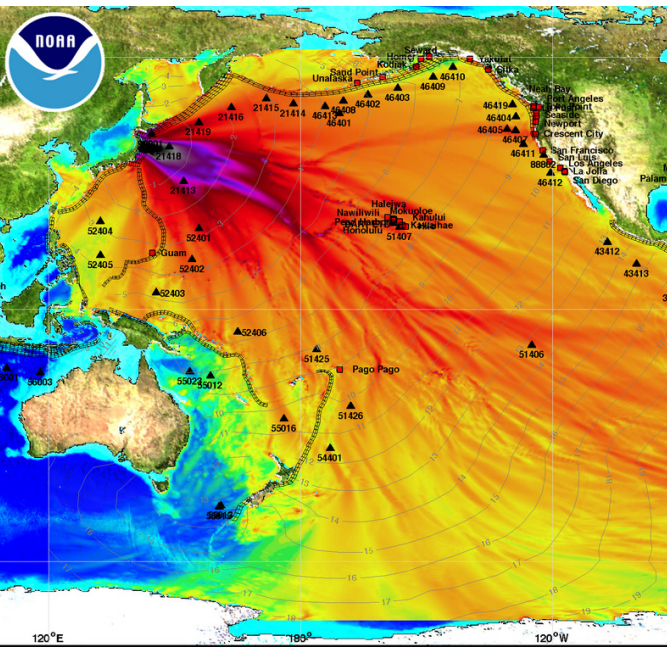

NOAA Scientific Publications Report

AUGUST 23, 2013

HIGHLIGHTED ARTICLE

A model of loggerhead sea turtle *(Caretta caretta)* habitat and movement in the oceanic North Pacific

Physiological stress response, reflex impairment, and survival of five sympatric shark species following experimental capture and release

Forecasting wave amplitudes after the arrival of a tsunami

Adaptive management institutions at the regional level: the case of large marine ecosystems

ADDITIONAL ARTICLES

Basin-scale phenology and effects of climate variability on global timing of initial seaward migration of Atlantic salmon *(Salmo salar)*

Changing states of North Atlantic large marine ecosystems

High predation on small populations: avian predation on imperiled salmonids

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Residence time and habitat persistence for higher trophic level predators in a small mid-Atlantic estuary

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

Four new species of Haplosclerida *(Porifera, Demospongiae)* from the Aleutian Islands, Alaska

Migration timing and distance from shore of southbound eastern Pacific gray whales *(Eschrichtius robustus)* off Ensenada, Baja California, Mexico.

Calculating the ecological impacts of animal-borne instruments on aquatic organisms

Sphyrna gilberti sp. nov., a new hammerhead shark, *(Carcharhiniformes, Sphyrnidae)* from the western North Atlantic Ocean

HIGHLIGHTED ARTICLE

AUTHORS

M. Abecassis, I. Senina, P. Lehodey, D. Parker, **G. Balazs**, and **J. Polovina (NMFS/PIFSC)**

PUBLICATION DATE

Expected August 2013

TITLE

A model of loggerhead sea turtle (Caretta caretta) *habitat and movement in the oceanic North Pacific*

JOURNAL

PLoS ONE

SIGNIFICANCE

- Despite remaining data gaps due to the relatively short lifespan of satellite tags in relation to the duration of the turtles' oceanic life stages, the authors were able to characterize the region where the likelihood of encounters with loggerhead turtles is highest.
- After fine-tuning with pelagic longline fisheries data, the authors were able to utilize their feeding habitat index to help reduce fishery interactions with this endangered species.

Loggerhead turtle

SUMMARY

Habitat preferences for juvenile loggerhead turtles in the North Pacific were investigated with the goal of potentially informing bycatch reduction strategies. Tracking tags were used to investigate changes in temperature preferences and speed of the animals with size. Average sea surface temperatures along the tracks ranged from 18 to 23 °C. Bigger turtles generally experienced larger temperature ranges and were encountered in warmer surface waters. Seasonal differences between small and big turtles suggest that the larger ones dive deeper and subsequently target warmer surface waters to rewarm. Average swimming speeds were under 1 km/h with larger turtles swimming faster than smaller ones. However, even though bigger turtles swam faster in terms of km/h, calculating body lengths per second revealed that smaller turtles had higher swimming speed. Temperature, speed, and size values were used to predict areas of highest probability of presence in the North Pacific. The model-generated from the data was very successful at capturing the north-south movements of the animals, but failed to replicate observed east-west movements, suggesting temperature and foraging preferences are not the only factors driving large-scale loggerhead movements.

