



Socioeconomic effects of Chinook salmon declines

Substantial subsistence and relatively small commercial Chinook salmon fisheries sustain the communities along the Yukon River and its major tributaries, yet the runs that support these fisheries are in decline. This report describes the socioeconomic effects of the declines on those small, rural communities.

Introduction

In recent years, Chinook salmon returns to the Yukon River have experienced severe declines, resulting in commercial and subsistence salmon fishing closures, as well as a number of economic disaster declarations. Chinook salmon returns on the Yukon River during the 2009 season failed to meet U.S.-Canadian border passage requirements of the Pacific Salmon Treaty (PST) and some spawning escapement objectives for the State of Alaska. In order to achieve state management goals and PST obligations, commercial fishing was closed on the Yukon River and subsistence harvests were restricted during the 2009 salmon season.

In August 2009, as a result of the closures and the effect of the restrictions on the communities in the region, Governor Sean Parnell requested that the U.S. Secretary of Commerce declare the 2009 Yukon River salmon fishery an economic disaster. In response, the Alaska State Legislature requested that the Alaska Department of Fish and Game (ADF&G) investigate the effects that poor salmon returns had on Yukon River communities. In 2010 and 2011, the ADF&G Division of Subsistence designed and implemented the Yukon River Salmon Disaster Project.

The primary objective was to study the influence of low Chinook salmon returns on fishing patterns and priorities. Specific objectives of the project included documenting multiple aspects of the Yukon River salmon fisheries:

- The effects of Chinook salmon shortfalls on the social organization of fishing activities;
- The locations and gear types used for salmon fishing in different parts of the drainage over time and as related to salmon shortfalls;
- How restrictions have affected subsistence opportunities for Yukon River salmon; and
- Patterns of redistribution of fish within and beyond Yukon River villages via the traditional practices of sharing, barter, and customary trade.

The larger report (*Brown et al. in prep*) and this summary seek to aid lawmakers and managers in addressing those effects on Yukon River residents.

Methods

Principal investigators identified five Alaska communities to represent the cultural, social, and economic diversity present throughout the Yukon River drainage in terms of location, community size, cultural and economic profiles, historical fishing patterns, and contemporary fishing priorities. Study communities were located in three distinct regions: the upper, middle, and lower Yukon River. These communities were Eagle (including Eagle City and Eagle Village), Beaver, Nulato, Marshall, and Emmonak (Figure 1).

Methods of data collection included semi-structured ethnographic interviews (including mapping), participant-observation, and short surveys that tracked exchange practices of sharing, barter, and customary trade. Participation in the project was voluntary and confidential.



Figure 1. Yukon Salmon Disaster Salmon project study communities: Emmonak, Marshall, Nulato, Beaver, Eagle, Eagle Village.



Photo: Alida Trainor, ADF&G

Figure 2. Division of Subsistence Researcher Brittany Retherford works with Nulato residents in a mapping session in the tribal office in Nulato.

Field research included 52 ethnographic interviews with 57 experienced subsistence fishers, or key respondents, identified by the local communities. The key respondent sample was designed to capture the array of fishing experiences along the river; these experiences spanned a timeframe as far back as the 1930s.

Mapping exercises during these interviews recorded locations of historical and contemporary salmon fishing sites, camps, and fishing gear types used (see Figure 2).

Researchers also conducted 172 surveys on exchange practices, including sharing, barter, and customary trade, using the same stratified sampling design as the Division of Commercial Fisheries postseason salmon harvest survey. Because many salmon exchanges occur between fishing households and nonfishing households, the sample included households in all strata of fishing effort, from heavy harvesters to nonfishing households.

Importantly, the survey was intended to describe and quantify the prevalence of different types of exchange involving salmon and to document local views and general trends regarding barter and customary trade; it was not designed to quantify or estimate the actual extent of those practices on a household or community level. According to division standards of research, the survey was confidential in all communities where it was conducted; the Nulato Tribal Council chose not to participate in the survey portion of the project.

