

# NOAA Scientific Publications Report



MAY 24, 2013

## HIGHLIGHTED ARTICLE

Defining trends and thresholds in responses of ecological indicators to fishing and environmental pressures

A bibliometric analysis of climate engineering research

Identifying ecological and fishing drivers of bycatch in a U.S. groundfish fishery

Effects of a tropical cyclone on a pelagic ecosystem from the physical environment to top predators

Thermal habitat constraints on zooplankton species associated with Atlantic Cod (*Gadus morhua*) on the US Northeast Continental Shelf

Measuring the socio-economic performance of catch share programs: definition of metrics and application to the U.S. Northeast Region groundfish fishery

Postnesting migratory behavior of loggerhead sea turtles (*Caretta caretta*) from three Florida rookeries

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Social capital and the success of harvest cooperatives in the New England groundfish fishery

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Possible stock structure of dolphinfish (*Coryphaena hippurus*) in Taiwan coastal waters and globally based on reviews of growth parameters

Does maternal size affect red king crab, *Paralithodes camtschaticus*, embryo and larval quality?

Community-wide validation of geospace model ground magnetic field perturbation predictions to support model transition to operations

Phylogeny and systematics of Demospongiae in light of new small-subunit ribosomal DNA (18S) sequences

Revision of the manefish genera *Caristiis* and *Platyberyx* (Teleostei: Perciformes: Caristiidae), with descriptions of five new species

Among-year variation in growth of Antarctic krill *Euphausia superba* based on length-frequency data

Testing systematic fishing responses with ecosystem indicators

Cetacean distribution and abundance in relation to oceanographic domains on the eastern Bering Sea shelf, June and July of 2002, 2008, and 2010

Global distribution of Risso's dolphin (*Grampus griseus*): A review and critical evaluation

Comparing MODIS and MERIS spectral shapes for cyanobacterial bloom detection

Age and growth of the thresher shark, *Alopias vulpinus*, in the western North Atlantic Ocean

Osteology of the prowlfish, *Zaprora silenus* (Cottiformes: Zoarcoidei: Zaproridae)

## OTHER REPORTS, BOOK CHAPTERS, & INTERNAL PUBLICATIONS

Guide to the identification of larval and early juvenile Pricklebacks (Perciformes: Zoarcoidei: Stichaeidae) in the northeastern Pacific Ocean and Bering Sea

ONMS National Condition Report

## AUTHORS

S. I. Large (NMFS/OAA), G. Fay (NMFS/OAA), K. D. Friedland (NMFS/NEFSC) and J. S. Link (NMFS/OAA)

## PUBLICATION DATE

Expected June 2013

## TITLE

*Defining trends and thresholds in responses of ecological indicators to fishing and environmental pressures*

## JOURNAL

ICES Journal of Marine Science

## SIGNIFICANCE

- This report empirically identifies reference levels where environmental forces and fishing pressure result in ecosystem change.
- These reference levels can be used to establish a foundation for the implementation of ecosystem-based fisheries management.

## SUMMARY

Both fishing and environmental forces can influence the structure of marine ecosystems. To further understand marine ecosystems and to implement ecosystem-based fisheries management (EBFM), an evaluation of ecosystem indicators is warranted. In this context, it is particularly important to identify thresholds where fishing and environmental pressures significantly influence ecological indicators. We empirically determined numerical values of environmental forces and fishing pressure that significantly altered the response of ecological indicators for the Northeast Shelf large marine ecosystem. Generalized additive models predicted a non-linear relationship for each pressure-response pairing. With this smoother, 95% confidence intervals (CI) for estimated first and second derivatives for each relationship were determined via parametric bootstrap. A significant trend or threshold was noted when the CI for the first or second derivative was greater or less than zero, delineating the level at which pressure variables influence the rate and direction of ecosystem indicator responses. We identify reference levels where environmental forces and fishing pressure result in ecosystem change by collectively examining the responses of multiple ecological indicators. Individual indicators showed unique responses to pressures, however, similar values for the pressures were associated with significant changes for multiple indicators. These reference levels establish a foundation for implementation EBFM.



Commercial Fishing Boats



## AUTHORS

C. Belter (NOAA Central Library) and D. Seidel (OAR/ARL)

## PUBLICATION DATE

Accepted 1 May 2013

## TITLE

*A bibliometric analysis of climate engineering research*

## JOURNAL

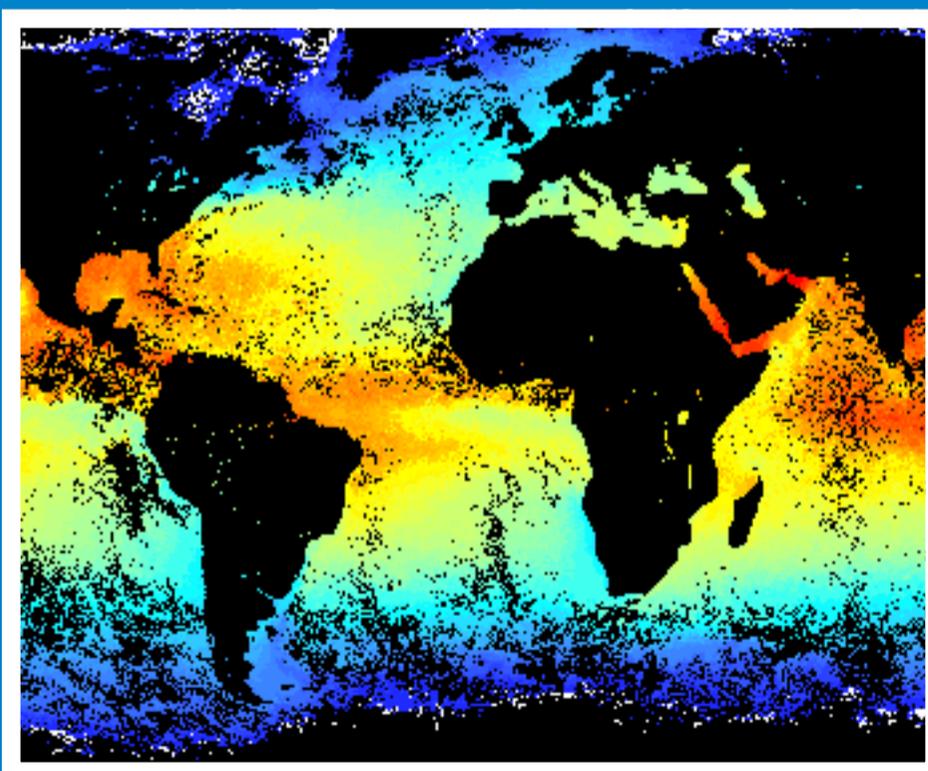
Wiley Interdisciplinary Reviews: Climate Change

## SIGNIFICANCE

- Climate engineering is gaining interest and attention in scientific and policy arenas. This article puts into context the state of scientific understanding and the nature of the international scientific effort.
- Bibliometric analysis is well suited to studying the complex and multidisciplinary climate engineering research.
- The analysis of publications through 2012 provides a baseline for monitoring future developments.

