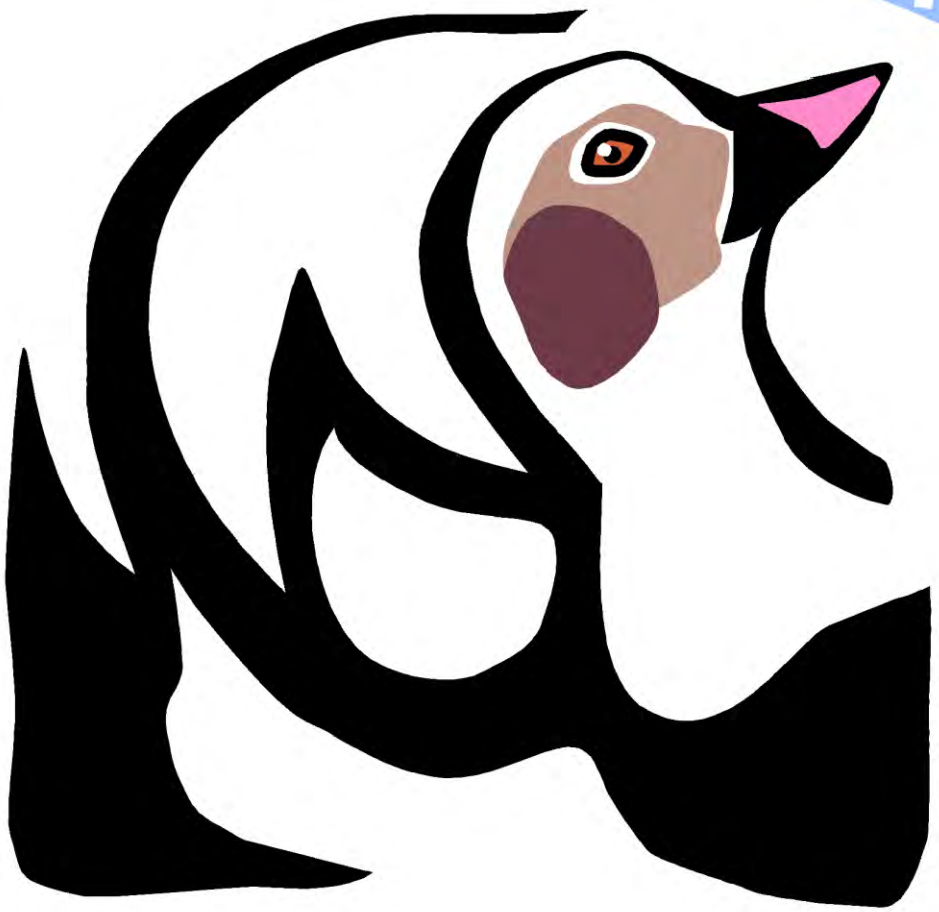
SeaDuck Conference

Fifth International



Iceland 2014

8-12 SEPTEMBER 2014

REYKJAVÍK • ICELAND

WELCOME TO REYKJAVÍK!

5th International Sea Duck Conference

Radisson Hótel Blu Saga, Reykjavík, Iceland, 8-12 September 2014

Dear Colleagues,

We warmly welcome you to Reykjavík for the 5th International Sea Duck Conference, jointly hosted by the University of Iceland & Environment Canada. We sincerely thank our Sponsors, including past sponsors and those new partners joining us for the first time. We also thank Dr. Árni Einarsson for his nicely designed logo featuring the long-tailed duck.

The 5th International Sea Duck Conference is truly an international event. We draw together academics, researchers, government and non-government organizations to address shared priorities for coastal conservation and management. We chose Iceland because of its mid-Atlantic location which has facilitated circumpolar attendance from both North America and Europe. Sessions include breeding ecology, foraging, behavior, emerging diseases, and marine drivers of population change. We also have a special Partner's Panel Discussion on socio-economic issues affecting sea ducks, how to establish research relationships with industry to benefit sea duck conservation.

This is the first Sea Duck Conference held outside of North America. We hope for a stimulating gathering and a reunion of old friends. We are delighted to see a strong turnout from our 'usual suspects', i.e., the USA, Canada, and all the Nordic countries, as well as attendees from all three Baltic States, Russia, Belarus, Poland, France, Czech Republic, United Kingdom, Germany and China. We anticipate more than 140 delegates in attendance from over 30 countries. We have three excellent plenary speakers from Europe and North America along with 66 oral presentations and 49 posters covering a variety of species and topics related to sea ducks.

We hope that you take this opportunity to discover Reykjavík. Only minutes away from our venue is the oldest part of downtown Reykjavík, originally settled in 874. We encourage you to visit Hallgrímskirkja and the adjacent statue of Leifur Eiríksson, who in the year 1000 led the first European (sea duck) expedition to North America; visiting Baffin Island, Labrador and Newfoundland. Nearby, Lake Tjörnin is one of many wintering sites of waterfowl in southwest Iceland, where one can regularly see mallards, greylag geese, whooper swans, tufted ducks, common eiders and red-breasted mergansers. Another good birding site is Bakkatjörn, a small lake 5 minutes' drive to the west.

We look forward to seeing our old friends and meeting new ones.

Welcome!

Jón Einar Jónsson, Co-Chair,
University of Iceland

Grant Gilchrist, Co-chair,
Environment Canada

PROGRAM AT A GLANCE

The 5th International Sea Duck Conference is held at the
Radisson BLU Hótel Saga, Reykjavik, Iceland
8-12 September 2014

	5th International Sea Duck Conference *Radisson BLU Hótel Saga, Reykjavik, Iceland*				Field Trip to Lake Mývatn *Hótel Laxá, Mývatn, Iceland*		
TIME	**MONDAY** **8-Sep-14**	**TUESDAY** **9-Sep-14**	**WEDNESDAY** **10-Sep-14**	**THURDAY** **11-Sep-14**	**FRIDAY** **12-Sep-14**	**SATURDAY** **13-Sep-14**	**SUNDAY** **14-Sep-14**
07:00 - 08:30		***Breakfast served*** *@ Radisson BLU Saga Hótel, Súlnasalur* *(included with room)*				***Breakfast @ Hótel Laxá*** *(inlcuded)*	
08:30 - 09:45		*Oral Presentations @ BLU Saga Hótel, Kalta*					
		Plenary: *Dr. Arnþór Garðarsson*	**Plenary:** *Dr. James R. Lovvorn*	**Plenary:** *Dr. Sveinn Are Hanssen*			
09:45 - 10:15		*Coffee break*					**Bus departs for Reykjavík**
10:15 - 12:00	*Registration open*	**Breeding Ecology**	**Marine Drivers of Population Change**	**Behavior**	**Bus departs for Lake Mývatn**		
12:00 - 13:30		***Lunch served*** *@ BLU Saga Hótel, Súlnasalur* *(inlcuded with registration)*			***Lunch stop*** *(on your own)*	***Lunch @*** *Dimmuborgir* *(included)*	***Lunch stop*** *(on your own)*
13:30 - 15:15	*Meetings and arrivals*	**Spatial Ecology**	**Techniques & Technology**	**Emerging Diseases**			
15:15 - 15:45		*Coffee break*					
15:45 - 17:30		**Foraging**	**Partners Panel Discussion**	**Population Dynamics**			
17:30 - 18:00					**Arrive @ Lake Mývatn**		
18:00 - 19:00	**Welcome Reception** *BLU Saga Hótel Súlnasalur* *with light food & drinks*	***Dinner*** *(on your own)*	***Dinner*** *(on your own)*	**Banquet** *BLU Saga Hótel Súlnasalur* *Three-course dinner & live music!*	***Dinner*** *@ Hótel Laxá*		**Arrive @ Reykjavík**
19:00 - 22:00		**Poster Session** *BLU Saga Hótel Súlnasalur* *with light food & drinks*	**NOWAC Workshop** *BLU Saga Hótel Kalta*		**Two-nights @ Hótel Laxá, Lake Mývatn**		**Radisson BLU Saga Hótel**

NOWAC: Nordic Waterbirds and Climate Network

Welcome Reception @ Súlnasalur, on Monday, 8 September, 18:00

Breakfast served daily @ Súlnasalur, 07:00 – 08:30

Lunch served daily @ Súlnasalur, 12:00 – 13:30

Oral Presentations @ Katla, Tuesday – Thursday, 9 – 11 September, 08:30 – 17:15

Poster Presentations @ Súlnasalur, Tuesday, 9 September, 19:00

NOWAC Workshop @ Katla, Wednesday, 10 September, 19:00

Banquet @ Súlnasalur, Thursday, 11 September, 18:00

CONFERENCE SPONSORS

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ACKNOWLEDGEMENTS

The 5th International Sea Duck Conference was made possible by an International committee. We thank them all for their contributions.

