Climate Change and Alaska Coastal Communities
Potential Impacts and Policy Issues

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Outline

I. Alaska and Louisiana

II. Alaska's coastal communities

III. Potential impacts of climate change on Alaska coastal communities

IV. Climate change policy issues for Alaska

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V. Lessons from Alaska's Exxon Valdez Oil Spill

I. Alaska and Louisiana

Alaska and Louisiana both have large oil and gas industries.

	Alaska	Louisiana
Oil production, 2007 (millions of barrels)	264	77
Natural gas production, 2007 (billion CF)	433	1364

Source: Statistical Abstract of the United States, 2010

Alaska and Louisiana both have large commercial fishing industries.

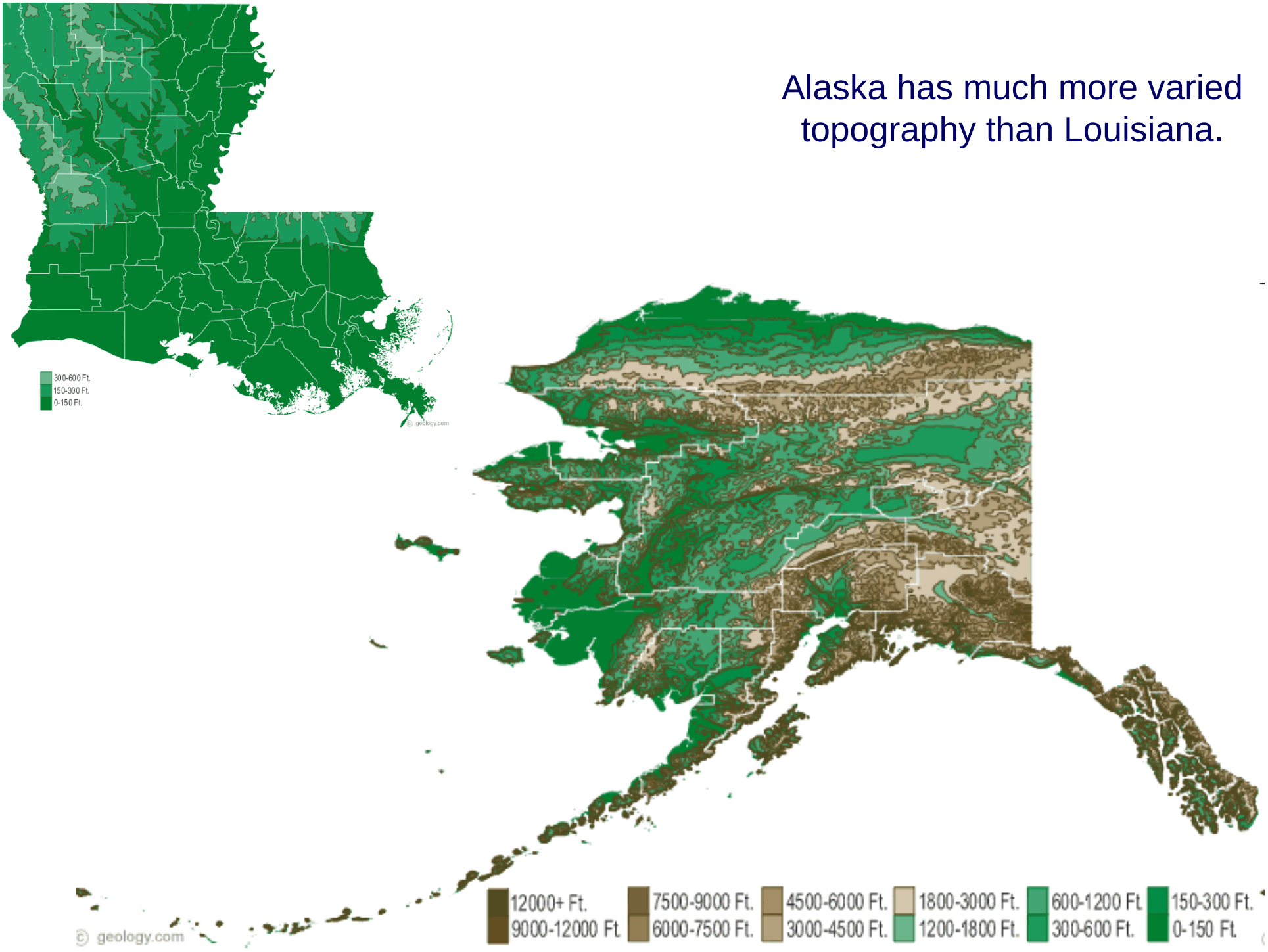
	Alaska	Louisiana
Volume of fish landings, 2008 (million pounds)	4533	915
Value of fish landings, 2008 ($ millions)	1700	272

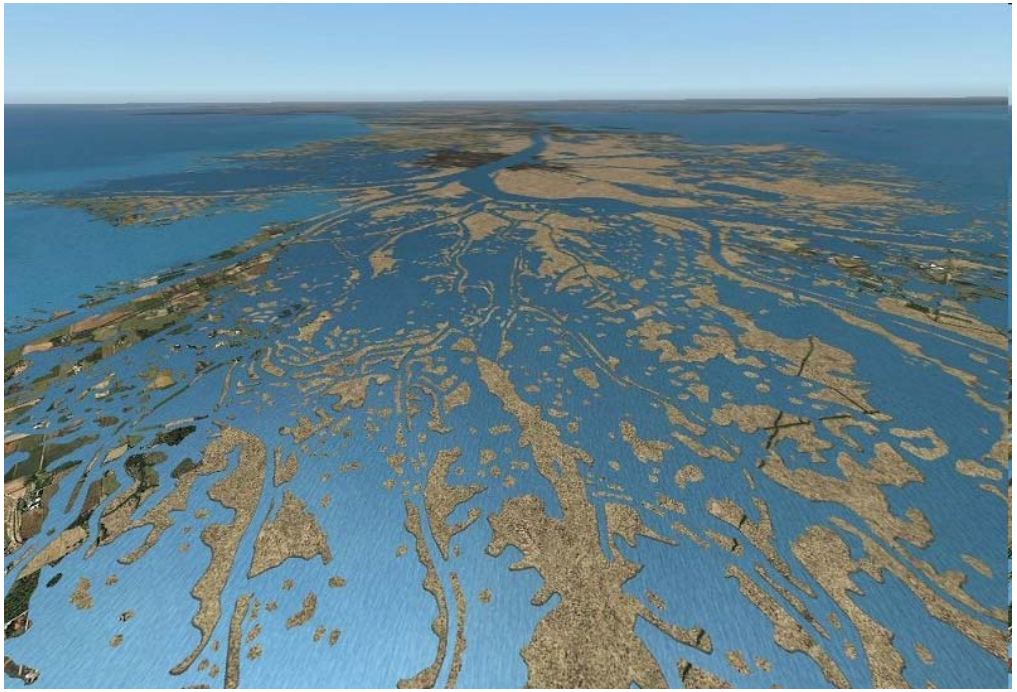
Source: Statistical Abstract of the United States, 2010

But Alaska is much larger than Louisiana!
Alaska has a much longer coast with much more variation in climate and geography.

Map source: http://www.alyeskaresort.com/Alyeska/SiteAssets/images/resort/alaska_reliefmap_web.jpg

Alaska has much more varied topography than Louisiana.





All of coastal Louisiana is low and flat. Only some of coastal Alaska is low and flat.

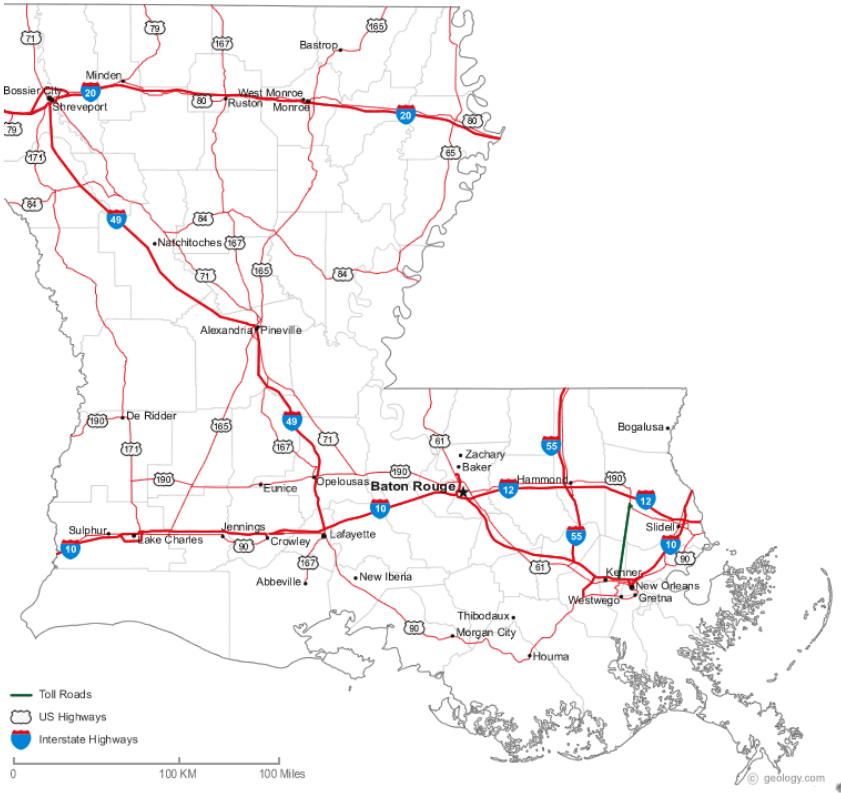
Alaska is a lot colder than Louisiana.