VISIT THE SCIENTIFIC PUBLICATIONS REPORT ARCHIVE

HIGHLIGHTED ARTICLE

AUTHORS

A. J. Gallagher, **J. E. Serafy (NMFS/SEFSC),** S. J. Cooke and N. Hammerschlag

PUBLICATION DATE

Accepted 26 August 2013

TITLE

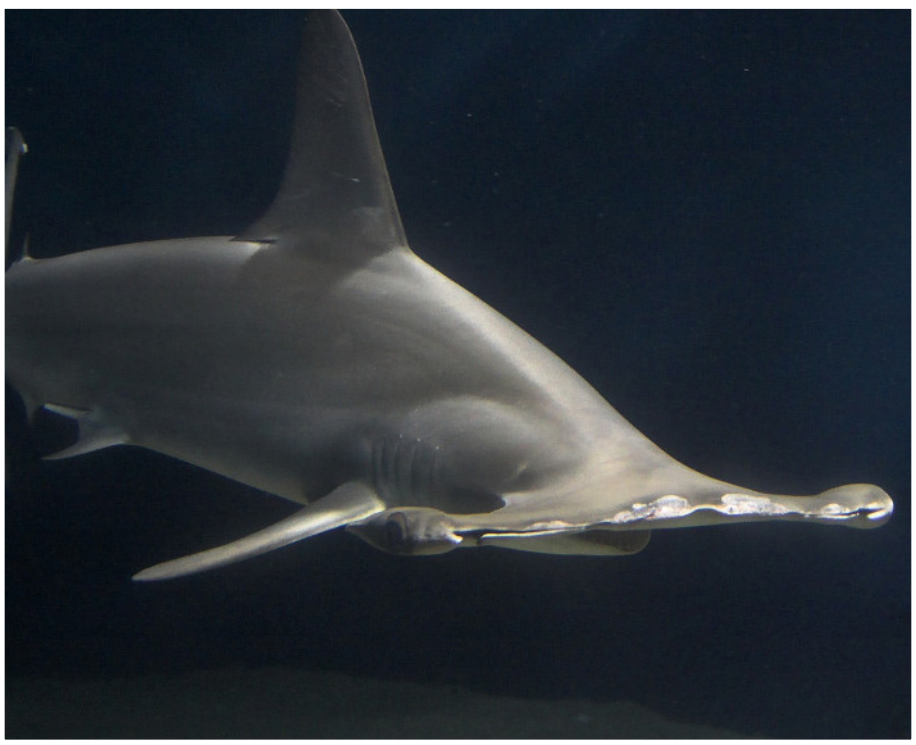
Physiological stress response, reflex impairment, and survival of five sympatric shark species following experimental capture and release

JOURNAL

Marine Ecology Progress Series

SIGNIFICANCE

- There is a relative degree of species-specific vulnerability to longline stress, and thus by-catch survivability, for five species of coastal sharks in the subtropical Atlantic.
- Results could be used to assess the success of current bycatch practices, particularly for ESA Candidate Species such as the great hammerhead.



Hammerhead shark

SUMMARY

In many fisheries, a component of the catch is usually released due to harvest regulations, conservation ethic, or because the captured organism was not the target. Quantifying the impacts of capture and release is critical for determining which practices are sustainable, particularly for threatened species. Using a standardized fishing technique, the authors investigated sublethal and lethal outcomes of fishing stress on five species of coastal sharks commonly encountered in the subtropical Atlantic Ocean. Species-specific differences were detected in via blood chemistry, most notably was the difference in lactate concentrations (a by product of the fight or flight response) related to fight time and size. A continuum of species vulnerability to capture and release emerged, with nearly 100% of all tagged tiger sharks (*Galeocerdo cuvier*) reported up to four weeks after release, which was significantly higher than bull sharks (74.1%, *Carcharhinus leucas*) and great hammerhead sharks (53.6%, *Sphyrna mokarran*). The authors discuss which mechanisms may lead to such a large range in sensitivity and suggest that observed variation in responses may be governed by ecological and evolutionary phenomena. This study suggests that some species may be inherently vulnerable to capture stress and mortality resulting from fisheries interactions, and should garner additional attention in future conservation strategies.

