Human dimensions research to improve science networks and marine resource management effectiveness

"Why won't you talk to me" (the "me" is "you")

PICES FUTURE open science meeting, April 2014

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Marine & Environmental Affairs
College of the Environment • University of Washington

Environmental Conservation 38 (2): 172–186 © Foundation for Environmental Conservation 2011 doi:10.1017/S0376892911000129

Creating space for interdisciplinary marine and coastal research: five dilemmas and suggested resolutions

THEMATIC SECTION
Interdisciplinary Progress in Environmental Science & Management

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Date submitted: 26 February 2010; Date accepted: 14 September 2010;
First published online: 6 April 2011

SUMMARY

Important changes are needed to disciplinary theories and methods to support interdisciplinary and integrated ocean and coastal management policies and implementation. This review argues that theories and methods should conform to a perspective that ocean management is a societal activity with diverse goals ideally informed by interdisciplinary information. The review focuses on the integrated coastal management (ICM) and marine ecosystem-based management (EBM) frameworks and the marine protected areas (MPA) management tool. It begins by suggesting that at present there is a notable imbalance in the degree of effort allocated to monitoring the ecological and social dimensions of ocean resource use and policy processes. Based on how Western society and an influential epistemic community construct 'the environment' and society's relation to the environment, natural sciences play an inordinately important role in the description of the problem and policy recommendations. The discourse advocating for a global networks of marine protected areas, without adequate consideration of society impacts and responses, represents an example of this imbalance. Rebalancing the contributions of scientific disciplines encounters various dilemmas with epistemological, methodological and sociological dimensions. The analysis concludes with suggestions for balancing ocean and coastal interdisciplinary research and reframing key issues, creating self reflexive and multidisciplinary research teams, and reworking educational programmes.

Keywords: coastal, ecosystem-based management, integrated coastal management, interdisciplinary research, marine, marine protected area

INTRODUCTION

This review paper primarily considers the role and practice of research to inform ocean policy making and the realized or potential role of interdisciplinary research (IR). IR can be defined as investigations which link epistemologies, theories, methods and skill sets across disciplines, which had previously been pursued independently, to create synthetic understandings (Pickett *et al.* 1999). IR, as conceptualized here, goes beyond the linking of disciplines, theories and methods within the natural, physical or social sciences, to consider the more challenging linkages between these realms.

The rationale for this review is grounded in a growing interest in IR-based environmental policy making (Pickett *et al.* 1999; Tress *et al.* 2005; Omenn 2006), while the current state of ocean-relevant IR and the policy conditions to foster such IR are inadequately developed at the present (Mascia *et al.* 2003; Campbell 2005). This review considers a variety of reasons for the current state of ocean-relevant IR and IR-based ocean policy making, and will focus on one of the key hindrances to progress, namely how ocean environmental problems are constructed (Steinberg 2001). Currently, natural sciences dominate the construction of environmental problems and there is little integration of natural and social science. IR will never be adequately developed unless there is a significant demand for synthetic information with adequate human and financial resources.

The predominant environmental policy process has assumed, implicitly or explicitly, that the key knowledge gap to effective policy making is inadequate knowledge of ecological function (Christie *et al.* 2002; Ruckleshaus *et al.* 2009. With this construct, the priority has become developing adequate understandings of biology, non-human population dynamics, ecological communities and ecosystem function. Such information has been fed into the policy process, with the expectation that it will provide the key to raising awareness of environmental problems and lead to policy solutions. This has been a generally failed experiment in policy making, resulting in incomplete understandings of scale and interrelationship, inadequate policies and frustrated scientists of various disciplines (including ecologists). As an alternative, if environmental problems are construed as imbalances in coupled social-ecological systems, then the role of IR necessarily expands within the policy-making process. A comprehensive, effective and balanced policy process requires detailed empirical understandings of not only ecological, biological and physical processes, but also humanistic, ethical and social processes, derived from both basic and applied research.

A review of the predominant discourse surrounding ocean decline is a useful starting point. The decline of ocean

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Take home message

- While improving, a persistent disciplinary imbalance persists within the EBM and MPA discourses
- Reason 1: worldview→social construction→epistemic community
- Reason 2: inherent disciplinary tensions
- Resolution: educational change and re-balanced research agenda

Background

Is Puget Sound (or PICES) science integrated?

- Between disciplines
- Between topical focus areas
- Between institutions
- Between science and policy

Has the research community been framing the "research problem as a decision"?

Background

- The increased need for linkages between the various disciplines and between science and policy making is becoming more apparent (McClure and Ruckelshaus 2007 and Weber et al. 2010)

Background: Site

Methods

Initial Project Scoping and Design:

- Focus is Puget Sound nearshore habitats, species and processes
- Sample included researchers and policy makers/resource managers working with researchers

Data Collection: TRIANGULATED approach

- Preliminary interviews (3 key informants)
- Focus Groups in Olympia and Seattle (2): Agencies, academics, tribes, etc.
- Social Survey (254 total responses): Researchers and policy makers
- Semi-structured, key informant interviews (20 key informants)

Methods

Data Analysis:

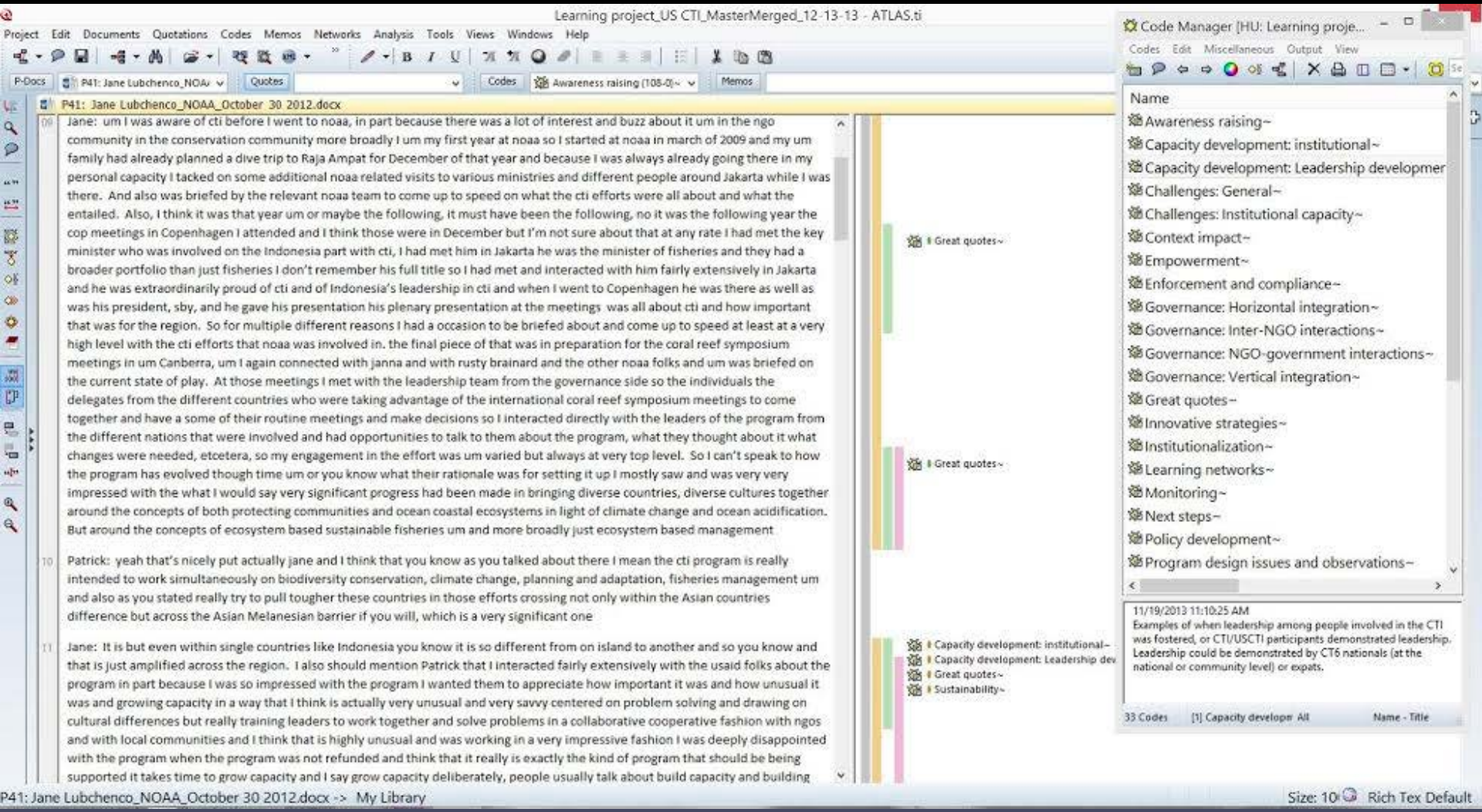
- Interview and focus group data were transcribed and analyzed using an inductive, exploratory approach
  - ATLAS.ti v.7
- Survey responses were analyzed using descriptive statistics and with social network analytic methods
  - UCINET Software for Social Network Analysis (Borgatti et al. 2002)

Survey question

- "Please identify **5-10 researchers** that you **most frequently** collaborate with in the course of your work, and provide information about each of these contacts… If you are not a researcher, please answer this survey with a focus on your contacts who are researchers…

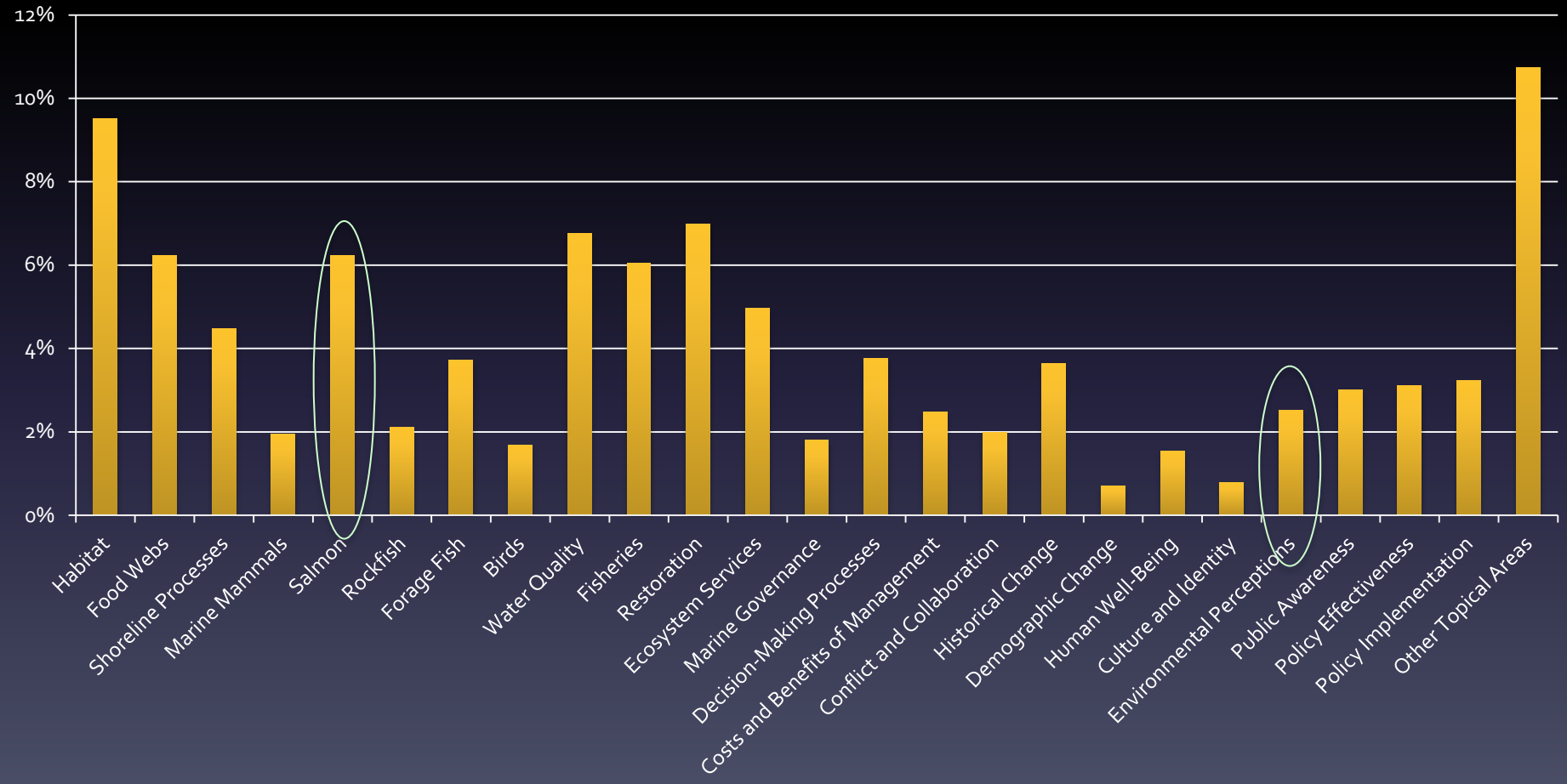
- The term **"collaboration"** will be used broadly to encompass diverse interactions, which could include:
  - Direct collaboration on shared research projects;
  - Consulting with researchers to discuss ideas and get feedback;
  - Sharing research findings;
  - Or participation in the same panel, committee, volunteer program, or other group or activity."