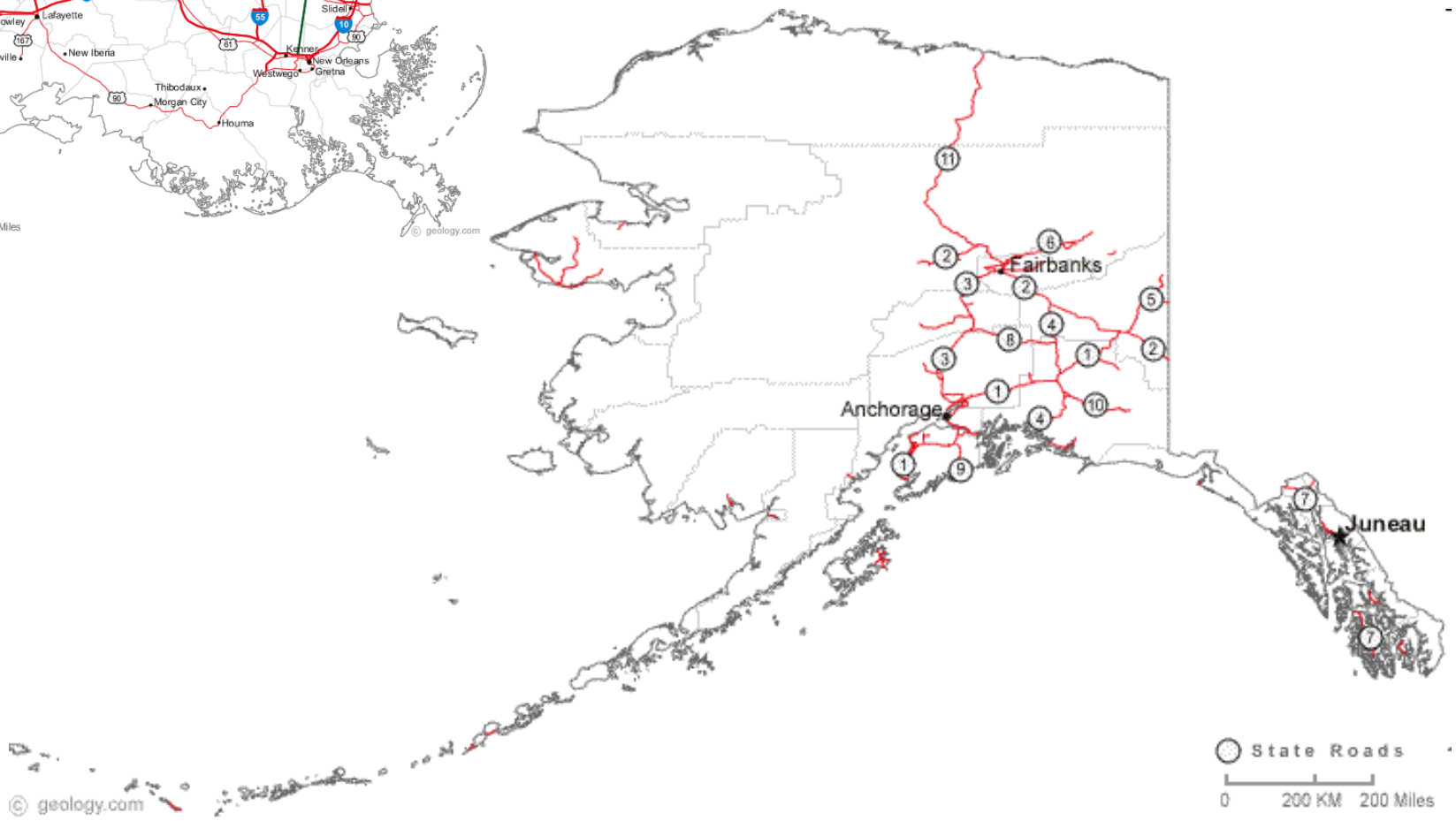
Alaska is a lot less densely populated than Louisiana.

	Alaska	Louisiana
Area (thousand square miles)	570	43
Population, 2008 (thousands)	686	4400

Source: Statistical Abstract of the United States, 2010

Alaska's coastal communities are much more remote than Louisiana's. Most coastal communities (including the state capital Juneau) are not accessible by road. Many are ice-bound for much of the year.





Flying over most of coastal Louisiana you can probably see *some* sign of human activity.
Flying over most of coastal Alaska you can't see *any* sign of human activity.

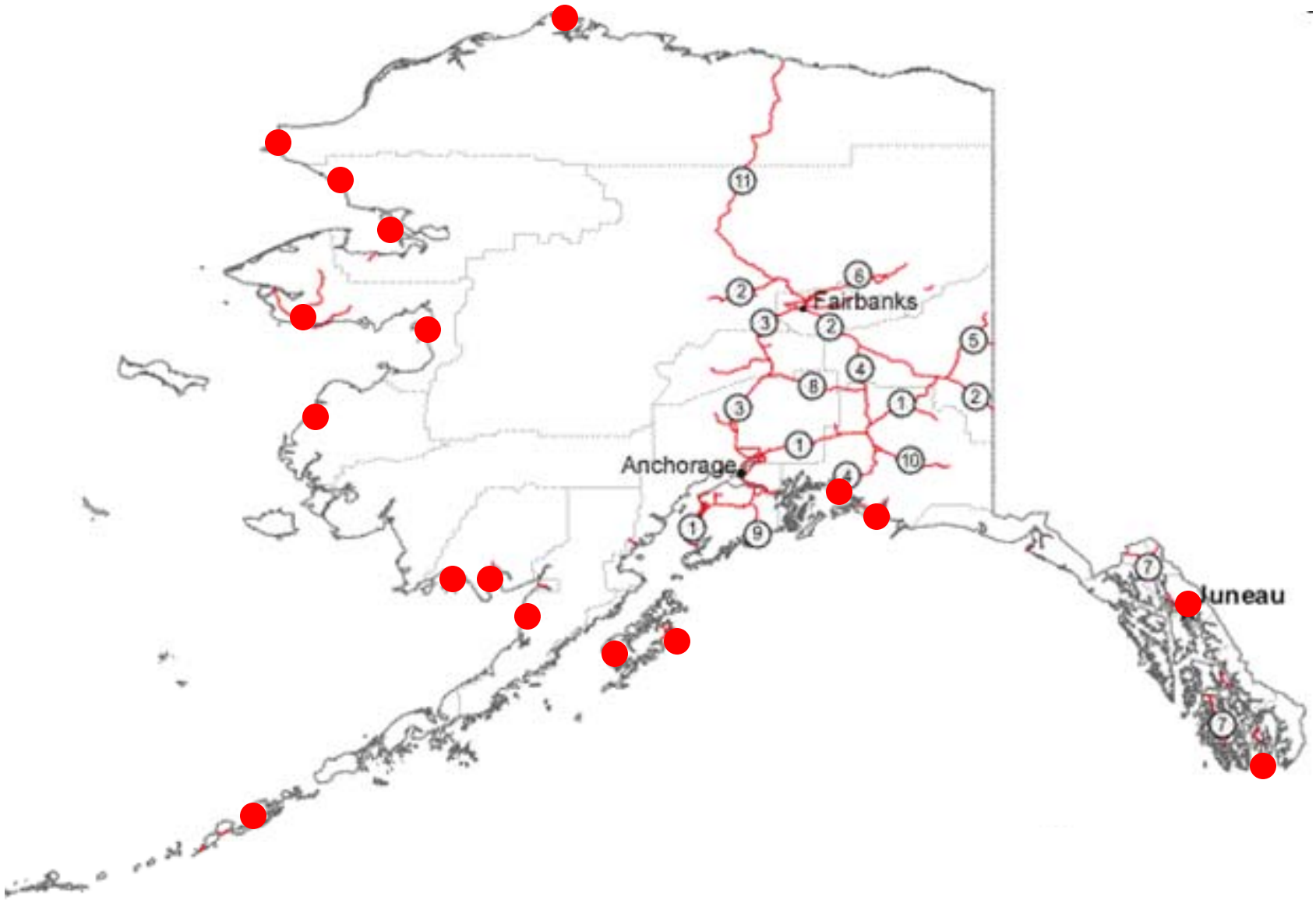
II. Alaska's coastal communities

Alaska has about 150 coastal communities widely spaced along a very long coastline.

