Marine Policy 48 (2014) 134–141

Contents lists available at ScienceDirect

Marine Policy

journal homepage: www.elsevier.com/locate/marpol

Alaskan fishing community revenues and the stabilizing role of fishing portfolios

Suresh Andrew Sethi [a,*], Matthew Reimer [b], Gunnar Knapp [b,1]

[a] Alaska Pacific University, Department of Environmental Science, 4101 University Drive, Anchorage, AK 99508, United States
[b] University of Alaska-Anchorage, Institute of Social and Economic Research 3211 Providence Drive, Anchorage, AK 99508, United States

ARTICLE INFO

Article history:
Received 18 January 2014
Received in revised form
20 March 2014
Accepted 20 March 2014
Available online 12 April 2014

Keywords:
Fishing community
Portfolio
Economic risk
Alaska

ABSTRACT

Fishing communities are subject to economic risk as the commercial fisheries they rely on are intrinsically volatile. The degree to which a community is exposed to economic risk depends on a community's ability to confront and/or alter its exposure to volatile fishery conditions through risk-reduction mechanisms. In this article, economic risk – as measured by community-level fishing gross revenues variability – is characterized across Alaskan fishing communities over the past two decades, and exploratory analyses are conducted to identify associations between community attributes and revenues variability. Results show that communities' fishing portfolio size and diversification are strongly related to fishing revenues variability. Communities with larger and/or more diverse fishing portfolios experience lower fishing revenues variability. Portfolio size and diversification appear to be related to the number of local fisheries, indicating that communities' portfolios may be constrained to the set of local fisheries. Hotspots of relatively higher fishing revenues variability for communities in north and west Alaska were identified, mirroring the spatial distribution of fishery-specific ex-vessel revenues variability. This overall pattern suggests that a community's fishing portfolio – and hence its exposure to risk – may be "predetermined" by its location, thereby limiting the policy options available to promote economic stability through larger and/or more diverse fishing portfolios. For such communities, diversifying income across non-fishing sectors may be an important risk reduction strategy, provided any potential negative cross-sector externalities are addressed.

1. Introduction

While the majority of Alaskan commercial fisheries are sustainably managed [1], Alaskan fishing communities experience a range of social, economic, environmental, and biological stressors. The 1996 re-authorization of the Magnuson–Stevens Fishery Conservation and Management Act requires that fisheries managers consider the impacts of fisheries regulations on fishing communities [2], and a pressing concern in fisheries management is to understand the current status of fishing communities and the mechanisms that drive community dynamics. Particular interest lies in identifying which characteristics, if any, are associated with a community's ability to withstand and adapt to the range of stressors affecting fishing communities [3,4]. With knowledge of attributes associated with fishing community resilience, managers can identify potentially controllable factors through which policy goals for sustainable fishing communities can be achieved, as well as highlight communities that are particularly vulnerable as candidates for more proactive and targeted policies.

Commercial fisheries upon which fishing communities rely are intrinsically volatile due to variable market conditions, fluctuating catches and stock dynamics, changes to fishery regulations, and environmental change [5–7]. It follows that communities that are dependent on revenue flows from these fisheries may be subject to significant economic risk—communities are more likely to experience periodic low revenue flows when fishing catches and prices are highly variable due to unpredictable fishery conditions. The degree to which a community is subject to economic variability, however, depends on a community's ability to confront and/or alter its exposure to volatile fishery conditions through risk-reduction mechanisms. For instance, a community may experience lower exposure to volatile fishery conditions if its revenues flows are diversified across a variety of fisheries, similar to a crop diversification strategy practiced by farmers [8,9]. However, fishing communities may differ in the opportunities available to diversify their portfolio of fishing revenue flows due to differences in their proximity to commercial fisheries or differences in fleet characteristics which promote or constrain participation in diversified fisheries, inter alia.

* Corresponding author. Tel.: +1 907 399 3998.
E-mail addresses: sasethi@gmail.com (S.A. Sethi), mnreimer@uaa.alaska.edu (M. Reimer), gunnar.knapp@uaa.alaska.edu (G. Knapp).
[1] Tel.: +1 907 786 7717.

http://dx.doi.org/10.1016/j.marpol.2014.03.027
0308-597X/

Fishing revenues are only one of the multiple dimensions which make up fishing communities; however, characterizing the status and drivers of economic variability is particularly important for communities whose economic base relies on the inflow of commercial fishing revenues, like many isolated fishing communities in Alaska [6,10–12]. The degree to which community-level gross fishing revenues have varied over recent history has not been systematically characterized across the state. For example, do communities across the state experience similar revenue variability, or are there hotspots of high or low variability?

In this paper, we conduct an exploratory analysis of observed levels of risk – i.e. the chance of experiencing a bad revenues outcome – in Alaskan fishing communities with the following three objectives: (i) characterize community-level fishing gross revenues risk across Alaskan fishing communities over the past two decades; (ii) identify associations between fishing community attributes and revenues risk, with a particular focus on the influence of fishing portfolios in mitigating risk; and (iii) discuss community attributes associated with fishing revenue variability and fishing portfolio composition in the context of natural resource management policy and future research directions to promote understanding of fishing community dynamics.

