JIMAR ANNUAL/FINAL REPORT FOR FY 2012

P.I. NAME: PingSun Leung, Shawn Arita, and Stewart Allen

NOAA OFFICE *(Of the primary technical contact)*: Pelagic Fisheries Research Program

NOAA SPONSOR NAME: Pelagic Fisheries Research Program

PROJECT PROPOSAL TITLE: The Role of Social Networks on Fishermen Economic Performance in Hawaii's Longline Fishery

FUNDING AGENCY: Pelagic Fisheries Research Program

NOAA GOAL *(Check those that apply)*:

- ✓ To protect, restore, and manage the use of coastal and ocean resources through ecosystem-based management

- ☐ To understand climate variability and change to enhance society's ability to plan and respond

- ☐ To serve society's needs for weather and water information

- ☐ To support the nation's commerce with information for safe, efficient, and environmentally sound transportation.

- ☐ Mission Support

PURPOSE OF THE PROJECT *(One paragraph)*:
This project seeks to examine the role of Social Network Capital on vessel economic performance in the HLF. With an ethnically fragmented participation structure, the HLF offers an interesting case to examine the economic effects of social networks on natural resource users. Our research framework combines two methodological tools: Social Network Analysis (SNA) and stochastic production frontier/econometric analysis. Unfortunately, due to restricted program funding for PFRP, our second year plan of work in linking an economic analysis to the SNA was not funded. This report covers only the accomplishment from the first year of support.

COMPLETION OF OBJECTIVIES AND PROGRESS DURING FY 2012 *(One-two paragraphs)*:
Include a comparison of the actual accomplishments to the objectives established for the period, along with reasons for the slippage if established objectives were not met

The goal of the first fiscal year of this project was to complete the first objective as listed in the proposal: **Perform a Social Network Analysis of the HLF.**

The following objectives were met:

    a. <u>Map out the entire social network structure of the HLF.</u>

Three separate surveys were designed to measure the social linkages for members of HLF and their individual social capital for vessel owners, vessel captains, and owner-operators that were carefully tailored. Our field team was successful in administering the social network questionnaires obtaining almost the complete population of fishermen (response rate of 91.2%). With the sociometric network information collected, we applied social network analysis tools to map out the network structure of all fishers in the HLF and assess the patterns of social linkages. Using the UCINET suite of social network programs we were able to visually show the social network structure of the fishery and map out the social network structure by ethnic groups (See figure 1 below).

    b. <u>Describe the mechanisms and processes which lead to development of social networks within the longline fleet.</u>

To investigate the mechanism and processes which lead to the development of social networks within the longline fleet, we examined socio-demographic and information sharing characteristics of the HLF fishers. We then conducted a thorough social network analysis of the fishery. The principle sociometrics examined in this study were:

    1) Component analysis
    2) Relational Contingency Table analysis (RCT)
    3) K-Core analysis
    4) Cut-point analysis

Ethnicity was identified as the primary factor influencing the social network structure of the HLF. The component and RCT analysis confirmed that there was a strong homophily effect by ethnic groups. The K-Core and Cut-point analysis identified the characteristics of these different social networks group.

    c. <u>Calculate measures for Social Network Capital based upon individual levels of social connectedness and Ethnic-Social-Capital (aggregate measures of social capital) across groups.</u>

We calculated various sociometrics to explore the level bonding, bridging, and linking social network capital for each community of fishers, and for the HLF as a whole. We found that while the Vietnamese-American and Korean-American ethnic groups were characterized by a bonding social network structure, the Euro-American were characterized by a coalition. We also examined linking social capital through the amount of group connections to industry leaders, management and government officials.

d. Explore linkages to policy implications

The mapping of the social network structure has introduced important policy implications. Critically from a management perspective, the structure of fisher's social networks and the existence or absence of social capital was found to affect the diffusion of information and innovation and impact attitudes toward fishery policy among individual fishers; all of which can play a role in the effectiveness of management initiatives. For example the Korean-American group was found to have lower levels of social network capital and very weak linkages to industry leaders, management and government officials. Considering these fishers reported the lowest percentage of total ties for both bycatch (27%) and regulations (45%) as a discussion topic, our findings suggests that the fragmented nature of the fishery may be leading to barriers to communication flows that are conducive to maintaining a sustainable fishery.

Distribution and Publication of Findings
Two research outputs are currently progressing. First, we have recently completed a draft of a technical report of this work, "A Network Analysis of Fisher's Social Capital and the Effects of Ethnic Diversity in Hawaii's Longline Fishery." The paper will be published under JIMAR's technical report series. Secondly, the results of this original study provide an important contribution to the literature of SNA in natural resources. We have submitted an article of our work for review to *Ecology and Society*. The journal recently asked us to revise the article and it has been resubmitted for a second round of review.

PLANS FOR THE NEXT FISCAL YEAR *(One paragraph)*:

It should be noted that this research program was originally intended to be a two year project. The project has met the objectives set forth in the first year's objectives. While funding from the PFRP program has ended, we intend to pursue the second phase of our project objectives and investigate the return to Social Network Capital on vessel economic performance by applying for other funding sources.