VISIT THE SCIENTIFIC PUBLICATIONS REPORT ARCHIVE

HIGHLIGHTED ARTICLE

AUTHORS

D. Nyland and **P. Huang (NWS/WCATWC)**

PUBLICATION DATE

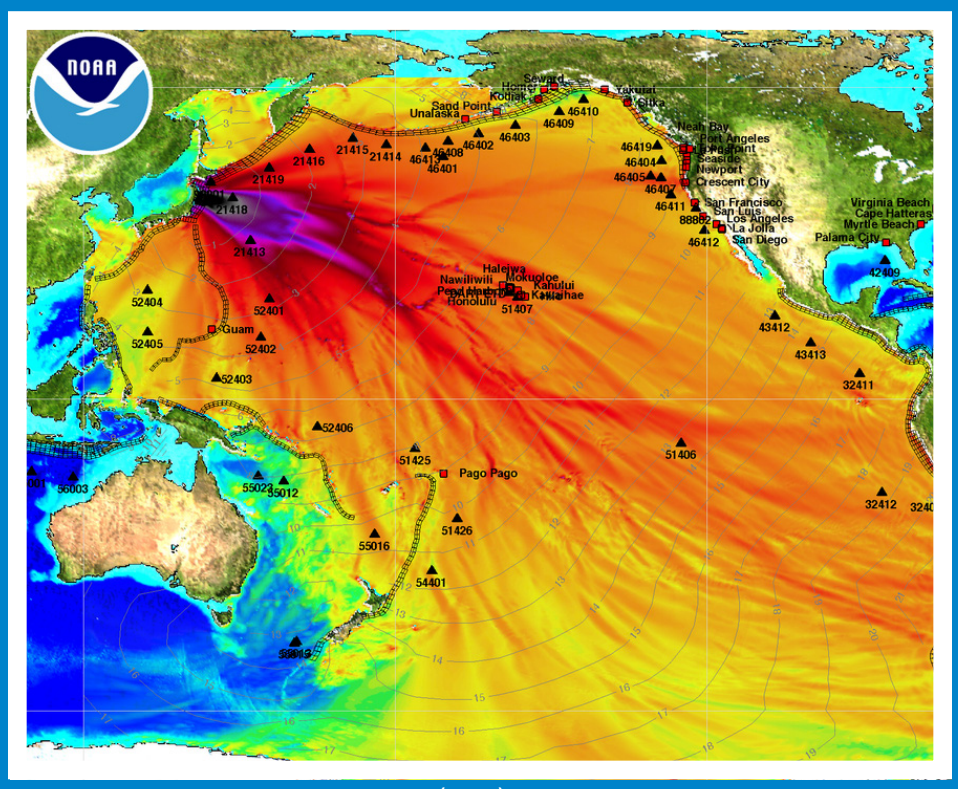
Accepted 24 July 2013

TITLE

Forecasting wave amplitudes after the arrival of a tsunami

SIGNIFICANCE

- The duration of a tsunami at a particular site can be forecasted with good reliability about two hours after a tsunami has peaked at that site.
- A technique is proposed which uses two exponential decay factors to provide scientists at a TWC the ability to determine when the waves will be under dangerous levels at a site. One decay factor is based on the observed tsunami decay and the other, which is applied later in the wave train, is a uniform decay factor for all sites.
- Tsunami Warning Center scientists will have an improved tool to forecast tsunami duration at sites where tide gages are available.



