Who's who in the Kenai River Fishery SES: A streamlined method for stakeholder identification and investment analysis

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ABSTRACT

The Kenai River Fishery is a unique social–ecological system (SES) with nearly 50 federal, state, local, and nonprofit groups influencing its political, ecological, and social structure. While ecological data exists for this fishery, the complexity of its stakeholder relationships has not been investigated. Stakeholder interactions can directly influence how science is integrated into management decisions and therefore affect the adaptive capacity of SES, such as the Kenai River Fishery. Drawing from the existing stakeholder literature, this methods identifies and ranks the key SES stakeholders and describes their roles. This study approached the question of which stakeholders should be included in a future SES adaptive capacity study by (1) identifying the key stakeholders within the Kenai River Fishery, (2) ranking each stakeholder’s investment within the fishery using eleven categories of interaction, and (3) using these categories to characterize each stakeholder’s role within the SES. The largest number of stakeholders fall into the secondary investment category, showing that a relatively small number of resource managers are interacting with a large number of diverse nonprofit organizations. The top ranking stakeholders in this study will be invited to attend participatory scenarios workshops that will build the foundation for a deeper scenarios-based analysis of SES adaptive capacity.

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1. Introduction

If you are an Alaskan heading down to the Kenai River to fish, you do not expect a quiet and solitary fishing experience. You know that you’re about to enter one of Alaska’s most notorious social events. The campgrounds are overflowing. Hotels are overbooked. Restaurants have actual wait times. The division between parking lots and roads are blurred. It’s called combat fishing for a reason. Alaskans build their summer schedules around the return of these fish.

The postcard-worthy landscape lures both locals and tourists. The glacially fed Kenai River drains the Kenai Peninsula of Alaska in Southcentral Alaska. It runs 82 miles (132 km) westward from Kenai Lake in the Kenai mountains through the Kenai National Wildlife Refuge and Skilak lake to its outlet into Cook Inlet. Its salmon rich waters draw anglers from all over the world. The river is divided into Upper, Mid, and Lower River sections. The 17.3 river miles of the upper river begin as the river exits Kenai Lake in Cooper Landing, narrowing as it descends through six miles of flat water until it enters Kenai Canyon’s two miles of whitewater and ends at Naptowne Rapids. The mid river consists of a fast moving 19.5 river miles. The Kenai River enters Cook Inlet near the City of Kenai in the Lower River Section, which spans 21 river miles. The last 12 miles of the river is tidally influenced.

Approximately 40 species of resident and anadromous fish live within the waters of the Kenai River and its tidal area. Chinook (Oncorhynchus tshawytscha), Sockeye (Oncorhynchus nerka), and Coho (Oncorhynchus kisutch) salmon are among the most commonly fished species. There are two distinct runs of Chinook: an early and a late run. The early run of kings heads for smaller tributaries and historically arrives in mid-May, peaks in mid-June, and ends in late June. The early king run size has fluctuated greatly within recent years, ranging from 8100 to 16,000 fish [1]. The larger late run of kings averages 56,000 fish [1]. The late run spawns in the main stem of the river, with fish arriving in early July and historically peaks through the end of July. The sockeye also have early and late runs. The early sockeye run is small and disperses through the Russian river drainage system so there is not much angling opportunity. The late sockeye run boasts an annual return rate of one million fish and begins in early July and continues through August. The early silver salmon run begins in early August, and the late run with larger sized fish begins in early October.

To keep up with the mounting pressures, local hatcheries support many of Alaska’s popular fisheries. The Cook Inlet Aquaculture Association (CIAA) was established in 1976 to provide the Cook Inlet drainage with an organized, scientifically-respected...
community responsible for the protection of self-perpetuating salmon stocks and the rehabilitation of salmon stocks and habitat [15]. On the Kenai, both the sockeye and coho runs are hatchery-supported in response to intensive commercial and sport fishing pressure [14]. With an average of 275,000 annual angler-days, the Kenai River Fishery is the most heavily fished river in Alaska [1]. An angler-day is one person fishing for any part of the day. The hatchery is part of a complex network of social and economic relationships that provide structure and support for the CPR fishery. Federal and state agencies, nonprofit organizations, local governments and businesses all work to sustain the biophysical and socio-economic components. The social-ecological system reacts to the environmental changes associated with development, climate change, and management decisions. A SES is defined as the subset of social systems in which some of the interdependent relationships among humans are mediated through interacting biophysical and non-human biological units [6].

The current management structure of the Kenai River is highly contested. The fishery’s users battle over closures and annual allocation regulations [2–4]. Commercial versus sport fishing user conflicts have broken relationships and recently led to a ballot initiative seeking to ban setnetting in Cook Inlet [5]. This conflict is not uncommon. Each user blames the others in the race for a scarce CPR. In the absence of a holistic understanding of the SES, it is difficult to determine what – if anything – can be done to alleviate conflict.

The ecological characteristics of the Kenai River Fishery can be clearly defined in terms of water quality, water quantity, fish abundance, fish growth, and vegetation. Agency and nongovernmental (NGO) scientists collect biophysical data to monitor the health of the fishery and the river. Defining the social and behavioral factors is more complicated.

