

NOAA SCIENTIFIC PUBLICATIONS REPORT MAY 14, 2015

HIGHLIGHTED ARTICLES

[Advances in methods for marine mammal and fish stock assessments: Thermal imagery and CamTrawl](#)

Marine Technology Society Journal (0.678)

[Analyzing large-scale conservation interventions with Bayesian hierarchical models: A case study of supplementing threatened Pacific salmon](#)

Ecology and Evolution (1.658)

[Assessing demographic effects of dams on diadromous fish: A case study for Atlantic salmon in the Penobscot River, Maine](#)

ICES Journal of Marine Science (2.525)

[Causes and impacts of the 2014 warm anomaly in the NE Pacific](#)

Geophysical Research Letters (4.456)

[Future of our coasts: The potential for natural and hybrid infrastructure to enhance the resilience of our coastal communities, economies, and ecosystems](#)

Environmental Science and Policy (3.948)

[Temporal variation in diet composition and use of pulsed resource subsidies by juvenile Sablefish](#)

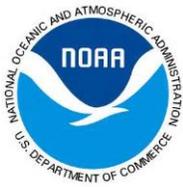
Transactions of the American Fisheries Society (1.314)

ADDITIONAL ARTICLES

CROSS-LINE OFFICE PUBLICATIONS

[A comparison of multi-scale GSI-based EnKF and 3DVar data assimilation using radar and conventional observations for mid-latitude convective-scale precipitation forecasts](#)

Monthly Weather Review (2.76)



NOAA SCIENTIFIC PUBLICATIONS REPORT MAY 14, 2015

[Late summer early fall phytoplankton biomass \(chlorophyll *a*\) in the eastern Bering Sea: Spatial and temporal variations and factors affecting chlorophyll *a* concentrations](#)

Deep Sea Research II (2.763), Bering Sea 4th Special Issue

NOS PUBLICATIONS

[Brevetoxin-associated mass mortality event of bottlenose dolphins and manatees along the east coast of Florida, USA](#)

Marine Ecology Progress Series (2.64)

[Comparison of gravity for the redefinition of the American vertical datum airborne gravity processing results by GravPRO and Newton software packages](#)

Geophysics (1.662)

NWS PUBLICATIONS

[Independence Day Holiday Weekend 2010 Flood on the South Plains of West Texas](#)

Journal of Operational Meteorology (1.702)

NESDIS PUBLICATIONS

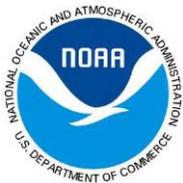
[A large-scale view of Space Technology 5 magnetometer response to solar wind drivers](#)

Earth and Space Science

OAR PUBLICATIONS

[Sensitivity of idealized supercell simulations to horizontal grid spacing: Implications for warn-on-forecast](#)

Monthly Weather Review (2.76)



NOAA SCIENTIFIC PUBLICATIONS REPORT
MAY 14, 2015

[Weather radar polarimetry: Dual-polarization radar promises to improve the modeling of convective storms](#)

Physics Today (5.648)

NMFS PUBLICATIONS

[Depth distribution, habitat associations, and differential growth of newly settled southern Tanner crab \(*Chionoecetes bairdi*\) in embayments around Kodiak Island, Alaska](#)

Fisheries Bulletin (1.783)

[Genetic identification of Chinook Salmon: Stock-specific distributions of juveniles along the Washington and Oregon coast](#)

Marine and Coastal Fisheries (1.810)

[Rethinking the longitudinal stream temperature paradigm: Region-wide comparison of thermal infrared imagery reveals unexpected complexity of river temperatures](#)

Hydrological Processes (2.696)

[Disentangling the contributions of ocean ranching and net-pen aquaculture in the successful establishment of Chinook salmon in a Patagonian basin](#)

Environmental Biology of Fishes (1.360)

[Discovery and characterization of single nucleotide polymorphisms in Coho salmon, *Oncorhynchus kisutch*](#)

Molecular Ecology Resources (5.626)

[Sedimentary facies, geomorphic features and habitat distribution at the Hudson Canyon head from AUV multibeam data](#)

Deep Sea Research II (2.763)

[Does reproductive investment decrease telomere length in *Menidia menidia*?](#)



NOAA SCIENTIFIC PUBLICATIONS REPORT
MAY 14, 2015

PLoS ONE (3.534)

[A tradeoff between precopulatory and postcopulatory trait investment in male cetaceans](#)

Evolution (4.659)

[Vertical and horizontal habitat use by white marlin *Kajikia albida* \(Poey, 1860\) in the western North Atlantic Ocean](#)

ICES Journal of Marine Science (2.525)

[Faunal features of submarine canyons on the eastern Bering Sea slope](#)

Marine Ecology Progress Series (2.64)

[Watershed geomorphology and snowmelt control stream thermal sensitivity to air temperature](#)

Geophysical Research Letters (4.456)

[A safer protocol for field immobilization of leopard seals \(*Hydrurga leptonyx*\)](#)

Marine Mammal Science (1.82)

[Balancing conservation and harvest objectives a review of considerations for management of salmon hatcheries in the Pacific Northwest](#)

North American Journal of Aquaculture (0.71)

[A subtropical embayment serves as essential habitat for sub-adults and adults of the critically endangered smalltooth sawfish](#)

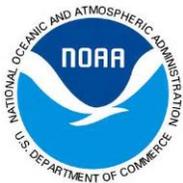
Global Ecology and Conservation (7.242)

[Spring bloom dynamics and zooplankton biomass response on the US Northeast Continental Shelf](#)

Continental Shelf Research (1.470)

[Fact and fiction regarding wood placement in streams](#)

Canadian Journal of Fisheries and Aquatic Sciences (2.276)



NOAA SCIENTIFIC PUBLICATIONS REPORT MAY 14, 2015

[Age at maturity, skipped spawning, fecundity, and site fidelity of female sablefish \(*Anoplopoma fimbria*\) during the spawning season](#)

Fishery Bulletin (1.783)

[Using measurement error models to account for georeferencing error in species distribution models](#)

Ecography (4.207)

[Interpreting the FLOCK algorithm from a statistical perspective](#)

Molecular Ecology Resources (5.626)

OTHER REPORTS, BOOK CHAPTERS, AND INTERNAL PUBLICATIONS

NWS PUBLICATIONS

[Changing of the guard: Satellite will warn Earth of solar storms](#)

EOS Transactions

NESDIS PUBLICATIONS

[Rescue, Archival and Stewardship of Weather Records and Data](#)

WMO Bulletin

HIGHLIGHTED ARTICLES

Advances in Methods for Marine Mammal and Fish Stock Assessments: Thermal Imagery and CamTrawl

Marine Technology Society Journal (0.678)

M. Sigler, D. DeMaster, P. Boveng, M. Cameron, E. Moreland, K. Williams, and R. Towler (NMFS/AKFSC)

- Describes of two new technologies that NOAA deploys in the Arctic.
- Thermal detection surveys require fewer personnel and less postsurvey processing time, can be flown at a higher altitude (reducing disturbance of seals), and yield higher rates of detection for ice seal surveys.
- An integrated a camera system in the aft portion of a trawl, the CamTrawl concentrates on marine organisms and presents this captive group to the cameras without having to recover them for onboard counting.



NOAA SCIENTIFIC PUBLICATIONS REPORT MAY 14, 2015

Two new technologies that NOAA deploys in the Arctic are an advanced thermal imaging technology used to survey ice seal abundance and a high-resolution, nonlethal technology that integrates cameras and trawls to sample pelagic fishes (CamTrawl). The thermal imaging was used during ice seal surveys to detect warm seal bodies hauled out on cold sea ice, and when compared to observer-based surveys, the thermal imaging detection surveys required fewer personnel and less postsurvey processing time. They can also be flown at a higher altitude, thus reducing disturbance of seals, and yield higher rates of seal detection. The CamTrawl is a self-contained stereo-camera system that is fitted to the aft end of a trawl, allowing the cod end (i.e., capture bag) to be left open allowing animals to escape. Positioning a camera system in the aft portion of a trawl allows researchers to record all the marine organisms captured during the trawl and presents this captive group to the cameras without having to recover them for onboard counting, as in traditional trawl tows where the animals are sorted on the deck of the trawler. Compared to traditional survey methods, the CamTrawl more precisely places marine organisms spatially in their environment, which is useful because of small-scale variation in the composition and distribution of fish schools.

Expected Publication Date: April 30, 2015

Analyzing large-scale conservation interventions with Bayesian hierarchical models: A case study of supplementing threatened Pacific salmon
Ecology and Evolution (1.658)

M. D. Scheuerell, E. Buhle, B. X. Semmens, M. J. Ford, T. Cooney
(NMFS/NWFSC), and R. W. Carmichael

- Varying degrees of supplementation with hatchery fish over a period of 25 years increased the density of natural-origin adults, on average, by 0 to 8% relative to non-supplementation years.
- 39 of 43 year effects were at least two times greater than the mean supplementation effect, suggesting common environmental variables play a more important role in driving inter-annual variability in adult density than hatchery supplementation.
- While there was considerable variation across the region, there was no systematic difference in adult populations between supplemented and reference populations.