Wave energy plot of Japanese tsunami (2011)

SUMMARY

The destructive Pacific Ocean tsunami generated off the east coast of Honshu, Japan, on 11 March 2011 prompted the West Coast and Alaska Tsunami Warning Center (WCATWC) to issue a tsunami warning and advisory for the coastal regions of Alaska, British Columbia, Washington, Oregon, and California. Estimating the length of time the warning or advisory would remain in effect proved difficult. To address this problem, the WCATWC developed a technique to estimate the amplitude decay of a tsunami recorded at tide stations within the Warning Center's Area of Responsibly (AOR). At many sites along the West Coast of North America, the tsunami wave amplitudes will decay exponentially following the arrival of the maximum wave (MOFJELD 16 et al., Nat Hazards 22:71–89, 2000). To estimate the time it will take before wave amplitudes drop to safe levels, the real-time tide gauge data are filtered to remove the effects of tidal variations. The analytic envelope is computed and a 2 h sequence of amplitude values following the tsunami peak is used to obtain a least squares fit to an exponential function. This yields a decay curve which is then combined with an average West Coast decay function to provide an initial tsunami amplitude-duration forecast. This information may then be provided to emergency manager to assist with response planning.

LINK TO PAPER

https://www.e-proof.sps.co.in/springer/ja.asp?rfp=autharflvahnat

VISIT THE SCIENTIFIC PUBLICATIONS REPORT ARCHIVE

HIGHLIGHTED ARTICLE

AUTHORS

K. Sherman (NMFS/NEFSC)

PUBLICATION DATE

Accepted 27 June 2013

TITLE

Adaptive management institutions at the regional level: the case of large marine ecosystems

JOURNAL

Ocean & Coastal Management

SIGNIFICANCE

- Management of LME goods and services at the regional level is being significantly advanced through the catalytic actions of the GEF in supporting LME Project partnerships with UN agencies, OECD countries, and over 100 Developing countries around the globe.
- The level of financial support through 2020 is projected at several billions of dollars based on catalytic ocean financing successes reported by the UNDP and the GEF. The GEF plans to allocate financial support from its sixth 4-yr. funding replenishment from 2014 through 2018.
- Progress toward future self-financing and continuity of LME projects initiated with GEF grants is encouraging. Given the prospect of continuing financial support by the GEF, and the expressed political will of countries with growing economies investing in LME projects, the outlook for advancing LME project activity around the globe appears rather positive.

Map of Large Marine Ecosystem (LME)

SUMMARY

A global effort is underway by scientists, stakeholders, resource managers, and multisectoral ministerial representatives (e.g. fisheries, transportation, mining, energy, tourism, environment) from 110 economically developing countries to implement ecosystem-based management at the Large Marine Ecosystem scale. The effort is supported with $3.1 billion in financial assistance from the Global Environmental Facility and World Bank to assess and manage goods and services of Large Marine Ecosystems (LMEs) along the coasts of economically developing countries in Africa, Asia, Latin America and eastern Europe. Through a systematic spatial and temporal scaling across multiple jurisdictions (e.g. community, municipal, regional, national, and international) a generic suite of indicators is applied to monitor the annual changes in LME productivity, fish and fisheries, pollution and ecosystem health, socioeconomics, and governance. Ecosystem-based governance practices are being implemented by Commissions that serve as institutional frameworks for restoring and sustaining transboundary LME goods and services. Under activities guided by LME Commissions, the suites of indicators are analyzed in relation to drivers of change and the results are applied to adaptive management regimes to reduce coastal pollution, restore damaged habitats, recover depleted fisheries conserve biodiversity, control nutrient over-enrichment and ocean acidification, and mitigate and adapt to the effects of climate warming. Application of ecosystem-based adaptive management practices presently underway by the People's Republic of China and the Republic of Korea are discussed for the Yellow Sea LME.