They vary widely with respect to many environmental and socioeconomic characteristics.

Type	Characteristics	Range
Environment	Topography	Steep & mountainous to low and flat
	Climate	Rainy to Arctic
	Ice	Ice-free to ice-bound for many months
	Vegetation	Heavily forested to tundra
Socioeconomic	Population	Less than 50 to more than 5000
	Ethnicity	Mostly white to mostly Native
	Economy	Diversified to commercial fishing to subsistence
	Transportation	Roads to jets to small plane
	Prosperity	Wealthy to very poor

A quick photo tour of some Alaska coastal communities . . .



Ketchikan

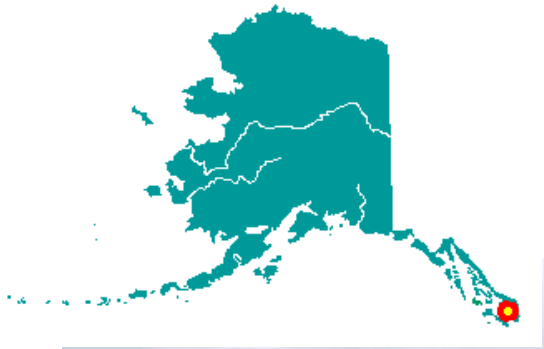


Photo source: http://www.chrisandjeanne.com/ketchikan.jpg

Juneau

Photo source: http://upload.wikimedia.org/wikipedia/commons/5/5b/Juneau_Alaska.jpg

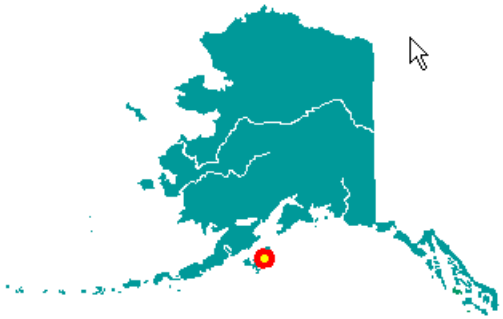
Cordova

Photo source: http://upload.wikimedia.org/wikipedia/commons/9/98/Cordova_Alaska_aerial_view.jpg

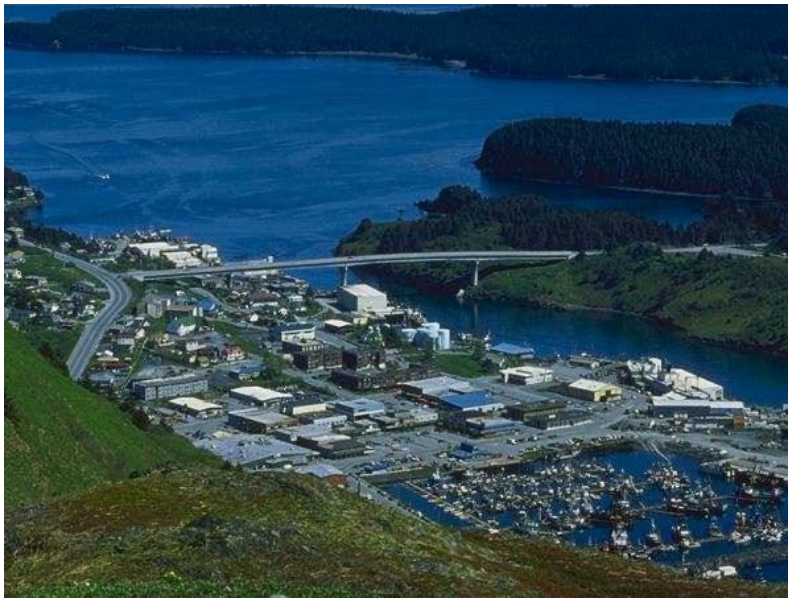
Valdez

[http://www.jpo.doi.gov/Photo%20Gallery/images/Valdez%20Marine%20Terminal_tif.jpg]

[http://www.ci.valdez.ak.us/harbor/harbor_pics/harbor_ariel.jpg]



Kodiak



[http://www.kodiak.org/images/city-a2.jpg]

http://www.flowersociety.org/images/Kodiak.jpg]

Larsen Bay

Photo source: http://www.anthc.org/cs/dehe/images/Larsen-Bay.jpg

King Cove

Photo source: http://pics4.city-data.com/cpicv/vfiles5646.jpg

Unalaska

Egegik

Photo source: http://upload.wikimedia.org/wikipedia/commons/9/98/Cordova_Alaska_aerial_view.jpg

Photo source:
http://upload.wikimedia.org/wikipedia/commons/thumb/4/4c/Dillingham_Alaska_aerial_view.jpg/628px-Dillingham_Alaska_aerial_view.jpg]

Dillingham

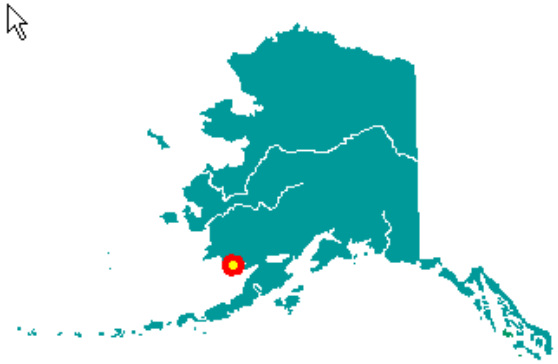


Photo source: www.commerce.state.ak.us/dca/photos/comm_photos.cfm

Togiak

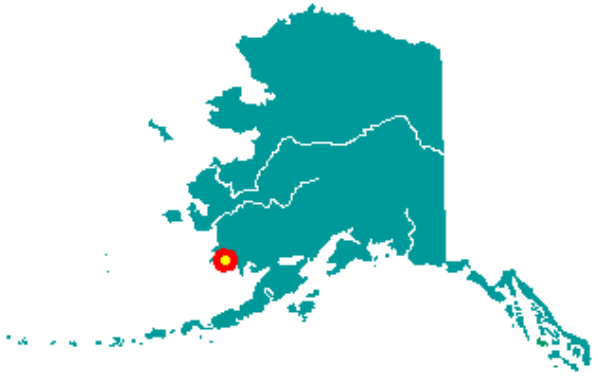


Photo source: http://farm5.static.flickr.com/4054/4257274389_f88205b092.jpg

Scammon Bay

Photo source: http://img.forministry.com/0/0F/0FC55D8B-BBA8-4199-A27A5E33862BF9F4/8C159FF4-3178-402C-AEEC61260F224225.jpg

Unalakleet

Photo source: http://i306.photobucket.com/albums/nn244/kewpik/2008%20Wedding/Unalakleet.jpg

Nome

Photo source: www.commerce.state.ak.us/dca/photos/comm_photos.cfm

Photo source: http://theideagirlsays.files.wordpress.com/2009/11/800px-nome_alaska_aerial_2006.jpg

Kotzebue

[http://upload.wikimedia.org/wikipedia/commons/thumb/c/cf/Kotzebue_Alaska_aerial_view.jpg/800px-Kotzebue_Alaska_aerial_view.jpg]

