



NOAA Scientific Publications Report



JUN 27, 2013

HIGHLIGHTED ARTICLE

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An inverse demand system for New England groundfish: welfare analysis of the transition to catch share management

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OTHER REPORTS, BOOK CHAPTERS, & INTERNAL PUBLICATIONS

Assessment of contaminant body burdens and histopathology of fish and shellfish species frequently used for subsistence food by Alaskan Native communities

AUTHORS

K. A. Bjorndal, **B.A. Schroeder**, A. M. Foley, B. E. Witherington, M. Bresette, D. Clark, R. M. Herren, M. D. Arendt, J. R. Schmid, A. B. Meylan, P. A. Meylan, J. A. Provanca, K. M. Hart, M. M. Lamont, R. R. Carthy, and A. B. Bolten (NMFS/OPR)

PUBLICATION DATE

Published Online: 7 June 2013

TITLE

Temporal, spatial, and body size effects on growth rates of loggerhead sea turtles (Caretta caretta) in the Northwest Atlantic

JOURNAL
Marine Biology

SIGNIFICANCE

- Temporally and spatially robust assessments of growth rates are most appropriate for use in population modeling efforts, as smaller scale studies may not adequately represent the larger population.
- Authors found that loggerhead growth rates declined significantly through 2007, then leveled off. This decline is coincident with declining nest counts in the Northwest Atlantic Ocean Loggerhead distinct population segment and may represent declines in productivity resulting from changes in environmental parameters.
- Collaborative, pooled data analyses, as completed in this study, are needed for improving sea turtle population assessments. Improved population modeling increases our understanding of the population status and trends of this threatened species and will better inform conservation recovery actions.

SUMMARY

In response to a call from the US National Research Council for research programs to combine their data to improve sea turtle population assessments, the authors analyzed somatic growth data for Northwest Atlantic (NWA) loggerhead sea turtles (*Caretta caretta*) from 10 research programs. They assessed growth dynamics over wide ranges of geography (9–33N latitude), time (1978–2012), and body size (35.4–103.3 cm carapace length). Generalized additive models revealed significant spatial and temporal variation in growth rates and a significant decline in growth rates with increasing body size. Growth was more rapid in waters south of the USA (24°N) than in USA waters. Growth dynamics in southern waters in the NWA need more study because sample size was small. Within USA waters, the significant spatial effect in growth rates of immature loggerheads did not exhibit a consistent latitudinal trend. Growth rates declined significantly from 1997 through 2007 and then leveled off or increased. During this same interval, annual nest counts in Florida declined by 43% (Witherington et al. in *Ecol Appl* 19:30–54, 2009) before rebounding. Whether these simultaneous declines reflect responses in productivity to a common environmental change should be explored to determine whether somatic growth rates can help interpret population trends based on annual counts of nests or nesting females. Because of the significant spatial and temporal variation in growth rates, population models of NWA loggerheads should avoid employing growth data from restricted spatial or temporal coverage to calculate demographic metrics such as age at sexual maturity.



Loggerhead turtle

Link to paper

<http://link.springer.com/content/pdf/10.1007%2Fs00227-013-2264-y.pdf>



AUTHORS

M.Y. Lee (NMFS/NEFSC) and E. Thunberg (NMFS/OST)

PUBLICATION DATE

Accepted: 4 June 2013

TITLE

An inverse demand system for New England groundfish: welfare analysis of the transition to catch share management

JOURNAL

American Journal of Agricultural Economics

SIGNIFICANCE

- This study used a model to explore the costs and benefits for both the consumers and producers in the New England Groundfish fishery under new fishery management policy.
- If the Northeast groundfish fishery operated under management by limiting days-at-sea instead of through catch shares, producers and consumers would be much worse off.

SUMMARY

In 2010, the Northeast groundfish fishery transitioned from an input-control system (Days-at-Sea) to an output-control system (catch shares). Simultaneously, a large decrease in aggregate catch was imposed in order to achieve biological objectives. The welfare effects of the transition to catch share management are examined by combining an inverse demand model for groundfish with a simulation based model of supply. The Synthetic Inverse Demand System is estimated for groundfish using monthly data from 1994-2011 using a Generalized Method of Moments estimator. In order to isolate the welfare effects the transition to catch shares, the estimated demand model parameters are combined with counterfactual landings derived from the Days-at-Sea system that is recalibrated to meet the mandated conservation goals. Due to the decreases in catch that were required to meet those goals, the 2010 policy undoubtedly resulted in worse outcomes for both producers and consumers when compared to 2009. However, the simulation results show that the recalibrated Days-at-Sea system would have been even worse for both consumers and producers.



AUTHORS

K. S. Van Houtan, L. McClenachan, and J.N. Kittinger
(NMFS/PIFSC)

PUBLICATION DATE

Expected Publication Date: July/August 2013

TITLE

Seafood menus reflect long-term ocean changes

JOURNAL

Frontiers in Ecology and the Environment

SIGNIFICANCE

- Menus may be a useful proxy of population changes when species are locally harvested and restaurants are the major market.
- When compiled and interpreted in the appropriate socioeconomic context, menus have great potential as a window to the past.