LIST OF PAPERS PUBLISHED IN REFERRED JOURNALS DURING FY 2011 OTHER PAPERS, TECHNICAL REPORTS, ETC.

Barnes, M.L., S. Arita, S.D. Allen, P.S. Leung. "A network analysis of fisher's social capital and the effects of ethnic diversity in Hawaii's longline fishery." Pelagic Fisheries Research Program Technical Report: JIMAR Contribution.

Barnes-Mauthe, M.L., S. Arita, S. D. Allen, S. A. Gray and P.S. Leung. "The influence of ethnic diversity on social network structure in a common-pool resource system: Implications for collaborative management." *Ecology and Society* (revise and resubmit).

GRADUATES:
Names of students graduating with MS or PhD degrees during FY 2012; Titles of their Thesis or Dissertation
Michelle Barnes, M.S. Thesis: "Bonding, bridging, and linking social capital in an
    ethnically diverse fishery: the case of Hawaii's longline fishery."

AWARDS:
Name of JIMAR employees or project receiving award during the period, and Name of award

PERSONNEL *(on Subcontracts)*:
For projects that awarded subcontracts in the fiscal year, please provide the number of supported postdocs and students from each subgrantee.


Student
1) Michelle Barnes, Natural Resources and Environmental Management M.S.
     Candidate (completed May, 2012)

IMAGES AND CAPTIONS:
*We will also be including images for the annual report. Please send two of your best high-resolution, color images (photo, graphic, schematic) as a **JPEG or TIFF (300 dpi)** with a caption for each image. If you do not have an electronic version of the image, a hardcopy version may be dropped off at the JIMAR office located in the Marine Sciences Building, Room 312*

