
2022 REGIONAL REPORTS



Reports compiled as of March 7, 2023

ALASKA AND RUSSIA

Compiled by Alexis Will

Alaska Peninsula

[No submissions]

Aleutians

[No submissions]

Bering and Chukchi Seas

St. Lawrence/*Sivuqaq* Island 2022: Alexis Will (WWF US Arctic Program) made a short visit to Kitnik the least and crested auklet (*Aethia pusilla*, *A. cristatella*) colony near Savoonga/*Sivangaq* 1-10 Aug to collect diet and blood samples. Field crew included Trevor Niksik (Savoonga) and Toryn Will (Fairbanks). Trevor Niksik and Punguk Shoogukwruk (Savoonga) installed trail cameras at the thick-billed and common murre (*Uria lomvia*, *U. aalge*) at Kiveepaq plots in late June as part of annual monitoring.

Gulf of Alaska

Middleton Island 2022: Scott Hatch (Institute for Seabird Research and Conservation) led pre-season preparations from early-April to mid-May. The core research team, consisting of camp leaders Shannon Whelan (McGill University) and Sierra Pete (Bucknell University), ISRC volunteers and university students Stella Solasz (New York), Don-Jean Leandri-Breton (McGill), Marie Claire Gatt (University of Milan), and Chinatsu Nakajima (University of Tsukuba) started off the field season in April. Gabby Dennis (Ohio), David Jadhon (Alaska), Haley Gee (California), Léo Marcouillier (University of Borgougne), Lauren Jackson and Alex Turmaine (McGill) worked at the station from 4 May through 15 August. Shannon Leone Fowler (University of Roehampton) and Kyle Elliott (McGill) deployed heart rate monitors for two weeks in May. Éliane Miranda (McGill) joined the team for PIT/RFID system work in June. Visiting the island in the July were journalist and filmmaker Morgan (Mo) Heim and researcher Morgan Benowitz-Fredericks (Bucknell). The 2022 team documented the first record of Leach's storm petrel (*Hydrobates leucorhous*) breeding on Middleton Island and a die-off of black-legged kittiwakes (*Rissa tridactyla*) in June that was similar, but smaller in scale, to an event attributed to botulism in 2021. Rhinoceros auklets (*Monocerata cerorhinca*) and pelagic cormorants (*Urile pelagicus*) were highly successful at raising young in 2022, while black-legged kittiwakes showed moderate breeding success.

Southeast Alaska

[No submissions]

ASIA AND OCEANIA

Compiled by Lara Brenner

Japan

The USFWS Alaska Region Ecological Services funded Jane Dolliver (OSU, Faculty Research Assistant) and Rachael Orben continued efforts to capture high resolution satellite imagery of short-tailed albatrosses nesting on the Senkaku Islands. We successfully obtained images from Pléiades Neo of the Senkaku Islands during nesting in 2022-23.

Nobuhiko Sato (Hokkaido University until recently, currently with Japan Fisheries Research and Education Agency) and Yasuko Suzuki (BirdLife International) continued to collaborate with local fishers in the town of Haboro and its neighboring areas in Hokkaido Japan to systematically collect data on gillnet fisheries and seabird bycatch throughout seasons. An opinion survey was carried out with the broader fishing communities in NW Hokkaido to better understand their demography, fishing history, and perspective on seabird bycatch. Also, an experimental study to test gillnet bycatch mitigation methods continued at a common murre (*Uria aalge*) and tufted puffin (*Fratercula cirrhata*) aviary with a dive pool at Tokyo Sea Life Park. With input from one of collaborating fishers in Hokkaido, we started comparing seabird responses to different net colors. Motohiro Ito (Toyo University) and his students started participating in the project in 2022.

Hong Kong

Yat-tung Yu (the Hong Kong Bird Watching Society) has continued banding Bridled Terns (*Onychoprion anaethetus*) in Hong Kong for six consecutive years as of 2022. In total, 364 Bridled Terns have been banded from 2017 to 2022, and field-readable leg flags have been attached to their legs for the purpose of studying their migration. Additionally, with the support of the Swire Trust, four Bridled Terns were fitted with satellite transmitters in 2022 to study their demography and migration routes. The tracking program will be continued in 2023.

CANADA

Compiled by Kerry Woo

Western Canada

Laurie Wilson (Environment and Climate Change Canada - Canadian Wildlife Service [ECCC-CWS], Delta, British Columbia) coordinated the Pacific CWS Seabird Colony Monitoring Program. In 2022, population trends of breeding Ancient Murrelet (*Synthliboramphus antiquus*) and Cassin's

Auklet (*Ptychoramphus aleuticus*) on Susk Gwaii (Frederick Island) in the Duu Guusd Conservancy on the west coast of Graham Island, Haida Gwaii were assessed by revisiting permanent plots and estimating occupancy rates. Global Positioning System (GPS) tracking devices were deployed on incubating Ancient Murrelets on Susk Gwaii. We tracked a single foraging trip for one bird in a mated pair. Vivian Pattison (Environment and Climate Change Canada – Wildlife Research Division [ECCC-WRD], Sidney, BC) and Patrick O’Hara (ECCC-CWS, Sidney, BC) will assist with analyzing the tracklogs. Specifically, we will identify Ancient Murrelet behaviour states from GPS track logs, use these data to determine home range and foraging locations, and explore whether biophysical variables (such as bathymetry, sea surface height anomaly, and chlorophyll-a) correlate with the foraging locations. Field crew included Laurie Wilson, Sydney Bliss, Kerry Woo, Agathe LeBeau, Ariel Lenske, Zoe Crysler and Harp Gill (all ECCC-CWS, Delta, BC), with Glen Keddie (ECCC-CWS contractor, Smithers, BC).

Finally, Laurie continues with her monitoring of seabird bycatch in commercial salmon gillnet fisheries. Reports of bird entanglements from the Department of Fisheries and Oceans Canada (DFO) test fisheries with observer programs and bycatch events reported by fishers are tallied; these data will be used to derive seabird bycatch estimates.

Mark Hipfner (Environment and Climate Change Canada – Wildlife Research Division [ECCC-WRD], Delta, BC) reports that summer 2022 marked the 29th year of operation of the Centre for Wildlife Ecology’s (CWE) seabird research program on Triangle Island. The 2022 field crew consisted of Hannah Avenant (ECCC-CWS, Delta, BC), Alice Domalik, Josh Green, Hipfner, Vivian Pattison, and Sarah Hudson (all ECCC-WRD, Delta BC), and a volunteer, Eric Wagner. The research program in 2022 was designed to collect information on growth rates and diets of nestling Cassin’s Auklets (*Ptychoramphus aleuticus*) and Rhinoceros Auklets (*Cerorhinca monocerata*), adding to long-term datasets for those species. Other projects included deploying GPS tags on 6 breeding Tufted Puffins (*Fratercula cirrhata*), and 10 Rhinoceros Auklets, as part of a larger, multi-year program to assess how effectively the boundaries of the Scott Islands marine National Wildlife Area envelop key foraging areas for seabirds in the region; and determining numbers, types, and source countries of derelict fishing gear found on beaches in Triangle Island’s South Bay.

Research also continued on other major Rhinoceros Auklet colonies in 2022. Hipfner and Pattison, along with Andrew Huang (ECCC-CWS, Delta, BC) and a volunteer, David Dickinson, visited Pine Island off BC’s Central Coast; Hipfner, Pattison and Elsie Krebs (all ECCC-WRD, Delta, BC) along with Patrick O’Hara (ECCC-CWS, Sidney BC) and PhD Candidate Kirk Hart (Simon Fraser University, Burnaby) visited Lucy Island off BC’s North Coast; and Mark Maftei (Raincoast Education Society, Tofino) visited Cleland Island off the west coast of Vancouver Island. The main goal of this program, which was started in 2006, is to study effects of oceanographic variation across multiple trophic levels – the diets fed to nestling auklets and the diets of their major fish

prey, the Pacific sand lance (*Ammodytes personatus*) and Pacific herring (*Clupea pallasii*). Field crews also deployed GPS tags on 7 Rhinoceros Auklets on Lucy Island. While on the colonies we also completed the tenth year of a project investigating the consumption of Pacific salmon (*Oncorhynchus* spp.) by seabirds in BC waters, in collaboration with Strahan Tucker (Department of Fisheries and Oceans Canada [DFO], Nanaimo – Pacific Biological Station); and completed the 14th year of a project investigating the ingestion of microplastics by forage fish, in collaboration with Moira Galbraith (DFO, Sidney - Institute of Ocean Sciences).

Other research conducted in summer 2022 included resighting banded Black Oystercatchers (*Haematopus bachmani*) in Pacific Rim National Park Reserve and the Gulf Islands National Park. That project is led by David Green and MSc Candidate Hannah Roodenrijs (Simon Fraser University, Burnaby), with support in 2022 from Domalik and Maftai. In addition, Kathryn Hargan and MSc Candidate Alexandra Zvezdin (Memorial University of Newfoundland, St. John's) continued their analysis of cores collected from the bottom of a small pond on S'Gang Gwaay, in Gwaii Haanas National Park Reserve and Haida Heritage Site, to assess decadal to centennial trends in seabird populations at this UNESCO World Heritage Site.

