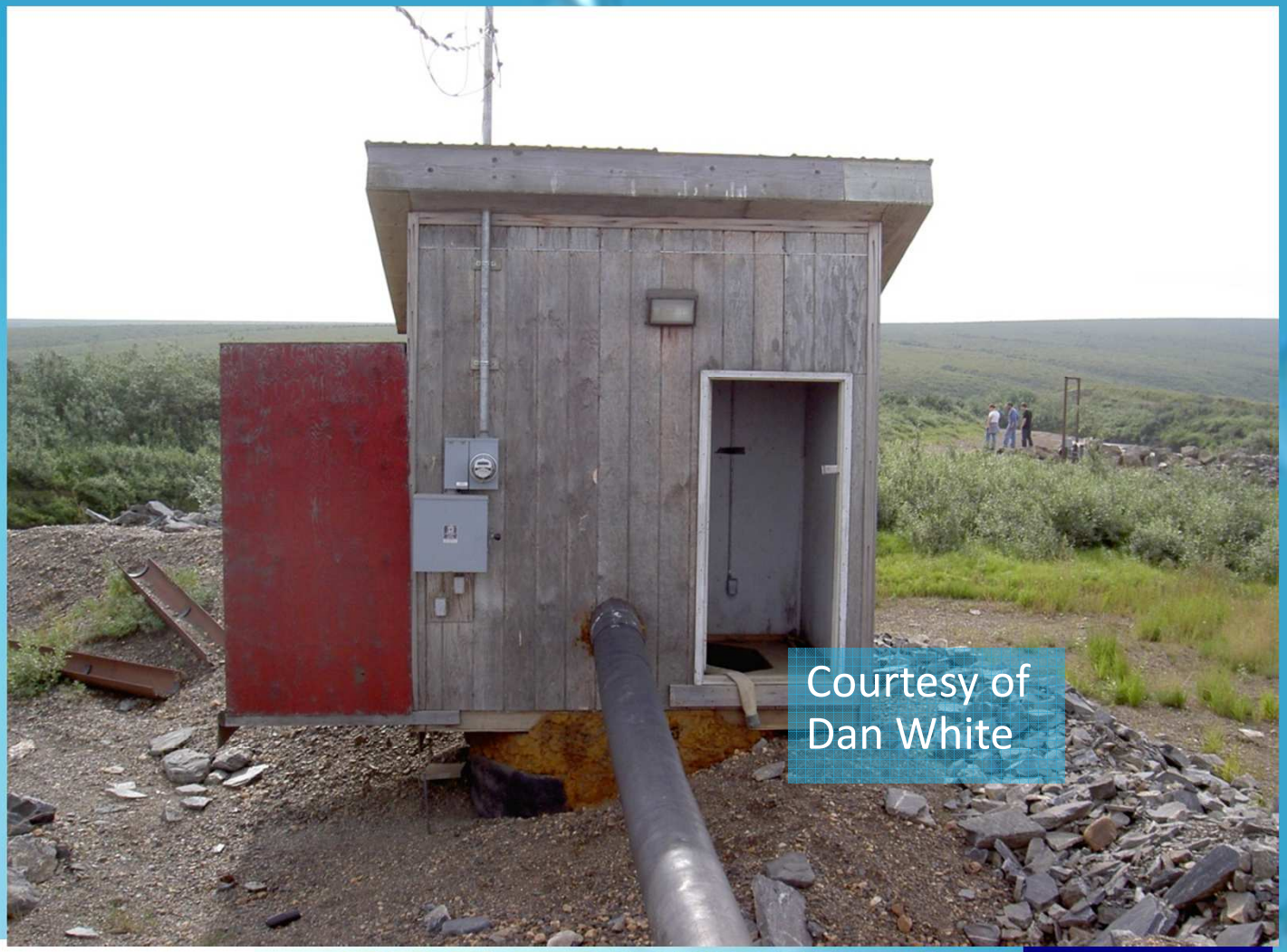
- 60 F – 85 F

9 “

$14,565

Inupiat

Subsistence



Courtesy of Dan White

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WELL water

Deering:

Courtesy of Dan White

WELL water

Deering:

Courtesy of Dan White

Potential Vulnerabilities
LAKE/RESERVOIR, RIVER, GROUNDWATER

- Contamination
- Pollution (direct and watershed runoff)
- Dissolved Organic Carbon
- Climate related
- Permafrost thaw related changes in groundwater flow
- Drying and drainage
- Salt water intrusion
- Eutrophication
- Winter availability

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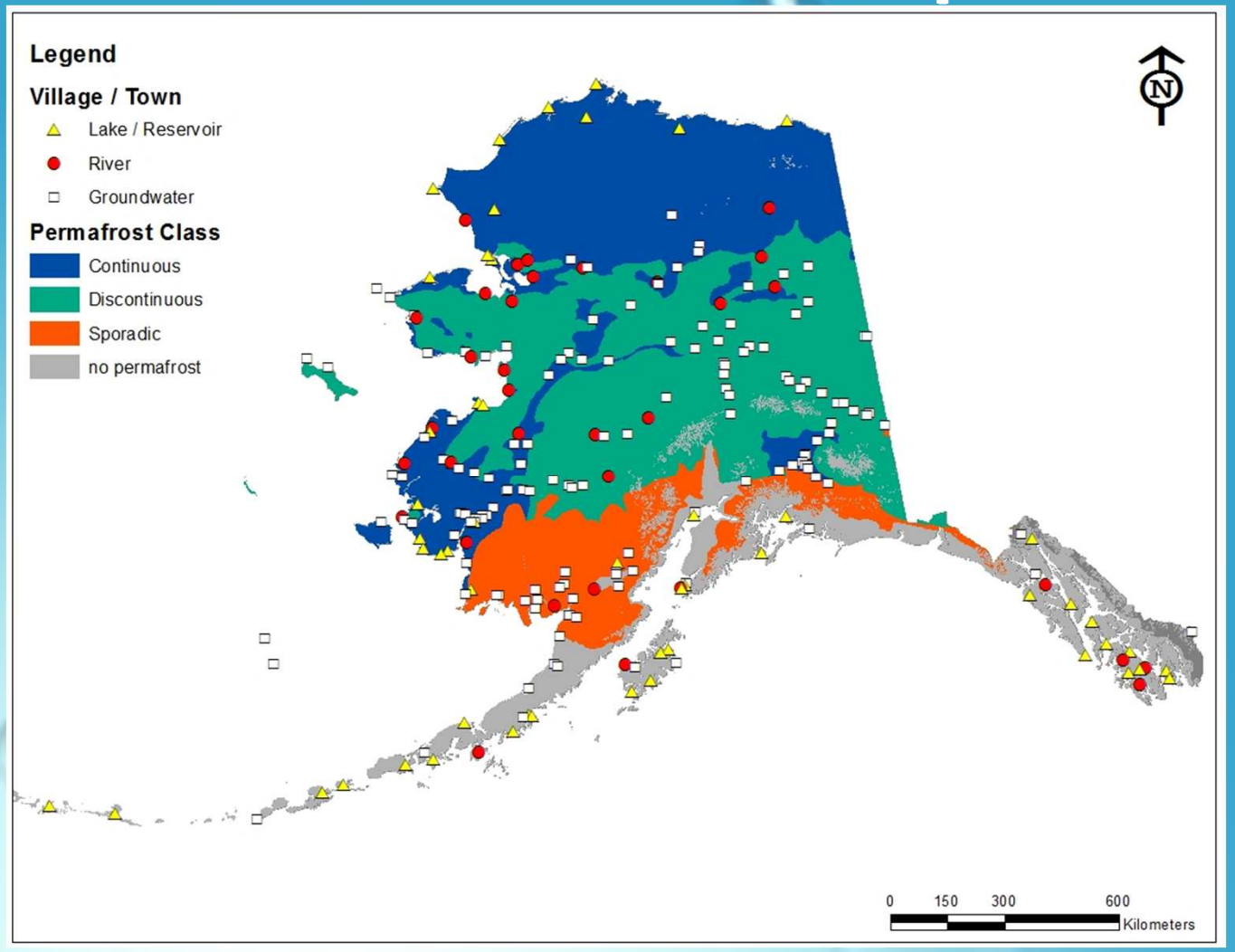
Maps showing correlations between environmental characteristics and the drinking water source type