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LOGO ARTIST

Árni Einarsson
University of Iceland

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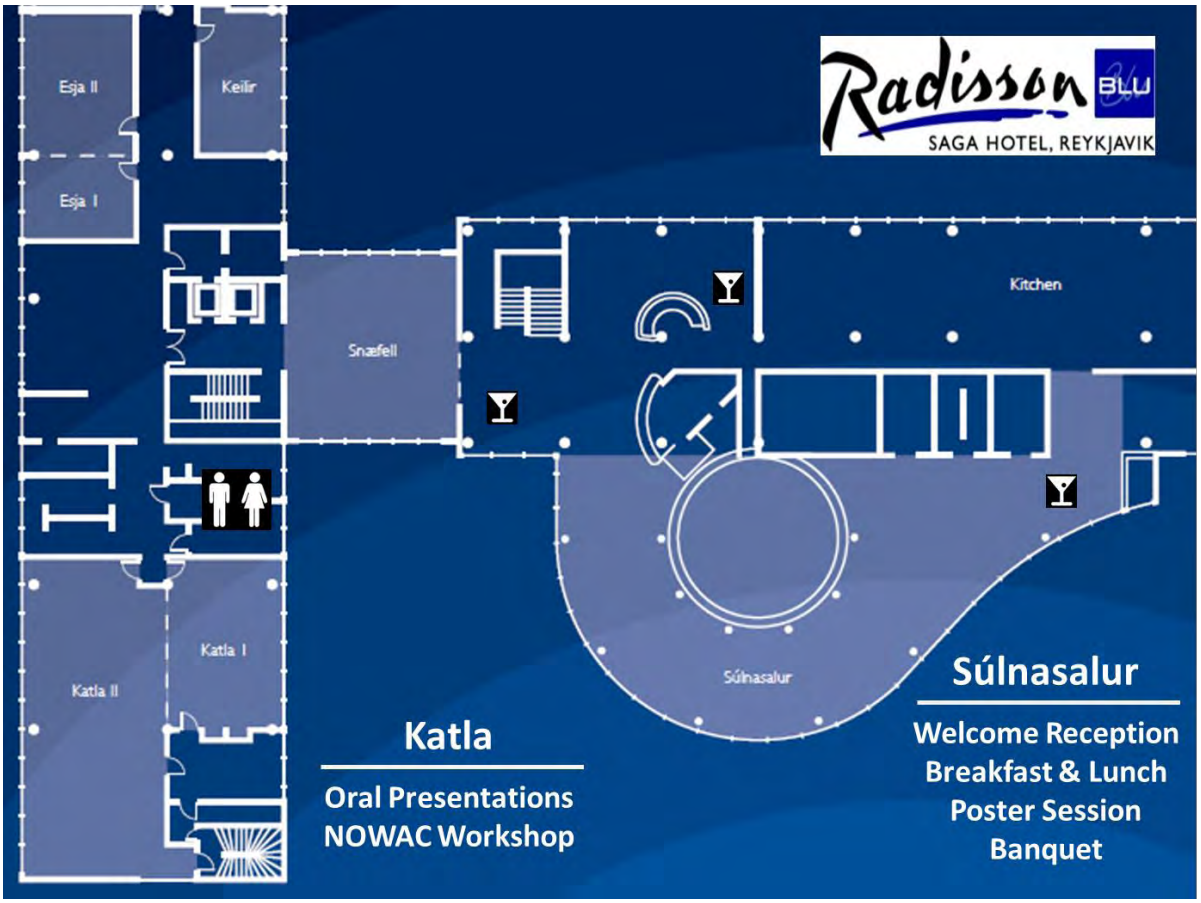
MEETING ROOMS AND FACILITIES

We are thrilled to be hosting the 5th International Sea Duck Conference at the Radisson BLU Saga Hótel which is ideally located just a few minutes' walk from the buzzing streets of downtown Reykjavík.

Restaurant & Bar: The Radisson BLU Saga Hótel has two restaurants on the first floor, Skrudur and Mimisbar, and the gourmet restaurant, Grill, is on the top floor with a deliciously unique menu and panoramic view over the city. Note that we have breakfast and lunch served daily in Súlnasalur, which is on the same floor as Katla, our meeting room.

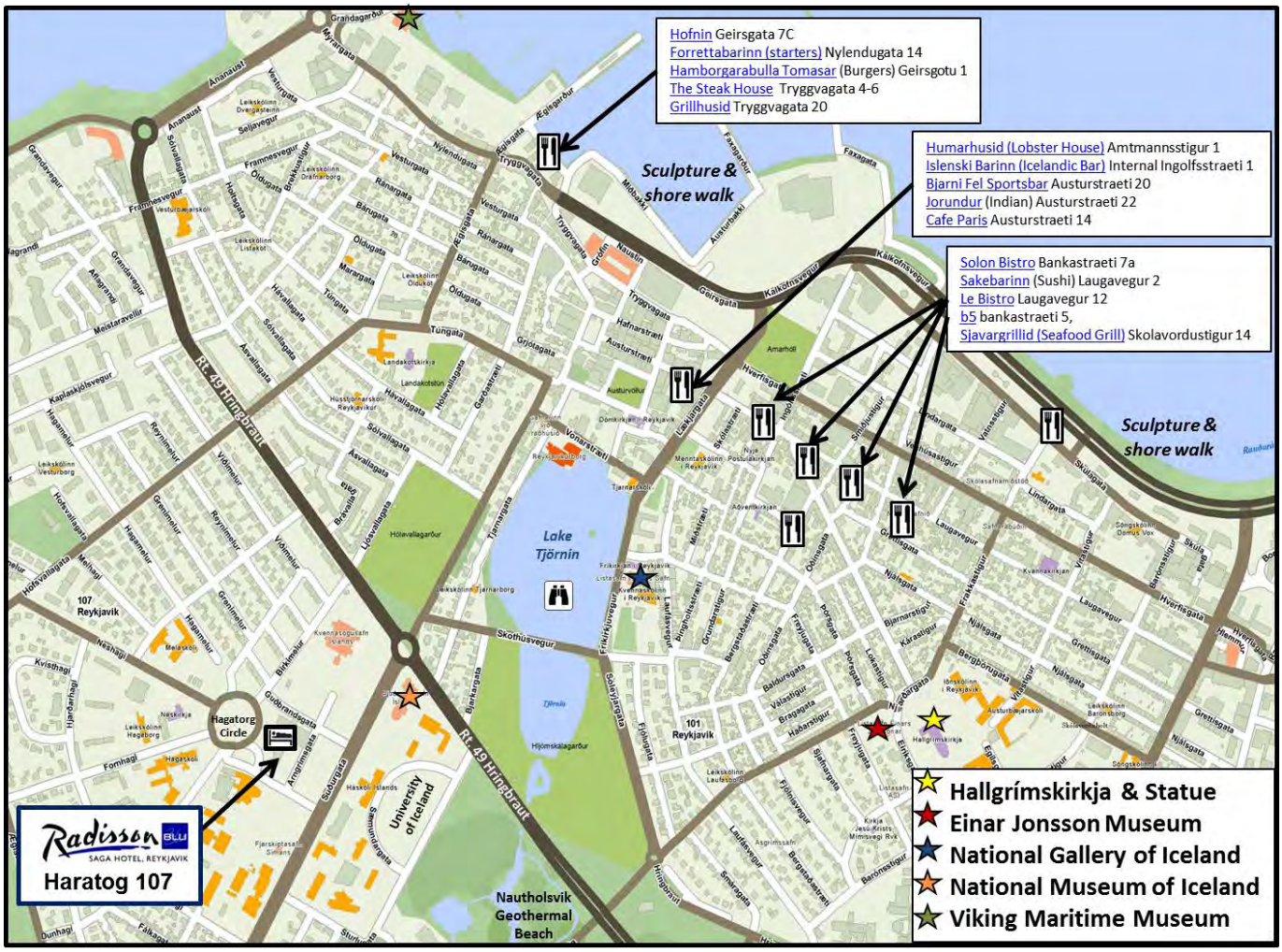
Fitness Center & Spa: The Hotel offers a complete fitness center and Spa for your enjoyment. Please inquire at Reception for details.

WiFi: Available and free of charge throughout the hotel.



LOCAL AREA AND RESTAURANTS

Radisson BLU Hótel Saga is located off Hagatorg Circle, next door to the University of Iceland's main campus. Delegates will find plenty of restaurants, bistros and bars a short walk to the north east of the hotel. We have listed a few (as there are many) that vary in price from $ to $$$. Check out Trip Advisor for more http://www.tripadvisor.com/Tourism-g189970-Reykjavik_Capital_Region-Vacations.html



ÍSLAND (‘ISTLANT)

Iceland: *Ísland* is a Nordic country between the North Atlantic and the Arctic Ocean. It has a population of 325,671 and an area of 103,000 km^2, making it the most sparsely populated country in Europe.

Although many people in Iceland speak English, here are some common Icelandic translations to help you navigate the language!

Hello	**- Halló (*Hah-low*)**
Yes	**- Já (*Yaw*)**
No	**- Nei (*Nay*)**
Please	**- Gjörðu svo vel, (to one person). (*Gyer-dhu svo vel.*)** **- Gerið þið svo vel, (to many people). (*Ger-adh thi-dh svo vel.*)**
Thank you	**- Þakka þér fyrir. (*Thah-ka thyer fi-rir.*)**
Thanks	**- Takk (*Tahk*)**
You're welcome	**- Ekkert að þakka. (*Eh-kehrt adh thah-ka.*)**
Good day	**- Góðan daginn**
Goodbye	**- Bless (*Bless; often said twice, "Bless bless".*)**
Good morning	**- Góðan daginn. (*Goh-dhan da-kin.*)**
Good evening	**- Gott kvöld. (*Got kvur-lt.*)**
Good night	**- Góða nótt. (*Goh-dha no-ht.*)**
Nice to meet you	**- Komdu sæll, (to a man) (*Komdu sight-l.*)** **- Komdu sæl, (to a woman) (*Komdu sighl.*)**
Where is the toilet?	**- Hvar er klósettið? (*Kvar er klow-sett-idh?*)**
Where is the bar?	**- Heyrðu, hvar er barinn? (*Hey- dhu, Kvar er barinn?)***
May I have a beer?	**- Fá einn bjór takk! (Faw aynn bjor. Tahk)**

CONFERENCE MENUS

Welcome Reception
@ Súlnasalur, Monday, 8 September, 18:00

Selection of gourmet appetizers & starters.
Full bar with selection of fine wines, beer & liquor.

Breakfast served daily
@ Súlnasalur, 07:00 – 08:30

Traditional continental menu of eggs & breakfast meats
along with fresh fruit, yogurt, cereals & muffins.

Lunch served daily
@ Súlnasalur, 12:00 – 13:30

Fresh fish or chicken along with a vegetarian option.

Poster Presentations
@ Súlnasalur, Tuesday, 9 September, 19:00

Selection of gourmet appetizers and starters.
Full bar with selection of fine wines, beer & liquor.

Banquet
@ Súlnasalur, Thursday, 11 September, 18:00

Nordic salmon & salmon tartar with apples, cucumber, ginger,
coriander horseradish & soya. Crispy rye bread.

Duo of Icelandic lamb (prime) & beef tenderloin with green pea & mint mouse.
Maderia glazed root vegetables & sweet potatoes.

Tiramisu with mocca ice cream, berry coulis and fresh strawberries.
Full bar with selection of fine wines, beer and liquor.

Music provided by the Iceland's Jazzy Jóel Pálsson Quartet with the Award winning Jóel Pálsson playing the saxophone, Kjartan Valdemarsson on piano, Tómas R. Einarsson on bass, & the Jazz Diva Kristjana Stefánsdóttir.