Kivalina

Photo source: http://pics4.city-data.com/cpicv/vfiles21113.jpg

Photo source: www.commerce.state.ak.us/dca/photos/comm_photos.cfm

Point Hope

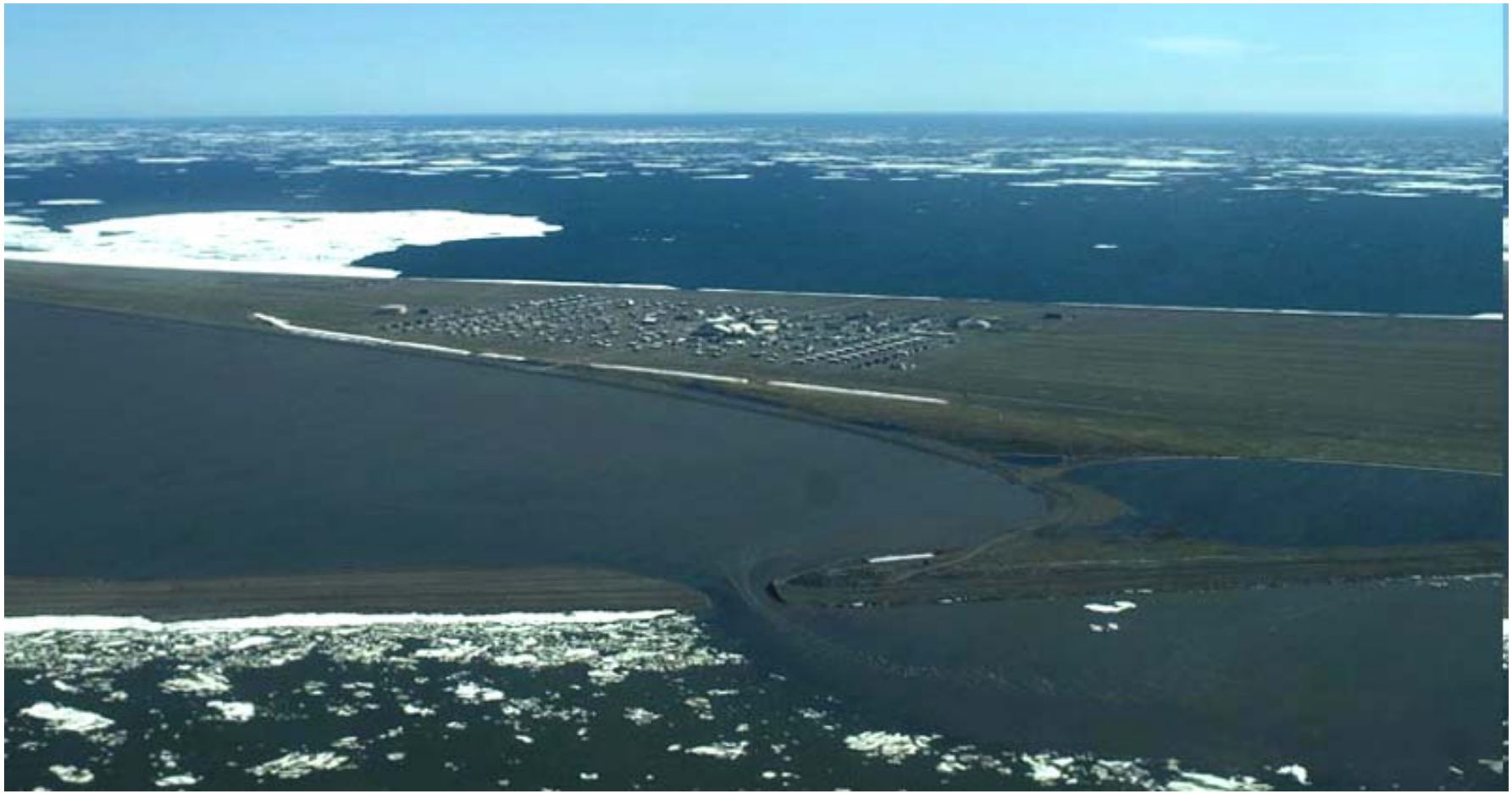


Photo source: http://majikimaje.com/DSC_9292.jpg

Barrow

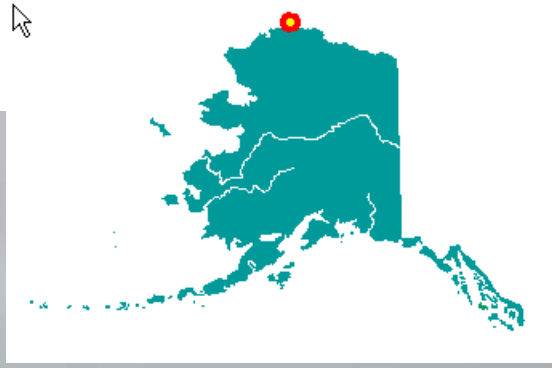


Photo source: http://gallery.usgs.gov/images/12_09_2008/s85Ar11Qpk/large/BarrowAK.JPG

III. Potential impacts of climate change on Alaska coastal communities

Potential impacts of climate change on Alaska coastal communities

SUMMARY

1. The diversity of Alaska's coastal communities—in their physical environment and their socioeconomic characteristics—means that communities will be affected in very different ways by climate change.

2. Climate change may affect communities through multiple and complex mechanisms.

3. The potential effects of climate change on communities are highly uncertain and difficult to predict.

4. Complexity, variation, and uncertainty of effects all increase the policy challenges in responding to climate change.

1. The diversity of Alaska's coastal communities—in their physical environment and their socioeconomic characteristics—means that they will be affected in very different ways by climate change.

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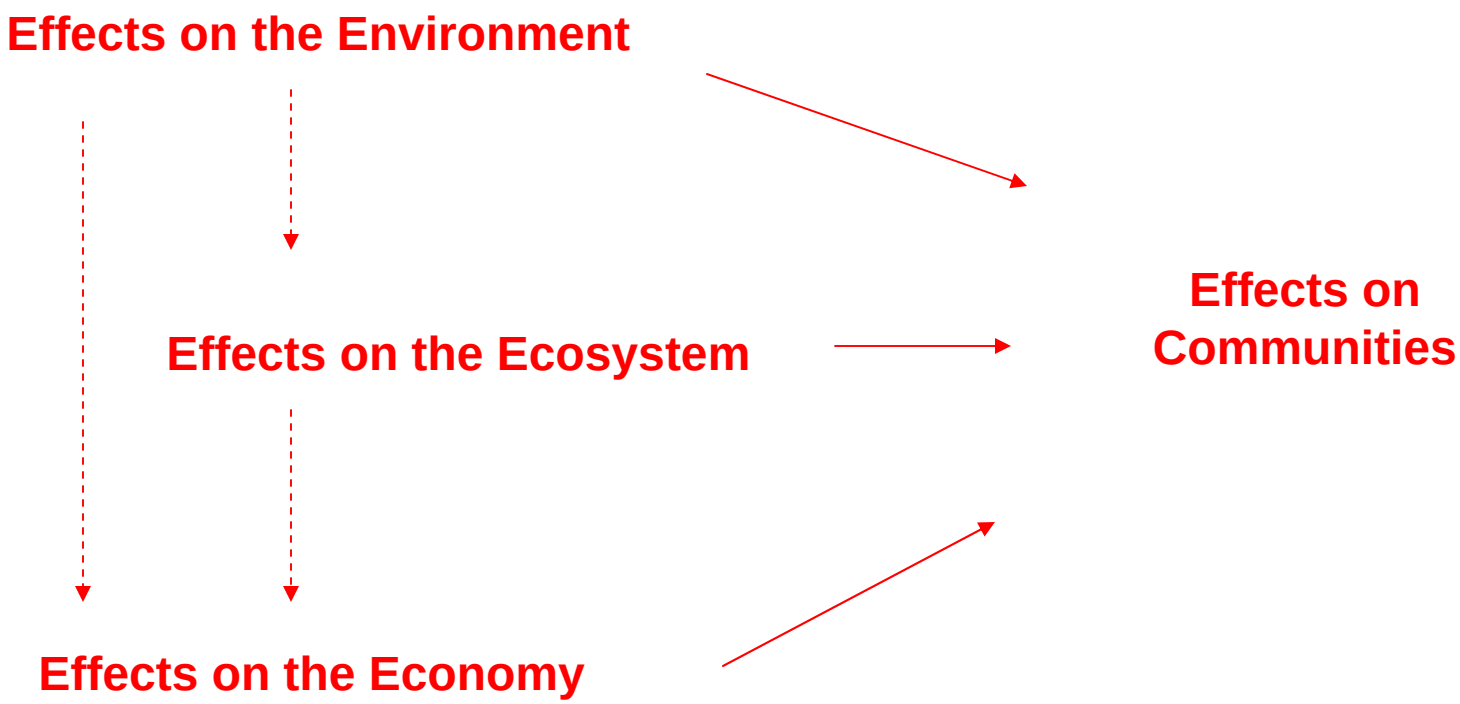

