

# How institutions promote or detract from resilience

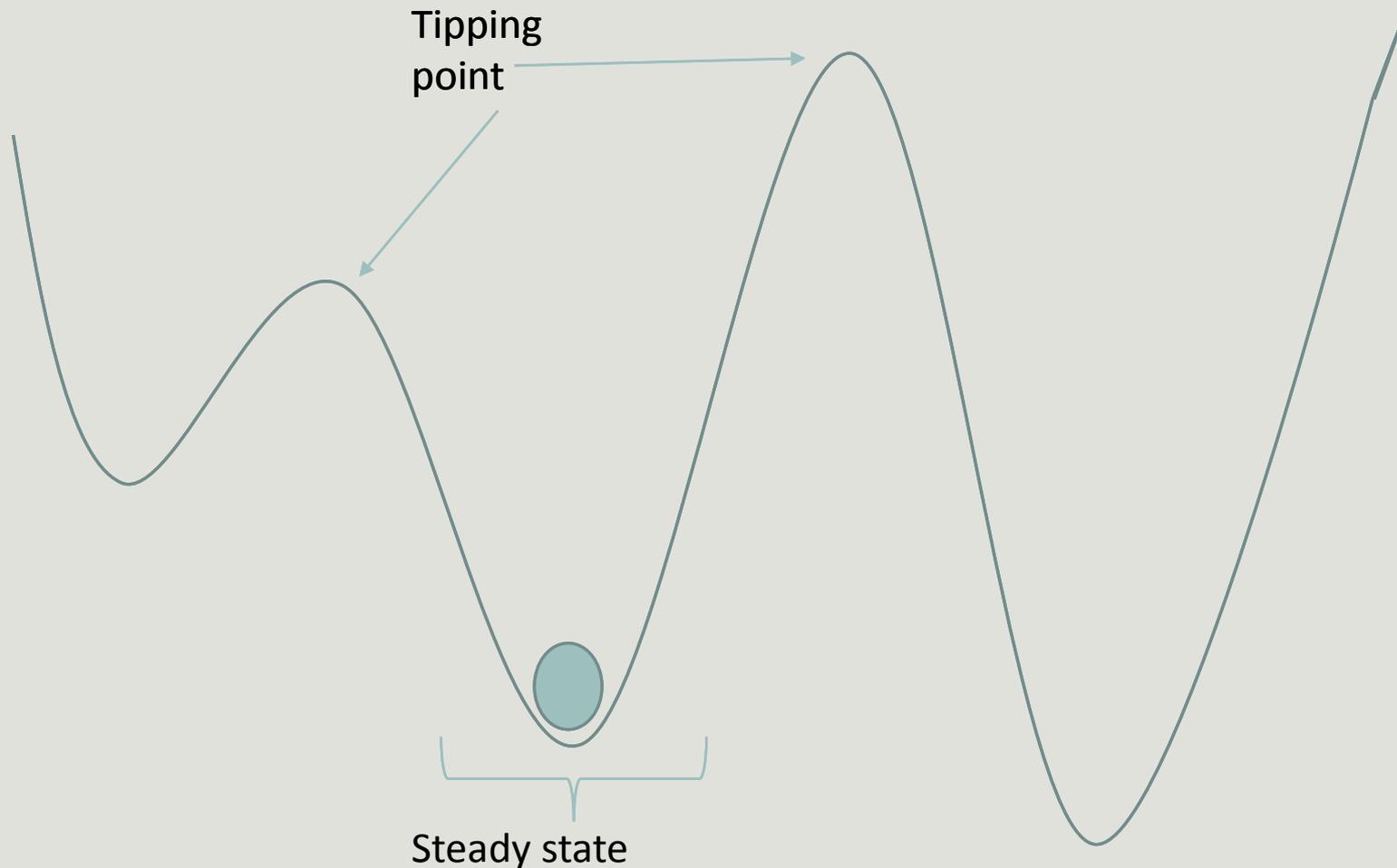
A CASE STUDY OF THE COPPER RIVER WATERSHED,  
ALASKA

---

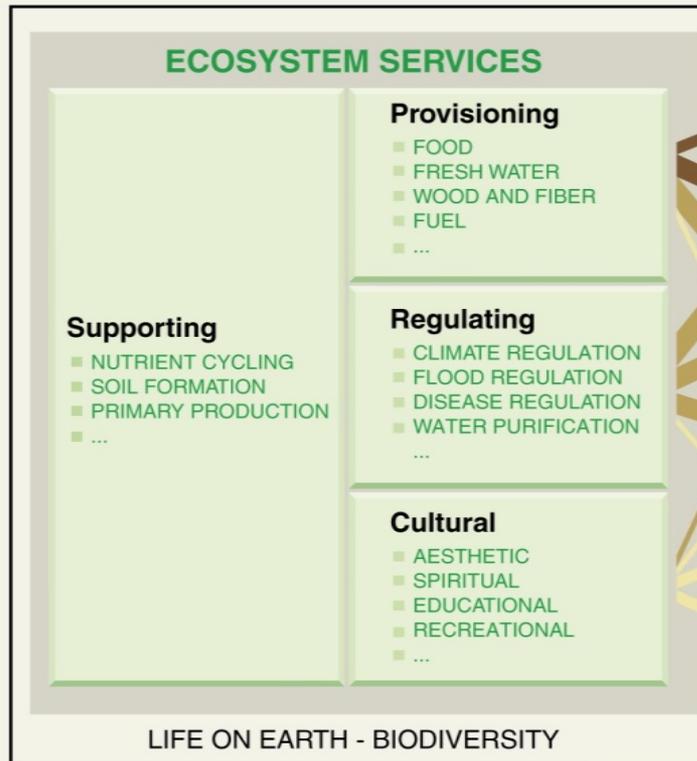
Erin Shew  
MA Candidate  
University of Alaska Fairbanks  
Department of Arctic and  
Northern Studies  
October 20, 2016

# What is resilience?

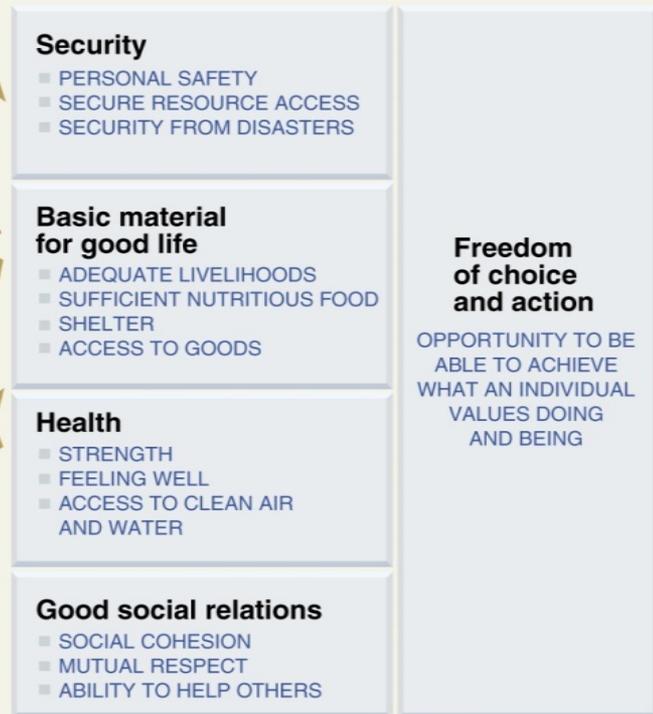
“The capacity of a system to deal with change and continue to develop”  
(Stockholm Resilience Center).