There was also winter field work completed in January and February of 2022. Domalik, Green, Hipfner, Hudson, Krebs, Pattison, along with Mark Drever and Anneka Vanderpas (both ECCC-WRD, Delta, BC), trapped Glaucous-winged Gulls (*Larus glaucescens*) around the BC portion of the Salish Sea (Strait of Georgia, Juan de Fuca Strait) for a study of food-web contamination and its implications for the physiological health of gulls that spend winter in the region. For outgroups, the crews also sampled on the west (Tofino and Ucluelet area) and north (Port Hardy) coasts of Vancouver Island. And lastly, Domalik, Pattison and Vanderpas deployed GPS tags on 10 California Gulls (*Larus californicus*), to assess habitat use in winter, and movements between the Pacific coast and inland breeding areas. A particular focus of this program is to assess the gulls' reliance on the herring spawn events in the Salish Sea.

Michael Rodway (Wildwing Environmental Research, Gold Bridge, BC), Wayne Campbell (Biodiversity Centre for Wildlife Studies, Victoria, BC), and Moira Lemon (ECCC-CWS, Delta, BC - retired) have just completed the third volume in their four-volume treatise on *Seabird Colonies of British Columbia*. The third volume presents the status and historical changes of seabird breeding populations at all known colonies along the BC outer coast from the Alaska border in the north to Race Rocks at the southern tip of Vancouver Island. All available data have been compiled to provide a history of visits and known changes at each colony. Introductory sections describe persons and institutions that have contributed to our knowledge of seabird breeding populations in the area. Historical impacts and current threats to nesting populations and established and recommended conservation measures are reviewed. The publication is entirely a volunteer effort, supported by the non-profit Biodiversity Centre for Wildlife Studies, located in Victoria, British Columbia, and by ECCC-CWS, Delta, BC, with the collaboration of Laurie Wilson.

The book is available for purchase on the Biodiversity Centre website, <http://www.wildlifebc.org/>. Upcoming Volume 4 concerns seabird breeding populations at colonies in the highly-urbanized and disturbed inner waters of the BC Salish Sea.

Alan Burger (University of Victoria and independent consultant) is mostly retired but continues some work on the Marbled Murrelet (*Brachyramphus marmoratus*) including contracts, reviews, conservation and publishing.

Louise Blight (University of Victoria and Procellaria Research & Consulting) and Edward Kroc (University of British Columbia) continue their project of monitoring status and biology of urban Glaucous-winged Gulls (*Larus glaucescens*) in coastal British Columbia, Canada. With Patrick O'Hara (ECCC-CWS, Sidney, BC and University of Victoria) and Douglas Bertram (ECCC-WRD, Sidney BC), Louise is also wrapping up a pilot study of small vessel traffic in two Migratory Bird Sanctuaries in the Greater Victoria area (British Columbia). In January 2023 Louise began a 4-year term as Co-chair of the Birds Specialist Sub-committee of the Committee on the Status of Endangered Wildlife in Canada (COSEWIC), the body that assesses conservation status of the country's wild species. Among the seabird species evaluated by COSEWIC to date are Pink-footed Shearwater (*Ardenna creatopus*), Black-footed Albatross (*Phoebastria nigripes*), Short-tailed Albatross (*Phoebastria albatrus*), and Marbled Murrelet (*Brachyramphus marmoratus*). Louise will continue as Managing Editor of Marine Ornithology until April 2023, a role she has held since 2016. She sends well-wishes to her currently-unnamed successor, and would like to thank all the PSG members who have contributed papers, book reviews, and photographs to the journal over those years.

Rachel Stapleton, a master's student in the Ecological Restoration program at Simon Fraser University, monitored nesting Double-crested Cormorants (*Phalacrocorax auritus*) at three locations within the Strait of Georgia, British Columbia. With the use of remote-timelapse photography, and help from Laura Cowen (Professor, University of Victoria), a multi-event model was created which offers details on breeding parameters throughout the progression of the nesting season. This study indicates variable rates of success across nesting locations, thanks to the photo analyzing efforts by Rose Wilkin (MSc graduate Simon Fraser University). Of course, none of this work would be possible without the support from Ruth Joy (Professor, Simon Fraser University).

Sonya Pastran worked as the Team Lead for Crescent Coastal Research in the spring and summer. She led the at-sea surveys that collected data in Oregon for the Marbled Murrelet (*Brachyramphus marmoratus*) Effectiveness Monitoring Program, which is a component of the Northwest Forest Plan. She also published a manuscript that explored the influence of breeding status and nest site location on marine habitat use by Marbled Murrelets (Pastran et al. 2022, *Marine Ornithology* 50: 229-243). She continues her research on Marbled Murrelets and Pink-

footed Shearwaters (*Ardenna creatopus*), modelling suitable marine habitat within British Columbia, Canada, under contract with Environment and Climate Change Canada

Arctic Canada

In summer 2022, Kyle Elliott (McGill University) and Grant Gilchrist (Environment and Climate Change Canada-Wildlife Research Division, Ottawa, ON) continued work at Coats Island, NU, on Thick-billed Murres (*Uria lomvia*) and Glaucous Gulls (*Larus hyperboreus*). Post-doc Allison Patterson (University of Windsor), PhD students Alyssa Eby (McGill University) and Marianne Gousy-Leblanc (McGill University), and MSc students Fred Tremblay (McGill) and Eliane Miranda (McGill) were present alongside contractors Douglas Noblet and Jesse Percival, and Inuit field technicians Josiah Nakoolak and Jupie Angootealuk. In addition to continuing long-term population monitoring, researchers are using GPS tracking, accelerometers, and geolocators to study movements, behaviour, and physiology of both species during the breeding and non-breeding season. We successfully used PIT tags to identify individual murres (much better than reading poopy colour bands). We also set up 3D-printed models to examine the thermal environment of the murres. Alyssa, Allison, Douglas and Brian Malloure continued on to Cape Graham Moore to continue similar work there.

Eastern Canada

Laura Bliss is finishing her Ph.D. with Dr. Gail Davoren (University of Manitoba) and Dr. Jen Zamon (NOAA NMFS and University of Manitoba adjunct) at the University of Manitoba. Her Ph.D. research focuses on marine food web ecology and predator-prey interactions on the west coast of North America in the Northern California Current, as well as on the east coast in Newfoundland, Canada. Laura is interested in how marine heatwaves affect forage fish and the seabirds that depend on them. She most recently published the results of her collaborative fisher interviews project in Newfoundland (Using fishers' knowledge to determine the spatial extent of deep-water spawning of capelin (*Mallotus villosus*) in Newfoundland, Canada, <https://doi.org/10.3389/fmars.2022.1061689>). For more information about her research, please visit <https://laurablisseco.wordpress.com/> or follow her on Twitter [@LauraBlissEco](https://twitter.com/LauraBlissEco). As of early 2023, Laura is based in Seattle, WA and is currently seeking post-doctoral researcher opportunities!

Emily Runnells, Matthew Legard (PhD students, University of Manitoba) and Kristina McOmber (MSc student, University of Manitoba) supervised by Gail Davoren (University of Manitoba), continued work on James Island, Newfoundland, Canada. During July and August 2022, GLS (global location sensor) and GLS/TDR (time depth recorders) combination tags were deployed on chick-rearing Razorbills (*Alca torda*). Upon recapture during summer 2023, these data will be combined with recaptured tags from previous years (Razorbill, GLS & GLS/TDR, 2017 & 2019-2021; Atlantic Puffin (*Fratercula arctica*), GLS, 2019-2021). Emily Runnells will use these data to

study species niche overlap during the non-breeding period and carry over effects while Matthew Legard will investigate the effects of personality on foraging behaviour, non-breeding distribution and reproductive success. Razorbill and Atlantic Puffin eggshell membranes were also collected on James Island during July and August 2022 and will be used by Kristina McOmber to study the period prior to egg laying. Assistance was provided by University of Manitoba undergraduate student Gibson Rieger, Michael Schrimpf (Cornell Lab of Ornithology Postdoctoral Researcher) and Gail Davoren. Gibson Rieger continued his studies on kleptoparasitism and predation by Herring Gulls (*Larus argentatus*) and Great Black-Backed Gulls (*Larus marinus*) on Atlantic Puffin and successfully submitted his honours thesis on this topic.

Raphael Lavoie (ECCC-CWS, QC) and Christina Petalas (McGill University, supervised by Kyle Elliott) visited Ile Laval and the Mingan Archipelago and studied Black-legged kittiwakes (*Rissa tridactyla*)

The Montevecchi Lab (Psychology and Biology Departments, Memorial University of Newfoundland and Labrador) conducted work on Leach's Storm-Petrels (*Hydrobates leucorhous*), Northern Gannets (*Morus bassanus*), and seabirds affected by the H5N1 epidemic in Newfoundland and Labrador, Canada. This work was a collaborative effort between Memorial University of Newfoundland and Labrador (MUN) and Environment and Climate Change Canada (ECCC).