Caption 1: HLF network configuration, adapted from Barnes-Mauthe et al. (forthcoming). The network includes all relations identified by the population of vessel owners and operators in the HLF. Nodes (representing actors) with the smallest path lengths to each other are placed closest together by an algorithm that uses iterative fitting. Node color and shape represent the actors title and ethnicity affiliation as described in the key.
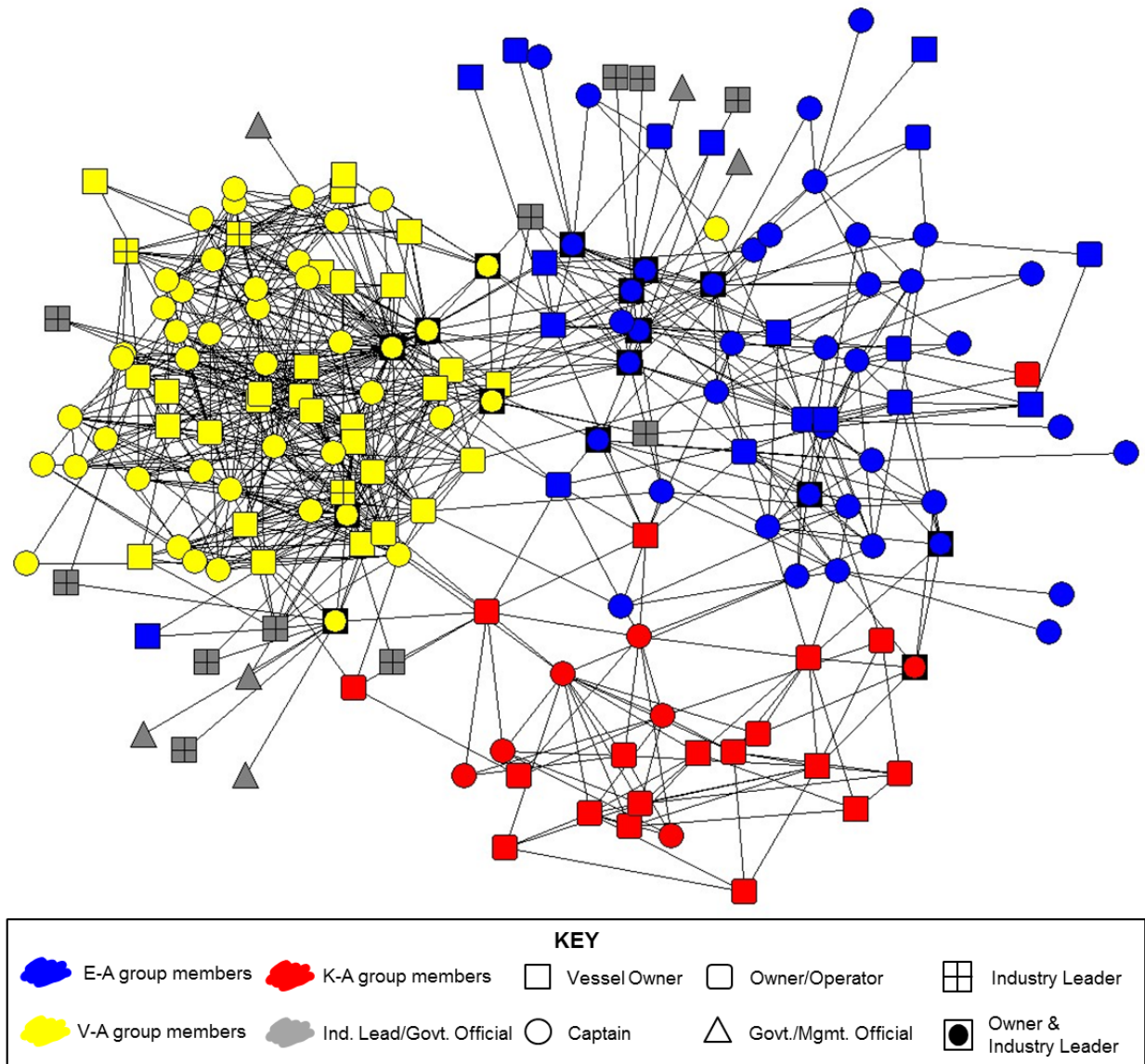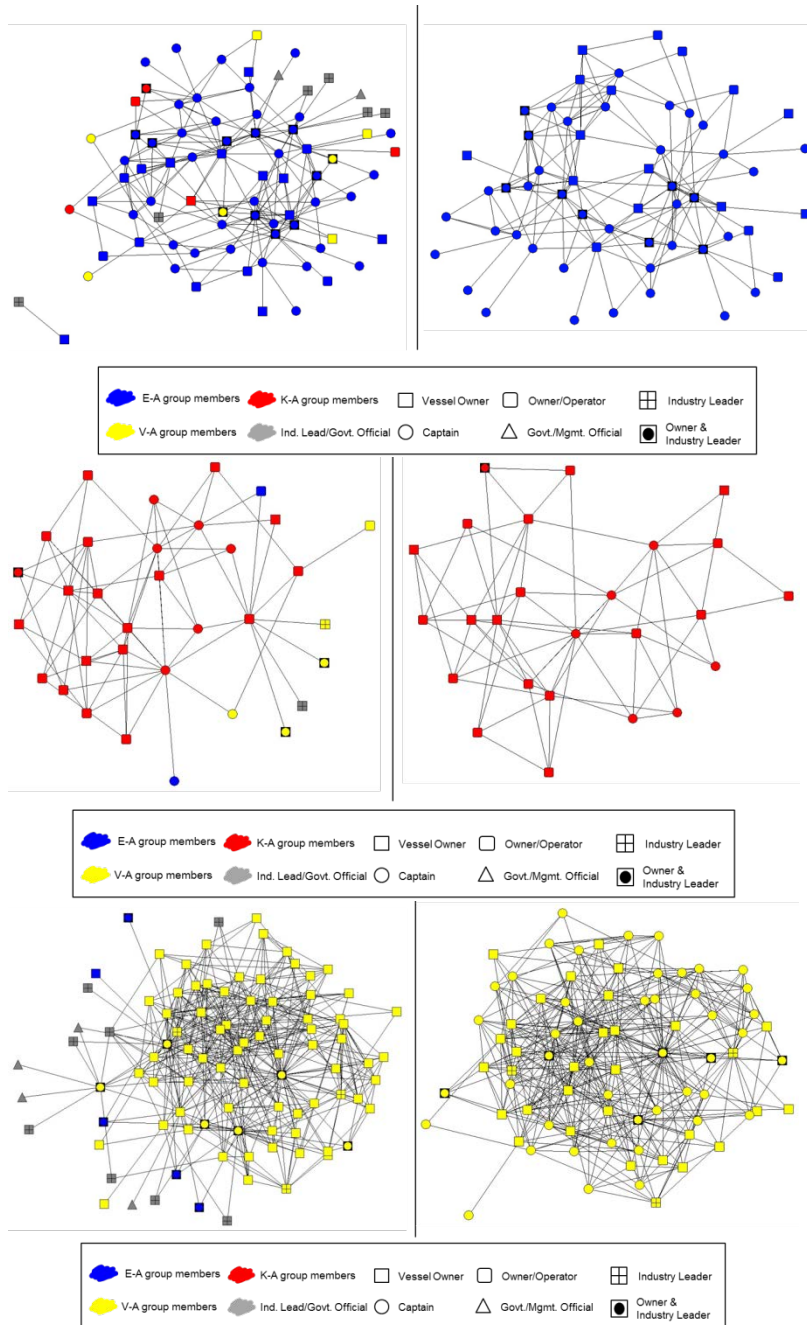
Caption 2: Network configurations generated in NetDraw (Borgatti 2002) by ethnic groups. Network depictions include all ties identified (top), and of ties between members of the same ethnic group only (bottom). Nodes (representing actors) with the smallest path lengths to each other are placed closest together. Node color and shape represent the actor's title and ethnicity affiliation as described in the key.

ACRONYMS:
Please provide the complete descriptions for any acronyms used in any areas of the report.
For example: UH (University of Hawaii)
E-A: Euro-American
K-A: Korean-American
V-A: Vietnamese-American
SNA (Social Network Analysis)
HLF (Hawaii Longline Fishery)