This project was conducted concurrently with a federal customary trade enforcement project on the Yukon River. This investigation may have made some community members uncomfortable with participating in the salmon disaster research. Therefore, it is important to note that principal investigators for the disaster research project maintain concerns about survey sample sizes, and, in some cases, the quality of the responses.

Preliminary Findings

Salmon fisheries are a critical component of the mixed subsistence-cash economies of Yukon River drainage communities. Changes to one aspect of these complex systems, such as declines in a particular resource, like Chinook salmon, rarely occur in isolation and will often affect many other parts of the system—and continue to interact and evolve with each other to shape the system as a whole.

Changes often operate at different levels (e.g., household, community, region, etc.) and on different time scales (e.g., short-term, long-term). These different levels of changes create a complex situation for residents of the Yukon River, who have depended on Yukon salmon fisheries for sustenance, exchange, and maintenance of cultural tradition over multiple generations.

Primary Socio-economic Effects

Long term effects of, and adaptive responses to, the changes wrought by the recent pattern of Chinook salmon declines are still in process; the following discussion describes the current moment.

1. **Decline in fish camp use** as a site of cultural, economic, nutritional, and educational values.
2. **Relationship between wage labor and subsistence:** job schedules often interfere with fishing schedules, but also provide the necessary cash for subsistence infrastructure (gas, boats, nets) - especially significant during low runs when the price of gas requires higher levels of efficiency. Loss of commercial opportunity compounds this problem.
3. **Regulations:** while important for conservation, increasing regulations (windows schedule, mesh restrictions, pulse closures) were cited as major impediments to meeting one's needs because they decreased fishing efficiency and usually increased the cost of fishing, in terms of time and money spent.
4. **The cost of fuel/gasoline and food** is increasingly burdensome in most rural villages, compounding problems caused by declining resources as fishers need to use more fuel to harvest.
5. **Dogs:** fishing restrictions can inhibit residents' ability to harvest large quantities of salmon for dog food. Also, changes in gear use—shifts away from fishwheels that efficiently catch fish for dogs towards gillnets used more for people food—have shaped fishing patterns in ways that make the decline in Chinook salmon particularly painful.
6. **Alternative subsistence resources:** strain on residents' capacity to access alternative resources due to regulations, environmental change, and the increased costs of subsistence harvesting mentioned above.

Overall, the study results indicate a very strong reliance on subsistence salmon harvests. However, respondents also reported a variety of serious concerns over changes in their ability to obtain sufficient amounts of salmon to meet their personal needs and to maintain social and cultural traditions related to salmon fishing.

All communities expressed support for the



Photo: Alida Trainor, ADF&G

Figure 3. Unlike other study communities, many Eagle residents continue to support dog teams for transportation, trapping, and as a source of income through guided tours. Consequently, fishing for dogs remains a vital component of summer subsistence activities. Respondents also cited increased reliance on chum salmon in light of Chinook salmon declines. Here, dried fall chum are stored through the winter at the bank of the Yukon River.

essential role of sharing subsistence foods as a way to maintain community and kin relationships and to continue important cultural and social traditions. Figure 4 shows a network of reported and typical barter and customary trade exchanges in all of the study communities combined.

Preliminary review of customary trade and barter surveys indicates approximately 25% of respondents had ever engaged in customary trade, and most reported that they did so because they needed food or money. The annual volume of trade exchanges varied greatly through time and by community. Also, approximately 33% of respondents had engaged in barter, with a majority of these claiming that they did so because either they needed food or someone else needed food (Table 1). Chinook salmon is more frequently exchanged for cash relative to other single resources and is central to all