FIELD TRIP TO LAKE MÝVATN

Lake Mývatn (mý – "midge" and vatn – "lake") is a shallow eutrophic lake in an area of active volcanism in the north of Iceland. The lake and its surrounding wetlands have an exceptionally rich fauna of waterbirds. We are likely to see Barrow's Goldeneye, Red-breasted Merganser, Wigeon, Gadwall, Mallard, Common Scoter (Black), Long-tailed duck, Tufted duck, Greater Scaup and Eurasian Teal. The Barrow's Goldeneye is population of about 2000 birds that rely entirely on the habitat provided by the Mývatn-Laxá water system and its surrounding lava fields. Interestingly, the Barrow's Goldeneyes overwinter at the Lake, using ice-free areas kept open by emerging spring water (both warm and cold) and in the strong river current and during the breeding season, use cavities in the lava for nesting instead of trees!

On Friday, 12 September 2014, we will depart Reykjavík for the Lake Mývatn Region by bus to travel along Iceland's Highway no. 1. We will stop for lunch (included) at Hvanneyri, and of course birding (we know some spots!). At Lake Mývatn, we will enjoy dinners and a two-night stay at the Hótel Laxá, a new hotel in the southern region of the Lake that features unique views of the river Laxá. We will spend the Saturday exploring one of the most beautiful places in northern Europe, guided by our very own Dr. Árni Einarsson, director of the Mývatn Field Station. At mid-day, we will enjoy a soup buffet at Dimmuborgir Guest house (included). On Saturday night, we will dine again at the Hótel Laxá before we depart Sunday morning for our return sight-seeing trip to Reykjavík, guided by Yann Kolbeinsson of the North East Iceland Nature Research Center!

ITINERARY – Lake Mývatn Field Trip

Friday 12-Sep-14
10:00 Depart: Radisson BLU Saga Hótel, Reykjavík
Guided bus tour with stops for lunch and wildlife viewing along the way.
Arrive ~20:00: Hótel Laxá, Lake Mývatn

Saturday 13-Sep-14
Exploring the region with Dr. Árni Einarsson, director of Mývatn Research Station
Icelandic soup lunch at Dimmuborgir Guest House

Sunday 14-Sep-14
10:00 Depart: Hótel Laxá, Lake Mývatn
Guided bus tour with stops for lunch and wildlife viewing along the way.
Arrive ~20:00: Radisson BLU Saga Hótel, Reykjavík

ANNOUNCEMENT

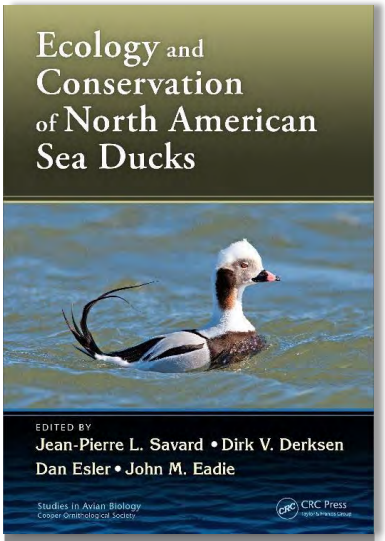
Ecology and Conservation of North American Sea Ducks

Volume in the *Studies in Avian Biology* series published on behalf of the Cooper Ornithological Society

Editors/Affiliations

Jean-Pierre L. Savard, Scientist Emeritus Environment Canada, Quebec
Dirk V. Derksen, U. S. Geological Survey, Anchorage, AK USA
Dan Esler, U. S. Geological Survey, Anchorage, AK USA **John M. Eadie,** University of California, Davis, USA

Sea duck research and management is important for understanding marine bird ecology and conservation as well as the health of marine ecosystems. This book is a synthesis of all that has been learned about sea ducks, highlighting data gaps, and directing future research and conservation efforts. An edited volume prepared by leading experts in the field, it addresses specific issues by drawing on all available information on sea ducks (and other waterfowl and avian taxa where this contrast is informative).



Key Features

- Provides an up-to-date synthesis of all that is known of an important group of diverse marine birds
- Presents collections of articles by leading experts on sea duck biology, ecology, and conservation
- Reports on an active area of ornithological research
- Offers an authoritative reference on sea duck ecology, behavior, and population dynamics

Selected Contents

Introduction. North American Status and Trends. Phylogeography. Population Dynamics/Demography. Diseases. Reproductive Energetics and Cross-Seasonal Effects. Contaminants. Foraging Energetics and Behavior. Migration Strategies. Molt Strategies. Reproductive Strategies. Reproductive Behavior. Population Delineation. Harvest. Important Habitats. Conservation Issues. Conclusions and Future Challenges.

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CONFERENCE SCIENCE PROGRAM

PLENARY SPEAKER

TUESDAY, 9 SEPTEMBER 2014, 08:45

Dr. Arnþór Garðarsson

Department of Biological and Environmental Science, Askja, University of Iceland, Reykjavík, Iceland; arnthor@hi.is

Arnþór Garðarsson is a Professor Emeritus at the University of Iceland. He has been involved in long-term ecological studies of waterbird populations (including six species of sea ducks) of the Mývatn – Laxá lake catchment area in North Iceland. His current research interests include surveys and detailed population studies of seabirds.

TEMPORAL AND SPATIAL DYNAMICS AFFECTING DUCKS AT MÝVATN

Mývatn (literally: Lake of Midges) is a volcanic lake in North-East Iceland. Its 2000 year history is wellknown from microfossils and its natural history has a 300 year long record. Waterbirds, fish, midges and crustaceans have been monitored for 40 years. Modern industrial exploitation and associated change began in the mid 20th century.

Many local and global factors influence the waterbird populations most of which are migratory. Early 20th century harvest records show large peaks in Barrow‘s Goldeneye (*Bucephala islandica*), Long-tailed Duck (*Clangula hyemalis*), Common Scoter (*Melanitta nigra*) and Red-breasted Merganser (*Mergus serrator*), and Arctic Charr (*Salvelinus alpinus*). These peaks are associated with abundant crustaceans and have not been repeated during the current monitoring programme. Early records also show smaller oscillations that resemble current results and are related to the abundance of chironomid midges which are important to many waterbird species.

The fecundity of ducks at Mývatn is generally correlated with local food abundance. Reproductive success usually affects density through a lagged response, best shown by the Eurasian wigeon (*Anas penelope*). Its brood size closely tracks the numbers of trapped midges. The number of yearling wigeon returning next year is proportional to the previous brood size, but the return rate of older adults is apparently governed by pairing behaviour as females in good condition pair with older males and lead them to distant breeding grounds. We speculate that similar mechansims may apply to other duck species.

Instant responses by adult ducks to the current food supply are shown by breeding and moulting Barrow‘s Goldeneyes which alternate between using the lake Mývatn and its effluent river the Laxá, depending on the local food situation, and by moulting Red-breasted Mergansers which track varying densities of three-spined sticklebacks (*Gasterosteus aculeatus*) on a somewhat larger scale.

PLENARY SPEAKER

WEDNESDAY, 10 SEPTEMBER 2014, 08:45

Dr. James R. Lovvorn

Southern Illinois University, Carbondale, IL, USA; lovvorn@siu.edu

Jim is a Professor in the Department of Zoology at Southern Illinois University. His research seeks to understand linkages between mobile top predators (birds) and aquatic food webs using simulation models that link both field and laboratory studies. Specifically, he relates the foraging energetics of sea ducks to the quality and dispersion of their prey, and evaluates prey availability as a function of food web interactions. He currently teaches a diversity of courses including ornithology, food web dynamics, and energetics.

DESIGNATING CRITICAL HABITAT IN A CLIMATICALLY CHANGING ARCTIC: EIDERS, SEA ICE, AND FOOD WEBS

The world population of Spectacled Eiders (*Somateria fischeri*) winters in pack ice in the Bering Sea, diving 40 to 70 m to feed on bivalves. These eiders are listed as Threatened under the U.S Endangered Species Act, which requires delineation and protection of critical habitat. By integrating studies of the dispersion of eiders and prey, dive costs and intake rates of captive ducks, biomechanics of deep-diving birds, and remote sensing of sea ice, we developed a computer model of prey densities needed for profitable foraging. Moderate sea ice cover that allows resting out of the water can decrease energy costs and increase the area with high enough prey densities for profitable foraging. Very dense ice can restrict access to prey, resulting in low fat levels in eiders. Maps of prey and ice over 3 decades showed that both prey dispersion and access to prey through the ice varied greatly among years, so that large protected areas are needed to ensure adequate prey availability under all conditions. Predicting effects of climate change on the long-term trajectory of profitable habitats required better understanding of ecosystem processes that determine the abundance and dispersion of prey. Although these deposit-feeding prey consumed mainly bacteria, they ultimately depend on phytoplankton settling from the water column. Food web modeling showed that ectotherm predators control the abundance of some potential prey, but at present the eiders' major bivalve prey are limited by the local supply of accumulated phytoplankton detritus. Wind-driven currents that determine the dispersion of detritus and prey, and ice conditions which vary with wind and temperature, are thus primary factors in the long-term adequacy of habitat for Spectacled Eiders. Anticipating climatic trends in these physical drivers, and linking them to the dispersal and early post-settlement survival of key deposit-feeding prey, are important challenges for future research.

PLENARY SPEAKER

THURSDAY, 11 SEPTEMBER 2014, 08:45

Dr. Sveinn Hanssen

Norwegian Institute for Nature Research, Norway;
sveinn.a.hanssen@nina.no

Sveinn is a Senior Research Scientist at the Norwegian Institute for Nature Research, in the Department of Arctic Ecology, in Tromsø, Norway. Sveinn's research focuses on the ecology of birds; particularly how factors such as parasites, contaminants, and predation affect individuals and populations. He has had a long standing interest in sea duck ecology and conservation in polar environments.

TRADE-OFFS DURING COMMON EIDER INCUBATION

Female common eider ducks are among a few bird species that do not eat during incubation. This leads to a mass loss of up to 40% during egg-laying and incubation. What are the costs and benefits of such a strategy? This energetic stress undoubtedly leads to physiological stress on the individual and may elicit both physiological and behavioral trade-offs to save energy. The strategy leads to high nest attendance, which may reduce predation, but may also have benefits related to costs of parasitism. Is this extreme breeding strategy vulnerable to anthropogenic stressors such as climate change and pollution? And could breeding female common eiders be used as a model species to study effects and implications of periodic starvation and use of body reserves in other animals or even humans?