Narrative Analysis



Description of the Network

Distribution of Topical Areas of Focus Listed By Survey Respondents

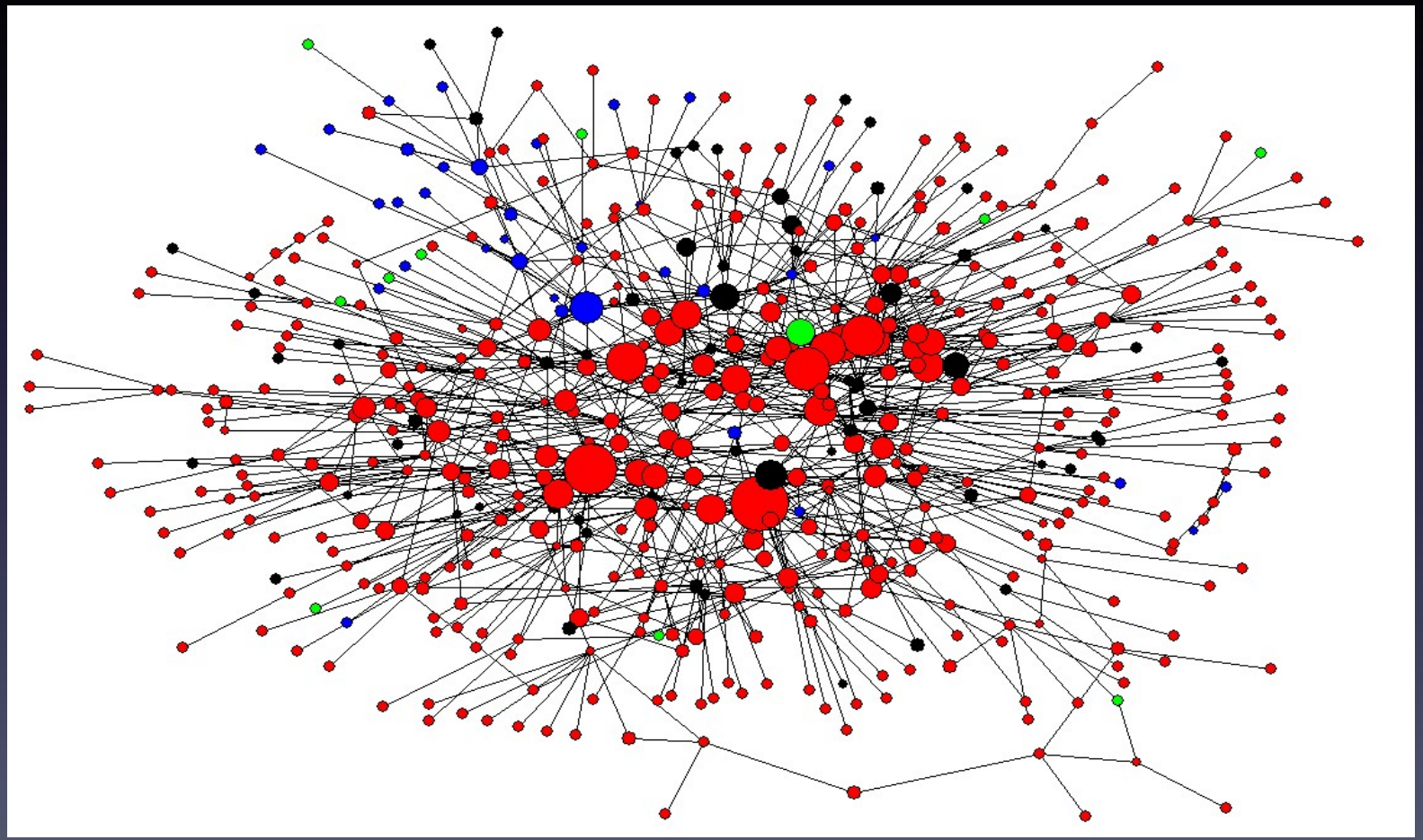


Social Network Analysis

Discipline Legend

- Natural Science
- Social Science
- Other
- Interdisciplinary

Entire network map: 60% ecologists, 12% policy analysts

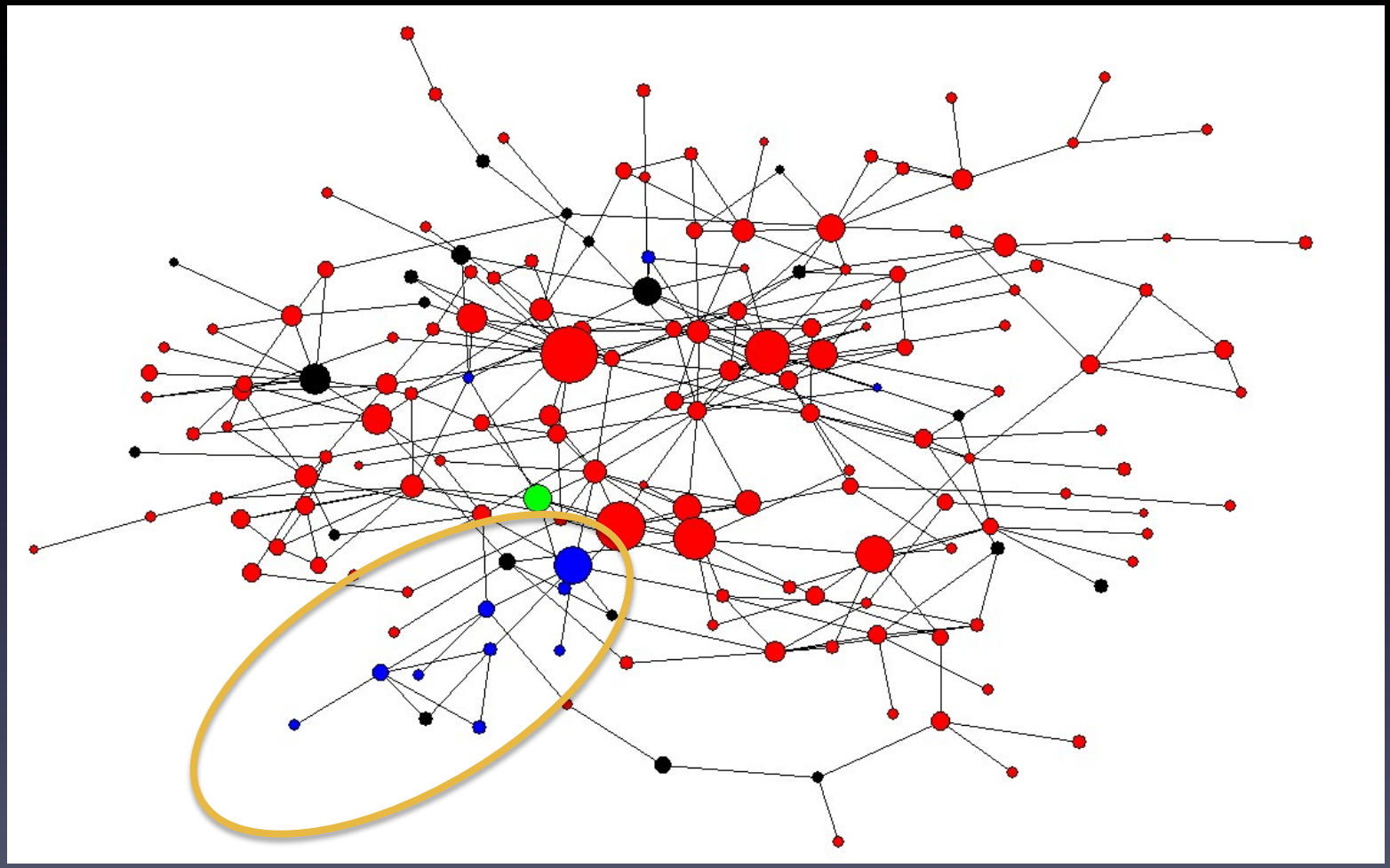


Social Network Analysis

Discipline Legend

- Natural Science
- Social Science
- Other
- Interdisciplinary

Researcher network

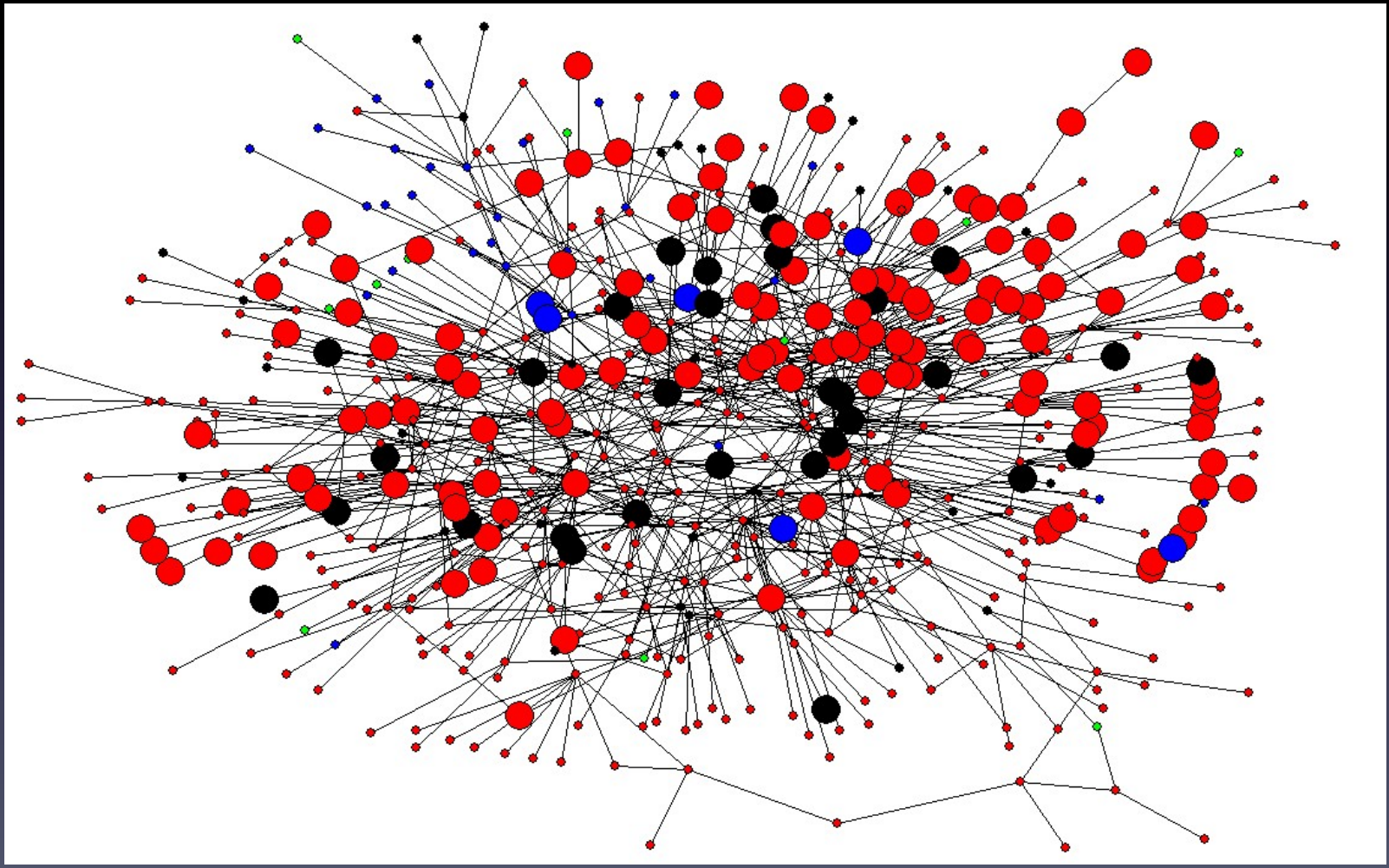


Social Network Analysis

Topic: Salmon (whole network)