SUMMARY

In assessing long-term changes in marine ecosystems, ecologists have used a variety of non-traditional information sources including newspapers, photographs, artwork, living memory, and midden deposits. Restaurant menus may provide a recent analog to middens, as they document seafood consumption over time and potentially the availability and value of different species in the past. Hawaii is perhaps an ideal location to use menus to analyze historical changes in the marine environment, as its remote location meant most locally consumed seafood was locally sourced. We analyzed 376 menus from 154 different Hawaii restaurants dated from 1928 to 1974, to supplement official fishery landing records and to infer changes in the availability of marine resources. The menus capture many of the dramatic shifts reflected in fishery landings, and perhaps additional changes in market supply and shifts in public preference. Reef fish, jacks, and bottomfish were common on menus before 1940, but by Hawaii's statehood in 1959 these items were collectively on fewer than 10% of menus. This period marked a rapid growth in pelagic fisheries and concurrent declines in nearshore fishery stocks. While nearshore resources sharply declined, restaurants shifted to serving large pelagic fish. By 1970, 95% of the menus contained large pelagics. For nearshore guilds, changes in menu occurrence may reflect market availability (and by proxy wild abundance) rather than shifts in consumer preferences. Not all local fishery dynamics are reflected in menus. Mollusks and shrimps were mostly imported from the Mainland U.S. and frogs were obtained from local aquaculture farms. Sea turtles were harvested in a commercial fishery in Hawaii; however, turtle meat was sold primarily at local fish markets, not in restaurants. Menus should be used selectively and in concert with significant socioeconomic information on fishery operation and culture. Market dynamics, resource abundance, availability, and consumer preference can all influence menu trends.



AUTHORS

S. Crosson, T. Yandle, and B. Stoffle (NMFS/SEFSC)

PUBLICATION DATE

Expected Publication Date: August 2013

TITLE

Renegotiating property rights in the Florida golden crab fishery

JOURNAL

International Journal of the Commons

SIGNIFICANCE

- The golden crab (*Chaceon fenneri*) supports a small, economically healthy fishery in south Florida. A portion of the fleet recently proposed shifting to individual transferable quotas (ITQs), which did not previously exist, to limit the ability of other crabbers to enter the fishery. Individual transferable quotas were not adopted.
- This study illustrates the usefulness of theoretical tools to better understand important social dynamics when changes to property rights and institutional arrangements are proposed.

SUMMARY

Crabbers in the south Florida golden crab fishery have successfully protected themselves against larger outside fishing interests in the past, and management has been stable for over fifteen years. Why, then, did a portion of the fleet propose shifting to individual transferable quotas? Our findings suggest that proponents sought individual transferable quota management because they believed it would further limit the ability of other crabbers to enter the fishery and act as a mechanism to legally preserve the informal and formal property rights that they have previously negotiated among themselves. Opponents believed that a shift to an individual transferable quota regime would destroy those same property rights. We explore the implications of these findings to a broader understanding of property rights and natural resource management institutions, noting that the currently existing system closely resembles a 'territorial use rights fishery.' The failure to adopt an individual transferable quota management program for golden crab had more than one cause. We conclude that crabbers in the different fishing zones have divergent business plans that may disrupt the fishery in the future. A simple solution would be to build upon the success of the existing zone system by dividing the fleet-wide quota between the different fishery zones.



AUTHORS

B.J. Burke, M. Liermann, D.J. Teel, and J.J. Anderson
(NMFS-NWFSC)

PUBLICATION DATE

Expected Publication Date: TBD

TITLE

Environmental and geospatial factors drive juvenile Chinook salmon distribution during early ocean migration

JOURNAL

Canadian Journal of Fisheries and Aquatic Sciences

SIGNIFICANCE

- During migration, yearling Chinook salmon exhibit a targeted northward migration and respond to local environmental conditions secondarily.
- Fish that are driven by genetically-determined migration behaviors and respond less to local environmental conditions may spend more time in poor habitat than fish with more flexible migration behavior, particularly as ocean conditions change with the climate.

SUMMARY

Migrating animals rely on a variety of cues to guide them, but the relative importance of those signals may vary with size, life stage, or location. During their initial ocean migration, yearling Chinook salmon from the Columbia River have stock-specific spatial distributions that shift through time. We used models to examine how the distribution of yearling migrants from three Chinook salmon stocks varies as a function of geospatial (e.g., latitude and distance from shore) and environmental (e.g., chlorophyll a and temperature) factors. We found that both environmental and geospatial factors explained substantial portions of observed patterns in abundance and location, suggesting that these fish responded to multiple cues during migration. Models indicated that fish distributions were more affected by geospatial than by environmental covariates. We conclude that during migration, behavioral responses to environmental variation are secondary to responses to geospatial variation, sometimes resulting in environmental conditions that are not suitable. These results help us understand Chinook responses to large-scale climate changes.



AUTHORS

D. Gilford, S. Smith, M. Griffin, and A. Arguez (NESDIS/NCDC)

PUBLICATION DATE

Accepted: 21 May 2013

TITLE

Southeastern United States daily temperature ranges associated with the El Niño-Southern Oscillation

JOURNAL

Journal of Applied Meteorology and Climatology

SIGNIFICANCE

- The study's results show a clear tendency for higher daily temperature ranges during La Niña and smaller values during El Niño, which is shown to impact livestock in the Southeast.