# Ecosystem services directly influence human well-being



## CONSTITUENTS OF WELL-BEING



Source: Millennium Ecosystem Assessment

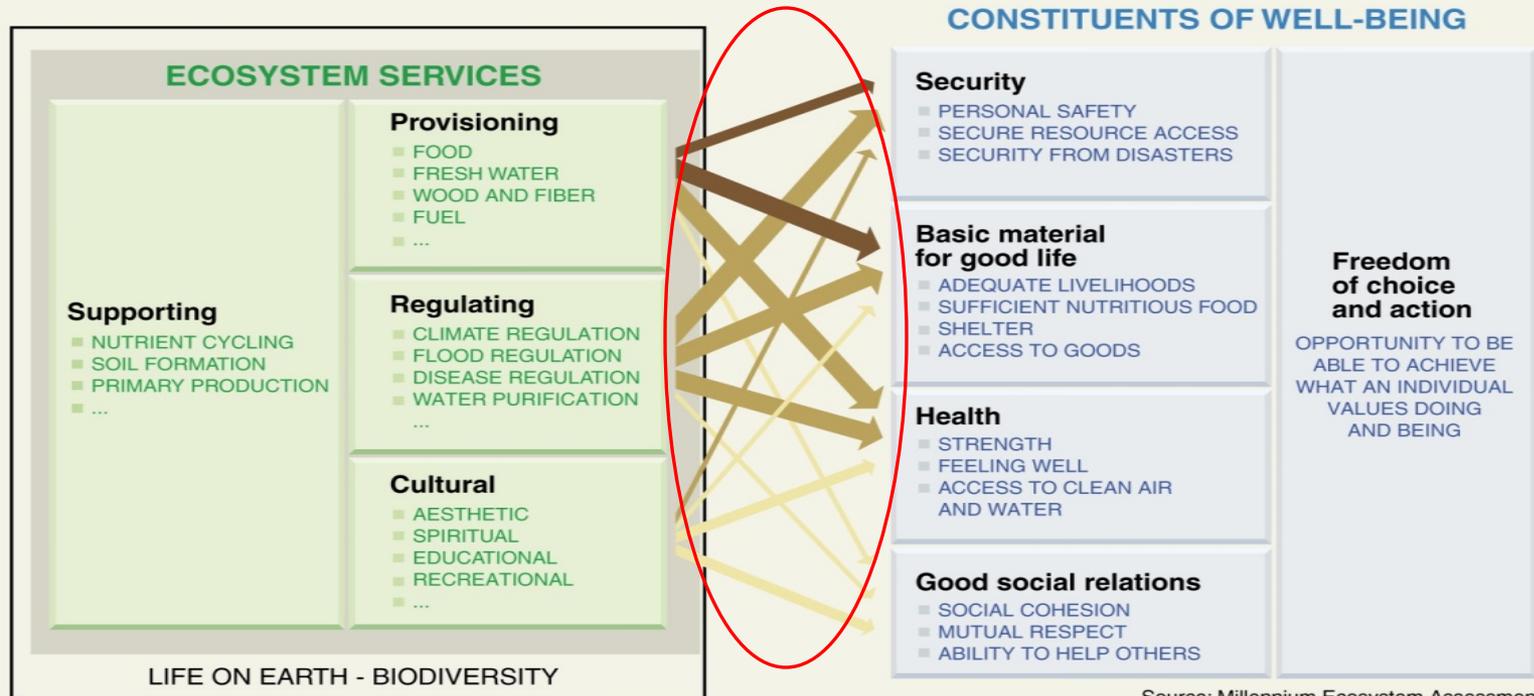
**ARROW'S COLOR**  
Potential for mediation by socioeconomic factors

- Low
- Medium
- High

**ARROW'S WIDTH**  
Intensity of linkages between ecosystem services and human well-being

- Weak
- Medium
- Strong

# Ecosystem services directly influence human well-being, and serve as links between social and ecological systems



Source: Millennium Ecosystem Assessment

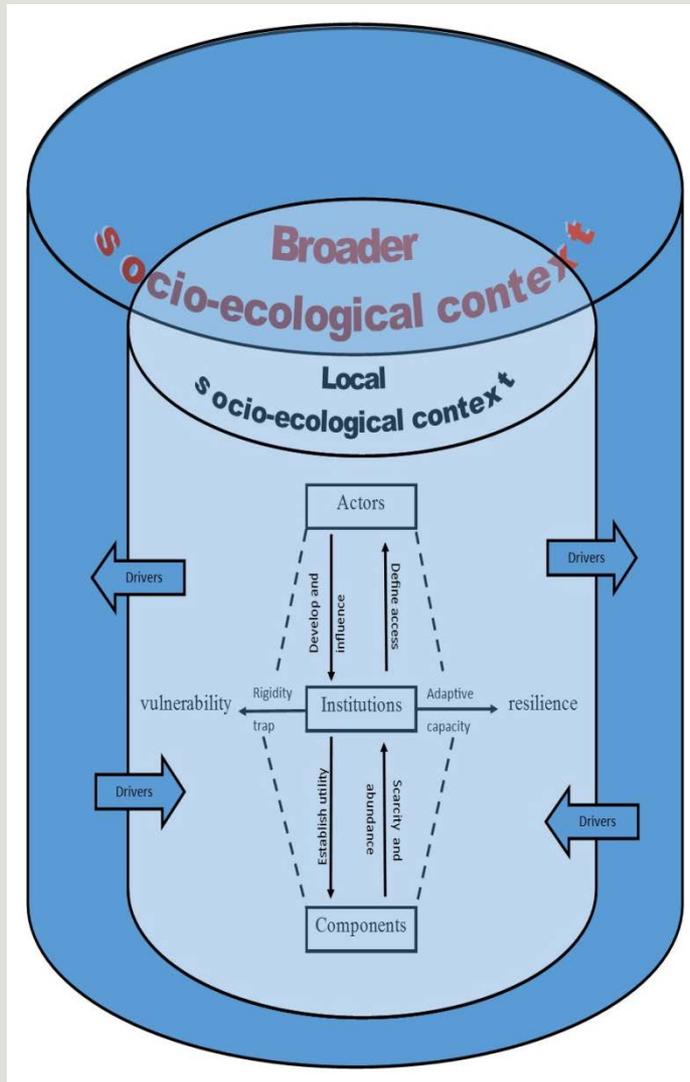
**ARROW'S COLOR**  
Potential for mediation by socioeconomic factors

- Low
- Medium
- High

**ARROW'S WIDTH**  
Intensity of linkages between ecosystem services and human well-being

- Weak
- Medium
- Strong

# What does that interaction look like?



- Institutions that promote resilience:
  - Are a good fit for the socio-ecological system
  - Representative of the diversity within the socio-ecological system
  - Are able to handle uncertainty
  - Have the capacity to learn and adapt to changing conditions

# Case study: the Copper River Watershed salmon fishery



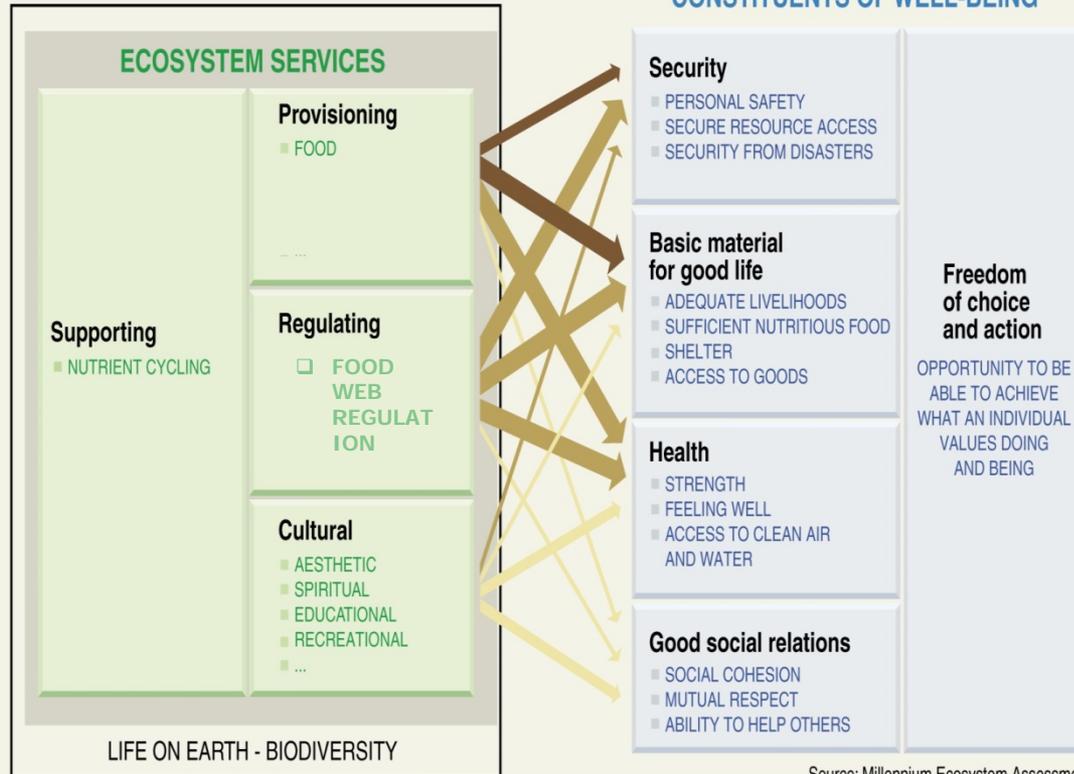
Map Credit: State of Alaska Department of Fish and Game  
[http://www.adfg.alaska.gov/index.cfm?adfg=chinookinitiative\\_copper.main](http://www.adfg.alaska.gov/index.cfm?adfg=chinookinitiative_copper.main)

