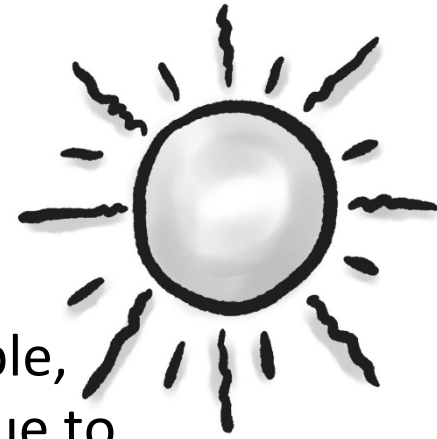


# Uncertainty: Climate Change

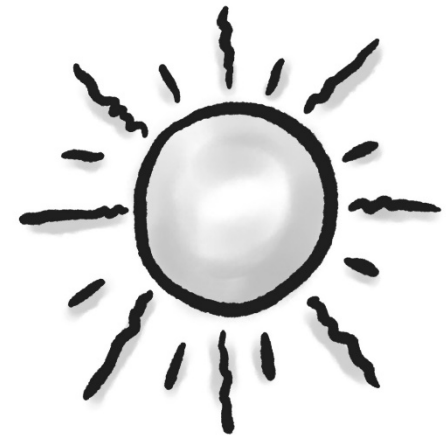
## Past Implications



- The system in the past 50 years has dried as available, measured water. Much faster than precipitation, due to warming temps.
- Changes in the trends are seasonal, seasonal variations impact salmon differently
- Less snow pack at lower elevations
- Increase turbidity, decrease salmon
- River has changed physical course and character
- Introduction of new species or suitability
- Increased frequency of wildfires
- Increase erosion, decreased cover increased stream temps.
- Increasing productivity generally
- Increase sport fishing, longer season extending to year-round

# Uncertainty: Climate Change

## Future Implications



- Water temperature changes
- Greater time spent in lethal temps for salmon
  - Primarily in non-glacial rivers/streams
- Loss of intolerant species
- More interaction with invasive plant species
- Increasing utility to active regions by the rest of the world – population and marine traffic due to open arctic marine
- Increase population, climate refugees
- Early emergent timing for juveniles in the spring
- Changes in hydrological regimes – melt, glacial, wetland drying – different seasonal hydrographs (Saltwater intrusion in freshwater)
- Rising sea levels

# Uncertainty: Regional Economy

## Past Implications



- Boom and bust - (driven by oil and gas)
- Alaska has tended to act as a trading post – lack of manufacturing and value adding and more exporting of natural resources
- Changes in the refuge boundaries in the 1940s enabled oil and gas development
- Healthcare needs have grown dramatically
- Land use in SC has changed from land productivity to focused on selling land for residential uses instead
- Limited zoning, few resections on private development
- Trophy fishing has been a driver of tourism
- Single commercial fishing industry for last century in the Kenai
- Increase in regulatory regimes
- Ending of fishing traps
- More complex and interrelated management system for the river

# Uncertainty: Regional Economy

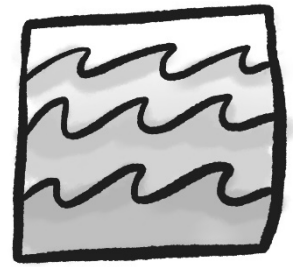
## Future Implications



- More people growing local food due to longer season
  - Agriculture increase
- Potential water supply issues
- May limit the retiree tax benefits
- Greater demands on resources including byproducts
- LNG industrial traffic
- Significant population increases
- Potential for transportation access from Anchorage – ex. Ferry system or bridge to anchorage
- Increase the culture due to increase in population – ex. more urbanized
- Partial size shrinking
- Decrease in sport fish guided industry due to crowding
- Limited access for public to rivers
- Boom and Bust (again)
- More blockage of rivers – due to energy flows
- Salmon becoming less important to the economy

# Uncertainty: Ocean Conditions

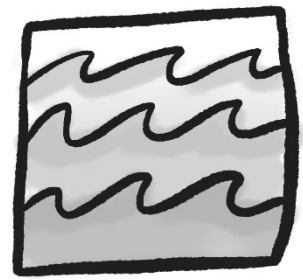
## Past Implications



- Temperature changes affecting run timing
- Salmon abundance increased with 70s warm ocean shift
- It is a big black box that we still don't understand
- Asian economic growth pushing pollution to Alaska shores – impacts?
- Huge changes in global fishing regulations
- Changes in warmer temps = new / different species coming in to Alaska
- Fishermen changing species that they are fishing for due to availability (diversifying of permits)
- Concern for carrying capacity of ocean species
- Increase attention to bycatch now

# Uncertainty: Ocean Conditions

## Future Implications



- Still a big black box
  - Likely to be reactive to problem without understanding causes
- Locally more red tides
- Redistribution of marine populations
- Increase invasive species in ocean, not just freshwater systems
- Ocean acidification
- Salmon run timing affected
- Consumption advisories
- Loss of prey
- Impacts of global disasters, man made or natural – ex. repeat of 1964 earthquake
- Increase in aquaculture due to new technologies
- Relative sea level rise
- Need for increased farming of marine products
- Arctic opening drives increase of traffic and pollution
- More international pressure due to arctic environment
- Might increase local support businesses, associated with oil and gas