SUMMARY

The daily temperature range (DTR), daily maximum minus minimum temperature, at 290 Southeast United States stations is examined with respect to the warm and cold phases of the El Niño–Southern Oscillation (ENSO) for the period of 1948–2009. A comparison of El Niño and La Niña DTR distributions during three-month seasons is conducted using various metrics. Histograms show each station's particular distribution. To directly compare the normalized distributions of El Niño and La Niña, a new metric, herein identified as conditional ratios, is produced and results are evaluated for significance at 95% confidence with a bootstrapping technique. Results show that during three-month winter, spring, and autumn seasons, DTRs above 29°F (16°C) are significantly more frequent during La Niña events, and DTRs below 15°F (8.3°C) are significantly more frequent during El Niño events. It is hypothesized that these results are associated spatially with cloud cover and storm tracks during each season and ENSO phase. Relationships between DTRs and ENSO-related relative humidity are examined. These results are pertinent to the Southeast cattle industry, allowing ranchers to plan for and mitigate threats posed by periods of low DTRs associated with the predicted phase of ENSO.



AUTHORS

T. DelSole, A. Kumar, and B. Jha (NWS/NCEP)

PUBLICATION DATE

Accepted: 22 May 2013

TITLE

Potential seasonal predictability: comparison between empirical and dynamical model estimates

JOURNAL

Geophysical Research Letters

SIGNIFICANCE

- This study validates the single time series approach to estimating potential seasonal predictability and quantifies limits of predictability.

SUMMARY

Methods for estimating potential seasonal predictability from a single realization of daily data are validated against an ensemble of simulations from an atmospheric model driven by the observed evolution of sea surface temperature, sea ice extent, and greenhouse gas concentration. The estimation methods include an Analysis of Covariance technique and a spectral technique. The methods give surprisingly good estimates of potential predictability of seasonal precipitation despite the fact that the methods assume Gaussian distributions. For temperature, the methods systematically underestimate weather noise variance over land. This bias is attributed to the neglect of variability induced by land-atmosphere coupling. Taking account of precipitation induced variability using regression methods leads to much more accurate estimates of potential predictability. Other biases are diagnosed but shown to affect limited regions. The results strongly support the validity of the single time series approach to estimating potential predictability, and enhance our confidence in previous estimates of potential predictability based on observations alone.



AUTHORS

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PUBLICATION DATE

Expected Publication Date: Advance Access
published May 30, 2013

TITLE

Fisheries management under climate and environmental uncertainty: control rules and performance simulation

JOURNAL

ICES Journal of Marine Science

SIGNIFICANCE

- Many reviewed studies have found that modifying management strategies to include environmental factors does not improve the ability to achieve management goals much, if at all, and only if the manner in which these factors drive the system is well known.
- It seems more appropriate to consider the implications of plausible broad forecasts related to how biological parameters may change in the future as a way to assess the robustness of management strategies.

SUMMARY

The ability of management strategies to achieve the fishery management goals are impacted by environmental variation and, therefore, also by global climate change. Management strategies can be modified to use environmental data using the "dynamic B_0 " concept, and changing the set of years used to define biomass reference points. Two approaches have been developed to apply management strategy evaluation to evaluate the impact of environmental variation on the performance of management strategies. The "mechanistic approach" estimates the relationship between the environment and elements of the population dynamics of the fished species and makes predictions for population trends using the outputs from global climate models. In contrast, the "empirical approach" examines possible broad scenarios without explicitly identifying mechanisms. Many reviewed studies have found that modifying management strategies to include environmental factors does not improve the ability to achieve management goals much, if at all, and only if the manner in which these factors drive the system is well known. As such, until the skill of stock projection models improves, it seems more appropriate to consider the implications of plausible broad forecasts related to how biological parameters may change in the future as a way to assess the robustness of management strategies, rather than attempting specific predictions per se.



AUTHORS

D. Risch, U. Siebert, P. Dugan, M. Popescu, and S. M. Van Parijs (NMFS/NEFSC)

PUBLICATION DATE

Expected Publication Date: August 2013

TITLE

Minke whale acoustic behavior and multi-year seasonal and diel vocalization patterns in Massachusetts Bay, USA

JOURNAL

Marine Ecology Progress Series

SIGNIFICANCE

- Next to nothing is known about minke whale distribution and seasonal presence. This manuscript uses acoustics to answer key long term monitoring questions.

SUMMARY

Passive acoustic monitoring (PAM) is a rapidly growing field, providing valuable insights in marine ecology. The approach allows for long-term, species-specific monitoring over a range of spatial scales. For many baleen whales fundamental information on seasonal occurrence and distribution are still missing. In this study, pulse trains produced by North Atlantic minke whales, a highly mobile and cryptic species, are used to examine their seasonality, diel patterns and spatial distribution throughout the Stellwagen Bank National Marine Sanctuary (SBNMS), USA. Three and a half years (2006, 2007-2010) of near continuous passive acoustic data were analyzed using automated detection methods. Random forests and cluster analyses grouped pulse trains into three main categories ('slow-down', 'regular' & 'speed-up'), with several subtypes. Slow-down pulse trains were the most commonly recorded call category. Minke whale pulse train occurrence was highly seasonal across all years. Detections were made from August to November, with 88% occurring in September and October. No detections were recorded in January and February, and only few from March to June. Minke whale pulse trains showed a distinct diel pattern, with a nighttime peak from approximately 20:00-01:00 EST. The highest numbers of pulse trains were detected to the east of Stellwagen Bank, suggesting that minke whales may travel preferably in deeper waters along the outer edge of the Sanctuary. These data show that minke whales consistently use Stellwagen Bank as part of their migration route to and from the feeding grounds. Unlike other baleen whales in this area they do not appear to have a persistent year-round acoustic presence.



