



National Center for Ecological Analysis and Synthesis

2012

Report to the National Science Foundation

NCEAS Annual Report 2011-2012

Contents

1. Participants.....	2
Partner Organizations.....	2
Other Collaborators.....	3
2. Activities and Findings	3
Computing & Informatics Support.....	3
Science Advisory Board	4
Major Research Activities (Based on data available as of August 31, 2012)	4
Postdoctoral Fellows.....	5
Distributed Graduate Seminars	11
Working Groups.....	12
Meetings Hosted by NCEAS	26
Scientific Visitors.....	27
Center Associates Hosted by NCEAS.....	28
Research Training Activities.....	29
Graduate Student Interns.....	29
Undergraduate Student Interns.....	30
Postdoctoral Training Sessions	31
Career Development Series.....	31
Training Sessions.....	31
Additional Seminars.....	32
Education and Outreach Activities.....	32
Communicating Science	32
Diversity Initiatives	35
K-12 and Community Outreach.....	35
Initiatives Focused on Higher Education	36
Diversity of Community Engagement	36
Publications and Products	37
Publications Reported July 17, 2011 through August 31, 2012	37
NCEAS Related Data Sets Registered or Uploaded to NCEAS Data Repository	47
3. Tables and Figures	49
Table 1. Science Advisory Board Members 2011-2012	49
Table 2. Ecolunch Seminars & Roundtable Discussions	50
Table 3. Number of NCEAS Articles Published in a Selection of High-impact Journals	54
Figure 1. Number of Proposals Submitted and Supported	55
Figure 2. Proposals Submitted and Supported by Activity Type	56
Figure 3. Number of Participants Since 1996	58
Figure 4. Frequency of Visits	59
Figure 5. Percent Women Participating in Working Groups	60
Figure 6. Percent Women on NCEAS Science Advisory Board	61
Figure 7. How did you hear about NCEAS?	62
Figure 8. Number of Publications	63

NCEAS Annual Report 2011-2012

1. Participants

Frank Davis, Director PI

Stephanie Hampton, Deputy Director Co-PI

Mark Schildhauer, Director of Computing

Partner Organizations

Matching funds have been provided by the State of California and by the University of California, Santa Barbara.

The Gordon and Betty Moore Foundation is supporting a project at NCEAS in which we purchased a proprietary software package (AD Model Builder) common in Fisheries management, moved it into the public domain and have provided free training sessions to extend its usefulness to other fields. A new Moore project "Identifying Thresholds, developing key indicators, and operationalizing their use in Marine Spatial Planning" will support several postdocs and working groups to pursue research at NCEAS.

The David and Lucille Packard Foundation continue to fund Working Groups and postdoctoral fellows focused on a critical review of ecosystem-based management (EBM) efforts relevant to coastal-marine ecosystems and to design a longer-term program of activities to develop the scientific foundations for EBM in coastal marine systems. Packard EBM awards include a project which emphasizes making scientific results more available and useful for policymakers. An upcoming extension of this project will support a summer training initiative for early-career researchers in 2013.

Last summer, NCEAS completed work on a project supported by The Nature Conservancy, in which we assembled Working Groups to examine the economic impacts of non-native forest pests and pathogens in North America; previous phases of the project included support for postdoctoral researchers, a distributed graduate seminar, and a graduate student.

NOAA is a co-supporter of a CAMEO (NSF-NOAA) collaboration to examine natural and human influences on coral reef community structure, diversity, and resilience, a project involving technicians who collaborate with a postdoctoral researcher.

The Henry Luce Foundation funded graduate fellowships at UCSB as part of a program called Environmental Science to Solutions, in which graduate students received training in leadership, communication and ecoinformatics. NCEAS provided ecoinformatics training, gave students experience in existing Working Group collaborations, and continues to host Working Groups that the students themselves have convened. Student projects include "The effects of global change on malaria transmission: A meta-analysis", "Can eco-labeling drive conservation & sustainable harvesting of

marine fisheries” and “The science, media reporting, and politics of CA air quality: Content, context, and voting patterns of Prop 23.”

An award from Conservation International convenes experts to develop rigorous and transparent indices of “ocean health” to guide and influence science and policy at national and international levels. Professional, postdoctoral, graduate student and high school researchers have been supported on this award.

The Ocean Conservancy supports a postdoc and working group to examine the impacts of marine debris on ocean ecosystems, and to evaluate a suite of potential solutions.

Other Collaborators

To facilitate informatics research and to support the informatics needs of the ecological community, NCEAS continued strong research partnerships with a growing group of organizations: San Diego Super Computer Center, University of Kansas and University of New Mexico (LTER Network Office), UC-Davis, Oak Ridge National Laboratories, the National Evolutionary Synthesis Center (NESCent), and the Ecological Society of America (ESA). These partners work together on multiple NSF awards.

Other collaborators are highlighted on the NCEAS web site: <http://www.nceas.ucsb.edu/collaborators>

2. Activities and Findings

Computing & Informatics Support

Responding to feedback from reviewers and the ecological community, NCEAS has increased our capabilities for providing informatics education and tools to the scientific community, in addition to maintaining a high level of computing support that facilitates scientific efforts at the Center. NCEAS currently has 54 working group and 10 distributed graduate seminar Plone collaboration websites (open source, free content management software), along with additional Plone sites serving various meetings and special projects and a multitude of standard html sites available for collaboration. Funding from this award supports such informatics education activities as: training workshops targeted to NCEAS resident scientists, one-on-one training for Working Group participants, and the development of undergraduate teaching modules in an undergraduate Distributed Seminar.

Many of the training activities highlighted elsewhere in this report are focused on informatics topics, in many cases leveraging external support, e.g. a training session the Brazilian LTER (formally PELD at INPA) supported a week-long training session in data management using approaches developed and maintained in the Knowledge Network for Biocomplexity, culminating in a new KNB node at the site. Other NSF awards to our Ecoinformatics team support training and outreach in informatics to the broader ecological community.

Science Advisory Board

Proposals submitted and supported by proposal period and by proposal type are shown in Figures 1 and 2. There was one call for proposals (August 2012) during this reporting period, requesting only working group proposals. We received 52 proposals. The Science Advisory Board is scheduled to meet Oct. 3-4, 2012 to review these proposals. Science Advisory Board members during 2011-2012 are listed in Table 1. A complete history of board members is available on the NCEAS web site: <http://www.nceas.ucsb.edu/sab/cumulative>.

Two working group proposals were submitted “off-cycle” and supported.

Major Research Activities *(Based on data available as of August 31, 2012)*

Since the beginning of this reporting period, October 1, 2011, NCEAS has supported 15 total postdoctoral researchers. A list of postdoctoral researchers, including descriptions of their projects is provided below. NCEAS did not support any sabbatical fellows during this reporting cycle.

Since the last report submission, NCEAS postdoctoral scientists have accepted faculty or other career positions at: University of Vermont; Pennsylvania State University; University of Victoria; University of Massachusetts, Boston; Ohio State University (2); Lund University; Santa Catalina School; Arizona State University; and State University of New York.

Since the beginning of the reporting period, roughly 680 individuals participated in activities at NCEAS. Of these participants, 107 were either residents of NCEAS or scientists at UCSB, and 14% were visiting from foreign institutions. A total of 20 Working Groups and one Distributed Graduate Seminar have been active or scheduled in the reporting period.

NCEAS also has hosted meetings for seven different collaborative groups. Eight Center Associates and at least 18 Scientific Visitors have been hosted at NCEAS in this reporting period. An additional four Working Groups, one hosted meeting, and two Scientific Visitors were here during the last report period, but were not included in the 2010-2011 report due to the July 2011 submission date. Activities are listed below.

An analysis of the factors associated with productivity of NCEAS working groups, and the collaborative tendencies of working group participants and NCEAS postdocs, was published in *BioScience* in November 2011 (Hampton and Parker 2011).

On 21-23 March 2012, NCEAS welcomed participants to Santa Barbara, for the 2012 Panel Symposium on “Trends in Ecological Analysis and Synthesis“, TrEAS. This symposium was convened to acknowledge key individuals associated with NCEAS, to examine trends in ecological analysis and synthesis since 1995, and to identify emerging needs and priorities for future synthesis research. The National Science Foundation Division of Environmental Biology provided funds for the event, and Pacific Standard Magazine co-hosted the opening night’s reception and dinner. Subsequent to the symposium, a TrEAS website (<http://treas.nceas.ucsb.edu>) was created which provides background material, videos of the panel discussions, and opportunities to post comments on a variety of topics.

On September 28-29, 2011 NCEAS, the Univ. of New Mexico, DataONE and LTER sponsored the Environmental Information Management (EIM) Conference in Santa Barbara. EIM provides a forum for information managers, scientists, and informatics researchers to present and discuss advances in environmental information management, analysis, and modeling. Approximately 100 people attended the conference. (The EIM Conference occurred prior to this reporting period, but was not reported earlier due to the early submission of the report.)

Postdoctoral Fellows

Occurred or were scheduled between October 1, 2011 and September 30, 2012

Based on data available as of August 31, 2012

Adair, Carol

06Apr-09 to 30-Nov-11

Do microbes matter? Using global data to test implicit versus explicit representation of microbial activity in litter decomposition models

Despite the major contribution of decomposition to global carbon and nitrogen cycles, it remains poorly understood. This uncertainty is reflected in the diversity of approaches used to depict decomposition in ecosystem models and in debate regarding if, or how, microbes should be explicitly represented. I propose to compile a large-scale, long-term database of litter decomposition data, which I will use to compare two sets of decomposition models: the first varies only in how microbial activity is modeled; the second compares the best model(s) from the first set to a range of published models. Conducting a sophisticated model comparison using spatially and temporally extensive data will allow me to evaluate the relevance of explicitly incorporating microbial activity into large-scale decomposition models and compare the ability of published models to accurately describe global decomposition.

Balch, Jennifer

1-Jan-09 to 11-Jul-12

Relative influence of fuels, climate, and ignition on fire frequency across earth's ecosystems

Fire is a critical catalyst of climate and vegetation change across the globe. Future shifts in fire regimes—associated with anthropogenic change—may alter ecosystems and biogeochemical cycles on a global scale. Yet, modeling efforts largely ignore fire in global vegetation and climate projections. Therefore, I propose to synthesize published data on fuel production, climate, and ignition sources with reconstructed fire histories in order to investigate the determinants of fire frequency across scales and ecosystems. Rather than gauge how fire influences the biosphere, I plan to assess the factors that control the global fire cycle. This fire-centric approach will illuminate the biotic and abiotic factors that increase fire frequency. Moreover, the results will provide mechanistic insights into historical fire patterns and bolster predictions of future fire regimes in an era of accelerating global land-cover and climate change.

Browne, Mark

20-Oct-11 to 18-Nov-11; 13-Feb-12 to 12-Feb-13

Marine Debris: Scale and impact of trash in ocean ecosystems (Supported by the Ocean Conservancy)

To construct the theory of marine debris incorporating the needs of nonscientific constituencies, this working group will accomplish the following goals: 1) compile and synthesize existing information to determine how much harmful debris is in our ocean; 2) compile and synthesize existing information to determine impacts of marine debris on ocean populations and ecology; 3) compile and synthesize existing information to determine impacts of marine debris on human populations; 4) identify the three most prominent sources/items of plastic debris for which behavior-oriented solutions can be implemented; and 5) analyze research regarding efficacy of policy solutions such as plastic bag bans as they relate to ocean trash items.

Byrnes, Jarrett

1-Nov-10 to 31-Aug-12

Linking network theory and biodiversity-ecosystem function research: topology modifies the consequences of species loss for the flow of energy and nutrients within food webs

Over the past decade, the field of biodiversity-ecosystem function research has sought to understand the consequences of declines in species diversity due to human activities. The field has yielded many robust conclusions regarding the consequences of plant species loss for primary production and nutrient cycling. It has not, however, arrived at many generalities regarding the consequences of species loss at higher trophic levels for the flow of energy and nutrients through food webs, even in the most simplified of experimental systems. Nor do we have a strong idea of the consequences of extinction in food webs of real-world complexity. This lack of understanding is due to extinction altering not just the number of species in a food web, but also degrading the network structure of feeding connections between species. I propose uniting biodiversity-ecosystem function research with food web network theory to better understand the consequences of species loss for the efficiency of trophic transfer within food webs. I propose developing a unified theoretical framework that examines the consequences of species loss in the context of food web network structure. I will then examine how real-world complexity alters the dynamics of trophic transfer by applying this framework to multiple long-term community data sets. Lastly, I will perform a meta-analysis of published food web manipulations to examine how the topology of even simplified experiments can influence the dynamics of resource use. The results of this research will therefore fill a critical gap for managers in predicting the consequences of consumer species extinction in nature.

Carbone, Mariah

1-Mar-11 to 30-Jun-13

A synthesis of soil respiration in semi-arid and arid ecosystems across multiple spatial and temporal scales

Soil respiration (SR) represents a huge uncertainty in global climate models. This is because we lack a mechanistic understanding of the plant and microbial processes that drive SR rates across different landscapes and in time. Predicting SR in semi-arid/arid ecosystems is particularly challenging

because of high interannual variability in precipitation, rapid wetting and drying cycles, large temperature variations, and short phenological cycles. By conducting a multiple phase synthesis of existing continuous SR datasets that span a range of semi-arid/arid ecosystem types, this work will improve our basic understanding of the mechanistic controls on SR in these ecosystems. Semi-arid/arid ecosystems cover large areas of Earth, and compared to tropical, temperate and boreal ecosystems, information about them is currently lacking in global synthesis studies. Specifically, this research will identify key biotic and abiotic drivers of SR in these ecosystems, and quantify their relative importance in a clear spatial and temporal framework. This will be accomplished through a combination of basic statistical and time series data analyses, novel isotopic techniques, as well as innovative model-data integration approaches. Results will be used to: (1) improve parameterization and mechanistic representation of SR in models; (2) develop protocols and strategies for quantifying SR in and across semi-arid/arid ecosystems; (3) create a uniform and publically accessible SR database with original and derived data products, including characterization of data uncertainties; and (4) contribute more broadly to a global SR synthesis effort.

Gray, Derek

17-Jan-12 to 16-Jan-13

Lake Baikal responses to global change (NSF Dimensions of Biodiversity)

Understanding how ecological communities will re-organize under global change is one of the main challenges facing ecologists today. Responses of communities will depend on the underlying genetic and functional diversity within and across species, as well as on the taxonomic diversity within communities. Here we will characterize these different aspects of diversity in the plankton of Lake Baikal, the oldest, largest (by volume) and most diverse lake in the world. Lake Baikal's planktonic food web is dominated by endemic species that are sensitive to changing climate and other anthropogenic stressors. These organisms fuel the rest of Baikal's incredibly diverse biota making responses of the plankton crucial to understanding how Lake Baikal biota will respond to global change. The UCSB team will analyze a Russian 60-yr time series from Lake Baikal to understand the complexity of community change over time, complementing field and laboratory studies carried out by other partners, in order to achieve a more holistic understanding of plankton biodiversity dynamics.

Johnson, Darren

1-Oct-09 to 30-Sep-12

Converting evolutionary costs into ecological currency: linking trait variation, natural selection, and population dynamics

Numerous studies in the ecological and evolutionary literature have estimated the magnitude of natural selection. Although natural selection is widespread and often strong, much less is known about the immediate effects of selection on population dynamics. I propose a method that can be used to quantify the direct effects of trait variation and natural selection on population dynamics. This method will be applied to meta-analyses examining the overall influence of selection on demographic components of fitness in a broad variety of organisms. Information from meta-analyses will be combined with models of population dynamics to evaluate how trait variation and selection can affect key population attributes such as size, growth rate, and probability of extinction. This work will be further applied to develop conceptual models of how different modes of selection (i.e., directional,

stabilizing and disruptive) influence concurrent population dynamics. This project has clear ramifications for incorporating evolutionary considerations in the management and conservation of living natural resources.

Lancaster, Lesley

1-Mar-09 to 16-May-12

What Community Characteristics Promote Recent and Current Bio-Diversification? An Investigation of Community-Level, Ecological Correlates of Rapid Diversification in Replicate, Temperate Angiosperm Genera

Processes behind patterns of angiosperm biodiversity in temperate regions are little understood. Further, we do not know whether particular communities that currently support relatively high temperate biodiversity are the same communities that promote the evolutionary process of diversification (i.e. speciation). I propose to compare diversification rates within selected angiosperm genera that inhabit a range of temperate communities using published phylogenies and sequence data, focusing on clades in which nodes can be or have been dated. I will then map habitat and community characteristics that have been hypothesized to be general factors promoting rapid diversification. I will apply method-of-moments estimators of diversification rates (using a stochastic birth-and-death model of diversification) both within and between selected genera to look for correlations between recent rapid divergence within clades and characteristics of habitat or community type occupied by those clades. Previous studies of diversification processes have targeted particularly diverse clades or communities and then attempted to draw conclusions about which factors led to their respective high species numbers. However, my proposed method will allow for more rigorous hypothesis testing and generalization of conditions promoting diversification by starting with a phylogenetically diverse array of genera and ecological conditions within which to compare habitat characteristics and diversification rates. Furthermore, recent advances in estimating diversification rates will allow me to disentangle the relative effects of speciation vs. extinction on diversification rates. These methods have seldom been applied to diversification rates within less inclusive crown clades, which may be the most relevant for understanding the processes of speciation and conservation of habitat features or communities that are most likely to be sites of current speciation and/or extinction.

Longo, Katie

6-Jun-10 to 30-Jun-13

Ocean Health Index (Supported by Conservation International)

The focus of the Ocean Health Index project is on narrowing the current suite of potential indicators to a tractable, meaningful, representative subset that can serve as critical tools for monitoring, planning, and policy with applicability across a range of systems and geographic scales. Specifically, this effort will bring together leading scholars and practitioners from ecology, fisheries, oceanography, economics, and the applied social sciences to develop ecosystem health metrics for the Arctic, coral reefs, estuaries, continental shelves and coastal upwelling regions. The resulting set of vital signs will serve as concrete concepts to help catalyze political will, pave the way for policy-making at all levels of government, provide critical tools to communicate the state of marine systems to the public, and facilitate much-needed integration across the social and natural sciences.

Pau, Stephanie

11-Jan-10 to 31-Dec-12

Improving our understanding of the ecological controls on the distribution and phenology of C3 and C4 grasses in response to climate variations

This proposed project seeks to analyze and synthesize herbarium, climate, and satellite data over several decades to address the spatial and temporal response of C3 and C4 grasses to climate variability in the Hawaiian Islands. Complicating our understanding of C3 and C4 response to climate change and increased CO₂ are large uncertainties regarding their differential response to climate variability. Numerous studies have demonstrated ecological sorting of C3 and C4 grasses along static spatial climate gradients, though few studies have focused on phenological differences between C3 and C4 grasses. In Hawaii, C4 grasses initiate a grass-fire feedback cycle that directly affects ecosystem structure and function. El Niño-driven droughts, the greatest source of interannual climate variability in Hawaii, may contribute to this feedback by providing a “tipping point” for C4 grass invasion into new regions. Results from this project will provide new information on the functional significance of C4 photosynthesis and the invasion dynamics of C4 grasses. This work will also provide insight on the response of these grasses to climate variability, and lay the groundwork for merging herbarium datasets with satellite data to create an ecological informatics database for grasses.

Rebich Hespanha, Stacy

17-Oct-11 to 16-Oct-12

DataONE: Observation Network for Earth (Supported by DataONE – NSF OCI-0830944)

DataONE (Observation Network for Earth) is building cyberinfrastructure for open, persistent, robust, and secure access to well-described and easily discovered Earth observational data. Supported by the U.S. National Science Foundation, DataONE will ensure preservation and access to multi-scale, multi-discipline, and multi-national science data. DataONE will transcend domain boundaries and make biological data available from the genome to the ecosystem; make environmental data available from atmospheric, ecological, hydrological, and oceanographic sources; provide secure and long-term preservation and access; and engage scientists, land-managers, policy makers, students, educators, and the public. DataONE is a collaboration between NCEAS/UCSB, the University of New Mexico, the Oak Ridge National Laboratory, the California Digital Library, NESCent, and a number of other organizations.

Rodriguez, Josephine

11-Jan-10 to 10-Jan-13

Understanding a diverse insect-parasitoid community: insights from synthesizing biodiversity inventory data from the tropics

This proposal aims to synthesize the caterpillar (and their host plants and parasitoids) database inventory of the Area de Conservación Guanacaste (ACG) in Costa Rica (conducted by D. Janzen and W. Hallwachs) with an extensive genetic dataset from BOLD (Barcode of Life Data Systems) with focus on the Microgastrinae (Braconidae) an important group of caterpillar parasitoid wasps. Understanding the extent and cause of tropical insect diversity is one of the major challenges in

modern ecology (Godfray et al., 1999) and generally requires two approaches: 1) rigorous biodiversity inventories of the insects at particular sites; and 2) reconstructing food webs demonstrating the trophic interactions between species (Godfray et al., 1999). Those two approaches are the major goals of this project and include testing specific hypotheses on microgastrine ecology and evolution. Specifically, I will integrate the genetic data (CO1 DNA barcodes) with inventory records to assess the number of species of microgastrine wasps and levels of host specificity. This will be followed by construction and analyses of microgastrine parasitoid food webs which will provide insights into community structure, crucial in interpreting patterns of parasitoid diversity and provide the basis for hypotheses about structuring processes (Memmott and Godfray, 1993; van Veen et al., 2006).