NOAA SCIENTIFIC PUBLICATIONS REPORT MAY 14, 2015

Evaluating the effectiveness of conservation interventions (e.g. habitat restoration, protected areas, and captive breeding) requires appropriate statistical methods given the quantity and quality of available data. Here the authors applied a Bayesian hierarchical time series model more commonly used in financial market analysis to a 43-year time series of adult Chinook salmon (*Oncorhynchus tshawytscha*) populations from the Snake River basin in the northwestern United States to evaluate the effects of a large-scale supplementation program on the density of adult salmon. They found that varying degrees of supplementation over a period of 25 years increased the density of natural-origin adults, on average, by 0 to 8% relative to non-supplementation years. Thirty-nine of the 43 year effects were at least two times greater than the mean supplementation effect, suggesting that common environmental variables play a more important role in driving inter-annual variability in adult density. Residual variation in density varied considerably across the region, but no systematic difference between supplemented and reference populations was found. These results demonstrate the power of hierarchical Bayesian models to detect the diffuse effects of management interventions and to quantitatively describe the variability of intervention success. However, this study could not address whether ecological factors (e.g., competition) were more important than genetic considerations (e.g., inbreeding depression) in determining the response to supplementation.

Publication Accepted: April 5, 2015

Assessing demographic effects of dams on diadromous fish: a case study for Atlantic salmon in the Penobscot River, Maine

ICES Journal of Marine Science (2.525)

J. L. Nieland, T. F. Sheehan (NMFS/NEFSC), and R. Saunders (NMFS/GARFO)

- Describes a population viability analysis used to estimate the effects of dams on diadromous fishes, using Atlantic salmon in the Penobscot River, Maine, as a case study.
- The abundance and distribution of adult Atlantic salmon increased in upper areas of the Penobscot River watershed when fewer mainstem dams were located in the watershed or passage efficiency at these dams was increased.



NOAA SCIENTIFIC PUBLICATIONS REPORT MAY 14, 2015

- Salmon abundance increased more when marine survival was increased compared to when freshwater survival was increased.

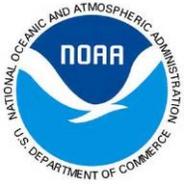
Dams are a major contributor to the historic decline and current low abundance of diadromous fishes. The authors developed a population viability analysis to assess demographic effects of dams on diadromous fishes within a river system, using Atlantic salmon in the Penobscot River, Maine as a case study. The abundance and distribution of wild- and hatchery-origin adult salmon throughout the watershed were used as performance metrics. The analysis found that salmon abundance, distribution to upper reaches of the Penobscot watershed, and the number and proportion of wild-origin fish in the upper reaches of the Penobscot watershed increased when dams, particularly mainstem dams, were removed or passage efficiency was increased. Salmon abundance increased as marine or freshwater survival rates were increased, but the increase in abundance was larger for increased marine survival compared to increased freshwater survival. Models like this one that incorporate biological, environmental, and functional parameters can be useful in evaluating and prioritising management and restoration actions for diadromous fishes.

Publication Accepted: April 16, 2015

Future of our coasts: The potential for natural and hybrid infrastructure to enhance the resilience of our coastal communities, economies, and ecosystems
Environmental Science and Policy (3.948)

A. Sutton-Grier (NOS), K. Wowk (NOS), and H. Bamford (NOAA Deputy Administrator)

- Both natural infrastructure (i.e., healthy ecosystems) and hybrid infrastructure (combination of natural and built features) provide important benefits to society and coastal risk reduction.
- These approaches are key to increasing coastal resilience to climate change.
- Now is the time to incorporate natural and hybrid approaches into coastal planning.
- More research is needed on both natural and hybrid infrastructure for coastal protection from storms and erosions, but we know enough about the protective benefits of these approaches that they should become a bigger part of coastal resilience planning efforts in the U.S. and around the world.



NOAA SCIENTIFIC PUBLICATIONS REPORT MAY 14, 2015

There is substantial evidence that natural infrastructure (i.e., healthy ecosystems) and combinations of natural and built infrastructure (“hybrid” approaches) enhance coastal resilience by providing important storm and coastal flooding protection, while also providing other benefits. There is growing interest in the U.S., as well as around the world, to use natural infrastructure to help coastal communities become more resilient to extreme events and reduce the risk of coastal flooding. The authors highlight strengths and weaknesses of the coastal protection benefits provided by built infrastructure, natural ecosystems, and the innovative opportunities to combine the two into hybrid approaches for coastal protection. They also examine case studies where hybrid approaches are being implemented to improve coastal resilience as well as some of the policy challenges that can make implementation of these approaches more difficult. Based on this analysis, the authors conclude that coastal communities and other decision makers need better information in order to incorporate ecosystem protection and restoration into coastal resilience planning efforts. As additional projects are developed, it is important to capitalize on every opportunity to learn more about the cost of natural and hybrid infrastructure projects, the value of the storm and erosion protection benefits provided, and the full suite of co-benefits provided by healthy coastal ecosystems. The authors highlight the top priorities for research, investment in, and application of natural and hybrid approaches. These data are critical to facilitate adoption of these approaches in planning and decision-making at all levels to enhance the resilience of our coasts.

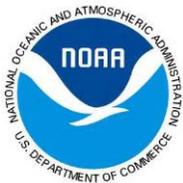
Publication Accepted: April 8, 2015

Causes and impacts of the 2014 warm anomaly in the NE Pacific

Geophysical Research Letters (4.456)

N. Bond (OAR/PMEL), M. Cronin (OAR/PMEL), H. Freedland, and N. Mantua (NMFS/SWFSC)

- The same persistent weather pattern that caused exceptionally low precipitation in California in 2013-14 also caused the development of a “warm blob” in the southern part of the Gulf of Alaska.
- This “warm blob” was characterized by high sea surface temperature and ocean mixed layer temperature anomalies in the winter/spring of 2014



NOAA SCIENTIFIC PUBLICATIONS REPORT MAY 14, 2015

- The “warm blob” that was originally offshore expanded into coastal waters by late spring and summer of 2014, and this coastal warming was associated with many anomalous ecosystem observations

Strongly positive temperature anomalies developed in the NE Pacific Ocean during the boreal winter of 2013-14. Based on a mixed layer temperature budget, these anomalies were caused by lower than normal rates of the loss of heat from the ocean to the atmosphere, and of relatively weak cold advection in the upper ocean. Both of these mechanisms can be attributed to an unusually strong and persistent weather pattern featuring much higher than normal sea level pressure over the waters of interest. This anomaly was the greatest observed in this region since at least the 1980s. The region of warm SST anomalies subsequently expanded and reached coastal waters in spring and summer 2014. Impacts on fisheries and regional weather are discussed. It is found that sea surface temperature anomalies in this region affect air temperatures downwind in Washington state.

Accepted: 1 April 2015

Link to full article:

<http://onlinelibrary.wiley.com/wo11/doi/10.1002/2015GL063306/full>

Temporal variation in diet composition and use of pulsed resource subsidies by juvenile Sablefish

Transactions of the American Fisheries Society (1.314)

K. M. Coutré, A. H. Beaudreau, and **P. W. Malecha (NMFS/AKFSC)**

- Salmon are a seasonally important component of juvenile Sablefish diets.
- This is one of the first studies to document a marine teleost species (Sablefish) scavenging on adult salmon carcasses in coastal marine waters.

Pulsed resources create an influx of energy that can provide individual and population level benefits to their consumers. As consumers, Sablefish, *Anoplopoma fimbria*, experience strong seasonal pulses in prey resources during their critical period of juvenile growth in the nearshore marine environment. This study described temporal patterns in the diet composition of over 1,000 juvenile Sablefish caught in St. John Baptist Bay, Alaska, during July and September. Juvenile Sablefish exploited a large variety of prey taxa characteristic of a generalist predator, but showed significant diet shifts among sampling periods revealing seasonal and interannual variation in resource use. Diets appeared more



NOAA SCIENTIFIC PUBLICATIONS REPORT MAY 14, 2015

diverse in 2012 when more invertebrate taxa were consumed, compared to 2013, when diets were dominated by herring and salmonid offal. In both Septembers, spawning Pink Salmon, *Oncorhynchus gorbuscha*, were observed within the study area and juvenile Sablefish capitalized on this high energy subsidy - salmon carcasses were among the top contributors to juvenile Sablefish diets during both years of the study. However, Sablefish also exploited lower energy in situ prey, such as benthic invertebrates, suggesting that they are not entirely reliant on seasonally pulsed, high energy prey. This study further emphasizes the significance of salmon as a vector of energy across ecosystems and is one of the first to document a marine teleost species scavenging on adult salmon carcasses in coastal marine waters.

Accepted: 20 March 2015

ADDITIONAL ARTICLES

CROSS LINE-OFFICE PUBLICATIONS

A comparison of multi-scale GSI-based EnKF and 3DVar data assimilation using radar and conventional observations for mid-latitude convective-scale precipitation forecasts

Monthly Weather Review (2.76)

A. Johnson, X. Wang, **J. Carley (NWS/NCEP)**, **L. Wicker**, and **C. Karstens (OAR/NSSL)**

- Ensemble-based data assimilation systems were more skillful than the conventional GSI-based 3DVar at both meso- and storm-scales for forecasting 8-hour precipitation totals.
- The current state of 3DVar within the GSI is not well suited for the assimilation of high-resolution mesoscale and storm-scale data.
- These results support development of ensemble-based data assimilation methods (potentially including hybrid methods) for meso- and storm-scale prediction.