VISIT THE SCIENTIFIC PUBLICATIONS REPORT ARCHIVE

ADDITIONAL ARTICLE

AUTHORS

J. Otero, J. H. L'Abée-Lund, T. Antonsson, J. D. Armstrong, F. Arnason, J. V. Arnekleiv, J.-L. Baglinière, P. Caballero, T. Castro-Santos, J. B. Dempson, M. Dillane, M. Dionne, J. Erkinaro, S. Groom, S. Gudjonsson, G. Horton, N. A. Hvidsten, A. J. Jensen, E. Jokikokko, B. Jonsson, I. R. Jonsson, N. Jonsson, R. J. Kennedy, **J. F. Kocik (NMFS/NEFSC)**, A. Lamberg, K. Leonardsson, B. H. Letcher, H. Lundqvist, J. C. MacLean, S. McKelvey, P. A. Music, E. Niemelä, T. F. Næsje, R. Poole, G. Rogan, A. Romakkaniemi, I. C. Russell, Ø. Skaala, G. W. Smith, N. C. Stenseth, G. O. Storvik, H. Sægrov, B. H. Taylor, M. Taberner, A. E. Veselov, and L. A. Vøllestad

TITLE

Basin-scale phenology and effects of climate variability on global timing of initial seaward migration of Atlantic salmon (Salmo salar)

PUBLICATION DATE

Expected September 2013

JOURNAL

Global Change Biology

SIGNIFICANCE

- On average, the initiation of the smolt seaward migration has occurred 2.5 days earlier per decade throughout the basin of the North Atlantic.
- This shift in phenology matches changes in air, river, and ocean temperatures, suggesting that Atlantic salmon emigration is responding to the current global climate changes.

SUMMARY

Migrations between different habitats are key events in the lives of many organisms. Such movements involve annually recurring travel over long distances usually triggered by seasonal changes in the environment. Often, the migration is associated with travel to or from reproduction areas to regions of growth. Young anadromous Atlantic salmon (*Salmo salar*) emigrate from freshwater spawning areas during spring and early summer to feed and grow in the North Atlantic Ocean. The transition from the freshwater ('parr') stage to the migratory stage where they descend streams and enter salt water ('smolt') is characterized by morphological, physiological, and behavioural changes where the timing of this parr-smolt transition is cued by photoperiod and water temperature. Environmental conditions in the freshwater habitat control the downstream migration and contribute to within- and among river variation in migratory timing. Moreover, the timing of the freshwater emigration has probably evolved to meet environmental conditions in the ocean as these affect growth and survival of the post-smolts. Using generalized additive mixed-effects modeling, we analysed spatio-temporal variations in the dates of downstream smolt migration in 67 rivers throughout the North Atlantic during the last five decades and found that migrations were earlier in populations in the east than the west. After accounting for this spatial effect, the initiation of the downstream migration among rivers was positively associated with freshwater temperatures, up to about 10 °C and leveling off at higher values, and with sea surface temperatures. Earlier migration occurred when river discharge levels were low but increasing.

VISIT THE SCIENTIFIC PUBLICATIONS REPORT ARCHIVE

ADDITIONAL ARTICLE

AUTHORS

K. Sherman, K. D. Friedland, J. O'Reilly (ret), and I. M. Belkin **(NMFS/NEFSC)**

PUBLICATION DATE

Published 17 July 2013

TITLE

Changing states of North Atlantic large marine ecosystems

JOURNAL

Environmental Development

SIGNIFICANCE

- Sea surface temperatures were consistently trending upward in all 15 LMEs.
- High levels of nutrient loading from land based sources are predicted and may require mitigation actions.
- Fishery biomass yields were consistently increasing in all the northern LMEs examined.

SUMMARY

Effects of climate forcing are examined for 15 large marine ecosystems (LMEs) bordering the North Atlantic basin. Trends in multi-decadal time-series data of temperature, chlorophyll, primary productivity, nutrients, and fisheries yields differed among the LMEs. Responses to climate warming varied between northwestern and northeastern Atlantic LMEs, with warming rates influencing changes in northeast Atlantic LME plankton production and fisheries yields more directly than in LMEs of the northwest Atlantic, where warming rates are lower. In contrast, negative effects of nutrient over-enrichment in relation to harmful algal blooms and hypoxic conditions were greater in the northwest Atlantic LMEs. Forecasts suggest significant increases in nutrient over-enrichment of North Atlantic LMEs by 2050. Fishery time-series analyses suggest increases in fishery yields for sub-arctic LMEs, and declines in LMEs of more southerly latitudes.