Scheef, Lindsay

4-Jan-10 to 31-May-12

CAMEO: Building the foundation: New statistical tools for analyzing community dynamics with applications to marine zooplankton (Supported by NOAA/NSF CAMEO)

We will develop an extended multivariate autoregressive (MAR) modeling framework to analyze community dynamics from time-series data, and then demonstrate the framework through investigations of long-term marine plankton data sets. MAR modeling has been used extensively for freshwater plankton communities to infer the inter-species interactions, the dominant environmental drivers, and the system stability and resilience. MAR modeling is well-grounded on theory concerning population and community dynamics and comparative properties of communities, such as resistance to disturbance, resilience, and return time after disturbance. The proposed research will address four technical barriers that hinder widespread application of the MAR framework to marine data sets – observation error, lower temporal autocorrelation due to open systems and infrequent sampling, multiple spatially-distributed sampling locations, and uncertainty introduced by unmeasured species or environmental drivers. The extended MAR framework will be used to do a comparative study of marine plankton community dynamics from different geographic regions using existing long-term data sets. The primary goals are 1) to identify the major drivers of plankton productivity and any directional changes in dynamics due to long-term changes in ocean conditions and 2) to compare the community dynamics – specifically interaction strengths and community stability – to four well-studied freshwater systems.

Turnipseed, Mary

01-Jun-11 to 31-May-12

Development and application of scientific knowledge to ecosystem-based management of coastal marine systems (Supported by the Packard Foundation)

Global demand for fish protein is growing rapidly, but few studies of the global seafood market have sought to understand the relationships among the economic drivers of international seafood trade, the constituent parts of the global seafood market, and their ecological consequences. Global Value Chain (GVC) analysis provides a critical framework with which to explore how seafood consumers link to producers in the global marketplace and how the global marketplace constrains (or opens up opportunities) for producers. GVC studies of food systems have rarely looked at seafood; likewise, studies of the drivers of ecological degradation by fisheries and aquaculture rarely elucidate the key firms and institutional and governance components of the value chains that move seafood around the world.

Williams, Jennifer

2-Dec-08 to 14-Oct-11

Evaluating Life History Theory and the Consequences of Reproductive Strategy For Population Fluctuations

Organisms have evolved a variety of mechanisms to maximize individual fitness in the face of environmental stochasticity that may also serve to buffer population fluctuations. Life history strategies for reproduction, including whether to produce all offspring at once (semelparity) or to spread out the reproductive effort across several bouts (iteroparity), can lead to important consequences for population persistence. While much theory predicts which strategy should be optimal for individuals, few empirical tests exist. The proposed research will use stochastic population models compiled from published and unpublished data of species that exhibit facultative semelparity to address two unresolved issues in evolutionary biology and population ecology: when can iteroparity buffer population fluctuations and do life history predictions match the observed strategy with realized levels of stochasticity? This project will help to refine current life history theory on semelparity and iteroparity, and will clarify the connection between selection pressures on individuals and the consequences for population persistence. Understanding a mechanism that can buffer population fluctuations will also contribute to predictions of which species may be more vulnerable to increased climate variability. Support from NCEAS will be crucial for gathering the volume of data necessary to conduct this research, and collaborations with resident and visiting ecologists will enhance not only this project but initiate new research.

Distributed Graduate Seminars*Occurred or were scheduled between October 1, 2011 and September 30, 2012**Based on data available as of August 31, 2012****Developing curricula and model systems for sustainability science***

Leader(s): Cavender-Bares, Jeannine; Polasky, Stephen

Sustaining the systems that support life while meeting human needs represents one of the greatest challenges that we face in the 21st century. Sustainability science is a use-inspired science aimed at addressing this challenge. We propose a two-year distributed graduate seminar across six institutions to address core concepts in sustainability science and to develop model systems for advancement of theory and tools for sustainable management. The collaboration will benefit from interaction and synthesis across institutions and disciplines, the hallmark of NCEAS, and from the technical, data management and cyber-support that NCEAS can provide. Four key outcomes include 1) a curriculum and publically accessible wiki for sustainability science to provide a pedagogic foundation for the emerging field, 2) the development of model systems for sustainability science to promote rapid advances, 3) a synthesis of key insights from applying a sustainability science framework to these model systems, and 4) a series of team case studies including inclusive valuation of shifts in land-use and restoration to aid decision making.

Working Groups

Occurred or were scheduled between October 1, 2011 and September 30, 2012

Based on data available as of August 31, 2012

Title: Comparative ecology of cities: What makes an urban biota “urban”?

Leader(s): Aronson, Myla; Warren, Paige; Katti, Madhusudan; Nilon, Charles

Participants: Myla Aronson, Mary Cadenasso, Sarel Cilliers, Bruce Clarkson, Cynnamon Dobbs-Brown, Mark Goddard, Marcus Hedblom, Madhusudan Katti, Ingolf Kühn, Frank La Sorte, Christopher Lepczyk, Jip Louwe Kooijmans, Ian MacGregor, Rachel McCaffrey, Mark McDonnell, Ulla Mörtberg, Charles Nilon, Stefan Siebert, Paige Warren, Peter Werner, Nicholas Williams

Abstract:

The rapid urbanization of the world has profound effects on global biodiversity and urbanization has been counted among the processes contributing to the homogenization of the world’s biota. However, there are few generalities of the patterns and drivers of urban biota and even fewer global comparative studies. A comparative approach of urban biota is needed to produce comparable methodologies to understand, preserve, and monitor biodiversity in cities. We propose an NCEAS working group involving researchers from cities worldwide to develop synthesis of urban ecology. We ask the overarching question: “What makes an urban biota ‘urban’?” and with that, “Are the patterns of urban biota and the processes that shape them the same across the world’s cities?” We have identified several factors that may serve as filters determining species distributions. We propose a hierarchical series of filters: 1) regional scale biogeographic context, 2) metropolitan scale urban intensification, and 3) local scale socio-economic/cultural factors. We will use plants and birds as independent datasets for addressing these broad questions. There is a newly matured wealth of existing urban bird and plant datasets for cities of different sizes, ages, and cultural and development patterns such as Baltimore, Berlin, Jalisco, New York City, Phoenix, Potchefstroom, and Stockholm, among others. We propose to bring datasets together, using commonly available data (e.g. land cover layers, national censuses, life history databases) to synthesize the urban biota. Outcomes from these proposed extensive comparative analyses will not only help to push forward the frontiers of transdisciplinarity in ecology, but will also provide useful information for planners and managers.

Title: Ecology of environmental justice in metropolitan areas

Leader(s): Boone, Christopher; Cadenasso, Mary; Grove, J. Morgan; Pickett, Steward

Participants: Christopher Boone, Geoff Buckley, Mary Cadenasso, Daniel Childers, Michail Fragkias, J. Morgan Grove, Melissa McHale, Jarlath O’Neil-Dunne, Laura Ogden, Diane Pataki, Steward Pickett, Stephanie Pincetl, Kirsten Schwarz, Ali Whitmer, Weiqi Zhou

Abstract:

This working group brings together experts in ecology and environmental justice to examine the socio-ecological dynamics of environmental justice in five metropolitan areas – Baltimore, Los Angeles, Miami, Sacramento, and Phoenix – that occupy humid temperate, Mediterranean, arid desert, and subtropical biomes.

Title: Pyrogeography - fire's place in earth system science

Leader(s): Bowman, David; Balch, Jennifer

Participants: Sally Archibald, Jennifer Balch, William Bond, David Bowman, Carla D'Antonio, Meg Krawchuk, Christian Kull, Michelle Mack, Jennifer Marlon, Max Moritz, Stephen Pyne, Christopher Roos, Andrew Scott, Thomas Swetnam, Shaun Walbridge, Christian Wells, Grant Williamson, Guido van der Werf

Abstract:

It is time to rethink the place of fire on Earth. Megafires are currently overwhelming human control, despite huge budgets and mature fire-fighting technologies. There is mounting evidence that, beyond immediate destruction of life and property, landscape fires have long-term effects on global carbon stocks, biodiversity, climate, world economies, and human health. Despite fire's pervasive influence in many disciplines, there is no unifying theory or paradigm concerning the role of biomass burning in Earth science. Moreover, fire has not been satisfactorily considered by global change policy and ecosystem management. We, therefore, propose a thought experiment addressing (i) whether fire would evolve where carbon-based life is present, (ii) how it would evolve, and (iii) how humans, their cultures, and fire may have coevolved. We will combine knowledge about biomass burning across fields to develop an integrative paradigm of 'pyrogeography' that addresses these fundamental questions. This synthetic exercise will inform and coordinate participant's research to derive global products that highlight how and where shifting fire regimes will have consequences for human health, property, and ecosystem services-including global terrestrial carbon stocks. Our outputs will be a succinct review paper, an edited volume, and a concise book that collectively will: (i) provide a conceptual framework to account for the variation of fire types (intensity, frequency, and extent) in space, time, and amongst cultures, (ii) set out working hypotheses that will guide future work, and (iii) identify major omissions of fire's important role in Earth science and management. These outputs are a prerequisite for adaptation to the apparent recent intensification of fire climate-vegetation feedbacks, which have been exacerbated by climate change, rapid land cover transformation, and exotic species introductions that challenge the evolutionary integrity of entire biomes.

Title: Biodiversity and the functioning of ecosystems: Translating results from model experiments into functional reality

Leader(s): Cardinale, Bradley; Duffy, Emmett; Hooper, Dave

Participants: Carol Adair, Patricia Balvanera, Jarrett Byrnes, Bradley Cardinale, Laura Dee, Emmett Duffy, Lars Gamfeldt, Andrew Gonzalez, Michael Goulden, John Griffin, Andrew Hector, Dave Hooper, Bruce Hungate, Forest Isbell, Jonathan Lefcheck, Kristin Matulich, Christian Messier, Mary O'Connor, Alain Paquette

Abstract:

We propose a working group that will advance recent efforts to synthesize one of the fastest growing fields of ecology - Biodiversity and Ecosystem Functioning. Over the past two decades, more than 200 experiments have examined how the diversity of bacteria, fungi, plants and animals influence important ecosystem processes in habitats throughout the world. Though diversity effects have by no means been universal, recent summaries have revealed considerable generality in how the number of genes, species, and functional groups of organisms impacts the efficiency by which communities process the energy and matter that define how ecosystems 'function'. These results suggest that modern biodiversity loss may have substantial impacts on the services that ecosystems provide to humanity. But the research remains controversial, in part, because results of often highly simplistic experiments have yet to be translated into meaningful predictions about how biodiversity loss will impact ecological processes in realistic systems at appropriate scales. We will overcome such

limitations by accomplishing three goals at this frontier between academic and applied ecology: (1) We will develop quantitative scaling relationships that allow conversion of the results of small scale, short-term experiments into predictions about the fraction of species required to optimize biological processes in more natural ecosystems. (2) We will characterize how biodiversity simultaneously impacts the suite of ecosystem processes that have been measured in past experiments to identify trade-offs and potential synergisms, and to provide guidance on optimizing the ‘multi-functionality’ of diverse systems. (3) We will evaluate how the impacts of biodiversity on key ecological processes (e.g., biomass production) can be translated into ecosystem ‘services’ (e.g., CO₂ uptake and storage) that can be used to aid decisions in conservation and management.

Title: Global expansion of jellyfish blooms: Magnitude, causes and consequences

Leader(s): Condon, Robert; Graham, William; Duarte, Carlos

Participants: Juli Berwald, Molly Bogeberg, Lucas Brotz, Richard Brodeur, Craig Carlson, Robert Condon, Mary Beth Decker, Carlos Duarte, Stefan Gelcich, William Graham, Steven Haddock, Cathy Lucas, Laurence Madin, Alenka Malej, Hermes Mianzan, Kylie Pitt, Jennifer Purcell, Kelly Rakow Sutherland, Jim Regetz, Tammi Richardson, Kelly Robinson, Mark Schildhauer, Shin-ichi Uye Paul del Giorgio

Abstract:

Jellyfish are an important and often conspicuous component of oceanic food webs. During the past several decades, dramatic spatial increases and temporal shifts in jellyfish distributions have been reported around the world. Undoubtedly there are associated ecological ramifications such as food web and biogeochemical pathway alterations. Moreover, socio-economic impacts include damage to fisheries, industry and tourism. However, reports have remained local in scope, and scientists agree that a composite understanding of the extent of the problem is still lacking. The bottle-neck is the lack of synthetic analyses across marine ecosystems, due to the present fragmentation of data sources. This proposal will provide a global synthesis of reports of jellyfish abundance to achieve four main objectives: (1) to examine the hypothesis of a global expansion of jellyfish blooms, and to explore the possible drivers for this expansion; (2) to examine the effects of jellyfish blooms on the ecosystem, addressing in particular, carbon cycling, and food webs; (3) to identify current and future consequences of jellyfish blooms for tourism, industry and fisheries, including ecosystem-based management on regional and global scales; and (4) to notify the public at large of the project results. The centerpiece of this project will be a scientifically coordinated global jellyfish and environmental database based on already identified datasets from coastal, estuarine and open-ocean regions. This is a two year project and meetings will be a combination of plenary and specific group level sessions involving data acquisition and statistical analyses, global synthesis of trajectory maps of regional jellyfish blooms, generation of conceptual diagrams of the role of jellyfish in biogeochemical cycles and food webs, and discussions relating to the socio-economic ramifications of jellyfish blooms. Discussions surrounding the framework of the database and identifying deficiencies and additional data requirements will take place in the first meeting. The deliverable products addressed in the proposal include: (1) at least six group publications submitted to major scientific journals in addition to several articles in the popular literature, (2) several new process-oriented proposals to be submitted to US and international funding bodies based on hypotheses generated from the database, (3) multi-lingual website and blog housed on the NCEAS network including the interactive jellyfish database, and educational information on jellyfish blooms, (4) two public seminars and discussion forums, hosted in Spain and another one facilitated by NCEAS coinciding with one of the meetings, (5) white papers designed for funding agencies and environmental managers identifying research priorities and

protocols for monitoring jellyfish blooms, and (6) a book detailing the biogeochemical, ecological and societal aspects of jellyfish blooms.

Title: Forecasting phenology: Integrating ecology, climatology, and phylogeny to understand plant responses to climate change

Leader(s): Cook, Benjamin; Wolkovich, Elizabeth

Participants: Kjell Bolmgren, Benjamin Cook, T. Jonathan Davies, Nathan Kraft, Susan Mazer, Stephanie Pau, Jim Regetz, Nicolas Salamin, Steve Travers, Elizabeth Wolkovich, S. Joseph Wright

Abstract:

The magnitude and direction of plant species responses to climate change has widespread consequences for trophic interactions, ecosystem services, and our ability to predict the shape of future communities. To date, however, research has focused primarily on documenting species responses without developing a detailed understanding of why some species and communities vary with climate and others do not. Combining expertise from ecologists, phylogeneticists, and climatologists, we will use extensive plant phenology data from experimental and observational studies across North America and Europe to conduct a metaanalysis and develop robust predictors of plant phenology responses and sensitivities to climate change. Our resulting database of phenological studies, their related climate variables, and phylogenetic trees will be, we believe, the most comprehensive data available to study the relationship between climate change and plant species phenological responses. Our comparison of experiments to observational studies will test whether short-term, small-scale manipulations of climate can predict the long-term trends seen on global scales, and should improve the design of future climate manipulation experiments. Additionally, our work will develop new approaches for the use of climate metrics in ecology and inform the designs of government data inventories and citizen science projects.

Title: Tropical coral reefs of the future: Modeling ecological outcomes from the analyses of current and historical trends

Leader(s): Edmunds, Peter; Gates, Ruth

Participants: Mehdi Adjeroud, Marissa Baskett, Iliana Baums, Lorenzo Bramanti, Ann Budd, Scott Burgess, Peter Edmunds, Nicholas Fabina, Amanda Fishbin, Erik Franklin, Ruth Gates, Kevin Gross, Xueying Han, Lianne Jacobson, Chandler Jennings, Sarah Kaufman, James Klaus, Jennifer O'Leary, Michael Lesser, Hollie Putnam, Chris Wall, Madeleine van Oppen, Robert van Woesik, Denise Yost

Abstract:

Climate change and local impacts are driving unprecedented global declines in the integrity of marine ecosystems. Although reefs generally exemplify this biome degradation, some reefs and individuals corals on reefs appear surprisingly resistant or resilient to environmental disturbances. This suggests that they are better adapted, or possess community and/or organismic attributes that make them less vulnerable or better equipped to recover. We propose to synthesize data from long-term coral monitoring projects and the primary literature to identify biological attributes and physical conditions that associate with environmental resistance and resilience in coral species and reef communities. Further, we propose to use this information to feed a population and community level model aimed at projecting coral reef community structure for a Caribbean and a Pacific reef 200 years into the future.

Title: Developing an integrated botanical information network to investigate the ecological impacts of global climate change on plant biodiversity

Leader(s): Enquist, Brian; Condit, Richard; Dolins, Steven; Peet, Robert; Boyle, Brad

Participants: Jorge Ahumada, Brad Boyle, Richard Condit, Barbara Dobrin, Steven Dolins, John Donoghue, Kristine Engemann Jensen, Brian Enquist, Eric Fegraus, Naia Holme, Peter Jorgensen, Nathan Kraft, Gabriela Lopez-Gonzalez, Aaron Marcuse-Kubitza, Brian McGill, Martha Narro, Jeff Ott, Robert Peet, Oliver Phillips, William Piel, Shashwati Ramteke, Jim Regetz, Mark Schildhauer, Irena Simova, Lindsey Sloat, Nick Spencer, Jens Svenning, Nathan Swenson, Barbara Thiers, Cyrille Violle, Susan Wisser, Hans ter Steege

Abstract:

Many of the major questions in ecology span enormous geographic and temporal scales, yet much ecological knowledge is still based on observations of individual investigators conducted at single locales, often covering scales of only a few hundred square meters. Understanding ecological patterns and predicting future changes, including those caused by human impact, necessitates a holistic approach covering large spatial scales, and this will only be achieved by identifying, retrieving, and synthesizing diverse data from distributed sources: heterogeneous data from a global confederation of collaborating scientists including a broad range of disciplines. To address this pressing need, we propose to network eight of the largest databases on plant inventories in the Americas to assemble an accessible and readily analyzable database warehouse on distributions and abundances. With it, we will answer major questions of direct relevance to conservation of new world biota. In particular, how does climate and latitude influence the relative distribution and abundance of narrow and widespread plant species? While this and associated questions have been mainstays for ecology our inability to integrate data has significantly limited our ability to answer them. The proposed working group will significantly improve our ability to finally answer these questions. We will also make distribution and abundance data widely available so that further analyses, for example covering other plant taxa or particular regions, will be possible. It is also part of our plan to continue expanding our meta-database with additional inventories, collections, and plots not yet digitized, plus future field work. This data network will provide a baseline of critical data will allow ecologists to address fundamental issues in plant ecology and global change biology.

Title: Cultural ecosystem services from marine and coastal systems: Counting the intangibles EBM (Supported by Packard Foundation)

Leader(s): Guerry, Anne; Chan, Kai

Participants: Patricia Balvanera, Xavier Basurto, Ann Bostrom, Gregory Bratman, Kai Chan, Ratana Chuenpagdee, Gretchen Daily, Rachelle Gould, Anne Guerry, Benjamin Halpern, Neil Hannahs, Sarah Klain, Jordan Levine, Bryan Norton, Mary Ruckelshaus, Roly Russell, Terre Satterfield, Debra Satz, Jordan Tam, Ulalia Woodside,

Abstract:

The field of ecosystem service science has begun to align economic incentives with conservation outcomes by identifying and valuing a more complete set of the services provided to humans by ecosystems than is traditionally considered in decision-making processes. Ecosystem services are the provision of things and experiences by ecosystems for people. The ecologists and economists working in this field have primarily focused on measuring, mapping, and valuing provisioning and regulating services; cultural services are always mentioned, but the integrated incorporation of such services into decision-making remains decades behind the more tangible services. We propose to

change this by jump-starting the integration of cultural services into ecosystem-service decision-making tools. This working group will bring together an interdisciplinary group of ecologists, anthropologists, political scientists, philosophers, sociologists, and practitioners to tackle the thorny question “How do changes in ecosystems affect changes in cultural values in different scenarios for use of coastal and marine regions?” We will review the available data linking such ecosystem change to changes in cultural values, paying particular attention to interactions between services, and to non-linearities. Our project will provide a framework for employing quantitative and—where necessary—qualitative methods to explicitly consider such values in marine and coastal planning.

Title: Identifying thresholds, developing key indicators, and operationalizing their use in

CMSP (*Supported by the Moore Foundation*)

Leader(s): Halpern, Benjamin

Participants: Mike Burner, Meaghan Calciari, Meg Caldwell, Larry Crowder, Ashley Erickson, John Field, Melissa Foley, Rod Fujita, Sara Gultinan, Benjamin Halpern, John Hansen, Sean Hastings, Carrie Kappel, John Kittinger, Andy Lanier, Phillip Levin, Don McIsaac, Corey Niles, Jameal Samhuri, Cyreis Schmitt, Donna Schroeder, Kimberly Selkoe, Becky Smyth, Hilary Thorpe, John Ugoretz, Steve Weisberg, Crow White, Liz Whiteman, Kate Wing

Abstract:

Coastal and marine spatial planning is emerging as a primary tool for implementing ecosystem-based management on the west coast of North America and in other parts of the world. As decision-makers begin to develop marine spatial plans for the west coast, they are faced with the problem of how to define objectives for the ecosystem, and how to evaluate whether the management actions they take are working towards and meeting those objectives. Identifying key ecological and socio-economic thresholds, where small changes in conditions produce large and sometimes abrupt responses in ecosystem state or function, remains a fundamental scientific and management need. In addition, knowing where such nonlinearities do not exist is as important as knowing where they do exist, as the former situations require value judgments rather than science to set a target, or desired state, for management. Relying on our team’s extensive ecological, social, legal and policy experience in the region, we will use a two-phase research program (Phase 1: characterize thresholds, Phase 2: develop indicators) book-ended by participatory processes to develop a framework and tools to inform and guide nascent marine spatial plans in the California Current and British Columbia, as well as a general approach that can be applied to CMSP processes elsewhere. The planning grant is strategically designed to hone and refine the ideas and approach to be taken in a full project. Members of our team have been instrumental in developing all of the five foundational research themes listed in the RFP and have a deep familiarity with nearly all available data for the region. We are uniquely poised to rapidly and comprehensively advance the science needed for understanding ecosystem thresholds and integrating them into management decision-making.