A GSI-based data assimilation (DA) system, including 3-Dimensional Variational assimilation (3DVar) and Ensemble Kalman Filter (EnKF), was extended to the multi-scale assimilation of both meso- and synoptic-scale observation networks and convective-scale radar reflectivity and velocity observations. EnKF and 3DVar



NOAA SCIENTIFIC PUBLICATIONS REPORT MAY 14, 2015

were systematically compared in this multi-scale context to better understand the impacts of differences between the DA techniques on the analyses at multiple scales and the subsequent convective-scale precipitation forecasts.

Averaged over ten diverse cases, 8-hour precipitation forecasts initialized using GSI-based EnKF were more skillful than those using GSI-based 3DVar, both with and without storm-scale radar DA. The advantage from radar DA persists for ~5h using EnKF, but only ~1h using 3DVar. A case study of an upscale growing MCS was also examined. The better EnKF-initialized forecast is attributed to more accurate analyses of both the mesoscale environment and the storm scale features. The mesoscale location and structure of a warm-front was more accurately analyzed using EnKF than 3DVar. Furthermore, storms in the EnKF multi-scale analysis were maintained during the subsequent forecast period. However, storms in the 3DVar multi-scale analysis were not maintained and generated excessive cold pools. Therefore, while the EnKF forecast with radar DA remains better than the forecast without radar DA throughout the forecast period, the 3DVar forecast quality is degraded by radar DA after the first hour. Diagnostics revealed that the inferior analysis at meso- and storm-scales for the 3DVar is primarily attributed to the lack of flow-dependence and cross-variable correlation, respectively, in the 3DVar static background error covariance.

Expected Publication: 10 April 2015

Available Online: <http://journals.ametsoc.org/doi/abs/10.1175/MWR-D-14-00345.1?af=R>

*Late summer early fall phytoplankton biomass (chlorophyll *a*) in the eastern Bering Sea: spatial and temporal variations and factors affecting chlorophyll *a* concentrations*

Deep Sea Research II (2.763), Bering Sea 4th Special Issue

L. B. Eisner (NMFS/AKFSC), J. C. Gann (NMFS/AKFSC), C. Ladd (OAR/PMEL), K. Ciciel (NMFS/AKFSC), C. W. Mordy (OAR/PMEL)

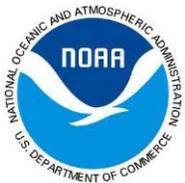
- Total phytoplankton chlorophyll *a* was significantly higher in warm compared to cold years on the south-outer Bering Sea shelf and on portions of the middle shelf. In contrast, the northeastern Bering Sea chlorophyll *a* did not vary between warm and cold regimes.



NOAA SCIENTIFIC PUBLICATIONS REPORT MAY 14, 2015

- chlorophyll *a* in summer and early fall is positively affected by wind-induced upwelling of nutrients to the surface and possibly by other bottom up effects such as temperature-mediated growth.

The spatial and temporal variability of late summer/early fall phytoplankton biomass estimated from *in situ* chlorophyll *a* (Chl*a*) concentrations was investigated over a 10-year time period from 2003-2012 in the eastern Bering Sea, encompassing both warm, (2003-2005) and cold (2007-2012) temperature regimes. Warm temperature regimes were characterized by above average water temperatures and low seasonal sea ice extent and cold by below average temperatures and high seasonal sea ice extent. The highest phytoplankton Chl*a* was observed near the Pribilof Islands and the southeastern shelf break where nutrient concentrations were high due to onshore flow from Pribilof and Bering Canyons. The lowest Chl*a* was observed on the northeastern middle and inner shelf, north of Nunivak and St. Matthew Islands and south of St. Lawrence Island (~61- 63°N). Stations north of St. Matthew Island (61°N) did not show significant variations in Chl*a* between temperature regimes. To the south, total phytoplankton Chl*a* was significantly higher in warm compared to cold years on the south-outer shelf and on portions of the middle shelf. Large phytoplankton Chl*a* was higher in warm years over most of the southern middle-shelf. For the entire southeastern Bering Sea shelf (~30-200 m bathymetry, south of Nunivak Island), the highest Chl*a* was seen in 2005 and lowest in 2007 and 2008. On the south-middle shelf, wind mixing and temperature below the pycnocline had strong positive associations with Chl*a* (total and large-size fraction) integrated over the top 50 m, explaining 85% of the variability in mean Chl*a*. This indicates that Chl*a* in summer and early fall is positively affected by wind-induced upwelling of nutrients to the surface and possibly by other bottom up effects such as temperature-mediated growth. Higher bottom temperature is related to reductions in sea ice extent which may elicit ecosystem responses such as reduced biomass of large crustacean zooplankton grazers, potentially due to the removal of ice algae, an important food resource for zooplankton in early spring. This, in turn, could reduce or alter the grazing pressure on phytoplankton later in the growing season. Overall, spatial and temporal variations in phytoplankton Chl*a* are due to a combination of factors,



NOAA SCIENTIFIC PUBLICATIONS REPORT MAY 14, 2015

from local inputs of nutrients related to mixing or advection, to large scale ecosystem effects.

Expected Publication: Summer 2015

NOS PUBLICATIONS

Brevetoxin-associated mass mortality event of bottlenose dolphins and manatees along the east coast of Florida, USA

Marine Ecology Progress Series (2.64)

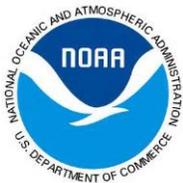
S. E. Fire, L. J. Flewelling, M. Stolen, W. N. Durden, M. de Wit, A. C. Spellman, **Z. Wang (NOS/NCCOS)**

- This study is the first to document a brevetoxin-associated marine mammal mortality event along the Atlantic coast of Florida.
- It also demonstrates that, despite the rarity of *K. brevis* blooms in this region, significant negative impacts to marine mammals inhabiting this region can occur.
- The toxic algal species *Karenia brevis* should be monitored along both west and east coasts of Florida for HAB forecasts and damage prevention or mitigation.

A mass mortality of bottlenose dolphins *Tursiops truncatus* and Florida manatees *Trichechus manatus latirostris* co-occurred with a severe bloom of the toxic algal species *Karenia brevis* along the eastern coast of Florida, USA, between October 2007 and January 2008. Brevetoxin (PbTx), a potent neurotoxin produced by this marine alga, was detected in 69 and 92% of tested carcasses of manatees and dolphins, respectively, at concentrations similar to those reported for earlier mortality events along the west coast of Florida. Brevetoxin was also detected in fetal and neonate dolphins, providing evidence of maternal transfer of the toxin in wild populations. Marine mammal mass mortality events caused by toxic algal species *Karenia brevis* generally occur along the west coast of Florida. This toxic species can also cause damage along the east coast of Florida.

Accepted: February 2015

Comparison of gravity for the redefinition of the American vertical datum airborne gravity processing results by GravPRO and Newton software packages



NOAA SCIENTIFIC PUBLICATIONS REPORT MAY 14, 2015

Geophysics (1.662)

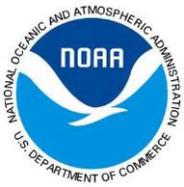
D. Zhong, **T. M. Damiani**, and **S. Ann (NOS/NGS)**

- Validation and comparison of NOAA's in-house airborne gravity processing software (GravPRO) with a commercial software package.
- Spotlights the high quality of the GRAV-D airborne gravity data that will be used to create the next national vertical datum.

Zero-length spring gravity sensors are widely used in airborne gravimetry applications due to their virtually drift-free characteristics. However, the quality of the final gravity product depends on the methods chosen to correct for several dynamic effects, including the vertical acceleration correction of the moving aircraft and the instrument platform tilt correction. For geodetic applications using regional gravity field mapping, the choice of correction method are extremely important because data collection flights are done uncommonly high and fast. For this reason, and in support of the Gravity for the Redefinition of the American Vertical Datum (GRAV-D) project, NOAA's National Geodetic Survey and Fugro Geospatial have independently developed airborne gravity processing software packages for TAGS data — called Newton and Grav-PRO, respectively. The authors evaluated the airborne gravity data processing methods that are used in the two software packages by processing a GRAV-D data set collected by NGS over Louisiana and the Gulf of Mexico in 2008 with both packages. The results determined that the two software packages were very comparable, both yielding an excellent crossover root-mean-square of 1.8 mGal without any crossover adjustment applied. For the worst 14% of survey lines, which had higher levels of aircraft dynamics during flight, GravPRO was able to retain more data due to advantages in its platform tilt correction method. Also, GravPRO's instrument calibration function, which is based on crossover error analysis, found a 45% improvement in achievable survey precision from approximately 2 mGal to approximately 1 mGal when comparing the test data set to a global gravity model. Expected Publication Date: May 2015

NWS PUBLICATIONS

Independence Day Holiday Weekend 2010 Flood on the South Plains of West Texas



NOAA SCIENTIFIC PUBLICATIONS REPORT MAY 14, 2015

Journal of Operational Meteorology (1.702)

J. D. Vitale, J. Lipe, and T. T. Lindley (NWS/WFO)

- Operational forecasters with the NWS can better anticipate extreme heavy rain and flooding events

An exceptionally rare flood and flash flood took place on the South Plains of West Texas during the Independence Day holiday weekend of 2010. Several daily and monthly record rainfall totals were broken across a wide region during this multi-day event. Lubbock Preston Smith International Airport recorded a storm total 155 mm (6.12 in) over four days and set daily records on 2 and 3 July when 56 mm (2.19 in) and 83 mm (3.27 in) were observed, respectively. The most notable impact was the failure of an earthen dam which emptied a 24 ha (60 acre) lake along the Upper Brazos River. The resulting flood ruptured pipelines that led to an oil spill. Much of this excessive rainfall was due to the influence of moisture from the remnants of Hurricane Alex. This abundant tropical moisture set the stage to create heavy rainfall from 1-4 July that reached a peak during the overnight hours of 3-4 July due to a mesoscale convective vortex (MCV). Warm-rain precipitation production processes were greatly enhanced during this event which contributed to excessive heavy rainfall.