## SUMMARY

The past five years have seen a dramatic increase in the number of media and scientific publications on the topic of climate engineering, or geoengineering, and some scientists are increasingly calling for more research on climate engineering as a possible supplement to climate change mitigation and adaptation strategies. In this context, understanding the current state of climate engineering research can help inform policy discussions and guide future research directions. Bibliometric analysis—the quantitative analysis of publications—is particularly applicable to fields with large bodies of literature that are difficult to summarize by traditional review methods. The multidisciplinary nature of the published literature on climate engineering makes it an ideal candidate for bibliometric analysis. Publications on climate engineering are found to be relatively recent (more than half of all papers during 1988-2011 were published since 2008), include a higher than average percentage of non-research articles (30% compared to 8-15% in related scientific disciplines), and be predominately produced by countries located in the Northern Hemisphere and speaking English. The majority of this literature focuses on land-based methods of carbon sequestration, ocean iron fertilization, and solar radiation management and is produced with little collaboration among research groups. This study not only provides a summary of existing publications on climate engineering, but also provides a baseline for quantitatively monitoring the development of climate engineering research in the future.



Climate Engineering



## AUTHORS

J. E. Jannot and D.S. Holland (NMFS/NWFSC)

## PUBLICATION DATE

Expected 2013

## TITLE

### *Identifying ecological and fishing drivers of bycatch in a U.S. groundfish fishery*

## JOURNAL

Ecological Applications

## SIGNIFICANCE

- Study provides an analytical framework for managers and fishers to assess bycatch minimization strategies in a U.S. Pacific coast groundfish fishery.
- This novel framework assesses both ecological and social drivers of bycatch in this region by comparing the relative effects of season, time of day, target group, depth, and latitude on the expected catch of 12 bycatch species of management interest.
- These assessments provide guidance in choosing between different management approaches: technical solutions (e.g., temporal or spatial closures, gear modifications) or incentives used to change the behavior of fishers (e.g., regulatory quotas).

## SUMMARY

Fisheries bycatch is driven by both ecological (e.g., area, season) and social (e.g., fisher behavior) factors which are often difficult to disentangle. We demonstrate a method for comparing fishery-dependent bycatch to fishery-independent catch to delineate the influence of ecological and social factors on bycatch and provide insights for bycatch management. We use data from commercial fishing vessels in the U.S. west coast trawl groundfish fishery (fishery-dependent data collected by fisheries observers) and scientific data from the U.S. west coast bottom trawl groundfish survey (fishery-independent data) to compare the relative effects of season, time of day, target group, depth, and latitude on the expected catch of 12 bycatch species of management interest. This comparison highlights two important relationships which help identify drivers of bycatch. First, when the effect of season, time of day, depth or latitude on bycatch in both the commercial and scientific data is positive, ecological processes are likely strong drivers of bycatch suggesting technical approaches (e.g., temporal or spatial closures, gear modifications) might effectively control bycatch. Alternatively, when the effects of season, time of day, depth, latitude, or target group appear only in the commercial data (but not in survey data), fisher behavior is likely the stronger driver of bycatch, suggesting a need to strengthen incentives for fishers to change behavior to avoid bycatch (e.g., regulatory quotas). Two other patterns emerge which suggest that fishery bycatch is not associated with temporal, target, or spatial variables implying that either current incentives to avoid bycatch are working (i.e., when survey expected catch is positively correlated with variables, but fishery catch is not); or bycatch is a product of unstudied or stochastic processes (i.e., variables are not correlated with expected catch in either data set) and continued monitoring is recommended. Our analysis provides managers and fishers with a basic analytical framework to assess bycatch reduction alternatives and methods useful for researchers interested in comparing bycatch before and after a management shift.



Bycatch



## AUTHORS

P. C. Fielder, J. V. Redfern, J. Van Noord, C. Hall, R. L. Pitman and L. T. Balance (NMFS/SWFSC)

## PUBLICATION DATE

Expected June 2013

## TITLE

*Effects of a tropical cyclone on a pelagic ecosystem from the physical environment to top predators*

## JOURNAL

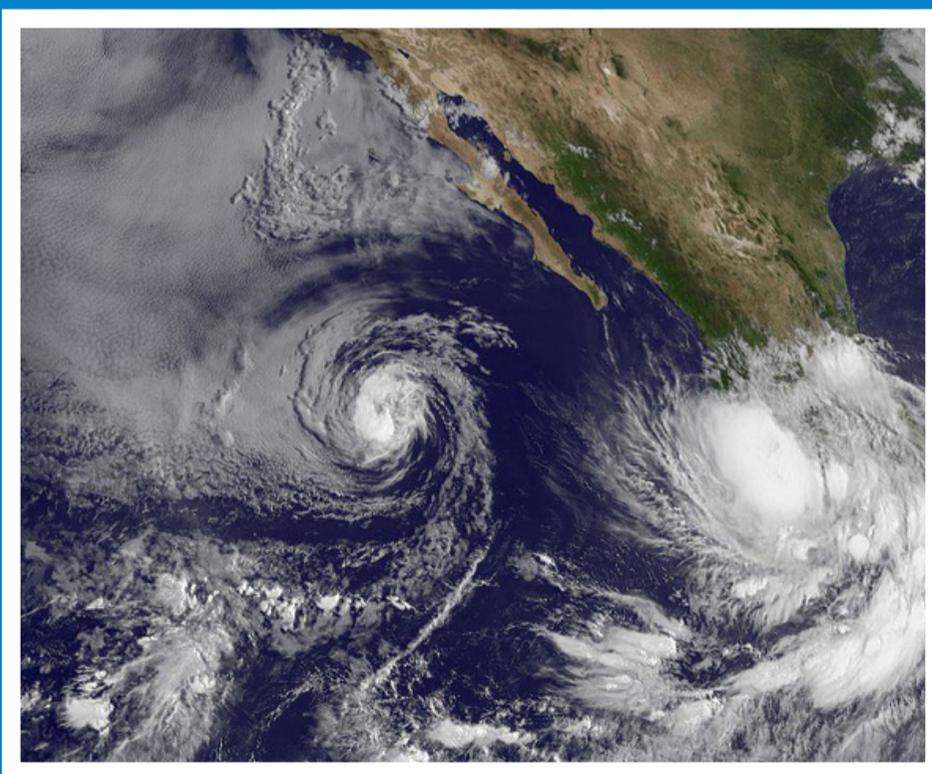
Marine Ecology Progress Series

## SIGNIFICANCE

- First observation of ecosystem effects of a cyclone in the open ocean.
- Recurrent tropical cyclones should be regarded as a disturbance regime.
- Variability caused by the storm was fit into the context of observed spatial-temporal variability over a broad range of scales in the eastern tropical Pacific Ocean.