Sydney Collins (Ph.D. Candidate, MUN) monitored the personality, foraging, migration, and incubation behaviour of over 100 Leach's Storm-Petrels from Gull Island, Witless Bay, Newfoundland and Labrador, Canada. In collaboration with ECCC, incubation behaviour was monitored using passive integrated transponders, foraging behaviour and space use were monitored using miniature global positioning system devices, and migration was monitored with light-level geolocator devices. For her doctoral thesis supervised by William Montevecchi (Professor Emeritus, MUN) and David Wilson (Associate Professor, MUN), Sydney is assessing the individual consistency in behaviour and space use to determine whether personality traits of individuals can predict reproductive success and association with oceanic risks such as oil platforms and wind farms.

Tori Burt (M.Sc. Student, MUN), along with Sydney Collins, Parker Doiron (M.Sc. Student, MUN), and Sherry Green (Weighmaster, Quinlan Brother's fish plant) conducted an experiment to determine the influence of anthropogenic light and other temporal and environmental factors on Leach's Storm-Petrel strandings from 2021-2022 under the supervision of William Montevecchi. This research was conducted at the Quinlan Brothers fish plant in Bay de Verde, Newfoundland and Labrador, as a part of Tori Burt's undergraduate honours thesis. Tori also researched the spatiotemporal distribution of Leach's Storm-Petrel strandings in Newfoundland

and Labrador using social media reports from 2021, and has submitted a paper for publication along with co-authors (Sydney Collins, Sherry Green and William Montevecchi).

Gretchen McPhail (B.Sc. Student, MUN) documented and assessed the spatial and temporal radiation of Highly Pathogenic Avian Influenza (HPAI H5N1) and relative species mortality in Newfoundland and Labrador, Canada. These assessments were made from observations of sick, stranded, or dead seabirds likely affected by HPAI between May and November 2022, compiled by Tori Burt and ECCC. As part of her undergraduate honours thesis, under the supervision of William Montevecchi, Gretchen examined the relationship between nesting density and risk of infection, as well as the observed mortality among scavengers and trans-equatorial migrants to assess the species most vulnerable to HPAI infection and the risk of further global circulation in 2023.

Parker Doiron (M.Sc. Student, MUN), with the help of Noah Careen (B.Sc. Student, MUN), and under the supervision of William Montevecchi and Pierre-Paul Bitton (Assistant Professor, MUN), developed, troubleshooted, and conducted surveys to record the interaction and impact between vessel-based anthropogenic light and Leach's Storm-Petrels in the waters surrounding Baccalieu Island, Newfoundland and Labrador, Canada. Surveys measuring storm-petrels collisions with vessels, storm-petrels and gulls following the vessels, and predation events by gulls were conducted in early July and late October 2022 by onboard observers on local fishing vessels circumnavigating the island with controlled and varied lighting conditions. Additionally, Parker is assessing risk exposure of Leach's Storm-Petrels colonies along the eastern coast of Newfoundland to vessel traffic using Vessel Monitoring System (VMS) data collected by the Fisheries and Oceans Canada (DFO) between 2005 and 2022.

Noah Careen monitored and recorded Northern Gannet breeding success at the Cape St. Mary's Ecological Seabird Reserve in Newfoundland and Labrador Canada, the species' southernmost colony. His honours thesis is under the supervision of William Montevecchi and Kyle d'Entremont (M.Sc. Graduate, MUN). During 2022, the colony was exposed to an outbreak of Highly Pathogenic Avian Influenza (HPAI H5N1) and a marine heatwave. Breeding success, calculated using several study plots, was < 20% - the lowest on record since 1977. Parental presence was assessed through a 20-week photographic analysis of a study plot throughout the breeding season and was compared with Sea Surface Temperature (SST) within the gannets' foraging range. There was a negative threshold response when SST increased to 16 C, the upper tolerance limit for the gannets' primary prey - the Atlantic mackerel.

Joanna Smith (The Nature Conservancy; Nature United, Canada) is in Eastern Canada and continues to work on marine spatial plans (MSP) globally to improve ocean management and expand marine protections for seabirds and other species. Since 2014, she has supported the Government of Seychelles as the MSP Process and Science Lead, where more than 410,000 sq

km were legally protected in March 2020. The covid-19 pandemic has caused about two years of delays in the MSP, with completion now in 2023 and signed into regulation to begin implementation (www.seymssp.com). Seychelles has several significant populations of seabirds including greater and lesser frigatebirds (*Fregata minor* and *F. ariel*, respectively), and some of the world's largest colonies of sooty terns (*Oncyoprion fuscatus*). Jo was selected as one of seven international experts to write a new MSP guidebook, published in October 2022, which provided updates and captured lessons learned from a decade of MSP around the world (UNESCO-IOC/European Commission 2021. MSPglobal International Guide on Marine/Maritime Spatial Planning. Paris, UNESCO No 89). Jo continues to support the implementation of the Marine Plan Partnership (MaPP) in British Columbia including co-authoring a recent publication (*Short et al*, 2023, Marine zoning for the Marine Plan Partnership (MaPP) in British Columbia Canada. Marine Policy. Open Access <https://doi.org/10.1016/j.marpol.2023.105524>). In 2022, Lindsay Young and Eric VanderWerf (Editors) published a new book Conservation of Marine Birds with many PSG scientists as co-authors. Rob Ronconi, Joanna Smith, and Karel Allard co-wrote a chapter on seabirds and spatial planning (Elsevier books; 2022). Sooty tern researchers in Seychelles, Chris Feare and Rachel Bristol, provided a valuable case study for the Conservation of Marine Birds chapter on spatial planning, illustrating how seabird tracking data can inform location and designs for Marine Protected Areas.

EUROPE

Compiled by Tegan Carpenter-Kling

Europe

Hólmfríður Arnardóttir (BirdLife Iceland), Yann Rouxel, and Steffen Oppel (both Royal Society for the Protection of Birds, UK) conducted trials aiming at reducing the bycatch of seaducks and alcids in gillnets targeting lumpfish in Iceland by deploying buoys with a rotating set of looming eyes designed to keep birds away from gillnets. Although these devices had previously deterred long-tailed ducks (*Clangula hyemalis*, Rouxel et al. 2021. Royal Society Open Science 8:210225) in the Baltic Sea, no reduction in bycatch of eiders (*Somateria mollissima*) and guillemots (*Uria aalge* and *Cepphus grille*) was found in Iceland.

The Royal Society for the Protection of Birds (Sandy, UK) attempted to eradicate invasive mice (*Mus musculus*) from Gough Island in winter 2021, but sadly the operation was not successful. In 2022, breeding success of all monitored seabird species was however unaffected by mice, and higher than ever recorded before (60-80%). Thus, removing mice would indeed result in the anticipated benefits. A review is under way to identify what may have caused some mice to survive the eradication, and the RSPB is still committed to restoring Gough Island.

Abby Bratt, Sarah Converse (University of Washington), Oli Yates and Steffen Oppel (both Royal Society for the Protection of Birds, UK) adapted an existing integrated population model from Tristan Albatrosses (*Diomedea dabbenena*; Oppel et al. 2022 J. Appl. Ecol. 59:2059– 2070) to examine whether the bycatch mitigation efforts across the South Atlantic Ocean have led to detectable increases in the survival of Atlantic Yellow-nosed Albatrosses (*Thalassarche chlororhynchos*) on Gough Island between 1980 and 2023.

Jonathan Handley, Bethany Clark, Tammy Davies (BirdLife International, Cambridge, UK), Silviu Petrovan (Conservation Evidence, Cambridge, UK), Phillip Boersch-Supan (British Trust for Ornithology, Cambridge, UK) and Steffen Oppel (Royal Society for the Protection of Birds, Cambridge, UK) are developing a tool kit to facilitate the identification of Key Biodiversity Areas from seabird tracking data. The toolkit is based on the existing R-package 'track2KBA' (Beal et al. 2021 Meth. Ecol. Evol. 12:2372-2378) but is targeted at users with little coding expertise.

Fernando Medrano, Sarah Saldanha and Jacob González-Solís (Universitat de Barcelona), Julio Hernández-Montoya, Ariana Duarte, and Yulianna Bedolla (Grupo de Ecología y Conservación de Islas) collaborated to study the spatial ecology of the threatened storm-petrels from Guadalupe Island, Ainley's storm-petrel (*Hydrobates cheimnomnestes*) and Townsend's storm-petrel (*Hydrobates socorroensis*). They deployed GPS tags to describe the areas used during the breeding season and geolocators to describe the non-breeding areas. Surprisingly, they found that Ainley's storm-petrel visits U.S. waters during the breeding season (published in Medrano, F., Saldanha, S., Hernandez-Montoya, J., Bedolla-Guzman, Y., & Gonzalez-Solis, J. (2022). Foraging areas of nesting Ainley's Storm Petrel *Hydrobates cheimnomnestes*. Marine Ornithology,

50, 125-127.). They are currently analyzing further GPS and geolocator data, which will allow them to establish the important areas for both species that should be protected.

NON-PACIFIC U.S

Compiled by Julia Gulka

Eastern U.S.