Expected publication date: 21 April 2015

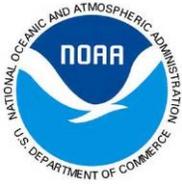
NESDIS PUBLICATIONS

A large-scale view of Space Technology 5 magnetometer response to solar wind drivers

Earth and Space Science

D. J. Knipp, L. M. Kilcommons, J. Gjerloev, **R. J. Redmon (NESDIS/NGDC)**, J. Slavin, and G. Le

- The authors mapped magnetic perturbation data from the Space Technology 5 mission to a reference altitude and provided them in common data format for community use.
- This allows for efficient inter-satellite comparisons of magnetic perturbations from both hemispheres.
- Our methods form the basis for future intermission comparisons of space-based magnetometer data.



NOAA SCIENTIFIC PUBLICATIONS REPORT MAY 14, 2015

In this data report we discuss reprocessing of the Space Technology 5 (ST5) magnetometer database for inclusion in NASA's Coordinated Data Analysis Web (CDAWeb) virtual observatory. The mission consisted of three spacecraft flying in elliptical orbits, from 27 March to 27 June 2006. Reprocessing includes (1) transforming the data into the Modified Apex Coordinate System for projection to a common reference altitude of 110 km, (2) correcting gain jumps, and (3) validating the results. We display the averaged magnetic perturbations as a keogram, which allows direct comparison of the full-mission data with the solar wind values and geomagnetic indices. With the data referenced to a common altitude, we find the following: (1) Magnetic perturbations that track the passage of corotating interaction regions and high-speed solar wind; (2) unexpectedly strong dayside perturbations during a solstice magnetospheric sawtooth oscillation interval characterized by a radial interplanetary magnetic field (IMF) component that may have enhanced the accompanying modest southward IMF; and (3) intervals of reduced magnetic perturbations or “calms,” associated with periods of slow solar wind, interspersed among variable-length episodic enhancements. These calms are most evident when the IMF is northward or projects with a northward component onto the geomagnetic dipole. The reprocessed ST5 data are in very good agreement with magnetic perturbations from the Defense Meteorological Satellite Program (DMSP) spacecraft, which we also map to 110 km. We briefly discuss the methods used to remap the ST5 data and the means of validating the results against DMSP. Our methods form the basis for future intermission comparisons of space-based magnetometer data.

Accepted: 25 March 2015

Link to full text:

<http://onlinelibrary.wiley.com/doi/10.1002/2014EA000057/abstract>

OAR PUBLICATIONS

Sensitivity of idealized supercell simulations to horizontal grid spacing:

Implications for Warn-on-Forecast

Monthly Weather Review (2.76)

C. K. Potvin (OAR/NSSL), and M. L. Flora



NOAA SCIENTIFIC PUBLICATIONS REPORT MAY 14, 2015

- The Warn-on-Forecast (WoF) program aims to deploy real-time prediction systems that combine a variety of data to improve short-term forecasts of tornadoes, flooding, lightning, damaging wind, and large hail.
- Researchers found that ensemble prediction systems need horizontal grid data with spacing less than 1 km to ensure that resolution errors do not limit the spatiotemporal precision of tornado warnings from rapid low-level rotation intensification.
- Larger-scale features of interest, including approximate locations of heaviest rainfall and highest tornado potential, were captured with grid spacings up to 3 km.
- However, model sensitivity to grid spacing varied considerably with storm environments.
- Improved understanding of grid spacing dependence will be needed to properly interpret and calibrate ensemble output, and to optimize tradeoffs between model resolution and other computationally constrained parameters like ensemble size and forecast lead time.

The Warn-on-Forecast (WoF) program aims to deploy real-time, ensemble data assimilation and prediction systems to improve short-term forecasts of tornadoes, flooding, lightning, damaging wind, and large hail. The authors examined grid spacing sensitivities of simulated supercells over Δx of 333 m - 4 km. Storm environment and physics parameterization were varied among the simulations. The results suggested that 4-km grid spacing is too coarse to reliably simulate supercells, whereas 3-km simulations more often capture important features, including low-level rotation tracks. Further decreasing Δx to 1 km enables useful forecasts of rapid changes in low-level rotation intensity, though significant errors remain (e.g., in timing). Grid spacing dependencies varied substantially among the experiments, suggesting that accurate calibration of ensemble output requires better understanding of how storm characteristics, environment, and parameterization schemes modulate grid spacing sensitivity. Much of the sensitivity arose from poorly resolving small-scale processes that impact larger (well-resolved) scales. Repeating some of the 333-m simulations with coarsened initial conditions revealed that supercell forecasts can substantially benefit from reduced grid spacing even when limited observational density precludes fine-scale



NOAA SCIENTIFIC PUBLICATIONS REPORT MAY 14, 2015

initialization. Until convection-resolving (horizontal grid spacing $\Delta x < 100$ m) systems become available, however, resolution errors will limit the accuracy of ensemble model output. Improved understanding of grid spacing dependence on simulated convection is therefore needed to properly calibrate and interpret ensemble output and to optimize tradeoffs between model resolution and other computationally constrained parameters like ensemble size and forecast lead time. Expected Publication: April 1, 2015

Available Online: <http://journals.ametsoc.org/doi/abs/10.1175/MWR-D-14-00416.1>

Weather radar polarimetry: Dual-polarization radar promises to improve the modeling of convective storms

Physics Today (5.648)

J. Carlin (OAR/NSSL)

- This is a concise and very accurate description of the basics of weather radar polarimetry and its potential benefits for convective-storm modeling.
- For convection-allowing models with grid spacing on the order of 1 km, radar remains the only source of data that has the requisite temporal and spatial resolution to fully resolve convective storms.
- Increasing collaboration between the radar polarimetry and cloud modeling communities will prove mutually beneficial and essential to tackling new problems in the years ahead.

Since the incidental discovery during World War II that radar could detect and track meteorological phenomena, it has been pivotal in developing modern meteorology. Thanks to its temporal and spatial resolution, which remains unmatched for remote observing systems, radar has helped advance our understanding of storms and precipitation. Weather radar also aids in issuing severe weather warnings, and has saved countless lives over past decades. And with modern communications technology, even members of the general public can view radar data from their mobile devices in real time. Given radar's fundamental importance to meteorology, scientists have focused significant attention to developing new radar technologies. Most recently, weather radar has leaped forward in the research, development, and operational use of dual-polarization radars. For convection-allowing models with grid spacing on the order of 1 km,



NOAA SCIENTIFIC PUBLICATIONS REPORT MAY 14, 2015

radar remains the only source of data that has the requisite temporal and spatial resolution to fully resolve convective storms. In addition to the many benefits already discovered, it is speculated that polarimetry will help alleviate some of the difficulties and assumptions required in current radar data assimilation techniques. Weather radar polarimetry is currently and will remain an active area of research. Scientists are still discovering its potential uses, and investigating remaining uncertainties pertaining to the optimal use of data.

Expected Publication Date: March 2015

NMFS PUBLICATIONS

*Depth distribution, habitat associations, and differential growth of newly settled southern Tanner crab (*Chionoecetes bairdi*) in embayments around Kodiak Island, Alaska*

Fisheries Bulletin (1.783)

C. H. Ryer, W. C. Long, M. L. Spencer, and P. Iseri (NMFS/AKFSC)

- This study is the first rigorous study of essential fish habitat for juvenile Tanner crab. It highlights the potential importance of shallow water nurseries in the Gulf of Alaska for contributing to commercially exploited Tanner stocks.
- Shallow water areas might represent opportunities for accessing the year-class strength of juveniles settling to the bottom in any given year. A survey focusing on shallow water settlement would give agencies another tool for predicting future stock levels.

The authors examined depth distribution, habitat association, and growth of newly settled southern Tanner crab (*Chionoecetes bairdi*) at 4 sites around the eastern end of Kodiak Island, Alaska, during 2010 and 2011. Settlement was from April through July, and crab density peaked during May–July, at 10 crabs/m² in 2010 and 2.3 crabs/m² in 2011. By the end of August, most crabs had progressed through 3–5 molt stages (instars). An association between crabs and tubes of the ampharetid polychaete, *Sabellides sibirica*, was observed in 2010, but was not seen in 2011 when both crabs and worms were less abundant. Crabs in protected embayments were larger in August than crabs at open coastal sites. Crabs at protected sites were also found in more shallower water than at open coastal



NOAA SCIENTIFIC PUBLICATIONS REPORT MAY 14, 2015

sites—a difference that may have exposed them to higher ambient water temperature and may have accelerated their growth. Accelerated growth may in turn result in earlier maturation. Southern Tanner crabs probably settle over a wide range of depths, but shallow embayments (depths <50 m) may play a disproportionately large role in providing recruits to the adult population.