## Methods:

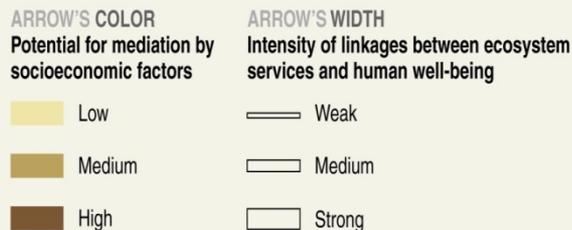
- Conducted literature review of salmon use and harvest in the Copper River region.
- Analyzed salmon harvest and escapement estimates from 1994-2014.
- Analyzed changes in ex-vessel values of commercial salmon fisheries and local ownership of limited entry permits from 1980-2014.
- Conducted 16 ethnographic interviews with fishery users and managers from 2011-2012 and identified prevalent themes related to the model.



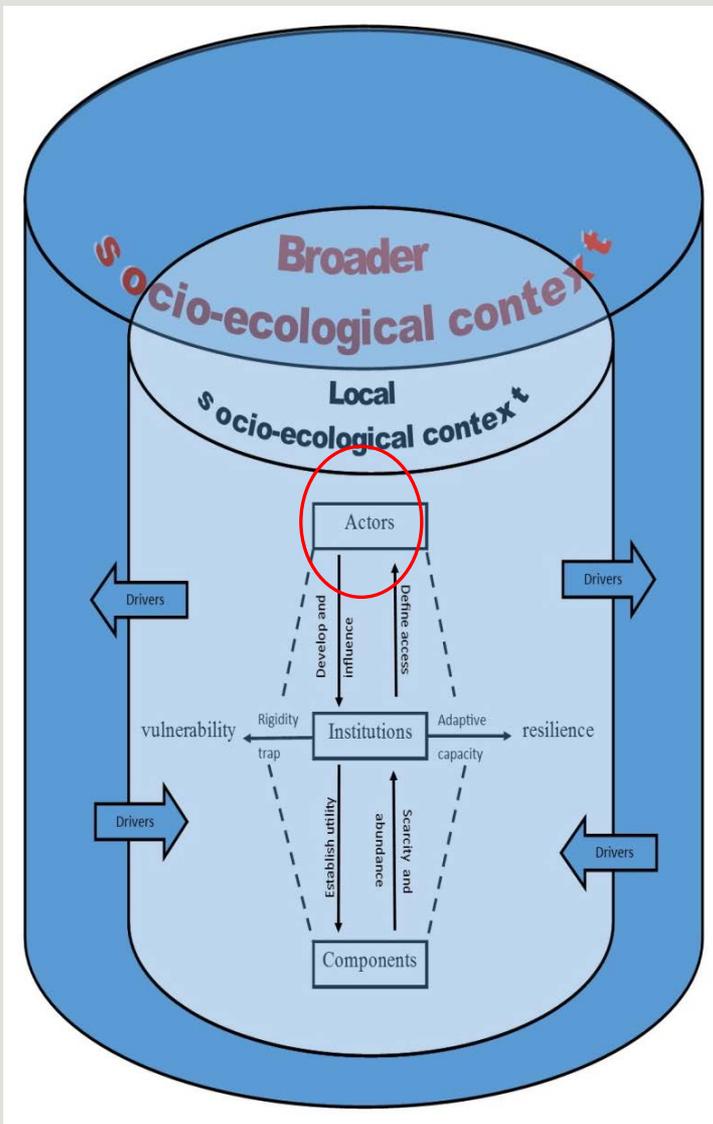
# What ecosystem services do salmon provide?