Permafrost map



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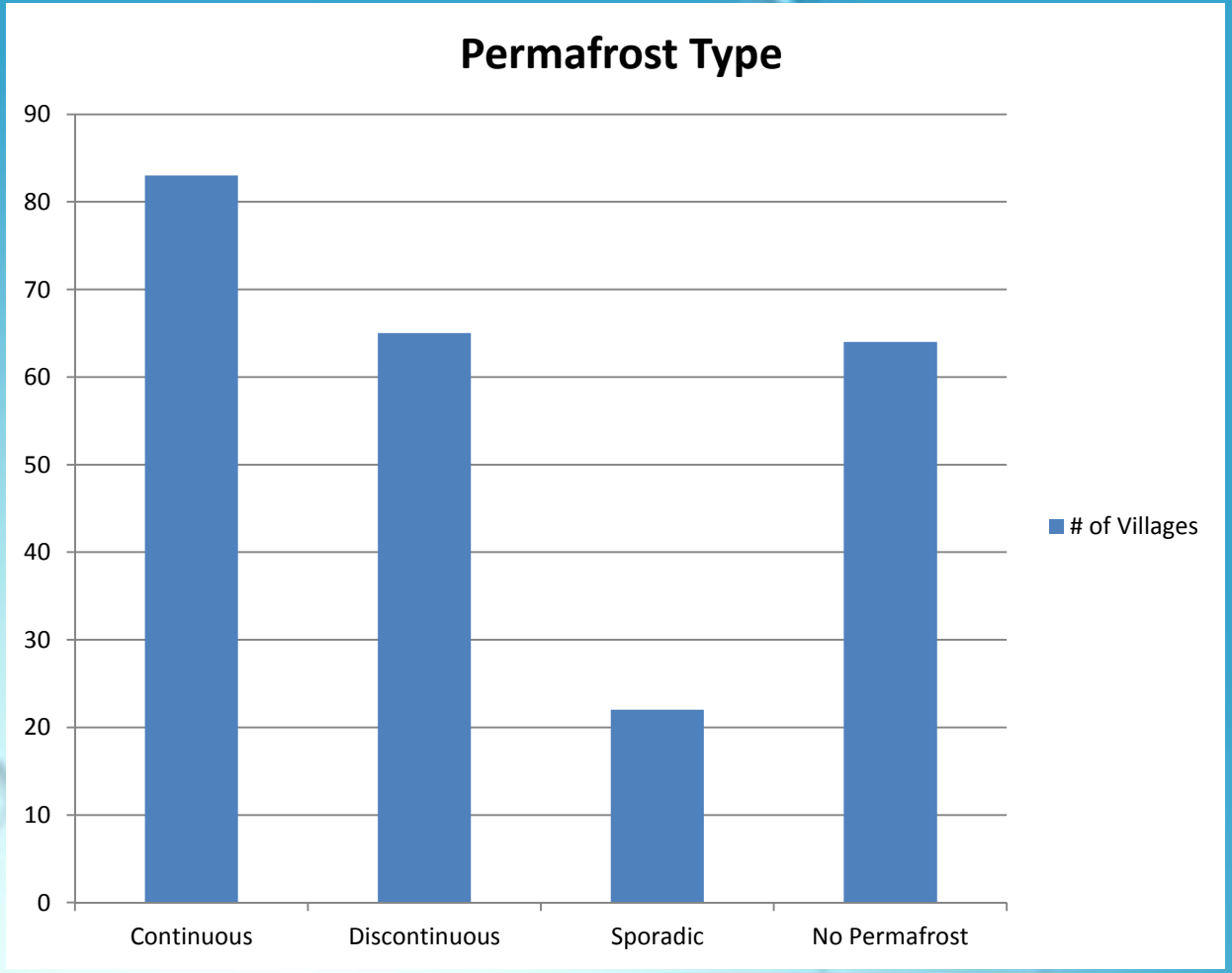
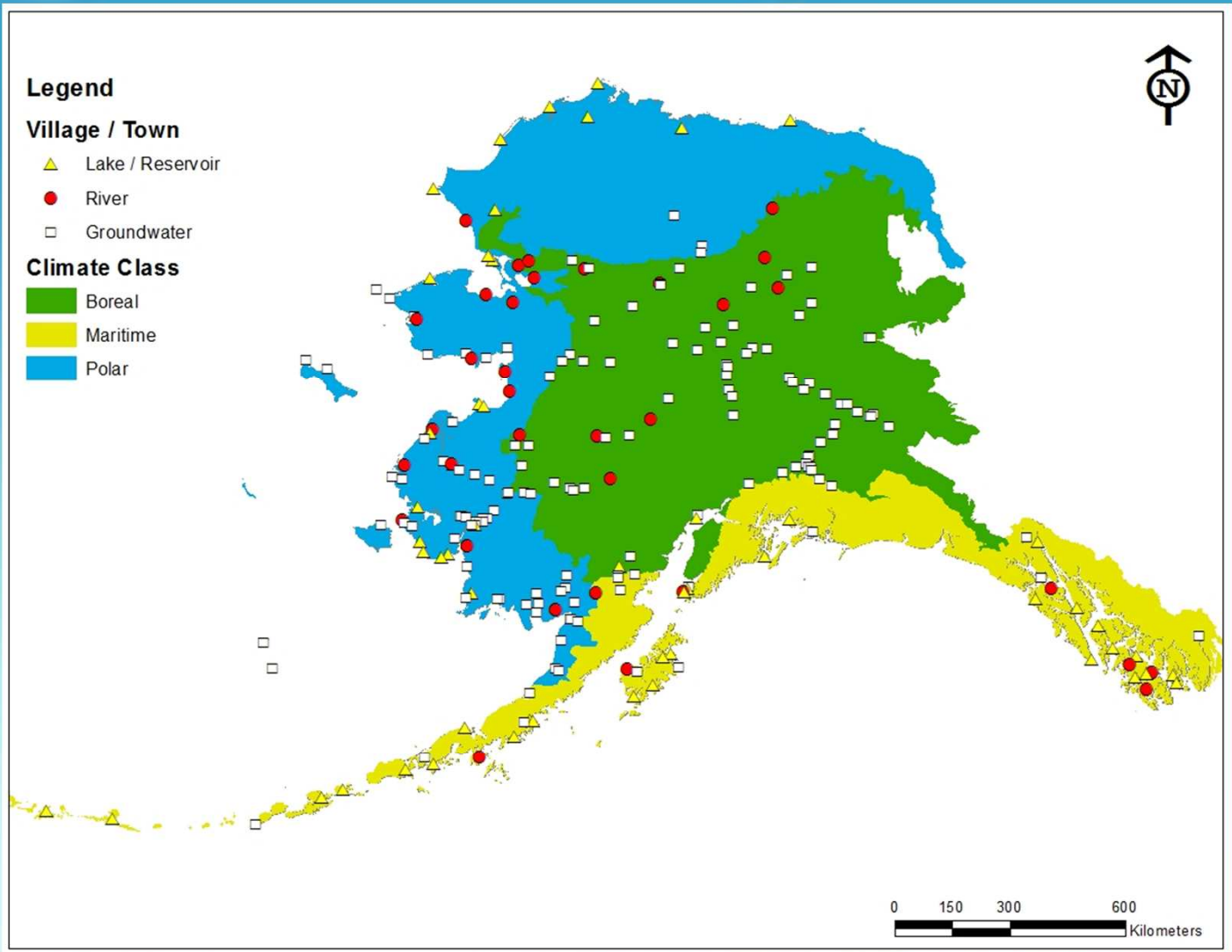
Permafrost graph