Richard Veit and Lisa Manne (CSI/SUNY) are funded with two NSF Grants, one to study vagrancy and colonization by birds, with a focus on satellite-tracking of Lesser Black-backed Gulls (*Larus fuscus*), and another to study the impact of warming climate upon the formation of positive interspecific associations among seabirds and mammals in the Scotia Sea, South Georgia (British Antarctic Territory). For the first, after several unsuccessful efforts, we managed, in collaboration with Lawrence Niles, to capture 18 Lesser Black-backed Gulls and attach solar powered PTTs in early February. PTTs are functioning well as of now. The 2022 research cruise to South Georgia was postponed due to combined effects of Covid (upon delivery of electronic components) and the Russian war in Ukraine (upon use of Russian satellites). We are now scheduled for cruises in 2023 and 2024. They published the following papers on seabirds in 2021/2022:

Acosta, M.A., L.L. Manne and R.R. Veit 2022. Does Population size drive changes in transatlantic vagrancy for gulls? A study of seven North Atlantic species. *Frontiers in Ecology and Evolution* 879.

Veit, R.R., L. L. Manne¹, L. C. Zawadzki³, M. A.¹ and R.W. Henry III². 2022. Editorial: Vagrancy, Exploratory Behavior and Colonization by Birds: Escape from Extinction? *Frontiers in Ecology and Evolution*. 10: 960841. doi: 10.3389/fevo.2022.960841

Veit, R.R., E. Velarde, M. Horn and L.L. Manne. 2021. Long distance vagrancy leads to colonization in Europe by Elegant Terns *Thalasseus elegans*. *Frontiers in Ecology and Evolution* 879.

Zawadzki, L.C., G.T. Halgrimsson, R.R. Veit, L. Rasmussen, D. Boertmann, N. Gillies and T. Guilford. 2021. Predicting source populations of vagrants using breeding population data: A case study of the Lesser Black-backed Gull (*Larus fuscus*). *Frontiers in Ecology and Evolution* 879.

Julia Gulka (Biodiversity Research Institute) is nearing completion on a project with Evan Adams, Chandra Goetch, Andrew Gilbert, Iain Stenhouse, Kate Williams (Biodiversity Research Institute), Kevin Friedland (National Marine Fisheries Service), Alicia Berlin (USGS), Bill Montevecchi (Memorial University), and Matthew Perry (Retired, USGS) using satellite telemetry data to examine the movement behavior of non-breeding northern gannets (*Morus bassinus*), red-throated loons (*Larus delawarensis*), and long-tailed ducks (*Clamator melanotos*) in relation to forage fish species occupancy and

surface aggregations in the U.S. Atlantic. With support from the New York Energy Research and Development Authority, Julia and Edward Jenkins (Biodiversity Research Institute) are helping to support research related to potential impacts to seabirds from offshore wind energy development, including 1) providing scientific technical support for a committee co-chaired by U.S. Fish and Wildlife Service and the Bureau of Ocean Energy Management to develop guidance for conducting research at offshore wind development projects to examine displacement effects to seabirds, and 2) compiling existing seabird distribution, tracking, and colony information to inform siting of offshore wind development in the Gulf of Maine.

Linda Welch (U.S. Fish and Wildlife Service, Maine Coastal Islands National Wildlife Refuge) in collaboration with David Wiley and Kevin Powers (Stellwagen Bank National Marine Sanctuary, NOAA) have been working on tracking the movement and foraging habitats of Great Shearwater, continuing its satellite tracking work in 2022 marking the 11th year of tagging wintering great shearwaters (*Ardenna gravis*) in the Gulf of Maine. This season, we also were able to deploy transmitters on four Cory's shearwaters (*Calonectris diomedea*). We have been collecting breath, feather, and blood samples for stable isotope analysis, and we are using eDNA analysis of fecal samples to examine diet in the two species. The most recent publication (Silva et. al. 2022, *Frontiers of Marine Science*, Vol 9, article 837604) examines the use of seabirds as a dynamic ocean management tool to mitigate anthropogenic risk to large whales. Linda and Jill Tengeres with Maine Coastal Islands National Wildlife Refuge continued their efforts to document diet composition, productivity, and chick growth rates for Arctic tern (*Sterna paradisaea*), common tern (*S. hirundo*), Atlantic puffin (*Fratercula arctica*), razorbills (*Alca torda*), black guillemot (*Cephus grille*), and Leach's storm-petrel (*Hydrobates leucorhous*). Annual monitoring efforts have been ongoing for 40 years. The Refuge is also working in collaboration with the National Audubon Society's Seabird Institute to understand the foraging ecology and habitat use of several of these seabird species.

Natasha Gownaris (Assistant Professor at Gettysburg College) started a research program on Atlantic puffins (*Fratercula arctica*), black guillemots (*Cephus grylle*), common terns (*Sterna hirundo*), and Arctic terns (*Sterna paradisaea*) on Petit Manan Island in the Gulf of Maine in collaboration with Linda Welch (Wildlife Biologist at the US Fish and Wildlife Service), Jill Tengeres (U.S. Fish and Wildlife Service), and the rest of the Maine Coastal Islands National Wildlife Refuge team. Two undergraduate students joined Natasha for the 2022 summer field season, including Kaiulani Sund (Senior, Gettysburg College). For her honor's thesis, Kaiulani is using high frequency provisioning data to quantify intraspecific variation in the response of terns to rising sea surface temperatures. That summer, the team also undertook comprehensive stable isotope sampling including eggshell membranes of all four species, blood samples (blood cells and plasma) of chicks of all four species, and a wide variety of diet items and isotopic baseline indicators. This summer, the team will be attaching GPS tags to common and Arctic terns to

provide further insight into the response of these species to rising temperatures and changing food availability in the Gulf of Maine.

Graduate student Sarah Guitart (University of Massachusetts Amherst), under the supervision of Dr. Michelle Staudinger (U.S. Geological Survey) and in collaboration with Carolyn Mostello (MassWildlife), is working on Common (*Sterna hirundo*) and Roseate Tern (*Sterna dougallii*) colonies on Bird and Ram Islands in Buzzards Bay, Southeastern Massachusetts. She will develop a trail-camera based chick provisioning monitoring methodology and test its capacity to reflect dietary diversity and foraging plasticity, as well as its comparability to the widely used in-person provisioning methodology.

Although officially retired as of 31 December 2018, Jeff Spendelow (Emeritus Research Wildlife Biologist, USGS) still continues to direct the Cooperative Roseate Tern Metapopulation Project (CRTMP), a research program on the metapopulation dynamics and ecology of the endangered Northwest Atlantic breeding population of Roseate Terns (*Sterna dougallii*; ROST) which he began in the late 1980s. A major goal of the CRTMP is to determine the relative importance of various factors that are limiting the recovery and growth of this population. Many cooperators (too numerous to mention all by name and affiliation here) band and identify individual terns at their breeding colony sites, and since 2011 Jeff has focused his personal fieldwork on staging site studies, mainly in the Cape Cod area of southeastern Massachusetts (CCMA). This research involves sighting colorbanded individuals with 3-character plastic field-readable (PFR) bands for the purpose of examining temporal and geographic variation in the use of staging sites by ROSTs of different ages and breeding status (e.g., Hatch Year [HY] birds; nonbreeding [mainly 1-, 2-, and 3-yr-old] adults; failed and successful breeders that are not caring for an HY; and successful breeders that are giving post-fledging care to HYs) coming from about a dozen colony sites spanning the entire breeding range.

In contrast to prior years, covid-related events had relatively little direct impact on colony-site fieldwork in 2022. However, as a result of other factors only 3, 100, and 0 ROST chicks were colorbanded, respectively, in CT, NY & MA, and 436 ROST chicks were colorbanded in the NH-ME-Nova Scotia area, so overall 539 ROST chicks received PFRs in 2022. For the first time ever at Great Gull Island (GGNY) New York, 100 Common Tern (COTE, *S. hirundo*) chicks also got PFR bands. Only 30 (30%) of 103 ROST chicks from the CT-NY area, but 298 (68%) of 436 ROST chicks from the NH-NS area were seen as HYs on CCMA. By comparison, only one COTE chick from GGNY was seen as an HY. On 16 September an HY COTE with a PFR that had been banded as a chick in July at the Hampton Roads Tunnel colony site in Virginia near the mouth of the Chesapeake Bay was seen by Jeff on CCMA.

Hawaii

Wieteke Holthuijzen (PhD student, University of Tennessee - Knoxville [UTK]), Dr. Holly Jones (Associate Professor, Northern Illinois University [NIU]), Dr. Elizabeth Flint (supervisory wildlife biologist, U.S. Fish and Wildlife Service [USFWS]), Coral Wolf (conservation science program manager, Island Conservation [IC]), and Dr. Jonathan Plissner (wildlife biologist, USFWS), and Dr. Daniel Simberloff (professor, UTK) have collaborated closely on quantifying the ecological effects of introduced house mice (*Mus musculus*) on Midway Atoll National Wildlife Refuge's Sand Island (located in the Northwestern Hawaiian Islands, protected under the Papahānaumokuākea Marine National Monument). Mice have been observed to attack and depredate Laysan and Black-footed Albatross (*Phoebastria immutabilis* and *P. nigripes*, respectively) since 2015. Efforts to eradicate mice in the summer of 2023 are currently underway, but the broader ecosystem-level effects of house mice on Sand Island are largely unknown. UTK, NIU, USFWS, and IC have been working on uncovering invasive house mouse diet on Sand through combined next-generation sequencing and stable isotope analyses. In turn, these diet data can help to refine and guide focused ecological monitoring to quantify current impacts of mice on insular flora and fauna, as well as predict ecological response post-eradication, such as the release of pest insects or invasive plant species. Despite severe set-backs and delays due to COVID-19, the Sand Island mouse diet work is complete, as well as an additional study providing baseline data of arthropod communities among Midway Atoll's two islands (Sand Island—where mice are present and Eastern Island—where mice are absent).