## SUMMARY

Tropical cyclones are environmental disturbances that may have important effects on open-ocean ecosystem structure and function, but their overall impact has rarely been assessed. The Stenella Abundance Research Line Transect and Ecosystem (STARLITE) survey, in August-November 2007, investigated spatial and temporal ecosystem variability in the eastern tropical Pacific Ocean off southwestern Mexico. Oceanographic, plankton, flyingfish, seabird, and cetacean sampling was conducted along eight 170-km transect lines, each of which were surveyed on two consecutive days at ~3-week intervals. Tropical storm Kiko passed through the study area on October 15-17 and forced changes in the physical environment and in the ecosystem, from plankton to top predators. Kiko mixed water from beneath the strong, shallow thermocline to the surface. As a result, surface temperature decreased by 0.6°C, the thermocline and chlorophyll maximum layer shoaled by 10-20m, stratification decreased by 27%, and chlorophyll increased by 33% at the surface and 35% over the euphotic zone. These changes persisted for at least 4 weeks. Zooplankton biomass increased by 59% about 3 weeks after the phytoplankton increase. Changes in the stomach fullness and diet composition of planktivorous flyingfish were consistent with the increase in zooplankton biomass. Among top predators, the sighting rate of dolphins declined, while the response of seabirds varied by species and was confounded by seasonal migration patterns. Tropical cyclones are a recurrent disturbance in this region. They initiate a bottom-up forcing of the ecosystem, creating persistent patches of higher primary and secondary production, and may be regarded as a disturbance regime.



Tropical Cyclone



## AUTHORS

K. D. Friedland, J. Kane, J. A. Hare, R. G. Lough, P. S. Fratantoni, M. J. Fogarty and J. A. Nye (NMFS/NEFSC)

## PUBLICATION DATE

Expected Summer 2013

## TITLE

*Thermal habitat constraints on zooplankton species associated with Atlantic Cod (*Gadus morhua*) on the US Northeast Continental Shelf*

**JOURNAL**  
Progress in Oceanography

## SIGNIFICANCE

- Reduced recruitment for sub-stock components of Gulf of Maine and Georges Bank cod may be related to declining density of key zooplankton species.
- Distribution of thermal habitats of the US Northeast Continental Shelf have changed.
- Thermal habitat area relates to the distributional abundance of zooplankton species.
- Observations are consistent with reduced reproductive output of cod.

## SUMMARY

The US Northeast Continental Shelf is experiencing a period of increasing temperature levels and range, which impacts the quantity of thermal habitats within the ecosystem. With increasing temperatures, the amount of warmer, surface water thermal habitats (16-27°C) has increased while there has been a reciprocal decline in cooler water habitats (5-15°C). These cooler water habitats are the most abundant and comprise the core habitats of the ecosystem. The coldest thermal habitats (1-4°C), however, have increased slightly in amount or have remained constant, reflecting a discontinuity in the progression of warming along a latitudinal gradient. This discontinuity may be the result of recent changes in the circulation of water masses in the northern Gulf of Maine, potentially associated with the Labrador Current. The contraction of core thermal habitats appears to have had biological consequences on multiple trophic levels. In particular, two zooplankton species associated with the larval feeding of Atlantic cod, *Gadus morhua*, have declined in abundance in the same areas where cod populations have exhibited continually poor recruitment. The zooplankton species group *Pseudocalanus* spp., which is associated with winter-spawning cod, has declined on Georges Bank and in the Eastern Gulf of Maine. The zooplankton *Centropages typicus* has declined in the Gulf of Maine during late summer into fall, potentially affecting spring-spawning cod in that area. These observations are consistent with the hypothesis that portions of the population complex of cod have lower reproductive output due to changes in zooplankton abundance, which we associate with the distribution of temperatures within the ecosystem.

## PUBLICATION LINK

<http://www.sciencedirect.com/science/article/pii/S0079661113000530>



Zooplankton *Pseudocalanus*



## TITLE

### *Measuring the socio-economic performance of catch share programs: definition of metrics and application to the U.S. Northeast Region groundfish fishery*

## SIGNIFICANCE

- Social and economic performance measures were developed from 2009-2010 by Northeast Fisheries Science Center (NEFSC) social scientists in order to track the success of a catch share program in Northeast Multispecies (groundfish) Fishery
- These measures and indicators serve as the foundation for monitoring social and economic outcomes for these fisheries, and the authors analyse the process of identifying performance measures and indicators for all federal fisheries in the U.S. Northeast Region
- The authors recommend that social science metrics should be refined and supported with new data, monitoring, and funding to effectively integrate analysis of social and economic outcomes into fishery management decisions

## SUMMARY

In May 2010, the New England Fishery Management Council introduced a catch share program in Northeast Multispecies (groundfish) Fishery. Amendment 16 of the Multispecies Fishery Management Plan allocated quota to 17 self-organized groups of permit holders based on their catch history. These groups are commonly referred to as Sectors and are similar to harvest cooperatives. Sectors represented a significant shift from previous management approaches reliant on limits to days at sea and other input controls. Given the potential for significant social and economic effects of catch shares and other management programs, social and economic performance measures were developed from 2009-2010 by Northeast Fisheries Science Center (NEFSC) social scientists. Previous social and economic monitoring of management outcomes had been ad hoc and provided minimal opportunity for inter-fishery comparison. This paper describes the process of identifying performance measures and associated indicators to serve as the foundation of monitoring social and economic outcomes for all federal fisheries in the U.S. Northeast Region, and for planning NEFSC social and economic research priorities. It then presents how these performance measures were applied to assess the first year of the Amendment 16 Sector program. Challenges and limitations of this process are presented along with a description of efforts underway to broaden the use of these social and economic metrics to other fisheries.



## AUTHORS

A. M. Foley, B. A. Schroeder (NMFS/OPR), R. Hardy, S. L. MacPherson, M. Nicholas and M. S. Coyne

## PUBLICATION DATE

Accepted 18 April 2013

## TITLE

*Postnesting migratory behavior of loggerhead sea turtles (*Caretta caretta*) from three Florida rookeries*

## JOURNAL

Endangered Species Research

## SIGNIFICANCE

- Characterization of loggerhead sea turtle behavior during postnesting migrations can inform assessments of anthropogenic threats and recovery actions.
- Using satellite telemetry, the authors identified four migratory corridors used by 42 postnesting Florida loggerheads: two on the continental shelf of the Florida Panhandle, one along the northern coast of Cuba, and one along the southeastern coast of Florida.
- A significant portion of post-nesting, migrating Florida loggerheads are concentrated in these narrow migratory corridors, which may make them uniquely vulnerable to threats in these areas. Identification of these migratory corridors provides important information for implementing recovery efforts for loggerhead turtles.