Discipline Legend

- Natural Science
- Social Science
- Other
- Interdisciplinary

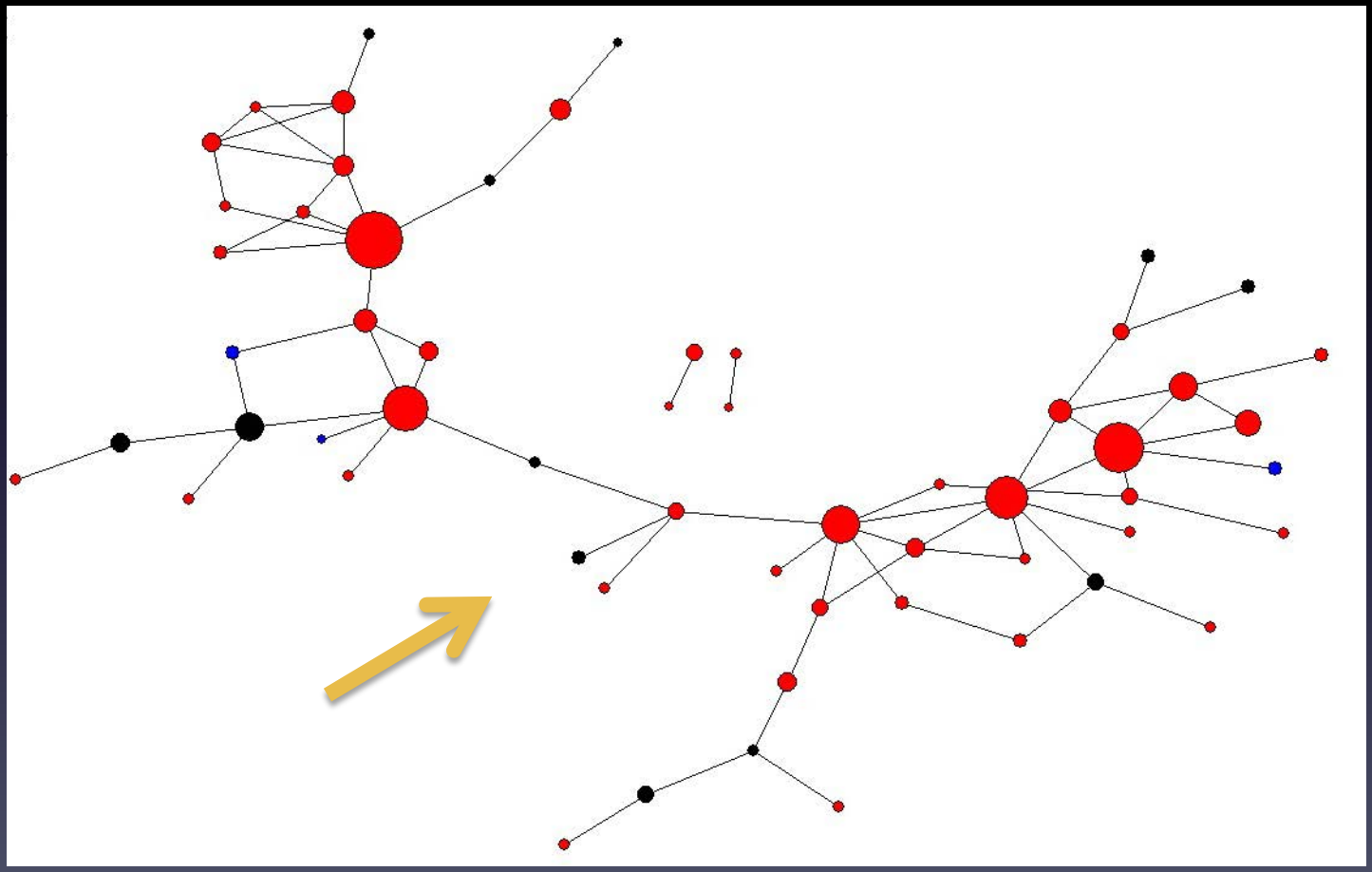


Social Network Analysis

Topic: Salmon (researchers only)

