



**NOAA
FISHERIES**

Capacity Building

Stock Assessment Science Program Review
September 9-12, 2014 – Silver Spring, MD

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Office of Science and Technology

ST Capacity Building Efforts

ST-led Efforts:

1. QUEST: Quantitative Ecology & Socioeconomics Training Program: Faculty, Graduate Students
2. NMFS/Sea Grant Fellowship Program: Graduate Students

Other Efforts:

- Living Marine Resource Cooperative Science Center
- Recruiting-Training-Research (RTR) Program
- Regional programs

Legislative Drivers for Capacity Building

America Competes Act

- Gives NOAA broad statutory authority for educational programs

MSA Reauthorization: Directed study/report (2008) on shortage of stock assessment scientists

- Shortage: 2-18 (scientists/year) = 20-180/decade

Report Recommendations:

- Increase faculty
- Increase graduate students & post-docs
- Improve quantitative skills of incoming undergrads

Questionnaire: Feedback on Capacity Building from Center Directors

- The training and capacity building activities implemented by ST are successful in helping to develop future stock assessment scientists.

Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree	Not Familiar
2	2		1	1	

Questionnaire: Center Director Comments

- Strongly Agree: NMFS/Sea Grant fellows program has been a good investment.... would like to discuss ST's interest in going national with the RTR Program.
- Strongly Agree: ...would like to see strong support for C-STAR along with CAPAM. Both programs fill needed gaps.
- Agree: One area that has declined precipitously in the past decade is the training investment that we make in our existing staff.... ST could identify areas of common need and utilize funding to develop training courses that would rotate around the country.
- Agree/Disagree: ...Not all centers have benefitted equally. The AFSC/NWFSC did not receive additional funding to support faculty at UW or OSU to train stock assessment scientists.... which requires discretionary research dollars to be diverted support for a faculty position at UAF also would be very helpful.
- Strongly Disagree: During our assessment review the lack of training, particularly at the national level, came up several times. I am not aware of any National SA capacity building program within ST.

QUEST

Quantitative Ecology and Socioeconomic Training Program

- Quantitative Ecology - Research to understand mathematical relationships among biotic and abiotic components of ecosystems
- Stock Assessment - Application of quantitative ecology to the dynamics of fish populations for fisheries management

Faculty Support

- 5 full-time quantitative ecology faculty around country
- 2 research faculty

A “Virtual Institute”

- Facilitates education and access to training opportunities
- Promotes information exchange between federal and academic communities
 - Course portal
 - Webinars

QUEST Faculty

Faculty	University	Expertise	Center Association
Cameron Ainsworth	University of South Florida	Ecosystem, food webs in GoMX	SEFSC
Brice Semmens	Scripps	Stock assessment, spatial ecology	SWFSC
Erik Franklin	University of Hawaii Manoa (HIMB)	Stock assessment, coral reefs	PIFSC
Gavin Fay (begins 9/14)	SMAST	Ecological indicators, climate effects	NEFSC
Research Faculty: Rubao Ji; Gareth Lawson	WHOI	Acoustic methods for zooplankton, fisheries oceanography	NEFSC
Trevor Branch	University of Washington	Stock assessment, global fisheries	NWFSC/AFSC (funded by Centers)

QUEST Faculty

Total ST Funding for quantitative ecology

- \$4.3M (FY10 – 14)

Quest faculty are currently:

- Training graduate students in quantitative ecology
- Offering courses in quantitative ecology
- Conducting research in quantitative ecology with applications to fisheries stock and ecosystem assessment
- Providing support to NMFS and living marine resource management

QUEST Faculty and Students

Currently advising

- 6 M.S. students; 16 Ph.D. students
- Student research topics in backup slides

Have completed

- 5 M.S. and Ph.D. students
- 1 at NMFS, another in state government

Students are directly interfacing with NMFS by:

- Collaborating on thesis projects
- Having NMFS scientists on their committees
- Holding regular meetings and seminars

Other QUEST Faculty Education and Training

Undergraduate

- Supervising interns, projects, laboratory research
- Teaching courses

K-12: Unique project (Brice Semmens)

- Program, curriculum on fish spawning aggregations in Caribbean. Introduces students to reef ecology, sustainable fisheries.
- Reached 22 US & Caribbean classrooms (~500 students) Brings research into classroom through web-based streaming
- Teacher training workshop

Other K-12

- Presentations, science fairs

QUEST Faculty Interactions with NMFS & Fishery Management (Examples)

Serving on science advisory panels (e.g., SSCs)

- Western Pacific FMC SSC (Franklin): Setting ACLs; Serving on stock assessment review panels
- Gulf Mexico FMC Ecosystem SSC Vice Chair (Ainsworth): SEDAR 33
- Science Advisory Panel to Pacific Hake Treaty Org (Branch)

Collaborating with NMFS on fisheries research

- Center for the Advancement of Population Assessment Methodology (CAPAM) – Brice Semmens with SWFSC and IATTC
- Test & field deployments of prototype new broadband acoustic system for stock and ecosystem assessment (Lawson/NEFSC)
- Developing multi-species assessment for Georges Bank (Fay/NEFSC)



QUEST Virtual Institute

Webinars

- First 3 held in 2014
- All had >100 participants: NOAA, Councils, Universities, NGOs
- Topics:
 - Ecosystem models & stock assessment (Ainsworth)
 - Steepness (Mangel)

Course Portal (www.st.nmfs.noaa.gov/quest)