Diversifying fishing activity over a variety of fisheries is an important mechanism through which fishing communities may be able to reduce economic risk [13–16]. The benefits of having a diversified portfolio of fishery revenue flows is analogous to the benefits of a diversified portfolio of risky assets; diversification can lower the variance – and thus the risk – of a portfolio's return, potentially below the variance of the least risky asset. In general, the larger the number of assets in a portfolio, the greater the benefits of diversification [17]; however, the effectiveness of portfolio diversification depends on the correlation between asset returns. The benefits of diversification are enhanced if assets are negatively correlated, noting that risk reduction can still occur with positively correlated assets cf. [18]. Commercial fishermen in Alaska have a wide range of fisheries in which they can participate, with each fishery differing by its target species (e.g. crab, herring, salmon, halibut), gear type (e.g. purse seine, gillnet, pot gear), and geographic location (e.g. Bristol Bay, Prince William Sound, Southeast Alaska). The degree of diversification in a community's fishery portfolio is therefore determined by the variety of commercial fisheries in which its residents participate.

In a separate analysis, Sethi et al. [19] collated a database of community-level metrics which provides information on the status of multiple dimensions of fishing communities. Metrics are partially or fully available for 324 Alaskan fishing communities over 1980–2010 and include community-level information on population, fishing opportunities, fleets, fishermen experience, and landings. These metrics are used in exploratory analysis of the relationship between variability in community-level fishing gross revenues and the following fishing community attributes: the size and diversity of a community's portfolio of fishing revenue flows, investment into fishing vessels, geographic location and proximity to fishing opportunities, and community demographics such as population size and fishing tenure. While the set of metrics used in this analysis may not fully characterize the myriad dimensions which drive fishing communities' revenue variability, we contend that they provide a good starting set of attributes for understanding the mechanisms underlying community-level economic risk. As an example, it is expected that fishing communities with larger fleet investments and more fishing experience would encounter less revenue variability since newer, larger, and better equipped vessels with more experienced captains may be able to take advantage of peripheral fishing areas and occasions – and thus revenue opportunities – that they would not be able to otherwise exploit.

Regression analyses indicated that communities' fishing portfolio size and diversification were strongly related to community-level fishing gross revenues variability, controlling for community size, fleet investments, and fishermen experience. Policies which restrict fishermen's and thus communities' abilities to diversify revenues flows over multiple fisheries could therefore lead to increased risk exposure. Portfolio size and diversification appeared to be related to the number of local fisheries, indicating that the composition of communities' fishing portfolios may be constrained to the set of local fisheries. Our results indicated hotspots of high community-level fishing gross revenues variability in north and west Alaska, with relatively lower community levels fishing revenues variability in the southern and eastern parts of the state, mirroring the spatial distribution of fishery-specific ex-vessel revenues variability [5]. This overall pattern suggests that a community's fishing portfolio – and hence its exposure to risk – may be "predetermined" by its location, thereby limiting the policy options available to promote economic stability through larger and/or more diverse fishing portfolios. For such communities, diversifying income across non-fishing sectors may be an important risk reduction strategy, provided any potential negative cross-sector externalities are addressed.

2. Methods

2.1. Definitions and data

Residents of Alaskan communities have a variety of state- and federally-managed commercial fisheries in which they can participate, spanning multiple targeted species, gear types, and management institutions. Commercial fisheries managed by the State of Alaska include all fisheries that occur within 3 nautical miles (nm) from shore and a subset of fisheries in federal waters >3 nm offshore within the U.S. exclusive economic zone but for which management is delegated to the State (e.g. crab fisheries). State-managed fisheries are dominated by limited entry programs, the majority of which allow the transfer of permits between individuals through sale or bequest [20]. At present, permit leases for state-managed fisheries are not allowed except in medical emergencies. U.S. federally-managed fisheries in Alaskan waters occur greater than three nautical miles offshore and are managed by some form of limited entry (e.g. the Central Gulf of Alaska groundfish trawl fleet) or catch share (e.g. the sablefish Individual Fishing Quota fleet) program. State- and federally-managed fisheries off Alaska are prosecuted by a wide variety of vessels, ranging from small skiffs using longlines to catch halibut, to large catcher processors which catch and process pollock in the Bering Sea.

Under State law, Alaskan commercial fisheries are stipulated by taxa (either a species such as Pacific herring, *Clupea pallasii*, or group such as Pacific salmon, *Oncorhynchus* spp.), fishing district, and gear type. Any individual that partakes in commercial activity in state waters, including harvesting or landing catch from a state- or federally-managed fishery, requires a fishery-specific permit issued by the Alaska Commercial Fisheries Entry Commission (CFEC). For example, a S03T CFEC permit is required to operate in the salmon (S) drift gillnet (03) fishery in Bristol Bay (T), Alaska. Overall, 20,275 CFEC permits were issued across 205 fisheries in Alaska in 2010, 15,475 of which were held by Alaskan residents with the remainder owned by non-Alaskan U.S. citizens. The CFEC tracks commercial landings by permit, permit ownership, and permit-holder residency information, and publishes data on fishing vessels registered in the State (e.g. length and engine horsepower). The CFEC assigns each permit-holder a unique file number which can be used to cross-reference residency, permit ownership, and vessel information. As such, the set of fishing