Discipline Legend

- Natural Science
- Social Science
- Other
- Interdisciplinary



Network Fragmentation

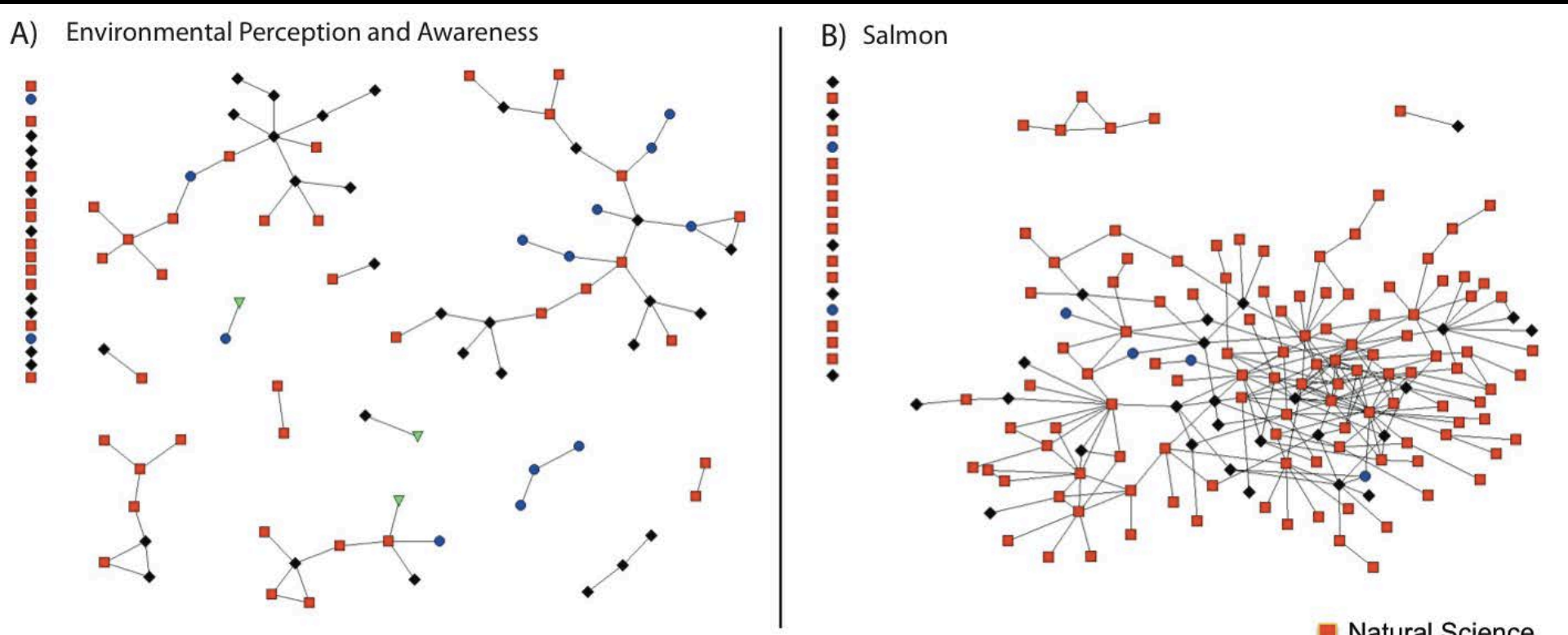


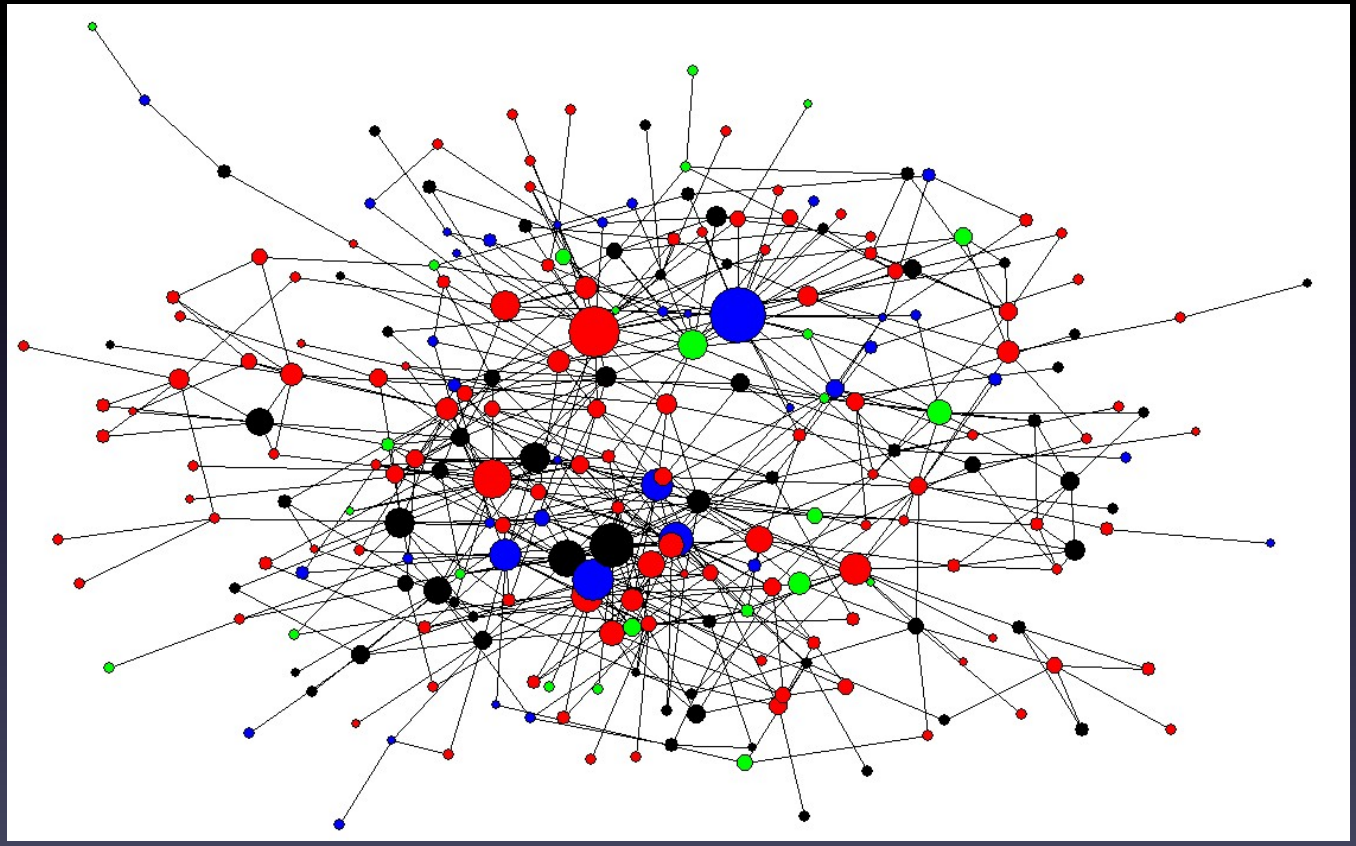
Figure 3. *A)* Map of the "Environmental Perception and Awareness" topical focus sub-network. This sub-network received the highest fragmentation score of all topical focus groups. (Number of nodes = 101, Density = 0.014, Average Degree = 1.386, Fragmentation = 0.887, Closure = 0.090). *B)* Map of the "Salmon" topical focus sub-network. This sub-network received the lowest fragmentation score of all topical focus groups. (Number of nodes = 166, Density = 0.017, Average Degree = 2.855, Fragmentation = 0.289, Closure = 0.165). Colors and shapes pertain to the disciplinary categories specified in the legend.