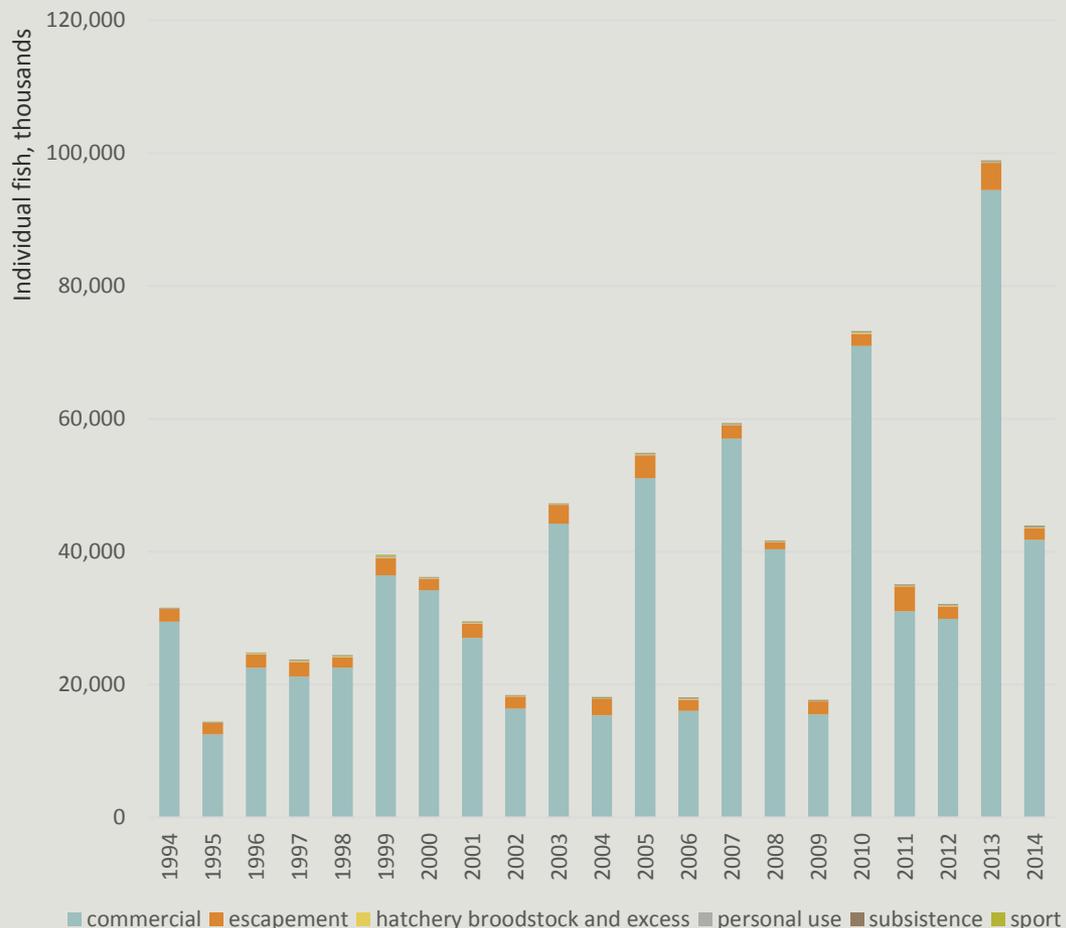
Source: Millennium Ecosystem Assessment



# Who are the actors in the system?

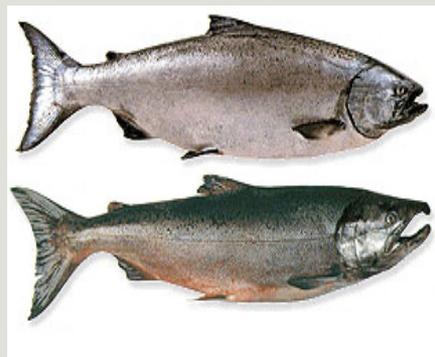
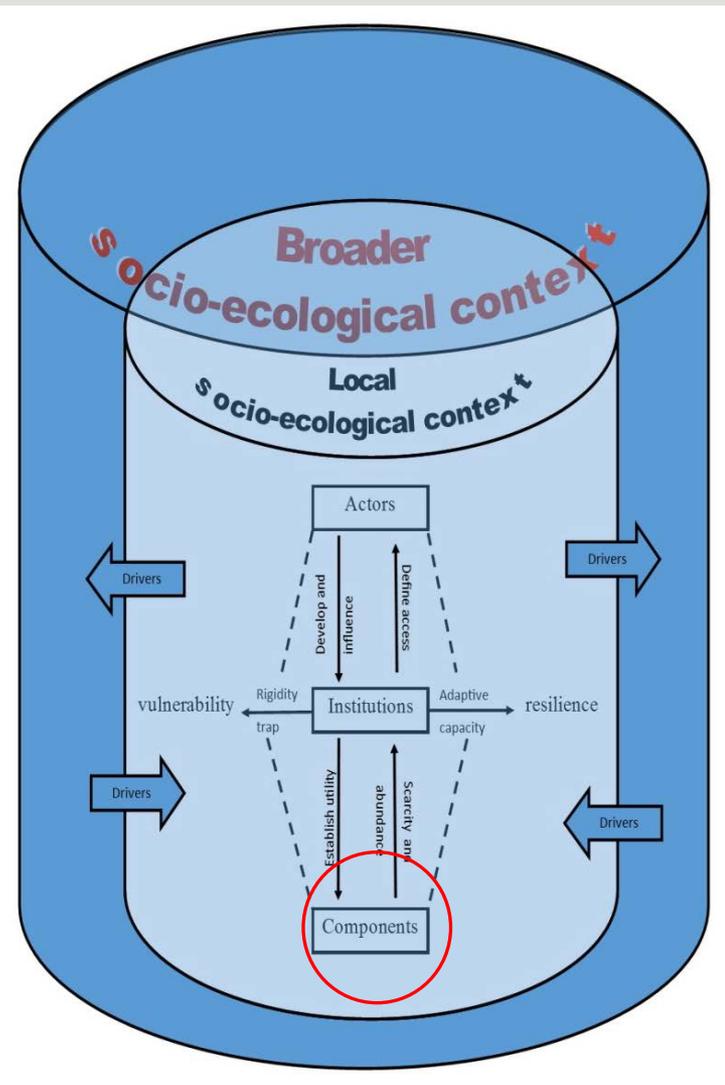


Use of all species of salmon in the Copper River and Prince William Sound, 1994-2014



Brady, Schultz, et al. 1990; Clark, McBride and Timmons 1994; Morstad, et al. 1996; Taube and Sarafin 2001; Hollowell, et al. 2007; Botz and Somerville 2011; Somerville and Maclean 2014; Wiese, et al. 2015; Fall, et al. 2016; Alaska Department of Fish and Game, Division of Sport Fish 2016.

# What are the components of the system?



Chinook (king) salmon  
*Oncorhynchus*



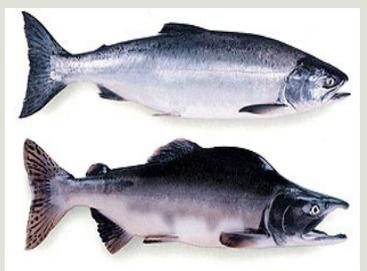
Sockeye (red) salmon  
*Oncorhynchus nerka*