Long term socio-economic data is very limited for the Kenai River Fishery. Several studies have recognized human impacts on the Kenai River and the need for restoration projects [22,49]. Studies have also looked at the economic impacts of management changes for salmon [27,37]. Other studies have examined Cook Inlet’s highly contested commercial fisheries and local perceptions’ of cultural and ecological sustainability [29,30,31,32].

The need for the inclusion of socio-economic data into decision making processes is becoming more widely recognized within the field of fisheries management [8,18,23,25,26,33,40,46,47]. Scenario development is one way that scientists can build a decision support tool that incorporates both socio-economic and biophysical data. Over the next two years, a team of University of Alaska researchers with expertise in GIS, economics, social science, ecology, and community planning will combine local knowledge with scientific data through a scenarios process. This process will produce a series of storylines, or plausible alternative futures for the region, and identify trends related to salmon abundance. In order to holistically model the SES and its potential future responses to environmental change through scenarios, scientists must closely examine the socio-economic components of this SES. This examination begins with identifying and analyzing the stakeholders.

When faced with the challenge of determining who should be invited to attend our scenarios workshops, I first reviewed the existing stakeholder literature. It is widely agreed that the inclusion of stakeholders in planning processes leads to more effective decision making [7,16,19,43]. Political ecology advocates for the inclusion of socio-political influences in the assessment of environmental issues [45]. There are many different ways to identify stakeholders, including using expert opinion, focus groups, semi-structured interviews, snowball sampling, or a combination of these methods [9,24,35,44]. The challenge is how to efficiently determine which stakeholders should be included in each specific planning process. Kivivts [36] recognizes that "one of the major problems with stakeholder analysis is the time required to analyze the results required by the analyst to reach usable results". Prell et al. [42] state that in order to identify stakeholders, it is first necessary to define the aspect (s) of the system, problem(s), or issue(s) under study.

The aims of stakeholder analysis (SA) are: (a) to identify and categorize the stakeholders that may influence and perhaps transform an organization or a system, (b) to develop an understanding of why changes occur, (c) to establish who can make changes happen, and (d) to discern how to best manage, for instance, natural resources [24,35].

SA is now widely used in political science, development studies and environmental studies [10,11,17,24,39], but implementing SA does have challenges [28]. The first question asked in SA is who (or what) might constitute a stakeholder? The term stakeholder is often associated with corporate management and was first recorded in 1708 as "a person who holds the stake or stakes in a bet" [34]. The modern definition originated in the fields of management studies and business administration [11]. Freeman defines a stakeholder as "any group or individual who can affect, or is affected by, the achievement of corporations’ purposes" [20]. In the context of natural resource management, Pomero and Rivera-Guieb [41] define stakeholders as individuals, groups or organizations who are, in one way or another, interested, involved or affected (positively or negatively) by a particular project or action toward resource use.

There have been many proposed stakeholder categorization schemes, such as primary and secondary [13], actors and those acted upon [35], strategic and moral [21], and generic and specific [12]; but our research required a fast and quantifiable approach to stakeholder inclusion.

2. Methods

Building on the history of identification methods, I narrowly define key stakeholders within this SES as individuals, groups, or organizations with significant investment in the fishery. Investment is broadly defined as a direct and ongoing interaction with a SES component. After conducting a literature review, 47 interviews with Kenai River stakeholders, and two Kenai River scenario workshops, we developed eleven categories of investment based on our findings and the SES components (Table 1). We combined the textual, verbal, and spatial data into thematic categories. The textual data included mission statements, budgets, and maps. I received verbal comments in direct response to questions about organizational activities and interests. The spatial data was collected by the scenario team in a workshop mapping exercise. These categories establish stakeholder investment by quantifying the interactions of the stakeholders with the SES’ various support structures. The most invested stakeholders have a ranking of 10.
The least invested stakeholders have a ranking of 1. If a stakeholder is only invested in 1 of the categories, they have a role within the fishery but are not a key stakeholder in this process.

I used historical documents, meeting minutes, and current website searches to build a list of potential stakeholders within the Kenai River Fishery. I improved this initial list through snowball sampling and semi-structured interviews of natural resource managers and NGOS in July 2015. Once the list was comprehensive, I began research on each stakeholder’s investment.

Textual analysis, phone calls, internet searches, and email verified the investment framework’s ability to determine the key stakeholders. In order to rank as a 1 (yes) in each category of investment, the stakeholder had to have a minimum of one data point supporting that category within the last three years. If the stakeholder had no action in a category with the last three years, they were given a 0 (no). I chose the recent timeframe to ensure that the stakeholders were currently invested. For example, the U.S. Fish and Wildlife Service ranked 1 in the “Revenue Source” category because they funded Kenai River habitat restoration projects through their Coastal Program in 2014.