ORAL PRESENTATIONS

5th International Sea Duck Conference

8 - 12 Sept 2014, Radisson BLU Saga Hótel, Reykjavík, Iceland

Monday, 8 September 2014

18:00 - 22:00		***WELCOME RECEPTION*** *@ Radisson BLU Saga Hótel - Súlnasalur*	

Tuesday, 9 September 2014

07:00 - 08:30		*Breakfast served @ Radisson BLU Saga Hótel, Súlnasalur (included with room)*	
08:30 - 08:45	**Jónsson**	Welcome, opening remarks & announcements, *Jón Einar Jónsson*	
08:45 - 09:45	**Garðarsson**	**TEMPORAL AND SPATIAL DYNAMICS AFFECTING DUCKS AT MÝVATN.** ***Arnþór Garðarsson***	**1A1**
09:45 - 10:15		*Coffee break*	

BREEDING ECOLOGY

Moderator: Ray Alisauskas

10:15 - 10:30	**Hennin***	**MANIPULATING BASELINE CORTICOSTERONE ALTERS REPRODUCTIVE DECISIONS AND SUCCESS IN ARCTIC-NESTING COMMON EIDERS**. ***Holly L. Hennin****, Joel Bêty, H. Grant Gilchrist, Mark Forbes and Oliver P. Love*	**1B1**
10:30 - 10:45	**Steenweg**	**DAILY VARIATION IN ENERGETIC PHYSIOLOGY IN ARCTIC-BREEDING COMMON EIDERS.** ***Rolanda J. Steenweg****, Holly L. Hennin and Oliver P. Love*	**1B2**
10:45 - 11:00	**Simon***	**ALTERED ENVIRONMENTAL STRESSORS AND LONG-TERM EFFECTS ON POPULATIONS OF COMMON EIDERS ON NOVA SCOTIA'S EASTERN SHORE**. ***Molly Simon****, Mark Mallory and Randy Milton*	**1B3**
11:00 - 11:15	**Petersen***	**WINTERING DISPERSAL AND SITE FIDELITY OF FEMALE COMMON SCOTERS BREEDING IN NORTHEAST ICELAND**. ***Ib Krag Petersen****,* *Ævar Petersen, Rasmus Due Nielsen, Anne Harrison, Hannah Robson, Vsevolod Afanasiev, James Fox and Anthony Fox*	**1B4**
11:15 - 11:30	**Legagneux**	**MOULTING CONDITIONS INDUCED CARRY-OVER EFFECS ON COMMON EIDER REPRODUCTION.** ***Pierre Legagneux****, N. Jane Harms, H. Grant Gilchrist, Joel Bêty, Oliver Love and Catherine Soos*	**1B5**
11:30 - 11:45	**Provencher***	**INTERACTIONS OF PARASITES AND MERCURY ON REPRODUCTIVE PERFORMANCE OF COMMON EIDERS**. ***Jennifer F. Provencher****, H. Grant Gilchrist, and Mark Forbes*	**1B6**
11:45 - 12:00	**Jónsson**	**THE EARLY BIRDS AND THE REST OF THEM: DO THE VERY FIRST NESTERS REPRESENT THE ENTIRE COLONY?** ***Jón Einar Jónsson*** *and Smári J. Lúðvíksson*	**1B7**
12:00 - 13:30		*Lunch served @ Radisson BLU Saga Hótel, Súlnasalur (included in registration)*	

SPATIAL ECOLOGY

Moderator: Susan De La Cruz

13:30 - 13:45	**Bentzen**	**DISPERSAL, MOVEMENTS, AND SITE FIDELITY OF POST-FLEDGING KING EIDERS AND THEIR ATTENDING FEMALES.** ***Rebecca L. Bentzen*** *and Abby N. Powell*	**1C1**
13:45 - 14:00	**MacCallum**	**MODELING HABITAT USE BY BROOD-REARING HARLEQUIN DUCKS IN THE NORTHERN ROCKY MOUNTAINS, ALBERTA.** ***N. Beth MacCallum****, Chiarastella Feder, Barry Godsalve, Marion I. Paibomesai and Allison Patterson*	**1C2**
14:00 - 14:15	**Dagys**	**RESULTS OF A SATELLITE TELEMETRY STUDY OF VELEVET SCOTERS WINTERING IN THE BALTIC SEA**. ***Mindaugas Dagys****, Ramūnas Žydelis, Julius Morkūnas and Liutauras Raudonikis*	**1C3**
14:15 - 14:30	**Qing***	**WHERE ARE THE ENDANGERED SECRETIVE SCALY-SIDED MERGANSERS? MODELING MICROHABITAT AT RIVER REACH SCALE**. ***Zeng Qing****, Wen Li, Shi Linlu, Duo Hairui and Lei Guangchun*	**1C4**
14:30 - 14:45	**Lepage**	**ANNUAL FIDELITY TO MOLTING, STAGING AND WINTERING AREAS BY WHITE-WINGED SCOTERS IN EASTERN NORTH AMERICA**. ***Christine Lepage****, Jean-Pierre L. Savard and Scott G. Gilliland*	**1C5**
14:45 - 15:00	**Osenkowski**	**HABITAT USE AND MOVEMENT ECOLOGY OF BLACK SCOTERS AND COMMON EIDERS DURING WINTER IN SOUTHERN NEW ENGLAND.** *Pamela Loring, Josh Beuth, Peter W.C. Paton,* ***Jason Osenkowski****, Scott Gilliland, Jean-Pierre L. Savard and Scott R. McWilliams*	**1C6**
15:00 - 15:15	**Waltho**	**LOST OR PIONEER? DISPLACEMENT, VAGRANCY AND EXTRALIMITAL BREEDING IN COMMON EIDER.** ***Chris Waltho***	**1C7**
15:15 - 15:45		*Coffee break*	

FORAGING

Moderator: Ramunas Zydelis

15:45 - 16:00	**De La Cruz**	**CLIMATE-DRIVEN GEOMORPHIC HABITAT ALTERATION AND IMPLICATIONS FOR FORAGING SEA DUCKS IN COASTAL ESTUARIES.** ***Susan E. W. De La Cruz****, John Y. Takekawa, Bruce Jaffe and A. Keith Miles*	**1D1**
16:00 - 16:15	**Morkūnė***	**FOOD SOURCES OF WINTERING VELVET SCOTER AND LONG-TAILED DUCK ON THE SE BALTIC SEA: TRIPLE STABLE ISOTOPE AND GUT CONTENT ANALYSIS.** ***Rasa Morkūnė****, Jūratė Lesutienė and Julius Morkūnas*	**1D2**
16:15 - 16:30	**Gilliland**	**DEVELOPMENT OF A MONITORING PROGRAM FOR COMMON EIDERS USING AERIAL COUNTS OF MALES IN SPRING.** *François Bolduc,* ***Scott G. Gilliland*** *and Christine Lepage*	**1D3**
16:30 - 16:45	**Alisauskas**	**DIET AND NUTRITION OF KING EIDERS AND LONG-TAILED DUCKS ARRIVING TO BREED AT KARRAK LAKE**. ***Ray T. Alisauskas*** *and Dana K. Kellett*	**1D4**
16:45 - 17:00	**White**	**A HOTSPOT OF DIVING DUCKS AND PREY INFLUENCED BY A HYDROGRAPHIC FRONT ON NANTUCKET SHOALS, MASSACHUSETTS**. ***Tim White***	**1D5**
17:00 - 17:15	**Esler**	**FATNESS ≠ FITNESS: EVIDENCE OF BODY MASS OPTIMIZATION IN SEA DUCKS THROUGH THE ANNUAL CYCLE**. ***Dan Esler****, Eric Anderson, Danica Hogan, Rian Dickson, Eric Palm, Corey Van Stratt, Jeanine Bond, Jonathan Thompson and W. Sean Boyd*	**1D6**

Wednesday, 10 September 2014

07:00 - 08:30		*Breakfast served @ Radisson BLU Saga Hótel, Súlnasalur (included with room)*	
08:30 - 08:45	**Savard**	Unveiling of **ECOLOGY AND CONSERVATION OF NORTH AMERICAN SEA DUCKS.** ***Jean-Pierre Savard****, Dirk Derksen, Daniel Esler and John Eadie,* eEitors. Studies in Avian Biology, CRC Press.	
08:45 - 09:45	**Lovvorn**	**DESIGNATING CRITICAL HABITAT IN A CLIMATICALLY CHANGING ARCTIC: EIDERS, SEA ICE, AND FOOD WEBS.** ***James R. Lovvorn***	**2A1**
09:45 - 10:15		*Coffee break*	
MARINE DRIVERS OF POPULATION CHANGE **Moderator:** Dan Esler			
10:15 - 10:30	**Larsson**	**INTERACTIONS BETWEEN PLANKTON, BLUE MUSSELS AND COMMON EIDERS IN THE BALTIC SEA.** ***Kjell Larsson***	**2B1**
10:30 - 10:45	**Takekawa**	**PRE-BREEDING BODY CONDITION OF PACIFIC COAST SURF SCOTERS: IMPLICATIONS FOR BREEDING PROPENSITY.** ***John Y. Takekawa****, Susan E. W. De La Cruz, Matthew T. Wilson and Tony D. Williams*	**2B2**
10:45 - 11:00	**Møller**	**CLIMATE AND NUTRIENT EFFECSTS ON POPULATION TRENDS OF DUCKS.** ***Anders Pape Møller****, Matthieu Guillemain and Karsten Laursen*	**2B3**
11:00 - 11:15	**Laursen**	**NUTRIENTS AND MUSSEL STOCKS DRIVE FECUNDITY IN THE EIDER DUCK POPULATION OF THE BALTIC /WADDEN SEA**. ***Karsten Laursen****, Thomas K. Christensen and Anders P. Møller*	**2B4**
11:15 - 11:30	**Guéry***	**UNDERSTANDING INTRA- AND INTER-POPULATION HETEROGENEITY: INFLUENCE OF WINTER ENVIRONMENTAL CONDITIONS ON COMMON EIDERS NESTING IN THE ARCTIC.** ***Loreleï Guéry****, Sébastien Descamps, Roger Pradel, Kjell Einar Erikstad, Sveinn Are Hanssen, Geir Wing Gabrielsen, Grant Gilchrist and Joël Bêty*	**2B5**
11:30 - 11:45	**Jean-Gagnon***	**SEA ICE CONDITIONS DRIVE BREEDING PROPENSITY AND TIMING OF BREEDING IN ARCTIC-NESTING COMMON EIDERS.** ***Frankie Jean-Gagnon****, Simon Bélanger, Pierre Legagneux, Oliver Love, Grant Gilchrist and Joël Bêty*	**2B6**
11:45 - 12:00	**Iverson***	**CASCADING ECOLOGICAL IMPACTS OF CLIMATE CHANGE: ADVANCING SEA ICE BREAK-UP ALTERS PREDATOR-PREY DYNAMICS IN THE CANADIAN ARCTIC.** ***Samuel A. Iverson****, H. Grant Gilchrist and Mark R. Forbes*	**2B7**
12:00 - 13:30		*Lunch served @ Radisson BLU Saga Hótel, Súlnasalur (included in registration)*	