Title: Marine Debris: Scale and impact of trash in ocean ecosystems (*Supported by the Ocean Conservancy*)

Leader(s): Hampton, Stephanie

Participants: Satie Airame, Linda Amaral Zettler, Anthony Andrady, Joel Baker, Morton Barlaz, Mark Browne, Gee Chapman, Christopher Costello, Patty Debenham, Mary Donohue, Cris Elfes, Steven Gaines, Francois Galgani, Roland Geyer, Miriam Golstein, Murray Gregory, Jan Hafner, Benjamin Halpern, Xueying Han, Allen Hershkowitz, K. David Hyrenbach, Jenna Jambeck, Hrisi

Karapanagioti, Kara Lavender Law, George Leonard, Nicholas Mallos, Nikolai Maximenko, Tracy Mincer, Skye Moret-Ferguson, Ramani Narayan, Douglas Ofiara, Stephen Palumbi, Lindsey Peavey, Karen Proctor, Giora Proskurowski, Andrew Read, Chelsea Rochman, Peter Ryan, Joseph Seneca, David Siegel, Ted Siegler, Sangwon Suh, Hideshige Takada, Richard Thompson, Susan Thorneloe, Tony Underwood, Rob Williams, Jim Wilson, Jan van Franeker, Erik Zettler

Abstract:

To construct the theory of marine debris incorporating the needs of nonscientific constituencies, this working group will accomplish the following goals: 1) compile and synthesize existing information to determine how much harmful debris is in our ocean; 2) compile and synthesize existing information to determine impacts of marine debris on ocean populations and ecology; 3) compile and synthesize existing information to determine impacts of marine debris on human populations; 4) identify the three most prominent sources/items of plastic debris for which behavior-oriented solutions can be implemented; and 5) analyze research regarding efficacy of policy solutions such as plastic bag bans as they relate to ocean trash items.

Title: DataONE: Observation Network for Earth (Supported by the National Science Foundation – OCI-0830944)

Leader(s): Jones, Matthew; Hampton, Stephanie

Participants: Paul Allen, Ilkay Altintas, Steve Aulenbach, Khalid Belhajjame, Rick Bonney, Shawn Bowers, Chris Brumgard, Amber Budden, James Cheney, Fernando Chirigati, Bob Cook, Victor Cuevas, Roger Dahl, Ewa Deelman, Nicholas Dexter, Ranjeet Devarakonda, Saumen Dey, Cliff Duke, Juliana Freire, Forrest Hoffman, Jeff Horsburgh, Damian Gessler, Yolanda Gil, Wendy Gram, Corinna Gries, Stephanie Hampton, Sandra Henderson, Heather Henkel, Jeff Horsburgh, Debbie Huntzinger, Vivian Hutchison, Christopher Jones, Matthew Jones, Steve Kelling, David Koop, Ryan Kroiss, John Kunze, Gretchen LeBuhn, Ben Leinfelder, Shishi Liu, Kelly Lotts, Bertram Ludaescher, Yiqi Luo, Deborah McGuinness, Anna Michalak, William Michener, Paolo Missier, Mingquan Mu, Robert Nahf, Greg Newman, Natasha Noy, Giri Palanisamy, Andy Pippin, John Porter, Line Pouchard, Karthik Ram, James Randerson, Stacy Rebich Hespanha, Skye Roseboom, Carlos Rueda, Eric Russell, Robert Sandusky, Ryan Scherle, Mark Schildhauer, Wayne Schroeder, Christopher Schwalm, Mark Servilla, Jennifer Shirk, Claudio Silva, Tianhong Song, Eric Stephan, Robert Stevenson, Carly Strasser, Joshua Tewksbury, Kathy Todd-Brown, Kristin Vanderbilt, Ravichand Vegiraju, David Vieglais, Robert Waltz, Michael Wan, Linda Wayne, Jake Weltzin, Andrea Wiggins, Bruce Wilson, Yaxing Wei, Vineet Yadav, Peter Yim

DataONE (Observation Network for Earth) is building cyberinfrastructure for open, persistent, robust, and secure access to well-described and easily discovered Earth observational data. Supported by the U.S. National Science Foundation, DataONE will ensure preservation and access to multi-scale, multi-discipline, and multi-national science data. DataONE will transcend domain boundaries and make biological data available from the genome to the ecosystem; make environmental data available from atmospheric, ecological, hydrological, and oceanographic sources; provide secure and long-term preservation and access; and engage scientists, land-managers, policy makers, students, educators, and the public. DataONE is a collaboration between NCEAS/UCSB, the University of New Mexico, the Oak Ridge National Laboratory, the California Digital Library, NESCent, and a number of other organizations.

Title: Applying population ecology to strategies for eradicating invasive forest insects*(Supported by the US Dept. of Agriculture)***Leader(s):** Liebhold, Andrew; McCullough, Deborah;**Participants:** Ludek Berec, Rebecca Epanchin-Niell, Robert Haight, Alan Hastings, Dan Herms, John Kean, Danny Lee, Andrew Liebhold, Deborah McCullough, David Suckling, Patrick Tobin, Takehiko Yamanaka**Abstract:**

Eradication refers to management activities that result in the extirpation of a species from a given area. Despite the vast amounts of money and effort expended on eradication programs and their importance to mitigation of undesirable effects of non-indigenous species, a scientific basis for eradication founded on basic principles of population ecology is lacking. We plan to assemble a team comprised of applied ecologists familiar with invasive forest insects and eradication efforts, theoretical ecologists with expertise in the dynamics of low-density populations, and economists with backgrounds in optimization and decision theory. This diverse group will assemble historical data and develop population models that capitalize on our knowledge of Allee effects, stochastic dynamics, and spatial ecology to formulate and optimize new strategies for eradicating alien species and for identifying conditions under which eradication is practical.

Title: The future of publishing in ecology, evolutionary biology, and environmental science**Leader(s):** Lortie, Christopher; Byrnes, Jarrett**Participants:** Lonnie Aarssen, Stefano Allesina, Edward Baskerville, Charles Bazerman, Phil Bourne, Amber Budden, Jarrett Byrnes, Bruce Caron, Patricia Cruse, Jonathan Eisen, Michael Eisen, Michael Hochberg, Doug Jackson, Nikolaus Kriegeskorte, Christopher Lortie, David Morrison, Cameron Neylon, Owen Petchey, Mark Schildhauer, Paula Stephan, Carol Tenopir**Abstract:**

The primary goal of this project is to explore the adoption of alternative publication models to promote more open science and to create a new system of disseminating completed research publications. What we hope to produce need not serve as a wholesale replacement for current journals but as an alternative to promote faster reviews, more transparency, collaboration, and more open access to the science we produce in every form. We are using the physics model of arXiv, the open access policy common in evidence-based medicine, and the data sharing policies of most genetics research as a point of departure for our working group and our vision of the future of science publishing. We will bring together participants from every aspect of the publication process in ecology and evolution from scientists to publishers, such as members of PLoS and arXiv, to the gatekeepers of academic databases, such as Google and ISI. To achieve our overarching goal, we will address the following three objectives. (1) To discuss how to more effectively promote 'open science' in ecology and evolution in general. The primary targets will be how to facilitate the linking of articles to their associated analytical and data attributes. Another target will be how to incorporate more of the discussion and review process associated with the end product including the decisions made in handling data and in analyzing and interpreting it in light of feedback from reviews. The deliverable will be a broad future directions paper on open science (including open access implications). (2) To discuss the viability of providing an arXiv pre-publication open forum for ecology and evolution and how to incorporate peer review into such a system (which arXiv currently does not). We will discuss whether the current journal and publication models in ecology and

evolution are outdated or able to adapt. The primary deliverable from this objective will be a synthesis paper of the limitations and strengths of the current publication models (from publisher handling of journals to treatment of reviews) and a discussion of future directions. (3) The final objective will be to launch a version of the platform proposed. The critical elements will be discussed at the final meeting by a reduced roster of the participants. The targets of this objective will be to define key elements needed for ecology and evolution – specifically in an online model, identify keystone elements needed for a beta version, and develop a pipeline for launch and effective buy in by the community. Queen’s University has the capacity and staff to assist with providing the beta-version for two years including Creative Commons Attribution 3.0 Licensing, part-time staff, DOIs, and will include the ‘journal’ as part of the Open Journals System. In summary, this working group will provide an open-science synthesis publication, a balanced report on the state-of-the-art for publishing in ecology and evolution, and a beta-version of an alternative model as an open journal.

Title: A framework to assess ecosystem health in support of ecosystem-based management of coastal-marine systems (EBM) (Supported by The Packard Foundation)

Leader(s): McLeod, Karen; Crowder, Larry; Fogarty, Michael; Rosenberg, Andrew;
Participants: Daniel Brumbaugh, Larry Crowder, Kendra Daly, Scott Doney, Michael Fogarty, Steven Gaines, Benjamin Halpern, Leah Karrer, Steve Katona, Heather Leslie, Sarah Lester, Catherine Longo, Karen McLeod, Elizabeth Neeley, Jennifer O’Leary, Stephen Polasky, Marla Ranelletti, Andrew Rosenberg, Jameal Samhoury, Paul Sandifer, Courtney Scarborough, Elizabeth Selig, Kevin St. Martin

Abstract:

Maintaining healthy, productive marine ecosystems is a recurrent theme in policy recommendations, management deliberations, and public sentiment. While healthy oceans are a broadly shared goal, distinct vital signs to gauge the state of oceans have not been widely implemented, yet are essential for effective policy-making. This working group will reduce hundreds of candidate indicators to a manageable set that will serve as critical monitoring and planning tools for effective marine ecosystem-based management. Specifically, we will bring together leading scholars and practitioners from ecology, fisheries, oceanography, economics, and applied social sciences to develop ecosystem health metrics for the Arctic, continental shelves, coral reefs, estuaries, and coastal upwelling regions. We will address three overarching questions: (1) What does ecosystem health mean and how can we measure it? (2) How can we measure the degree to which human well-being is sustained by marine systems? (3) How transferable are such metrics across different systems? The indicators developed through this initiative will serve as concrete concepts to help catalyze political will, pave the way for policy-making at all levels of government, provide critical tools to communicate the state of marine systems to the public, and facilitate much-needed integration across the social and natural sciences.

Title: Advancing Theory and Research on Scientific Synthesis

Leader(s): Parker, John; Hackett, Edward

Participants: Stefano Allesina, Winslow Bursleson, Beatrice Crona, Jonathon Cummings, Edward Hackett, Stephanie Hampton, Peter Kareiva, Erin Leahey, Craig McClain, John Parker, Bart Penders, Ismael Rafols, Niki Vermeulen, Ann Zimmerman

Abstract:

We propose a working group to advance theoretically-grounded, empirical study of scientific collaborations designed to achieve synthesis. Synthesis is the integration of diverse theories, methods and data across spatial or temporal scales, scientific phenomena, and forms of expertise to increase the generality, parsimony, applicability, or empirical soundness of scientific explanations. It generates emergent explanations beyond the scope of any one discipline, dataset or method. It counterbalances scientific specialization, capitalizes on existing data, and can be used to address complex problems. Synthesis centers are an increasingly vital component of science policy, rising in number, size, and prominence nationally and globally. Despite this, our understanding of synthesis-group collaborations and their performance are inadequate to advance knowledge, inform policy and guide practice. This meeting will draw together scientists who lead and conduct synthetic research with a diverse group of experts on scientific collaboration and research evaluation. Our aim is to advance understanding of synthesis and develop new approaches for investigating it empirically, longitudinally and comparatively.

Title: Towards understanding marine biological impacts of climate change

Leader(s): Richardson, Anthony; Poloczanska, Elvira

Participants: Keith Brander, Chris Brown, John Bruno, Lauren Buckley, Mike Burrows, Carlos Duarte, Benjamin Halpern, Ove Hoegh-Guldberg, Johnna Holding, Carrie Kappel, Wolfgang Kiessling, Pippa Moore, Mary O'Connor, John Pandolfi, Camille Parmesan, Elvira Poloczanska, Anthony Richardson, David Schoeman, Franklin Schwing, William Sydeman

Abstract:

This Working Group will provide the globally coherent view of marine biological changes in response to climate change that is currently lacking but so desperately needed. We will bring together marine experts specializing in diverse ecosystems and robust statistical analysis to address key questions concerning the vulnerability of marine systems to climate change: 1. What are the similarities and differences between marine and terrestrial systems in terms of types and rates of responses? 2. Which marine species, taxonomic groups and systems (e.g., pelagic, benthic, rocky shore, sandy beach, coral reef) are most sensitive? 3. What are the similarities and differences in the types and rates of responses in tropical, temperate and polar seas? 4. Do multiple human stresses increase vulnerability of species and habitats to climate change? 5. Can we attribute change in marine ecosystems to climate change? To answer these key questions, we will undertake three tasks: Task 1: Database assembly – Build a marine climate impacts database employing an innovative tiered approach to classify impacts. The database will be publicly-accessible through the NCEAS data repository, enabling researchers to validate entries and upload new results. Task 2: Impacts analysis – Address the first 4 key questions above by applying robust meta-analytic techniques (e.g., Parmesan & Yohe 2003) to the marine climate impacts database. Task 3: Attribution – Employ the analytical techniques of the IPCC (2007) and Rosenzweig et al.(2008) to attribute changes in marine biological ecosystems to global warming with a high degree of certainty (key question 5).

Title: Human impacts of water infrastructure on watershed ecosystems and the sustainability of irrigated agriculture in the coterminous US

Leader(s): Sabo, John; Bowling, Laura; Schoups, Gerrit

Participants: Laura Bowling, John Kominoski, Jennifer Roath, John Sabo, Gerrit Schoups, Tushar Sinha

Abstract:

The goal of the proposed working group is twofold: 1) to measure the ecological footprint of freshwater infrastructure in the US (e.g., dams, irrigated agriculture, growing urban centers), and 2) to identify sustainable solutions to potential water shortages given climate change and rapid growth of major US urban areas. The underlying approach includes synthesis of numerous publicly available datasets describing surface and groundwater hydrology, human population growth, agriculture, economics and ecology. The approach also includes a novel analysis in which we will apply macroscale hydrologic models and IPCC climate forecasts to provide sustainable solutions to water shortages that consider water for cities, farms and biodiversity. The group hopes to publish 2-3 high impact papers prior to the 25th anniversary of Cadillac Desert: The American West and its disappearing water (Reisner 1986, Penguin Press) in 2011. The activities will culminate in a final workshop in which noted popular press authors and policy makers are invited to write an op-ed piece to be submitted to the NY Times. This popular press article will comment on the state of US freshwater infrastructure then (based on Cadillac Desert) and now (based on our scientific work), and propose a policy platform for freshwater sustainability in the US.

Title: Climate change and invasive species: Are non-natives poised for greater success in future climatic conditions?

Leader(s): Sorte, Cascade; Dukes, Jeffrey; Lawler, Joshua

Participants: Dana Blumenthal, Bethany Bradley, Carla D'Antonio, Jeffrey Diez, Jeffrey Dukes, Regan Early, Edwin Grosholz, Inés Ibañez, Sierra Jones, Joshua Lawler, Luke Miller, Nicole Molinari, Julian Olden, Cascade Sorte, Wilfried Thuiller

Abstract:

Climate change and biological invasions are two of the primary causes of biodiversity loss, and it has been hypothesized that these factors may operate synergistically in the future. We propose a working group composed of experimentalists and modelers whose objective will be to quantitatively evaluate the interaction between climate change and species invasions. First, we will conduct the first cross-ecosystem meta-analysis of non-native and native species' physiological tolerances and impacts of changing climatic conditions on demographic rates. Our goal will be to address whether non-natives are poised for greater success in future climate conditions. Second, using information on current ranges and on physiological tolerances, we will construct a combination of bioclimatic envelope models and mechanistic distribution models to compare changes in range sizes for non-native and native species. Such integration between modeling techniques has rarely been attempted, despite it being one of the most promising methods for advancing our understanding of the ecological consequences of climate change. Finally, we will further integrate our meta-analysis and modeling results to address the relative change in invasion impacts for target species, with the goal of improving recommendations for conservation and management. The uncommon breadth and depth of our study will yield robust insights into how the spread and impact of invasive species will be altered by climate change. Specific results will inform estimates of the species- and location-specific risks of invasions, which will support invasive species management decisions. Our working group is uniquely poised to make progress toward forecasting the effects of climate change on species invasions because our participants have access to a large quantity of high-quality data and bring the theoretical and empirical expertise needed for the task.

Title: Red flags and species endangerment: Meta-analytical development of criteria for assessing extinction risk

Leader(s): Waples, Robin; Hutchings, Jeffrey

Participants: H. Resit Akcakaya, Priyanga Amarasekare, Stuart Butchart, Jean Cochrane, Ben Collen, Nick Dulvy, Elizabeth Holmes, Jeffrey Hutchings, Douglas Keinath, David Keith, Georgina Mace, Marta Nammack, Michael Schwartz, Andrew Shelton, Robin Waples

Abstract:

The proposed project builds on previous work (some of it sponsored by NCEAS) to evaluate performance of criteria for identifying species at risk. Novel aspects of our approach include the following: 1) We begin with a conceptual definition of an endangered species (one that has entered a Red Zone where both extinction risk and uncertainty about biological processes increase non-linearly); 2) We will leverage large datasets that have become available over the last decade, including those for taxa (e.g., marine fishes) for which application of standard risk criteria has been very controversial; 3) We propose a rather broad interpretation of depensation and Allee effects that facilitates consideration of the importance of ecological and evolutionary processes; 4) We will explicitly consider how risks scale on the continuum populations/metapopulations/ESUs/species; 5) We will evaluate practical utility of candidate RedFlag criteria by applying them to case studies of species that have been formally considered for federal protection in the US and Canada.

Following are working groups prior to October 1, 2011, but not reported in the NSF 2010-2011 report due to submission of the report prior to the end of the reporting period:

Title: Mechanistic distribution models: Energetics, fitness, and population dynamics

Leader(s): Buckley, Lauren; Angilletta, Michael; Holt, Robert; Tewksbury, Joshua

Participants: Amy Angert, Michael Angilletta, Lauren Buckley, Lisa Crozier, Curtis Deutsch, George Gilchrist, Sarah Gilman, Robert Holt, Leslie Rissler, Michael Sears, Joshua Tewksbury

Abstract:

Biologists must understand the dynamics of species distributions to address questions about community structure and to predict distributional shifts over space and time (1). Despite recent theoretical progress (2), predictions of species' ranges still rely largely on correlational methods (3, 4). Our working group will achieve a more dynamic and mechanistic understanding of species' distributions by incorporating individual energetics, fitness curves, population dynamics, and evolutionary change. Several distinct, but complementary, mechanistic models of species' distributions were recently published and share strong mechanistic and physiological bases (5-7). The working group will evaluate these mechanistic models, synthesize salient features of each, and generalize the synthetic model to include physiological adaptation (both plastic and evolutionary), species interactions, and dispersal limitations. Model development and empirical validation will focus on predicting climate-induced shifts in native ranges and the spread of invasive species using both modern and paleontological data.

Title: Tidal wetland carbon sequestration and greenhouse gas emissions model

Leader(s): Callaway, John; Crooks, Steve; Doherty, Abe; Megonigal, Pat

Participants: Richard Ambrose, Omar Aziz, John Callaway, Kim Diana Connolly, Christopher Craft, Steve Crooks, Abe Doherty, Stephen Faulkner, Jason Keller, Pat Megonigal, James Morris, Enrique Reyes, Lisa Schile, Lisamarie Windham-Myers

Abstract:

Wetlands are important in global carbon cycling because they accumulate carbon in wood and soil organic matter, but they also emit methane, CH₄, a potent greenhouse gas (GHG) (Bridgman et al. 2006). Tidal wetlands are a potentially effective sink for carbon through accretionary processes both in response to sea-level rise or via restoration (Chmura et al. 2003, Duarte et al. 2005, Crooks et al. 2009). Tidal wetlands also have low methane emissions, making restoration of these wetlands a promising technique for reducing greenhouse gas emissions. Research to date on tidal wetland carbon dynamics has been uncoordinated geographically and narrowly focused. Carbon sequestration and greenhouse gas emissions are complicated as belowground biomass accumulation and methane production increase from saline to freshwater tidal settings (Bridgman et al. 2006). There is a real need not only to synthesize work in different parts of the country and on different aspects of wetland carbon budgets, but also to incorporate understanding from multiple fields into an integrated model of wetland carbon dynamics, including production, decomposition, sequestration and greenhouse gas GHG emissions. An integrated model would provide the scientific framework to guide wetland climate change mitigation and adaptation policies on many scales. State, regional, national and international initiatives are rapidly being implemented to reduce GHG emissions through cap-and-trade systems. Carbon offset protocols are essential for any carbon trading program, which requires development of reliable, quantified performance standards. Sale of the carbon offsets from tidal wetland restoration projects could be a significant new funding mechanism for restoration, with billions of dollars of offsets expected to be sold in the next five years. The proposed working group will evaluate and test the potential to develop empirically-based and process-based models of carbon dynamics that identify variations in sequestration and emissions across gradients of salinity, inundation, tidal range, and suspended sediment supply. The working group will include experts in a wide range of fields, including the development of carbon offset protocols, to ensure that the products of the working group will directly integrate with GHG emissions reduction programs.