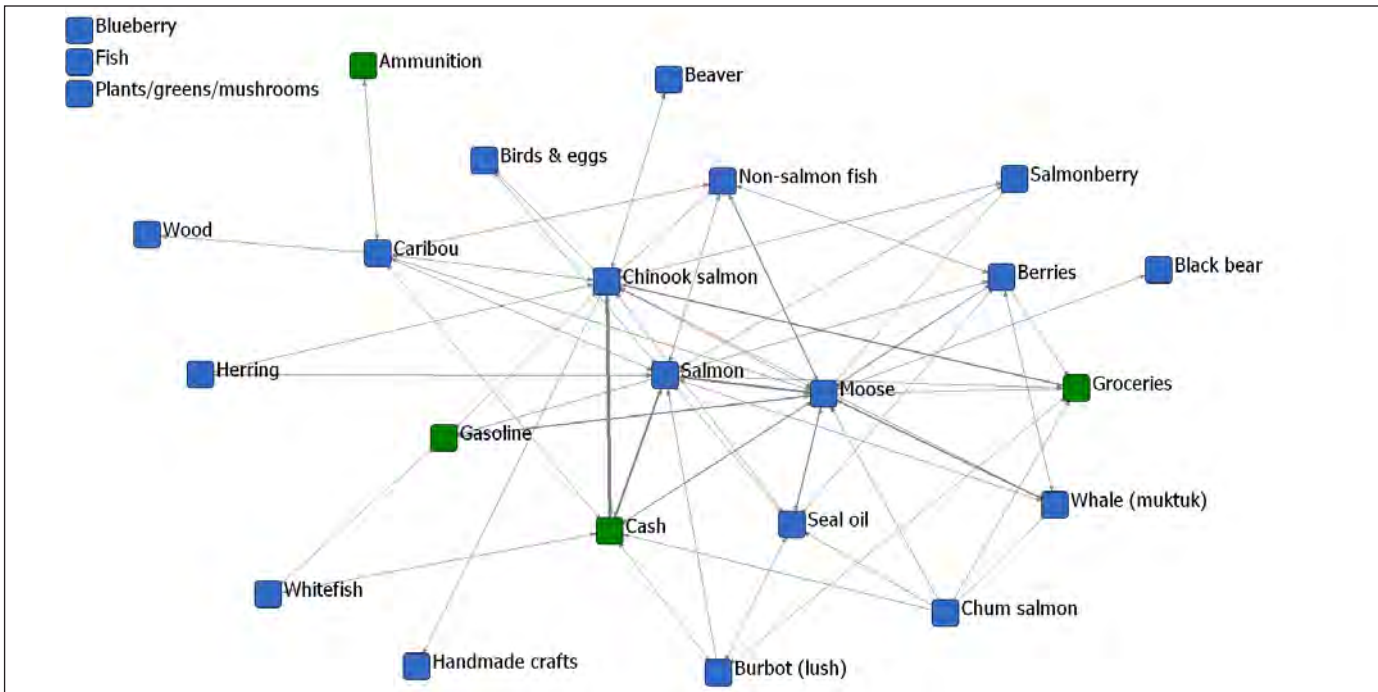


Figure 4. Barter and trade networks, both reported and “typical”, of five Yukon River communities. Blue boxes represent subsistence resources; green boxes are non-subsistence resources. Resources exchanged with greater frequency are found closer to the center of the network; the weight of the line connecting resources indicates the frequency of exchange between them. In all study communities, salmon (primarily Chinook) and moose are at the center of exchange networks.

communities’ exchange networks. Thus, as Chinook salmon decline, the effects of the decline will cascade through the entire economy and continued reductions of this central resource will have widespread effects on Yukon river communities, potentially requiring significant adaptive responses from these communities.


Key questions remain as to how they will respond to this decline over time and how these changes will differ from community to community.

Acknowledgments

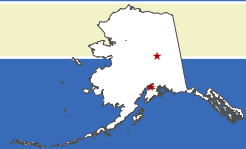
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Table 1. Customary trade and barter in 5 Yukon River communities

Community	% of households sampled	% of households who have ever bartered	% of households who have ever traded	Primary resource exchanged in both barter and trade	Processed type	Primary reason for barter	Primary reason for trade
Eagle	66%	37%	15%	Chinook Salmon	Strips	Household needed fish	Household needed food
Beaver	91%	27%	7%	Chinook Salmon	Jarred	Household needed fish	Household needed food
Nulato				No Data			
Marshall	45%	47%	47%	Chinook Salmon	Smoked	Household needed fish	Household needed food
Emmonak	43%	21%	33%	Chinook Salmon	Smoked	Household needed fish	Household needed food



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