Shrinking sea ice

Climate change

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Effects on the Environment

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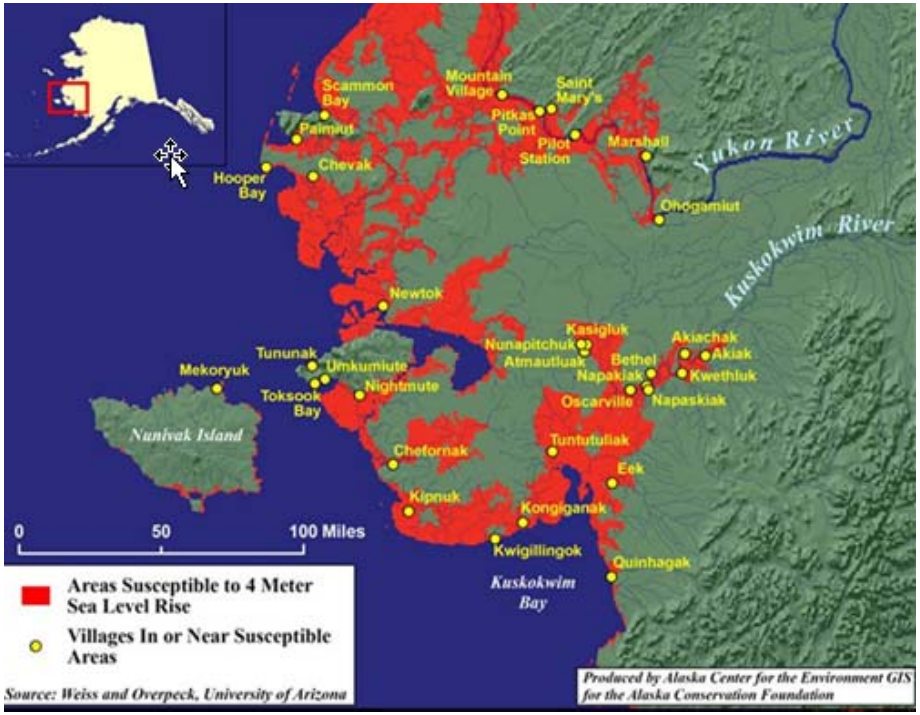
Effects on Communities

Melting permafrost

Rising sea levels



Coastal erosion

Ice—when and where and how it freezes, moves, and melts—critically affects travel and transportation in western and northern Alaska.

Ice and snow are critical to how Alaskans travel in winter . . .

. . .even for Alaska’s largest city and port, Anchorage.

Alaska North Slope oil industry winter ice road, May 2009
Closed due to unexpected early thaw, stranding exploration rig

Melting of the Arctic ice pack could result in significant shipping by Arctic sea routes.

- Environmental risks from spills?
- Economic opportunities for some communities as support ports?

Accelerating coastal erosion caused by increased exposure to storms as shore ice forms later in the season is the most immediate and visible effect of climate change confronting western Alaska coastal communities.

Source: Alaska Conservation Solutions, Presentation on Global Warming in Alaska, www.alaskaconservationsolutions.com

Climate change

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Effects on the Ecosystem

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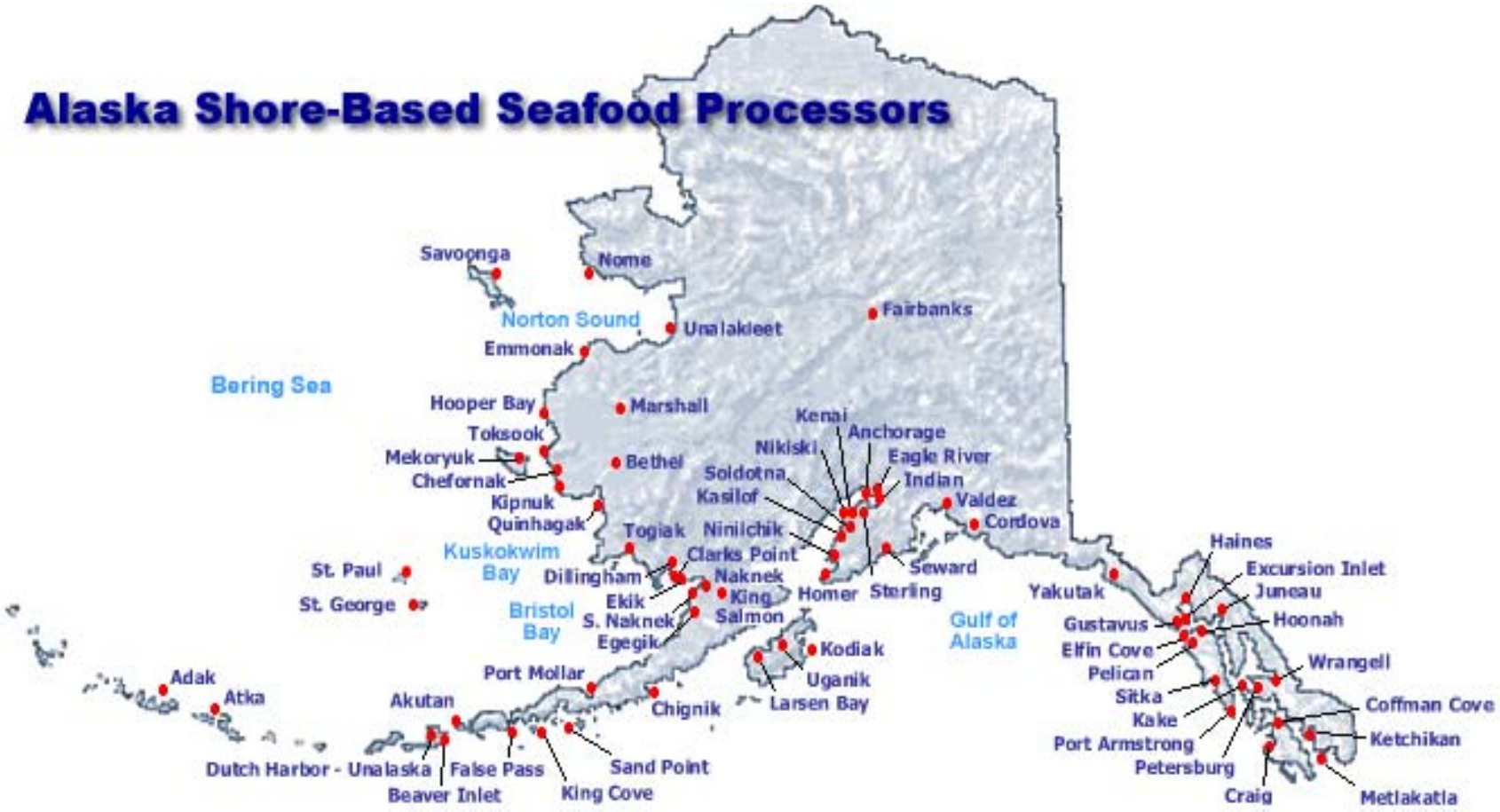
Effects on Communities