TECHNIQUES & TECHNOLOGY

Moderator: Mikael Kilpi

13:30 - 13:45	**Einarsson**	**MICROSCOPIC IDENTIFICATION OF WATERFOWL EGGSHELLS.** ***Arni Einarsson****, Megan Hicks, Kesara Anamthawat-Jónsson and Ægir Þórsson*	**2C1**
13:45 - 14:00	**Silverman**	**EMPLOYING DIGITAL STILL IMAGING AND OBSERVER COUNTS TO ESTIMATE BIAS IN AERIAL SURVEYS OF WINTERING SEA DUCKS.** *Joseph R. Evenson, Heather J. Tschaekofske, Jeffery B. Leirness,* ***Emily D. Silverman****, Tom A. Cyra, Bryan L. Murphie and Donald K. Kraege*	**2C2**
14:00 - 14:15	**Heinänen**	**ANALYZING HABITAT USE BY SEA DUCKS USING HIGH PRECISION GPS TELEMETRY**. ***Stefan Heinänen****, Ramūnas Žydelis and Henrik Skov*	**2C3**
14:15 - 14:30	**Silverman**	**EXPERIMENTAL SURVEY WORK CHARACTERIZING THE WINTER DISTRIBUTION OF SEA DUCKS ALONG THE ATLANTIC COAST OF THE UNITED STATES.** ***Emily D. Silverman****, Jeffery B. Leirness, David T. Saalfeld, Mark D. Koneff, Walt E. Rhodes and M. Tim Jones*	**2C4**
14:30 - 14:45	**Žydelis**	**EXPLAINING AND PREDICTING SEADUCK HABITATS USING SPECIES DISTRIBUTION MODELS.** ***Ramūnas Žydelis****, Stefan Heinänen, Henrik Skov, Martin Laczny and Werner Piper*	**2C5**
14:45 - 15:00	**McWilliams**	**DEUTERIUM DILUTION: A NON-LETHAL METHOD FOR MEASURING BODY COMPOSITION OF COMMON EIDERS**. *Joshua M. Beuth,* ***Scott R. McWilliams****, Peter W. C. Paton, Jason Osenkowski and Chris Dwyer*	**2C6**
15:00 - 15:15	**Weiß**	**MONITORING SEA DUCKS USING A HIGH DEFINITION AERIAL VIDEO SURVEY TECHNIQUE.** ***Felix Weiß****, Heike Büttger, Monika Dorsch, Andy Webb and Georg Nehls*	**2C7**
15:15 - 15:45		*Coffee break*	

PARTNERS PANEL DISCUSSION

Moderator: Grant Gilchrist

15:45 - 17:00	**ABORIGINAL AND INDUSTRIAL PARTNERSHIPS TO BENEFIT SEA DUCK CONSERVATION**
	Aboriginal Partnerships, *Jean-Pierre Savard*
	Aquaculture, *Samantha Richman*
	Off-shore Wind, *Scott McWilliams*
	Arctic Resource Development, *Flemming Merkel*
	Restoration and Remediation, *Dan Esler*

Thursday, 11 September 2014

07:00 - 08:30		*Breakfast served @ Radisson BLU Saga Hótel, Súlnasalur (included with room)*	
08:30 - 08:45		***Opening remarks & announcements***	
08:45 - 09:45	**Hanssen**	**TRADE-OFFS DURING COMMON EIDER INCUBATION.** ***Sveinn Are Hanssen***	**3A1**
09:45 - 10:15		*Coffee break*	
BEHAVIOR **Moderator:** Holly Hennin			
10:15 - 10:30	**Merkel**	**CONTRASTING FEEDING STRATEGIES AMONG WINTERING COMMON EIDERS LINKED TO WHITE-TAILED EAGLE PREDATION.** ***Flemming Merkel***	**3B1**
10:30 - 10:45	**Boyd**	**CHANGES TO THE MOLT PATTERN OF MALE HARLEQUIN DUCKS MAY BE HAVING POPULATION LEVEL EFFECTS.** ***W. Sean Boyd***	**3B2**
10:45 - 11:00	**Seltmann**	**PERSONALITY AND STATE DRIVE SOCIALITY IN A FACULTATIVELY SOCIAL BIRD.** *Markus Öst,* ***Martin W. Seltmann*** *and Kim Jaatinen*	**3B3**
11:00 - 11:15	**Öst**	**SMART ENOUGH TO SENSE DANGER? RESPONSIVENESS TO PREDATION RISK DEPENDS ON BRAIN SIZE IN FACULTATIVELY SOCIAL EIDERS**. ***Markus Öst*** *and Kim Jaatinen*	**3B4**
11:15 - 11:30	**Craik**	**HIGH RATES OF NEST ABANDONMENT IN RED-BREASTED MERGANSERS: POTENTIAL EFFECTS OF BROOD PARASITISM.** ***Shawn R. Craik****, Rodger D. Titman, Mohammadi Kaouass, Natalie Thimot and Éric Tremblay*	**3B5**
11:30 - 11:45	**Jaatinen**	**BRAIN SIZE-DEPENDENT BREEDING STRATEGIES IN A SEA DUCK.** ***Kim Jaatinen*** *and Markus Öst*	**3B6**
11:45 - 12:00	**Steele**	**BOLDNESS AND STRESS RESPONSIVENESS INFLUENCE NEST-SITE SELECTION IN COMMON EIDERS.** ***Benjamin B. Steele****, Martin W. Seltmann, Kim Jaatinen and Markus Öst*	**3B7**
12:00 - 13:30		*Lunch served @ Radisson BLU Saga Hótel, Súlnasalur (included in Registration)*	

EMERGING DISEASES

Moderator: Glenn Olsen

13:30 - 13:45	**Harms***	**TRACKING AVIAN CHOLERA IN NORTHERN CANADA.** ***N. Jane Harms****, Jeffrey Foster, André Dallaire, Grant Gilchrist, Janet Hill, Samuel Iverson, Stéphane Lair, Frederick Leighton, Scott McBurney, Greg Robertson, Michael Samuel, Guylaine Séguin, Hugh Whitney, Michelle Wille and Catherine Soos*	**3C1**
13:45 - 14:00	**Iverson***	**DEMOGRAPHIC AND POPULATION-LEVEL EFFECTS OF AN EMERGING INFECTIOUS DISEASE IN AN IMMUNOLOGICALLY NAÏVE HOST.** ***Samuel A. Iverson****, H. Grant Gilchrist, E. Isabel Buttler and Mark R. Forbes*	**3C2**
14:00 - 14:15	**Allison**	**CYCLIC MASS MORTALITY OF COMMON EIDERS IN THE NORTHEASTERN UNITED STATES IS ASSOCIATED WITH A NOVEL ORTHOMYXOVIRUS**. ***Andrew B. Allison****, Jennifer R. Ballard*, Robert B. Tesh, Randall M. Mickley, Hon S. Ip, Valerie I. Shern-Bochsler, Edward C. Holmes and Chris Dwyer*	**3C3**
14:15 - 14:30	**Ballard***	**PATTERNS OF WELLFLEET BAY VIRUS SEROPREVALENCE IN COMMON EIDERS.** ***Jennifer R. Ballard****, Samantha Gibbs, Chris Dwyer, Randall Mickley, Catherine Soos, H. Grant Gilchrist, N. Jane Harms, Jeffrey Hall, Jean-Francois Giroux, Stéphane Lair, Randy Milton, Glen Parsons, Brad Allen, John Fischer and Daniel G. Mead*	**3C4**
14:30 - 14:45	**Savoy**	**AN INVESTIGATION INTO THE POTENTIAL SOURCE POPULATIONS OF COMMON EIDERS AFFECTED BY WELLFLEET BAY VIRUS THROUGH DNA.** *Chris Dwyer, Sarah Sonsthagen, Randall M. Mickley, Samantha E. J. Gibbs, Jean-Francois Giroux, Brad Allen and Randy Milton*	**3C5**
14:45 - 15:00	**Ballard***	**EXPERIMENTAL INOCULATION OF THE COMMON EIDER WITH WELLFLEET BAY VIRUS.** ***Jennifer R. Ballard****, Samantha Gibbs, Chris Dwyer, John Fischer and Valerie Shearn-Bochsler*	**3C6**
15:00 - 15:15	**Olsen**	**WELLFLEET BAY VIRUS AND SEA DUCK CONSERVATION: MORE QUESTIONS THAN ANSWERS.** *Samantha E. J. Gibbs, Chris Dwyer, Jennifer R. Ballard, Andrew B. Allison and Randall M. Mickley*	**3C7**
15:15 - 15:45		*Coffee break*	