## SUMMARY

The authors used satellite telemetry to study postnesting migrations of 42 loggerhead sea turtles (*Caretta caretta*) from three Florida rookeries. Postnesting migrations ended in neritic (<200 m) waters of Florida, Alabama, Texas, Mexico, and the Bahamas. Most postnesting migrations were restricted to the continental shelf and were relatively direct. Migrations through oceanic areas (>200 m) tended to be less direct largely due to apparent influences of the Florida Current in the Atlantic and to looping travel paths (often along edges of mesoscale eddies of the Loop Current) in the Gulf of Mexico. The largest loggerheads tended to migrate to foraging grounds that were farthest from the nesting beach. Turtles spent more time near the surface (<3 m) when migrating than they did during residency at foraging sites, and were likely swimming just below the surface. Migrating loggerheads may have been foraging, as evidenced by the substantial amount of time spent near the bottom in neritic areas and by looping travel paths in oceanic areas. The authors identified four migratory corridors. Two were on the continental shelf of the Florida Panhandle, one was along the northern coast of Cuba, and one was along the southeastern coast of Florida. Migrating loggerheads may be uniquely vulnerable to mortality factors because of where they travel and how they behave, particularly if they are concentrated in narrow (perhaps <10 km wide) migratory corridors. Characterizing the behavior and identifying the travel paths of loggerhead sea turtles during postnesting migrations are necessary steps for implementing successful recovery efforts.



## AUTHORS

J. OKUYAMA (NMFS/SWFSC), K. Nakajima, T. Noda, S. Kimura, H. Kamihata, M. Kobayashi, N. Arai, S. Kagawa, Y. Kawabata and H. Yamada

## PUBLICATION DATE

Expected 26 May 2013

## TITLE

*Ethogram of immature green turtles: behavioral strategies for somatic growth in large marine herbivores*

**JOURNAL**  
PLOS ONE

## SIGNIFICANCE

- The authors investigated fine-scale behavioral patterns (feeding, resting and other behaviors) and microhabitat use in immature green sea turtles in Japan.
- Immature green turtles spent the largest proportion of their time feeding to maximize energy acquisition. The amount of time feeding appeared to be restricted by gut capacity.
- When not feeding, turtles spent much of their time resting at locations close to feeding grounds, allowing turtles to conserve travel energy and reduce exposure to predation.

## SUMMARY

Animals are assumed to obtain/conserv energy effectively to maximize their fitness, which manifests itself in a variety of behavioral strategies. For marine animals, however, these behavioral strategies are generally unknown due to the lack of high resolution monitoring techniques in marine habitats. As large marine herbivores, immature green turtles do not need to allocate energy to reproduction but are at risk of shark predation, although it is a rare occurrence. They are therefore assumed to select/use feeding and resting sites that maximize their fitness in terms of somatic growth, while avoiding predation. The authors investigated fine-scale behavioral patterns (feeding, resting and other behaviors), microhabitat use and time spent on each behavior for eight immature green turtles using data loggers including: depth, global positioning system, head acceleration, speed and video sensors. Immature green turtles at Iriomote Island, Japan, spent an average of 4.8 h feeding on seagrass each day, with two peaks, between 5:00 and 9:00, and between 17:00 and 20:00. This feeding pattern appeared to be restricted by gut capacity, and thus maximized energy acquisition. Meanwhile, most of the remaining time was spent resting at locations close to feeding grounds, which allowed turtles to conserve energy spent travelling and reduced the duration of periods exposed to predation. These behavioral patterns and time allocations allow immature green turtles to effectively obtain/conserv energy for growth, thus maximizing their fitness.



## AUTHORS

D. S. Holland (NMFS/NWFSC), A. W. Kitts, (NMFS/NEFSC), P. Pinto da Silva (NMFS/NEFSC) and J. Wiersma

## PUBLICATION DATE

Expected June 2013

## TITLE

*Social capital and the success of harvest cooperatives in the New England groundfish fishery*

## JOURNAL

Marine Resources Economics

## SIGNIFICANCE

- By surveying sector members, authors provide insights into the relationship between sector performance and social capital in the U.S. Northeast Multispecies Groundfish Fishery.

## SUMMARY

In May of 2010 a new management system based on harvest cooperatives called “sectors” was implemented in the U.S. Northeast Multispecies Groundfish Fishery. Sectors are self-organized, self-managed groups of fishermen that receive annual catch entitlements. The authors hypothesize that the success and longevity of these sectors is likely to depend, in part, on the relationships amongst the members including their degree of trust and ability to collaborate. The value of these relationships and the ability to cooperate is commonly referred to as social capital. Prior to the implementation of the new sector system, the authors conducted a survey to derive baseline measures of social capital for individual groundfish permit holders and sectors. They constructed indices of bonding, bridging and linking social capital, information sharing, and trust, and they explored correlations between these social capital indices, characteristic of the vessels in the sectors, and various measures of economic performance of sectors.



## AUTHORS

A.C. Haynie (NMFS/AFSC) and L. Pfeiffer (NMFS/NWFSC)

## PUBLICATION DATE

Expected Summer 2013

## TITLE

*Climatic and economic drivers of the Bering Sea pollock (*Theragra chalcogramma*) fishery: implications for the future*

## JOURNAL

Canadian Journal of Aquatic and Fisheries Science

## SIGNIFICANCE

- We find that the Bering Sea pollock fishery does not move northward directly with changing climate conditions as has been predicted by a number of ecology papers.
- In the summer, there has been a shift in mean effort in the pollock catcher vessels fishery over the last decade, but the concentration in the northern part of the fishing grounds has actually been correlated colder bottom temperatures.
- We have not seen conditions that are most predicted to occur in future years, namely warm, low-abundance conditions, so it is very difficult to anticipate the impacts of those conditions on the spatial distribution of fishing.

## SUMMARY

This paper illustrates how climate, management, and economic drivers of a fishery interact to affect fishing. Retrospective data from the Bering Sea pollock (*Theragra chalcogramma*) catcher-processor fishery were used to model the impact of climate on spatial and temporal variation in catch and fishing locations, and make inferences about harvester behavior in a warmer climate. Models based on IPCC scenarios predict a 40% decrease in sea ice by 2050, resulting in warmer Bering Sea temperatures. We find that differences in the value of catch result in disparate behavior between winter and summer seasons. In winter, warm temperatures and high abundances drive intensive effort early in the season to harvest earlier-maturing roe. In summer, warmer ocean temperatures were associated with lower catch rates and approximately 4% less fishing in the northern fishing grounds, contrary to expectations derived from climate-envelope-type models that suggest fisheries will follow fish poleward. Production-related spatial price differences affected the effort distribution by a similar magnitude. However, warm, low-abundance years have not been historically observed, increasing uncertainty about future fishing conditions. Overall, annual variation in ocean temperatures and economic factors has thus far been more significant than long-term climate change-related shifts in the fishery's distribution of effort.