Expected Publication: Spring 2015

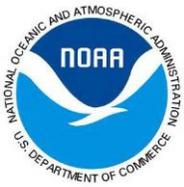
Genetic identification of Chinook salmon: Stock-specific distributions of juveniles along the Washington and Oregon coast

Marine and Coastal Fisheries (1.810)

D. J. Teel, B. J. Burke, D. R. Kuligowski, C. A. Morgan, and D. M. Van Doornik (NMFS/NWFSC)

- Early marine distributions of Chinook Salmon stocks reflect differences in migration behavior, as well as the influence of environmental factors and hatchery practices.
- Metrics describing among- and within-ESU variability in early marine distributions can be incorporated into ESA evaluations of Chinook salmon trait diversity.

We used microsatellite DNA data and genetic stock identification methods to delineate the temporal and spatial distributions of juvenile Chinook Salmon (*Oncorhynchus tshawytscha*) occupying coastal habitats extending from central Oregon to northern Washington. Juveniles were collected in trawl surveys conducted during spring, summer and autumn over 15 years. Distributions (mean latitude and distance from shore) differed between yearling and subyearling life history types and between stocks. Many of these differences were consistent across years. Yearlings were nearly all (98%) from Columbia River sources and only 6% were naturally produced. In late May, yearlings from the lower Columbia and Willamette rivers were farther north than other yearlings, likely due to the early spring timing of their releases from hatcheries and subsequent out-migration from the Columbia River. However, yearling distributions in late June reflected known migration behaviors. Yearlings from interior Columbia River and Snake River sources were farthest north by June, while yearlings from other stocks were more spread out in latitude. Subyearlings were also largely from the Columbia River in early summer (98%), but greater percentages of subyearlings from coastal



NOAA SCIENTIFIC PUBLICATIONS REPORT MAY 14, 2015

rivers were present in the fall (24%). In contrast to yearlings, natural production accounted for nearly one third of subyearlings. For most stocks, subyearlings tended to remain relatively near their point of sea entry throughout the summer. Subyearlings from the Snake River fall and Upper Columbia summer/fall stocks exhibited diverse distributions that included both southward and northward dispersal. Overall, distributions of Chinook Salmon stocks and life history types reflect differences in migration behavior, but also the influence of environmental factors and hatchery practices.

Accepted: 15 April 2015

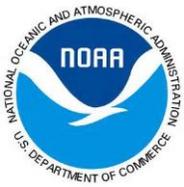
Rethinking the longitudinal stream temperature paradigm: region-wide comparison of thermal infrared imagery reveals unexpected complexity of river temperatures

Hydrological Processes (2.696)

A. H. Fullerton, C. E. Torgersen, J. J. Lawler, R. N. Faux, E. A. Steel, **T. J. Beechie**, J. L. Ebersole, S. G. Leibowitz (NMFS/NWFSC)

- Many longitudinal river temperature patterns do not fit theoretical expectations, are diverse in shape, and have no clear geographic trends
- Correlations with common predictors of water temperature vary among rivers

Prevailing theory suggests that stream temperature warms asymptotically in a downstream direction, beginning at the temperature of the source in the headwaters and leveling off downstream as it converges to match meteorological conditions. However, there have been few empirical examples of longitudinal patterns of temperature in large rivers due to a paucity of data. We constructed longitudinal thermal profiles (temperature versus distance) for 53 rivers in the Pacific Northwest (USA) using an extensive dataset of remotely sensed summertime river temperatures and classified each profile into one of five patterns of downstream warming: asymptotic (increasing then flattening), linear (increasing steadily), uniform (not changing), parabolic (increasing then decreasing), or complex (not fitting other classes). We evaluated (1) how frequently profiles warmed asymptotically downstream as expected, and (2) whether relationships between river temperature and common hydroclimatic variables differed by profile class. We found considerable diversity in profile shape, with 47% of rivers warming



NOAA SCIENTIFIC PUBLICATIONS REPORT MAY 14, 2015

asymptotically, and 53% having alternative profile shapes. Water temperature did not warm substantially over the course of the river for coastal parabolic and uniform profiles, and for some linear and complex profiles. Profile classes showed no clear geographical trends. The degree of correlation between river temperature and hydroclimatic variables differed among profile classes, but there was overlap among classes. Water temperature in rivers with asymptotic or parabolic profiles was positively correlated with August air temperature, tributary temperature and velocity, and negatively correlated with elevation, August precipitation, gradient, and distance upstream. Conversely, associations were less apparent in rivers with linear, uniform, or complex profiles. Factors contributing to the unique shape of parabolic profiles differed for coastal and inland rivers, where downstream cooling was influenced locally by climate or cool water inputs, respectively. Potential drivers of shape for complex profiles were specific to each river. These thermal patterns indicate diverse thermal habitats that may promote resilience of aquatic biota to climate change. Without this spatial context, climate change models may incorrectly estimate loss of thermally suitable habitat.

Accepted: 31 March 2015

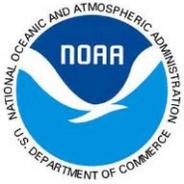
Link to full article: <http://onlinelibrary.wiley.com/doi/10.1002/hyp.10506/abstract>

Disentangling the contributions of ocean ranching and net-pen aquaculture in the successful establishment of Chinook salmon in a Patagonian basin

Environmental Biology of Fishes (1.360)

C. Di Prinzio, C. R. Rossi, J. Ciancio, **J. C. Garza** (NMFS/SWFSC), and R. Casaux

- Chinook salmon introduced into Chile for ocean ranching purposes have successfully invaded Patagonian waters. The population was first established by fish imported from for ocean ranching purposes and was later supplemented by escaped fish from net pen aquaculture.
- The populations are genetically diverse, and the subsequent admixture and hybridization among these multiple independent source stocks is likely responsible for the high level of standing genetic variation.
- This may be facilitating local adaptation and augmenting the opportunity for successful invasion and further colonization.



NOAA SCIENTIFIC PUBLICATIONS REPORT MAY 14, 2015

The presence of Chinook salmon in Patagonia is an example of a successful invasion by a Pacific salmon species. The combination of historical records and genetic data can help to determine the origin of invasive / introduced species and allow the identification of the sources and dispersal process. We analyzed the genetic structure of Chinook salmon in the Futaleufú River (Pacific slope basin of Patagonia) using single nucleotide polymorphism genotypes and a recently described baseline dataset of native North American Chinook salmon populations. Our results revealed that Chinook salmon established in the Futaleufú River have high levels of within- population genetic diversity compared with populations from across the native range. Based on genetic similarity and historical reports, our results indicate that the Futaleufú population was first established by colonizing fish derived from the Lower Columbia River Basin, imported into Chile for ocean ranching purposes during the 1970s and 1980s, and afterward it was strongly supplemented by escaped fish from net pen aquaculture that used broodstock imported during the 1990s from various sources, including the California Central Valley (via New Zealand), the Middle Oregon Coast, and Vancouver Island. The higher incidence of fish derived from the most recent introductions in our sample suggest that the contribution of escaped salmon from these posterior stockings on establishment success must have been particularly strong because included different sources. Subsequent admixture and hybridization among these multiple independent source stocks is likely responsible for the high level of standing genetic variation, which may be facilitating local adaptation and augmenting the opportunity for successful invasion and further colonization.

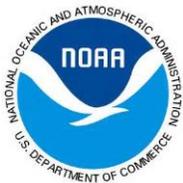
Accepted: 31 March 2015

Discovery and characterization of single nucleotide polymorphisms in Coho salmon, Oncorhynchus kisutch

Molecular Ecology Resources (5.626)

H. A. Starks, A. J. Clemento, and J. C. Garza (NMFS/SWFSC)

- Next generation molecular genetic tools for coho salmon are described
- The effectiveness for genetic identification of coho salmon is demonstrated



NOAA SCIENTIFIC PUBLICATIONS REPORT MAY 14, 2015

Molecular population genetic analyses have become an integral part of ecological investigation and population monitoring for conservation and management. Microsatellites have been the molecular marker of choice for such applications over the last several decades, but single nucleotide polymorphism (SNP) markers are rapidly expanding beyond model organisms. Coho salmon (*Oncorhynchus kisutch*) is native to the north Pacific Ocean and its tributaries, where it is the focus of intensive fishery and conservation activities. As it is an anadromous species, coho salmon typically migrate across multiple jurisdictional boundaries, complicating management and requiring shared data collection methods. Here, we describe the discovery and validation of a suite of novel SNPs and associated genotyping assays which can be used in genetic analyses of this species. These assays include 91 that are polymorphic in the species and one that discriminates it from a sister species, Chinook salmon. We demonstrate the utility of these SNPs for population assignment and phylogeographic analyses, and map them against the draft trout genome. The markers constitute a large majority of all SNP markers described for coho salmon and will enable both population and pedigree-based analyses across the southern part of the species native range.