Using a combined approach of next-generation sequencing (NGS) and stable isotope analysis (SIA), it was found that introduced house mice on Sand Island mainly consume arthropods, with nearly equal (but substantially smaller) contributions of C3 plants, C4 plants, and Laysan Albatross. Although seabird tissue is a small portion of mouse diet, mice consume many detrital-feeding arthropods in and around seabird carcasses, such as isopods, flesh flies, ants, and cockroaches. Additionally, most arthropods and plants eaten by mice are non-native. Mouse diet composition differs among habitat types but changes minimally throughout the year, indicating that mice are not limited by food source availability or accessibility. This study has important implications for the pending eradication of house mice on Midway Atoll NWR's Sand Island—in particular, the availability of food sources during bait application. Bait is expected to be applied between July 1 to August 15, 2023, when most albatross chicks are expected to fledge and the fewest seabirds and migratory shorebirds are present. However, during the fledging of albatross chicks, many albatross chicks are unsuccessful—so, albatross carcasses will also be present. In turn, these carcasses could provide a substantial (alternative) food source for mice and decrease the chance that mice consume enough bait. For example, three dipteran species common in Sand Island mouse diet (*Lucilia sericata*, *Sarcophaga dux*, and *Megaselia scalaris*) specifically rely on carrion during their life cycle, laying their eggs and larvae in carcasses. Depending on how many carcasses are present and accessible to mice, it may be important to consider removing

carcasses before/during bait application and/or applying extra bait in/around carcasses. Undoubtedly, mice scavenge decaying seabird tissue, simultaneously eating detrital-feeding arthropods (and their eggs and larvae) in and around seabird carcasses. Although the mouse eradication will absolutely benefit Sand Island's seabirds, it is unclear how arthropod and plant communities may respond and change. Non-native and invasive arthropods and plants previously consumed (and possibly suppressed) by mice may be released post-eradication, which could prevent recovery of native taxa.

Beyond the diet study, the collaborators from NIU, USFWS, and IC also studied arthropod community composition between Midway's two main islands (Sand and Eastern Islands, where mice are present and absent, respectively). Both islands differ in terms of the composition and structure of arthropod communities, which may indicate an effect of mouse predation of arthropods, but likely also reflects the different land-use and species introduction histories between the islands. To read the full study, refer to Holthuijzen et al., *Pacific Science*, 75:3, 2021.

Another aspect of the pending mouse eradication on Sand Island of Midway Atoll NWR is mitigating the risk of non-target poisoning, especially for federally listed species such as the Laysan Duck (*Anas laysanensis*). To reduce exposure to rodenticide, ducks will be captured and translocated to the nearby mouse-free Eastern Island during and after the mouse eradication. Even so, ducks may risk secondary poisoning by ingesting arthropods that feed on rodenticide bait. Therefore, it is crucial to monitor rodenticide residue in arthropods consumed by ducks to determine when *koloa pōhaka* can be safely released post-eradication. In turn, Wieteke Holthuijzen (PhD student, University of Tennessee - Knoxville [UTK]), Carmen Antaky (biologist, US Department of Agriculture [USDA]), Dr. Holly Jones (associate professor, Northern Illinois University [NIU]), Dr. Elizabeth Flint (supervisory wildlife biologist, U.S. Fish and Wildlife Service [USFWS]), Coral Wolf (conservation science program manager, Island Conservation [IC]), and Dr. Jonathan Plissner (wildlife biologist, USFWS) undertook a diet study using next-generation sequencing (NGS) to identify which arthropods ducks consume. From August 2019 to February 2020, 71 fresh duck fecal samples were collected in areas where ducks are commonly found. 21 samples yielded usable DNA, which were sequenced to determine the identify of arthropod prey items. Sand Island's ducks most frequently consume cockroaches (Blattodea), freshwater ostracods (Cyprididae), midges (Chironomidae), and isopods (Porcellionidae). To a lesser degree, ducks also eat spiders (Araneae), moths (Lepidoptera), beetles (Coleoptera), springtails (Entomobryomorpha), thrips (Thysanoptera), and crabs (Decapoda). Notably, Sand Island's ducks consume entirely different arthropods from ducks on Kamole (Laysan Island), which mainly eat flies (Diptera) and brine shrimp (Anostraca, *Artemia* sp.). In turn, this information will be used to focus ecological monitoring efforts. Specifically, focal arthropods will be regularly sampled for several weeks after bait application to monitor brodifacoum levels, until residue levels have

dropped to a safe level and ducks may be released from Eastern Island following mouse eradication.

In January 2022, Scott Shaffer (SJSU) and Henri Weimerskirch (CNRS) completed the first year of field work for the NFWF funded project: Characterizing the occurrence and drivers of Hawaiian albatross encounters with fishing vessels inside and outside the Papahānaumokuākea MNM. Their efforts were supported by Sarah Youngren, Dan Rapp and the USFWS. A second field season is planned for January 2023. This project is co-led by Rachael Orben, Scott Shaffer, and Leigh Torres (OSU).

The Hawai'i Wildlife Center (HWC): Provides emergency response, medical and rehabilitative care for native birds and bats statewide, alongside conservation programs that aim to create a community where native wildlife thrive. HWC's main facility is on Hawai'i Island, with a satellite on Lāna'i Island and as of October 2022, a new satellite was opened on O'ahu at the Honolulu Zoo. HWC will be expanding operations at the new satellite in phases.

Hawaiian archipelago seabird and shorebird rehabilitation patients treated at HWC September 1, 2021 to February 28, 2023 consisted of 1,420 seabirds (22 species) and 16 (2 species) shorebirds. The release rate for all birds treated in this period was 91.68%. Treated seabirds were downed while fledging due to light pollution on land or on ocean vessels, orphaned, injured, and entangled in fishing line/hooks. Shorebirds are admitted with injuries or emaciation.

Seabird species are listed in order of largest number cared for to lowest:

- Wedge-tailed Shearwater (*Ardenna pacifica*)('Ua'u kani)-1,226
 - The majority of these shearwaters were downed fledglings with a short stay in care
- White-tern (*Gygis alba*) (Manu o Kū) -84
 - Most of the terns are orphaned chicks that are raised and soft-released
- Bulwer's Petrel (*Bulweria bulwerii*) ('Ou)-35
 - Majority are downed fledglings with short stays in care
- Hawaiian Petrel (*Pterodroma sandwichensis*) ('Ua'u)-16
- Red-footed Booby (*Sula sula*) ('Ā)-13
- White-tailed Tropicbird (*Phaethon lepturus*) (Koa'e kea)-9
- Sooty Tern (*Sterna fuscata*)('Ewa 'ewa) -7
- Brown Booby (*Sula leucogaster plotus*) ('Ā)-7
- Leach's Storm-Petrel (*Oceanodroma leucorhoa leucorhoa*)-3
- Masked Booby (*Sula dactylatra*) ('Ā)-3

- Black-winged Petrel (*Pterodroma nigripennis*)-2
- Brown Noddy (*Anous stolidus*) (Noio kōhā)-2
- Buller's Shearwater (*Puffinus bulleri*)-2
- Laysan Albatross (*Phoebastria immutabilis*) (Mōlī)-2
- Newell's Shearwater (*Puffinus neweli*) ('A'o)-2
- Black-footed Albatross (*Phoebastria albatrus*) (Ka'upu)-1
- Cassin's Auklet (*Ptychoramphus aleuticus*)-1
- Christmas Shearwater (*Puffinus nativitatus*) ('Ao'ū)-1
- Glaucous-winged Gull (*Larus glaucescens*)('Opa'ipa'i)-1
- Great Frigatebird (*Frigata minor palerstoni*) ('Iwa)-1
- Red-tailed Tropicbird (*Phaeithon rubricauda*) (Koa'e 'ula)-1
- Sooty Shearwater (*Ardenna grisea*)-1

Shorebirds:

- Pacific Golden Plover (*Pluvialis fulva*) (Kōlea)-15
- Ruddy Turnstone (*Arenaria interpres*) ('Akekeke)-1

NORTHERN CALIFORNIA

Region-Wide

H.T. Harvey and Associates

H.T. Harvey and Associates continues to develop a 3D model of seabird distribution in the California Current; final report soon. Also, in Sept. 2022 we conducted 'sea truthing' of a 'thermal tracker,' developed by Pacific Northwest National Laboratory (PNNL) to assess seabird flight height to be used in the vicinity of offshore wind farms. Development continues.