LINK TO PAPER

http://dx.doi.org (DOI: 10.1016/j.envdev.2013.05.004)

VISIT THE SCIENTIFIC PUBLICATIONS REPORT ARCHIVE

ADDITIONAL ARTICLE

AUTHORS

A. K. Osterback, D. M. Frechette, A. O. Shelton, and **S. A. Hayes (NMFS/SWFSC)**

PUBLICATION DATE

Expected August 2013

TITLE

High predation on small populations: avian predation on imperiled salmonids

JOURNAL

Ecosphere

SIGNIFICANCE

- We developed a robust quantitative framework to better understand the impact of predation by an abundant generalist predator, adult Western Gulls, on populations of threatened wild juvenile steelhead in central California watersheds
- Predation rates estimated in this study provide the first estimate of overall predation rates of adult Western Gulls on juvenile wild steelhead. Predation rate estimates are almost an order of magnitude higher than minimum predation rates from tag recoveries alone, and can vary substantially among years.
- The role of avian predators on salmonid decline is often overlooked, however our research demonstrates that avian predation can be a significant source of mortality for juvenile salmonids and may contribute to salmonid decline.

SUMMARY

Generalist predators can contribute to extinction risk of imperiled prey populations even through incidental predation. Quantifying predation on small populations is important to manage their recovery, however predation is often challenging to observe directly. Recovery of prey tags at predator colonies can indirectly provide minimum estimates of predation, however overall predation rates often remain unquantifiable because an unknown proportion of tags are deposited off-colony. Here, we estimated overall predation rates on threatened wild juvenile steelhead (*Oncorhynchus mykiss*) by generalist adult Western Gulls (*Larus occidentalis)* in six central California (USA) watersheds. We estimated predation rates by gulls from the recapture of PIT (passive integrated transponder) tags that were originally inserted into steelhead and were subsequently deposited at a Western Gull breeding colony, Año Nuevo Island (ANI). We combined three independent datasets to isolate different processes: (1) the probability a tagged steelhead was consumed during predation, (2) the probability a consumed tag was transported to ANI, and (3) the probability a transported tag was detected at ANI. Together, these datasets parameterized a hierarchical Bayesian model to quantify overall predation rates while accounting for tag loss between when prey were tagged and subsequent tag detection at ANI. Results from the model suggest that low recovery rates of PIT tags from steelhead at ANI were mostly driven by low probabilities of transportation (≤0.167) of consumed tags to ANI. Low transportation probabilities equate to high per-capita probabilities of predation (≥0.306 per yr) at the three watersheds in closest proximity to ANI, whereas predation rates were uncertain at watersheds farther from ANI due to very low transportation rates. This study provides the first overall estimate of Western Gull predation rates on threatened wild juvenile steelhead and suggests gull predation on salmonids is a larger source of mortality than was previously estimated from minimum predation rates. This study thus represents an important example of high rates of incidental predation by a generalist consumer on an imperiled prey and provides a quantitative framework to inform robust estimates of predation rates on small populations that can be applied to other systems where direct observation of predation is not feasible.

VISIT THE SCIENTIFIC PUBLICATIONS REPORT ARCHIVE

ADDITIONAL ARTICLE

AUTHORS

N. F. Putman, **K. L. Mansfield (NMFS/SEFSC)**, R. He, D. J. Shaver, and P. Verley

PUBLICATION DATE

Accepted 25 July 2013

TITLE

Predicting the distribution of oceanic-stage Kemp's ridley sea turtles

JOURNAL

Biology Letters

SIGNIFICANCE

- This paper provides a new approach to defining oceanic juvenile habitat and dispersal for oceanic stage Kemp's ridely sea turtles in the Gulf of Mexico.
- This paper suggests that oceanic stage survival may vary annually (vs. the common assumptions that survival is static for all cohorts entering the ocean under different current and habitat regimes).

SUMMARY

The inaccessibility of open ocean habitat and the cryptic nature of small animals are fundamental problems when assessing the distribution of oceanic-stage sea turtles and other marine animals sharing similar life-history traits. Most methods that estimate patterns of abundance cannot be applied in situations that are extremely data-limited. Here we use a movement ecology framework to generate the first predicted distributions for the oceanic-stage of the Kemp's ridley sea turtle (*Lepidochelys kempii*). Our simulations of particle dispersal within ocean circulation models reveal substantial annual variation in distribution and survival among simulated cohorts. Such techniques can help prioritize areas for conservation and supply inputs for more realistic demographic models attempting to characterize population trends.