Climatic zones map



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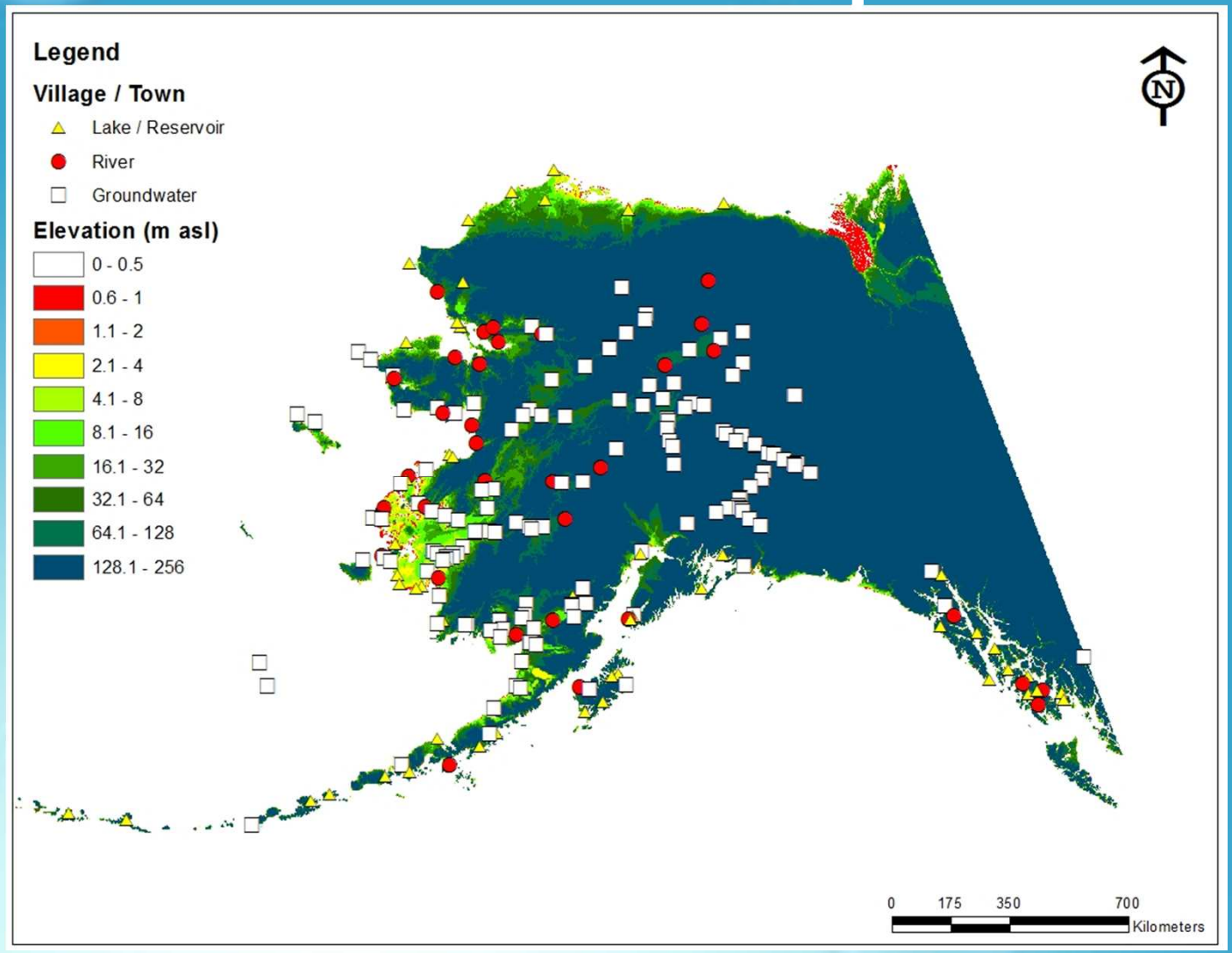
Elevation map