- Directory with 36 courses posted (some web-based)
- From 13 organizations

QUEST Virtual Institute							
Home	Courses	Seminars	Teaching Resources	Student Opportunities	About	Contact Us	
Show 10 entries				Search:			
Course(s)	Class Format	Contact	Host Organization	Summary	Dates offered	Link or files for More Information	Options for Natural Resource Professionals?
Courses in R and Statistical Methods							
Online courses in R and Maximum Likelihood Estimation		Jim Bence	Michigan State University Quantitative Fisheries Center	Online courses in R and Maximum Likelihood Estimation; Target audiences include students and natural Resource Professionals	Ongoing	Website	yes
R Programming (Introductory and Advanced)		Trevor Branch	University of Washington	Introductory and Advanced R Programming	Fall semesters	Introductory Advanced	Yes for audit

NMFS/Sea Grant Fellowships

Overview

- In 1999, NMFS and Sea Grant established a fellowship program in population and ecosystem dynamics, and in marine resource economics.
- SG runs recruitment/selection process, administers coop. agreements
- ST/SG joint funding

Program Priorities (*Pop/Eco Dynamics Fellowship only*)

1. Encourage qualified applicants to pursue careers in population dynamics, stock assessment, marine eco modeling, IEAs, EBM
2. Provide hands-on experiences to graduate students
3. Foster closer relationships between academic & NMFS scientists

Fellowship Program Elements

- **Research:** Public interest, relevance to NMFS
 - Assessing status of living marine resources
 - Development, implementation of quantitative methods for assessing marine ecosystems
- **NMFS mentors:** at science centers
- **Annual fellows symposium:** at a NMFS science center
- **Hands-on experience:** Expectation for 1-3 week field or learning experience focused on living marine resource management

Basic Program Stats (2000 – 2014)

	Economics	Population Dynamics	Combined
# Fellows	28	67	95
# New fellows/yr Ave (range)	2 (1-3)	4 (2-10)	6 (3-12)
Male to Female ratio	20 M (71%): 8 F (29%)	39 M (58%): 28 F (42%)	59 M (62%): 36 F (38%)
# Universities that hosted fellows	13	27	33
Universities with most fellows	1. U Wash (5) 2. UC Davis (4) 3. URI (4) 4. U MD (3)	1. U Wash (16) 2. VIMS (7) 3. UC Davis (6) 4. U Miami (5)	1. U Wash (21) 2. UC Davis (10)

Fellowship Funding (2000 – 2014)

	Total Fellow Years	Cost
Population Dynamics	189	\$6.0M Combined (NMFS & Sea Grant)

ST and Sea Grant contributions (for 1 fellow/year)

- ST: \$19,250
- Sea Grant: \$12,833

Recent average annual support: 5 fellows (3 years each)

- ST: \$288,750
- Sea Grant: \$153,996

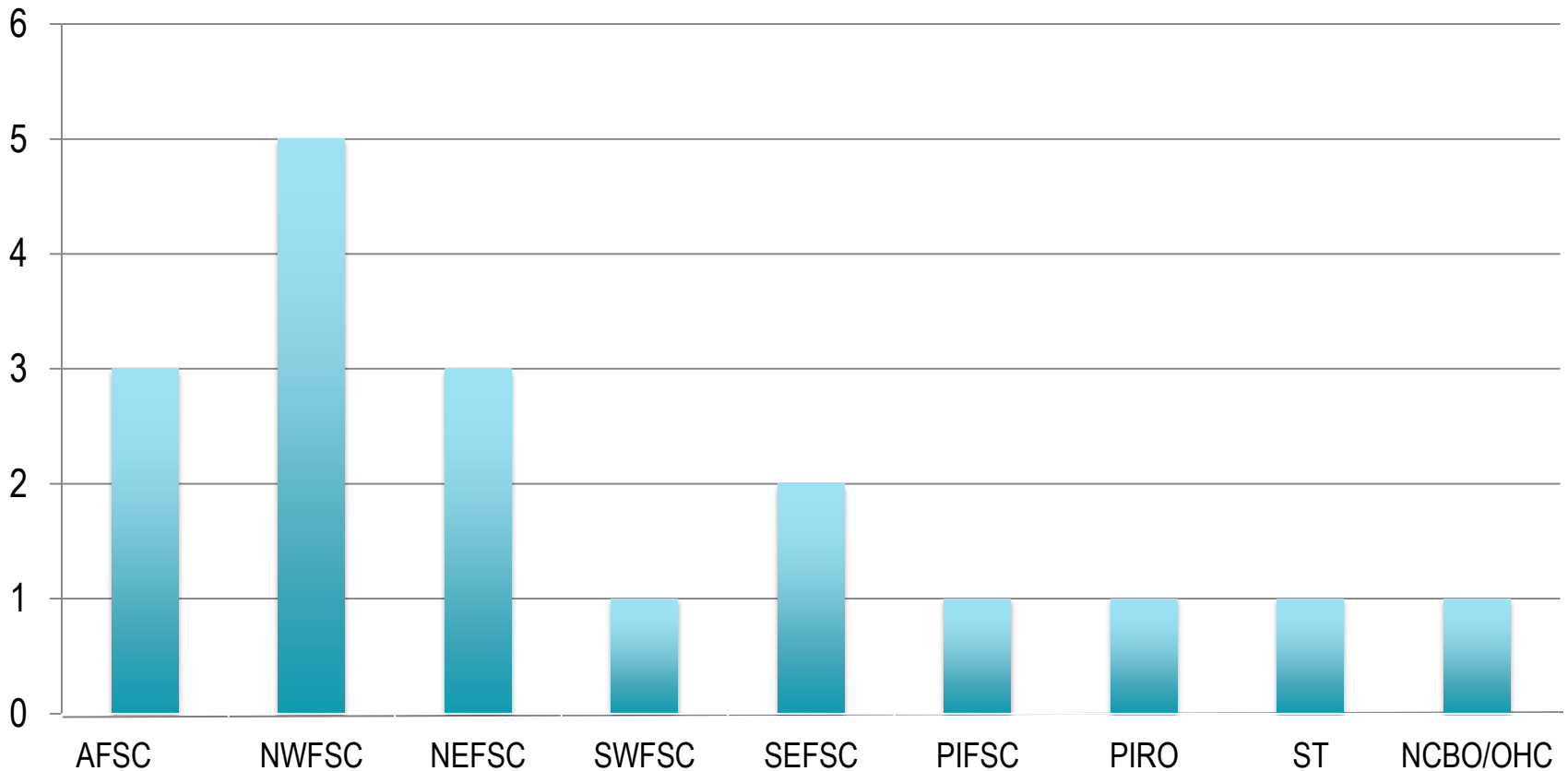
NMFS contributions trending upward:

- 2014 ST contribution for record high 10 fellows: \$744,328

Fellow Associations with NMFS Post-Fellowship

- **Spring 2014:** Feedback questionnaire administered to past/present fellows to assess program impacts
- **15/20 (75%)** alumni respondents currently have a position that gives them a role in marine resource management
- **Over 40%** of population and ecosystem dynamics fellows go on to work for NMFS
 - Includes current and previous federal employees, contractors, and post-docs
- **Where are the fellows if not at NMFS?** Councils and commissions, >15 universities, environmental NGOs

Distribution of Former Pop Dy Fellows in NMFS



Examples of Fellow Research Projects

- **Susan Piacenza (2012):** Developing quantitative tools to evaluate recovery in green sea turtles
- **Charles Peretti (2011):** Development of novel stock assessment methods for market squid (post-doc at NEFSC)
- **Patrick Lynch (2009):** Expanding quantitative approaches to assessing the population status and dynamics of large pelagic fishes (ST coordinator)
- **Jim Thorson (2009):** Evaluating Pacific groundfish schooling behavior and untrawlable refuges using multi-species mixture models and data from autonomous underwater vehicles (NWFSC scientist)
- **Carey McGilliard (2007):** Evaluating stock assessment methods and management strategies for spatially heterogeneous fish stocks (NWFSC scientist)
- **Melissa Haltuch (2002):** Temporal and regional summer groundfish assemblages in the U.S. west coast trawlable continental shelf, 1977–2001 (NWFSC scientist)

Other (non-ST) Efforts

Living Marine Resource Cooperative Science Center (since 2001)

- 7 academic institutions (1 on west coast) – mainly MSIs
- Goal: increase diversity of students in NMFS sciences
- Courses, grad/undergrad degrees, internships – quantitative ecology

Recruiting Training Research Program (SEFSC/U of FL, since 2003)

- Unique undergraduate focus; connects to graduate pipeline
- Reached ~ 200 students; positively influenced student interest in careers in marine population dynamics
- 35 alumni are/have worked for NMFS

Regional

- Center for Stock Assessment Research (SWFSC/UCSC)
- Center for Advancement of Population Assessment (SWFSC/Scripps)
- Individually supported post-docs, students, interns; Co-located faculty

Strengths

Successful pipeline for next generation of NMFS stock assessment scientists

- QUEST Faculty –
 - Increased faculty around country working w/ NMFS
 - Training 22 students in collaboration with NMFS staff
- NMFS/SG Fellowship – Over 40% fellows go on to NMFS

Conducting high quality research in support of stock, ecosystem assessment

- QUEST faculty: 71 publications over a 5-year period

Stewardship and improved living marine resource management

- QUEST faculty, students serving on SSCs and contributing to current stock and ecosystem assessments
- Improving tools available for assessments

Geographic Diversity – supporting all regions

- QUEST: Faculty associated with every science center
- NMFS/SG Fellows: 27 universities, 16 states; 73 NMFS mentors from all centers

Challenges

- Lack of positions available for finishing students
- NMFS/SG Fellowship competitiveness (annual funding per fellow)
- Minorities still under-represented
- Unmet needs for continued training of NMFS scientists (e.g., reduced travel and time constraints limit opportunities for current staff)
- No training programs for data collection, processing skills
- Administration STEM consolidation effort

Solutions

Lack of positions

- Institute post-doc program for transitioning to centers
- Request funds and authority to create more positions

NMFS/SG Fellowship competitiveness

- Increase funding for each fellowship recipient

Minorities still under-represented

- Increase use of LMRCSC-funded internship opportunities at centers
- Increase efforts to recruit NMFS/SG fellows from MSI's

Unmet needs for continued training of NMFS scientists

- Develop training program for new and continuing NMFS assessment scientists
- Enhance use of QUEST virtual institute (e.g., web-based courses)

Training programs for data collection and processing skills

- Partner with universities to develop applied internship opportunities at centers

Administration STEM consolidation effort

- Continue to highlight strengths, value of QUEST, fellowships



Thank You!



NOAA FISHERIES

QUEST Faculty Courses Offered (Full time faculty)

- **Trevor Branch:**
 - Fitting models to data (in R) using maximum likelihood & Bayesian methods, to solve problems in conservation & nat. res. mgmt;
 - Current topics in fisheries; Grad. Discussion on Sus. Fisheries
 - 3 Levels of courses in R Programming (Introduction to Advanced)
 - Creating scientific graphics for peer-reviewed publications using R
- **Cameron Ainsworth:** Population dynamics; Ecosystem modeling; Fisheries ecology reading course
- **Erik Franklin:** Intro to Quantitative Methods in Fisheries Science; Ecosystem Approaches to Fisheries.
- **Brice Semmens:** Intro to Statistics for marine biologists (Undergrad); Bayesian hierarchical population modeling (grad); Marine biology lab and field techniques (Undergrad); Data analysis and modeling in R (grad).
- **Gavin Fay:** (Planned); Models for EBM; Numerical computing for fisheries and conservation (hierarchical modeling and simulation testing methods); Statistical programming for natural resources (R); Writing for publication