POPULATION DYNAMICS

Moderator: Sam Iverson

15:45 - 16:00	**Pöysä**	**ENVIRONMENTAL CONDITIONS IN EARLY LIFE, RECRUITMENT AGE AND PERFORMANCE AT FIRST BREEDING IN COMMON GOLDENEYE FEMALES.** ***Hannu Pöysä****, Robert G. Clark, Antti Paasivaara and Pentti Runko*	**3D1**
16:00 - 16:15	**Pavón-Jordán***	**CLIMATE-DRIVEN CHANGES IN WINTER ABUNDANCE OF A WATERBIRD OF CONSERVATION CONCERN IN RELATION TO EU PROTECTED AREAS.** ***Diego Pavón-Jordán****, Anthony D. Fox, Preben Clausen, Mindaugas Dagys, Bernard Deceuninck, Koen Devos, Richard D. Hearn, Chas A. Holt, Menno Hornman, Verena Keller, Tom Langendoen, Łukasz Ławicki, Svein H. Lorentsen, Leho Luigujõe, Wlodzimierdz Meissner, Petr Musil, Leif Nilsson, Jean-Yves Paquet, Antra Stipniece, David A. Stroud, Johannes Wahl, Marco Zenatello and Aleksi Lehikoinen*	**3D2**
16:15 - 16:30	**Lehikoinen**	**HABITAT-SPECIFIC BREEDING POPULATION DYNAMICS OF DUCKS IN FINNISH BOREAL ZONE.** ***Aleksi Lehikoinen****, Jukka Rintala and Hannu Pöysä*	**3D3**
16:30 - 16:45	**Rintala**	**DYNAMICS OF WINTER LONG-TAILED DUCKS IN THE BALTIC SEA.** ***Jukka Rintala*** *and Martti Hario*	**3D4**
16:45 - 17:00	**Roberts***	**ENVIRONMENTAL INFLUENCES ON GOLDENEYE ABUNDANCE AND DISTRIBUTION AT A HYPERSALINE LAKE.** ***Anthony J. Roberts**** *and Michael R. Conover*	**3D5**

POSTER PRESENTATIONS

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Luigujõe	**DISTRIBUTION AND NUMBERS OF NON-BREEDING WATERBIRDS IN THE GULF OF RIGA, BALTIC SEA.** *Ainars Aunins, Andres Kuresoo, Leho Luigujõe and Antra Stīpniece*	**P1**
De La Cruz	**DEMOGRAPHICS AND GROSS PATHOLOGY OF DIVING DUCKS KILLED DURING TWO OIL SPILLS IN CALIFORNIA.** *Jessie Beck, Hannah Rose Nevins, Michelle Hester, John Y. Takekawa and* ***Susan E. W. De La Cruz***	**P2**
Bowman	**LESSONS LEARNED FROM THE NORTH AMERICAN SEA DUCK JOINT VENTURE.** ***Timothy D. Bowman***	**P3**
Bowman	**TRAINING TOOLS FOR AERIAL OBSERVERS.** ***Timothy D. Bowman*** *and John I. Hodges*	**P4**
Boyd	**ANNUAL CYCLE MOVEMENTS, SITE FIDELITY, AND POPULATION DELINEATION OF BARROW'S GOLDENEYES IN WESTERN NORTH AMERICA.** ***W. Sean Boyd,*** *Dan Esler, Tim D. Bowman, Jonathan E. Thompson and Jason L. Schamber*	**P5**
Carlsen	**VARIATION IN EIDERDOWN QUALITY IN RELATION TO REGIONS, CLIMATIC FACTORS AND THE CLEANING PROCESS OF THE DOWN.** ***Thomas Holm Carlsen***	**P6**
Reid	**THE PROMISE OF COMMUNITY-BASED MONITORING: OPPORTUNITIES TO MEASURE SEADUCK TRENDS IN ARCTIC CANADA.** *Jason Charlwood, Kevin Smith,* ***Frederic A. Reid****, Louie Porta and Gary Stewart*	**P7**
Christensen	**MANAGING HUNTED POPULATIONS THROUGH SEX-SPECIFIC SEAON LENGTHS: A CASE OF THE COMMON EIDER IN THE BALTIC-WADDEN SEA FLYWAY POPULATION.** ***Thomas Kjær Christensen*** *and Jens Peder Hounisen*	**P8**
Counihan-Edgar*	**QUANTIFICATION OF IMMUNOGLOBULIN G LEVELS IN EIDER EGG YOLK.** ***Katrina Counihan-Edgar****, Mary Bozza and Tuula Hollmén*	**P9**
Silverman	**SURVIVAL ESTIMATES FOR SURF AND WHITE-WINGED SCOTERS MOLTING ON THE SALISH SEA IN WASHINGTON STATE, USA, AND BRITISH COLUMBIA, CANADA.** *Joseph R. Evenson, Eric T. Reed, Eric M. Anderson, Bryan L. Murphie, Tom A. Cyra, Jennifer Barrett, Donald K. Kraege and André Breault*	**P10**
Faulkner*	**INFLUENCE OF MARICULTURE ON WINTER SEA DUCK DISTRIBUTION AND ABUNDANCE IN SOUTHERN PUGET SOUND, WASHINGTON STATE.** ***Hannah S. Faulkner****, Joseph R. Evenson, Tom A. Cyra, Bryan L. Murphie, Dina L. Roberts and Donald K. Kraege*	**P11**
Hennin*	**PRE-BREEDING ENERGETIC MANAGEMENT IN AN ARCTIC-BREEDING SEA DUCK**. ***Holly L. Hennin****, Pierre Legagneux, Joël Bêty, Tony D. Williams, Grant H. Gilchrist, Tyne M. Baker and Oliver P. Love*	**P12**
Holm	**EFFECTS OF A DANISH ACTION PLAN ON REDUCING SHOTGUN WOUNDING OF COMMON EIDER 1997-2014.** ***Thomas Eske Holm***	**P13**

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Kilpi	**EXPLORING THE CAUSES FOR A DECLINE IN COMMON EIDERS ON THE FINNISH COAST USING VITAL RATES AND STOCHASTIC LIFE TABLE RESPONSE EXPERIMENTAL ANALYSIS**. *Patrik Karell,* ***Mikael Kilpi****, Andreas Lindén, Satu Ramula and Markus Öst*	**P14**
Alisauskas	**POPULATION ECOLOGY OF LONG-TAILED DUCKS AT KARRAK LAKE, NUNAVUT.** *Dana K. Kellett and* ***Ray T. Alisauskas***	**P15**
Kokhanova*	**SITE FIDELITY OF SPECTACLED EIDERS IN CHAUN-DELTA WESTERN CHUKOTKA, RUSSIA.** ***Vera Kokhanova****, Diana V. Solovyeva, Sergey L. Vartanyan and Gleb Danilov*	**P16**
Latty*	**PREVALENCE AND POTENTIAL SOURCES OF ELEVATED STRONTIUM IN WATERFOWL EGGS IN INTERIOR ALASKA.** ***Christopher J. Latty****, Angela C. Matz, Keith A. Hobson and Tuula E. Hollmen*	**P17**
Lehikoinen	**MANAGING WETLANDS FOR WATERFOWL – URGE OF AID FOR DIVING DUCKS AND PISCIVORES.** ***Petteri Lehikoinen****, Aleksi Lehikoinen and Kim Jaatinen*	**P18**
Lorentsen	**RESULTS FROM OVER 30 YEARS OF MONITORING WINTERING SEA DUCKS IN NORWAY.** ***Svein-Håkon Lorentsen***	**P19**
Olsen	**A COMPARISON OF HEALTH AND BEHAVIORAL EFFECTS OF THREE EXTERNAL TRANSMITTER ATTACHMENT TECHNIQUES ON SURF SCOTERS.** *K. Mark McBride,* ***Glenn H. Olsen****, Alicia M. Wells-Berlin and Mary Ann Ottinger*	**P20**
Meattey	**A COMPARISON OF MERCURY CONCENTRATIONS IN COMMON EIDERS AND PREY ITEMS FROM THE NORTHEASTERN UNITED STATES**. ***Dustin Meattey****, Lucas Savoy, Chris Dwyer, Randall M. Mickley, Josh Beuth and Kevin Regan*	**P21**
Mickley	**A COLLABORATIVE INVESTIGATION OF AN EMERGING DISEASE ISSUE IN THE NORTHEASTERN US: WELLFLEET BAY VIRUS.** ***Randall M. Mickley****, Chris Dwyer, Julie Ellis, Jennifer R. Ballard and Samantha E. J. Gibbs*	**P22**
Miller*	**MULTI-SPECIES ASSESSMENT OF TRACE ELEMENT BURDENS IN ARCTIC SEA DUCKS**. ***Micah W.C. Miller****, James R. Lovvorn, Robert J. Taylor, Angela C. Matz, David E. Safine and Christopher J. Latty*	**P23**
Montgomerie	**EFFECTS OF HEMOLYSIS ON COMMON EIDER PLASMA BIOCHEMISTRY.** ***Claire K. Montgomerie*** *and Christopher J. Latty*	**P24**
Morkūnas*	**SURGICAL AND HUSBANDRY TECHNIQUES FOR SEA DUCKS AND DIVERS MARKED WITH IMPLANTABLE TRANSMITTER: EXAMPLE OF SURGERIES PERFORMED IN LITHUANIA**. ***Julius Morkūnas****, Ramūnas Žydelis, Mindaugas Dagys and Liutauras Raudonikis*	**P24**
Morkūnė*	**THE ROLE OF WINTERING SEABIRDS IN THE COASTAL FOOD WEB: ECOPATH MODEL AND TRIPLE STABLE ISOTOPE APPROACH.** ***Rasa Morkūnė****, Jūratė Lesutienė, Julius Morkūnas and Artūras Razinkovas-Baziukas*	**P26**