Coho (silver) salmon  
*Oncorhynchus kisutch*

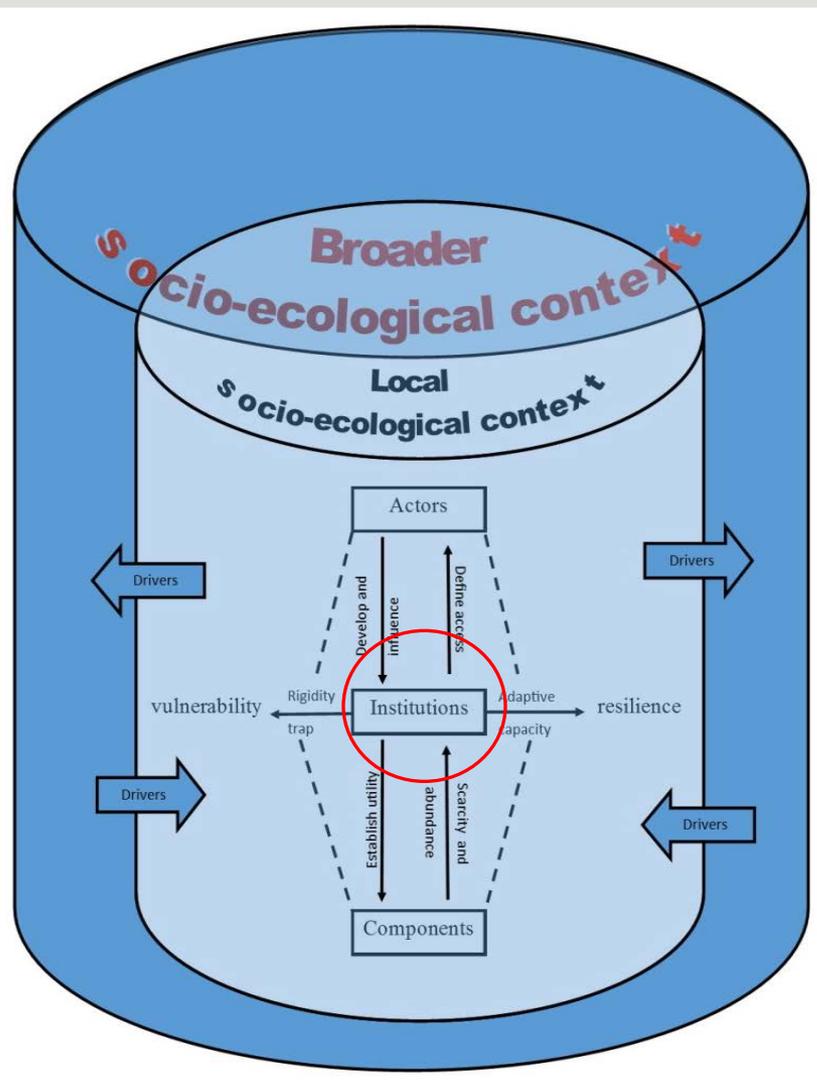


Chum (dog) salmon  
*Oncorhynchus keta*



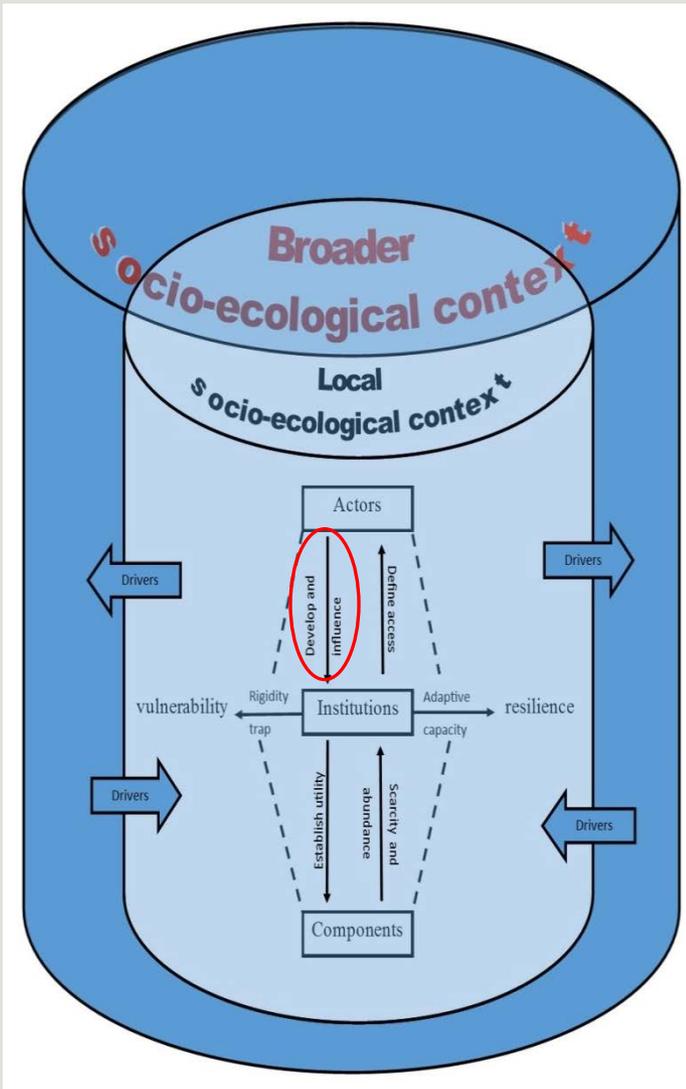
Pink (humpy) salmon  
*Oncorhynchus gorbuscha*

# What institutions govern the system?



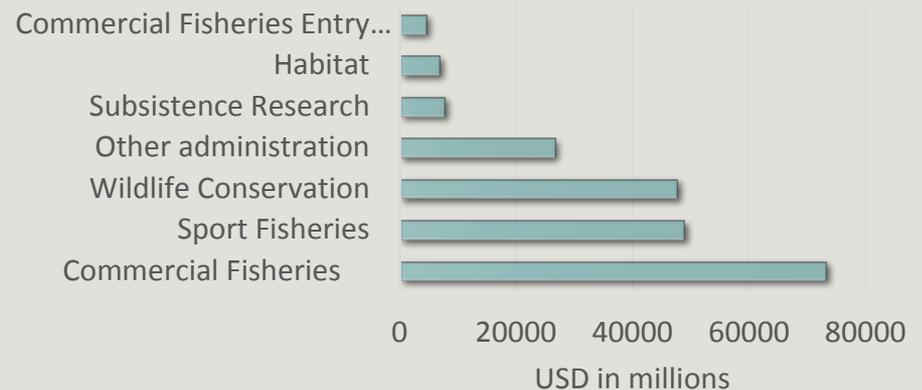
- Formal management system
  - Dual management structure between State of Alaska Department of Fish and Game and the Federal Office of Subsistence Management
- Non-binding international norms and law
  - Code of Conduct for Responsible Fisheries
  - Voluntary sustainable seafood certification programs
- Informal cultural and social norms
  - Traditional indigenous management systems
  - Social constructions of adulthood, in particular masculinity
- Capitalist economics

# “Where is the board of habitat?”

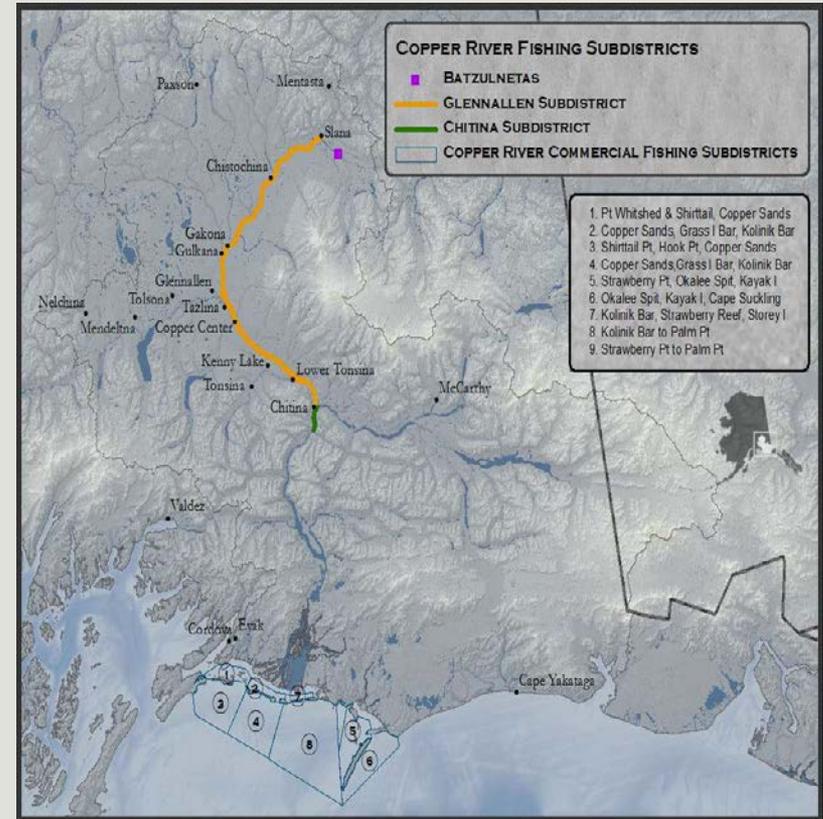
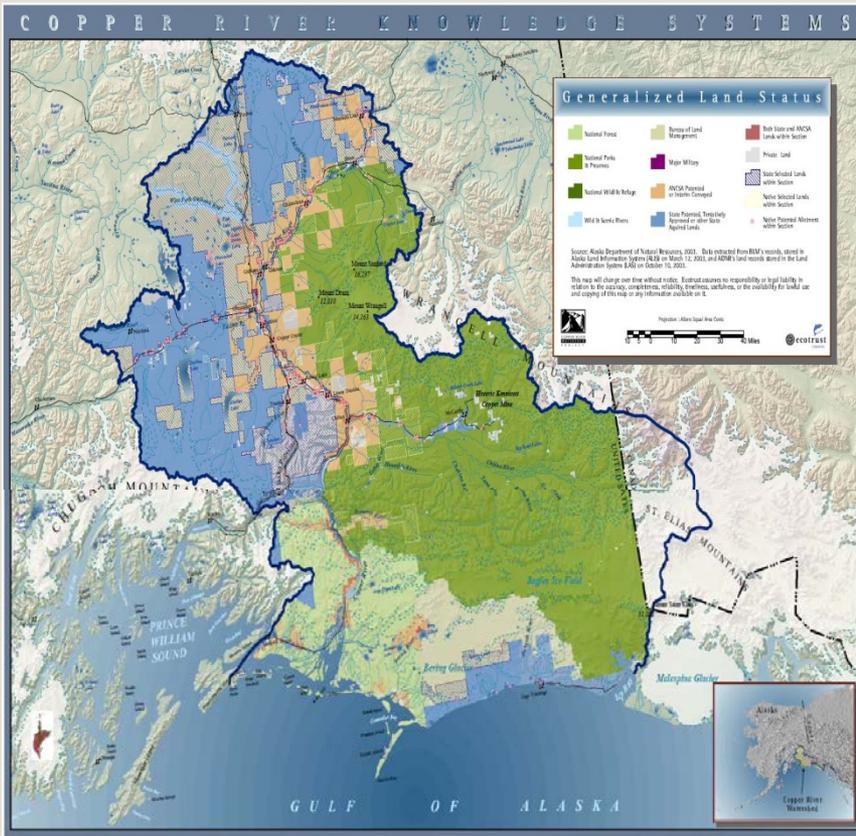


- Actors’ abilities to influence the development of institutions are most often reflective of access to various forms of capital.
  - Board of Fish
  - Allocation of resources to research
  - Which ADF&G divisions have management authority