AUTHORS

C. Vizza, B. L. Sanderson, D. G. Burrows, and H. J. Coe
(NMFS/NWFSC)

PUBLICATION DATE

Expected Publication Date: Fall 2013

TITLE

The effects of ethanol preservation on fish fin stable isotopes: does variation in C:N ratio and body size matter?

JOURNAL

Transactions of the American Fisheries Society

SIGNIFICANCE

- Ethanol is a common tool for preserving specimens in the field, yet preservation in ethanol may influence stable isotope signatures of preserved tissues.
- Our results suggest that isotopic ratios of both carbon and nitrogen in ethanol-preserved tissues be interpreted with caution.

SUMMARY

Although chemical preservation of stable isotope samples has been studied in a variety of species and tissue types, the effects of ethanol preservation on fish fin tissue have not been examined. Using caudal fin samples from juvenile chinook salmon, *Oncorhynchus tshawytscha*, and steelhead/rainbow trout, *O. mykiss*, we investigated how storage time (two, four, and six months), fin composition (C:N ratio), and fish body size (fork length, 50–130 mm) influence preservation-induced changes in $\delta^{13}\text{C}$ and $\delta^{15}\text{N}$. In both species, we found that treatment fins (frozen and later preserved in ethanol) exhibited higher $\delta^{13}\text{C}$ than paired reference fins (frozen). The changes in $\delta^{15}\text{N}$, however, were smaller in magnitude and less consistent. Preservation-induced increases in fin $\delta^{13}\text{C}$, but not $\delta^{15}\text{N}$, were significantly correlated with the change in C:N ratio (treatment – reference) in both species. In addition, these increases in $\delta^{13}\text{C}$ were more highly correlated with body size in *O. mykiss* than in chinook salmon. Storage time had a significant effect on the shift in treatment fin $\delta^{13}\text{C}$ and a small, but insignificant, effect on $\delta^{15}\text{N}$ in *O. mykiss*. However, storage time was not a significant factor for explaining the isotopic shifts observed in chinook salmon fin tissue. This is the first study to document variation in preservation-induced changes in $\delta^{13}\text{C}$ within a species and to link this variation to C:N ratio. Future studies using species-specific and tissue-specific models to correct for preservation-induced shifts in stable isotope ratios should be aware that these models do not account for intraspecific variation in tissue composition.



AUTHORS

N. Tolimieri, J.F. Samhuri, V. Simon, B.E. Feist, and P.S. Levin (NMFS/NWFSC)

PUBLICATION DATE

Published Online: 10 June 2013

TITLE

Linking the trophic fingerprint of groundfishes to ecosystem structure and function in the California Current

JOURNAL
Ecosystems

SIGNIFICANCE

- Mean trophic level (MTL) is a highly used indicator in marine systems.
- It is important to link changes in MTL to top-down forcing and the structure of ecosystems.
- Modeling results show that changes in MTL of west coast ground fishes can drive changes in the abundance of other important taxa like forage species, salmon, seabirds and tuna.

SUMMARY

Mean trophic level (MTL) is one of the most widely used indicators of marine ecosystem health. It usually represents the relative abundance of fished species across a spectrum of TLs. The reality, ubiquity, and causes of a general decline in the MTL of fisheries catch through time, and whether fisheries catch tracks ecosystem level changes, have engendered much attention. However, the consequences of such patterns for broader ecosystem structure and function remain virtually unexplored. Along the Pacific U.S. coast, previous work has documented fluctuations and a slow increase in ecosystem MTL from 1977 to 2004. Here, we document a decline in the ecosystem MTL of groundfishes in the same ecosystem from 2003 to 2011, the proximate cause of which was a decrease in the biomass of higher TL groundfishes. Using a food web model, we illustrate how these shifts in ecosystem structure may have resulted in short term, positive responses by many lower TL species in the broader ecosystem. In the longer term, the model predicts that initial patterns of prey release may be tempered in part by lagged responses of other higher TL species, such as salmon and sea-birds. Although ecosystem functions related to specific groups like piscivores (excluding high-TL groundfishes) changed, aggregate ecosystem functions altered little following the initial reorganization of biomass, probably due to functional redundancy within the predator guild. Efforts to manage and conserve marine ecosystems will benefit from a fuller consideration of the information content contained within, and implied by, fisheries-independent TL indicators.

Link to paper

<http://link.springer.com/article/10.1007/s10021-013-9680-1>



AUTHORS

C. A. Steele, E. C. Anderson, M. W. Ackerman, M. A. Hess, N. Campbell, S. R. Narum, and M. Campbell (NMFS/SWFSC)

PUBLICATION DATE

Expected Publication Date: mid-to-late 2013

TITLE

A validation of parentage-based tagging using hatchery steelhead in the Snake River basin

JOURNAL

Canadian Journal of Fisheries and Aquatic Sciences

SIGNIFICANCE

- This is a precursor to IDFG switching from CWTs to PBT for tagging Snake River Basin steelhead and Chinook.

SUMMARY

This paper verifies that PBT is, as predicted by Anderson and Garza (2005, 2006), is a viable, and in this case, less expensive and more information-rich tagging methodology than coded wire tags. Opens path to adoption of PBT by other agencies.