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Mosbech	**LINKAGE OF KING EIDER POPULATION IN NORTHEAST GREENLAND: MIGRATION, MOLT, AND DISCOVERY OF A NEW OFF-SHORE WINTERING AREA AT SPITSBERGENBANKEN.** ***Anders Mosbech****, Kasper L. Johansen, Christian Sonne and Hallvard Strøm*	**P27**
Musilová	**INCREASING IMPORTANCE OF INLAND WINTERING AREAS FOR THREE SEADUCK SPECIES WITH DIFFERENT TREND IN NUMBERS OF A FLYWAY POPULATION.** ***Zuzana Musilová,*** *Petr Musil and Jan Zouhar*	**P27.5**
Olsen	**UPDATE ON SURGERY TECHNIQUES FOR IMPLANT SURGERY OF SATELLITE TRANSMITTERS IN SEADUCKS.** ***Glenn H. Olsen****, Samantha E. J. Gibbs, Alicia M. Wells-Berlin and Charlotte B. L. Kilchenstein*	**P28**
Olsen	**LOOKING FOR WELLFLEET BAY VIRUS IN COMMON EIDER: CLINICAL PATHOLOGY STUDIES**. ***Glenn H. Olsen,*** *Samantha E. J. Gibbs, Jennifer R. Ballard, Joshua Beuth and Jay Osenkowski*	**P29**
Petersen	**DO ANOTHROPOGENIC ACTIVITES INFLUENCE THE DISTRIBUTION OF MOLTING SEADUCKS?** ***Ib Krag Petersen****, Rasmus Due Nielsen and Ole Roland Therkildsen*	**P30**
Qing*	**USING SPECIES DISTRIBUTION MODEL TO ESTIMATE THE WINTERING POPULATION OF THE ENDANGERED SCALY-SIDED MERGANSER IN CHINA.** ***Zeng Qing****, Sun Gongqi, Duo Hairui, Wen Li and Lei Guangchun*	**P31**
Richman	**NUTRIENT ALLOCATION IN WATERFOWL**. ***Samantha E. Richman****, Keith A. Hobson and Shiway W. Wang*	**P32**
Saari	**A LONG-TERM STUDY OF BREEDING WATERFOWL POPULATIONS IN THE FINNISH BALTIC SEA**. ***Lennart Saari***	**P33**
Savard	**SPRING AND FALL MIGRATION OF SCOTERS IN EASTERN NORTH AMERICA: ROUTES, TIMING AND DURATION.** ***Jean-Pierre L. Savard,*** *Scott G. Gilliland, Christine Lepage and Matt Perry*	**P34**
Savoy	**NARROWING THE FOCUS OF THE WELLFLEET BAY VIRUS INVESTIGATION: ANNUAL MOVEMENT PATTERNS OF SATELLITE-MARKED COMMON EIDERS BREEDING IN BOSTON HARBOR, MASSACHUSETTS, USA.** ***Lucas Savoy****, Chris Dwyer, Randall M. Mickley, Samantha E.J. Gibbs, Glenn H. Olsen, H. Heusmann, Susannah Corona and Jorge Ayub*	**P35**
Savoy	**A COMPARISON OF MERCURY CONCENTRATIONS IN BLOOD TISSUE OF SEA DUCKS FROM THE ATLANTIC AND GREAT LAKES REGIONS**. ***Lucas Savoy****, Tim Bowman, Dustin Meattey, Oksana Lane, Jason Osenkowski, Josh Beuth, Scott Gilliland, Glenn H. Olsen, Nancy Pau, Kate O'Brien, Alicia M. Wells-Berlin, Philip Wilson, Shannon Badzinski, Shawn Meyer and Christine Lepage*	**P36**
Dusek	**INITIAL DETECTION AND LABORATORY INVESTIGATION OF DISEASE CAUSED BY WELLFLEET BAY VIRUS, AN EMERGING PATHOGEN OF COMMON EIDERS.** *Valerie Shearn-Bochsler, Anne Ballmann, Jeffrey Hall, Chris Dwyer, and Hon Ip*	**P37**

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Solovyeva	**WINTER ACTIVITY BUDGET OF SPECTACLED EIDER: SOME RESULTS OF DEPTH/TEMPERATURE LOGGER USE**. ***Diana V Solovyeva,*** *Gleb K Danilov and Sergey L Vartanyan*	**P39**
Systad	**MOLTING COMMON EIDERS IN MAINLAND NORWAY.** ***Geir Helge Systad****, Trond Vidar Johnsen, Magdalene Langset, Svein Håkon Lorentsen and Arne Follestad*	**P40**
Þórarinsson	**POPULATION STATUS HARLEQUIN DUCKS WINTERING IN ICELAND**. ***Þorkell L. Þórarinsson****, Aðalsteinn Ö. Snæþórsson, Yann Kolbeinsson, Böðvar Þórisson and Jón Einar Jónsson*	**P41**
Ulman	**RETENTION TIME AND EFFECTS OF RADIO TRANSMITTER ATTACHMENT ON THE BEHAVIOR OF CAPTIVE LONG-TAILED DUCKS DURING WINTER.** ***Sadie E.G. Ulman****, Tuula E. Hollmén, January Frost, Manfred R. Enstipp, Russel D. Andrews, Charles Frost, and Pamela A. Tuomi*	**P42**
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Legagneux	**SPATIALLY EXPLICIT DEPLETION MODELS HIGHLIGHT BEHAVIOURAL DECISIONS OF FORAGING SEA DUCKS.** *Tolon Vincent,* ***Pierre Legagneux****, Christophe Aulert, Bastien Chouquet, Pascal Hacquebart, Pascal Provost and Vincent Bretagnolle*	**P43**
Waltho	**MINK EFFECTS ON NESTING COMMON EIDER AT LOCH FYNE, FIRTH OF CLYDE, SCOTLAND, SUGGEST RECRUITMENT FAILURE RATHER THAN DIRECT PREDATION OF INCUBATING FEMALES**. ***Chris Waltho***	**P44**
Waltho	**150 YEARS OF SOUTHWARDS RANGE EXPANSION OF NESTING COMMON EIDER ALONG THE WESTERN COASTS OF THE BRITISH ISLES: THE WRONG DIRECTION FOR A CLIMATIC DRIVER?** ***Chris Waltho***	**P45**
Olsen	**DETERMINING OFFSHORE USE OF SEADUCK SPECIES IN FEDERAL WATERS OF THE MID-ATLANTIC UNITED STATE USING SATELLITE TRACKING**. *Alicia M. Wells-Berlin, Ronald E. Therrien, Lucas Savoy,* ***Glenn H. Olsen****, Scott Ford, Carrie Gray, Caleb Spiegel, James Woehr and Scott Johnston*	**P46**
Willie	**SPATIAL VARIATION IN POLYCYCLIC AROMATIC HYDROCARBON EXPOSURE IN BARROW'S GOLDENEYE IN COASTAL BRITISH COLUMBIA**. ***Megan Willie****, Dan Esler, Ron Ydenberg and Sean Boyd*	**P47**
Olsen	**COMPARING VOCALIZATIONS AND HEARING THRESHOLDS IN AQUATIC BIRD SPECIES.** *Sally E. Yannuzzi, Sara C. Therrien, Alicia M. Wells-Berlin and* ***Glenn H. Olsen***	**P48**

Žydelis	**ACCOUNTING FOR MISSED DIVING BIRDS DURING VISUAL AND DIGITAL AERIAL SURVEYS.** ***Ramūnas Žydelis****, Monika Dorsch, Georg Nehls, Stefan Heinänen and Henrik Skov*	**P49**

ABSTRACTS FOR ORAL PRESENTATIONS

1B1: BREEDING ECOLOGY

MANIPULATING BASELINE CORTICOSTERONE ALTERS REPRODUCTIVE DECISIONS AND SUCCESS IN ARCTIC-NESTING COMMON EIDERS

Holly L. Hennin*, Joel Bêty, H.Grant Gilchrist, Mark Forbes and Oliver P. Love*

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A combination of intrinsic and extrinsic factors is predicted to influence the reproductive decisions and success of individuals. Recent research has shown that state-mediating physiological traits can influence individual fitness. Corticosterone (CORT), the main glucocorticoid ('stress') hormone in birds, is a state-dependent hormone that mediates energetics across life-history stages, making it a viable candidate for mediating reproductive decisions and fitness. Therefore, if variation in baseline CORT influences resource acquisition, it may also affect reproductive decisions and success. To test this hypothesis, we manipulated CORT in pre-breeding female common eiders (*Somateria mollissima*) in 2011/2012 at East Bay Island, Nunavut. Post-migratory females were captured at arrival, individually marked, and implanted them with one of three hormone pellets: moderate/low CORT, or control, and we subsequently collected data on breeding propensity, laying date, pre-laying interval and reproductive success. Preliminary analyses indicate that CORT-treated females had earlier laying dates, shorter pre-laying intervals, and higher reproductive success compared to controls indicating that moderate short-term increases in baseline CORT in pre-breeding females benefit reproduction. These results suggest that individual variation in state-mediated physiological traits may play a strong mechanistic role in influencing variation in key life-history decisions and therefore fitness.

1B2: BREEDING ECOLOGY

DAILY VARIATION IN ENERGETIC PHYSIOLOGY IN ARCTIC-BREEDING COMMON EIDERS

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Temporal variations in corticosterone secretion profiles influence daily energetics and foraging behaviours. In temperate breeding birds, previous studies have established that the diurnal pattern of corticosterone secretion is influenced by light levels, with a peak prior to sunrise to stimulate waking and foraging behaviours. In response to an increase in foraging, there is an increase in circulating plasma triglycerides, indicating individual fattening rate. Although diel patterns of corticosterone secretion has been studied in temperate species it is unknown if arctic-nesting species demonstrate similar trends in corticosterone secretion or if triglycerides (fattening) are driven by corticosterone secretion. We examined the influence of two external mechanisms (time of day and tidal trends/food availability) on corticosterone and triglyceride secretion across a 24 hour period in arctic-nesting common eiders (*Somateria mollisima*) from 2006-2013 at East Bay Island, Nunavut. We found that neither time of day, nor tidal trend predicted variation in corticosterone or triglyceride secretion across a 24 hour period. Further, secretion in triglycerides does not appear to be driven by corticosterone secretion. Therefore, in contrast to temperate breeding species, common eiders breeding in the arctic do not show diurnal variation in corticosterone, potentially because their ability to forage is not limited either through light levels or resource availability. The lack of a secretion trend may be a strategy in arctic-breeding birds allowing them to maximize acquisition of energetic resources for reproduction within a highly constrained breeding season.

1B3: BREEDING ECOLOGY

ALTERED ENVIRONMENTAL STRESSORS AND LONG-TERM EFFECTS ON POPULATIONS OF COMMON EIDERS ON NOVA SCOTIA'S EASTERN SHORE

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Colonial nesting Common Eiders (*Somateria mollissima dresseri)* are an iconic, broadly-distributed, harvested sea duck. They are particularly vulnerable to a variety of threats (e.g. predation, disease, contaminants, commercial fisheries, disturbance), and some colonies in eastern North America have experienced significant declines over the past few decades. In eastern Nova Scotia, monitoring has been undertaken at the Eastern Shore Islands Wildlife Management Area for the past 36 years, and preliminary analyses indicate up to a 60% decline in the number of nesting eiders since the 1980s, as well as markedly reduced female survival (0.81 females, 0.89 males). We used aerial imagery and remote cameras to evaluate whether habitat change and altered predator abundance were contributing to these changes in local nesting populations. Results show a reduction in protective vegetation cover for nesting females, high predation rates of nests and young, as well as asynchrony in nest initiation across islands. We also observed increased use of artificial nesting shelters and more stable long-term colonies on islands with shelters. These results suggest that eiders are responding to both mammalian and avian predation pressure directly (mortality and/or decreased nesting attempts) and indirectly through altered nesting behaviour (site selection and nest initiation).