Accepted: 23 April 2015

Sedimentary facies, geomorphic features and habitat distribution at the Hudson Canyon head from AUV multibeam data

Deep Sea Research II (2.763)

M. Pierdomenico, **V. G. Guida** (NMFS/NEFSC), L. Macelloni, F. L.

Chiocci, P. A. Rona, M. I. Scranton, V. Asper, and A. Diercks

- Presents a method for integrating multiple sources of physical and biological data to analyze physically complex areas.
- Describes in detail the physical bottom habitat types and stock associations in Hudson Canyon and the adjoining continental shelf including the distribution of deep sea corals.
- Provides habitat data for use in creating habitat suitability models for managed species for extrapolation to other shelf-edge submarine canyons where recent acoustic mapping is providing better physical habitat data.

Mapping the physical benthic habitats at the head of Hudson Canyon was performed with integrated analysis of acoustic data, video surveys, and seafloor



NOAA SCIENTIFIC PUBLICATIONS REPORT MAY 14, 2015

sampling. Acoustic mapping with an AUV-mounted multibeam sonar provided ultra-high resolution bathymetric and backscatter imagery for the identification of geomorphological features and the characterization of surficial sediments. Habitat characterization in terms of seafloor texture and identification of benthic and demersal communities was accomplished by visual analysis of still photographs from underwater vehicles. Habitat classes were defined on the basis of the seafloor texture observed on photos and then compared with the geophysical data in order to associate habitats to acoustic classes and/or geomorphological features. These data were used to infer habitat distribution on the basis of morpho-acoustic classes and extrapolate results over larger areas. Results from bottom trawling were used to determine the overall biodiversity within the identified habitats. The analysis revealed a variety of topographic and sedimentological structures that provide a wide range of physical habitats, including sandy and muddy substrates, gravel patches and mudstone outcrops. These features host rich and varied faunal assemblages, including cold-water corals and sponge communities. Pockmark fields below 300-m depth suggest that methane-based chemosynthetic carbonate deposition may create specific benthic habitats. Hummocky terrain has been delineated along the canyon rims and associated with extensive, long-term burrowing activity by golden tilefish (*Lopholatilus chamaeleonticeps*). These results show the relationships of physical features to benthic habitat variation support the notion of the area as a biodiversity hotspot and define essential habitats for planning of sustainable regional fisheries.

Expected Publication Date: September 2015

Does reproductive investment decrease telomere length in Menidia menidia?

PLoS ONE (3.534)

J. Gao and **S. Munch** (NMFS/SWFSC)

- Telomere shortening may be an index of the rate of aging.
- Telomere length decreases with reproductive investment, but not somatic growth, in Atlantic silversides.
- Individuals with high reproductive investment tend to die earlier than individuals with lower relative gonad weights.

Given finite resources, intense investment in one life history trait is expected to reduce investment in others. Telomere length appears to be strongly tied to



NOAA SCIENTIFIC PUBLICATIONS REPORT MAY 14, 2015

age in many taxa, and telomere maintenance requires energy. Therefore, the authors hypothesized that telomere maintenance may trade off against other life history characters. Using natural variation in laboratory populations of Atlantic silversides (*Menidia menidia*), the authors tested the relationship between growth, fecundity, life expectancy, and relative telomere length. Consistent with several other studies on fishes, there was no clear dependence of telomere length on age. However, more fecund fish tended to have both reduced life expectancy and shorter telomeres, which is consistent with the hypothesis that there is a trade-off between telomere maintenance and reproductive output.

Accepted: 10 April 2015

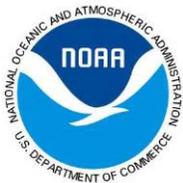
A tradeoff between precopulatory and postcopulatory trait investment in male cetaceans

Evolution (4.659)

J. P. Dines, **S. L. Mesnick** (NMFS/SWFSC), K. Ralls, L. May-Collado, I. Agnarsson, and M.D. Dean

- Data on reproductive anatomy can be used to make predictions about male mating strategies for the many cetacean species for which adequate behavioral observations do not yet exist.
- Information on mating systems enables better understanding of trends in abundance and patterns of recovery or lack of resilience to exploitation among cetacean species.

Mating with multiple partners is a common strategy across species and understanding how individual males secure fertilization in the face of competition remains a fundamental goal of evolutionary biology. Game theory stipulates that males have a fixed budget for reproduction that can lead to a trade-off between investment in precopulatory traits like body size, armaments and ornaments, and postcopulatory traits such as testis size and spermatogenic efficiency. Recent theoretical and empirical studies have shown that if males can monopolize access to multiple females, they will invest disproportionately in precopulatory traits and less in postcopulatory traits. Using phylogenetically controlled comparative methods, the authors compared sexually dimorphic characters across 58 cetacean species and found that species with the most prominent sexual dimorphism in size,



NOAA SCIENTIFIC PUBLICATIONS REPORT MAY 14, 2015

shape, teeth, tusks, and singing invest significantly less in relative testes mass. These species also tend to show evidence of male contests, suggesting there is opportunity for winners to monopolize access to multiple females. This approach provides a robust data set with which to make predictions about male mating strategies for the many cetacean species for which adequate behavioral observations do not exist.

Accepted: 21 April 2015

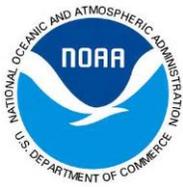
*Vertical and horizontal habitat use by white marlin *Kajikia albida* (Poey, 1860) in the western North Atlantic Ocean*

ICES Journal of Marine Science (2.525)

J. P. Hoolihan, J. Luo, **D. Snodgrass**, **E. S. Orbesen**, A. M. Barse, and **E. D. Prince** (NMFS/SEFSC)

- Provides information applicable to habitat standardization models that will help reduce uncertainties in the stock assessment process for an overexploited species.

Pop-up satellite archival tags were deployed on 40 white marlin *Kajikia albida* (synonym: *Tetrapturus albidus*) off the coasts of Maryland and North Carolina (U.S.), and the island nation of Aruba in the Caribbean. Useful data were available for analysing vertical and horizontal habitat use from 28 individuals. Time at liberty ranged from 10 to 181d (mean 115, SD 53.3). Seasonal southerly fall migration routes were documented for fish released off the north-eastern U.S., while those released off Aruba remained in the Caribbean basin. Horizontal movements ranged from 228 to 8084 km (19 to 100 km/d) based on light-level geolocation estimates using a sea surface temperature and bathymetry-corrected Kalman filtering. Analyses included an evaluation of vertical movements using ΔT , the time spent at temperature relative to the uniform temperature surface layer. Movements included exploration of depths as great as 387 m and ambient temperatures as low as 7.8 °C. However, the greatest proportion of time was spent in the upper 20 m of the water column for both day (50.8%) and night (81.6%), and time spent in water colder than 7 °C below the uniform temperature surface layer was negligible. Overall, white marlin showed less variability in vertical movement and less tolerance to colder temperatures compared to similar studies for blue marlin (*Makaira nigricans*) and sailfish (*Istiophorus platypterus*). Values for ΔT



NOAA SCIENTIFIC PUBLICATIONS REPORT MAY 14, 2015

are presented in tabular format to allow direct input into habitat standardization models used to estimate vertical distribution and population abundance. The large spatial dispersion and disparate tracks illustrated in the present study serve to underscore the complexity of white marlin behavior and habitat use, and further highlight the many challenges facing the management and conservation of this over-exploited species.

Accepted: 14 April 2015

Faunal features of submarine canyons on the eastern Bering Sea slope

Marine Ecology Progress Series (2.64)

M. F. Sigler, C. N. Rooper, G. R. Hoff, R. P. Stone, R. A. McConnaughey, and T. K. Wilderbuer (NMFS/AKFSC)

- This study examined whether 5 large canyons in the Bering Sea are faunally distinct.
- The authors found that the 5 canyons are not faunally distinct features of the eastern Bering Sea slope but that the major characteristics structuring fish and invertebrate communities were depth, latitude, and sediment.
- In 2012, the North Pacific Fishery Management Council (NPFMC) received testimony from environmental organizations to protect coral, sponge and other benthic habitat of fish and crab species in two of these canyons (Pribilof and Zhemchug).
- In response to this testimony, the NPFMC requested that the NOAA Alaska Fisheries Science Center analyze the distribution of fishes and benthic invertebrates and the vulnerability of their habitat to fishing activities.

Some of the largest submarine canyons in the world incise the eastern Bering Sea shelf break. The authors compiled data from the eastern Bering Sea that included trawl survey data on fish and invertebrate distributions and observations of ocean conditions and benthic habitat. These data were analyzed using multivariate techniques to determine if the canyons are distinguishable from the adjacent continental slope. One notable feature of these canyons is that about one quarter of the coral habitat predicted for the eastern Bering Sea slope occurs in Pribilof Canyon, an area that comprises only ~10% of the total slope area. The predicted coral habitat also extends westward to the adjacent slope, indicating that this coral



NOAA SCIENTIFIC PUBLICATIONS REPORT MAY 14, 2015

habitat concentration is not unique to Pribilof Canyon but rather that it is typical for a larger area (Pribilof Canyon and westward).

Expected Publication Date: May 2015

Watershed geomorphology and snowmelt control stream thermal sensitivity to air temperature

Geophysical Research Letters (4.456)

P. J. Lisi, D. E. Schindler, T. J. Cline, **M. D. Scheuerell (NMFS/NWFSC)**, and P. B. Walsh

- Topography generates diverse thermal responses to air temperature in streams
- Snowmelt thermally buffers streams to air temperature in steeper watersheds
- Thermal heterogeneity across rivers basins could be lost with reduced snowpack.