Parentage-based tagging (PBT) is a promising alternative to traditional coded-wire tag (CWT) methodologies for monitoring and evaluating hatchery stocks. This approach involves the 19 genotyping of hatchery broodstock and uses parentage assignments to identify the origin and brood year of their progeny. In this study we empirically confirmed that fewer than 100 SNPs were needed to accurately conduct PBT, demonstrated that our selected panel of SNPs was comparable in accuracy to a panel of microsatellites, and verified that stock assignments made with this panel matched those made using CWTs. We also demonstrated that when sampling of spawners was incomplete an estimated PBT-tagging rate for the offspring could also be predicted with fewer than 100 SNPs. This study in the Snake River basin is one of the first large-scale implementations of PBT in salmonids and lays the foundation for adopting this technology more broadly in the region, thereby allowing the unprecedented ability to mark millions of smolts and an opportunity to address a variety of parentage-based research and management questions.



AUTHORS

D. Frechette, A.L. Collinsa, J.T. Harvey, S.A. Hayesa, D.D. Huff, A.W. Jones, A.E. Langford, J.W. Moore, A.-M.K. Osterback, N.A. Retford, W.H. Satterthwaite, and S.A. Schaffer (NMFS/SWFSC)

PUBLICATION DATE

Expected Publication Date: August 2013

TITLE

*A bioenergetics approach to assessing potential impacts of avian predation on juvenile steelhead (*Oncorhynchus mykiss*) during freshwater rearing*

JOURNAL

North American Journal of Fisheries Management

SIGNIFICANCE

- We provide a bioenergetics-based tool for establishing boundaries on the plausible range of avian-caused mortality of steelhead in the absence of rigorous local diet data.
- This method can be applied broadly to help focus future research or inform management strategies for ESA-listed fish populations when local predator diet and energetic data are lacking.

SUMMARY

Avian predation of juvenile salmonids is an important source of mortality in freshwater and estuarine habitats when birds and salmonids overlap spatially and temporally. We assessed the potential impact of avian predation upon juvenile steelhead, *Oncorhynchus mykiss*, in a coastal watershed in central California. We conducted stream surveys between 2008 and 2010 to determine the composition, distribution, and density of piscivorous birds in areas that provide rearing habitat for juvenile steelhead. The most commonly sighted bird species were common mergansers, *Mergus merganser*, and belted kingfishers, *Megacyrle alcyon*. Density of avian predators varied spatially and temporally but was greatest in the estuary regardless of season and decreased with increasing distance from the estuary. We applied a bioenergetics model to estimate potential predation on juvenile steelhead in the Scott Creek estuary by mergansers and kingfishers, in the absence of local predator diet data. Model parameters included (1) published values of bird energetic requirements and Steelhead energy density, (2) the number of birds present in the estuary during the closure period (from stream surveys), and (4) the size frequency and abundance of Steelhead present in the estuary during closure. We predicted the extent of predation for different values of steelhead in bird diet, accounting for uncertainty in estimates using a Monte Carlo simulation approach. With the assumed contribution of steelhead to the diet ranging from 20% to 100%, the population of kingfishers foraging in the Scott Creek estuary had the potential to remove 3 to 17% of annual production, whereas mergansers had the potential to remove 5 to 54% of annual steelhead production. Our results suggest that predation by avian species, particularly mergansers, may be an important source of mortality for threatened steelhead populations in central California and should be addressed further in future salmonid research and recovery planning.



AUTHORS

J.P. Meador, M.S.J. Warne, P.M. Chapman, K.M. Chan, S. Yu, and K.M.Y. Leung (NMFS/NWFSC)

PUBLICATION DATE

Expected Publication Date: Online now, final publication in early 2014

TITLE

Tissue-based environmental quality benchmarks and standards

JOURNAL

Environmental Science and Pollution Research

SIGNIFICANCE

- Tissue-based environmental quality standards can be very useful for management and policy decisions regarding environmental protection because they provide additional lines of evidence.
- These methods have a higher degree of scientific defensibility because values are based on dose-response data and often exhibit low variability.

SUMMARY

Although the use of tissue concentrations (residues) of chemical contaminants as the dose metric to characterize chemical toxicity to aquatic organisms has been gaining acceptance over the past 20 years, tissue concentrations are less commonly used in water quality management and have yet to be formally adopted as benchmarks or environmental quality standards (EQS). This synthesis paper addresses advantages and disadvantages for the development and application of tissue-based EQS as an alternative and supplement to exposure-based EQS determined with water and sediment concentration data. Tissue-based EQS can be readily developed in parallel with conventional toxicity tests, and achieved by quantification of chemical concentrations in tissue alongside traditional concentration-response toxicity testing. Tissue-residue toxicity metrics can be used as benchmarks for screening and monitoring water and sediment quality, to derive equivalent water or sediment EQS, and for ecological risk assessments and weight of evidence approaches for assessing ecosystem impairment. Tissue-based toxicity metrics and associated EQS provide several advantages; however, there are some limitations to consider and key knowledge gaps to fill.