Social Network Analysis

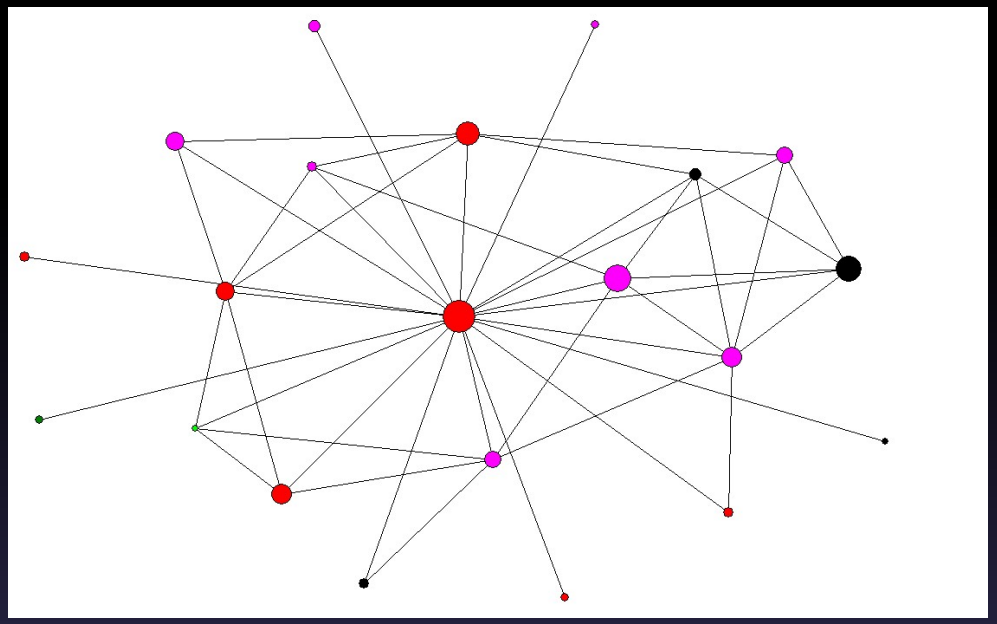
Links between researchers and others
(only survey respondents)

Discipline Legend

- Research only
- Policy only
- Other (no resp or "no")
- Both research and policy



EgoNetworks: Long standing, academic natural scientist



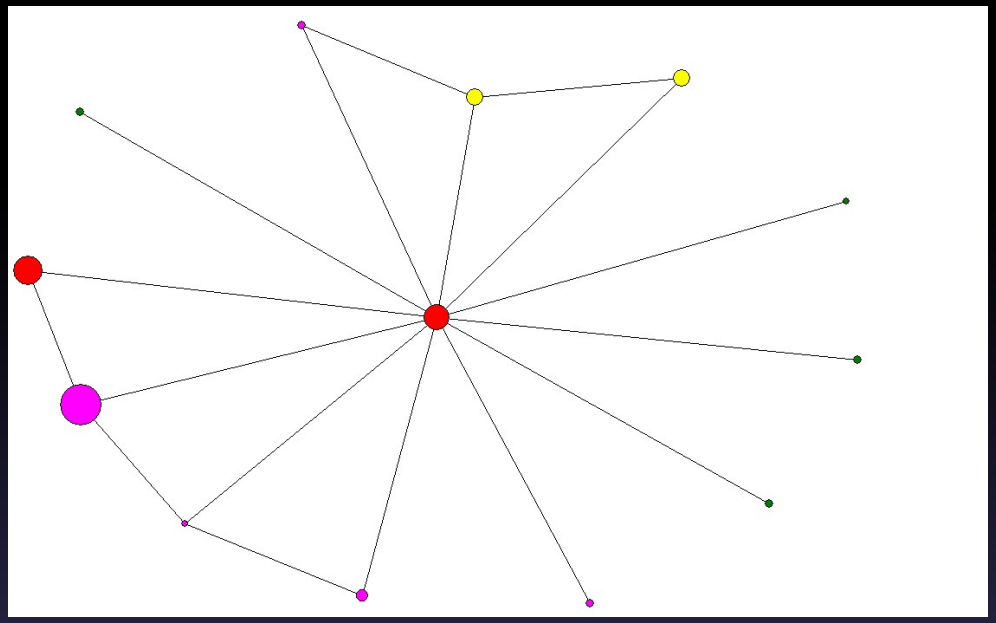
Employer Legend

- Federal Agency
- Research Institute
- Academic Institution
- State Agency
- Non-profit/NGO
- Tribe / Tribal Council / Organization providing services to a Tribe
- Consulting firm/Consultant

"Monitoring has disappeared. The Partnership is not to fund monitoring. It's to take data and make management decisions… It destroyed the monitoring framework of the action team."