## Alaska Department of Fish and Game FY2015 expenditures by Division

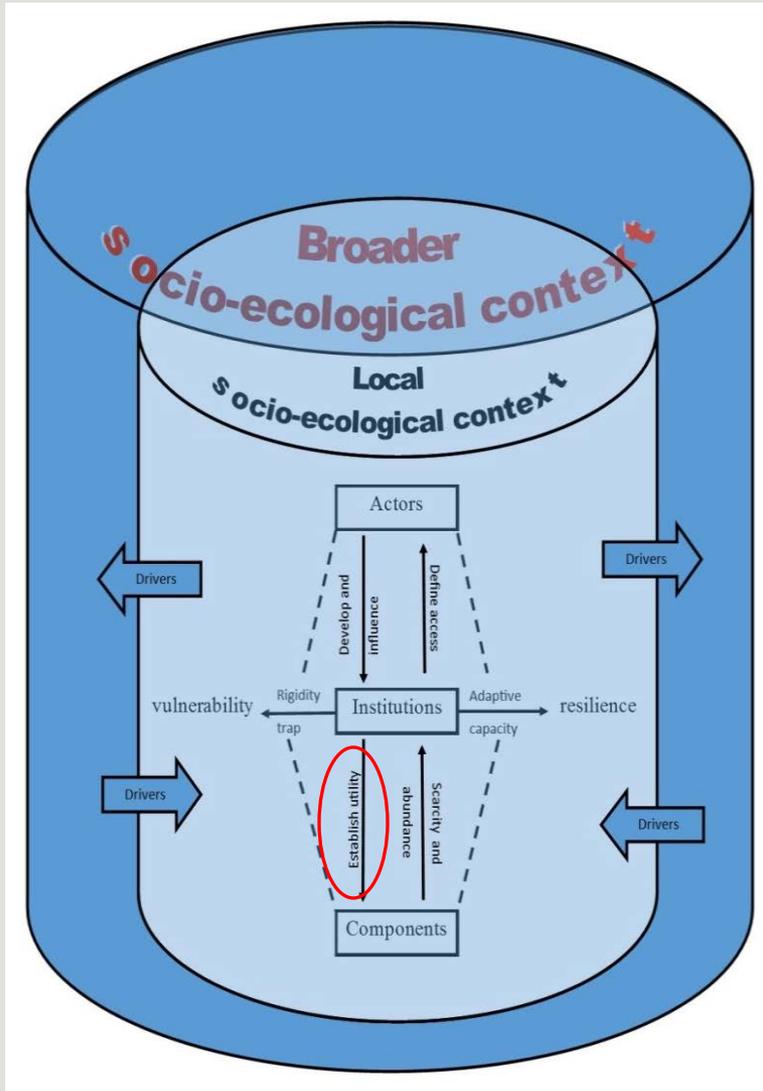


# Fragmentation



- Actors always emphasize what they know. Salmon fisheries management is fragmented geographically between upriver and downriver, creating divides regarding use and allocation of resources.

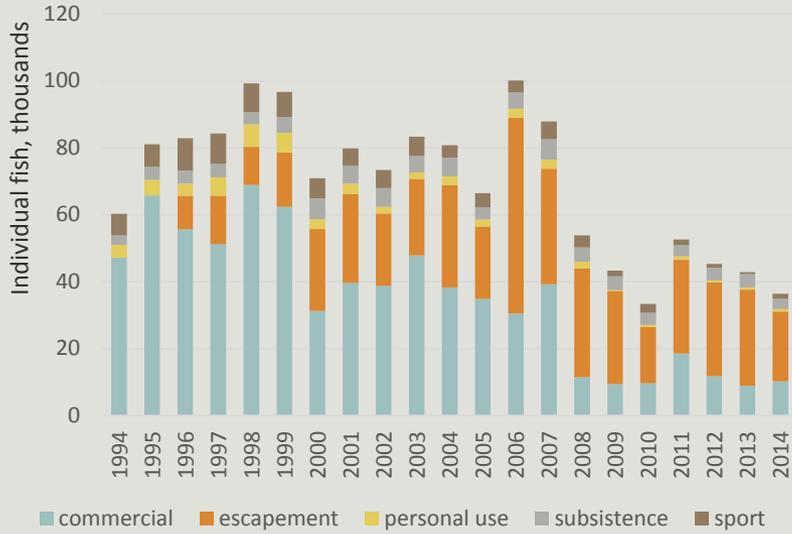
# Extractive ecosystem services are heavily emphasized



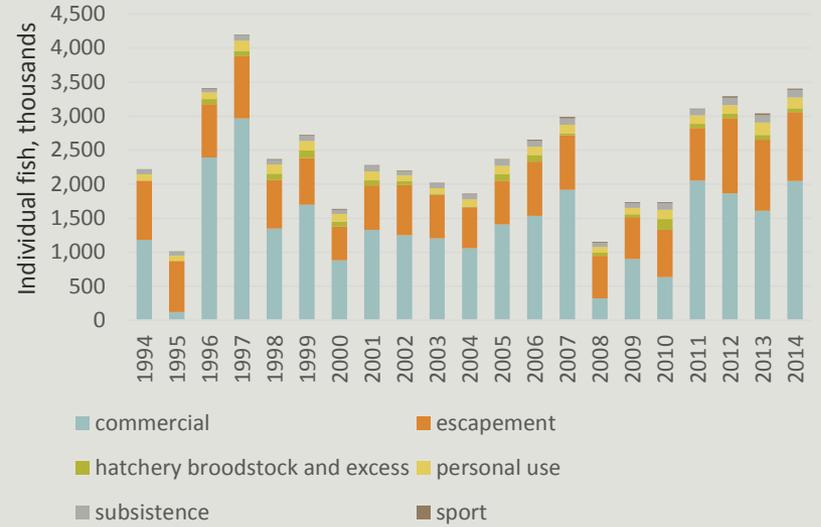
Use of all species of salmon in the Copper River and Prince William Sound, 1994-2014