QUEST Faculty Courses Offered (Research Faculty)

- **Gareth Lawson:** Elements of modern oceanography; Marine bio-acoustics; History of Biological oceanography
- **Rubao Ji:** Quantitative fisheries oceanography (MIT-WHOI joint program course)

QUEST Faculty & Their Students (Full time faculty)

Trevor Branch:

- **Students:** 4 total (2 M.S. and 2 PhD Students)
- **Research Topics:** 1. Status of north-east Pacific blue whales 2. Stock assessments of data-poor coral reef fish species 3. Effects of catch shares on US west coast groundfish fisheries 4. Stock assessment and value of information for Prince William Sound herring populations.
- **NMFS Connections:** All students have frequent meetings, have NMFS researchers on their committees, attend regular (weekly and two-weekly) seminars with NMFS employees.
- **Completed Students:** 1 M.S. student now in PhD program

Cameron Ainsworth:

- **Students:** 4 PhD students
- **Research Topics:** 1. MPA design in the GOM considering larval dispersal patterns 2. Evaluation of harvest control rules under increasing red tides 3. Oil impacts from DWHOS 4. Boat collision risk in manatees
- **NMFS Connections:** NMFS personnel on academic committees, various data resource people involved in research, NCDDC provided hydrodynamics data for several students
- **Completed Students:** 1 student now in state government

Erik Franklin:

- **Students:** 6 total (4 M.S.; 2 PhD students)
- **Research Topics:** 1) Effects of climate change & eutrophication on coral reef habitats; 2) Comparing vis. Obs & next-gen sequencing methods to eval prey diversity from gut contents of wahoo; 3) Evaluating EBFM strategies for Hawaiian coral reef fisheries using a metacommunity dynamics model framework; 4) Delineating EFH of Hawaiian coral reef ecosystem mgmt unit spp; 5) **Population assessment & survey method developments for Pacific marine mammals;** 6) **Stock assessment & life history of striped marlin in the Pacific.**
- **NMFS Connections:** Most students are collaborating with PIFSC scientists on their projects (e.g., Bob Humphreys, Gerard DiNardo, Jon Brodziak, Erin Oleson, Amanda Bradford, Marc Nadon, Invor Williams, Annie Yao)

QUEST Faculty & Their Students (Full time faculty)

Brice Semmens:

- **Students:** 4 PhD students; 1 post-doc
- **Research Topics:** 1) Spatial ecology of oceanic manta w/ satellite tags, stable isotopes, and genetics; 2) Quantitative tools and techniques to address pressing questions in fisheries research and mgmt (e.g., white seabass stock assessment); 3) Mark/recapture techniques and acoustic tagging to study vital rates and spatial ecology of recreationally important coastal fish spp (Paralabrax); 4) Quantitative tools and techniques to study issues in marine fisheries (e.g., estimating spatial distributions of data limited marine spp).
- **NMFS Connections:** : Most students are collaborating with SWFSC and NWFSC scientists on their projects (e.g., Tomo Eguchi, Eric Ward, Paul Crone).
- **Completed Students:** 2 M.S. (just graduated, haven't been hired yet)

Gavin Fay:

- **Students:** 2 PhD students (starting 1/15); Aim: in 5 yrs (4 PhD/2 MS at one time)
- **Research Topics:** 1) Performance of spatial modeling methods for assessment and management of living marine resources; 2) Risk Assessment tools for EBM. Anticipated: Incorporating regime shift dynamics into fisheries harvest control rules; Modeling Economic & Ecological effects of OA in NE U.S.
- **NMFS Connections:** NMFS scientists on committees for all students; Research collaborations with NEFSC scientists; Plan to hold regular joint quantitative NEFSC/SMASST seminar/workshop series

QUEST Faculty & Their Students (Research Faculty)

Rubao Ji:

- **Students:** 1 Ph.D. student
- **Research Topics:** Quantitative fisheries oceanography; Population connectivity; Computational methods for fisheries problems
- **NMFS Connections:** NMFS scientists on thesis committee; Developing proposals with NMFS scientists

Gareth Lawson:

- **Students:** 1 Ph.D. student
- **Research Topics:** Ocean acidification and thecosome pteropod ecology
- **NMFS Connections:** PhD student working with certain datasets based on ongoing NMFS ZP sampling programs provided by NEFSC collaborators
- **Completed students:** 1 M.S. student now working at NMFS

QUEST Faculty Undergraduate Training Offerings

- **Trevor Branch:** Capstone projects with several undergrads to do research as a final project for their fisheries degree. One student is writing up a paper on length-weight relations for Guam.
- **Cameron Ainsworth:** supervised an honors project of a student at the USF School of Global Sustainability
- **Erik Franklin:** Lab includes undergrads in research (e.g., one student from Boston U). Some undergrads take grad courses
- **Brice Semmens:** Teach undergrad courses; Undergrads volunteer in lab doing research
- **Gavin Fay:** Anticipate supervising 1-2 undergrad interns with aim to recruit math & computer sci students w/ interests in LMR issues. Hope to be part of proposed U MassD REU site that will recruit from regional comm colleges
- **Gareth Lawson:** Host summer and winter undergraduate fellows

QUEST K-12 Offerings

- **Brice Semmens:** Annual program/curricula centered on research on fish spawning aggregations in Caribbean;
- **Gareth Lawson:** Gives 1-2 lectures/yr to Elementary students visiting WHOI
- **Erik Franklin:** Gives occasional presentations to elementary schools on marine biology/coral reef sci and to student groups (K-12) that visit HIMB. Participates in GIS day (international event) - involves primary students in biogeography.