"The Salish Sea conference used to [highlight science and relevance to management], but the PSP takeover sort of caused it to become a poorly represented meeting in terms of the science."

EgoNetworks: Independent, interdisciplinary scientist



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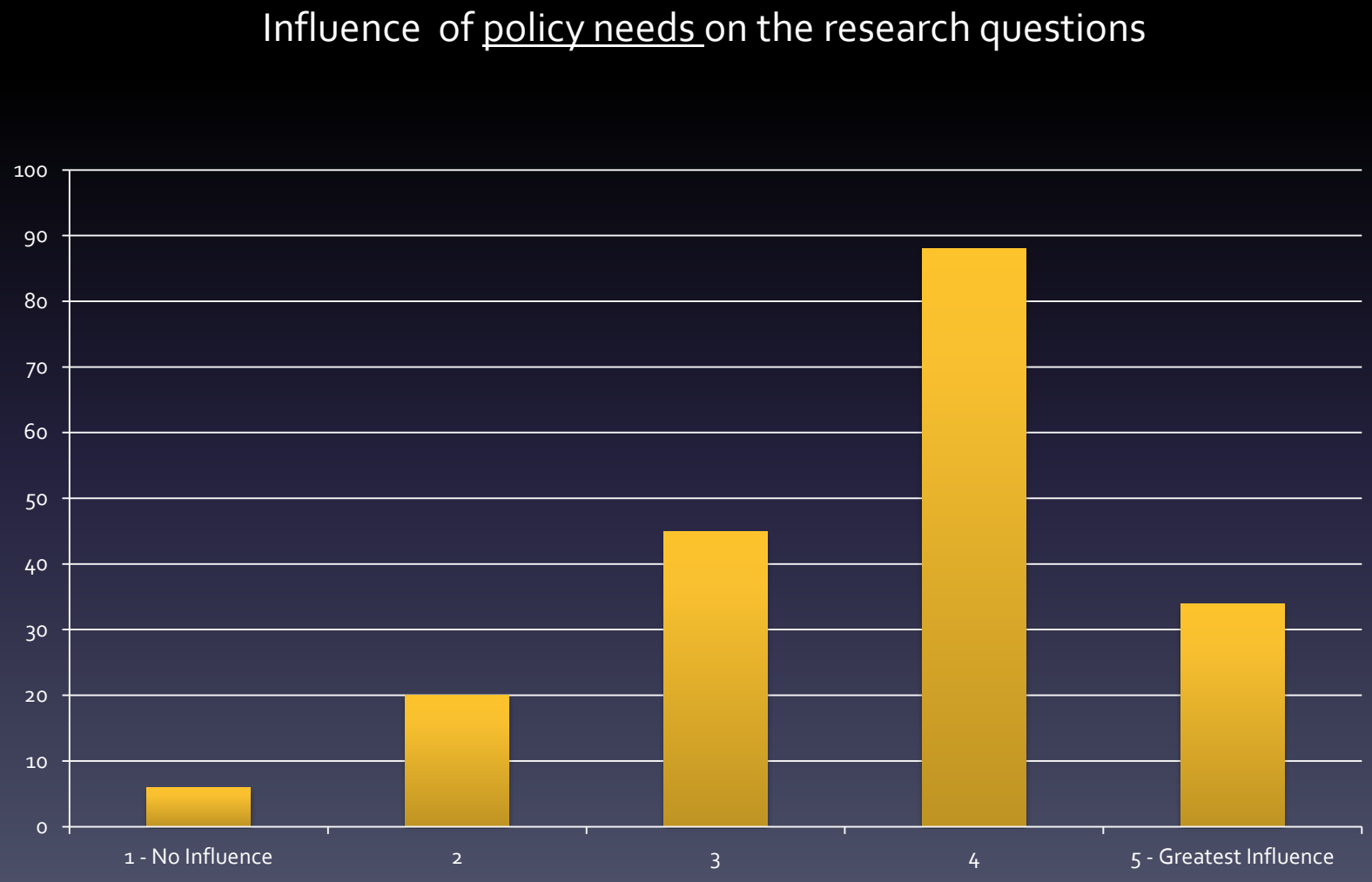
"Incentives are few and far between. For those who just truly want to make a difference or influence policy and management, then the incentives are more personal and not often rewarded in a departmental sense."