***Title:* Envisioning a sustainable global seafood market and restored marine ecosystems**

Leader(s): Crowder, Larry; Smith, Martin

Participants: James Anderson, Molly Anderson, Kristin Carden, Larry Crowder, Benjamin Halpern, Ahmed Khan, Dane Klinger, Joonkoo Lee, Ethan Lucas, Raphael Sagarin, Kimberly Selkoe, Geoffrey Shester, Dale Squires, Wilf Swartz, Mary Turnipseed, Peter Tyedmers

Abstract:

Ecologists, conservationists, and economists agree that many of the world's wild-capture fisheries are overfished, overcapitalized, and continue to decline. At the same time, global demand for fish protein is growing rapidly. Aquaculture provides an increasing share of the world's edible fish protein, but there are potentially adverse environmental effects of large-scale aquaculture production. Wild-capture fisheries and aquaculture together comprise the global seafood market. Though the deleterious impacts of fisheries and aquaculture on marine ecosystems have been widely studied, few studies have focused on the mechanisms by which the global seafood trade contributes to declines in marine ecosystems and how this trade might be altered to support restoration of marine ecosystems. Also, scientists from different disciplines mainly study the constituent parts of seafood production in isolation without an overarching vision of what an ecologically and economically sustainable seafood

system would look like. This is the void in scholarship we seek to fill with a team of marine ecologists, conservation practitioners, natural resource economists, and an anthropologist. We seek to explore three overarching questions: 1) Can we envision a global seafood system that is sustainable and does not degrade marine ecosystems? 2) Are there features of the global seafood trade that, if enhanced, could facilitate bottom-up sustainability of individual fisheries and aquaculture operations? 3) Are there top-down policy instruments or international agreements that would nudge the global seafood trade towards more sustainable practices? This study is timely and of vital importance, and we believe we have assembled an ideal team to carry it out. By linking knowledge about how the global seafood trade works with knowledge about the ecological impacts of fisheries and aquaculture operations, we will identify the pressure points to shift the global seafood trade away from harming marine ecosystems and towards a sustainable seafood system.

Title: Evaluating and improving open source software for nonlinear statistical modeling in ecology

Leader(s): Maunder, Mark; Gardner, Beth; Bolker, Benjamin

Participants: Benjamin Bolker, Mollie Brooks, Liza Comita, Elizabeth Crone, Sarah Cubaynes, Trevor Davies, Jessica Ford, Beth Gardner, Olivier Gimenez, Eunjung Kim, Marc Kéry, Cleridy Lennert-Cody, Arni Magnusson, Steve Martell, Mark Maunder, Mihoko Minami, John Nash, Anders Nielsen, Jim Regetz, Jeffrey Royle, Hans Skaug, Casper Willestofte Berg, Elise Zipkin, Perry de Valpine

Abstract:

Increasingly, non-linear and complex models are applied as a tool for improving understanding of ecological systems. These statistical models are often used to test hypotheses and make inferences about ecological theories and management decisions based on available data. This explosion in the application of such models is due to rapid and current development of methodology to carry out statistical inference of complex nonlinear models and improvements in computer power (faster and multiple processors). While there are many tools available for statistical inference that differ in their effectiveness for specific applications, no formal comparisons have been conducted between various software packages. It is therefore important to identify which tools are most appropriate for given applications and to demonstrate how such tools can be used most effectively. We evaluate three open source software packages commonly used to carry out statistical inference of complex nonlinear models: OpenBUGS, AD Model Builder, and R. To test the strengths and weaknesses of each package, we will bring together experts in all three software packages and apply a common set of ecological models. Working directly with NCEAS informatics staff, we will produce a web-based guide regarding the utility of each package for particular applications that includes annotated model code for each package, the data sets used in the applications, and peer-reviewed articles. We will also identify how the different packages can be modified to improve their applicability to an array of complex nonlinear models that are essential for advancing ecological research. As statistical models are becoming increasingly more complex and ecologists are faced with a myriad of software options, the results of this project will provide support for ecologists and analysts across a broad spectrum of specialties.

Meetings Hosted by NCEAS

*Occurred or were scheduled between October 1, 2011 and September 30, 2012
Based on data available as of August 31, 2012*

7-Oct-11 to 7-Oct-11

IPCC marine impacts of climate change discussion

Leaders: Richardson, Anthony; Poloczanska, Elvira

9-Jan-12 to 10-Jan-12

Financing Fisheries Reform

Leader: Michaela Clemence

25-Jan-12 to 26-Jan-12 and 11-Sep-12 to 12-Sep-12

Expert Judgement

Leader: Tess Freidenburg

8-Feb-12 to 10-Feb-12

What makes reintroductions work? Developing a comprehensive framework to evaluate and guide reintroduction efforts (Luce Fellows)

Leaders: Roth, Keely; Gosnell, Stephen; Diaz, Stephanie

21-Mar-12, 23-Mar-12

Synthesis Ecology: An NCEAS Postdoc Perspective

Leader: Balch, Jennifer

23-May-12 to 24-May-12

Data Management Short Course (Hosted by NCEAS)

Leader: Amber Budden

9-May-12 to 11-May-12

Eco-labeling Marine Fisheries, Luce Fellows (Hosted by NCEAS)

Leader: Mordecai, Erin

The following meeting occurred prior to October 1, 2011, but was not reported in the NSF 2010-2011 report due to submission of the report prior to the end of the reporting period:

16-Sep-11 through 16-Sep-11

Socio-Environmental Syntheses Center, Leadership Meeting

Participants: Boyd, James; Fagan, William; Grimes, Amanda; Hawthorne, David; JaJa, Joseph; Nassauer, Joan; Palmer, Margaret; Smorul, Mike

Host: Stephanie Hampton

Scientific Visitors

*Occurred or were scheduled between October 1, 2011 and September 30, 2012
Based on data available as of August 31, 2012*

Best, Ben

27-JUN-11 through 31-DEC-11
Ocean Health Index (Hosted by NCEAS)
Host: Ben Halpern

Bever, James; Hochberg, Michael; Mack, Keenan; Nemri, Adnane; Poisot, Timothée; Thrall, Peter

Parasite Co-evolution
9-FEB-12 through 18-FEB-12
Host: Stephanie Hampton

Hochberg, Michael

23-JUL-12 through 27-JUL-12
Conceptual models around community-host interactions
Host: Stephanie Hampton

Kaplan, Lila Rose

6-JAN-11 through 31-AUG-12
Host: Stephanie Hampton

Krawchuk, Meg

29-APR-12 through 3-MAY-12
Pyrogeography - fire's place in earth system science
Host: David Bowman

Law, Kara Lavender

27-FEB-12 through 2-MAR-12
Marine Debris: Scale and impact of trash in ocean ecosystems
Host: Stephanie Hampton

Merrill, Scott

6-APR-09 through 30-NOV-11
Understanding the link between precision agriculture and landscape ecology
Host: Stephanie Hampton

Moritz, Max

14-DEC-11 through 30-SEP-13
Fire Dynamics
Host: Stephanie Hampton

Parker, John

11-JUN-12 through 11-AUG-12
Sociology of Collaboration

Host: Stephanie Hampton

Ranelletti, Marla

6-APR-10 through 31-MAR-12

Ocean Health Index (Hosted by NCEAS)

Host: Ben Halpern

Reyes, Whitney

9-JUL-12 to 31-JUL-12

Marine debris: Scale and impact of trash in ocean ecosystems

Host: Stephanie Hampton.

Runyan, Curtis

1-JAN-09 through 11-JUL-12

Nature Conservancy Magazine

Host: Stephanie Hampton

Rochman, Chelsea

1-AUG-12 through 31-AUG-12

Marine Debris: Scale and impact of trash in ocean ecosystems

Host: Mark Browne

Spafford, Ryan

11-DEC-11 through 17-DEC-11

The future of publishing in ecology, evolutionary biology, and environmental science

Host: Chris Lortie

Following are visitors prior to October 1, 2011, but not reported in the NSF 2010-2011 report due to submission of the report prior to the end of the reporting period:

Hoegh-Guldberg, Ove and King, Melanie

Collaboration with Global Change Institute at University of Queensland

13-JUN-11 through 14-JUN-11

Host: Stephanie Hampton

Center Associates Hosted by NCEAS

Occurred or were scheduled between October 1, 2011 and September 30, 2012

Based on data available as of August 31, 2012

Andelman, Sandy

1-Feb-10 through 31-Dec-11

Conservation International (Hosted by NCEAS)

Baron, Nancy

3-May-04 through 30-Sep-13

SeaWeb (Hosted by NCEAS)

Budden, Amber

9-Aug-2010 through 30-Sep-13

Occurrence of publication bias in ecology

Courtney, Steven

14-Sep-09 through 30-Sep-13

Roles of scientists and science managers

Halpern, Benjamin

1-Jan-07 through 30-Sep-12

Knowledge and capacity-building to support ecosystem-based management (EBM) for sustainable coastal-marine systems

Kappel, Carrie

1-Jun-09 through 30-Sep-12

Mapping Human Impacts to Massachusetts Marine Ecosystems

Ranganathan, Jai

8-Jan-10 through 30-Sep-13

Developing a return on investment approach for conservation planning in Argentina

Selkoe, Kimberly

21-Sep-05 through 31-Dec-12

Elucidating marine dispersal with population genetics: A simulation approach with case studies on the Northwest Hawaiian Islands and the Pacific coasts of Baja and Southern California (Hosted by NCEAS)

Research Training Activities

Six graduate and one undergraduate students were involved with research activities at NCEAS during the reporting period. An additional two graduate students were here during the previous reporting period, but were not included in the 2010-2011 report due to the July 2011 submission date. They are listed below, along with the titles of the projects on which they worked.

Graduate Student Interns

Occurred or were scheduled between October 1, 2011 and September 30, 2012

Based on data available as of August 31, 2012

Chang, Michelle

1-OCT-11 through 31-Dec-11

DataONE: Observation Network for Earth

Clark, Sarah

1-Jun-12 through 30-Sep-12

Collaborative Data Management and Holistic Synthesis of Impacts and Recovery Status Associated with the Exxon Valdez Oil Spill

Elfes, Cris

30-Aug-11 through 1-Aug-12

Ocean Health Index (Hosted by NCEAS)

Elmore, Aaron

1-OCT-10 through 30-Jun-12

Ecoinformatics graduate internships

Han, Xueying (Shirley)

1-Jan-09 through 30-Sep-12

Ecoinformatics graduate internships

Heyman, Jessica

18-Jan-12 through 7-Jun-12

Outreach and Development

Following are graduate students prior to October 1, 2011, but not reported in the NSF 2010-2011 report due to submission of the report prior to the end of the reporting period:

Jacobsen, Kelsey

9-Jun-11 through 5-Aug-11

Ocean Health Index (Hosted by NCEAS)

Natalie Robinson

1-Aug-11 through 31-Aug-11

Choosing (and making available) the right environmental layers for modeling how the environment controls the distribution and abundance of organisms

Undergraduate Student Interns

Occurred or were scheduled between October 1, 2011 and September 30, 2012

Based on data available as of August 31, 2012

Truitt, Stephanie

20-Jun-11 through 7-Oct-11

Improving our understanding of the ecological controls on the distribution and phenology of C3 and C4 grasses in response to climate variations

Postdoctoral Training Sessions

For training sessions, NCEAS Postdoctoral Associates are the primary audience, with attendance by other NCEAS scientists (e.g., sabbaticals, graduate students) and UCSB scientists of all stages welcomed.

Career Development Series

Occurred or were scheduled between October 1, 2011 and September 30, 2012

Based on data available as of August 31, 2011

(Sabbaticals and UCSB faculty are invited to provide faculty perspective in a discussion with Postdocs on career development topics that vary from year to year.)

Academic Job Application Process (series)

Non-academic Careers (series)

Outreach with K-12 Students

Working with the Media

Training Sessions

Occurred or were scheduled between October 1, 2011 and September 30, 2012

Based on data available as of August 31, 2011

8-Nov-11 through 9-Nov-11

Social Media for Scientists Workshop

Instructor: Ranganathan, Jai

1-May-12 through 4-May-12

Software Tools for Sensor Networks (LTER, DataONE, NCEAS)

11-Jun-12 through 15-Jun-12

R-phylogenetics Workshop (Hosted by NCEAS)

Following are training workshops prior to October 1, 2011, but not reported in the NSF 2010-2011 report due to submission of the report prior to the end of the reporting period:

6-Jun-11 through 8-Jun-11

Structural Equation Modeling

Instructor: Byrnes, Jarrett

1-Aug-11 through 4-Aug-11

R-phylogenetics Workshop (Hosted by NCEAS)

Instructors: Michael Alfaro and Luke Harmon

30-Sep-11

DataONE: Observation Network for Earth

Instructor(s): Amber Budden

Additional Seminars

The wide range of visiting and resident scientists at NCEAS has provided excellent opportunities for interactions through the NCEAS Ecolunch seminar series. A list of Ecolunch speakers is provided in Table 2. Recently NCEAS residents chose to implement “Roundtable Discussions” in lieu of Ecolunch. This new format provides a more informal setting that encourages discussions on current research pursuits with NCEAS, UCSB and visiting scientists. The change also included creating a Word Press web site, <http://roundtable.nceas.ucsb.edu/>, where materials can be posted and discussions can continue online. A list of Roundtable discussions is also included in table 2.

Education and Outreach Activities

NCEAS publicizes new research to increase the public understanding of science through press releases and information on our website, provides outreach training and experiences to resident scientists, fosters the inclusion of synthesis in ecology education and contributes, educationally and culturally, to the local community through a K-12 program and participation in community events.

Communicating Science

Press/Publicity

NCEAS continues to emphasize the importance of media coverage and media training, expanding its coverage to maximize exposure for its research, education and outreach efforts. Working with NCEAS scientists, collaborators, and funding sources we have increased visibility of NCEAS activity and results via public media. We continue to prepare and coordinate press releases with an expanding number of scientists’ home institutions, University of California, and NSF media professionals; and work with resident and visiting scientists to craft public-oriented summaries of their research. Since October 1, 2011 publications resulting from NCEAS support were featured in at least 15 press releases developed by UC Santa Barbara on behalf of NCEAS. One of the products of the TrEAS symposium will be a series of podcasts on topics discussed at the symposium.

Media Training

Media Training is a key component of the postdoctoral experience at NCEAS. This year we offered several interactive presentations on how scientists can communicate their work effectively to journalists. Included were sessions on science blogging, and how the media reports on science.

Social Media

NCEAS has substantially increased its activity on Twitter in the past year, and now has almost 900 followers. Jai Ranganathan conducted a workshop titled “Social Media for Scientists” in November of 2011. SciFund, a crowdsourced fundraising platform, is the brainchild of a NCEAS postdoc Jarrett Byrnes and Center Associate Jai Ranganathan; the primary purpose is to help scientists communicate the importance of their science to the public while also raising modest funds to support various research. SciFund attracted 49 scientists in its first round, and 75 scientists in its second round;

Byrnes and Ranganathan currently have a paper in review analyzing the social networking and communication benefits that arose from the project.

Public Understanding of Science

NCEAS maintains a section of the website with material written for the general public - “Featured Research Underway”. We interact with journalists and other communications professionals, and collaborate with local and national organizations such as COMPASS, to promote public interest in and understanding of science.

In addition to hosting Center Associate Nancy Baron (COMPASS) who has participated in many NCEAS efforts to communicate science to the public, NCEAS now also hosts Jai Ranganathan who is initiating a series of public events that will include live video feeds. Both Center Associates interact regularly with visitors and residents, with Dr. Ranganathan drawing heavily from the stream of visitors to create his podcasts about science. <http://www.miller-mccune.com/category/curiouser/>

NCEAS strives to track popular media coverage of publications that result from NCEAS-sponsored research. As a result of this effort, we found that it has been an active year for many researchers and groups.. A number of projects have inspired prominent media attention, both in the U.S. and around the world. Below are only a few examples.

Examples of Projects that Received Prominent Press Coverage

Project: Pyrogeography – fire’s place in earth system science

PIs: David Bowman and Jennifer Balch

D. Bowman, et al. The human dimension of fire regimes on Earth, *Journal of Biogeography* 38(12):2223-2236 (2011)

Covered by: *BBC Radio 4* (UK); *Scientific American*; *Dalje* (Croatia); *EU Science News* (Europe); *Fire Engineering*; *Middle East North Africa Financial Network (MENAFN)*

Project: Towards understanding marine biological impacts of climate change

PIs: Anthony Richardson and Elvira Poloczanska

M. Burrows, et al. The pace of shifting climate in marine and terrestrial ecosystems, *Science* 334(6056):652-655 (2011)

Covered by: *ABC Australia*; *The Sydney Morning Herald* (Australia); *Herald Sun* (Australia); *Times of India*; *The Atlantic*; *Fish Update*; *FishNewsEU* (Europe)

Project: Climate warming and fire in a naïve biome: Using insights from boreal forests to understand causes and consequences of fire intensification in arctic tundra

PI: Michelle Mack

M. Mack, et al. Carbon loss from an unprecedented Arctic tundra wildfire, *Nature* 475(7357): 489-492 (2011)

Covered by: *ABC Australia*; *Anchorage Daily News*; *BBC News* (UK); *BioKnow* (China); *Daily Bhaskar* (India); *Dalje* (Croatia); *Discover News*; *International Business Times*; *Nigerian Daily*; *MSN Latino* (Latin America); *Public Radio* (many states in US); *Reuters Africa*, UK); *Scientific American*; *Wall Street Journal*

Project: Global expansion of jellyfish blooms: Magnitude, causes and consequences

PIs: Robert Condon, Carlos Duarte, and William Graham

R. Condon, et al. Questioning the rise of gelatinous zooplankton in the world's oceans, *BioScience* 62(2): 160-169 (2012)

Covered by: *Scientific American*; *The Huffington Post*; *Nature*; *New York Times*; *Sydney Morning Herald* (Australia); *Times of India*; *Fish Information & Services* (Japan)

Project: Forecasting phenology: Integrating ecology, climatology, and phylogeny to understand plant responses to climate change

PIs: Benjamin Cook and Elizabeth Wolkovich

E. Wolkovich, et al. Warming experiments underpredict plant phenological responses to climate change, *Nature* 485:494-497 (2012)

Covered by: *BBC News* (UK); *Philippine Daily Inquirer* (Philippines); *Reuters* (international); *Science Magazine*; *Scientific American*; *The Jerusalem Post* (Israel); *Yahoo News* (India)

Project: Relative influence of fuels, climate, and ignition on fire frequency across earth's ecosystems

PI: Jennifer Balch

E. Davidson, et al. The Amazon basin in transition, *Nature* 481: 321-328 (2012)

Covered by: *BBC News* (UK); *Scientific American*; *World Weather Post*; *Science News*; *Dawn* (Pakistan); *Folha* (Brazil)

Project: Linking network theory and biodiversity-ecosystem function research: Topology modifies the consequences of species loss for the flow of energy and nutrients within food webs

PI: Jarrett Byrnes

D. Hooper, et al. A global synthesis reveals biodiversity loss as a major driver of ecosystem change, *Nature* 486: 105-108 (2012)

Covered by: *Scientific American*; *Statesman Journal*; *The News Tribune*; *The Seattle Times*; *The Virginia Gazette*; *Yahoo News* (India); *Network of Academies of Science in Islamic Countries* (Pakistan)

Project: Envisioning a sustainable global seafood market and restored marine ecosystems

PIs: Larry Crowder and Martin Smith

D. Klingler, et al. Moving beyond the fished or farmed dichotomy, *Marine Policy* (2012)

Covered by: *Science Insider*; *Science Daily*; *Fish Information & Services* (Japan)

Project: Efficient wildlife disease control: From social network self-organization to optimal vaccination

PI: Peter Walsh

S. Ryan, et al. Consequences of non-intervention for infectious disease in African Great Apes, *PLoS ONE* 6(12): e29030 (2011)

Covered by: *Futurity*; *Science Daily*; *Red Orbit*

Project: Ecotoxicology of the gulf oil spill: A holistic framework for assessing impacts**PIs: Sean Anderson, Garry Cherr, and Charles Peterson**

C. Peterson, et al. A tale of two spills: Novel science and policy implications of an emerging new oil spill model, *BioScience* 62(5): 461-469 (2012)

Covered by: *Science Daily; National Science Foundation; Ventura County Star; Energy Daily; Ars Technica*

Project: Ecological and evolutionary models for homeland security strategy**PI: Raphael Sagarin**

R. Sagarin, *Learning from the Octopus*. Basic Books, New York, NY (2012)

Covered by: *Huffington Post; New Scientist (interview)*

Diversity Initiatives

NCEAS continues to expand efforts to reach students and scientists from groups currently under-represented in ecology.

In our Distributed Graduate Seminars (DGS) we work with PI's to include Minority Serving Institutions in their proposals, with the intention of reaching our goal: to have 25% of participating institutions be MSI's. Our Distributed Seminar for undergrads is continuing, organized in partnership with ESA's Diversity and Education program and NEON, in which half of participating colleges/universities are Minority Serving Institutions.

NCEAS works with NESCent and other partners to co-produce a suite of activities to promote careers in ecology and evolution. These include a scientific symposium, career panel, and film discussion at the annual conference of the Society for the Advancement of Chicanos and Native Americans in Science (SACNAS). NCEAS postdoctoral associate Carly Strasser represented NCEAS at the 2011 SACNAS meeting.

Our K-12 program, Kids Do Ecology, reaches a local community in which participating elementary classrooms have high Hispanic enrollment, from 45-94% Hispanic students in 2010-2011.

K-12 and Community Outreach

NCEAS offers postdoctoral and sabbatical fellows training and hands-on opportunities for outreach through the K-12 Kids Do Ecology program and associated activities.

The Kids Do Ecology (KDE) classroom program, a successful initiative that has been our primary means of outreach to K-12 students since 1995, continues to flourish. Eleven NCEAS resident scientists provided instruction and mentoring to students in 9 fifth-grade classrooms in Santa Barbara. An annual Poster Presentation Day was held at NCEAS in March 2012 for students, their families and teachers, and NCEAS staff. The bilingual KDE website continues to be used by elementary school teachers to create educational materials for their classrooms.

NCEAS scientists additionally participated in the broader community by giving talks at UC Santa Barbara, coordinating the Ecolunch and Roundtable series, and judging ecology projects for the Santa Barbara Country Science Fair.

Initiatives Focused on Higher Education

In association with a related NCEAS Distributed Graduate Seminar “Engaging Undergraduate Students in Ecological Investigations Using Large, Public Datasets,” several teaching modules have been submitted for review or published at TIEE, including a module by NCEAS postdocs Jennifer Balch and Josephine Rodriguez, as well as Deputy Director Stephanie Hampton.