How local geomorphic and hydrologic filters control the sensitivity of stream thermal regimes to variation in climatic conditions remains a critical uncertainty in understanding aquatic ecosystem responses to climate change. The authors used stable isotopes of hydrogen and oxygen in stream water to estimate contributions of snow and rainfall to 80 boreal streams in southwest Alaska, and show that differences in snow contribution are controlled by watershed topography. Multivariate time-series analysis of stream thermal regimes revealed that streams in rain-dominated, low-elevation watersheds were 5-8 times more sensitive to variation in summer air temperature compared to neighboring streams draining steeper topography whose flows were dominated by melted snow. Thus, the impact of climate warming on freshwater thermal regimes will be spatially heterogeneous across river basins as controlled by local watershed features. However, this thermal heterogeneity may be lost with reduced snowpack and increased ratios of rain to snow in stream discharge.

Expected Publication: Summer 2015

A safer protocol for field immobilization of leopard seals (Hydrurga leptonyx)
Marine Mammal Science (1.82)

N. Pussini and **M. E. Goebel (NMFS/SWFSC)**



NOAA SCIENTIFIC PUBLICATIONS REPORT MAY 14, 2015

- This paper reports on changes in capture drug protocols that are safer for both the animals and researchers.
- This new protocol will allow for more, safer captures, tissue sampling and instrumentation of leopard seals to better define their changing role in coastal Antarctic

Leopard seals are an important apex predator in marine ecosystems of Antarctica with potential to influence community structure. Understanding their role and impact on the marine ecosystem requires safe capture and handling. However, there are few studies on chemical immobilization of leopard seals in the field. Anesthesia protocols typically used on other phocid species are frequently associated with high mortality rates. We present results of an ongoing study on field anesthesia of free-ranging leopard seals. We chemically immobilized 13 adult females, (380-501 kg) with a combination of butorphanol (50 mg/mL) at 0.1-0.2mg/kg and midazolam (50 mg/mL) at 0.1-0.2 mg/kg. When necessary, additional 10 mg boluses of midazolam were delivered to maintain the appropriate anesthetic plane. A mask was used to deliver oxygen at 3-5 l/min throughout the procedures. During anesthesia respiration rates (mean: 7.9 bpm, SD: ± 1.79), heart rates (mean: 82.1 bpm, SD: ± 7.2), and blood pO₂ saturation (mean: 98.8%, SD: ± 0.11) were monitored and recorded. Rapid reversal agents, naltrexone (0.1 mg/kg) and flumazenil (0.005 mg/kg), were used to antagonize respectively butorphanol and midazolam. No mortality occurred and no emergency procedures, such as resuscitation or mechanical ventilation were needed. A maximum anesthesia time of 1.8 hours was achieved with the protocol presented. The animals tolerated the anesthesia well, and returned to the same haul out beaches on the days following capture procedures. This study provides a novel, safer alternative to the traditional telazol or ketamine drug protocol commonly used in capturing free-ranging phocids.

Accepted: 24 February 2015

Balancing conservation and harvest objectives a review of considerations for management of salmon hatcheries in the Pacific Northwest

North American Journal of Aquaculture (0.71)

T. A. Flagg (NMFS/NWFSC)



NOAA SCIENTIFIC PUBLICATIONS REPORT MAY 14, 2015

- To be successful, Pacific North West (PNW) hatchery programs must be scientifically defensible and relate to both published standards and statistically relevant outcomes,
- have well-defined and documented goals with biological and operational specifications documented,
- and have management protocols in place to respond adaptively to new information.

The U.S. Pacific Northwest contains one of the largest suites of hatchery programs for anadromous salmonids in the world, with about 500 programs producing about 325 million juvenile fish. A total of about 0.7 million Pink Salmon *Oncorhynchus gorbuscha*, 21 million steelhead *O. mykiss*, 50 million Chum Salmon *O. keta*, 32 million Sockeye Salmon *O. nerka*, 41 million Coho Salmon *O. kistutch*, and 182 million Chinook Salmon *O. tshawytscha* are released annually from PNW hatcheries. These hatchery fish provide for robust sustainable fisheries and their production and release are set to meet legal agreements, international treaties, and treaty trust responsibilities. However, this level of hatchery production is often assumed to have negative effects on the conservation of U.S. Endangered Species Act (ESA) listed salmon populations in the region. A review of the development of best management practices to balance conservation and sustainable fisheries goals for PNW salmon hatcheries indicates that to be successful, every hatchery program must be 1) scientifically defensible and relate to both published standards and statistically relevant outcomes, 2) have well-defined and documented goals with biological and operational specifications documented, and 3) have management protocols in place to respond adaptively to new information. The focus should be on the biological integrity of the populations propagated in or influenced by the hatchery environment, as opposed to focusing on the management of physical facilities. Complete documentation for a proposed hatchery action component should include items ranging from hatchery location and water source(s) to all aspects of animal husbandry and harvest and management plans for adult returns. The current science for items should be described and the choice of an action component justified as to either the science or policy basis of the expected outcome. Where appropriate, complete monitoring and evaluation plans for the proposed actions need to be described.



NOAA SCIENTIFIC PUBLICATIONS REPORT MAY 14, 2015

Expected Publication: Fall 2015

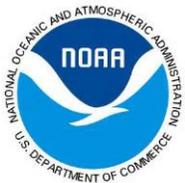
A subtropical embayment serves as essential habitat for sub-adults and adults of the critically endangered smalltooth sawfish

Global Ecology and Conservation (7.242)

Y. P. Papastamatiou,, R. D. Grubbs, J. Imhoff,, **S. J.B. Gulak , J. K. Carlson** (NMFS/SEFSC), and G. Burgess

- Florida Bay was identified as essential habitat for the critically endangered smalltooth sawfish
- Many adults displayed site fidelity
- The authors hypothesize that it may be an important breeding ground

Identifying essential habitat for large, mobile endangered species is difficult, particularly marine species where visual observations are limited. Though various methods of telemetry are available, each suffers from limitations and only provides satisfactory information over a specific temporal or spatial scale. Sawfish are one of the most imperiled groups of fishes, with every species worldwide listed as endangered or critically endangered. Whereas movements of juvenile sawfish are fairly well studied, much less is known about adults due to their rarity and the challenging environments they live in. Previous encounter records have identified Florida Bay in the Everglades National Park as a potentially important habitat for adults of the critically endangered smalltooth sawfish (*Pristis pectinata*). We used a combination of acoustic and satellite telemetry, as well as conventional tagging, to determine patterns of movement and residency by sub-adult and adult sawfish. Over short time periods, movements appeared primarily tidal driven with some evidence that animals moved into shallow water during the ebbing or flooding tides. Adult sawfish sexually segregated seasonally with males found by mangrove-lined canals in the spring and females predominantly found in outer parts of the bay. Males migrated from canals starting in late May potentially as temperatures increased above 30°C. Some males and females migrated north during the summer, while others may have remained within deeper portions of Florida Bay. Male sawfish displayed site fidelity to Florida Bay as some individuals were recaptured 1–2 years after originally being tagged. We hypothesize that mating occurs in Florida Bay based on aggregations of mature animals coinciding with the proposed mating period, initial sexual segregation of



NOAA SCIENTIFIC PUBLICATIONS REPORT MAY 14, 2015

adults followed by some evidence of females moving through areas where males show seasonal residency, and a high percentage of animals showing evidence of rostrum inflicted injuries. The combination of methods providing movement data over a range of spatial and temporal scales reveals that sub-tropical embayments serve as essential habitat for adult smalltooth sawfish.

Published: 2 April 2015

Link to full paper:

<http://www.sciencedirect.com/science/article/pii/S2351989415000293>

Spring bloom dynamics and zooplankton biomass response on the US Northeast Continental Shelf

Continental Shelf Research (1.470)

K. D. Friedland, R. T. Leaf, **J. Kane**, D. Tommasi, R. G. Asch, **N. Rebeck**, R. Ji, **S. I. Large**, C. Stock, and **V. S. Saba** (NMFS/NEFSC)

- Spring blooms are a variable feature of the US Northeast Continental Shelf system.
- Bloom duration was inversely related to bloom start date, early blooms last longer.
- Bloom initiation was related to the timing of the spring thermal transition.
- Spring zooplankton biovolume showed a mixed response to phytoplankton production.
- Zooplankton biovolume was alternatively related to spring bloom biomass and timing.