Humboldt Redwood Company

Humboldt Redwood Company, LLC (HRC) continued the conservation activities for the marbled murrelet (*Brachyramphus marmoratus*) under the company's Habitat Conservation Plan (HCP). Project leaders were Sal Chinnici and Mark Freitas of HRC. The HCP requires tracking of murrelet occupancy and numbers over time using both radar and audio-visual (AV) survey techniques. Surveys were continued in 2022 at the Headwaters Forest Reserve and Humboldt Redwoods State Park (the Reserves), and at the Marbled Murrelet Conservation Areas (MMCA) on HRC forestlands, with the collaboration of Sean McAllister of North Coast Field Biologists, O'Brien Biological Consulting, and Adam Brown of Environmental Protection in the Caribbean.

Since the inception of HCP monitoring (1999), occupied behaviors have been observed in the MMCA and Reserve stands using AV surveys. In 2022, surveyors conducted 130 surveys at 33

stations and observed occupied behaviors (below canopy flight or circling) in the Headwaters Forest Reserve, Humboldt Redwoods State Park, and all the HRC MMCAs with the exception of the Shaw Gift MMCA.

Radar surveys track murrelets traveling to and from nesting areas within the MMCAs and Reserves. Radar counts are considered indices of the breeding population. In 2022, 56 radar surveys were conducted at 14 sites. Most murrelets tracked by radar were at Humboldt Redwoods State Park and the Allen Creek MMCA. Final analyses of the 2022 data have not yet been conducted. The 2021 data indicated that after 19 years of monitoring, trends in radar counts of murrelets in the MMCAs and Reserves have differed during the study period; there has been a significant decline in radar counts in both the Reserves and the MMCAs since the 2002 baseline, but the rate of decline in the MMCAs is slower.

A recent publication discusses the results of our monitoring: Brunk, et. al., 2021. Assessing the effectiveness of a forest Habitat Conservation Plan for a threatened seabird, the Marbled Murrelet. *Ornithological Applications*. Vol. 123, pp.1–15.

Northwest Forest Plan Marbled Murrelet Effectiveness Monitoring Program

The goal of the Marbled Murrelet Effectiveness Monitoring Program (MAMU EMP) is to evaluate the effectiveness of the Northwest Forest Plan (NWFP) in maintaining and restoring marbled murrelet (*Brachyramphus marmoratus*) populations and nesting habitat from the Canada–Washington border to northern California and to inform management decisions. The MAMU EMP operates with two teams: population and habitat monitoring. Monitoring program members include: Jim Baldwin, Adam Duarte and Martin Raphael (U.S. Forest Service); Katherine Fitzgerald, Colleen Holland, Teresa Lorenz, Bill McIver, and Daryl Van Dyke (U.S. Fish and Wildlife Service); Monique Lance and Scott Pearson (Washington Department of Fish and Wildlife); Kim Nelson (Oregon State University); and Craig Strong (Crescent Coastal Research).

This program has estimated marbled murrelet population size and trends during the breeding season between the state of Washington and San Francisco Bay, California since 2000. This monitoring program uses at-sea line transects within 8 km of the Washington, Oregon, and northern California coastline in the area covered by the NWFP. In 2022, at-sea surveys were conducted in Conservation Zone 1 (Puget Sound and Strait of Juan de Fuca, Washington) and Conservation Zone 3 (Oregon coast from Columbia River mouth to Coos Bay), using established long-term protocols. Conservation Zone 1 surveys were conducted by excellent survey biologists Kelly Beach, Chad Norris, Kristin Saksa, and Sarah Tanedo; the surveys were led by Monique Lance and Scott Pearson. Surveys in Conservation Zone 3 were supervised by Craig Strong, with crew members Sonya Pastran (crew lead), Kelly DeForest, Naomi Himley, and Darell Warnock conducting surveys. In January 2022, the MAMU EMP provided a summary report on monitoring results from at-sea surveys for marbled murrelets in 2022. This and other program reports can

be accessed online at: <https://www.fs.usda.gov/r6/reo/monitoring/marbled-murrelet.php>. In 2023, at-sea surveys will be conducted in Conservation Zone 2 (Western Washington Coast [Cape Flattery to Columbia River mouth]) and Conservation Zone 4 (Siskiyou Coast [Coos Bay to southern boundary of Humboldt County, California]).

In addition, the MAMU EMP has estimated marbled murrelet nesting habitat abundance and trends in the NWFP area since 1993. Nesting habitat monitoring work was not conducted in 2022, but three members (all US Fish and Wildlife Service employees) were added to the nest habitat team in 2022, as follows: Colleen Holland (Roseburg, Oregon), Teresa Lorenz (Wenatchee, Washington) and Daryl Van Dyke (Arcata, California). In 2023, the nesting habitat team will begin evaluating nesting habitat for the 1993–2022 time period, in preparation of the “30-year report” under the NWFP’s Effectiveness Monitoring Program.

USGS WERC

Jonathan Felis, Josh Adams, Emma Kelsey, Cheryl Horton, and Laney White (all of the USGS Western Ecological Research Center, e.g., USGS WERC), with observer support from Alex Rinkert (California State Parks), continued long-term (1999–present) at-sea marbled murrelet (*Brachyramphus marmoratus*) surveys in Conservation Zone 6 in central California to estimate murrelet abundance reproductive output in 2022. This long-term monitoring project was funded by the Luckenbach Oil Spill Trustee Council. With additional support from California State Parks, Jonathan Felis, Josh Adams, and Ben Becker (NPS and UC Berkeley) conducted a retrospective evaluation of murrelet status, trend, and monitoring effectiveness using this time series. Both will be available as reports soon: https://www.usgs.gov/centers/werc/science/marbled-murrelet-surveys-central-california-coast?qt-science_center_objects=0#qt-science_center_objects

Jonathan Felis, Laney White, and Emma Kelsey opportunistically deployed acoustic sensors and conducted nest searches to monitor for ashly storm-petrels (*Oceanodroma homochroa*) at remote offshore sites along the California coast from Mendocino to San Luis Obispo counties. This effort was in coordination with USGS WERC effort to deploy bat acoustic sensors offshore.

Josh Adams, Emma Kelsey, Jonathan Felis, and Jennilyn Stenstke (USGS WERC) published their effort enumerated colony count estimates for surface nesting seabirds at three major colonies in the Main Hawaiian Islands – Marine Corps Base Hawai‘i, Moku Manu Islet off O‘ahu, and Lehua islet of Ni‘ihau: Adams, J., Kelsey, E.C., Stenske, J., and Felis, J.J., 2022, Aerial counts for surface-nesting seabirds at Lehua Island and Moku Manu Islet and Ulupa‘u Crater, O‘ahu, in 2019: Data Report 1161, 20 p., <https://doi.org/10.3133/dr1161>. This publication is part of the ongoing effort to create an updated Atlas of Breeding Seabirds of the Main Hawaiian Islands (<https://www.sciencebase.gov/catalog/item/5fc0045cd34e4b9faad7ef37>).

Josh Adams, Laney White, and Cheryl Horton (USGS WERC), in collaboration with Matthew McKown, Jeff Schlueter, and Abram Fleishman (Conservation Metrics Inc.), and support from David Pereksta (BOEM) are working on manual low taxonomic identification of model output from aerial survey images collected off southern-central California between 2018–2021.

Josh Adams, Emma Kelsey and Jonathan Felis (USGS WERC), in collaboration with David Pereksta (Bureau of Ocean Energy Management; BOEM), are updating the vulnerability of seabirds to offshore wind farms in the California Current System, first published in 2017.

Josh Adams, Laney White, Emma Kelsey, Cheryl Horton, and Jonathan Felis (USGS WERC), in collaboration with David Pereksta (BOEM), are working to expand the Motus Wildlife Tracking System in central and southern California with a focus on increasing tracking capacity for seabirds and bats off southern-central California and in the Southern California Bight.

Morgan Gilmour and Josh Adams (USGS Western Ecological Research Center), Sara Maxwell (University of Washington, Bothell), Abram Fleishman (Conservation Metrics, Inc.), and Abigail Schiffmiller (University of Alaska, Fairbanks) deployed tracking tags on great frigatebirds (*Fregata minor*), red-footed boobies (*Sula sula*), and sooty terns (*Onychoprion fuscatus*) at Palmyra Atoll in May 2022. This tagging effort was part of a larger collaborative project, Palmyra Bluewater Research (PBR), with Alex Wegmann and Nick Holmes (The Nature Conservancy), Scott Shaffer (San Jose State University), and other partners at NOAA and several universities. In May, PBR concurrently deployed tags on yellowfin tuna (*Thunnus albacares*), grey reef sharks (*Caracharhinus amblyrhynchos*), reef manta rays (*Mobula alfredi*), bottlenose dolphins (*Tursiops truncatus*) and melon-headed whales (*Peponocephala electra*) to quantify and characterize habitat use in the Pacific Remote Islands Marine National Monument.

Central California

High Arctic Gull Research Group

Scott Moorhouse (High Arctic Gull Research Group) is continuing his studies of Iceland gulls (*Larus glaucoides thayeri*), including completing additional work on the abundance, habitat use, and behavior of wintering gulls in central California. Preliminary field studies were completed in the winter of 2020–2021 and detailed field studies were completed in the winter of 2021–2022. Detailed field studies are also being completed in the winter of 2022–2023. This work includes collection of detailed count data in representative study areas located in all of the major habitat types used by this species in the winter in this geographic area. Data are also being collected on age class distribution, general behavior, and specific feeding habitat use. An additional component of this work is to compare these specific aspects of the occurrence, ecology, and behavior of wintering *L. thayeri* in this geographic area located at the southern end of the winter range on the west coast of North America, with the same aspects in coastal British Columbia, the

core winter range. This study is a continuation of my previous work on Iceland Gulls (Moorhouse, S.S. 2021. The feeding ecology and behavior of breeding Iceland gulls *Larus glaucooides kumlieni* and comparisons with sympatric large Larus gulls on southwestern Baffin Island, Canada. *Marine Ornithology* 49: 83–90).