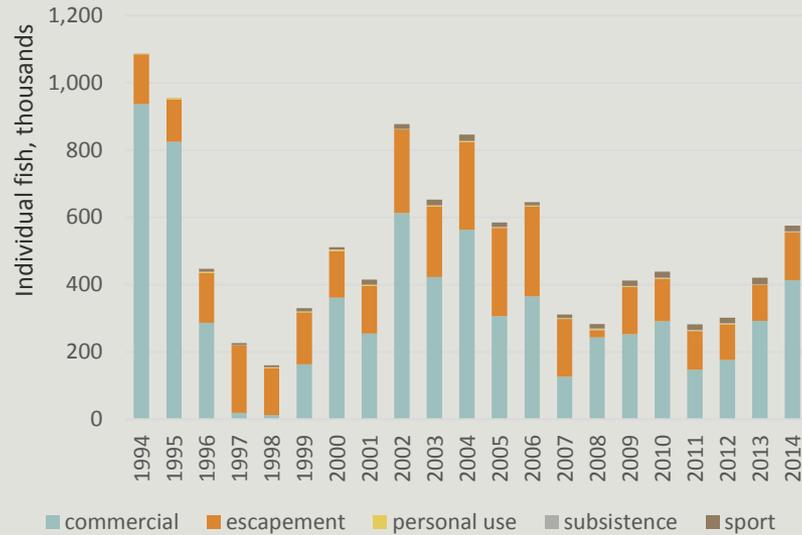
### Use of Chinook salmon, 1994-2014



### Use of Sockeye salmon, 1994-2014



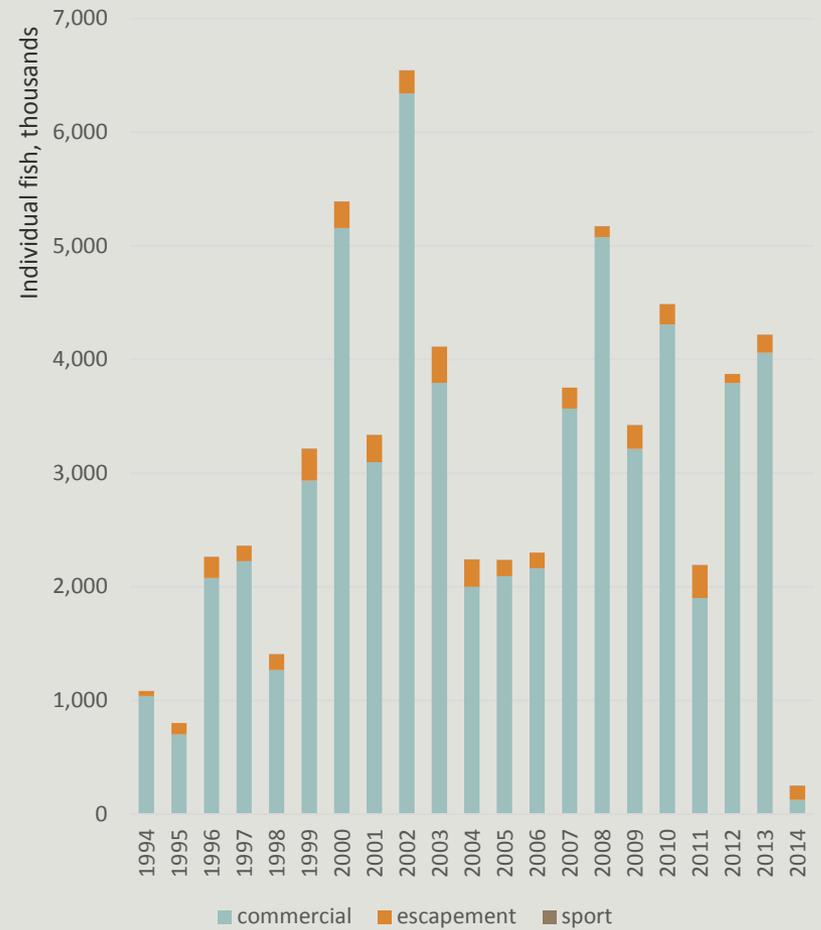
### Use of Coho salmon, 1994-2014



### Use of Pink salmon, 1994-2014

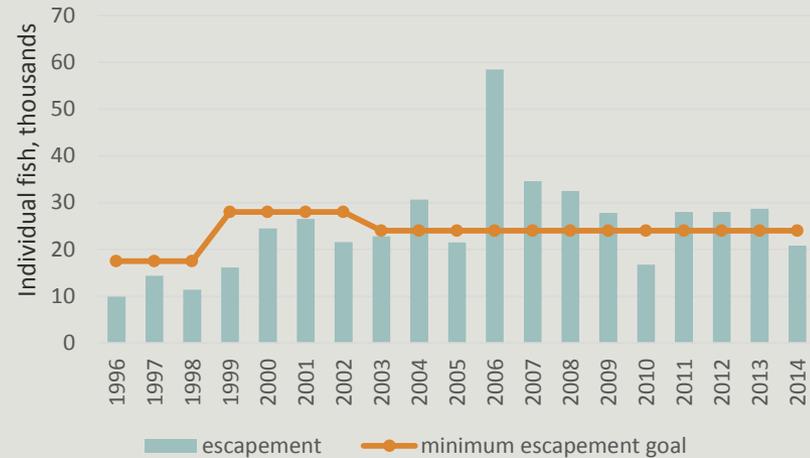


### Use of Chum salmon, 1994-2014

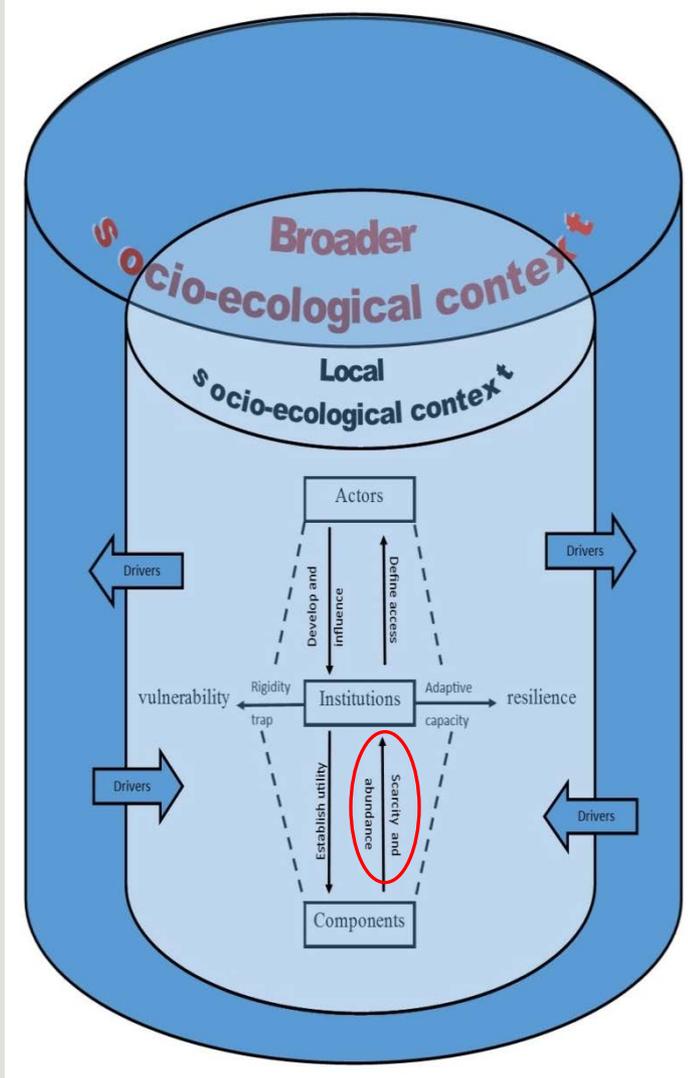


# Scarcity and abundance drive decision-making within institutional structures

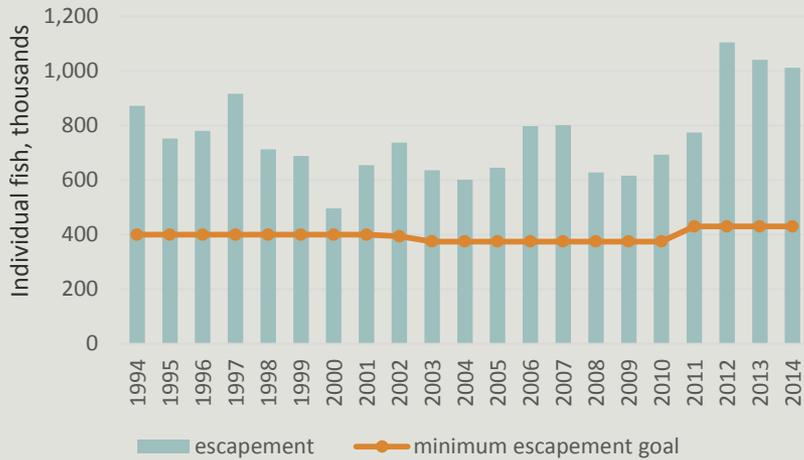
Estimated Chinook salmon escapement for the Copper River, 1996-2014