The spring phytoplankton bloom on the US Northeast Continental Shelf is a feature of the ecosystem production cycle that varies annually in timing, spatial extent, and magnitude. To quantify this variability, the authors analyzed remotely-sensed ocean color data at two spatial scales, one based on ecologically defined sub-units of the ecosystem (production units) and the other on a regular grid (0.5°). Five units were defined: Gulf of Maine East and West, Georges Bank, and Middle Atlantic Bight North and South. The units averaged 47×10^3 km² in size. The initiation and termination of the spring bloom were determined using change-point analysis with constraints on what was identified as a bloom based on climatological bloom patterns. A discrete spring bloom was detected in most years over much of the western Gulf of Maine production unit. However, bloom



NOAA SCIENTIFIC PUBLICATIONS REPORT MAY 14, 2015

frequency declined in the eastern Gulf of Maine and transitioned to frequencies as low as 50% along the southern flank of the Georges Bank production unit. Detectable spring blooms were episodic in the Middle Atlantic Bight production units. In the western Gulf of Maine, bloom duration was inversely related to bloom start day; thus, early blooms tended to be longer lasting and larger magnitude blooms. The authors view this as a phenological mismatch between bloom timing and the “top-down” grazing pressure that terminates a bloom. Estimates of secondary production were available from plankton surveys that provided spring indices of zooplankton biovolume. Winter chlorophyll biomass had little effect on spring zooplankton biovolume, whereas spring chlorophyll biomass had mixed effects on biovolume. There was evidence of a “bottom up” response seen on Georges Bank where spring zooplankton biovolume was positively correlated with the concentration of chlorophyll. However, in the western Gulf of Maine, biovolume was uncorrelated with chlorophyll concentration, but was positively correlated with bloom start and negatively correlated with magnitude. This observation is consistent with both a “top-down” mechanism of control of the bloom and a “bottom-up” effect of bloom timing on zooplankton grazing. Our inability to form a consistent model of these relationships across adjacent systems underscores the need for further research.

Accepted: April 2015

Link to full text paper:

<http://www.sciencedirect.com/science/article/pii/S0278434315000862>

Fact and fiction regarding wood placement in streams

Canadian Journal of Fisheries and Aquatic Sciences (2.276)

P. Roni, T. J. Beechie, G. R. Pess, and K. Hanson (NMFS/NWFSC)

- Placed wood has relatively low failure rates and can be stable for years.
- The majority of studies report a favorable physical response to wood placement.
- The majority of studies have shown a favorable fish response to wood, although most are not long-term studies

Despite decades of research on wood in rivers, the addition of wood as a river restoration technique remains controversial. We reviewed the literature on natural and placed wood to shed light on areas of continued debate. Research on river



NOAA SCIENTIFIC PUBLICATIONS REPORT MAY 14, 2015

ecology demonstrates that large woody debris has always been a natural part of most rivers systems. While a few studies have reported high structural failure rates (>50%) of placed instream wood structures, most studies have shown relatively low failure rates (< 20%) and that placed wood remains stable for several years, though long-term evaluations of placed wood are rare. The vast majority of studies on wood placement have reported improvements in physical habitat (e.g., increased pool frequency, cover, habitat diversity). Studies that have not reported improvements in physical habitat often found that watershed processes (e.g., sediment, hydrology, water quality) had not been addressed. Finally, most evaluations of fish response to wood placement have shown positive responses for salmonids, though few studies have looked at long-term watershed-scale response or studied a wide range of species.

Expected publication date: 15 November 2015

Age at maturity, skipped spawning, fecundity, and site fidelity of female sablefish (Anoplopoma fimbria) during the spawning season

Fishery Bulletin (1.783)

C. J. Rodgveller, J. W. Stark, K. B. Echave, and P. F. Hulson (NMFS/AKFSC)

- Updated maturity at age data is now available for stock assessment of sablefish
- Skipped spawning was documented for the first time and may vary with environmental conditions.

Accurate maturity at age data is necessary for estimating spawning stock biomass and setting fishing reference points. This is the first age at maturity study of female sablefish sampled in Alaska near their winter spawning period, when maturity is most easily assessed. The authors document the first known observations of skipped spawning by female sablefish, where individuals that have spawned in the past did not spawn during the current season. Age at maturity was heavily influenced by whether these skipped spawners were classified as mature or immature; the age at 50% maturity when skipped spawners were classified as mature was 6.8-years and 9.9-years when classified as immature. Skipped spawning was more common in some areas and rates of skipped spawning were higher for older females. Winter estimates of age at maturity were more similar to estimates collected in the summer when skipped spawners were classified as



NOAA SCIENTIFIC PUBLICATIONS REPORT MAY 14, 2015

mature in the winter (skipped spawning was not identified in the summer). When skipped spawners were considered immature during the winter, estimates of spawning biomass decreased substantially. Relative fecundity did not change with size and age, verifying the assumption made in the Alaska sablefish stock assessment that relative reproductive output is linearly related to female spawning biomass. Four female sablefish were satellite tagged during the spawning season. Although sablefish are highly migratory throughout their lives, the limited results indicate that sablefish have site fidelity during the spawning season.

Accepted: 12 March 2015

Using measurement error models to account for georeferencing error in species distribution models

Ecography (4.207)

J. Velasquez, C. Graham, **S. Munch** (NMFS/SWFSC)

- The authors developed a method to account for georeferencing error in constructing species distribution models.
- For certain types of species and datasets the Measurement Error (ME) model is an effective method to reduce biases in probability of occurrence estimates and account for the uncertainty generated by georeferencing error.
- This approach may be expanded for its use with presence-only data as well as to include other sources of uncertainty in species distribution models.

Georeferencing error is prevalent in datasets used to model species distributions, inducing uncertainty in covariate values associated with species occurrences that result in biased probability of occurrence estimates. Traditionally, this error has been dealt with at the data-level by using only records with an acceptable level of error (filtering) or by summarizing covariates at sampling units by using measures of central tendency (averaging). Here the authors compare those previous approaches to a novel implementation of a Bayesian logistic regression with measurement error (ME), a seldom used method in species distribution modeling. This study shows that the ME model outperforms data-level approaches on (1) specialist species and (2) when either sample sizes are small, the



NOAA SCIENTIFIC PUBLICATIONS REPORT MAY 14, 2015

georeferencing error is large or when all georeferenced occurrences have a fixed level of error.

Accepted: April 2015

Link to full text paper:

<http://onlinelibrary.wiley.com/doi/10.1002/2015GL063306/abstract>

Interpreting the FLOCK algorithm from a statistical perspective

Molecular Ecology Resources (5.626)

E. C. Anderson (NMFS/SWFSC) and P. D. Barry

- This paper demonstrates the incorrect description of the algorithm in the software program flock.
- Its redundancy to an existing method is outlined.
- Interpreting flock's algorithm as a special case of the model in structure should aid in understanding the program's output and behavior.

The authors show that the algorithm in the program flock (Duchesne & Turgeon, 2009) can be interpreted as an estimation procedure using a model that is essentially identical to the structure (Pritchard et al., 2000) model with no admixture and non-correlated allele frequency priors. The computational routine in flock is equivalent to searching for the maximum-a-posteriori estimate of this restricted structure model via a simulated annealing algorithm with an extreme cooling schedule (namely, the exponent on the objective function $\rightarrow \infty$). By analysis of a large, real data set the authors confirm that flock yields results similar to structure with the no-admixture model and uncorrelated allele frequency prior with more variability from run to run. Interpreting flock's algorithm as a special case of the model in structure should aid in understanding the program's output and behavior.

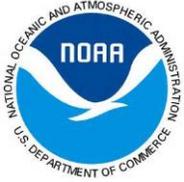
Accepted: April 2015

OTHER REPORTS, BOOK CHAPTERS, AND INTERNAL PUBLICATIONS

NWS PUBLICATIONS

Changing of the guard: Satellite will warn Earth of solar storms

EOS Transactions



NOAA SCIENTIFIC PUBLICATIONS REPORT MAY 14, 2015

D. Knipp and D. Biesecker (NWS/NCEP)

- A general story about the value of NOAA's first deep space mission.
- Demonstrating NOAA commitment to space weather, and acknowledges the partnership between NOAA, NASA, and the USAF.

A general information story covering the main aspects of DSCOVR - the Deep Space Climate Observatory - a new satellite, launched in February 2015, designed to monitor the solar wind and warn of looming space weather storms. The authors cover a some of the history of the satellite and mention the FY16 President's Budget for the Space Weather Follow-on.

Publication Date: 24 March 2015

Available Online: <https://eos.org/project-updates/changing-of-the-guard-satellite-will-warn-earth-of-solar-storms>

NESDIS PUBLICATIONS

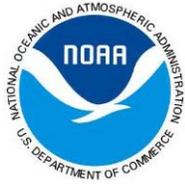
Rescue, Archival and Stewardship of Weather Records and Data

WMO Bulletin

J. Cooper (NESDIS/NCDC)

- Creating homogeneous, complete data sets from disparate collections is a fundamental challenge facing the climate research community.
- This is best achieved by leveraging partnerships to share resources and areas of expertise.

Data repositories and archives play a critical role as the source for the observational data used in the study of weather and climate. After over two centuries of recording observations on paper, observations in the last 20 years have mostly been collected digitally. Repositories around the world now have a mix of data on physical media, such as paper and microfilm, and digital media such as computer disks, magnetic tapes and DVDs. There is risk of data loss regardless of storage media. Repositories must identify, appraise, acquire, archive and migrate data to new technologies to make it available for research. These acts of stewardship and conversion to common electronic formats are vital to preserving and enhancing the global climate record. Creating homogeneous, complete data sets from disparate collections is a fundamental challenge facing the climate research community. This is best achieved by leveraging partnerships to share resources and areas of expertise. The goal is to bring more information into the



NOAA SCIENTIFIC PUBLICATIONS REPORT

MAY 14, 2015

hands of scientists who seek to understand the global climate system and anticipate changes to the climate.

Publication Date: March 2, 2015

Available Online: <http://www.wmo.int/bulletin/en/content/rescue-archival-and-stewardship-weather-records-and-data>