Bay Area

Alcatraz Island

Maggie Lee Post, Julie Thayer (Farallon Institute) and Lidia D’amico (National Park Service, Golden Gate National Recreation Area) continued the long-term monitoring of breeding seabird colonies on Alcatraz Island in San Francisco Bay. Brandt’s cormorants (*Urile penicillatus*) nested in the highest numbers (n = 4430) ever observed in the time series, and had reproductive success above the long-term mean (1995–2021). The frequency of anthropogenic disturbance to the cormorant colony increased over recent years; most disturbances were caused by recreational fisherman in small boats and frequent flyovers by helicopters and planes. The western gull (*Larus occidentalis*) breeding population remained stable (n = 1016), and their productivity was above the long-term mean (1999–2021). The California gull (*L. californicus*) colony was displaced by the growing Brandt’s cormorant colony and the two pairs seen on the island were unsuccessful in fledging chicks. Pelagic cormorants (*U. pelagicus*) have not nested on the island since 2013. Two black oystercatcher (*Haematopus bachmani*) pairs nested on Alcatraz in 2022, though neither fledged chicks. Pigeon guillemots (*Cephus columba*) continued to nest on Alcatraz, with 47 nest sites confirmed with fish deliveries.

Additionally, William Sydeman, Sarah Ann Thompson, Brian Hoover, and Michael Force (contractor) of Farallon Institute coordinated and conducted at-sea transect surveys of seabirds on a) the spring (April) and summer (August) California Cooperative Oceanic Fisheries Investigations (CalCOFI) oceanographic surveys and b) the NOAA Rockfish Recruitment and Ecosystem Assessment Survey (RREAS; May–June). Brian Hoover was the observer on the summer CalCOFI survey, while Michael Force observed on the spring CalCOFI survey and the RREAS. Time series are now 1996–2022 for the RREAS and 1987–2022 for CalCOFI.

SOUTHERN CALIFORNIA

Justin Schuetz (JGS Projects, contractor) collaborated with Nacho Vilchis, Rachel Smith, Travis Wooten, Kristina Wolf, Elena Oey, and Ron Swaisgood (San Diego Zoo Wildlife Alliance, SDZWA) to analyze data collected on California Least Tern (*Sternula antillarum browni*) populations breeding at Naval Base Coronado and Marine Corps Base Camp Pendleton in San Diego County, California. SDZWA is interested in understanding the ecological causes and reproductive

consequences of variation in nest attendance behavior and breeding phenology for California Least Terns.

WASHINGTON-OREGON

Compiled by Amelia Duvall and Laura Koehn

Coastwide

COASST

2022 was the 23rd year of the Coastal Observation and Seabird Survey Team (COASST), a citizen science program based at the University of Washington in Seattle (coasst.org). Monthly beached seabird surveys to establish baseline levels of mortality continued in Alaska (428), Washington (1511), Oregon (683), and northern California (425) during this year. 376 beaches were monitored across all regions, with surveys conducted by 762 participants. Pandemic-inspired virtual trainings continued, but in-person COASST surveyor trainings resumed in all states.

Seabird carcass encounter rates remained near baseline levels throughout the year (see coasst.org/explore-data for more detail by region and species), with elevated (>5x baseline) numbers of Northern Fulmar (*Fulmarus glacialis*) reported in northern California regions in the first months of 2022.

Decades of COASST data were analyzed by University of Washington graduate student Jazzmine Waugh to publish on oiling susceptibility across marine bird species (<https://doi.org/10.1016/j.marpolbul.2022.113437>). She and coauthors (Timothy T. Jones and Julia K. Parrish, both of the University of Washington) compared baseline beached bird encounter rates from COASST surveys with those reported in major oil spill events to identify taxa susceptible to oiling.

COASST survey data have also contributed to the 2022 summary of seabird status in NOAA's Ecosystem Status Reports in Alaska (Eastern Bering Sea, Gulf, and Aleutians) and the California Current Integrated Ecosystem Assessment. COASST data have been incorporated into the AOOS (Alaska Ocean Observing System) Ocean Data Explorer data portal, with annual updates to that shared data portal planned for at least the next 3 years.

Oregon

Oregon Coast National Wildlife Refuge Complex

Shawn W. Stephensen (Oregon Coast National Wildlife Refuge Complex, U.S. Fish and Wildlife Service [USFWS]) and Mike Szumski (Ecological Services, USFWS) conducted an aerial seabird colony survey on 9 and 10 June 2021 that included the entire Oregon coast and Castle Rock,

California. The aircraft used was a Bell Jet Ranger III helicopter operated by Mike Everette of Northwest Helicopters (Olympia, WA). Total flight time was approximately 10 hours. All Common Murre (*Uria aalge*), Brandt's Cormorant (*Phalacrocorax penicillatus*), Pelagic Cormorant (*Phalacrocorax pelagicus*), and Double-crested Cormorant (*Phalacrocorax auritus*) colonies were photographed using digital cameras and birds were counted on the digital images utilizing GIS computer software. Ten thousand digital images were organized and archived for future reference. Colony attendance by murre appeared to be at normal levels in comparison to previous years.

An Oregon coastwide Tufted Puffin (*Fratercula cirrhata*) colony survey was conducted during the chick rearing period from July 14 – August 25, 2021 from boat, mainland, or on-island. Observers included Shawn W. Stephensen, Alyssa Nelson, Noah Dolinajec, Hannah Buschert, Tiffany Boothe, Frances Bowman, Mike Szumski, Samantha Luginbuhl, Charlie Neher, Madeleine Vander-Heyden, and Lee Whitmer (USFWS and volunteers). A total of 62 historical colonies were surveyed, 16 active colonies were documented, and no new colonies were found. The current tufted puffin estimated breeding population of Oregon is 519 individuals. The breeding bird population was calculated by multiplying the number of burrows by two at each site except for Face Rock and Island Rock where the actual number of birds observed was used. The breeding population remains low but stable compared to previous coastwide surveys.

Tim Halloran (USFWS volunteer) and Shawn W. Stephensen of the Oregon Coast National Wildlife Refuge Complex conducted a population status assessment of Tufted Puffin (*Fratercula cirrhata*) at Haystack Rock, Cannon Beach which is within the Oregon Islands National Wildlife Refuge. The project also included a pilot study to evaluate the feasibility of monitoring additional reproductive parameters at the island, such as breeding phenology and data collection success from shore-based vantage points. The number of tufted puffins present at Haystack Rock was documented during 2010 - 2021 by conducting instantaneous counts of birds on the land, water, and in the air at 15 minute intervals. The daily mean counts were 42, 33, 13, 35, 22, 21, 23, 18, 26, 18, and 15 birds during 2010, 2011, 2012, 2013, 2014, 2015, 2016, 2017, 2018, 2019, and 2020 respectively. Burrow occupancy was determined and the annual breeding population estimate was calculated based on the number of viable occupied burrows. We estimated the Tufted Puffin breeding population (individual birds) at Haystack Rock to be 127 in 2010, 115 in 2011, 92 in 2012, 143 in 2013, 125 in 2014, 121 in 2015, 124 in 2016, 109 in 2017, 127 in 2018, 127 in 2019, and 98 in 2020. We have not completed 2021 data analysis, however, initial data review indicated 60 puffins appeared to have nested. We also documented many negative interactions with gulls and disturbances by eagles, as well as interesting social behaviors between puffins.

An Intra-Agency Agreement (IAA) between the Bureau of Ocean Energy Management (BOEM), Department of the Interior (DOI), and the U.S. Fish and Wildlife Service Pacific Region (USFWS),

DOI was completed. The purpose of the agreement was to secure proper data management and obtain data synthesis of long-term aerial seabird colony data (photographs) collected at breeding sites surveyed by USFWS Oregon Coast National Wildlife Refuge Complex (OCNWRC) and Washington Maritime National Wildlife Refuge Complex (WMNWRC) along the Oregon and Washington coasts. A sampling plan was adapted from the USFWS Protocol Framework for Monitoring Common Murres (*Uria aalge*) and Brandt's Cormorants (*Phalacrocorax penicillatus*) to conduct four complete censuses of murres and Brandt's cormorants roughly every 10 years in 1988, 1994, 2003 (cormorants) or 2006 (murres), and 2014. The estimated breeding population of common murres in Oregon decreased by 23% from the 1988 census to the 2014 census with notable distributional shifts in the north and central sub-regions; over this period the north decreased by 74%, while the central sub-region increased by 105%. The south sub-region remained relatively stable over the study years. Oregon coast Brandt's cormorant populations decreased by 21% from 1988 to 2014, however when we integrated population data from the Columbia River Estuary, overall population decline over the same time period was only 7%.