## PUBLICATION LINK

<http://www.nrcresearchpress.com/doi/pdf/10.1139/cjfas-2012-0265>



## AUTHORS

S.-K. Chang, G. DiNardo, J. Farley, J. Brodziak and Z.-L. Yuan (NMFS/PIFSC)

## PUBLICATION DATE

Expected Summer 2013

## TITLE

*Possible stock structure of dolphinfish (Coryphaena hippurus) in Taiwan coastal waters and globally based on reviews of growth parameters*

**JOURNAL**  
Fisheries Research

## SIGNIFICANCE

- The worldwide prominence of dolphinfish in pelagic fisheries underscores the need for further research on the stock structure and dynamics of this species.
- The finding of regional stocks highlights the need for international cooperation in dolphinfish stock assessment.

## SUMMARY

Dolphinfish (*Coryphaena hippurus*) is used by many coastal countries. Sustaining harvest of this resource will require cooperation among fishing countries in each region, and determining population structure is paramount to ensuring effective management. Examining life-history parameters (such as growth rate) is a useful and relatively inexpensive method for identifying possible stock units, which can be subsequently confirmed by other methods. The purpose of this study is two-fold. First, we examine the two-stock assumption for Taiwanese dolphinfish and the reliability of estimated growth curves based on seasonally-stratified growth performance indices. The von Bertalanffy growth functions (VBGF) were firstly estimated from 2005-2009 length frequency sample data of eastern and southern coasts of Taiwan. New growth performance indices were then calculated from the log-transformed parameters of the VBGF and examined by a simultaneous confidence region (SCR) under the assumption of bivariate normal distribution. Second, we summarize VBGF parameter estimates from all regions worldwide and based on the growth parameters and performance indices, review the possible stock structures and the reliability of growth estimations for dolphinfish. The results support a single-stock hypothesis for dolphinfish in the Kuroshio Current off Taiwan with new estimated VBGF parameters of  $L_{\infty} = 149.4$  cm and  $K = 0.72$  year<sup>-1</sup>. Some potentially biased estimates of dolphinfish growth parameters are identified in the worldwide VBGF dataset and are suggested for further investigations. Excluding these estimates, the results indicate at least a five-stock structure in the Pacific and the Atlantic oceans.



## AUTHORS

K. M. Swiney (NMFS/AFSC), G. L. Eckert and G. H. Kruse

## PUBLICATION DATE

Accepted 11 March 2013

## TITLE

*Does maternal size affect red king crab, Paralithodes camtschaticus, embryo and larval quality?*

## JOURNAL

Journal of Crustacean Biology

## SIGNIFICANCE

- Red king crab maternal size does not have a biologically significant effect on embryo and larval quality in colder-than-average years in the eastern Bering Sea.
- Maternal size effects on embryo and larval quality does not need to be explicitly incorporated into reproductive output estimates in stock assessments in colder-than-average years.

## SUMMARY

Stock assessment of Alaskan red king crab, *Paralithodes camtschaticus* (Tilesius, 1815), can be improved by incorporating reproductive output, which requires an understanding of maternal size effects on embryo and larval quality. In June 2009 and 2010, we collected clutches of recently extruded red king crab embryos in Bristol Bay, Alaska, to assess embryo quality based on dry weight, carbon and nitrogen content. To assess larval quality, we collected ovigerous females from Bristol Bay in 2007 and reared them in the laboratory until larval hatching in 2008. Larval quality based on dry weight, carbon and nitrogen content, and times to 50% mortality under starvation conditions were assessed. All samples were collected in years that were colder than the 15-year average in the eastern Bering Sea. Among the measures of embryo quality, only nitrogen content was significantly different, increasing with maternal size. Carbon and nitrogen content were significantly higher for embryos in 2009 than in 2010, suggesting inter-annual differences in maternal investment. No effect of maternal size with larval quality was found. Our results indicate that maternal size does not have a biologically significant effect on embryo and larval quality in colder-than-average years, and therefore maternal size effects on embryo and larval quality does not need to be explicitly incorporated into reproductive output estimates in stock assessments under these conditions. We are, however, cautious to extrapolate our results to years with different environmental conditions. Further study is needed to fully resolve the possible interaction of environment with maternal size effects on embryo and larval quality for red king crab.



## AUTHORS

A. Pulkkinen, L. Rastatter, M. Kuznetsova, **H. Singer**, **C. Balch**, D. Weimer, G. Toth, A. Ridley, T. Gombosi, M. Wiltberger, J. Raeder and R. Weigel (NOAA/NWS/NCEP/SWPC)

## PUBLICATION DATE

Accepted 1 May 2013

## TITLE

*Community-wide validation of geospace model ground magnetic field perturbation predictions to support model transition to operations*

## JOURNAL

Space Weather: The International Journal of Research and Applications

## SIGNIFICANCE

- The results of this effort will be used as one of the criteria for NOAA SWPC to select a geospace model(s) for transition to operations.
- The results of this work identify areas that need to be addressed for future model improvement and evaluation.
- This work is foundational, on many levels, about how our (space science/space weather) community carries out the work and interactions between research and applications.

## SUMMARY

In this paper we continue the community-wide rigorous modern space weather model validation efforts carried out within GEM, CEDAR and SHINE programs. In this particular effort, in coordination among the Community Coordinated Modeling Center (CCMC), NOAA Space Weather Prediction Center (SWPC), modelers and science community we focus on studying the models' capability to reproduce observed ground magnetic field fluctuations, which are closely related to geomagnetically induced current phenomenon. One of the primary motivations of the work is to support NOAA SWPC in their selection of the next numerical model that will be transitioned into operations. Six geomagnetic events and 12 geomagnetic observatories were selected for validation. While modeled and observed magnetic field time series are available for all 12 stations, the primary metrics analysis is based on 6 stations that were selected to represent the high-latitude and mid-latitude locations. Events-based analysis and the corresponding contingency tables were built for each event and each station. The elements in the contingency table were then used to calculate Probability of Detection (POD), Probability of False Detection (POFD) and Heidke Skill Score (HSS) for rigorous quantification of the models' performance. In this paper the summary results of the metrics analyses are reported in terms of POD, POFD and HSS. More detailed analyses can be carried out using the event by event contingency tables provided as an online appendix. An online interface built at CCMC and described in a companion paper is also available for more detailed time series analyses.



## AUTHORS

N.E. Redmond, C.C. Morrow, R.W. Thacker, M.C. Diaz, N. Boury-Esnault, P. Cárdenas, E. Hajdu, G. Lôbo-Hajdu, B.E. Picton, S.A. Pomponi, E. Kayal and **A.G. Collins (NMFS/NEFSC)**

## PUBLICATION DATE

Accepted 14 May 2013

## TITLE

*Phylogeny and systematics of Demospongiae in light of new small-subunit ribosomal DNA (18S) sequences*

## JOURNAL

Integrative and Comparative Biology

## SIGNIFICANCE

- Elucidating biodiversity through sound systematics is of foundational importance to ecosystem management.
- This paper advances systematics of Demospongiae the most group within the important phylum Porifera.