In another program targeted at undergraduates, the Synthetic Undergraduate Networks for Analyzing Ecological Data (Project SUN), was designed and carried out by David Marsh from Washington and Lee University. Project SUN introduced undergraduate students in ecology to the benefits of collaboration and synthesis through actual research experience carried out in partnership with students from other universities. The initial research project focused on identifying factors that promote or inhibit plant invasions. Dr. Marsh and Dr. Hampton sought and received NSF support for an evolution of this model, to reach more undergraduates in synthesis research, funded by the NSF TUES program. That new project is called: Toads, Roads, and Nodes: Collaborative Course-Based Research on the Landscape Ecology of Amphibian Populations.

For graduate-level students, NCEAS continued its collaboration with the Henry Luce Foundation. The Luce Environmental Science to Solutions Fellowship Program (Luce Fellows) allows selected Ph.D. scholars to carry out multi-disciplinary research on environmental issues under the guidance of experienced scientist mentors at NCEAS and UCSB. Student-driven working groups hosted at NCEAS are a component of the program. A list of Luce Fellows meetings held during the funding period is included in the Meetings section of this report.

Diversity of Community Engagement

Since 1995, over 5,200 scientists and other professionals have participated in activities at NCEAS and (Figure 3) shows the level of participation per year. The vast majority of NCEAS visitors come only once (Figure 4), allowing NCEAS to continue to engage new scientists. Of these NCEAS participants, roughly 200 come from Minority Serving Institutions as defined by the Department of Education (i.e., Minority Institutions, Historically Black Colleges and Universities, Alaska Native-Serving Institutions, High Hispanic Enrollment, Hispanic-Serving Institutions, Indian Tribally Controlled Colleges and Universities, and Native Hawaiian-Serving Institutions). Representation of women in Working Groups at NCEAS continues to grow (Figure 5), and has increased on the Science Advisory Board since NCEAS establishment (Figure 6). Disciplinary breadth continues to increase; participants over the lifespan of NCEAS have belonged to approximately 600 different professional societies and have published their NCEAS work in over 300 distinct journals. Since 1995, participants have come from over 1,500 different institutions. Finally, 25% of the participants during this reporting period to date were from non-academic institutions.

We continue to strive to reach new participants. The NCEAS leadership and our Science Advisory Board actively encourage Working Group leaders to recruit participants who have not had previous NCEAS experience. Figure 7 shows a trend consistent with the Board's increasing scrutiny of participant lists, encouraging recruitment of new faces; more participants report that their first knowledge of NCEAS has come via invitation from a Working Group leader or word-of-mouth. We advertise our Call for Proposals through professional listservs, such as Ecolog, and the relatively high number of "hits" on our online Call for Proposals that are directed to us from email servers following these listserv advertisements indicates success in gaining attention through this approach. In addition, we also announce the Call for Proposals via Twitter and our "news" email list.

Publications and Products

The total number of publications from NCEAS activities now exceeds 2,100 since the establishment of NCEAS (Figure 8). (This does not include publications from the NSF-supported SEEK project, which are reported to NSF independently.) Recently we matched our publications to the most recent Impact Factor scores available, and we present in Table 3 selected high-impact journals and the number of publications NCEAS has had in these journals over its lifespan.

Below we list 152 newly reported publications for the period since July 2010 (last report submission date). Note that this list includes publications that have been reported to us by participants in NCEAS activities during this period, and actual publication dates may precede this period. It also includes some publications for which we now have complete citations, and were reported as "in press" in the past. It does not include publications reported for the SEEK project, which are reported to NSF separately.

In addition to publications reported, we have listed 17 data sets that were registered or uploaded to the NCEAS Data Repository since July 1, 2010. NCEAS scientists have reported that they made 68 presentations of their NCEAS work, submitted 5 new proposals to other organizations, and completed 4 thesis as a result of activities at NCEAS.

Publications Reported July 17, 2011 through August 31, 2012

Includes journal articles, books, and book chapters

* *Indicates publication is being updated from previously reported as "in press"*

Angilletta, Michael J.; Sears, Michael. 2011. Coordinating theoretical and empirical efforts to understand the linkages between organisms and environments. *Integrative and Comparative Biology*. 51(5). 653-661.

Aukema, Juliann; Leung, Brian; Kovacs, Kent; Chivers, Corey; Britton, Kerry; Englin, Jeffrey E.; Frankel, Susan; Haight, Robert G.; Holmes, Thomas P.; Liebhold, Andrew M.; McCullough, Deborah G.; Von Holle, Betsy. 2011. Economic impacts of non-native forest insects in the continental United States. *PLoS ONE*. 6(9). e24587-e24587.

Aziz, Omar I.; Mantua, Nathan; Myers, Kate. 2011. Potential climate change impacts on thermal habitats of Pacific salmon *Oncorhynchus* spp in the North Pacific Ocean and adjacent seas. *Canadian Journal of Fisheries and Aquatic Sciences*. 68(9). 1660-1680.

- Bagchi, Sumanta; Ritchie, Mark. 2012. Body size and species coexistence in consumer-resource interactions: A comparison of two alternative theoretical frameworks. *Theoretical Ecology*. 5(1). 141-151.
- Beaulieu, Jeremy; Ree, Richard H.; Cavender-Bares, Jeannine M.; Weiblen, George D.; Donoghue, Michael J. 2012. Synthesizing phylogenetic knowledge for ecological research. *Ecology*. 93(6). s4-s13.
- Beechie, Timothy; Imaki, Hiroo; Greene, Jennifer; Wade, Alisa; Wu, Huan; Pess, George; Roni, Phil; Kimball, John; Stanford, Jack; Kiffney, Peter; Mantua, Nathan. 2012. Restoring salmon habitat for a changing climate. *River Research and Applications*. (published online July 2012).
- Benavides, Julio; Walsh, Peter D.; Meyers, Lauren; Raymond, Michel; Caillaud, Damien. 2012. Transmission of infectious diseases en route to habitat hotspots. *PLoS ONE*. 7(2). e31290-e31290.
- Blackwood, Julie; Berec, Ludek; Yamanaka, Takehiko; Epanchin-Niell, Rebecca; Hastings, Alan; Liebhold, Andrew M. 2012. Bioeconomic synergy between tactics for insect eradication in the presence of allee effects. *Proceedings of the Royal Society B: Biological Sciences*. 279(1739). 2807-2815.
- Bowman, David; Balch, Jennifer K.; Artaxo, Paulo; Bond, William J.; Cochrane, Mark; D'Antonio, Carla; DeFries, Ruth S.; Johnston, Fay; Keeley, Jon; Krawchuk, Meg A.; Kull, Christian; Mack, Michelle C.; Moritz, Max A.; Pyne, Stephen J.; Roos, Christopher; Scott, Andrew; Sodhi, Navjot S.; Swetnam, Thomas W. 2011. The human dimension of fire regimes on Earth. *Journal of Biogeography*. 38(12). 2223-2236.
- Boyer, Denis; Crofoot, Margaret C.; Walsh, Peter D. 2012. Non-random walks in monkeys and humans. *Journal of the Royal Society Interface*. 9(70). 842-847.
- Bradley, Bethany A.; Blumenthal, Dana; Early, Regan; Grosholz, Edwin; Lawler, Joshua J.; Miller, Luke; Sorte, Cascade; D'Antonio, Carla; Diez, Jeffrey; Dukes, Jeffrey S.; Ibañez, Inés; Olden, Julian. 2011. Global change, global trade, and the next wave of plant invasions. *Frontiers in Ecology and the Environment*. 10(1). 20-28.
- Brando, Paulo M.; Nepstad, Daniel C.; Balch, Jennifer K.; Bolker, Benjamin; Christman, Mary C.; Coe, Michael T.; Putz, Francis E. 2012. Fire-induced tree mortality in a neotropical forest: The roles of bark traits, tree size, wood density and fire behavior. *Global Change Biology*. 18(2). 630-641.
- Breto, Carles; Ionides, Edward. 2011. Compound Markov counting processes and their applications to modeling infinitesimally over-dispersed systems. *Stochastic Processes and Their Applications*. 121(11). 2571-2591.
- Brown, Chris; Schoeman, David; Sydeman, William J.; Brander, Keith; Buckley, Lauren B.; Burrows, Michael; Duarte, Carlos M.; Moore, Pippa J.; Pandolfi, John M.; Poloczanska, Elvira; Venables, William.; Richardson, Anthony J. 2011. Quantitative approaches in climate change ecology. *Global Change Biology*. 17(12). 3697-3713.
- Burns, Jean H.; Strauss, Sharon. 2012. Effects of competition on phylogenetic signal and phenotypic plasticity in plant functional traits. *Ecology*. 93. s126-s137.
- Burrows, Mike; Schoeman, David; Buckley, Lauren B.; Moore, Pippa; Poloczanska, Elvira; Brander, Keith; Brown, Chris; Bruno, John F.; Duarte, Carlos M.; Halpern, Benjamin S.; Holding, Johnna; Kappel, Carrie V.; Kiessling, Wolfgang; O'Connor, Mary I.; Pandolfi, John; Parmesan, Camille; Schwing, Franklin; Sydeman, William J.; Richardson, Anthony J. 2011. The pace of shifting climate in marine and terrestrial ecosystems. *Science*. 334(6056). 652-655.
- Cadotte, Marc W.; Dinnage, Russell; Tilman, David. 2012. Phylogenetic diversity promotes ecosystem stability. *Ecology*. 93(8). s223-s233.
- Cadotte, Marc W.; Strauss, Sharon. 2011. Phylogenetic patterns of colonization and extinction in experimentally assembled plant communities. *PLoS ONE*. 6(5). e19363-e19363.
- Cardinale, Bradley J.; Matulich, Kristin L.; Hooper, Dave U.; Byrnes, Jarrett E.; Duffy, Emmett; Gamfeldt, Lars; Balvanera, Patricia; O'Connor, Mary I.; Gonzalez, Andrew. 2011. The functional role of producer diversity in ecosystems. *American Journal of Botany*. 98(3). 572-592.

- Carvalho, Karine S.; Alencar, Ane; Balch, Jennifer K.; Moutinho, Paulo. 2012. Leafcutter ant nests inhibit low-intensity fire spread in the understory of transitional forests at the Amazon's forest-savanna boundary. *Psyche: A Journal of Entomology*. 2012. 1-7
- Cavender-Bares, Jeannine M.; Reich, Peter B. 2012. Shocks to the system: Community assembly of the oak savanna in a 40-year fire frequency experiment. *Ecology*. 93. s52-s69.
- *Chase, Jonathan; Myers, Jonathan. 2011. Disentangling the importance of ecological niches from stochastic processes across scales. *Philosophical Transactions of the Royal Society B: Biological Sciences*. 366(1576). 2351-2363.
- Chen, Shi; Fricks, John; Ferrari, Matthew. 2011. Tracking measles infection through non-linear state space models. *Journal of the Royal Statistical Society Series C-Applied Statistics*. 61(1). 117-134.
- Cleland, Elsa E.; Harpole, W. Stanley. 2010. Nitrogen enrichment and plant communities. *Annals of the New York Academy of Sciences*. 1195. 46-61.
- Comita, Liza S.; Muller-Landau, Helene C.; Aguilar, Salomon; Hubbell, Stephen P. 2010. Asymmetric density dependence shapes species abundances in a tropical tree community. *Science*. 329. 330-332.
- Condon, Robert H.; Graham, William M.; Duarte, Carlos M.; Pitt, Kylie A.; Lucas, Cathy H.; Haddock, Steven H.D.; Rakow Sutherland, Kelly C.; Robinson, Kelly L.; Dawson, Michael N.; Decker, Mary Beth; Mills, Claudia E.; Purcell, Jennifer E.; Malej, Alenka; Mianzan, Hermes; Uye, Shin-ichi; Gelcich, Stefan; Madin, Laurence P. 2012. Questioning the rise of gelatinous zooplankton in the world's oceans. *BioScience*. 62(2). 160-169.
- Connolly, John; Cadotte, Marc W.; Brophy, Caroline; Dooley, Aine; Finn, John; Kirwan, Laura; Roscher, Christiane; Weigelt, Alexandra. 2011. Phylogenetically diverse grasslands are associated with pairwise interspecific processes that increase biomass. *Ecology*. 92(7). 1385-1392.
- Cook, Benjamin I.; Wolkovich, Elizabeth M.; Parmesan, Camille. 2012. Divergent responses to spring and winter warming drive community level flowering trends. *Proceedings of the National Academy of Sciences*. 109(23). 9000-9005.
- Crona, Beatrice; Parker, John N. 2012. Learning in support of governance: Theories, methods, and a framework to assess how bridging organizations contribute to adaptive resource governance. *Ecology and Society*. 17(1). art32-art32.
- Crona, Beatrice; Parker, John N. 2011. Network determinants of knowledge utilization: Preliminary lessons from a boundary organization. *Science Communication*. 33(4). 448-471.
- Davidson, Eric A.; de Araujo, Alessandro C.; Artaxo, Paulo; Balch, Jennifer K.; Brown, I. Foster; Bustamante, Mercedes; Coe, Michael T.; DeFries, Ruth S.; Keller, Michael; Longo, Marcos; Munger, J. William; Schroeder, Wilfrid; Soares-Filho, Britaldo S.; Souza, Carlos M. ; Wofsy, Steven C. 2012. The Amazon basin in transition. *Nature*. 481. 321-328.
- Davies, T. Jonathan; Cooper, Natalie ; Diniz-Filho, Alexandre F.; Thomas, Gavin H.; Meiri, Shai. 2012. Using phylogenetic trees to test for character displacement: A model and an example from a desert mammal community. *Ecology*. 93(8). s44-s51.
- Davies, T. Jonathan; Kraft, Nathan J.B.; Salamin, Nicolas; Wolkovich, Elizabeth M. 2012. Incompletely resolved phylogenetic trees inflate estimates of phylogenetic conservatism. *Ecology*. 93(2). 242-247.
- Diez, Jeffrey; D'Antonio, Carla; Dukes, Jeffrey S.; Grosholz, Edwin; Olden, Julian; Sorte, Cascade; Blumenthal, Dana; Bradley, Bethany A.; Early, Regan; Ibáñez, Inés; Jones, Sierra J.; Lawler, Joshua J.; Miller, Luke. 2012. Will extreme climatic events facilitate biological invasions?. *Frontiers in Ecology and the Environment*. 10(5). 249-257.
- Drake, John M.; Lodge, David M. 2008. Reply to the comment by Reid and Hudson on "Rate of species introductions in the Great Lakes via ships' ballast water and sediments". *Canadian Journal of Fisheries and Aquatic Sciences*. 65(3). 554-555.

- Eaton, Deren A. R. ; Fenster, Charles B.; Hereford, Joe ; Huang, Shuang-Quan; Ree, Richard H. 2012. Floral diversity and community structure in *Pedicularis* (Orobanchaceae). *Ecology*. 93(8). s182-s194.
- Eilers, Elizabeth J.; Kremen, Claire; Greenleaf, Sarah S.; Garber, Andrea K.; Klein, Alexandra-Maria. 2011. Contribution of pollinator-mediated crops to nutrients in the human food supply. *PLoS ONE*. 6(6). e21363.
- Ekstrom, Julie; Young, Oran R. 2009. Evaluating functional fit between a set of institutions and an ecosystem. *Ecology and Society*. 14(2). art16.
- Emery, Nancy; Forrestel, Elisabeth; Jui, Ginger; Park, Michael ; Baldwin, Bruce G; Ackerly, David D. 2012. Niche evolution across spatial scales: Climate and habitat specialization in California *Lasthenia* Asteraceae. *Ecology*. 93(8). s151-s166.
- Epanchin-Niell, Rebecca; Haight, Robert G.; Berec, Ludek; Kean, John; Liebhold, Andrew M. 2012. Optimal surveillance and eradication of invasive species in heterogeneous landscapes. *Ecology Letters*. 15(8). 803-812.
- Franklin, Erik; Stat, Michael; Pochon, Xavier; Putnam, Hollie; Gates, Ruth. 2011. GeoSymbio: A hybrid, cloud-based web application of global geospatial bioinformatics and ecoinformatics for Symbiodinium-host symbioses. *Molecular Ecology Resources*. 12(2). 369-373.
- Garcia, Serge; Kolding, J.; Rice, Jake; Rochet, M. J.; Zhou, Shijie; Arimoto, T.; Beyer, J. E.; Borges, Lisa; Bundy, Alida; Dunn, Daniel; Fulton, Elizabeth A.; Hall, Martin; Heino, Mikko P.; Law, Richard; Makino, M.; Rijnsdorp, A. D.; Simard, François; Smith, A. D.M. 2012. Reconsidering the consequences of selective fisheries. *Science*. 335(6072). 1045-1047.
- Gotelli, Nicholas J.; Chao, Anne; Colwell, Robert K.; Hwang, Wen-Han; Graves, Gary R. 2011. Specimen-based modeling stopping rules and the extinction of the Ivory-Billed Woodpecker. *Conservation Biology*. 26(1). 47-56.
- Graham, Catherine; Parra, Juan Luis; Tinoco, Boris A.; Stiles, F. Gary ; McGuire, A. David. 2012. Untangling the influence of ecological and evolutionary factors on trait variation across hummingbird assemblages. *Ecology*. 93(8). s99-s111.
- Granek, Elise; Polasky, Stephen; Kappel, Carrie V.; Reed, Denise J.; Stoms, David M.; Koch, Evamaria W.; Kennedy, Christopher J.; Cramer, Lori A.; Hacker, Sally; Barbier, Edward B.; Aswani, Shankar; Ruckelshaus, Mary; Perillo, Gerardo; Silliman, Brian R.; Muthiga, Nyawira; Bael, David; Wolanski, Eric. 2010. Ecosystem services as a common language for coastal ecosystem-based management. *Conservation Biology*. 24(1). 207-216.
- Graves, Tabitha A.; Wasserman, Tzeidle; Ribeiro, Milton Cezar; Landguth, Erin; Spear, Stephen; Balkenhol, Niko; Higgins, Colleen; Fortin, Marie- Josée; Cushman, Samuel A.; Waits, Lisette. 2012. The influence of landscape characteristics and home-range size on the quantification of landscape-genetics relationships. *Landscape Ecology*. 27(2). 253-266.
- Hackett, Edward J. and John N. Parker. 2011. Leadership of Scientific Groups. In William Bainbridge (Ed.), *Leadership in Science and Technology: A Reference Handbook*. Los Angeles: Sage.
- Halpern, Benjamin S.; Lester, Sarah E.; McLeod, Karen L. 2010. Marine reserves special feature: Placing marine protected areas onto the ecosystem-based management seascape. *Proceedings of the National Academy of Sciences of the United States of America*. 107. 18312-18317.
- Halpern, Benjamin S.; Longo, Catherine S.; Hardy, Darren; McLeod, Karen L.; Samhuri, Jameal; Katona, Steve; Kleisner, Kristin; Lester, Sarah E.; O'Leary, Jennifer; Ranelletti, Marla; Rosenberg, Andrew A.; Scarborough, Courtney E.; Selig, Elizabeth R.; Best, Ben; Brumbaugh, Daniel R.; Chapin, F. Stuart; Crowder, Larry B.; Daly, Kendra L.; Doney, Scott; Elfes, Cris; Fogarty, Michael J.; Gaines, Steven D.; Jacobsen, Kelsey; Karrer, Leah B.; Leslie, Heather M.; Neeley, Elizabeth; Pauly, D. M.; Polasky, Stephen; Ris, Bud; St. Martin, Kevin; Stone, Gregory S.; Sumaila, Ussif Rashid; Zeller, Dirk. 2012. An index to assess the health and benefits of the global ocean. *Nature*. (published online August 2012).

- Hampton, Stephanie E.; Parker, John N. 2011. Collaboration and productivity in scientific synthesis. *BioScience*. 61(11). 900-910.
- Hampton, Stephanie E.; Tewksbury, Joshua; Strasser, Carly. 2012. Editorial: Ecological data in the Information Age. *Frontiers in Ecology and the Environment*. 10(2). 59.
- Hampton, Stephanie E.; Wheeler, Terry A. 2011. Fostering the rebirth of natural history. *Biology Letters*. 8(2). 161-163.
- Hansen, Michael M.; Olivieri, Isabelle M.; Waller, Donald M.; Nielson, E. E.; The GeM Working Group 2012. Monitoring adaptive genetic responses to environmental change. *Molecular Ecology*. 21(6). 1311-1329.
- Harpole, W. Stanley; Tilman, David. 2007. Grassland species loss resulting from reduced niche dimension. *Nature*. 446(7137). 791-793.
- Hartter, Joel; Ryan, Sadie J.; Southworth, Jane; Chapman, Colin A. 2011. Landscapes as continuous entities: Forest disturbance and recovery in the Albertine Rift landscape. *Landscape Ecology*. 26(6). 877-890.
- Hartter, Joel; Stampone, Mary; Ryan, Sadie J.; Kirner, Karen; Chapman, Colin A.; Goldman, Abraham. 2012. Patterns and perceptions of climate change in a biodiversity conservation hotspot. *PLoS ONE*. 7(2). e32408-e32408.
- Hawkins, Bradford A.; McCain, Christy M.; Davies, T. Jonathan; Buckley, Lauren B.; Anacker, Brian L.; Cornell, Howard V.; Damschen, Ellen I.; Grytnes, John A.; Harrison, Susan P.; Holt, Robert D.; Kraft, Nathan J.B.; Stephens, Patrick R. 2011. Different evolutionary histories underlie congruent species richness gradients of birds and mammals. *Journal of Biogeography*. 39(5). 825-841.
- Heathcote, Adam J.; Downing, John A. 2012. Impacts of eutrophication on carbon burial in freshwater lakes in an intensively agricultural landscape. *Ecosystems*. 15(1). 60-70.
- Hedblom, Marcus and Mortberg, Ulla. 2011. Characterizing biodiversity in urban areas using remote sensing. In Xiaojun Yang (Ed.), *Urban Remote Sensing: Monitoring, Synthesis and Modeling in the Urban Environment* (287-304). Chichester: John Wiley and Sons, Ltd.
- Helmus, Matthew R.; Ives, Anthony R. 2012. Phylogenetic diversity-area curves. *Ecology*. 93. s31-s43.
- Holmes, Thomas P.; Liebhold, Andrew M.; Kovacs, Kent; Von Holle, Betsy. 2010. A spatial-dynamic value transfer model of economic losses from a biological invasion. *Ecological Economics*. 70(1). 86-95.
- Hooper, Dave U.; Adair, Carol; Cardinale, Bradley J.; Byrnes, Jarrett E.; Hungate, Bruce A.; Matulich, Kristin L.; Gonzalez, Andrew; Duffy, Emmett; Gamfeldt, Lars; O'Connor, Mary I. 2012. A global synthesis reveals biodiversity loss as a major driver of ecosystem change. *Nature*. 486. 105-108.
- Jennings, Michael D.; Faber-Langendoen, Don; Loucks, Orie L.; Peet, Robert K.; Roberts, David W. 2009. Standards for associations and alliances of the U.S. National Vegetation Classification. *Ecological Monographs*. 79(2). 173-199.
- Johnson, Darren; Christie, Mark R.; Moye, Jessica; Hixon, Mark. 2011. Genetic correlations between adults and larvae in a marine fish: Potential effects of fishery selection on population replenishment. *Evolutionary Applications*. 4(5). 621-633.
- Kanagaraj, R.; Wiegand, Thorsten; Comita, Liza S.; Huth, A. 2011. Tropical tree species assemblages in topographical habitats change in time and with life stage. *Journal of Ecology*. 99(6). 1441-1452.
- Karp, Daniel S.; Rominger, Andrew J.; Ranganathan, Jai; Ehrlich, Paul R.; Daily, Gretchen. 2012. Intensive agriculture erodes β -diversity at large scales. *Ecology Letters*. 15(9). 963-970.
- Keller, Reuben P.; Kocev, Dragi; Džeroski, Sašo. 2012. Trait-based risk assessment for invasive species: High performance across diverse taxonomic groups, geographic ranges and machine learning/statistical tools. *Diversity and Distributions*. 17(3). 451-461.