LINK TO PAPER

<http://link.springer.com/article/10.1007/s11356-013-1714-x>



AUTHORS

M.P. Jensen, C. Limpus, S.D. Whiting, M. Guinea, R.I.T. Prince, K. Dethmers, I.B.W. Adnyana, R. Kennett, and N.N. FitzSimmons (NMFS/SWFSC)

PUBLICATION DATE

Accepted: 27 June 2013

TITLE

*Defining olive ridley turtle (*Lepidochelys olivacea*) management units in Australia and assessing the potential impact of mortality in ghost nets*

JOURNAL

Endangered Species Research

SIGNIFICANCE

- The results presented in this paper establish that there are at least two independent Management Units of olive ridley turtles nesting in Australia and emphasizes the importance of conserving the genetically distinct small breeding population nesting along the north-western Cape York Peninsula.
- Results from 44 turtles caught in ghost nets across the Gulf of Carpentaria revealed that 50% of the haplotypes (32% of all ghost net samples) had not been observed at any rookery in Australia or SE Asia and highlights the need for better information on olive ridley population structure in the region.

SUMMARY

In Australia the olive ridley sea turtle (*Lepidochelys olivacea*) has received little research attention and monitoring compared to other species of marine turtles. The Australian populations are relatively small and their distribution is limited to remote areas in the northern part of the country. Previous global genetic studies of olive ridley populations showed that the Australian breeding population at the McCluer Group of islands, Northern Territory, is genetically distinct from olive ridley populations breeding in Malaysia, Sri Lanka, India and the eastern Pacific. However, nothing is known about the genetic stock structure among Australian olive ridley rookeries. High predation of eggs by feral pigs, dogs and goannas is believed to have caused a severe decline in the number of nesting females at some rookeries. Of particular concern is the small nesting population on the western Cape York Peninsula, and without immediate conservation action this population faces extinction. The results presented in this paper establish that there are at least two independent Management Units of olive ridley turtles nesting in Australia and emphasizes the importance of conserving the genetically distinct small breeding population nesting along the north-western Cape York Peninsula. In addition, results from 44 turtles caught in ghost nets across the Gulf of Carpentaria revealed that 50% of the haplotypes (32% of all ghost net samples) had not been observed at any rookery in Australia or SE Asia. Obtaining samples from other regional olive ridley rookeries is needed to determine the origins of stranded turtles or those caught at sea. This research highlights the need for better information on olive ridley population structure in the region and for urgent conservation action for the declining western Cape York population.



AUTHORS

E. D. Weber and T. J. Moore (NMFS/SWFSC)

PUBLICATION DATE

Expected Publication Date: September 2013

TITLE

Corrected conversion algorithms for the CalCOFI station grid and their implementation in several computer languages

JOURNAL
CalCOFI Reports

SIGNIFICANCE

- Researchers can conduct CalCOFI line and station conversions more conveniently in a variety of computer languages, thereby avoiding pitfalls when implementing the algorithm in their own programs.

SUMMARY

Converting between geographic coordinates in latitude and longitude and the line and station sampling pattern of the California Cooperative Fisheries Investigations (CalCOFI) program is a commonly required task for conducting research on the California Current ecosystem. This note presents several corrections and clarifications to the previously published algorithms for performing these conversions. We include computer code to implement the algorithms in Java™, Perl, Python, and R. We note that freely available code to conduct the conversions in Fortran, Matlab®, JavaScript™, and Visual Basic® has previously been published, and an online conversion tool is also available. A future version of the PROJ.4 cartographic projections library will also include support for CalCOFI conversions, thereby allowing for convenient conversions using the GRASS GIS, PostGIS, Python, Perl, R, and many other programs and programming languages.



AUTHORS

R. Viereck, J. Kunches, M. Codrescu, and R. Steenburgh
(NWS/NCEP)

PUBLICATION DATE

Expected Publication Date: Fall 2013

TITLE

*Customers and Requirements for
Ionosphere Products and Services*

JOURNAL

AGU Chapman Conference Monograph on Ionospheric
Impacts

SIGNIFICANCE

- There are many customers who want better ionospheric products and services. NOAA SWPC and the Space Weather Prediction Testbed are working to improve the products and services to customers and develop new models to improve forecasts.

SUMMARY

Many space weather impacts on the terrestrial environment result from changes in the ionosphere. Some systems, such as HF radio communication systems, are impacted by enhancements in the D-region ionospheric densities. Other systems are impacted by changes in the E and F regions. Other systems, such as single frequency Global Positioning System (GPS) or Global Navigation Satellite Systems (GNSS), are affected by changes in the Total height integrated Electron Content (TEC). While dual frequency GPS/GNSS systems provide corrections for many different types of ionospheric variability, they are susceptible to small scale ionospheric irregularities that cause scintillation of the signal. This report presents an overview of space weather that affects the ionosphere. Ionospheric impacts on various technical systems and the requirements of different customer types for ionospheric services that rely on the National Oceanic and Atmospheric Administration (NOAA) Space Weather Prediction Center (SWPC) for specification and forecasts of the space environment will also be presented. An overview of the current products in operations and in development will be discussed, and a new section within SWPC, the Space Weather Prediction Testbed, will be described. The Testbed is where new products and models are tested and validated to assess their performance and their utility to customers and the Forecast Office.



AUTHORS

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PUBLICATION DATE

Published online: June 2013

TITLE

Mitogenomic insights into a recently described and rarely observed killer whale morphotype

JOURNAL

Polar Biology

SIGNIFICANCE

- This study provides the first genetic support of the 'type D' killer whale potentially being a distinct subspecies or species of killer whale.
- These authors' findings highlight the value of natural history museum collections and new technologies to investigate the taxonomy of rare, cryptic, or difficult to access species.