## SUMMARY

In recent years, the systematics of the Demospongiae clade, which contains more than 7,000 species, has developed rapidly in light of new studies combining molecular and morphological observations. We add more than 500 new, nearly complete 18S sequences (an increase of more than 200%) in an attempt to further enhance understanding of the phylogeny of Demospongiae. Our study specifically targets representation of type species and genera that have never been sampled for any molecular data in an effort to accelerate progress in classifying this diverse lineage. Our analyses recover four highly supported subclasses of Demospongiae: Keratosa, Myxospongiae, Haploscleromorpha, and Heteroscleromorpha. Within Keratosa, neither Dendroceratida, nor its two families, Darwinellidae and Dictyodendrillidae, are monophyletic and Dictyoceratida is divided into two lineages, one predominantly composed of Dysideidae and the second containing the remaining families (Irciniidae, Spongiidae, Thorectidae, and Verticillitidae). Within Myxospongiae, we find Chondrosida to be paraphyletic with respect to the Verongida. We amend the latter to include species of the genus Chondrosia and erect a new order Chondrillida to contain remaining taxa from Chondrosida, which we now discard. Even with increased taxon sampling of Haploscleromorpha, our analyses are consistent with previous studies; however, Haliclona species are interspersed in even more clades. Haploscleromorpha contains five highly supported clades, each more diverse than previously recognized, and current families are mostly polyphyletic. In addition, we reassign Janulum spinispiculum to Haploscleromorpha, and resurrect Reniera filholi as Janulum filholi comb. nov. Within the large clade Heteroscleromorpha, we confirmed twelve recently identified clades based on alternative data, as well as a sister-group relationship between the freshwater Spongillida and the family Vetulinidae. We transfer Sytlissa flabelliformis to the genus Scopalina within the family Scopalinidae, which is of uncertain position. Our analyses uncover a large, strongly supported clade containing all heteroscleromorphs other than Spongillida, Vetulinidae, and Scopalinidae. Within this clade, there is a major division separating Axinellidae, Biemnida, Tetractinellida, Bubaridae, Stelligeridae, Raspailiidae, and some species of Petromica, Topsentia, and Axinyssa from Agelasida, Polymastiidae, Placospongiidae, Clionaidae, Spirastrellidae, Tethyidae, Poecilosclerida, Halichondriidae, Suberitidae, and Trachycladus. Among numerous results: 1) Spirophorina and its family Tetillidae are paraphyletic with respect to a strongly supported Astrophorina within Tetractinellida; 2) Agelasida is the earliest diverging lineage within the second clade listed above; and 3) Merlia and Desmacella appear to be the earliest diverging lineages of Poecilosclerida.



## AUTHORS

D.E. Stevenson (NMFS/AFSC) and C.P. Kenaley

## PUBLICATION DATE

Accepted 26 February 2013

## TITLE

*Revision of the manefish genera Caristius and Platyberyx (Teleostei: Percomorpha: Caristiidae), with descriptions of five new species*

## JOURNAL

Copeia

## SIGNIFICANCE

- This paper provides taxonomic clarity and stability for a poorly known marine fish family, describing several previously unknown species

## SUMMARY

The family Caristiidae, commonly known as manefishes or veil fins, includes several species of mesopelagic, oceanic fishes found throughout the major ocean basins of the world. We present herein the second part of our revision of the family, including all of the “large-mouth” species, which are distinguished from other members of the family by having a narrow suborbital space, and a long upper jaw that extends to mid-orbit or beyond and which is visible externally, not covered by the thin bones of the suborbital series. This group, which is comprised of the genera *Platyberyx* and *Caristius*, is described in full, including descriptions of five new species. The genus *Platyberyx*, which includes six species, three of which are newly described, is distinguished from all other caristiid genera by the presence of a conspicuous lateral line with large scales. The genus *Caristius*, with four species, two of which are newly described, is distinguished from *Platyberyx* by the absence of a conspicuous lateral line and by the presence of serrated ventral caudal-fin rays. Species in both genera are distinguished from each other on the basis of meristics, morphometrics, dentition, and gill-raker morphology. Most of the species described here are relatively widespread; species of *Platyberyx* appear to be more common in the Atlantic basin, while *Caristius* is more common in the Pacific.



## AUTHORS

A. O. Shelton, D. Kinzey, C. Reiss, S. Munch, G. Watters and M. Mangel (NMFS/SWFSC)

## PUBLICATION DATE

Published 7 May 2013

## TITLE

*Among-year variation in growth of Antarctic krill *Euphausia superba* based on length-frequency data*

## JOURNAL

Marine Ecology Progress Series

## SIGNIFICANCE

- This paper presents a general approach for estimating growth variability from differences in length-frequencies over time.
- Growth rates are fundamental parameters for estimating biological productivity in stock assessments and in other management and scientific activities.

## SUMMARY

Understanding the temporal variability in vital rates (e.g. growth and survivorship) of wild populations is practically and statistically difficult but crucial for connecting such variation to mechanistic drivers and their population consequences. For somatic growth, empirical estimates of variation are rare because they often require expensive long-term tag-recapture programs. In marine pelagic ecosystems, where many species are difficult to sample and not amenable to tagging studies, researchers have relied on estimating growth from length-frequency distributions. We developed a general approach for estimating growth from observed length-frequency samples by combining kernel density estimates of the length-frequency distribution and the von Bertalanffy growth function. Our approach is conceptually straightforward and easy to implement. We applied the methods to Antarctic krill *Euphausia superba* collected from the Southern Ocean over a span of 19-yr to document among-year variation in krill growth during the austral summer. Our estimates of growth align closely with existing estimates of growth, but we provide the first estimates of among-year variation in krill growth. We estimate very high among-year variation in growth (annual estimates for a 30 mm krill in the Elephant Island region ranged from 0.00 to 0.17 mm d<sup>-1</sup>; mean = 0.073, among-year coefficient of variation ≈ 0.8). We correlated growth rate variation to estimates of ocean chlorophyll but not to other oceanographic indices, contrasting with results from previous studies. The large amount of variation in growth unexplained by environmental covariates has substantial implications for ecosystem management in the Southern Ocean ecosystem.



## AUTHORS

G. Fay (NMFS), S. I. Large (NMFS), J. S. Link (NMFS) and R. Gamble (NMFS/NEFSC)

## PUBLICATION DATE

Accepted 12 May 2013

## TITLE

*Testing systematic fishing responses with ecosystem indicators*

**JOURNAL**  
Ecological Modeling

## SIGNIFICANCE

- This paper quantifies tradeoffs among ecological indicators in response to fishing.
- Ceilings based on indicator thresholds were able to improve fishery performance.
- Threshold values for indicators can be used to define reference points for Ecosystem Based Fisheries Management.