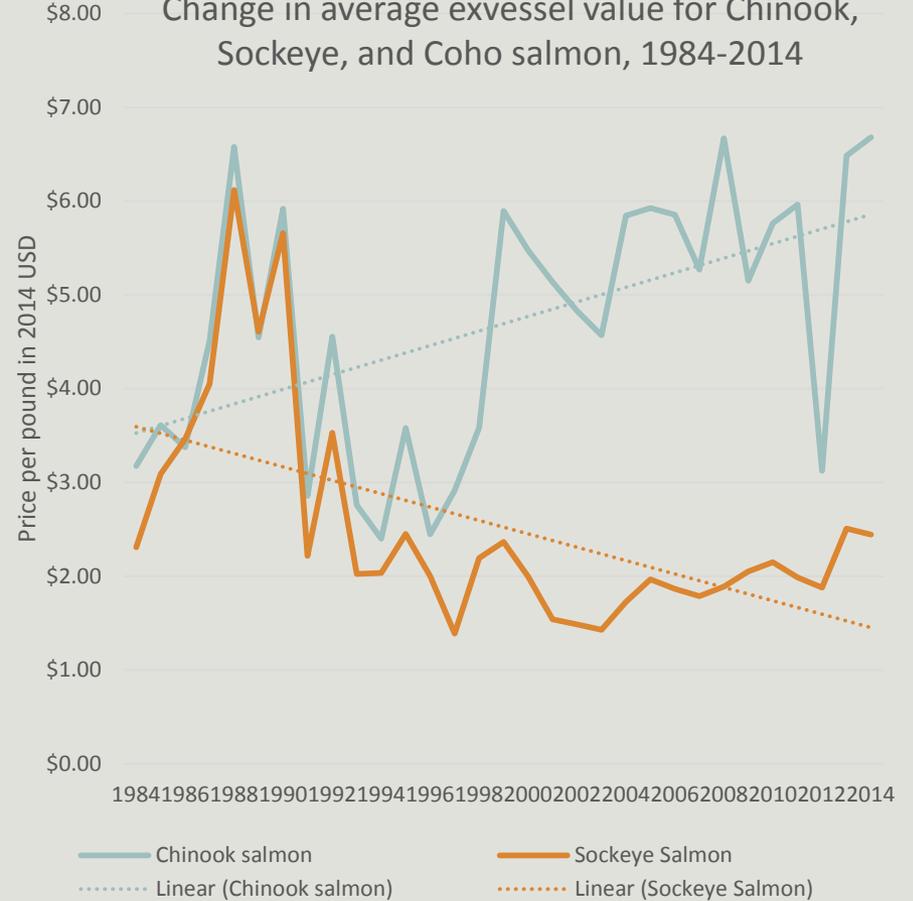
Commercial harvest of Chinook salmon, 1994-2014



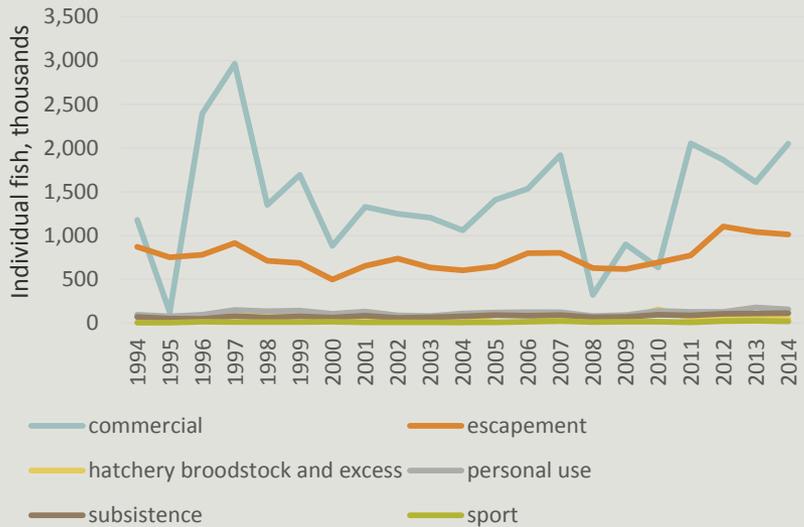
### Estimated sockeye salmon escapement for the Copper and Bering Rivers, 1994-2014



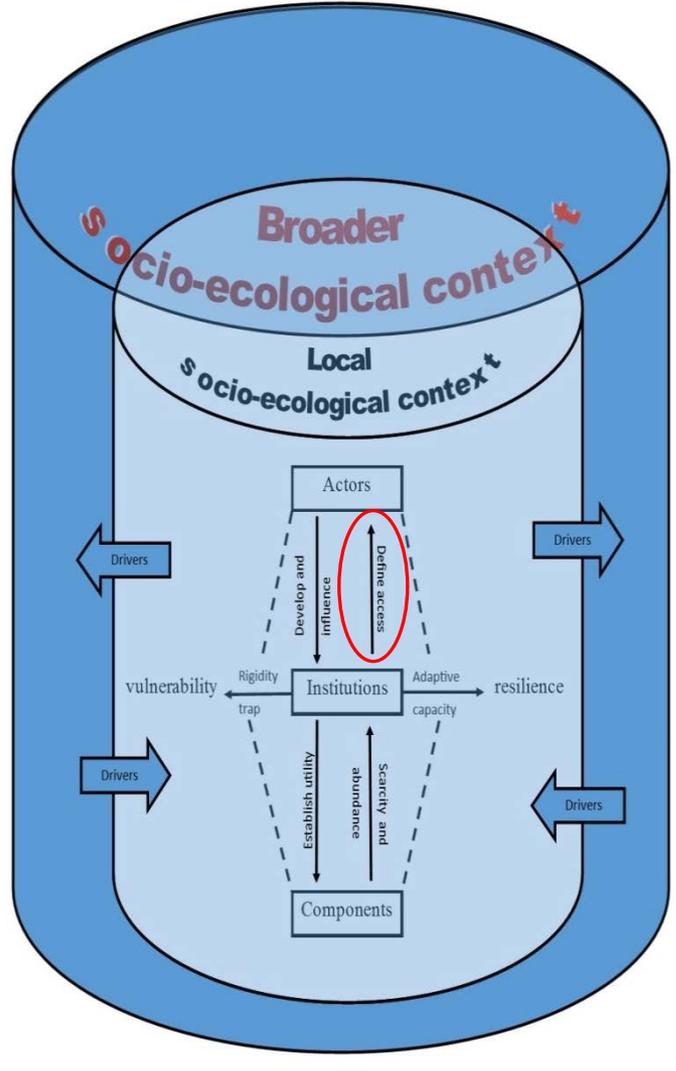
### Change in average exvessel value for Chinook, Sockeye, and Coho salmon, 1984-2014



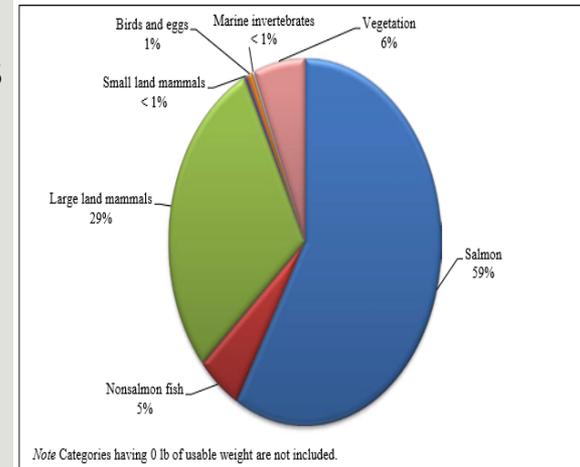
### Use of Sockeye salmon, 1994-2014



# Access to resources has direct implications on resilience



"We are no longer secure on the land which had been ours for centuries. New laws make it hard for us to hunt for food when we need it. We must buy food and there are not enough jobs for our people" (Tanana Chiefs Conference, quoted in Hunt, 1976).



Note Categories having 0 lb of usable weight are not included.  
 Figure 2-8.—Composition of harvest by resource category in pounds usable weight, Glennallen, 2013.

Technical Paper 405, ADF&G, 2013.

"People in Alaska, they like to catch and keep and eat the fish from the rivers, and to tell an Alaskan that he's trying to go fishing and he can't keep the fish that he just caught is kind of like a foreign language to most people, and so that's a tough one to swallow.... I would say that my business was down 90% this year.... And we're not talking this is just something that I do for beer and peanut money. This is how I make my living, and my living is directly influenced and impacted by the decisions that are made out in Cordova" (Recreational guide, 2012)

# Some preliminary conclusions

Institutions that promote resilience:

- Are a good fit for the socio-ecological system
- Representative of the diversity within the socio-ecological system
- Are able to handle uncertainty
- Have the capacity to learn and adapt to changing conditions

The Copper River salmon management system:

- Is fragmented
- Represents diversity of uses but doesn't necessarily represent those uses equally
- Is not well designed to preserve biodiversity
- Is able to handle uncertainty to an extent
- Is able to learn and adapt to an extent