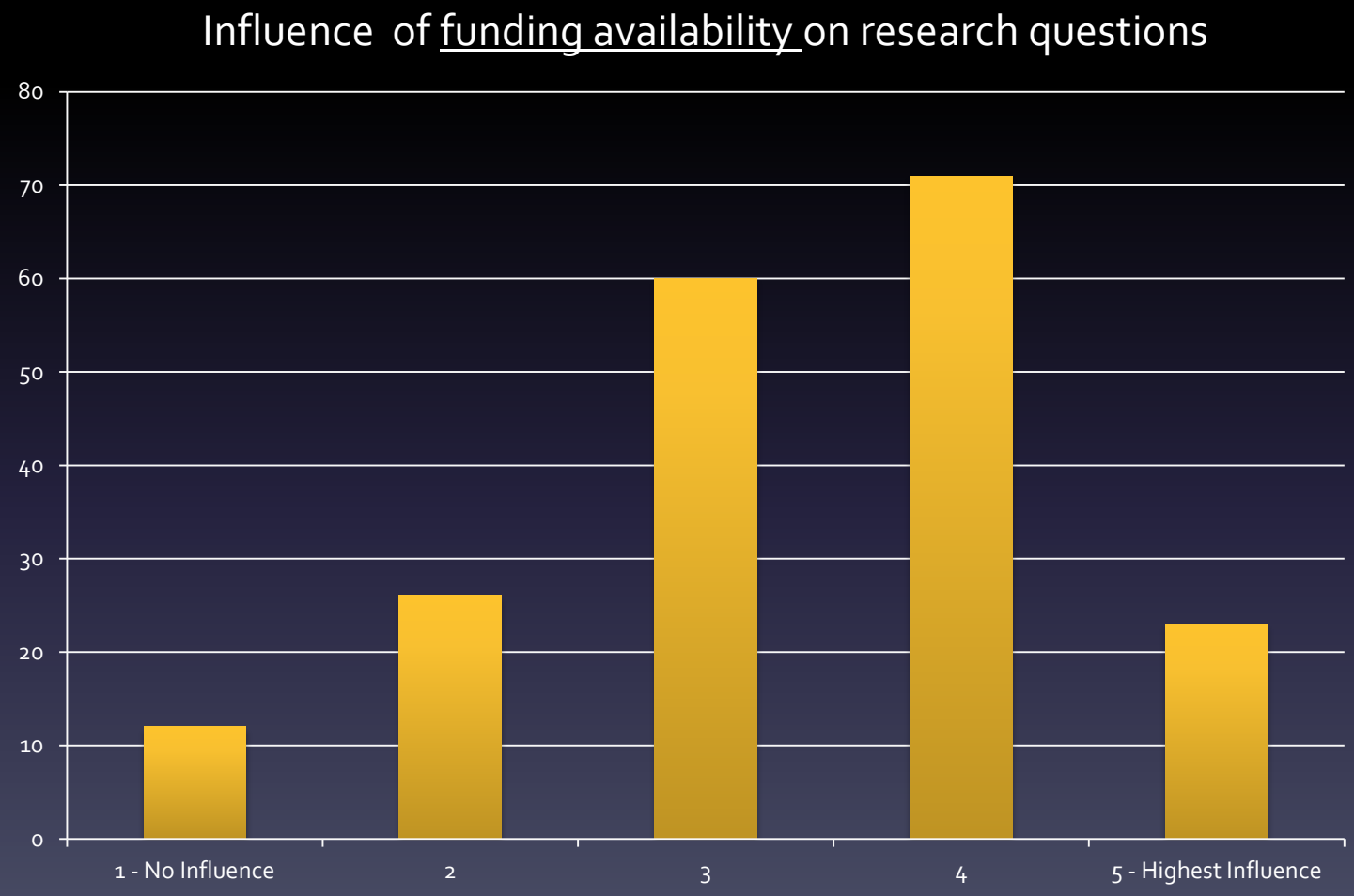
"Our approach is to mindfully work with the end user from the beginning. [We] try to talk to people who use the information and they help constrain the question. Sometimes it's a NGO or government entity and then [we] make sure the academic information can be used."

"The big one [that creates high-impact] is having an iterative relationship between science and policy…"

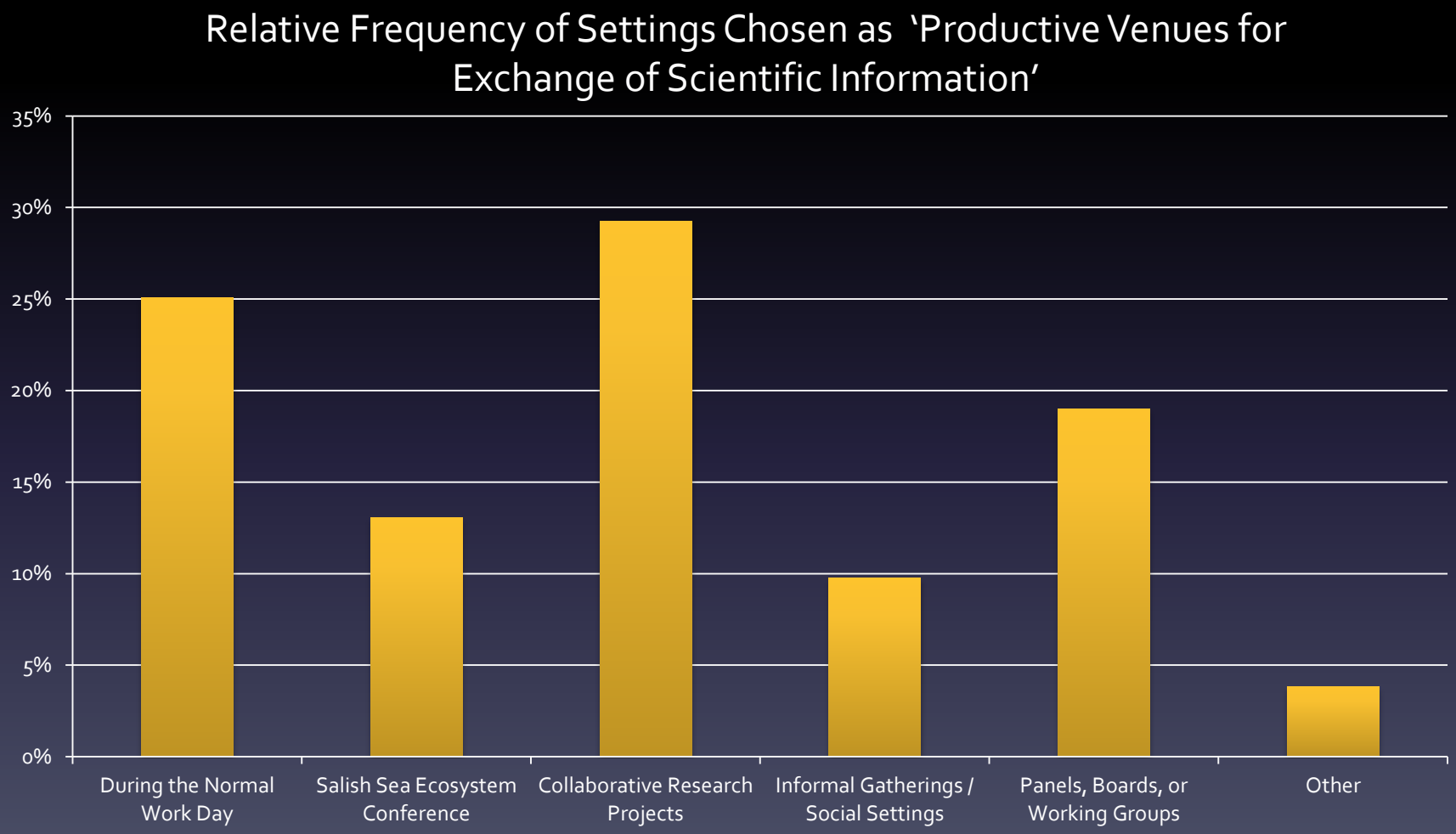
What shapes research?



What shapes research?



How is information shared?



Recommendations and Next Steps

- Query dataset regarding different forms of collaboration, factors shaping SN and collaboration
- Sample more heavily within particular networks/topics
- Foster linkages within communities working on high-priority topics (like environmental awareness)
- More effort and funding aimed toward long-term, collaborative, interdisciplinary research…including end users

- Determine variables influencing the role of human dimensions research/ers in Puget Sound and environmental recovery?

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Thanks to:

The Puget Sound Partnership, especially Scott Redman, and all of our informants.

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