## SUMMARY

Successful implementation of Ecosystem Based Fisheries Management (EBFM) requires practical methods of translating information on system status into management actions. Threshold values in ecosystem indicators have been demonstrated to provide insight for characterizing change points in marine ecosystems and suggested as reference points for EBFM. We used a guild based multispecies simulation model of the Georges Bank finfish community to quantify tradeoffs and changes among values for proposed ecological indicators given alternative fishing scenarios, and tested the performance of indicator-based approaches for setting system ceilings on annual catches. Values for ecosystem indicators were sensitive to the exploitation rates on guilds, with total biomass of the community being most sensitive to groundfish exploitation rate. Setting ceilings on system-wide annual catches was successful in constraining values for indicators and revealed levels of system catch associated with indicator change. Community composition indicators showed catch thresholds lower than provided by the total biomass indicator. Ceilings based on community composition indicators more frequently resulted in higher yields and fewer species being overfished than when ceilings were set using total biomass or when no ceiling was in place. Simulations demonstrated that threshold values in ecosystem indicators can be used to determine reference points in an EBFM context. The broad ranges for threshold values obtained demonstrates the sensitivity of such methods to exploitation history, underscoring the need to both incorporate expert knowledge and relate reference point determination to management objectives.



## AUTHORS

N. A. Friday (NMFS/AFSC), A. N. Zerbini (NMFS/AFSC), J. M. Waite (NMFS/AFSC), S. E. Moore (NMFS/ST) and P. J. Clapham (NMFS/AFSC)

## PUBLICATION DATE

Online preview available

## TITLE

*Cetacean distribution and abundance in relation to oceanographic domains on the eastern Bering Sea shelf, June and July of 2002, 2008, and 2010*

**JOURNAL**  
Deep Sea Research II

## SIGNIFICANCE

- The distribution and abundance of cetaceans changed between the warmer survey year (2002) and the colder years (2008 and 2010) with whales increasing in colder years and porpoise decreasing.
- It is likely that changes in estimated abundance are due at least in part to shifts in distribution and not just changes in overall population size.

## SUMMARY

As part of the Bering Sea Project, cetacean surveys were conducted to describe distribution and estimate abundance on the eastern Bering Sea shelf. Three marine mammal observers conducted visual surveys along transect lines sampled during the Alaska Fisheries Science Center walleye pollock assessment survey in June and July of 2008 and 2010. Distribution and abundance in 2008 and 2010 (cold years) are compared with results from a similar survey conducted in 2002 (a warm year), as the only three years that the entire survey area was sampled; patterns largely match those previously observed. Abundance estimates for comparable areas in 2002, 2008 and 2010 were as follows:

Year	Humpback Whales	Fin Whales*	Minke Whales	Dall's Porpoises	Harbor Porpoises
2002	213 (CV=0.63)	419 (CV=0.33)	389 (CV=0.52)	35,303 (CV=0.53)	1,971 (CV=0.46)
2008	436 (CV=0.45)	1368 (CV=0.34)	517 (CV=0.69)	14,543 (CV=0.32)	4,056 (CV=0.40)
2010	675 (CV=0.80)	1061 (CV=0.38)	2020 (CV=0.73)	11,143 (CV=0.32)	833 (CV=0.66)

\* Trends were significant

^ It should be noted that these abundance estimates are not corrected for biases due to perception, availability, or responsive movement.

It is likely that changes in estimated abundance are due at least in part to shifts in distribution and not just changes in overall population size. Annual abundance estimates were examined by oceanographic domain. Humpback whales were consistently concentrated in coastal waters north of Unimak Pass. Fin whales were broadly distributed in the outer domain and slope in 2008 and 2010, but sightings were sparse in 2002. Minke whales were distributed throughout the study area in 2002 and 2008, but in 2010 they were concentrated in the outer domain and slope. In 2002, Dall's porpoise were sighted on the western edge of the middle domain and in the outer domain and slope, but shifted west out of the middle domain in 2008 and 2010. In 2002 and 2008, harbor porpoise were consistently found in the middle domain with scattered sightings in the outer domain and slope. In 2010, there was a multi-species aggregation between Navarin and Pervenets canyons.

## PRESS RELEASE

<http://www.sciencedirect.com/science/article/pii/S0967064513001094>



## AUTHORS

T. A. Jefferson, C. R. Weir, R. C. Anderson, L. T. Balance, R. D. Kenney and J. J. Kiszka (NMFS/SWFSC)

## PUBLICATION DATE

Expected Late 2013

## TITLE

*Global distribution of Risso's dolphin (Grampus griseus): A review and critical evaluation*

## JOURNAL

Mammal Review

## SIGNIFICANCE

- The authors utilized various data sources to construct a global distribution for the Risso's dolphin, this has been an area of uncertainty in the literature for several years.

## SUMMARY

The global range of Risso's dolphin *Grampus griseus* is not well known, and there has been confusion in the literature as to whether the species has a broad, circum-global range or only occurs along continental margins. To clarify the species' distribution and habitat preferences, the authors compiled and reviewed all available (published and unpublished) records of sightings and captures of this species for the past 62 years (1950-2012, n = 8068 records). Stranding records were not included. The results showed that the species has a range that extends across ocean basins, and spans between at least 64°N and 46°S, and is apparently absent from high-latitude polar waters. Although Risso's dolphins occur in all habitats from coastal to oceanic, they show a strong range-wide preference for mid-temperate waters of the continental shelf and slope between 30° and 45° latitude. Although a number of misconceptions about the distributional ecology of Risso's dolphin have existed, this analysis showed that it is a widespread species. It strongly favours temperate waters, and prefers continental shelf and slope waters to oceanic depths. These habitat preferences appear to hold throughout much or all of the species' range.



## AUTHORS

T. T. Wynne, R.P. Stumpf and T. O. Briggs (NOS/NCOSS)

## PUBLICATION DATE

Expected 30 September 2013

## TITLE

*Comparing MODIS and MERIS spectral shapes for cyanobacterial bloom detection*

## JOURNAL

International Journal of Remote Sensing

## SIGNIFICANCE

- This paper shows that MODIS can be used in place of MERIS when a correction factor is applied to simulate the MERIS imagery.
- The 2012 forecasts were done with MODIS imagery. The 2013 forecasts will be done with MODIS.
- This will allow NOAA to disseminate weekly HAB forecasts to the management community (both human health and natural resource) for the foreseeable future (until MODIS goes offline).