After I finished the rankings, I submitted the investment rankings to local residents, nonprofit organizations, and agencies for review. After incorporating the recommendations, I finalized the rankings (see Appendices A, B, C). I then divided the stakeholders into three categories using a histogram: Primary (ranking of 9–10), Secondary (ranking of 5–8), and Tertiary (ranking of 3–5). Primary stakeholders engage with advocacy, education, revenue, research, land use planning, and land ownership (see Appendix A). The Kenaitze Tribe is the only resource user in this category, and the only stakeholder that does not engage in regulatory/permitting and resource management. The U.S. Fish and Wildlife Refuge is the only stakeholder that does not have social interest.

3. Results

3.1. Primary stakeholders

Primary stakeholders demonstrate a significant investment within the fishery but are relatively few in numbers. The seven primary stakeholders include state and federal natural resource managers and land owners (see Table 2). Every stakeholder within this category engages with advocacy, education, revenue, research, land use planning, and land ownership (see Appendix A). The Kenaitze Tribe is the only resource user in this category, and the only stakeholder that does not engage in regulatory/permitting and resource management. The U.S. Fish and Wildlife Refuge is the only stakeholder that does not have social interest.

3.2. Secondary stakeholders

There are 12 secondary stakeholders, including state and federal agencies and nonprofit organizations (see Table 3). All of the stakeholders engage with education (see Appendix B). The EPA is the only stakeholder that is not involved with advocacy. ADFG Subsistence is the only stakeholder that does not serve as a revenue source. All of the stakeholders conduct research except UCIDA, KPKA, and KRGA. None of the NGOs possess regulatory/permitting or land management authority. EPA and ADNR are the only stakeholders in this category who participate in land planning. ADNR and KWF are the only land owners. Economic and social interest within this group is fairly scattered, depending on agency and organizational mandates.

3.3. Tertiary stakeholders

The largest number of stakeholders are tertiary. These 19 stakeholders are primarily NGOs (see Table 4). The greatest number of invested stakeholders falls within the education category (see Appendix C). Salamatoff Native Association (SNA), Katchemak Heritage Land Trust (KHLT), and the Mental Health Land Trust (MHLT) are the only land owners. SNA, Army Corps of Engineers (ACOE), and the MHLT are all engaged in land use planning. Alaska Department of Environmental Conservation (ADEC), U.S. Fish and Wildlife Service, and U.S. Geological Survey all participate in resource management. ADEC and ACOE both have regulatory/permitting authority. Investment is scattered across the remaining categories and depends on each organization’s specific mandate.

4. Discussion

The largest number of stakeholders fall into the secondary investment category, showing that a relatively small number of
resource managers are interacting with a large number of diverse nonprofit organizations. The effectiveness of the secondary stakeholders to influence management decisions is not only dependent upon the primary stakeholders' power, legitimacy, and/or urgency [35] but also the stakeholders' perceptions of future change. The NGOs develop their mission statements based on their perception of management needs.

In addition to this framework, the Scenario Team used the 47 stakeholder interviews to produce a Social Network Analysis [38]. Social Network Analysis (SNA) is the study of the relations between actors. It is a quantitative methodology that employs graph theory and sociograms to analyze and visualize social relationships [48], where nodes in the graph represent the actors (or sometimes other observations of interest, such as organizations), and the

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**Table A1**  
Primary stakeholders.

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<th>Revenue source</th>
<th>Research</th>
<th>Regulatory/permitting</th>
<th>Resource management</th>
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edges or lines between them represent their relationships. The SNA confirmed the results of the Investment Framework, identifying the same primary and secondary stakeholders (Fig. 1). The SNA is a different approach to stakeholder identification because it measures communication between the stakeholders – not their investment; but it does provide a reference for the accuracy of The Investment Framework.

For the purposes of our scenarios research, we included all of the primary stakeholders and the four top ranking secondary stakeholders invested in regulatory/permitting and resource management. None of the NGOs were included in our initial workshop but may be included in the future as scenario development progresses.

When compared to relatively general stakeholder identification methods, I found this targeted investment method to yield preferred results. The investment categories allow researchers to easily identify common interests across the stakeholders and better foster dialogue [18]. The investment framework results allowed us to tailor the participant lists for our Kenai River workshop. This was vital to our research because each workshop required a very specific set of stakeholders, beginning with the natural resource managers, then the NGOs, and then the general public.

The key desired social components of an SES can now be determined through stakeholder meetings or surveys that reveal which components are vital to supporting social, ecological, and economic needs. These results also enable us to conduct a Social Network Analysis on the stakeholders, which provides additional insight into stakeholder characteristics and community adaptive capacity.

5. Conclusion

There is no single ‘silver bullet’ approach to stakeholder identification and assessment, but developing a relevant investment framework is a straightforward way to quantify stakeholder involvement. This method allows researchers to rank stakeholders based on their specific goals and objectives as opposed to casting too wide or too narrow of a net. Researchers do need to spend a considerable amount of time clearly defining their goals and objectives to properly develop an investment framework, but this focus greatly streamlines the identification process. It may be worth investigating the use of a general investment framework applicable across a wide range of natural resource issues.

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Appendix A

See Table A1.

Appendix B

See Table B1.

Appendix C

See Table C1.

References