SUMMARY

Identifying evolutionary divergent taxonomic units, e.g. species and subspecies, is important for conservation and evolutionary biology. The 'type D' killer whale, *Orcinus orca*, is a rarely observed morphotype with a pelagic, circumpolar subantarctic distribution, making dedicated research and therefore taxonomic study extremely difficult to date. In this study, the authors used DNA target enrichment hybridization capture coupled to high throughput sequencing, to obtain the first DNA sequence from the only known museum specimen of this recently described morphotype. The high coverage, complete mitogenome sequence was compared to a previously published global dataset of 139 individuals, indicating that this type is highly divergent to all previously genetically sequenced killer whale forms. The estimated divergence time (390,000 year ago) from its most recent common ancestor with other extant killer whale lineages was the second oldest split within the killer whale phylogeny. This study provides the first genetic support of type D potentially being a distinct subspecies or species of killer whale, although further samples are needed to identify if there is monophyly of 3 mitogenome sequences and whether nuclear DNA also indicates reproductive isolation. These findings also highlight the value of natural history museum collections and new technologies to investigate the taxonomy of rare, cryptic, or difficult to access species.

LINK TO PAPER

<http://link.springer.com/content/pdf/10.1007/s00300-013-1354-0.pdf>



AUTHORS

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PUBLICATION DATE

Expected Publication Date: Summer/Fall 2013

TITLE

Validation of blubber progesterone concentrations for pregnancy determination in three dolphin species and a porpoise

JOURNAL
PLOS One

SIGNIFICANCE

- The authors' results support the applicability and validity of measuring progesterone levels in blubber samples to identify pregnant females across a wide range of cetacean species in the field.
- The authors provide baseline data on blubber progesterone concentrations according to reproductive class in four new species of cetaceans.

SUMMARY

Recent studies have validated the use of biopsies as a minimally invasive way to identify pregnant females in several species of wild cetaceans: *Balaenaptera acutorostrata*, *Delphinus delphis*, *Lisodidelphis borealis*, and *Lagenorhynchus obliquidens*. These studies found that progesterone (P4) concentrations quantified from blubber attached to biopsy samples is diagnostic of pregnancy. The authors examined a broader group of cetacean species in an effort to investigate how progesterone levels vary between species with respect to pregnancy status. They compared P4 concentrations in blubber collected from fishery bycatch and beach-stranded specimens for 40 females of known reproductive condition from *Delphinus capensis* (n = 18), *Stenella attenuata* (n = 8), *S. longirostris* (n = 6) and *Phocoenoides dalli* (n = 8). The P4 concentrations were different ($t = -7.1$, $p = 1.79E-08$) between pregnant and non-pregnant animals in all species, with the mean blubber P4 concentration for pregnant animals 164 times higher than that of non-pregnant animals. There was no overlap in concentration levels between sexually immature or non-pregnant sexually mature animals and pregnant animals. No significant differences ($F = 0.354$, $p = 0.559$) were found between mature non-pregnant and immature *D. capensis* and *P. dalli*, suggesting P4 level is not indicative of maturity state in female delphinoids. P4 concentrations in relation to reproductive state were remarkably similar across species. All samples were analyzed with two different enzyme immunoassay kits to gauge assay sensitivity to measure progesterone in small samples, such as biopsies. With the technique now validated for these cetacean species, blubber P4 is a reliable diagnostic of pregnancies across multiple species, and thus expands the utility of this method to study reproduction in free-ranging cetaceans using biopsies.



AUTHORS

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PUBLICATION DATE

Expected Publication Date: July 2013

TITLE

Microbial biogeography during austral summer 2007 in the surface waters around the South Shetland Islands, Antarctica

JOURNAL
Aquatic Microbial Ecology

SIGNIFICANCE

- The goal of this study was to determine if biogeographic patterns are present for aquatic microbes in waters which meet around the South Shetland Islands (SSI), Antarctica.
- Microbial communities responsible for cycling of nutrients and carbon in the Southern Ocean vary in space, and their distribution is associated with differing water masses.
- Nutrient cycling and primary productivity necessary for sustaining Antarctic krill population will therefore differ as climate changes and environments warm.

SUMMARY

Recent studies have concluded that different water bodies in the ocean can contain different microbial communities. Prokaryotic and eukaryotic marine microbial communities were monitored during the 2007 austral summer by use of polymerase chain reaction (PCR) and denaturing gradient gel electrophoresis (DGGE) of small subunit ribosomal DNA. Hydrographic properties, nutrients and chlorophyll a were also measured. There was an onshore to offshore gradient in temperature, salinity, and iron concentration, and a unimodal distribution of chlorophyll a concentration in relation to the middle of this gradient that occurred near the SSI. The differences in microbial community structure between stations in the studied area were correlated with both geographical distance and environmental factors. For eukaryotes the correlation was strongest for environment, whereas it was strongest for geographical distance for the prokaryotes. Eukaryotic and prokaryotic community structure was highly correlated. Surface water from the Weddell Sea had a different community of eukaryotes than the water in the Antarctic Circumpolar Current in the Drake Passage, whereas the prokaryotic community was not significantly different. The area close to the SSI where the two water types mix had the highest chlorophyll concentration and significantly different communities of eukaryotes and prokaryotes from both of the inflowing water types. These results suggest that the prokaryote community structure was more affected by productivity than by environmental variables.