VISIT THE SCIENTIFIC PUBLICATIONS REPORT ARCHIVE

ADDITIONAL ARTICLE

AUTHORS

J. P. Manderson, L. L. Stehlik, J. Pessutti, J. Rosendale, and **B. Phelan (NMFS/NEFSC)**

PUBLICATION DATE

Accepted 2 August 2013

TITLE

Residence time and habitat persistence for higher trophic level predators in a small mid-Atlantic estuary

JOURNAL

Fishery Bulletin

SIGNIFICANCE

- Changes in the seasonal phenology of temperature, precipitation and human water use could change duration times that small estuarine tributaries serve as suitable habitats for commercially and recreationally important fish species.

SUMMARY

Residence times of individual fish should reflect the durations habitat resources support survival, metabolic maintenance, and adequate growth. From May through October, 2006 and 2007, we measured residencies of ultrasonically tagged age 1+ striped bass (*Morone saxatilis*; N=36), age 0 and age 1+ bluefish (*Pomatomus saltatrix*; N=45 and 35, respectively) and age 1+ weakfish (*Cynoscion regalis*; N=41) in a small estuarine tributary in New Jersey using ultrasonic receivers (N=32) to monitor movements and sensors to measure habitat resources. Striped bass and age 1+ bluefish used the estuary for medians of 9.5 days (d; max=58 d) and 22 d (max=88 d), while age-0 bluefish and weakfish were resident for medians of 30d (max=52 d) and 41 d (max=88 d). Small individuals were likely to remain in the estuary longer at warmer temperatures than large individuals. Size-dependent temperature responses were similar to optimal temperatures for growth reported in the literature. Freshwater discharge also influenced residence. All species were likely remain in the estuary until discharge rates fell to a value associated with transition from partially to fully mixed state. This transition weakens flows into the upstream salt front where prey concentrations are typically high.

ADDITIONAL ARTICLE

AUTHORS

P. M. Clay, A. Kitts, and **P. Pinto da Silva (NMFS/NEFSC)**

PUBLICATION DATE

Expected online November 2013

TITLE

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

JOURNAL

Marine Policy

SIGNIFICANCE

- This paper provides a measurement of social and economic outcomes for federal fisheries in the U.S. Northeast Region groundfish fishery.
- It describes a process to define indicators to measure the social and economic performance of catch share programs.

SUMMARY

In May 2010 the New England Fishery Management Council introduced a catch share program in the 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 collective 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.

VISIT THE SCIENTIFIC PUBLICATIONS REPORT ARCHIVE

ADDITIONAL ARTICLE

AUTHORS

H. Lehnert and **R. P. Stone (NMFS/AKFSC)**

PUBLICATION DATE

Expected 12 August 2013

TITLE

Four new species of Haplosclerida (Porifera, Demospongiae) *from the Aleutian Islands, Alaska*

JOURNAL

Zootaxa

SIGNIFICANCE

- Four new species of an order of spongers, Haplosclerida, are described from the Aleutian Islands, Alaska
- This study increases awareness of the species diversity of benthic ecosystems in the Aleutian Islands region.

SUMMARY

The four species described include: *Callyspongia mucosa* n. sp., *Cladocroce infundibulum* n. sp., *Cladocroce attu* n. sp. and *Cladocroce kiska* n. sp. The new species are described and compared to related species of the region. This is the northernmost record of the genus *Callyspongia* and the first record of the subgenus *Callyspongia* from the North Pacific Ocean.

ADDITIONAL ARTICLE

AUTHORS

M. De Jesus, G. Heckel, **J. Breiwick (NMFS/AKFSC)**, and S. Reilly.

PUBLICATION DATE

Accepted 26 July 2013

TITLE

Migration timing and distance from shore of southbound eastern Pacific gray whales (Eschrichtius robustus) *off Ensenada, Baja California, Mexico.*

JOURNAL

Marine Mammal Science

SIGNIFICANCE

- This paper adds to the body of scientific information on eastern Pacific gray whale southbound migration timing and the migration corridor off Baja California, Mexico.