Subsistence fish and game resources

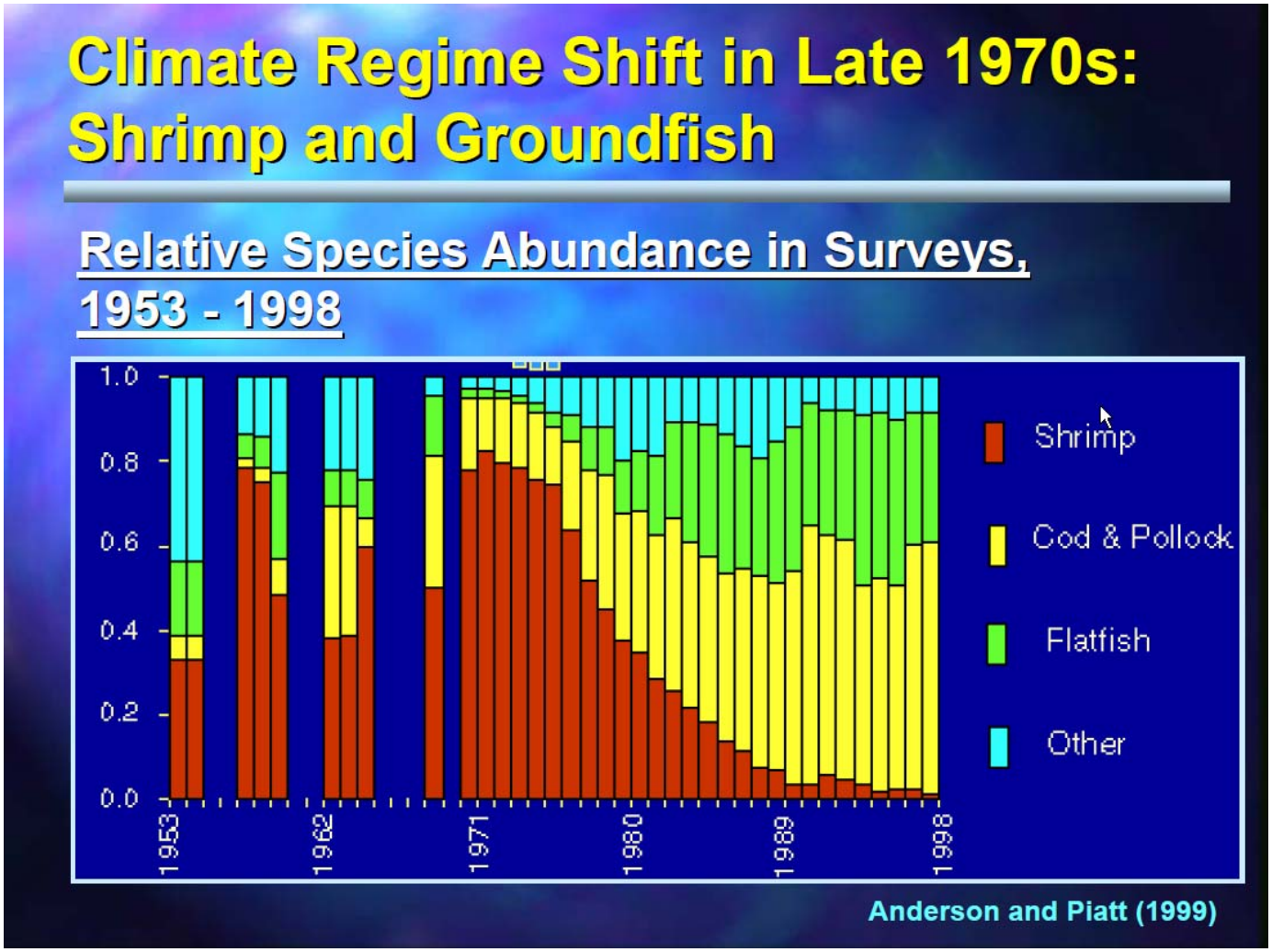
Commercial fishery resources

Almost all Alaska coastal communities and residents could potentially be affected by climate-change driven changes in Alaska fishery resources.



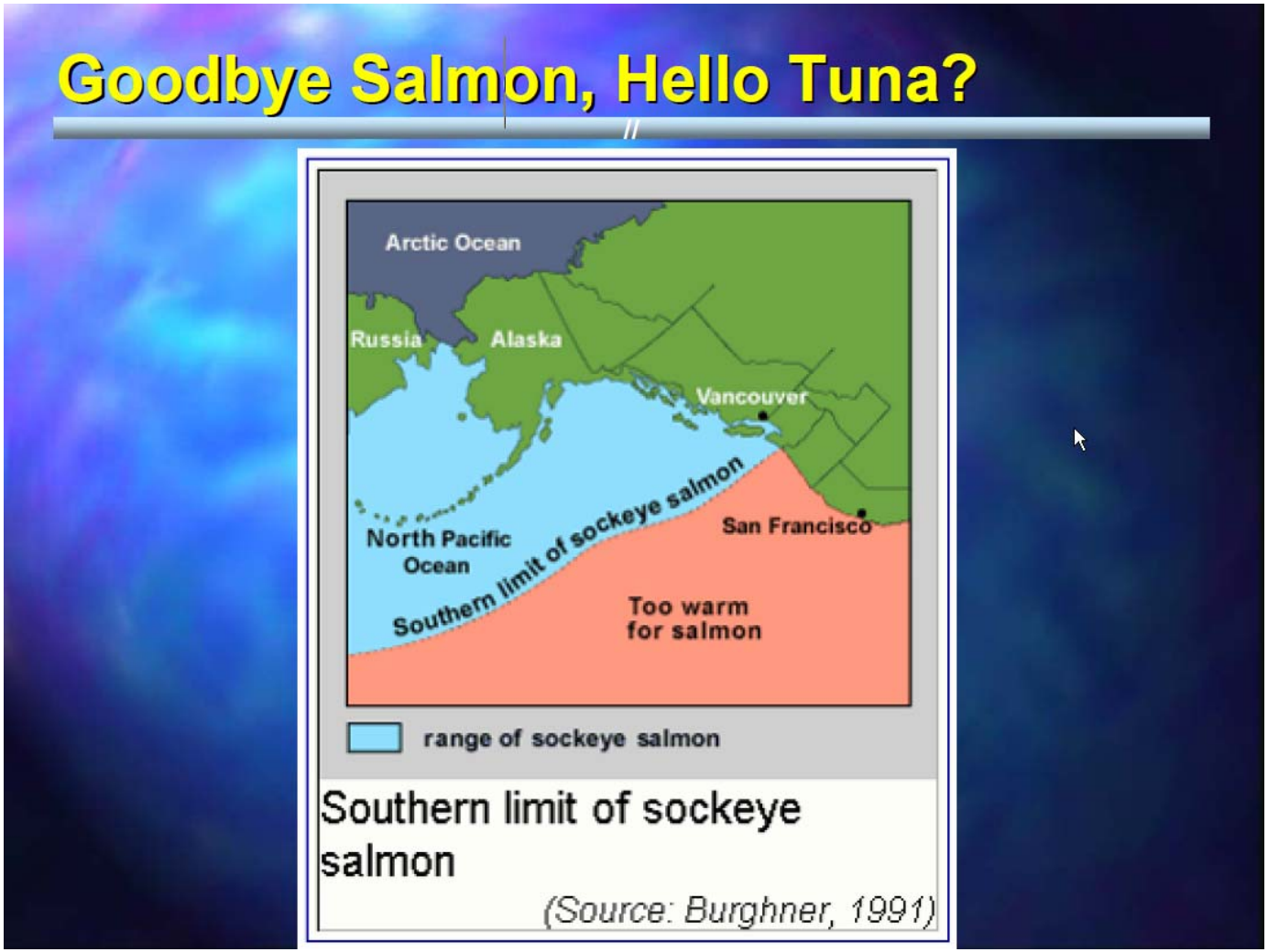
Map source: Alaska Division of Community Advocacy web site: http://www.dced.state.ak.us/cbd/seafood/seafoodprocessors.htm.

Past long-term changes in North Pacific ocean temperatures and currents (known as “regime shifts”) have resulted in dramatic changes in relative abundance of different species.



Source: Presentation by Gordon Kruse of the University of Alaska Fairbanks on “What Does Climate Change Mean for Alaska’s Fisheries?”, 2007.
http://www.sfos.uaf.edu/news/2007/KruseScienceforAlaska.pdf

Global climate change could result in relatively more dramatic changes in ocean conditions than past regime shifts—with significant implications for the abundance and distribution of commercial fishery resources.



Source: Presentation by Gordon Kruse of the University of Alaska Fairbanks on "What Does Climate Change Mean for Alaska's Fisheries?", 2007.
http://www.sfos.uaf.edu/news/2007/KruseScienceforAlaska.pdf

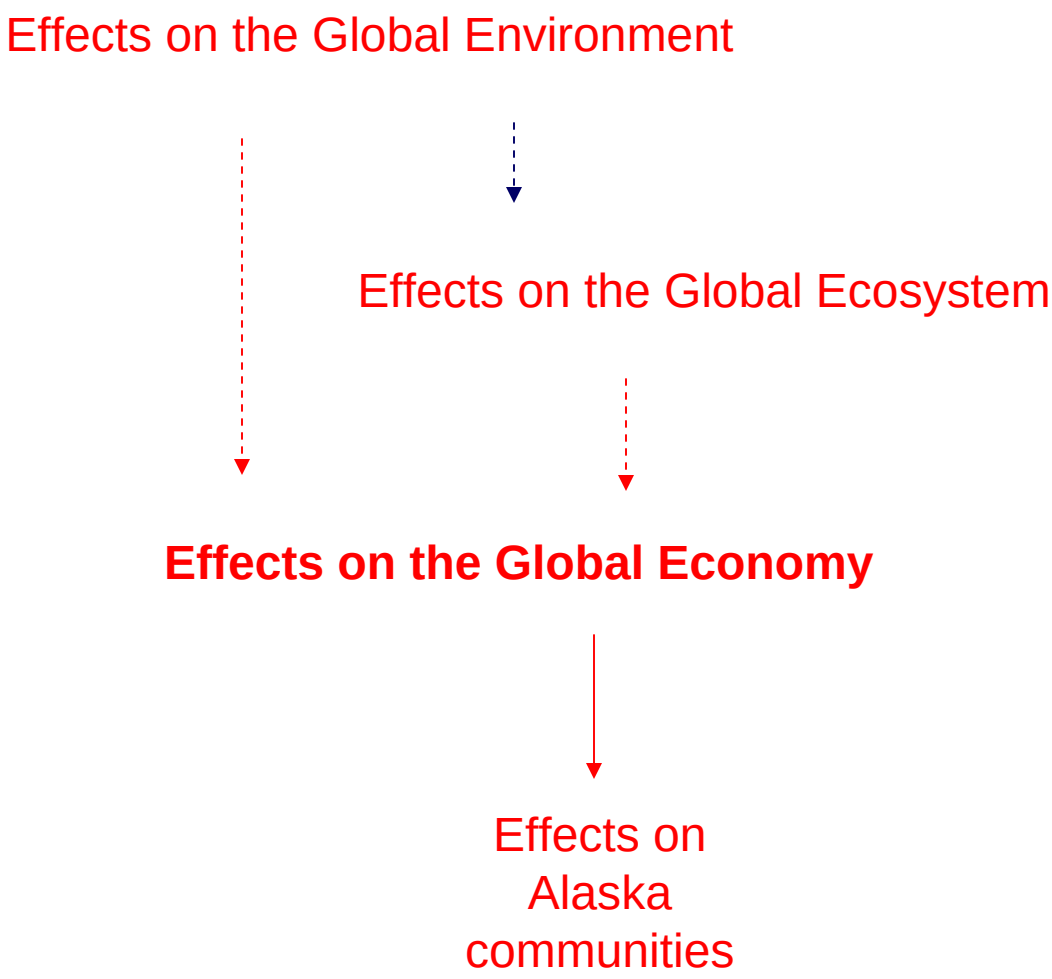
Stocks of Eastern Bering Sea pollock—the number one commercially harvested U.S. species by volume—are shifting farther north and west

- Affecting the relative economic viability of Dutch Harbor-based processing operations
- Shifting pollock resources into the Russian zone

Potential implications of ocean acidification are particularly scary.