- Kembel, Steven W.; Cowan, Peter D.; Helmus, Matthew R.; Cornwell, William K.; Morlon, Helene; Ackerly, David D.; Blomberg, Simon; Webb, Campbell O. 2010. Picante: R tools for integrating phylogenies and ecology. *Bioinformatics*. 26 (11). 1463-1464.
- Kikvidze, Zaal; Michalet, Richard; Brooker, Robin; Cavieres, Lohengrin; Lortie, Christopher J.; Pugnaire, Francisco; Callaway, Ragan. 2011. Climatic drivers of plant-plant interactions and diversity in alpine communities. *Alpine Botany*. 121(1). 63-70.
- Klinger, Dane; Turnipseed, Mary; Anderson, James; Asche, Frank; Crowder, Larry B.; Guttormsen, Atle; Halpern, Benjamin S.; O'Connor, Mary I.; Sagarin, Raphael; Selkoe, Kimberly A.; Shester, Geoffrey G.; Smith, Martin D.; Tyedmers, Peter. 2012. Moving beyond the fished or farmed dichotomy. *Marine Policy*. (published online July 2012).
- Knapp, Sonja ; Dinsmore, Lucy ; Fissore, Cinzia ; Hobbie, Sarah E.; Jakobsdottir, Ina ; Kattge, Jens ; King, Jennifer; Klotz, Stefan; McFadden, Joseph P.; Cavender-Bares, Jeannine M. 2012. Phylogenetic and functional characteristics of household yard floras and their changes along an urbanization gradient. *Ecology*. 93. s83-s98.
- Konrad, Christopher P.; Olden, Julian; Lytle, David; Melis, Theodore; Schmidt, John C.; Bray, Erin; Freeman, Mary; Gido, Keith B.; Hemphill, Nina P.; Kennard, Mark J.; McMullen, Laura E.; Mims, Meryl; Pyron, Mark; Robinson, Christopher T.; Williams, John G. 2011. Large-scale flow experiments for managing river systems. *BioScience*. 61(12). 948-959.
- Kovacs, Kent; Mercader, Rodrigo J.; Haight, Robert G.; Siegert, Nathan W. ; McCullough, Deborah G.; Liebhold, Andrew M. 2011. The influence of satellite populations of emerald ash borer on projected economic costs in U.S. communities, 2010-2020. *Journal of Environmental Management*. 92(9). 2170-2181.
- Kovacs, Kent; Vaclavik, Tomas; Haight, Robert G.; Pang, Arwin; Cunniffe, Nik J.; Gilligan, Chris; Meentemeyer, Ross K. 2011. Predicting the economic costs and property value losses attributed to sudden oak death damage in California (2010-2020). *Journal of Environmental Management*. 92(4). 1292-1302.
- Kozak, Kenneth H.; Wiens, John. 2012. Phylogeny, ecology, and the origins of climate-richness relationships. *Ecology*. 93. s167-s181.
- Kraft, Nathan J.B.; Comita, Liza S.; Chase, Jonathan M.; Sanders, Nathan J.; Swenson, Nathan G.; Crist, Thomas O.; Stegen, James C.; Vellend, Mark; Boyle, Brad; Anderson, Marti J.; Cornell, Howard V.; Davies, Kendi F.; Freestone, Amy L.; Inouye, Brian D.; Harrison, Susan P.; Myers, Jonathan A. 2011. Disentangling the drivers of β diversity along latitudinal and elevational gradients. *Science*. 333(6050).1755-1758.
- Lamarre, Greg; Baraloto, Christopher; Fortunel, Claire; Dávila, Nallarett ; Mesones, Italo ; Ríos, Julio Grandez ; Ríos, Marcos ; Valderrama, Elvis ; Pilco, Magno Vasquez ; Fine, Paul. 2012. Herbivory, growth rates, and habitat specialization in tropical tree lineages: Implications for Amazon beta-diversity. *Ecology*. 93. s195-s210.
- Landguth, Erin; Fedy, Bradley; Oyler-McCance, Sara J.; Garey, Andrew L.; Emel, Sarah; Mumma, Matthew; Wagner, Helene; Fortin, Marie-Josée; Cushman, Samuel A. 2012. Effects of sample size, number of markers, and allelic richness on the detection of spatial genetic pattern. *Molecular Ecology Resources*. 12(2). 276-284.
- Liebhold, Andrew M.; Brockerhoff, Eckehard; Garrett, Lynn; Parke, Jennifer; Britton, Kerry. 2012. Live plant imports: The major pathway for forest insect and pathogen invasions of the US. *Frontiers in Ecology and the Environment*. 10(3). 135-143.
- Lortie, Christopher J.; Aarssen, Lonnie W.; Parker, John N.; Allesina, Stefano. 2012. Good news for the people who love bad news: An analysis of the funding of the top 1% most highly cited ecologists. *Oikos*. 121(7). 1005-1008.
- Lotze, Heike K.; Coll, Marta; Dunne, Jennifer. 2011. Historical changes in marine resources, food-web structure and ecosystem functioning in the Adriatic Sea, Mediterranean. *Ecosystems*. 14(2). 198-222.

Lucas, Cathy H.; Pitt, Kylie A.; Purcell, Jennifer E.; Lebrato, Mario; Condon, Robert H. 2011. What's in a jellyfish? Proximate and elemental composition and biometric relationships for use in biogeochemical studies. *Ecology*. 92(8). 1704-1704.

Lu, Yaogong; Kueppers, Lara M. 2012. Surface energy partitioning over four dominant vegetation types across the United States in a coupled regional climate model (Weather Research and Forecasting Model 3-Community Land Model 3.5). *Journal of Geophysical Research*. 117. D06111.

Mack, Michelle C.; Bret-Harte, Sydonia; Hollingsworth, Teresa N.; Jandt, Randi R.; Schuur, Edward A.G.; Shaver, Gaius R.; Verbyla, David L. 2011. Carbon loss from an unprecedented Arctic tundra wildfire. *Nature*. 475(7357). 489-492.

Madin, Joshua S.; Alroy, John; Aberhan, Martin; Fürsich, Franz T.; Kiessling, Wolfgang; Kosnik, Matthew A.; Wagner, Peter J. 2006. Response to comments on "Statistical Independence of Escalatory Ecological Trends in Phanerozoic Marine Invertebrates". *Science*. 314 (5801). 925-925.

*Manel, Stéphanie; Joost, Stéphane; Epperson, Bryan K.; Holderegger, Rolf; Storer, Andrew T.; Rosenberg, Michael S.; Scribner, Kim T.; Bonin, Aurélie; Fortin, Marie-Josée. 2010. Perspectives on the use of landscape genetics to detect genetic adaptive variation in the field. *Molecular Ecology*. 19(17). 3760-3772.

McCabe, Gregory J.; Ault, Toby R.; Cook, Benjamin I.; Betancourt, Julio L.; Schwartz, Mark D. 2011. Influences of the El Niño southern oscillation and the Pacific decadal oscillation on the timing of the North American spring. *International Journal of Climatology*.

McDonald, Robert I.; Douglas, Ian; Revenga, Carmen; Hale, Rebecca; Grimm, Nancy B.; Gronwall, Jenny; Fekete, Balazs. 2011. Global urban growth and the geography of water availability, quality, and delivery. *Ambio*. 40(5). 437-446.

McDonald, Robert I.; Green, Pamela A.; Balk, Deborah; Fekete, Balazs; Revenga, Carmen; Todd, Megan; Montgomery, Mark. 2011. Urban growth, climate change, and freshwater availability. *Proceedings of the National Academy of Sciences*. 108(15). 6312-6317.

Melián, Carlos J.; Alonso, David; Allesina, Stefano; Condit, Richard; Etienne, Rampal S. 2012. Does sex speed up evolutionary rate and increase biodiversity? *PLoS Computational Biology*. 8(3). e1002414.

Michener, William K.; Jones, Matthew B. 2012. Ecoinformatics: Supporting ecology as a data-intensive science. *Trends in Ecology and Evolution*. 27(2). 85-93.

*Millar, R.; Anderson, Marti; Tolimieri, Nick. 2011. Much ado about nothings: Using zero similarity points in distance-decay curves. *Ecology*. 92(9). 1717-1722.

Molina-Montenegro, Marco A.; Cleland, Elsa E.; Watts, Sean M.; Broitman, Bernardo R. 2011. Can a breakdown in competition-colonization tradeoffs help explain the success of exotic species in the California flora? *Oikos*. 121(3). 389-395.

Moritz, Max A.; Parisien, Marc-André; Batllori, Enric; Krawchuk, Meg A.; Van Dorn, Jeff; Ganz, David; Hayhoe, Katharine. 2012. Climate change and disruptions to global fire activity. *Ecosphere*. 3(6). art49.

Mosier, Arvin R.; Bleken, Marina Azzaroli; Chaiwanakupt, Pornpimol; Ellis, Erle C.; Freney, John; Howarth, Richard B.; Matson, Pamela; Minami, Katsuyuki; Naylor, Roz; Weeks, Kristin N.; Zhu, Zhao-Liang. 2002. Policy implications of human-accelerated nitrogen cycling (Reprinted from *Biogeochemistry*, vol 52, pg 281-320, 2001). *Biogeochemistry*. 57(1). 477-516.

Nadon, Marc O.; Baum, Julia K.; Williams, Ivor D.; McPherson, Jana; Zgliczynski, Brian J.; Richards, Benjamin L.; Schroeder, Robert E.; Brainard, Russell E. 2012. Re-creating missing population baselines for Pacific Reef sharks. *Conservation Biology*. 26(3). 493-503.

Norberg, Jon; Urban, Mark C.; Vellend, Mark; Klausmeier, Christopher; Loeuille, Nicolas. 2012. Eco-evolutionary responses of biodiversity to climate change. *Nature Climate Change*. (published online July 2012).

Norden, Natalia; Letcher, Susan G.; Boukilli, Vanessa; Swenson, Nathan G.; Chazdon, Robin L. 2012. Demographic drivers of successional changes in phylogenetic structure across life-history stages in plant communities. *Ecology*. 93(8). s70-s82.

O'Dwyer, James; Lake, Jeffrey K.; Ostling, Annette; Savage, Van M.; Green, Jessica L. 2009. An integrative framework for stochastic, size-structured community assembly. *Proceedings of the National Academy of Sciences*. 106(15). 6170-6175.

Parker, John N.; Crona, Beatrice. 2012. On being all things to all people: Boundary organizations and the contemporary research university. *Social Studies of Science*. 42(2). 262-289.

Parker, John N.; Hackett, Edward J. 2012. Hot spots and hot moments in scientific collaborations and social movements. *American Sociological Review*. 77(1). 21-44.

Parker, John N.; Vermeulen, Niki; Penders, Bart. 2011. Correspondence: Admin burden is part of the job. *Nature*. 476. 33.

Parker, Sophie S.; Seabloom, Eric; Schimel, Josh. 2012. Grassland community composition drives small-scale spatial patterns in soil properties and processes. *Geoderma*. 170. 269-279.

Pascoe, Sean; Wilcox, Chris; Donlan, C. Josh. 2011. Biodiversity offsets: A cost-effective interim solution to seabird bycatch in fisheries? *PLoS ONE*. 6(10). e25762-e25762.

Pau, Stephanie; Gillespie, Thomas W.; Wolkovich, Elizabeth M. 2012. Dissecting NDVI-species richness relationships in Hawaiian dry forests. *Journal of Biogeography*. 39(9). 1678-1686.

Pau, Stephanie; Wolkovich, Elizabeth M.; Cook, Benjamin I.; Davies, T. Jonathan; Kraft, Nathan J.B.; Bolmgren, Kjell; Betancourt, Julio L.; Cleland, Elsa E. 2011. Predicting phenology by integrating ecology, evolution and climate science. *Global Change Biology*. 17(12). 3633-3643.

Peres-Neto, Pedro; Leibold, Mathew A.; Dray, Stéphane. 2012. Assessing the effects of spatial contingency and environmental filtering on metacommunity phylogenetics. *Ecology*. 93(8). s14-s30.

Peterson, Charles H.; Anderson, Sean S.; Cherr, Gary; Ambrose, Richard F.; Anghera, Shelly; Bay, Steven; Blum, Michael; Condon, Robert H.; Dean, Thomas A.; Graham, William M.; Guzy, Michael; Hampton, Stephanie E.; Joye, Samantha; Lambrinos, John; Mate, Bruce; Meffert, Douglas; Powers, Sean P.; Somasundaran, Ponisseril; Spies, Robert; Taylor, Caz M.; Tjeerdema, Ronald S.; Adams, E. Eric. 2012. A tale of two spills: Novel science and policy implications of an emerging new oil spill model. *BioScience*. 62(5). 461-469.

Pollnac, Richard; Christie, Patrick J.; Cinner, Joshua E.; Dalton, Tracey; Daw, Tim M.; Forrester, Graham E.; Graham, Nicholas A. J.; McClanahan, Timothy R. 2010. Marine Reserves Special Feature: Marine reserves as linked social-ecological systems. *Proceedings of the National Academy of Sciences*. 107(43). 18262-18265.

Queenborough, Simon A.; Comita, Liza S. 2011. Should ecological science be ethical? *Union Seminary Quarterly Review*. 63. 18-25.

Queenborough, Simon A.; Parker, John N. 2012. The habits of successful ecologists: Learning from the best. *Bulletin of the British Ecological Society*. 43. 31-34.

Quickie, Donald L. J. ; Smith , M. Alex; Janzen, Daniel H; Hallwachs, Winnie ; Fernandez-Triana, Jose; Laurene, Nina M; Zaldívar-Riverón, Alejandro; Shaw, Mark R; Broad, Gavin R; Klopstein, Seraina ; Shaw, Scott R; Hrcek, Jan ; Hebert, Pual D. N; Miller, Scott E; Rodriguez, Josephine; Whitfield, James B; Sharkey, Michael J; Sharanowski, Barbara J; Jussila, Reijo; Gauld, Ian D; Chesters, Douglas; Vogler, Alfried. 2012. Utility of the DNA barcoding gene

fragment for parasitic wasp phylogeny (Hymenoptera: Ichneumonoidea): Data release and new measure of taxonomic congruence. *Molecular Ecology Resources*. 12(4). 676-685.

Reed, Thomas E.; Schindler, Daniel E.; Hague, M.J.; Patterson, D.A.; Meir, Eli; Waples, Robin; Hinch, S.G. 2011. Time to evolve? Potential evolutionary responses of Fraser River Sockeye Salmon to climate change and effects on persistence. *PLoS ONE*. 6(6). e20380-e20380.

Reed, Thomas E.; Schindler, Daniel E.; Waples, Robin. 2011. Interacting effects of phenotypic plasticity and evolution on population persistence in a changing climate. *Conservation Biology*. 25(1). 56-63.

Reed, Thomas E.; Waples, Robin; Schindler, Daniel E.; Hard, Jeff; Kinnison, Michael T. 2010. Phenotypic plasticity and population viability: The importance of environmental predictability. *Proceedings of the Royal Society of London Series B-Biological Sciences*. 277(1699). 3391-3400.

Richardson, Anthony J.; Brown, Chris; Brander, Keith; Bruno, John F.; Buckley, Lauren B.; Burrows, Mike; Duarte, Carlos M.; Halpern, Benjamin S.; Hoegh-Guldberg, Ove; Holding, Johnna; Kappel, Carrie V.; Kiessling, Wolfgang; Moore, Pippa; O'Connor, Mary I.; Pandolfi, John; Parmesan, Camille; Schoeman, David; Schwing, Franklin; Sydeman, William J.; Poloczanska, Elvira. 2012. Climate change and marine life. *Biology Letters*. (published only July 2012).

Rüger, Nadja; Huth, A.; Hubbell, Stephen P.; Condit, Richard. 2011. Determinants of mortality across a tropical lowland rainforest community. *Oikos*. 120(7). 1047-1056.

Ryan, Sadie J. 2011. Book review: *Governing Africa's Forests in a Globalized World*. *Natural Resources Forum*. 35(2). 146-147.

Ryan, Sadie J.; Brashares, Justin S. ; Walsh, Chelsey; Milbers, Katherin; Kilroy, Caileen; Chapman, Colin A. 2012. A survey of gastrointestinal parasites of olive baboons (*Papio anubis*) in human settlement areas of Mole National Park, Ghana. *Journal of Parasitology*. 98(4). 885-888.

Ryan, Sadie J.; Walsh, Peter D. 2011. Consequences of non-intervention for infectious disease in African Great Apes. *PLoS ONE*. 6(12). e29030-e29030.

Sagarin, Raphael. 2012. *Learning from the Octopus: How Secrets from Nature That Can Help Us Fight Terrorist Attacks, Natural Disasters and Disease*. New York: Basic Books.

Samhuri, Jameal; Lester, Sarah E.; Selig, Elizabeth R.; Halpern, Benjamin S.; Fogarty, Michael J.; Longo, Catherine S.; McLeod, Karen L. 2012. Sea sick? Setting targets to assess ocean health and ecosystem services. *Ecosphere*. 3(5). art41-art41.

Savage, Jessica; Cavender-Bares, Jeannine M. 2012. Habitat specialization and the role of trait lability in structuring diverse willow family genus *Salix* communities. *Ecology*. 93. s138-s150.

Seabloom, Eric. 2010. Spatial and temporal variability in propagule limitation of California native grasses. *Oikos*. 120(2). 291-301.

Sears, Michael; Raskin, Evan; Angilletta, Michael J. 2011. The world is not flat: Defining relevant thermal landscapes in the context of climate change. *Integrative and Comparative Biology*. 51(5). 666-675.

*Selkoe, Kimberly; Toonen, Robert. 2011. Marine connectivity: A new look at pelagic larval duration and genetic metrics of dispersal. *Marine Ecology Progress Series*. 436. 291-305.

Stetz, Jeffrey; Kendall, Katherine C.; Vojta, Christina; The Genetic Monitoring (GeM) Working Group. 2011. Genetic monitoring for managers: A new online resource. *Journal of Fish and Wildlife Management*. 2(2). 216-219.

Suckling, David M.; Tobin, Patrick; McCullough, Deborah G.; Herms, Dan. 2012. Combining tactics to exploit Allee effects for eradication of alien insect populations. *Journal of Economic Entomology*. 105(1). 1-13.

Swenson, Nathan G.; Erickson, David L.; Mi, Xiangcheng; Bourg, Norman A.; Forero-Montaña, Jimena ; Ge, Xuejun ; Howe, Robert ; Lake, Jeffrey K.; Liu, Xiaojuan ; Ma, Keping ; Pei, Nancai ; Thompson, Jill; Uriarte, María; Wolf, Amy; Wright, S. Joseph; Ye, Wanhu; Zhang, Jinlong ; Zimmerman, Jess K.; Kress, John. 2012. Phylogenetic and functional alpha and beta diversity in temperate and tropical tree communities. *Ecology*. 93. s112-s125.

Teck, Sarah J.; Halpern, Benjamin S.; Kappel, Carrie V.; Micheli, Fiorenza; Selkoe, Kimberly A.; Crain, Caitlin; Martone, Rebecca; Shearer, Christine; Arvai, Joe; Fischhoff, Baruch; Murray, Grant; Neslo, Rabin; Cooke, Roger. 2010. Using expert judgment to estimate marine ecosystem vulnerability in the California Current. *Ecological Applications*. 20(5). 1402-1416.

Templer, Pamela, Mack, Michelle C.; Chapin, F. Stuart; Christenson, Lynn; Compton, Jana E.; Crook, H. D.; Currie, William S.; Curtis, Chris J.; Dail, Bryan; D'Antonio, Carla; Emmett, Bridgett A.; Epstein, Howie; Goodale, Christine L.; Gundersen, Per; Hobbie, Sarah E.; Holland, Keri; Hooper, Dave U.; Hungate, Bruce A.; Lamontagne, S.; Nadelhoffer, Knute; Osenberg, Craig W.; Perakis, Steve; Schleppei, Patrick; Schimel, Josh; Kappel Schmidt, Inger; Sommerkorn, Martin; Spoelstra, John; Tietema, Albert; Wessel, Willem W.; Zak, Donald R. 2012. Sinks for nitrogen inputs in terrestrial ecosystems: A meta-analysis of enriched ¹⁵N field tracer studies. *Ecology*. 93(8). 1816-1829.