AUTHORS

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PUBLICATION DATE

Expected Publication Date: unknown

TITLE

*Interannual and spatial variation in the population genetic composition of young-of-the-year Pacific ocean perch (*Sebastes alutus*) in the Gulf of Alaska*

JOURNAL
Fisheries Oceanography

SIGNIFICANCE

- Results of this study show that adult Pacific ocean perch have restricted lifetime dispersal.
- This conclusion could have implications for spatial management of annual catch limits for a commercially valuable fish species.

SUMMARY

Little is known about the population structure of Alaskan rockfishes, including Pacific ocean perch (*Sebastes alutus*), and how ocean features may influence their structures. Moreover, early life history information is sparse for many species. We characterize the genetic structure of young fish collected during 1998 - 2003 from the Gulf of Alaska and the Bering Sea. Broad-scale geographic variation in genetic structure of young fish had similarities to that observed in a previous adult study. The overall correlation between genetic and geographic distance (isolation by distance) for young fish was nearly identical to that observed in the adults. Fine-scale geographic divergence was also observed and may be the result of oceanographic circulation features within the GOA. The similarities of the young with the adults and the pattern of genetic divergence confirm that dispersal of Pacific ocean perch is limited in all life stages.



AUTHORS

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PUBLICATION DATE

Expected Publication Date: Fall 2013

TITLE

Linking forest harvest and landscape factors to benthic macroinvertebrate communities in the interior of British Columbia

JOURNAL
Hydrobiologia

SIGNIFICANCE

- The research showed that landscape variables explained more variation in aquatic communities than forest harvest. Therefore, it is essential to account for natural variation in the landscape when assessing the ecological effects of human caused disturbance such as forest harvest.

SUMMARY

Detecting the magnitude of human-induced disturbance events, such as forest harvest, on biological communities is often confounded by other environmental gradients and scales at which these effects are examined. In this study, benthic invertebrates were collected from 43 streams across 4 basins and 2 geographic regions to 1) determine whether invertebrate abundance and community structure are best explained by historic forest harvest, landscape variables or a combination of both, and 2) evaluate associations between harvest, landscape variables, in-stream physical habitat and invertebrates. Nonmetric multidimensional scaling (NMS) showed that invertebrate community structure was primarily explained by watershed area and elevation, and basin and region but not by measures of forest harvest. Model selection using an information-theoretic approach and Akaike's information criterion (AIC) indicated that watershed area was the most important variable explaining clinger and long-lived taxa richness, while basin was the most important variable explaining total abundance, and total, Ephemeroptera, Plecoptera and Trichoptera (EPT) taxa richness. Forest harvest ranked lower than landscape variables in relative importance in all models. These results suggest that landscape characteristics were relatively more important in predicting invertebrate community structure than forest harvest, and should therefore be considered when assessing the impacts of both reach and watershed scale forest harvest on benthic communities. Perhaps the levels of forest harvest examined in this study had only marginal effects on benthic invertebrates because these ecosystems are naturally resilient as a result of frequent disturbance from forest fires.



AUTHORS

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PUBLICATION DATE

Accepted: 4 June 2013

TITLE

Assessment of contaminant body burdens and histopathology of fish and shellfish species frequently used for subsistence food by Alaskan Native communities

SIGNIFICANCE

- The fish and shellfish collected from the Native villages of Nanwalek, Port Graham and Seldovia showed low tissue contamination. Additionally, observable pathologic effects in shellfish or fish tissues for the parasites and diseases measured were absent or minimal.
- The results from contaminant body burden and histopathological characterization of the softshell clams, cockles, chum and sockeye salmon showed that the fish and shellfish were healthy and non-contaminated.
- Chemistry and histopathology data from this study represent useful information for concerned native community members and coastal resource managers in Alaska.

SUMMARY

Subsistence food items may constitute a health concern in rural Alaska because community members often rely on fish and wildlife resources not routinely monitored for persistent bioaccumulative contaminants and pathogens. In response to the growing concerns among Native communities, contaminant body burden and histopathological condition of chum and sockeye salmon (*Oncorhynchus keta* and *Oncorhynchus nerka*) and the shellfish cockles and softshell clams (*Clinocardium nuttallii* and *Mya arenaria*) were assessed. In the Spring of 2010, the fish and shellfish were collected from traditional subsistence harvest areas in the vicinity of Nanwalek, Port Graham, and Seldovia, AK, and were analyzed for trace metals and residues of organic contaminants routinely monitored by the NOAA National Status & Trends Program (NS&T). Additionally, the fish and shellfish were histologically characterized for the presence, prevalence and severity of tissue pathology, disease, and parasite infection. The fish and shellfish sampled showed low tissue contamination, and pathologic effects of the parasites and diseases were absent or minimal. Taken together, the results showed that the fish and shellfish were healthy and pose no safety concern for consumption. This study provides reliable chemistry and histopathology information for local resource managers and Alaska Native people regarding subsistence fish and shellfish use and management needs. However, these findings do not preclude the possibility of other factors synergistically impacting these coastal resources in the region. Most of the contaminants measured are exogenous to the fish and shellfish body, and their mere presence at detectable levels in the tissues suggested some minimal exposure from remote sources.

LINK TO PAPER

<http://www2.coastalscience.noaa.gov/publications/ccma/detail.aspx?resource=7XKsCPikyjd85fyZITZ0008R/dvc50otljBYu6v4OGM=>