- Affects how mollusks and crustaceans make their support structures.
- Could affect:
  - Commercial species such as clams and crabs
  - Prey for other commercial species such as finfish
  - The entire ocean ecosystem

Climate change at the global level may affect communities through the increasingly globalized economy.



Changes in fish harvests anywhere in the world may affect fishermen everywhere through global fish markets.

It works the other way, too.

Climate change in Alaska

↓

Changes in Alaska salmon harvests

↓

Changes in world salmon supply

↓

Changes in world salmon prices

↓

Effects on Russian Far East salmon fishermen and communities
Effects on American consumers

Policy responses to climate change at the global level may also affect communities through the increasingly globalized economy.

Concerns about effects of climate change at the global level

↓

Carbon taxes and other policies to discourage oil use

↓

Higher world oil prices

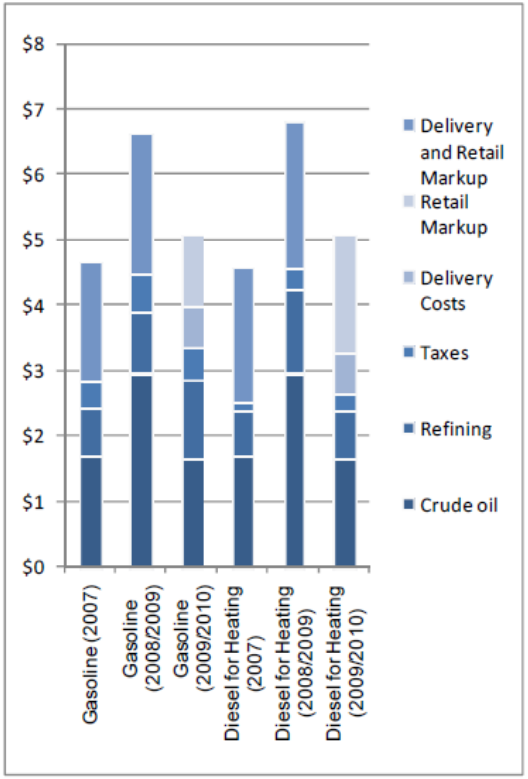
↓

Effects on
Alaska
communities

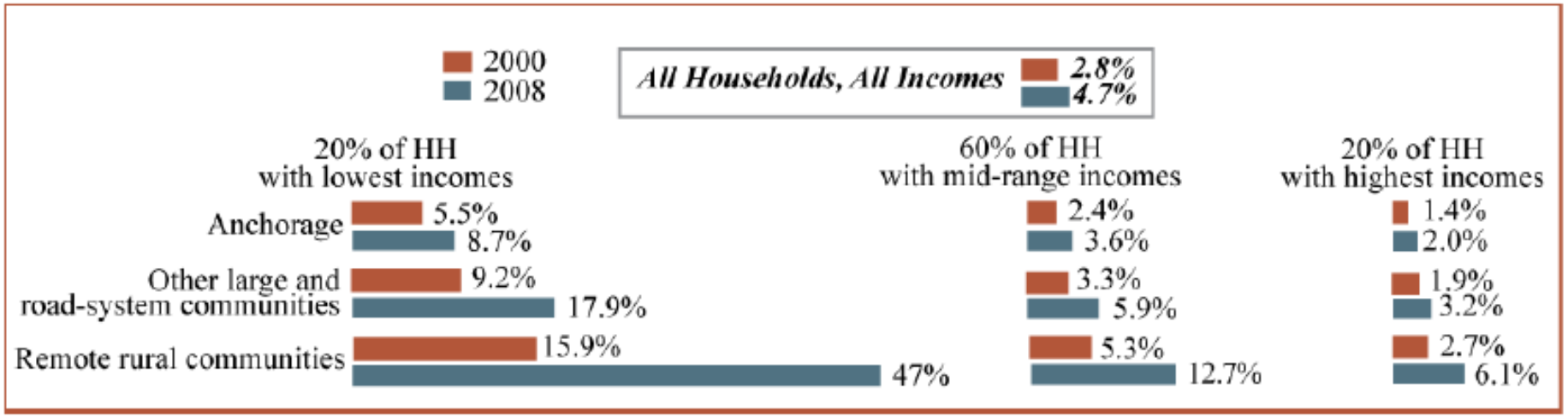
Very high costs of energy already threaten the economic viability of remote rural Alaska communities.

Climate change policy responses –such as carbon taxes—could further increase energy costs.

Cost of fuel in Unalakleet



Estimated median share of income Alaska households spend for home energy use, 2000 and 2008



3. The potential effects of climate change on communities are highly uncertain and difficult to predict.

- The potentially affected systems are highly complex:
  - Environment
  - Ecosystem
  - Economy
- The potential effects of climate change are outside the range of historical observations
- We can't predict accurately
  - How the climate will change
  - How changing climate might affect these systems
  - How changes in the systems may affect us

4. Complexity, variation, and uncertainty of effects all increase the policy challenges in responding to climate change.

- We don’t know what the effects will be
- The potential effects vary widely between communities
- The costs and benefits of potential responses vary widely between communities
- We can’t measure who is to blame
- It isn’t clear who should pay

IV. Climate change policy issues for Alaska

Climate change creates a wide variety of new policy challenges and issues.

- Infrastructure and services
- Fisheries management
- Issues of place

Infrastructure and services

- Melting permafrost
  - Buildings, roads, pipelines
  - Maintenance and repairs for existing infrastructure
  - Planning for new infrastructure
- New public services
  - Coast guard base for the Arctic
  - Ice forecasts
- Tourism

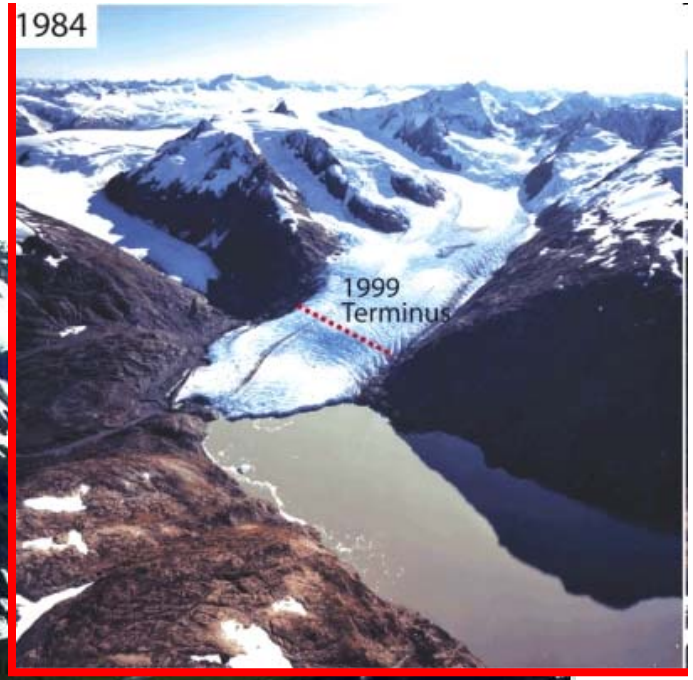
Damage to a Russian Building from melting permafrost

Portage glacier is a very impressive glacier which calves into a lake just a short drive from Anchorage.

In the mid-1980s the Forest Service built a very nice visitors center from which tourists could view the glacier.