# Uncertainty: Increased Population & Competition

## Past Implications



- Loss of habitat
- Greater pressure on resources
- Loosely controlled development
- Road building and fish passage issues
- Changes in harvest selection
- Introduction of impervious surfaces and storm water systems
- Increased use of PU fisheries has changed emphasis away from commercial, which makes it harder to manage escapement – pressure on managers to increase PU allocation
- Increased population makes managing harvest more complex
- More important harbor uses – increased port use
- Increased water pollution impacts the river
- Increasing pressure to have access
- Changing use patterns – sports fishery and boats – PU fishery
- Affects on riparian areas – loss of habitat and regulations
- Loss of Marine derived nutrients – less going upstream
- Increased invasive spp.

# Uncertainty: Increased Population & Competition

## Future Implications

- Changing demographic composition in both users and voters
- More development of marginal areas such as soils that are not suited for use
- Need for long term management plan to be more proactive – see everything in the past
- Less interest in fish and fishery conservation
- Loss of culture, shift of culture to less of a land ethic
- Cumulative increase of pressure use and development on the mouth of the Kenai
- More interest in fish and more conflict
- Less local participation more outsiders coming in to fish
- Increasingly complex regulatory for land use and fishing
- Aggregation and industrialization of harvest activities
- If PFD goes away, benefits to seniors go away, population could decrease – everything above relates to an increase in population
- More likely to have a demographic switch than a population change





# Uncertainty: Sport Fishing

## Past Implications



- Less guided fishing more individual sport fishing overall
- Increased in regulatory complexity
- Focus on trophy fish has led to size selection
- Sport fishing increases pollution
- More catch and release practices in the river
- Increase pressure on resident species
- Impacts on habitat
- Increase of invasive – plants, fish, etc.
- Both positive and negative impacts on local residents (tourism)
- Guide academy, increase educational programs for guides, sport fishing in the classroom
- Political organization to influence policy
- Pressure on city and state parks
- Increased crowding
- Increased bear / wildlife interaction
- Increased conflict with commercial fishing industry
- Allocation changes, changes in escapement goals, etc.
- Drives fluctuations within the local economy, and can be a stabilizer
- Culture of fishing from sport to harvest...
- In the past people would go fish for the frying pan – changing the character of fishing
- Experience of fishing has changed (see two above)

# Uncertainty: Sport Fishing

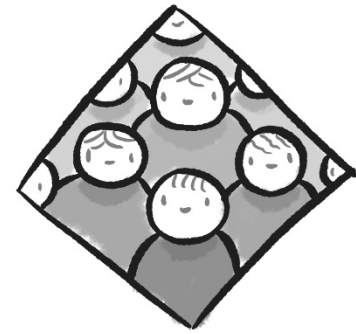
## Future Implications



- Provides pathway for people to connect with resource values
- More reliance on ranched (salmon) and stocked (lakes) fish – fisheries
- Increased fishery you get increased water pollution, water quality, invasive
- With decrease size of kings less interest in sport fishing, trophy fish hunting, or switch to different species e.g. pressure on coho
- Increase in shoulder season, people fish in rivers outside of the Kenai river. Spillover growth.
- Mat-Su increased infrastructure that leads to decrease in fisheries here - What happens in Mat-Su affects what happens here
- Regulatory complexity continues to increase
- More interest in guided fishing
- Increased expectation for harvest returns – which may be contradictory to salmon population trends
- More interest in marine sport fishing
- Increased demand on services – infrastructure; toilets, roads, parking, emergency services, hospitality

# Uncertainty: Personal Use Fisheries

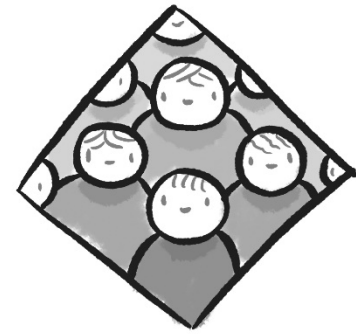
## Past Implications



- River use and congestion in lower river
- Water pollution
- Demand for infrastructure
- Highway traffic
- Management complexity
- Law enforcement
- Social issues
- Shift of where decisions are made (BoF to more political, legislature)
- Significant impact on local government services
- Changes in attitudes and how they utilize salmon, and expectations
- Increased conflict between locals and other alaskans
- Habitat degradation
- High use doesn't correlate to economic gain
- Generated a new niche of dipnet gear
  - Advertised as a party
  - 1996 dipnetting was created as a category
  - Complete different demography – voting perspective as well as fishing
  - Locals move south to places like Kasliof in peak seasons
- Increased awareness of land ethic

# Uncertainty: Personal Use Fisheries

## Future Implications



- Increased regulations
- Increase in the burden of local government to deal with the trash and pollution
- New infrastructure development demands
- Changes to the delivery of sockeye to the in-river allocations and impacts to the sport fishery
- Potential continued pressure on allocation to preferred personal use over sport and commercial
- Continued growth and use has more negative impacts
- We may have more management tools and practices as a result of more people having salmon
- New areas of fishing – pressure may decrease on the Kenai and move to different areas
- Pressure on commercial fishing
- Habitat degradation