QUEST Faculty Research Topics - Examples

- **Trevor Branch (NW/AK):** Fish stock assessment, global fisheries, status/trends in large whales, fishing effects on marine food webs, effects of catch shares on fisheries
- **Cameron Ainsworth (SE):** Ecosystem and food-web interactions in Gulf of Mexico, Integrated ecosystem assessment; Impacts of DWH oil spill
- **Brice Semmens (SW):** Stock assessment; Fish spawning aggregation management and conservation; Population assessment/spatial ecology – mark recapture studies on recreationally important spp (Paralabrax spp); Spatial ecology – electronic tagging studies on marine spp of conservation concern; Time series analysis in context of population assessment
- **Erik Franklin (PI):** Stock assessment methods for Pacific insular and pelagic spp; Population assessment & habitat use of tropical Pacific marine mammals; Metacommunity dynamics of coral reefs; EFH of coral reef ecosystem management unit spp;
- **Gavin Fay (NE):**
 - **Current:** Ecological indicators for EBFM; OA and fisheries mgmt in NE; Quantifying risk & ecological/economic tradeoffs of fish mgmt scenarios; Regime shift dynamics in fisheries control rules; MSE of ecosystem-based control rules for NE LME;
 - **Anticipated:** Multi-model inference for effects of climate on NE fisheries and ecosystem; Improving use of tagging info in integrated analysis stock assessment methods; Assessment & mgmt tools for protected spp; Risk assessment tools for EBM; Process error modeling for single & multi- spp stock assessment



QUEST Faculty Research Topics - Examples

- **Gareth Lawson:** Develop acoustic methods for sampling zooplankton, micronekton for purpose of stock and ecosystem assessment; Application of acoustic techniques for study of euphausiid ecology and fisheries interactions in Gulf of Maine & ecosystem dynamics at New England continental shelf break; Examination of ecology and physiology of pteropods, their role in ecosystem, and response to OA
- **Rubao Ji:** Fisheries oceanography; Biological-physical modeling; plankton dynamics

QUEST Faculty Interactions w/ NMFS (full-time faculty)

- **Trevor Branch:** Frequent meetings with NMFS employees on joint projects. Serve on Science Advisory Panel to Pacific Hake Treaty organization.
- **Cameron Ainsworth:** Vice Chair of Ecosystem SSC (since 2011)
- **Erik Franklin:** Collaborations w/ PIFSC scientists; WPRFMC – SSC, Tech sub-comm of Fishery Data collection and research committee;
- **Brice Semmens:** Runs CAPAM with Paul Crone (SWFSC), Mark Maunder (IATTC); Post-doc at SWFSC; Grad student funded through NOAA to work on developing modeling approaches to estimating marine turtle spatial distributions; Collaborates with NMFS scientists on research (Eric Ward, Mark Scheuerell, Eli Holmes) – the latter 2 on tools and techniques in time series analysis; Participated in CFMC spawning aggregation wkshop
- **Gavin Fay:**
 - **Current:** Collaborations with NEFSC/NMFS: 1) Developing multi-spp assessment for Georges Bank; 2) Develop methods for MSE & include ecological indicators for EBFM strategies; 3) Atlantis ecosystem model development and application; 4) Improve use of tagging info in integrated analysis stock assessment methods (Stock Synthesis)
 - **Anticipated:** Collaborations with NEFSC on assessment tools and mgmt performance for loggerhead turtles (Including interactions w/ stock assessments); Collaboration w/ MAFMC: Contribute to MSE for some spp; Expect interactions w/ regional SSCs; Member of ICES WG for N. Atl regional seas & working to develop recommendations for implementing components of IEAs in NW Atlantic.

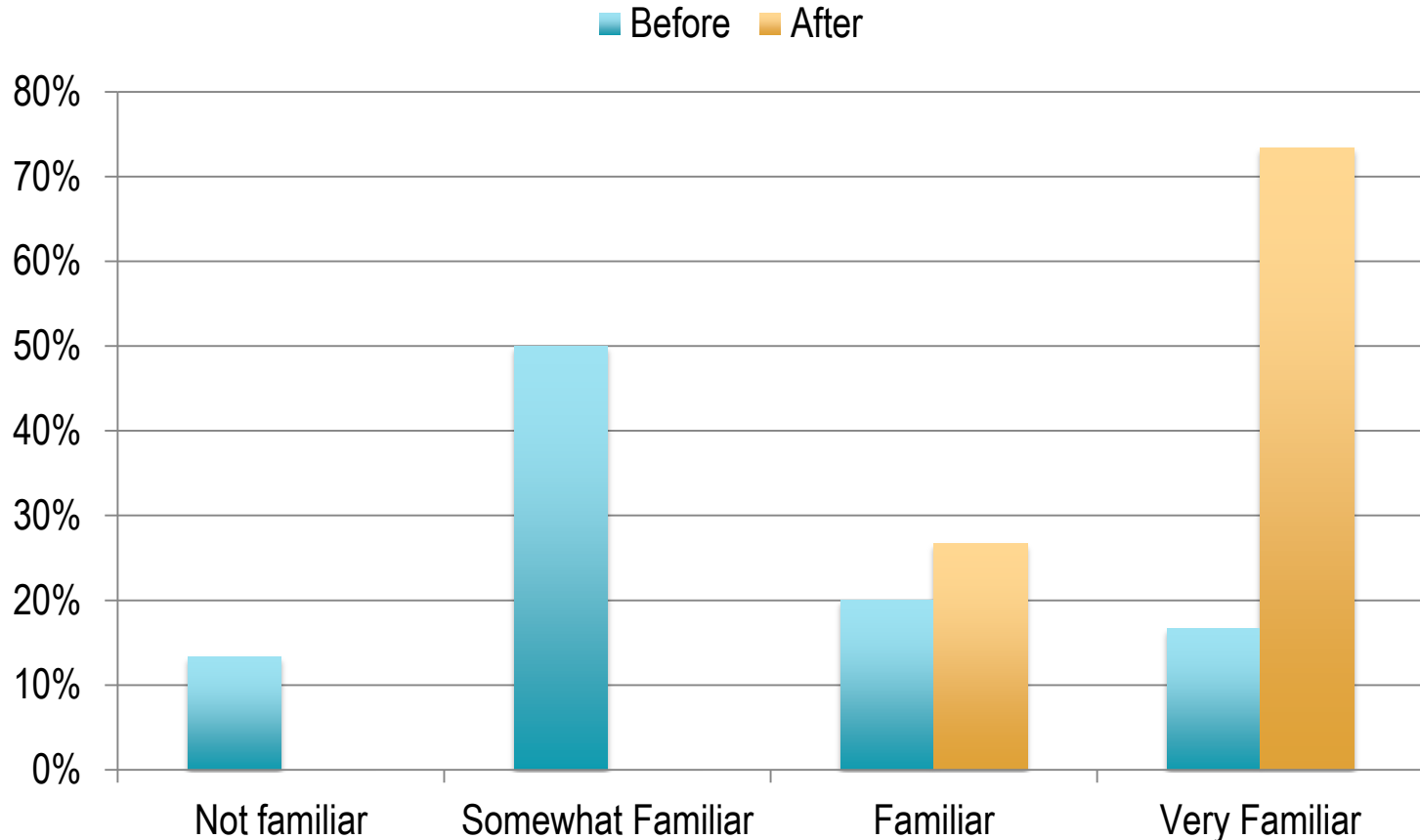
QUEST Faculty Interactions w/ NMFS (research faculty)