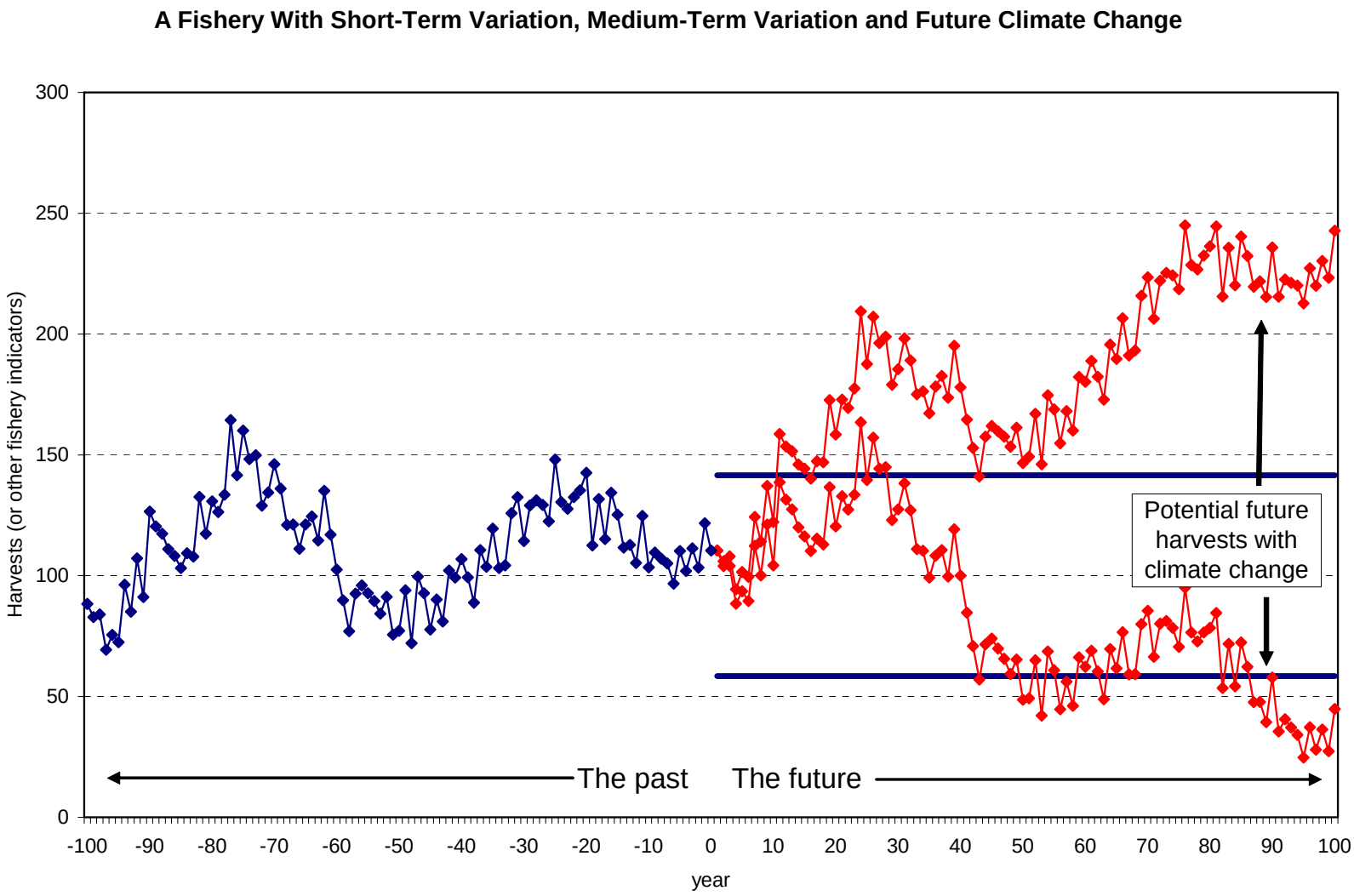
Begich-Boggs Visitors Center at Portage Lake

Unfortunately, the glacier has since receded around the corner so you can't see it from the visitor's center anymore.



The glacier was here when the center opened in 1986

Climate change raises new questions of how to manage fisheries resources with increased uncertainty about the future.



Land-based processors vs. floating processors

Land-based processors help support communities--but only if there are fish for them to process!

Floating processors don't support communities but are less vulnerable to changes in geographic distribution of resources.

In response to concerns about potential impacts of new fisheries which might develop in the Arctic as the ice-free period and area expands, in 2009 the North Pacific Fisheries closed all federal waters of the U.S. Arctic to commercial fishing until the resources of this region are better understood.

Arctic Fishery Management Plan

A policy outlining commercial fishery management in the U.S. Exclusive Economic Zone of the Beaufort and Chukchi Seas.

Climate change highlights and exacerbates
difficult questions of place.

- *What places "make sense" to live?*
  - *Environmental viability*
  - *Ecosystem viability*
  - *Economic viability*
- *What should we do when places no longer "makes sense"?*

These are difficult and delicate questions even to discuss.
Climate change forces us to think and talk about them.
We need to learn *how* to think and talk about them.

Questions of place raise difficult choices and issues.

If a place doesn't "make sense" . . .

Choices

- *Help people stay?*
- *Help people leave?*
- *Do nothing?*

Issues

- *Who decides if a place "makes sense"—based on what?*
- *Can the choice succeed?*
- *What is ethically right?*
- *What is best for future generations?*
- *What can we afford?*
- *Who should make the choices?*

There is a long-standing debate in Alaska about whether the federal and state government should support infrastructure and services in small remote coastal communities.

NO

- Extremely high costs
- Extremely high dependence on government subsidies
- No realistic options for economic development
- Failing infrastructure and public services

YES

- Strong subsistence traditions and ties to the land
- Unique cultures dating back thousands of years
- Absence of skills for economic success elsewhere
- Financial capacity of wealthy government to help
- Moral imperative
- Human rights

The debate over the support of remote rural communities in Alaska in highly charged and sensitive

- Alternatives to support of remote rural communities unclear
- Allegations of urban ignorance, insensitivity and racism
- Does *anywhere* in Alaska “make sense”?
- Whose money is it anyway?
- Divisions within rural communities

Climate change is forcing discussion in Alaska of long-taboo subjects of village viability and relocation.

Source: Alaska Conservation Solutions, Presentation on Global Warming in Alaska, www.alaskaconservationsolutions.com

V. Lessons from Alaska's Exxon Valdez Oil Spill

The news and images from the Gulf oil spill are a painful reminder for Alaskans of the Exxon Valdez Oil Spill and its aftermath.

We vividly recall . . .

- Feelings of powerlessness as the spill kept spreading
- Feelings of sorrow over filthy oil in a beautiful, pristine environment
- Feelings of frustration, rage, and cynicism over:
  - Broken promises that “it won’t happen” and “we can clean it up”
  - Chaotic response by industry and government
  - Useless (or harmful) “clean-up” activities
  - Economic disruptions
  - Two decades of litigation culminating in disappointment

LESSON 1
The oil spill creates challenges and opportunities for scientists

- Everyone wants immediate answers about complex questions, even though:
  - You have your regular job to do
  - They weren't willing to fund the baseline research that would have made it possible to answer their questions
- What scientists say suddenly matters a lot
  - There is a lot of money at stake
    - What kinds of impacts the spill will have
    - How long will they last
  - People may attack you and your research if they don't like your answers
  - Objective scientific analysis and discussion becomes much more difficult
- There will be a lot of funding for research—and competition for funding.
- Who you work for matters
  - People will perceive your research as influenced by who funded you
  - Who you work for could affect your future credibility
- It is more important than ever to be careful and objective!
- Can you find ways to create "neutral" research planning and funding mechanisms?

LESSON 2
Consider the model of the Exxon Valdez Oil Spill Trustee Council

- Can the tragedy of the spill create an opportunity to better understand and care for the Gulf ecosystem?

LESSON 3
Try not to spend lots of money in stupid ways.

- Exxon spent a huge amount of money on “clean-up” efforts that were of minimal value--and maybe harmful--because:
  - They promised they would clean it up
  - They had to look like they were trying
  - Nobody cared about saving money for Exxon
  - A lot of people made a lot of money working on the clean-up

- It would have been better if that money had been spent in more useful ways that brought more long-term benefit.
- ***Is there a way you can negotiate so that you spend money on what gets you the most benefit over the long term?***

LESSON 4
Deal with the spill—and then move on.

- Some Alaska communities and individuals can’t seem to move on
- Some blame the spill for everything that has gone wrong since
  - Problems of the salmon industry
- Don’t become permanent victims

LESSON 5

We need to think very hard about whether there are ways we can minimize the perverse incentives of our legal system in how we respond to this kind of crisis.

- A large oil spill cries out for cooperation between oil companies, government, and affected communities
  - In understanding what is happening
  - In minimizing damage
  - In cleaning up
  - In identifying and facilitating appropriate compensation
  - In designing policies that work better
- It's hard to cooperate when everyone has to position themselves for the coming lawsuits
- It's hard to see the litigation which followed the Exxon-Valdez spill as anything but a failure of our justice system
  - Expense
  - Delay
  - Uncertainty
- We need fundamental reforms to how we deal legally with environmental disasters.