Townsend, Alan R.; Cleveland, Cory C.; Houlton, Benjamin Z.; Alden, Caroline B.; White, James WC. 2011. Multi-element regulation of the tropical forest carbon cycle. *Frontiers in Ecology and the Environment*. 9(1). 9-17.

Trebilco, Rowan; Halpern, Benjamin S.; Mills Flemming, Joanna; Field, Chris A.; Blanchard, Wade; Worm, Boris. 2011. Mapping species richness and human impact drivers to inform global pelagic conservation prioritisation. *Biological Conservation*. 144(5). 1758-1766.

Urban, Mark C. 2011. The evolution of species interactions across natural landscapes. *Ecology Letters*. 14(7). 723-732.

van der Leeuw, Sander E.; Costanza, Robert; Aulenbach, Steve; Brewer, Simon; Burek, Michael; Cornell, Sarah; Crumley, Carole; Dearing, John; Downy, Catherine; Graumlich, Lisa J.; Heckbert, Scott; Hegmon, Michelle; Hibbard, Kathy A.; Jackson, Stephen; Kubiszewski, Ida; Sinclair, Paul; Sörlin, Sverker; Steffen, Will. 2011. Toward an integrated history to guide the future. *Ecology and Society*. 16(4). art2-art2.

van Woesik, Robert; Franklin, Erik; O'Leary, Jennifer; McClanahan, Timothy R.; Klaus, James S.; Budd, Ann F. 2012. Hosts of the Plio-Pleistocene past reflect modern-day coral vulnerability. *Proceedings of the Royal Society B-Biological Sciences*. 279(1737). 2448-2456.

Verburg, Piet; Antenucci, J. P.; Hecky, R. E. 2011. Differential cooling drives large-scale convective circulation in Lake Tanganyika. *Limnology and Oceanography*. 56(3). 910-926.

Verburg, Piet; Hecky, R. E.; Kling, H.J. 2006. Climate warming decreased primary productivity in Lake Tanganyika, inferred from accumulation of dissolved silica and increased transparency. *International Association of Theoretical and Applied Limnology*. 29(5). 2335-2338.

Wagner, Helene; Murphy, Melanie; Holderegger, Rolf; Waits, Lisette. 2012. Developing an interdisciplinary, distributed graduate course for twenty-first century scientists. *BioScience*. 62(2). 182-188.

Wang, Xugao; Comita, Liza S.; Hao, Zhanqing; Davies, Stuart; Ye, Ji; Lin, Fei; Yuan, Zuoqiang. 2012. Local-scale drivers of tree survival in a temperate forest. *PLoS ONE*. 7(2). e29469-e29469.

Waples, Robin; England, Phillip R. 2011. Estimating contemporary effective population size on the basis of linkage disequilibrium in the face of migration. *Genetics*. 189(2). 633-644.

Waples, Robin; Waples, Ryan K. 2011. Inbreeding effective population size and parentage analysis without parents. *Molecular Ecology Resources*. 11. 162-171.

Warren, Christopher P.; Pascual, Mercedes; Lafferty, Kevin; Kuris, Armand. 2010. The inverse niche model for food webs with parasites. *Theoretical Ecology*. 3(4). 285-294.

- White, Crow; Halpern, Benjamin S.; Kappel, Carrie V. 2012. Ecosystem service tradeoff analysis reveals the value of marine spatial planning for multiple ocean uses. *Proceedings of the National Academy of Sciences of the United States of America*. 109(12). 4696-4701.
- Whitfield, Timothy J.; Novotny, Vojtech; Miller, Scott E; Hrcek, Jan ; Klimes, Petr ; Weiblen, George D. 2012. Predicting tropical insect herbivore abundance from host plant traits and phylogeny. *Ecology*. 93(8). s211-s223.
- Wilson, Erin E.; Wolkovich, Elizabeth M. 2011. Scavenging: How carnivores and carrion structure communities. *Trends in Ecology and Evolution*. 26(3). 129-135.
- Wiser, Susan K.; Spencer, Nick; De Cáceres, Miquel; Kleikamp, Martin; Boyle, Brad; Peet, Robert K. 2011. Veg-X - An exchange standard for plot-based vegetation data. *Journal of Vegetation Science*. 22(4). 598-609.
- Wolf, Adam; Anderegg, William; Ryan, Sadie J.; Christensen, Jon. 2011. Robust detection of plant species distribution shifts under biased sampling regimes. *Ecosphere*. 2(10). art 115-art115.
- Wolkovich, Elizabeth M.; Cook, Benjamin I.; Allen, Jenica M.; Crimmins, Theresa M.; Betancourt, Julio L.; Travers, Steve; Pau, Stephanie; Regetz, Jim; Davies, T. Jonathan; Kraft, Nathan J.B.; Ault, Toby R.; Bolmgren, Kjell; Mazer, Susan J.; McCabe, Gregory J.; McGill, Brian; Parmesan, Camille; Salamin, Nicolas; Schwartz, Mark D.; Cleland, Elsa E. 2012. Warming experiments underpredict plant phenological responses to climate change. *Nature*. 485. 494-497.
- Wolkovich, Elizabeth M.; Regetz, Jim; O'Connor, Mary I. 2012. Advances in global change research require open science by individual researchers. *Global Change Biology*. 18(7). 2102-2110.
- Young, Oran R.; Osherenko, Gail; Ekstrom, Julie; Crowder, Larry B.; Ogden, John C.; Wilson, James; Day, Jon; Douvère, Fanny; Ehler, Charles; McLeod, Karen L.; Halpern, Benjamin S.; Peach, Robbin. 2007. Solving the crisis in ocean governance: Place-based management of marine ecosystems. *Environment*. 49. 21-32.
- Zipkin, Elise; Ries, Leslie; Reeves, Rick; Regetz, Jim; Oberhauser, Karen. 2012. Tracking climate impacts on the migratory monarch butterfly. *Global Change Biology*. (published online July 2012).

NCEAS Related Data Sets Registered or Uploaded to NCEAS Data Repository

Based on data available as of July 26, 2011 through August 31, 2012

- Balch, Jennifer. 2012. Size, species, and fire behavior predict tree and liana mortality from experimental burns in the Brazilian Amazon.
- Balch, Jennifer. 2012. Fire-induced tree mortality in a tropical forest: The roles of bark traits, tree size, wood density, and fire behavior.
- Balch, Jennifer. 2012. Introduced annual grass increases regional fire activity across the arid western USA 1980-2009.
- Bradley, Bethany. 2012. Global change, global trade, and the next wave of plant invasions: Data.
- Crowder, Larry and Martin Smith. 2011. Global seafood trends.
- Franklin, Erik. 2011. GeoSymbio: Symbiodinium-host symbioses.

- Hooper, David. 2012. Data and analyses for Hooper et al. (2012) Nature, "A global synthesis reveals biodiversity loss as a major driver of ecosystem change", DOI: 10.1038/nature11118.
- Kennedy, Christina. 2012. Local farm management and landscape effects on native bee pollinators in agroecosystems.
- Liebhold, Andrew. 2012. Live plant imports: The major pathway for forest insect and pathogen invasions of the US.
- Ryan, Sadie. 2012. Mosquito.
- Ryan, Sadie. 2012. Recovery simulations for infectious diseases in African Great Apes.
- Turnipseed, Mary. 2012. Interagency Ocean Policy Task Force Data.
- Williams, Jennifer. 2011. Demographic data of *Cynoglossum officinale* at 3 sites in the native and introduced ranges from 2004 – 2007.
- Wolkovich, Elizabeth. 2011. Phenology Literature Review.
- Wolkovich, Elizabeth. 2012. Network of Ecological and Climatological Timings Across Regions (NECTAR).
- Wolkovich, Elizabeth. 2012. STONE: Synthesis of Timings Observed in iNcrease Experiments.
- Woods, Kerry. 2012. Multi-decade population studies of Michigan old-growth forests.

3. Tables and Figures

Table 1. Science Advisory Board Members 2011-2012

A complete history of Science Advisory Board members can be found at <http://www.nceas.ucsb.edu/sab/cumulative>.

SAB Members During 2011 and 2012	Institutions	Term
Ashley, Mary	University of Illinois at Chicago	2008-2012
Bjornstad, Ottar	Pennsylvania State University	2008-2012
Cottingham, Kathryn	Dartmouth College	2008-2012
Miriti, Maria	Ohio State University	2008-2012
Osenberg, Craig	University of Florida	2008-2012
Ricketts, Taylor	World Wildlife Fund	2008-2012
Briggs, Cherie	University of California, Santa Barbara	2009-2012
Essington, Tim	University of Washington	2009-2012
Holmes, Elizabeth	National Marine Fisheries Service, Seattle WA	2009-2012
Pendall, Elise	University of Wyoming	2009-2012
Smith, Felisa	University of New Mexico	2009-2012
Altizer, Sonia	University of Georgia	2010-2012
Bolker, Ben	McMaster University	2010-2012
Curran, Lisa	Stanford University	2010-2012
Fryxell, John	University of Guelph	2010-2012
Liebold, Andrew	USDA Forest Service	2010-2012
Litchman, Elena	Michigan State University	2010-2012
Sabo, John	Arizona State University	2010-2012

Table 2. Ecolunch Seminars & Roundtable Discussions

September 1, 2011 – August 31, 2012

Ecolunch Fall/Winter 2011

September 15

John Callaway, University of San Francisco and Pat Megonigal, Smithsonian Environmental Research Center

Carbon sequestration rates and methane emissions in tidal wetlands

September 22

Susan Alberts, Duke University

Age at maturity in wild baboons: genetic and parental effects

September 29

E. Christian Wells, University of South Florida

Framing sustainability: citizenship, metabolism, and resiliency

October 6

Kai Chan, University of British Columbia

Can ecosystem services research improve decision-making? Values, cultural services, and a proposed framework

October 13

Cascade Sorte, University of Massachusetts, Boston

Global change delivers a double-whammy: ocean warming and invasive species dominance

October 20

Frank Davis, UC Santa Barbara and NCEAS

Population biology of a Mediterranean-climate oak

October 26

Kara Lavender Law, Sea Education Association, Woods Hole, MA

The science behind ocean "garbage patches"

November 3

Mary Turnipseed, NCEAS

Re-imagining the Public Trust Doctrine to conserve US oceans

November 11

Stephanie Pau, NCEAS

Diverse ecosystem responses to climate across space and time

November 17

Carrie Kappel, NCEAS

Ecosystem service tradeoff analysis reveals the value of marine spatial planning for multiple ocean uses

December 1

Jai Ranganathan and Jarrett Byrnes, NCEAS

The SciFund Challenge: a new way to connect people to science and raise money for research

December 15

Mary Cadenasso, UC Davis

Ecosystem services in urban landscapes: Who benefits?

Ecolunch Winter/Spring 2012

January 26

Steve Katz, Channel Islands National Marine Sanctuary

Alternative data streams for addressing maritime conservation and management problems in the Channel Islands

February 2

Cristiane Elfes, Department of Ecology, Evolution, and Marine Biology, UCSB

High value and long life - double jeopardy for tunas and billfishes

February 9

Derek Gray, NCEAS

The influence of dispersal as freshwater plankton communities respond to regional environmental change

February 14

Forest Isbell, University of Minnesota

Causes and consequences of changes in grassland plant diversity

February 16

Werner Kuhn, Institute for Geoinformatics, University of Münster

Spatial information in ecology - what are the core concepts

February 23

Rob Condon, Dauphin Island Sea Lab

Questioning the rise of gelatinous zooplankton in the world's oceans

March 1

Mark Browne, NCEAS

Water-tight solutions to engineering intertidal biodiversity in our cities

March 8

Ben Halpern, NCEAS

An Ocean Health Index: quantifying and mapping the health of global marine ecosystems

March 15

Benoit Parmentier, NCEAS

Characterization of fire scars in Alaska using remotely sensed environmental variables

April 5

Stacy Rebich Hespanha, NCEAS

Society and nature in regional and national U.S. news coverage of climate change: visual framing of a global environmental issue

April 12

Mariah Carbone, NCEAS

The influence of fog and low clouds on the metabolism of a coastal pine ecosystem

April 19

John Parker, Arizona State University

Ideas, emotions, and intergenerational change in apex scientific groups: the micro-politics of intellectual fields

April 26

James Salzman, Duke University

Creating markets for ecosystem services

May 17

Jarrett Byrnes, NCEAS

Engagement leads to crowd funded science

May 24

Jennifer Balch, NCEAS

Frontier fire in the Amazon: Local to global consequences of human-altered fire regimes in tropical forests

May 31

David A. Siegel, Earth Research Institute and Department of Geography, UCSB

Global phytoplankton dynamics: the SeaWiFS legacy

Roundtable Discussions Summer 2012

July 6

Darren Hardy, NCEAS

Geography of Wikipedia authorship, or How I learned to stop worrying and love crowdsourced geodata

August 17

Stacy Rebich Hespanha, NCEAS

Professional development at NCEAS: community interests and expertise + Some ideas about negotiation

August 22

Stephanie Hampton, NCEAS

Big Data and the Future for Ecology

August 29

Mark Browne

Combining insights from ecology, environmental chemistry, forensics and medical science to understand and reduce the problems caused by plastic debris

Table 3. Number of NCEAS Articles Published in a Selection of High-impact Journals since the establishment of NCEAS in 1995, sorted by Impact Factor of the journal.*

Journal Title	2011 Impact Factor	# NCEAS pubs as of July 2011	# NCEAS pubs as of Aug. 2012
Nature	36.28	42	46
Science	31.201	81	82
Ecology Letters	17.557	97	100
Trends in Ecology and Evolution	15.748	46	47
Annual Review of Ecology, Evolution, and Systematics	14.373	16	16
PLoS Biology	11.452	7	7
Systematic Biology	10.225	2	2
Proceedings of the National Academy of Sciences	9.681	60	63
Frontiers in Ecology and the Environment	9.113	26	31
Ecological Monographs	7.433	10	11
Global Change Biology	6.862	28	34
Ecological Applications	5.102	59	60
Molecular Ecology	5.522	6	12
Proc. Royal Society of London Series B	5.415	37	37
Evolution	5.146	10	11
Global Ecology and Biogeography	5.145	14	14
Journal of Applied Ecology	5.045	8	8
Journal of Ecology	5.044	7	9
Ecology	4.849	131	150
Global Biogeochemical Cycles	4.785	7	7
Conservation Biology	4.692	44	47
BioScience	4.621	38	42
American Naturalist	3.24	75	76

* Over NCEAS lifetime; Does not include SEEK publications

Figure 1. Number of Proposals Submitted and Supported in total for each NSF proposal period since the establishment of NCEAS in 1995. Note that 2010-Jul and 2012 were only Working Group proposals (See Figure 2).

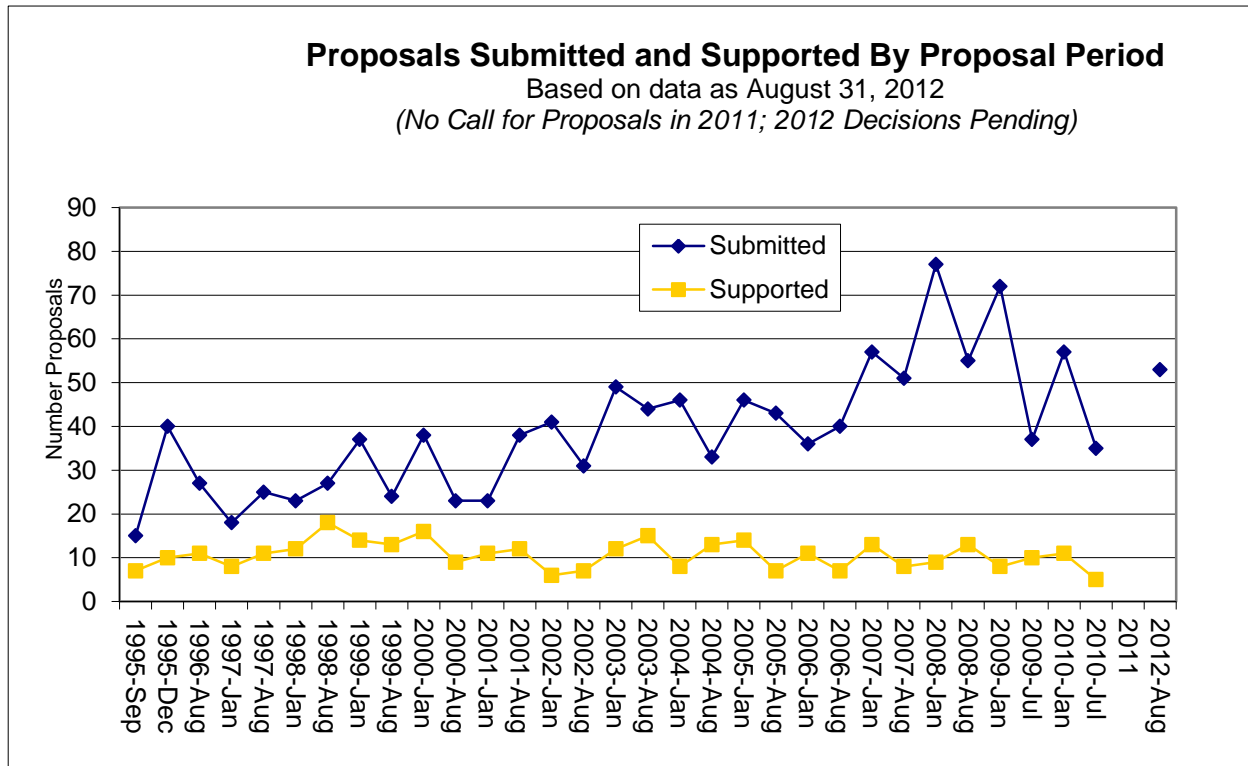
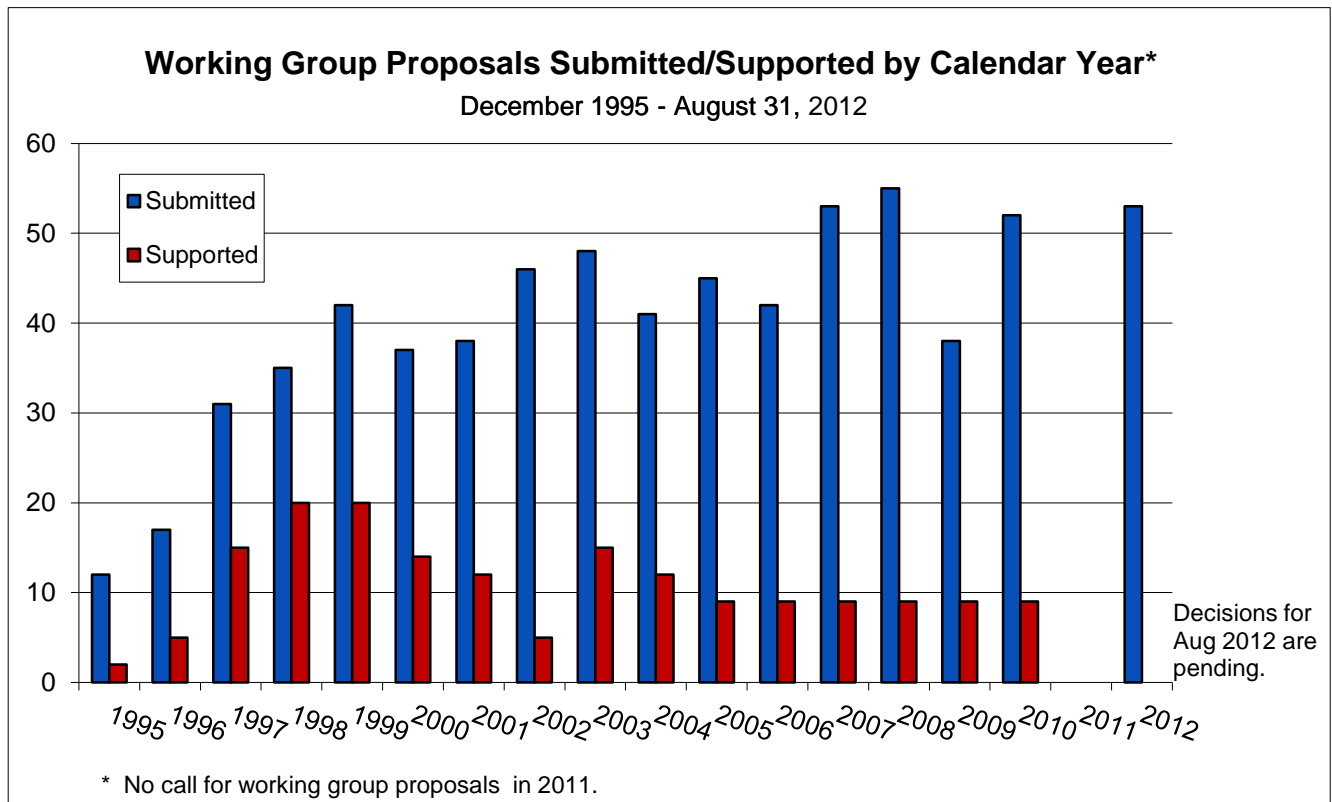


Figure 2. Proposals Submitted and Supported by Activity Type

Note that 2010-Jul and 2012 includes only one call for proposals, while all other years in the past decade have included 2 calls. August 2012 was a record high of 52 working group proposals in a single call compared to a previous high of 35 in July 2010.