- **Gareth Lawson:** Collaborations with NEFSC on multiple projects – 1) Test and field deployments of prototype new broadband acoustic system for stock/ecosystem assessment; 2) Collection of multi-frequency acoustic data incidental to marine mammal surveys as indices of ZP and Micronekton for use in IEA and marine mammal habitat modeling; 3) Initiation of new seminar series on fisheries and ecosystem acoustics, based at NEFSC but distributed nationally via webinar
- **Rubao Ji:** Collaboration with NEFSC on research

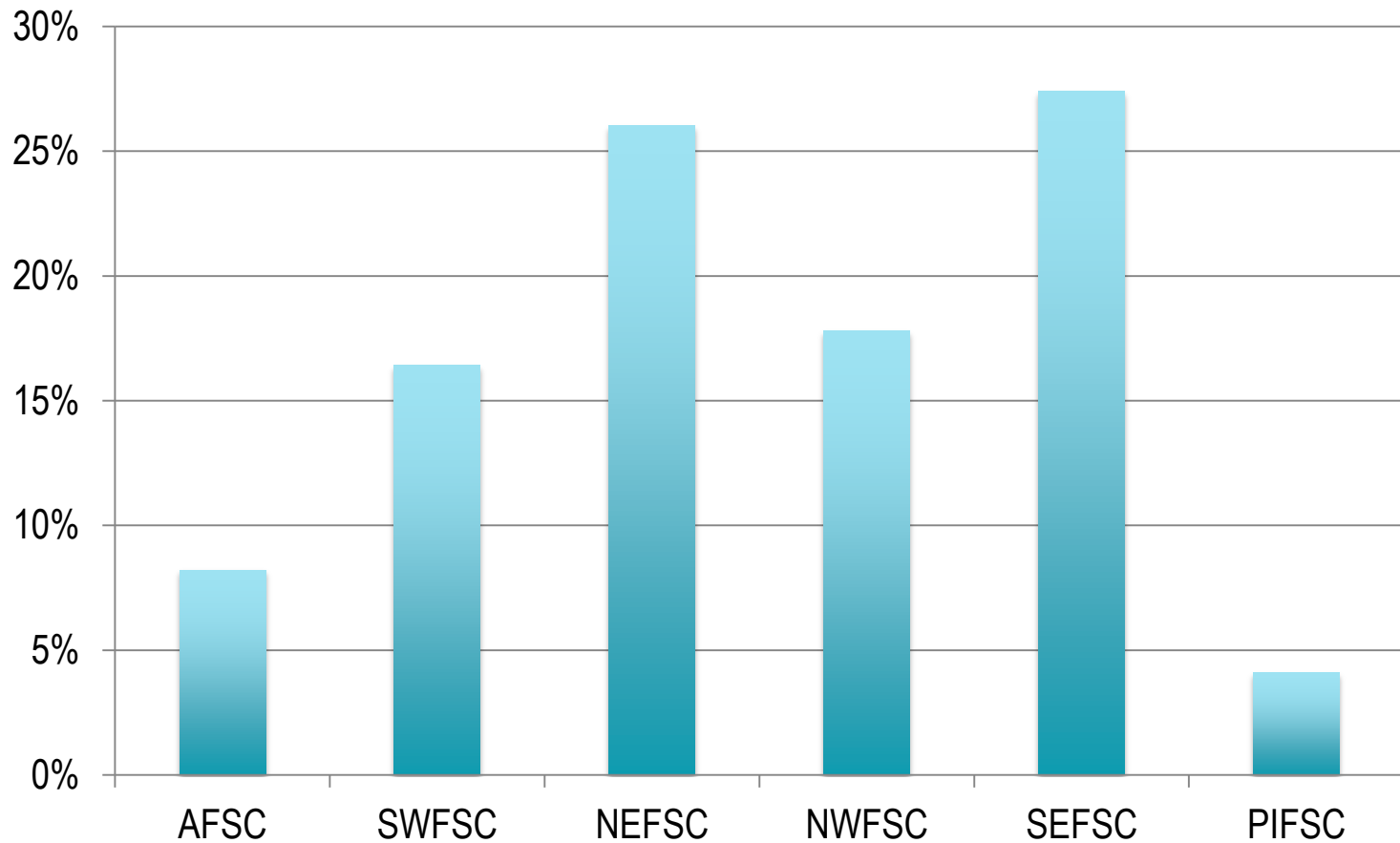
Fellowship Honors

- PECASE (2008)
- AK legislative citation (Sen. Dennis Egan)
- ICES Service Award
- NOAA Bronze Medal Award
- Outstanding Publication Awards
- Other fellowships, grants, academic achievement awards
- Presentation Awards
- Travel Awards
- Teaching Awards