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Agencies and Organizations Involved


ALASKA NATIVE TRIBAL HEALTH CONSORTIUM
Alaska Rural Water Association
USGS
science for a changing world
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UAF
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UAF INE
Alaska DEC
NSF
UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
USDA
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Health Data

Climate Change related observations

ARUC program

Assisted Billing

System Construction

Funding

Training

Village Safe Water Program

Division of Environmental Health: Drinking Water Program

Alaska Rural Water Association

Help and services to the villages

Workshops

Maintenance

Circuit raiders

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Laws and Regulations,

Water quality standards

Requirements – sampling… violations…


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Deeper understanding…

CULTURE

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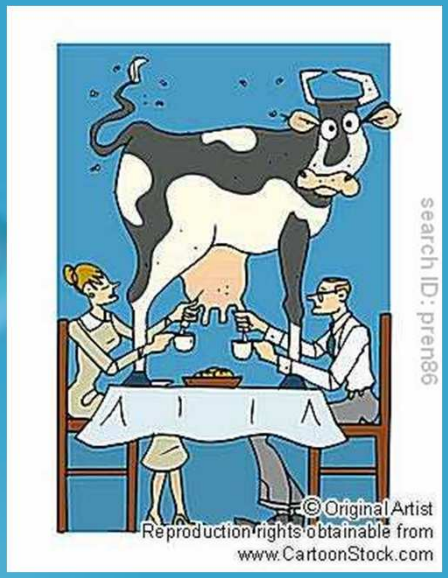
Deeper understanding… CULTURE



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Deeper understanding…

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Deeper understanding…

ECONOMIC SITUATION, FEASIBILITY

ENERGY IS A BIG ISSUE

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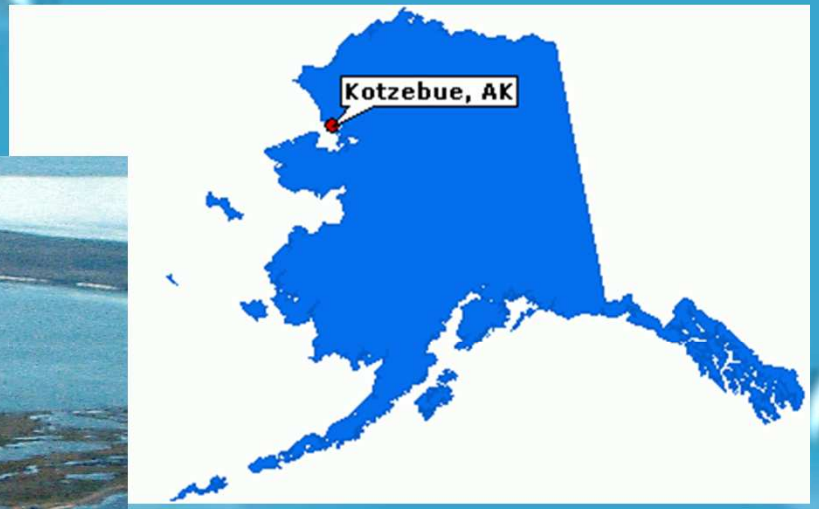
Future Work:



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Acknowledgements:

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Dan White, UAF INE
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John Spriggs, ANTHC
Michael Ulroan, ANTHC
Laren Kowallis, ARWA
Lillian Alessa, UAA-RAM
Andrew Kliskey, UAA-RAM

UNDERSTANDING
COMMUNICATION
COOPERATION
EFFICIENCY

NSF-IPY: Municipal Water Systems & Resilience of Arctic Communities

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Thank you for your attention!

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