Joe Liebezeit and Allison Anholt (Portland Audubon) and Taylor Ozimek (USFWS Intern) conducted a community science monitoring project within Cape Perpetua and Cape Falcon Marine Reserves in Oregon. With the help of trained volunteers, we monitored 54 cormorant nests ((37 Brandt's (*Phalacrocorax penicillatus*), 12 Double-crested (*Phalacrocorax auritus*), and 5 Pelagic (*Phalacrocorax pelagicus*)), all within the Cape Perpetua Marine Reserves. Cape Falcon suffered a near-complete colony collapse, following a partial collapse in 2021. The only remaining nests (~5 Pelagic and ~10 Double-crested) were in areas largely inaccessible and difficult to monitor, so monitoring was not conducted in 2022 at this site. The Cape Perpetua Marine Reserve colonies also exhibited lower numbers of all three species, and hatch rates were also lower than in previous years for Brandt's and Pelagic Cormorants (hatch rates: 0.56 Brandt's, 0 Pelagic, and 0.91 Double-crested). For nests that did hatch, fledge rates remained relatively comparable to prior years, but total fledging success was low due to nest failures (2.1 chicks fledged/nest for Double-crested and 0.81 for Brandt's.) Counts of Rhinoceros Auklets (*Cerorhinca monocerata*) and Pigeon Guillemots (*Cephus grylle*) were also taken throughout the breeding season at Sea Lion Caves, also located within Cape Perpetua Marine Reserve, after a 2-year hiatus due to COVID. The highest daily count was on July 28, totaling 114 Pigeon Guillemots and 4 Rhinoceros Auklets, a low count for auklets and the second lowest count of guillemots since monitoring began in 2014. This is the final year of community science seabird monitoring for the Oregon Marine Reserves project collaboration.

Shawn W. Stephensen (Oregon Coast National Wildlife Refuge Complex) participated in a Tufted Puffin range-wide conservation and management coordination trip in Alaska August 12-17, 2022. Listed below are the objectives of the trip. 1. Bring tufted puffin species experts and partners from across the North American range together to foster professional collaboration and

coordination. 2. Conduct site visits to tufted puffin breeding areas to highlight challenges to colony-based population monitoring and discuss methods to count and monitor puffins at sites across the species' North American range. Lessons and ideas will help inform a range-wide colony census and monitoring framework, work being undertaken by a post-doc at the University of Washington. 3. Identify research and conservation knowledge gaps for tufted puffin; identify and prioritize research, conservation, and other projects and build relationships in support of a shared conservation vision. The team arrived Dutch Harbor and boarded the R/V *Tiglavik* and visited Aiktak Island, Kaligagan Island, Poa Island, Puffin Island, and the Baby Islands.

Oregon Marbled Murrelet Project

The Oregon Marbled Murrelet Project, Oregon State University, undertook the final season of field data collection on Marbled Murrelet (*Brachyramphus marmoratus*) breeding ecology and space use along the central Oregon Coast. The project captured and marked 61 murrelets with VHF-telemetry tags and found 7 active nests (1 successful, 6 failed). Across the entire study (2017-19 & 2021-22 breeding seasons) the project has captured 375 individual murrelets, of which 300 were VHF radio-tagged, leading to 37 active nests with known fates. Work continues to explore breeding season movements and marine space use, quantify the incubation and chick provisioning behaviors of adults, foraging from and evaluate nest site selection at multiple scales, among others. This long-term research project is being supported by funding from the Institute for Working Forest Landscapes within the College of Forestry at Oregon State University and the USDA National Institute of Food and Agriculture, McIntire Stennis project 1014995. The current project team includes Jim Rivers (PI), Matt Betts (co-PI), Kim Nelson (co-PI), Dan Roby (co-PI), Jon Dachenhaus (Faculty Research Assistant), Ethan Woodis (M.S. Student), and Cecelia Frisinger (M.S. Student). A crew of ~25 students and young professionals have been providing logistical support in the field and in the laboratory in the past year.

Turnstone Environmental Consultants, Inc. (Turnstone)

Turnstone Environmental Consultants, Inc. (Turnstone) conducted work related to seabirds for several projects in 2022, which are summarized below. These projects involved surveys for marbled murrelets (*Brachyramphus marmoratus*) and all surveys were conducted according to the PSG's 2003 protocol requirements.

The Oregon Department of Forestry State Forests Program (ODF) contracted Turnstone to conduct marbled murrelet surveys on state lands in the Coast Range of Oregon in four ODF districts (Astoria, Forest Grove, Tillamook, and West Oregon) as well as within multiple Oregon Parks and Recreation Department State Parks (Beverly Beach, Fort Stevens, Nehalem Bay, and Cape Lookout). Visiting a mixture of first and second year survey sites, surveyors conducted 1,488 surveys at 266 unique sites and 1,031 unique stations in 2022. Murrelets were detected during thirty-five surveys at 25 sites in two different districts, and significant behavior was observed during 11 of these surveys.

Turnstone also conducted surveys as part of a bioacoustical research project conducted by the Pacific Northwest Research Station and Oregon State University. The objective of this study is to compare the detectability of marbled murrelets using bioacoustics to the Pacific Seabird Inland Survey Protocol and determine the efficacy of bioacoustics surveys for this species.

Tom Williamson was the Turnstone project manager and Matt Gostin was the ODF primary contact.

Turnstone conducted marbled murrelet surveys at first, second, and multi-year sites for three field offices of the Bureau of Land Management (BLM) Northwest Oregon District in 2022. The BLM Northwest Oregon District contracted Turnstone to conduct marbled murrelet surveys in areas managed by the Marys Peak, Siuslaw, and Tillamook Field Offices. Turnstone biologists conducted 160 surveys at 24 unique sites and 83 unique stations. Murrelets were detected during eight surveys at three sites, and significant behavior was observed during one of these surveys. Tom Williamson is the Turnstone project manager and Scott Hopkins, Jessie Huck, and Stephanie Humphress are the BLM primary contacts for the Marys Peak, Tillamook, and Siuslaw field offices, respectively. The BLM Coos District contracted Turnstone to conduct marbled murrelet surveys in survey areas within the Coos District, Oregon. Turnstone biologists conducted 121 surveys at 19 unique sites and 90 unique stations. Murrelets were detected during 25 surveys at eight unique sites, and significant behavior was observed during three surveys. Jeff Reams is the Turnstone project manager and Amanda Cutler is the BLM primary contact.

Turnstone biologists also conducted marbled murrelet surveys in the Oregon Coast Range for one other private client. A total of 19 surveys at four unique sites and 20 unique stations were surveyed. Murrelets were detected during 5 surveys at 2 unique sites. Jeff Reams was the Turnstone project manager.

Seabird Oceanography Lab – Oregon State University (OSU)

Rachael Orben (Assistant Professor – Senior Research, OSU), Adam Peck-Richardson (Faculty Research Assistant, OSU), and Alexa Piggott (Faculty Research Assistant, OSU) entered the fourth year of the Cormorant Oceanography Project. This interdisciplinary project is developing and deploying novel biologging tags on cormorants and shags to collect oceanographic data while gaining insights into seabird ecology. In 2022, we continued to work with tag manufacturers to refine GPS-GSM tags to measure salinity (conductivity + temperature). We continued our Socotra cormorant tagging effort in the United Arab Emirates (UAE) and Bahrain with critical support from Sabir Bin Muzaffar (Professor – UAE University) and Alexa Foster (KAUST). We also initiated collaborations with researchers globally. The resulting physical oceanography datasets were shared with oceanographers at OSU. Jim Lerczak (Professor, OSU) and Greg Wilson (Assistant Professor, OSU) are processing bird-derived data to describe water column properties and to

calibrate satellite derived oceanographic models. Planning is underway for additional deployments in the Arabian Gulf, Baltic, Mediterranean, and Australasian regions. We are actively seeking potential collaborators for additional deployments in the Asia-Pacific Region. This effort is funded by the Office of Naval Research.

2022 was the 16th consecutive year of monitoring at the Yaquina Head colony in Newport, Oregon. Jessica Porquez (Faculty Research Assistant, OSU), Andrea Robles (Environment for the Americas Intern), Sofia Franco-Cruz (NSF REU Intern), Yaya Callahan (NSF REU Intern) and Rachael Orben conducted reproductive and diet studies of common murre (*Uria aalge*) and Brandt's and pelagic cormorants (*Phalacrocorax spp*). The common murre colony experienced complete reproductive failure and pelagic cormorants did not attempt to nest, however Brandt's cormorants had average reproductive success. This long-term study is funded by the BLM, USFWS, NOAA, and NSF.

Sam Eberhard (UCSC undergraduate) launched the second season of bill load photography of tufted puffins at Haystack Rock. Funding support came from the Oregon Wildlife Foundation and Friends of Haystack Rock.

OSU's Marine Mammal Institute initiated the Marine Offshore Assessments to Inform Clean Energy (MOSAIC) project. This include two years of seabird and cetacean visual surveys in the Northern California Current. Lisa Balance (Marine Mammal Institute, OSU) is leading the project.

Luke Stuntz (OSU, MSc student) and Rachael Orben initiated a project in collaboration with the USFWS to monitor and manage predators of Leach's storm-petrels in southern Oregon.