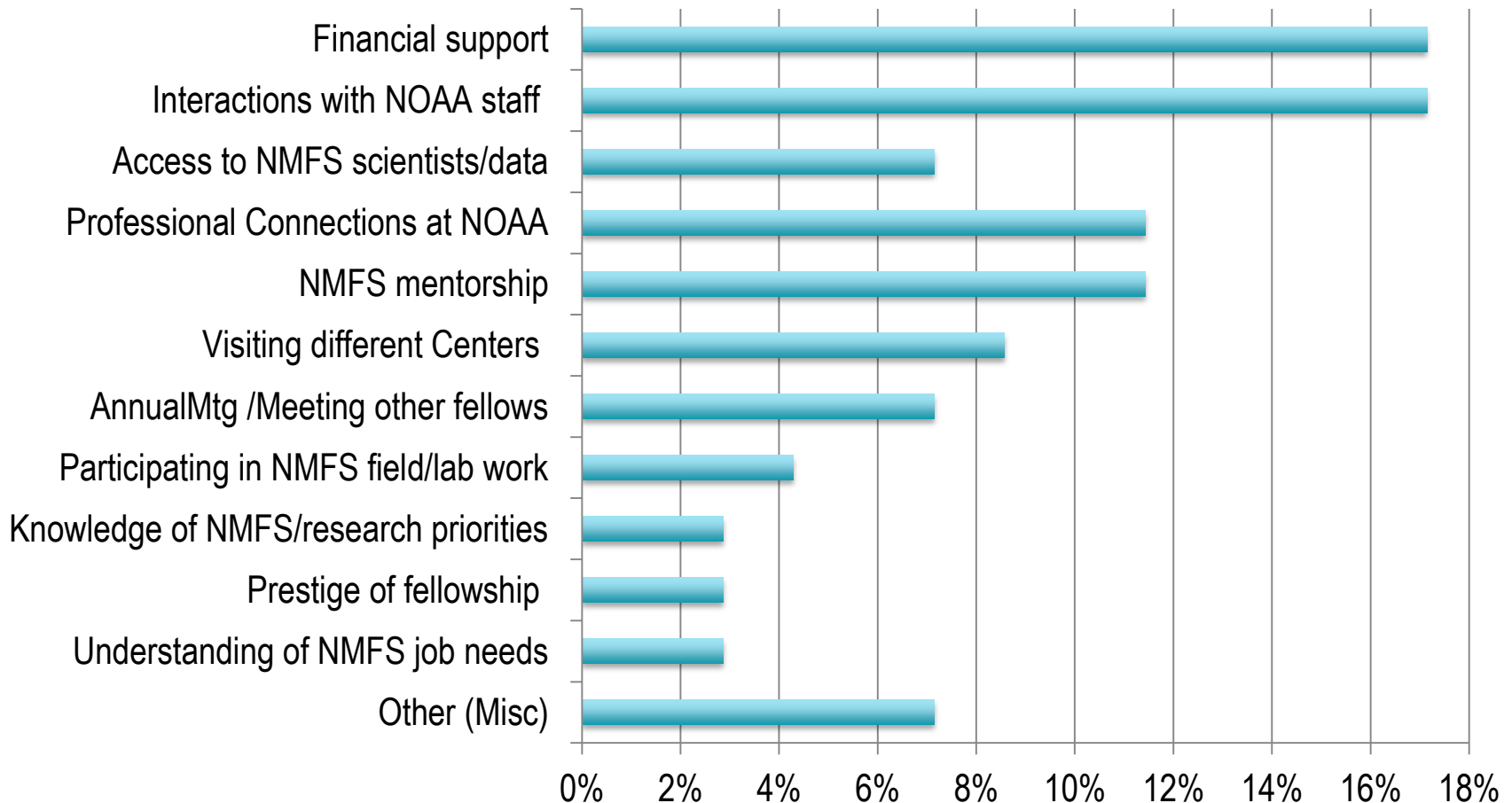
Familiarity with NMFS Before/After Fellowship (Pop Dy Fellows only)