SUMMARY

Eastern Pacific gray whales were monitored off Ensenada (Mexico) during the southbound migration. The objectives were to determine southbound migration timing and width of the corridor during three annual migration seasons (2003-2006). The onset of the migration off Ensenada was in late December/early January and ended around the 13th of February. The first and third season were very similar in duration with the median date for the season occurring between January 23rd and 26th. The second season, however, had a median date a week earlier. Boat surveys indicated a wide (20km) migration corridor but most gray whales traveled within 9.9 km from shore. The estimated total number of whales during watch hours was 2,298 (95% CI = 40 1,536–4,447). Calculations on how the authors determined the onset and duration of the migration season as well as estimates for the abundance of whales migrating during that time are explained in detail in the full article.

VISIT THE SCIENTIFIC PUBLICATIONS REPORT ARCHIVE

ADDITIONAL ARTICLE

AUTHORS

T. T. Jones (NMFS/PIFSC), K. S. Van Houtan (NMFS/PIFSC), B. L. Bostrom, P. Ostafichuk, J. Mikkelsen, E. Tezcan, M. Carey, B. Imlach, and **J. A. Seminoff (NMFS/SWFSC)**

PUBLICATION DATE

Accepted 6 August 2013

TITLE

Calculating the ecological impacts of animal-borne instruments on aquatic organisms

JOURNAL

Methods in Ecology and Evolution

SIGNIFICANCE

- As technology for animal-borne instrumentation rapidly improves it is increasingly being used to study migration and other behaviors of free-ranging fish and wildlife.
- Accurate results from such studies require understanding the drag caused by the instruments and applying appropriate corrections to observed animal behavior.
- The authors used marine turtles as a model to estimate the drag of commercial tags in aquatic animals. They provide guidelines on assessing drag caused by animal-borne instruments and discuss the potential ecological impacts to marine organisms.

SUMMARY

Animal-borne instruments provide researchers with valuable data to address important questions on wildlife ecology and conservation. However, these devices have known impacts to animal behavior and energetics. For marine organisms, the only tagging guidelines that exist are based on lift and thrust impacts to birds – concepts that do not translate well to aquatic animals. Here we used marine turtles as model aquatic organisms and conducted wind tunnel experiments to measure the fluid drag of commercial tags. Most tags caused minimal additional drag (< 5%) to adult animals, but the same devices increased the drag for juveniles significantly (> 100%). We then used concepts of fluid dynamics to create a universal equation estimating drag impacts from instruments across marine taxa. Tags deployed on migrating animals may reduce reproductive-output through increased energy demands or cause phenological mismatches of foraging and nesting events. Herein we provide guidelines on assessing drag from animal-borne instruments and discuss the ecological impacts to marine organisms.

ADDITIONAL ARTICLE

AUTHORS

J. M. Quattro, **W. B. Driggers III (NMFS/SEFSC)**, J. M. Grady, G. F. Ulrich, and M. A. Roberts

PUBLICATION DATE

Accepted 7 July 2013

TITLE

Sphyrna gilberti sp. nov., a new hammerhead shark, (Carcharhiniformes, Sphyrnidae) *from the western North Atlantic Ocean*

JOURNAL

Zootaxa

SIGNIFICANCE

- The authors describe a new species of hammerhead shark found off the coast of South Carolina.
- As the new species is morphologically indistinguishable from scalloped hammerheads, estimates of abundance for scalloped hammerheads could be lower than currently suggested.
- The range of and potential impact of fisheries on of this new species are unknown.

SUMMARY

Sphyrna gilberti sp. nov. is described based on 54 specimens collected in the coastal waters of South Carolina, USA. Analyses indicate *S. gilberti* sp. nov. is morphologically almost inseparable from *S. lewini* (Griffith & Smith, 1834), with differences in the number of precaudal vertebrae being the only means for separation at present. Due to rarity of specimens and the highly migratory behavior of most sphyrnids, the range of *S. gilberti* sp. nov. is unknown.

Sphyrna gilberti