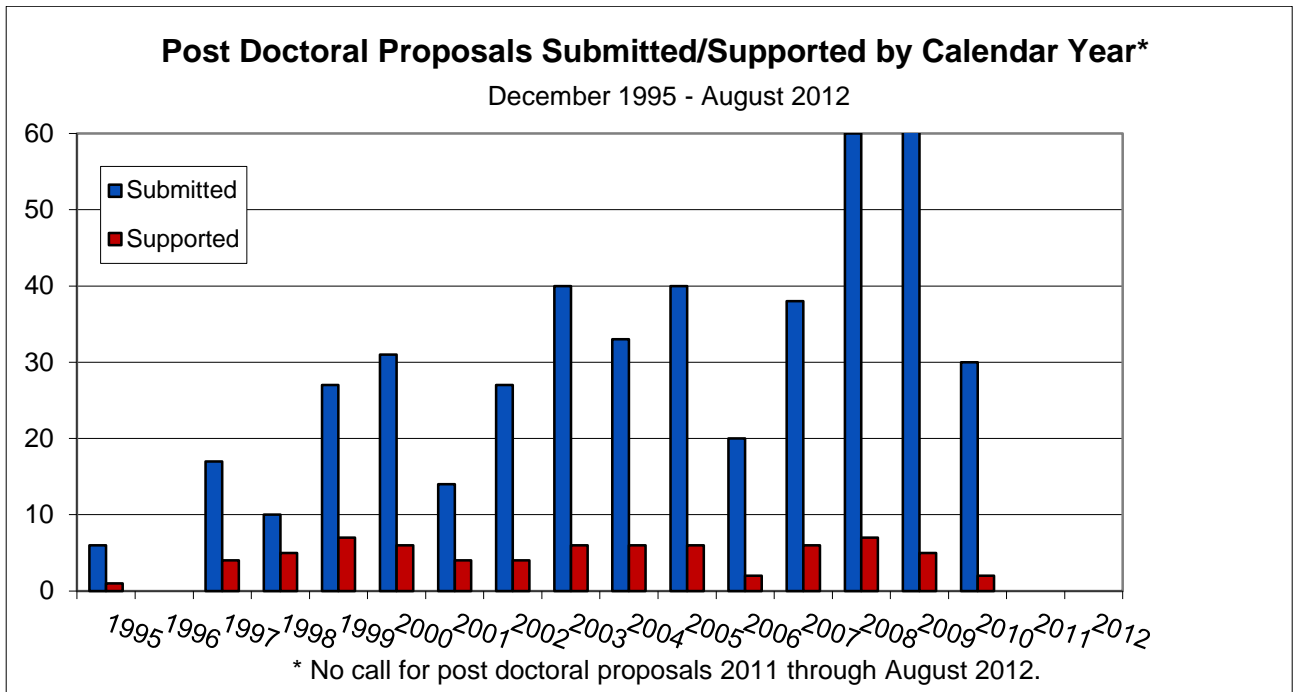
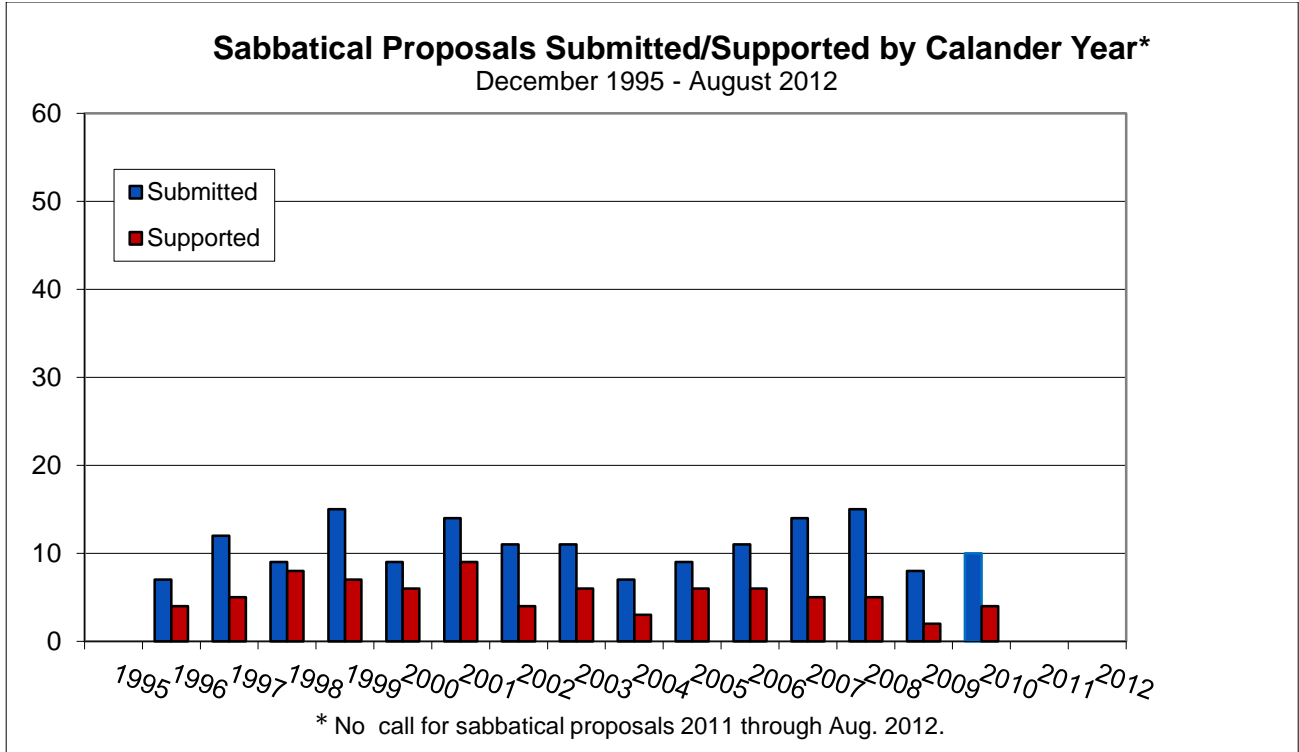


Figure 3. Number of Participants Since 1996

(“Unique participants” excludes multiple visits within a given year)

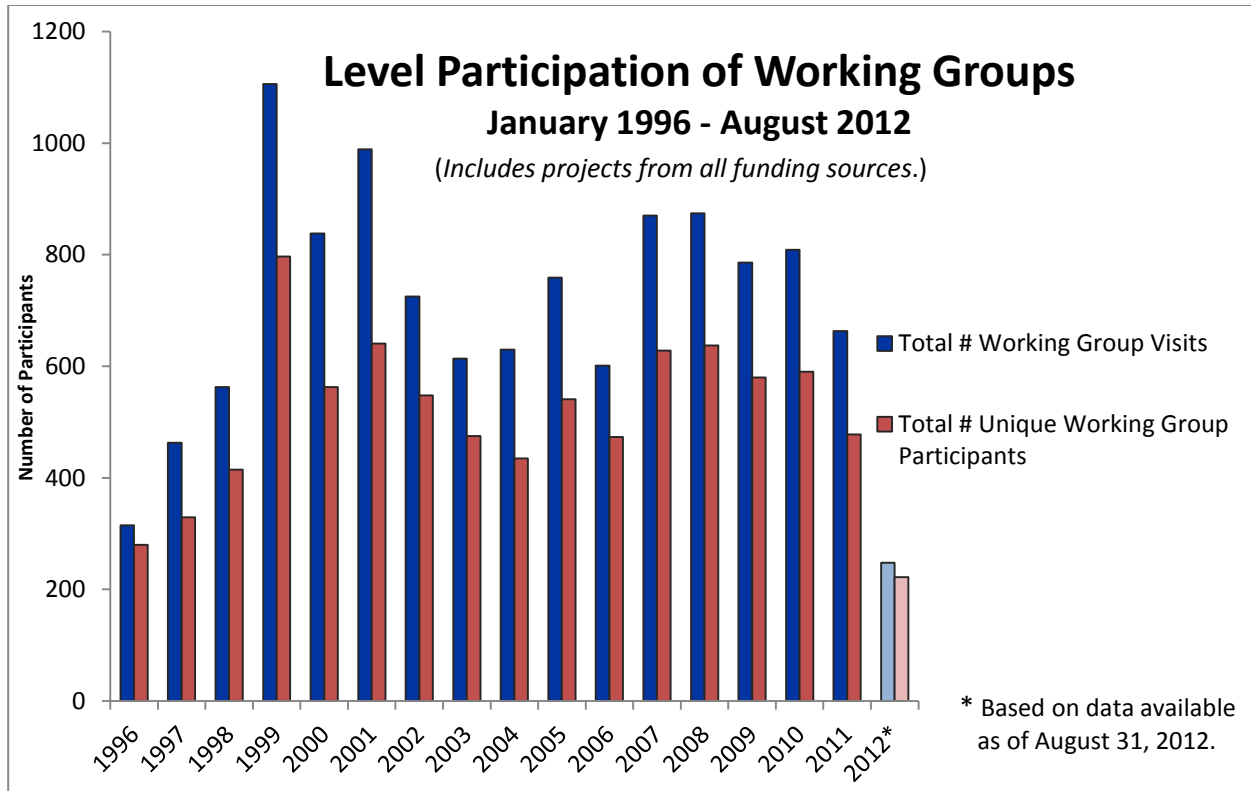


Figure 4. Frequency of Visits by each unique Working Group participant since establishment of NCEAS in 1995.

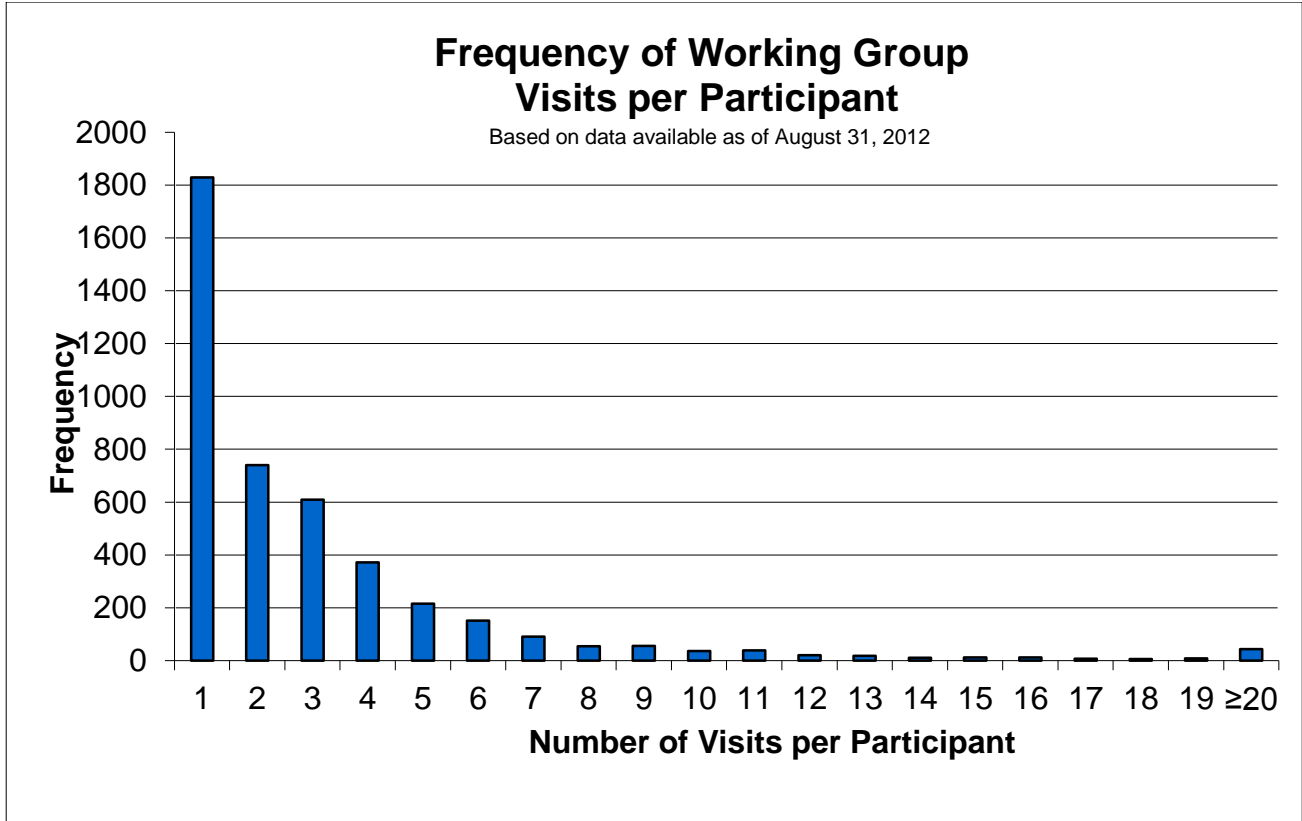


Figure 5. Percent Women Participating in Working Groups since establishment of NCEAS in 1995. For comparison, among ESA members who answered diversity survey questions for a 2006 report, the average female representation on faculty was 36% (30% women among senior professors, 44% women among junior professors).

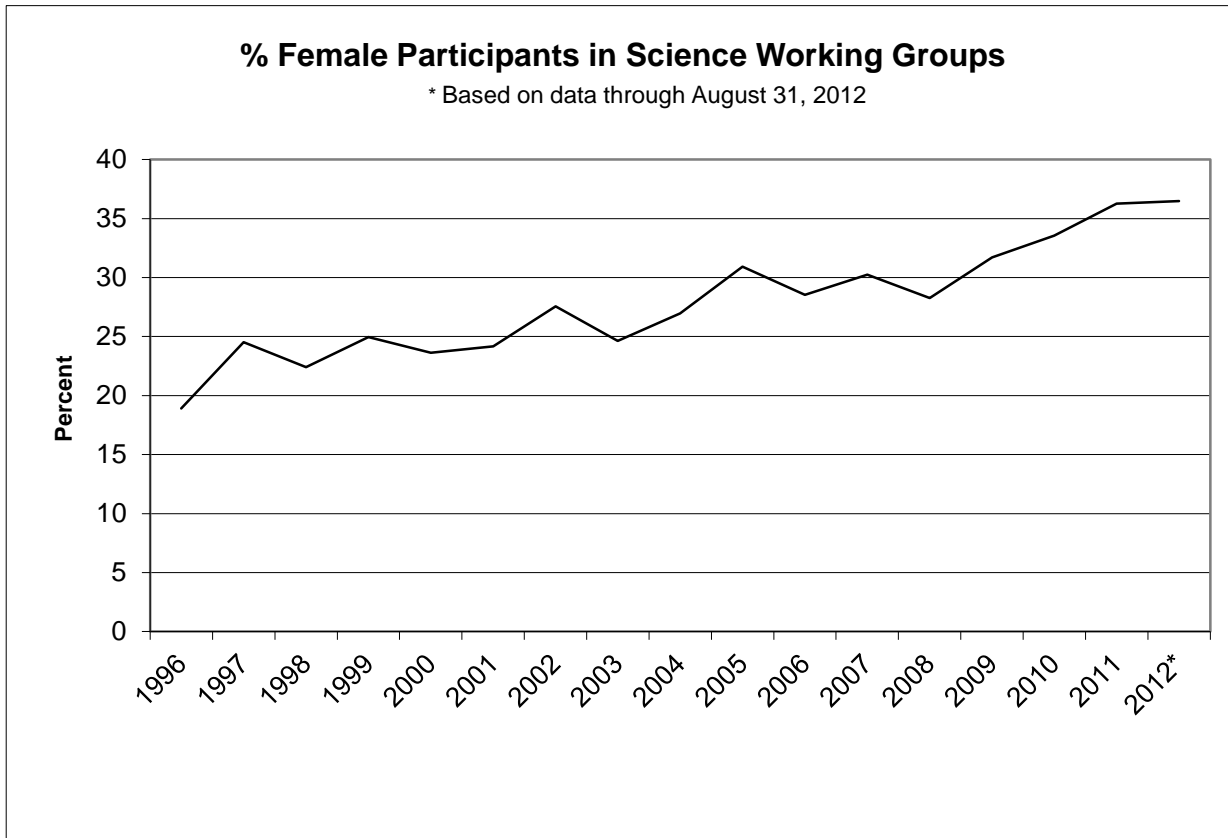


Figure 6. Percent Women on the NCEAS Science Advisory Board

for each year since NCEAS establishment. For comparison, among ESA members who answered diversity survey questions for a 2006 report, the average female representation on faculty was 36% (30% women among senior professors, 44% women among junior professors).

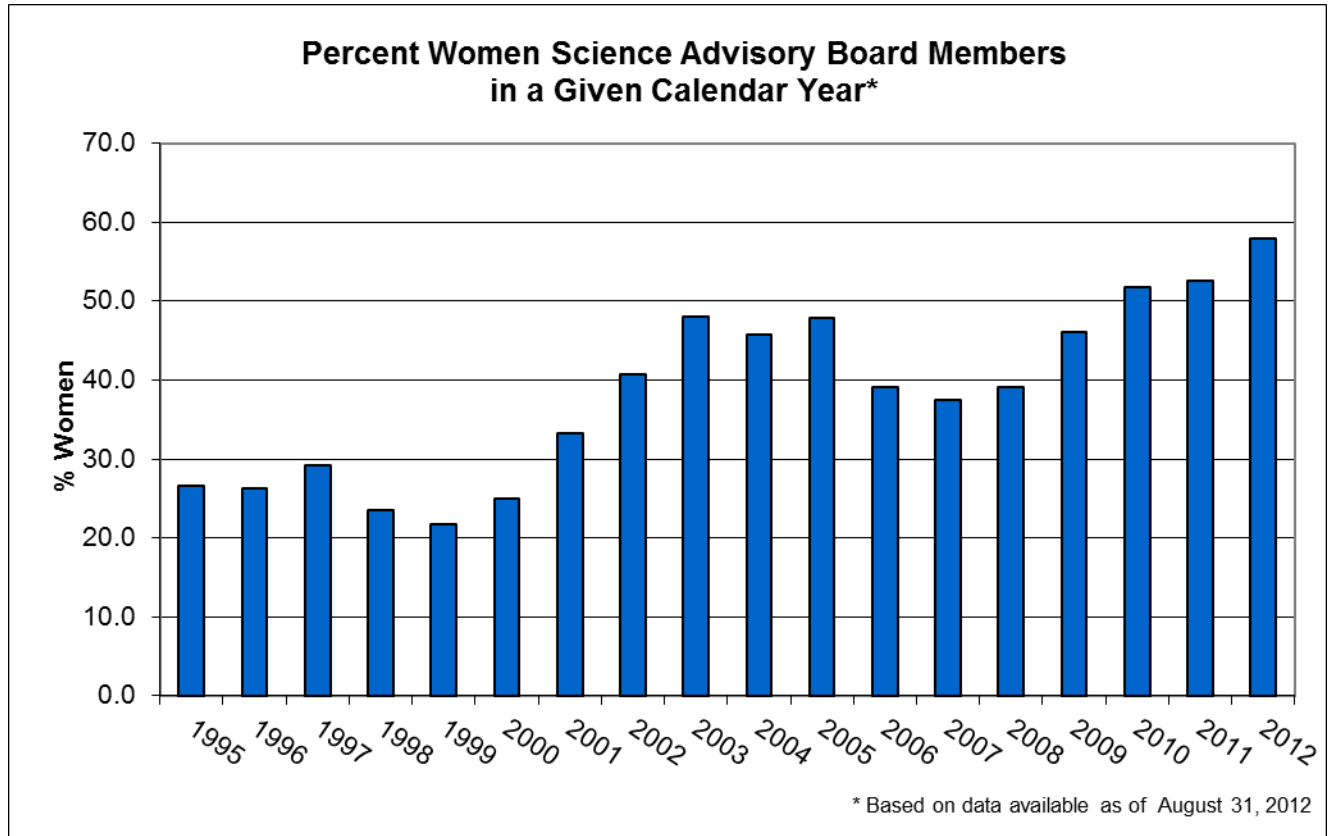


Figure 7. How did you hear about NCEAS?

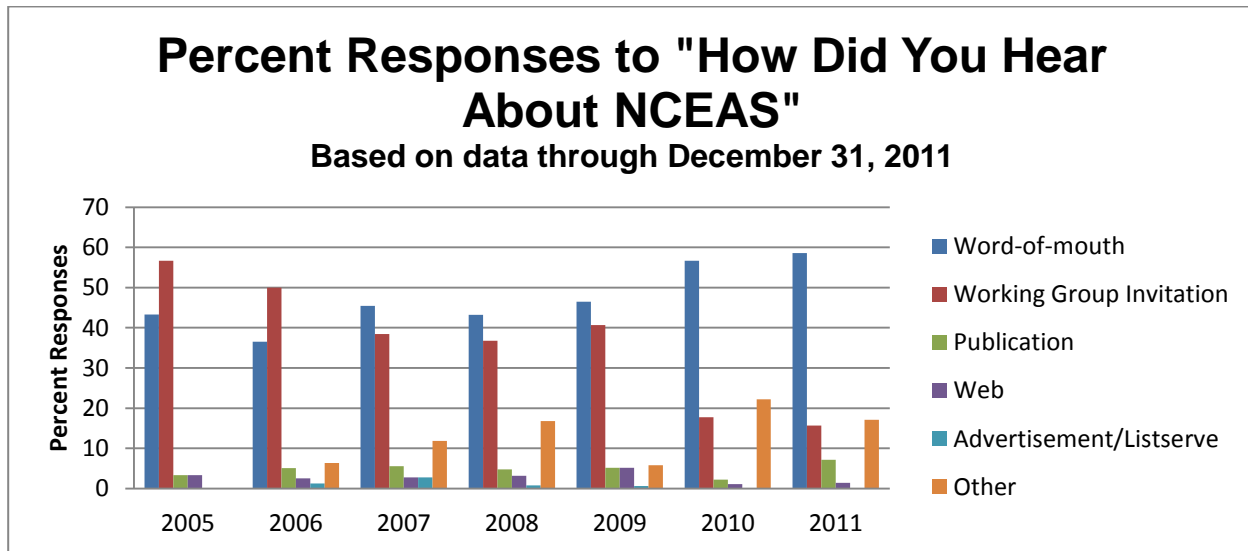


Figure 8. Number of Publications reported from NCEAS activities since establishment in 1995, by publication date.