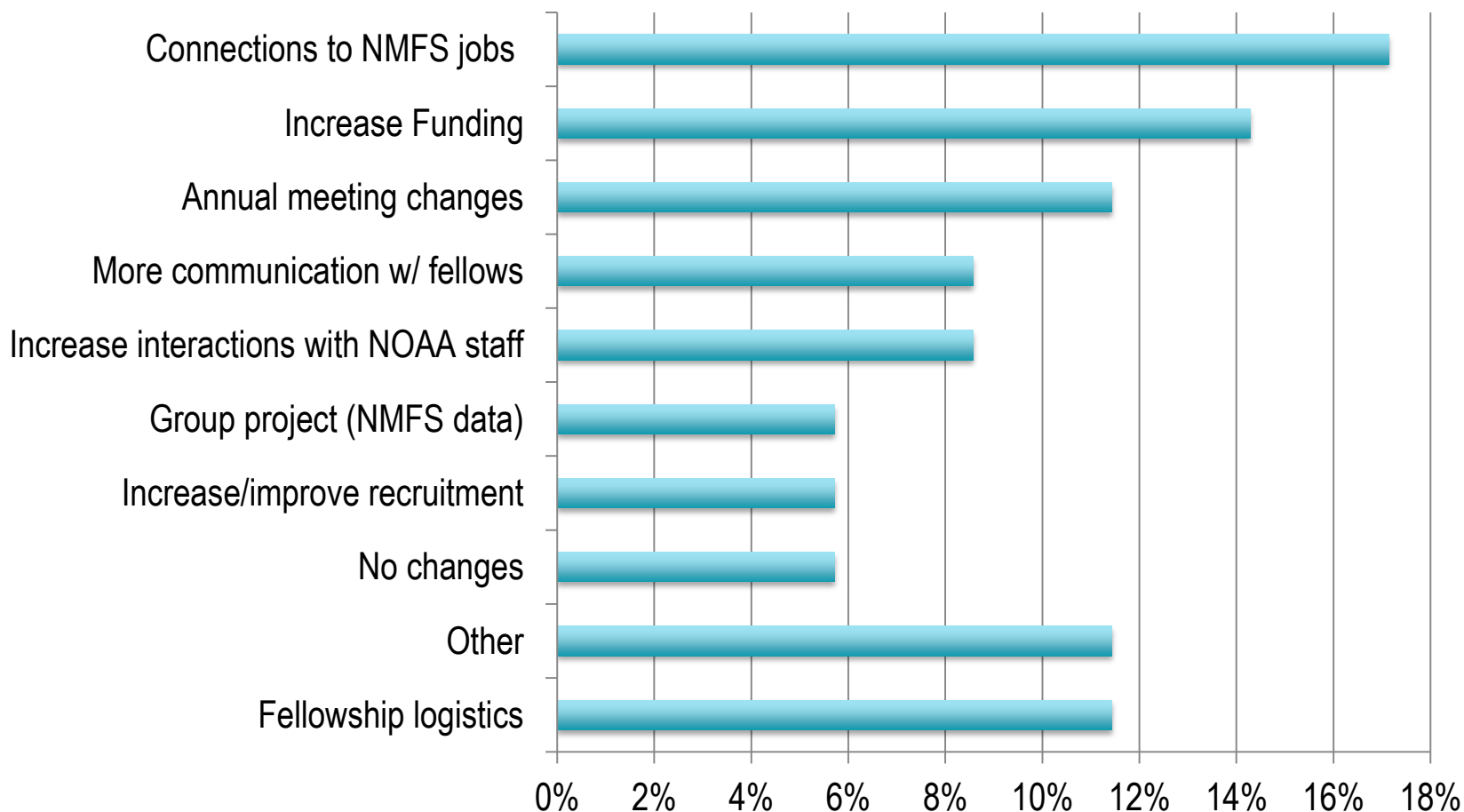
Where the NMFS Mentors Come From (Pop Dy Fellows Only)



Most Important Thing Gained from Fellowship



Suggestions to Improve the Fellowship Program



Examples

- “A formal career development component would be very beneficial, particularly regarding assistance with finding and applying for NMFS jobs.”
- “Pairing up with 2-3 fellows and working directly with a NMFS dataset on an issue of interest would be useful and potentially beneficial to fellows...and the centers.”
- “Increase funding to keep pace with tuition costs -- the "3 year" funding currently pays for ~2 years of costs at many schools.”
- “For stock assessment fellows, make sure there is exposure to other NMFS stock assessment programs (e.g., protected species, coral reefs) than just fisheries.”
- “Enforce field requirements; as a scientist, I think it is very important for fellows to get out in the field and learn where their data comes from. Many fellows laughed at me for going into the field; some haven't even seen the species they work on in real life.”

How does the NMFS/SG Fellowship Compare to the NSF Graduate Research Fellowship Program¹

	NMFS/SG Fellowship	NSF GRFP
Degree targeted	PhD	Masters or PhD
Award amount	\$38.5K/\$32K (Fed portion)	\$32K; \$12K Cost of Education allowance
# awarded /year	1-9	2000
Funding Duration	2-3 years	Up to 3 years within 5 yrs
Ave time to complete doctoral degrees	5.7 (survey respondents)	5.95 yrs
Male/Female ratio	35% previous/current fellows female	47.9% of GRFP w/ degrees (female)

1. NORC (2014). Evaluation of the National Science Foundation's Graduate Research Fellowship Program (Final Report). Released 6/10/14.

Other Fellowship Programs

- **EPA Science to Achieve Results (STAR) Fellowships for Graduate Environmental Study**
 - Masters or PhD; Up to \$42K/yr (\$25K stipend; \$12K/yr for tuition/academic fees; \$5K expenses (health insurance/books/supplies/computers/travel))
- **DOE Computational Science Graduate Fellowship**
 - 4 year fellowship; \$36K stipend, payment of all tuition & fees; \$5K academic allowance 1st fellowship yr - \$1K each subsequent yr
- **Science, Math, & Research for Transformation (SMART) Scholarship for Service Program**
 - 1-5 yrs support; Full tuition and education fees (not meal plans, housing, parking); Cash awards \$25K - \$41K; health insurance reimbursement up to \$1.2K/yr; \$1K book allowance/yr
- **DOD Nat'l Defense Sci & Engineering Grad Fellowship**
 - Support for 3 yrs similar to GRFP; Full tuition and mandatory fees; \$31K stipend/yr; \$1K/yr medical insurance

NMFS/Sea Grant Fellowship Program & Administration FY 15 STEM Education Proposal

- Admin FY15 STEM Proposal - comprehensive reorg of Fed STEM education programs
- NOAA FY15 Budget Request: Proposes *program termination* of NMFS/SG Fellowship Program in accordance with Admin STEM education proposal
- HR (May): Does not adopt any of NOAA's proposed STEM education consolidation proposals.
- Senate (June): Opposes the administration's proposed elimination of education and fellowship activities.