## SUMMARY

A spectral shape algorithm applied to Medium Resolution Imaging Spectrometer (MERIS) imagery has detected cyanobacterial blooms, with extensive examples in Lake Erie. The detection algorithm uses an approximation of the second derivative as a measure of spectral shape around the 681 nm band S2d(681). With the end of the MERIS mission on 8 April 2012, an analogue was developed for Moderate Resolution Imaging Spectro-radiometer (MODIS) to continue monitoring for these blooms. The MODIS analogue uses the standard  $s$  (Rayleigh-corrected reflectance) to determine S2d(678), which is computationally equivalent to the negative of the MODIS fluorescent line height (FLH). A comparison was made of the two products from image pairs during a period of relatively severe blooms of cyanobacteria (2008-2011). When the MODIS bands do not saturate due to surface scums from high cyanobacteria biomass or conditions of glint or dense aerosols, the algorithms produce comparable results with a linear transform of the MODIS S2d (678). The results indicate that MODIS can be used to monitor these blooms. In addition, dense cyanobacteria blooms will produce negative FLH for the MODIS sensor. The S2d (678) offers a tool to support monitoring for dense algal blooms.

## PRESS RELEASE



## AUTHORS

B. Gervelis and L. Natanson (NMFS/Northeast Fisheries Science Center)

## PUBLICATION DATE

Expected Late 2013

## TITLE

*Age and growth of the thresher shark, Alopias vulpinus, in the western North Atlantic Ocean*

## JOURNAL

Transactions of the American Fisheries Society

## SIGNIFICANCE

- These are the first age and growth estimates for thresher shark in the western North Atlantic.
- The thresher shark is a popular target for recreational fishermen, so accurate life history data is essential for proper management and to prevent overexploitation.

## SUMMARY

Age and growth estimates were generated for the thresher shark, *Alopias vulpinus*, in the western North Atlantic (WNA) using vertebral centra from 173 females and 135 males ranging in size from 56 cm to 264 cm fork length (FL). Males and females were 22 (228 cm FL) and 24 (244 cm FL) years old, respectively. Growth of both sexes was similar until approximately age 8 (185 cm FL), after which male growth rate slowed. Female growth slowed at a later age than males (approximately 10 years). Relative-goodness-of-fit for all candidate models supported modeling sexes separately. For males, von Bertalanffy growth parameters generated from the vertebral data using a set size at birth (81 cm FL) provided the best fit for the band counts:  $L_{\infty} = 225.4$  cm FL and  $k = 0.17$ . For females, the standard 3-parameter von Bertalanffy growth model provided the best fit to the band counts:  $L_{\infty} = 274.5$  cm FL,  $k = 0.09$ , and  $t_0 = -4.82$ . These growth parameters are the first generated for the thresher shark in the WNA and can be used to make informed management decisions for this species.



## AUTHORS

E. J. Hilton and D. E. Stevenson (NMFS/AFSC)

## PUBLICATION DATE

Accepted 2 May 2013

## TITLE

*Osteology of the prowfish, Zaprora silenus*  
(Cottiformes: Zoarcoidei: Zaproridae)

## JOURNAL

Journal of Morphology

## SIGNIFICANCE

- This paper provides a basis for anatomical comparisons investigating the evolutionary relationship of prowfish, the only member of the Zaproridae family, with related species.

## SUMMARY

The prowfish, *Zaprora silenus*, is the sole member of the family Zaproridae. It is a large, relatively elongate species with a robust head and body, and it feeds primarily on jellyfishes. Although the larvae and juveniles are pelagic (don't live close to shore or at the bottom of the ocean), the adults are demersal (live near the bottom). The species is widely distributed from southern California around the Pacific Rim to Hokkaido, Japan. The prowfish family is currently evolutionary placed, along with the Stichaeidae, in the Zoarcoidei. Previous anatomical studies of prowfish have been based on relatively few specimens from a limited geographic range and have not included cleared and stained specimens. Here we provide a complete description of the osteology of the prowfish, based on a large series of specimens representing a broad range, including a series of cleared and stained specimens. Our results contradict the findings of previous authors in the structure of the pharyngeal teeth, presence of the pelvic girdle, and the placement of the first dorsal pterygiophore. However, we concur with the findings of previous morphological and molecular phylogenetic studies, which indicate that the prowfish is probably most closely related to at least some members of the Stichaeidae.



## AUTHORS

A. C., Matarese, D. M. Blood and M. S. Busby (NMFS/AFSC)

## PUBLICATION DATE

Accepted 19 March 2013

## TITLE

*Guide to the identification of larval and early juvenile Pricklebacks (Perciformes: Zoarcoidei: Stichaeidae) in the northeastern Pacific Ocean and Bering Sea*

## JOURNAL

NOAA Professional Papers - NMFS

## SIGNIFICANCE

- Stichaeids are important in ecological interactions as forage for commercial and non-commercial fishes, marine birds, and marine mammals of the ecosystems of the North Pacific Ocean and Bering Sea.
- Information about stichaeid early life history is essential to our understanding of recruitment and survival of intertidal and nearshore fishes.

## SUMMARY

Stichaeidae, commonly referred to as pricklebacks, are intertidal and subtidal fishes primarily of the North Pacific Ocean. Broad distribution in relatively inaccessible and undersampled habitats has contributed to a general lack of information about this family. In this study, descriptions of early life history stages are presented for 25 species representing 18 genera of stichaeid fishes from the northeastern Pacific Ocean, Bering Sea, and Arctic Ocean Basin. Six of these species also occur in the North Atlantic Ocean. Larval stages of 16 species are described for the first time. Additional information or illustrations intended to augment previous descriptions are provided for 9 species. For most taxa, we present adult and larval distributions, descriptions of morphometric, meristic, and pigmentation characters, and species comparisons, and we provide illustrations for preflexion through postflexion or transformation stages. New counts of meristic features are reported for several species.



## AUTHORS

M. Tartt, S. Gittings and K. Broughton (NOS/ONMS)

## PUBLICATION DATE

Expected June 2013

## TITLE

*ONMS National Condition Report*

## JOURNAL

ONMS Condition Report Series

## SIGNIFICANCE

- Condition reports of the 14 units of the National Marine Sanctuary System (system) reveal general trends in resource condition, pressures and concerns, ways of addressing each, and accomplishments and gaps in conservation science for each sanctuary.
- In this report, the status and trends of resource condition are evaluated across the system.

## SUMMARY

Among the many pressures to the natural and archaeological resources in the system, a number stand out: marine debris entanglement, trapping, and ingestion, wildlife disturbance, ship strikes and water quality, to name a few. Sanctuaries report changes in key species, which warrant special attention because of their integral role in a balanced ecosystem. Most have documented troubling invasions by non-indigenous species that can displace native species, disrupt ecosystems and damage fisheries. And many present concerns about the effects of tourism, visitation, and coastal development, which can cause intentional and unintentional impacts to sanctuary resources. In the face of these pressures sanctuaries are making important strides in resource protection through progressive, science-based management, targeted resource protection programs and engaging education and outreach activities. Marine reserves, improved vessel routing patterns, vessel speed controls, active involvement in coastal development decisions, and public education campaigns are examples that all help address problems. Partnerships and improved coordination with local communities, and the local, state, federal, and territorial governments, especially with respect to fisheries management, all demonstrate a unified front in protecting these unique places.