1B4: BREEDING ECOLOGY

WINTERING DISPERSAL AND SITE FIDELITY OF FEMALE COMMON SCOTER BREEDING IN NORTHEAST ICELAND

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Large scale anthropogenic development of the marine environment, particularly offshore wind farms, has focussed attention on the dispersal and subpopulation delineation of diving ducks. Common Scoter *Melanitta nigra* frequently occur in proposed development areas, yet we lack basic knowledge about their migration, dispersal and breeding provenance.. From 2009 to 2013 female Common Scoters were fitted with geolocators in northeast Iceland. By 2013, 24 sets of annual movement data had been obtained from a total of 16 Common Scoter females, based on a ca 50% recapture rate.The Icelandic breeding population of Common Scoter is estimated to be ca 300 pairs, with ca 60 pairs breeding in the 25 km^2 study area in northeast Iceland. Birds from this one locality wintered across most of the known wintering area of the western Palaearctic population of Common Scoters, from Scotland in the north to Spain/Portugal in the south. Six females delivered data from more than one winter, which showed a high degree of winter site fidelity.

1B5: BREEDING ECOLOGY

MOULTING CONDITIONS INDUCED CARRY-OVER EFFECTS ON COMMON EIDER REPRODUCTION

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Annual migrants use several distinct sites during their migratory cycle and hence their population dynamics can be strongly affected by environmental conditions at these sites (e.g., habitat quality, climate). We provide new information on how events occurring during moult migration can carry-over and affect subsequent reproduction of common eider ducks the following year. Common eiders that partly rely on body stores accumulated prior to reproduction to produce and incubate their eggs. The concentration of corticosterone (CORT) in feathers is an integrated measure of hypothalamic–pituitary–adrenal activity during the moulting period, and provides information on the total baseline and stress-induced CORT secreted during the period of feather growth. We first used data from multiple recaptures to disentangle the contribution of individual quality vs. external factors (i.e., breeding investment or environmental conditions) on feather CORT. Feather CORT was not affected by prior reproductive investment, nor by pre-breeding (spring) body condition prior to the moulting period. Individual feather CORT greatly varied significantly among years, and August-September temperatures explained most of the annual variation in average feather CORT. Secondly, we investigated the importance of stress experienced during moult on subsequent reproduction. Using path analyses, we show an indirect effect of moulting conditions on eider reproductive success via impacts on pre-breeding body condition and timing of spring migration. We demonstrate that condition experienced during moult (assessed with feather CORT) can have carry-over effects on subsequent fitness.

1B6: BREEDING ECOLOGY

INTERACTIONS OF PARASITES AND MERCURY ON REPRODUCTIVE PERFORMANCE OF COMMON EIDERS

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Many wildlife species are currently experiencing changing environmental conditions at northern latitudes that may affect condition, reproduction, and survival of individuals. As one example, rising temperatures in polar environments is known to have increased the release of mercury stored in glaciers and permafrost. Growing global industrialization also has generated higher atmospheric mercury emissions and subsequent mercury deposition in polar environments. These trends are disconcerting as mercury is a known toxin that can negatively affect both body condition and reproductive success of wildlife: traits which are themselves affected by the degree of parasitism experienced by individuals. We explore how factors such as mercury concentrations and degree of parasitism interact to affect breeding of a sea duck species, the northern common eider (*Somateria mollissima*). To do this, we manipulated the degree of parasitism of female eiders by administering them with either an anti-parasite treatment or a placebo treatment (distilled water), upon their arrival at a nesting colony in northern Hudson Bay, Nunavut (East Bay Island). The mercury concentration of the same females was assessed by analysis of a blood sample taken before they were released and subsequently observed on the breeding colony. Although we detected no difference in the timing of nest initiation between anti-parasite treatment and control groups among birds that arrived early, we found that anti-parasite treatment increased the likelihood that females arriving later would lay eggs. When mercury concentrations were also considered, nesting propensity was not influenced, but re-sight rates of females were. Collectively, our preliminary findings suggest both the degree of parasitism and mercury levels at arrival influence breeding decisions among female eiders in Arctic Canada, particularly among those arriving late and in poorer body condition.

1B7: BREEDING ECOLOGY

THE EARLY BIRDS AND THE REST OF THEM: DO THE VERY FIRST NESTERS REPRESENT THE ENTIRE COLONY?

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Early arrival of breeders often is related to successful breeding in waterfowl. Furthermore, climate change studies have detected earlier arrival of breeding birds. However, first nest dates potentially do not accurately predict changes because population size or sampling effort can bias the interpretation of such dates. We studied the relationships between first nest date, median arrival date (when at least 50% of all females have nested) and nest numbers (final nest count each season) at the common eider (*Somateria mollissima*) colony at Rif, Iceland, during 1992-2013. The colony occurs on a rock island, which was an established artificially 20 years before the study began, and a nearby grass island which was colonized by the eiders in 1990, two years prior to the study. Nest numbers at Rif increased from 185 to 620 during 1992-2007 but remained at approx. 520 nests 2010-2013. Research questions were: 1) are first nest dates a good predictor for the study population, as would be indicated by a linear relationship of first nest dates with median arrival date; 2) does their relationship differ between the nesting islands; and 3) were first nest date or median arrival date related to nest numbers? First nest date advanced by 11 days during the study but had no relationship with nest numbers. Median arrival date had no relationship with first nest date or nest numbers. First nest date was on average 3-4 days earlier for the rock island, which also became fully occupied before the grass island, indicating the rock island generally was the favored nest site by the earlier breeders. First nest date may not represent the colony as a whole, but rather the fittest individuals, which may be relatively robust to environmental conditions than the general population. Early breeding may have become more advantageous as nest numbers increased.

1C1: SPATIAL ECOLOGY

DISPERSAL, MOVEMENTS, AND SITE FIDELITY OF POST-FLEDGING KING EIDERS AND THEIR ATTENDING FEMALES

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Post-fledging dispersal and site fidelity is poorly understood for sea ducks that spend the majority of their annual cycles at sea. This is the first description of movements and their timing for first- (juvenile) and second-year (subadult) King Eiders (*Somateria spectabilis*) in relation to their attending females. We tagged 63 hatch-year birds and 17 adult females that were attending them with two-year satellite transmitters at breeding areas in northern Alaska, 2006–2009. Our goals were to describe the spatio-temporal distribution of pre-breeding individuals and adult females that had been successful breeders. We also examined fidelity to wing moult and winter areas as well as natal philopatry. Juveniles did not appear to follow attending adults, although they did winter in the same three general wintering areas, suggesting that genetic inheritance and social factors may have roles in the initial migration from the breeding area. Additionally, juveniles were more variable in the timing and duration of migration, moved longer distances during the winter, and were less faithful to moult and winter areas than adults, indicating that individual exploration and acquired navigational memory played a role in subsequent migrations. Most (75%) subadult females returned to natal areas, likely prospecting for future reproduction, while subadult males were widely dispersed at sea. Timing and duration of moult migration and wing moult of adult females that were presumed successful breeders varied from unsuccessful breeders due to their extended time on the breeding grounds. This study provides the first information on movements and site fidelity of young age classes of a long-lived sea duck and is vital for effective management and mitigation of oil and gas exploration and development and increased shipping in arctic waters.

1C2: SPATIAL ECOLOGY

MODELING HABITAT USE BY BROOD REARING HARLEQUIN DUCKS IN THE NORTHERN ROCKY MOUNTAINS, ALBERTA

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Prefledging waterfowl are vulnerable to an array of mortality agents and are often spatially restricted during this growth period. Understanding habitat requirements at each stage of development is important for understanding dynamics of the full reproductive cycle. Factors affecting habitat use by brood-rearing Harlequin Duck females at the home range scale were investigated in the east slope of Alberta's Rocky Mountains. Generalized linear models with a logit-link function were used to assess the effect of environmental parameters on Harlequin Duck brood presence (n = 38) and brood absence (n = 38). A set of models were built a priori and ranked by Akaike Information Criterion (AICc). Models relating to foraging conditions indicated the probability of a site being used for brood-rearing increased with total invertebrate biomass. Models relating to predator avoidance indicated the probability of brood use was high when percentage of channel overhang is close to 0, but declined with increasing overhang, shrub cover in the 1st meter, bank relief and more exposed bank. Models testing whether the selection of brood-rearing habitat optimizes foraging conditions and predator avoidance indicated that models with variables relating to predator avoidance had more support than models based on foraging conditions or models combining foraging conditions and predator avoidance. We concluded that Harlequin Duck females select habitat for brood-rearing based on the physical ability of the ducklings to use predator avoidance features. Invertebrate biomass was important but not as important as presence of predator avoidance features in distinguishing brood use from brood non-use areas.

1C3: SPATIAL ECOLOGY

RESULTS OF A SATELLITE TELEMETRY STUDY OF VELVET SCOTERS WINTERING IN THE BALTIC SEA

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Recent studies have indicated significant declines in Western Siberian/Northern European population of Velvet Scoter (*Melanitta fusca*), triggering concern for its conservation and resulting in the species being classified as endangered according to the IUCN criteria since 2012. Lithuanian marine waters of the Baltic Sea traditionally hold significant aggregations of this species in winter, while data on their seasonal movements and origin, essential for effective conservation, have been lacking. During wintering seasons in 2012 and 2013 we equipped 11 Velvet Scoters with implantable satellite transmitters (PTT-100, Microwave Telemetry). Birds were caught and released in Lithuanian coastal waters. Over 7000 good quality position fixes were received from eight birds that were successfully tracked throughout their wintering, migration and breeding seasons. In wintering areas birds used rather small core home ranges, averaging 72 km². On the other hand, wintering bird were very mobile and used a number of such wintering sites in coastal waters from the Gulf of Gdansk in the south to the Gulf of Finland in the North, resulting in large overall winter home ranges (655 km² on average). Sea depth, availability of filter feeders as well as distance to shipping lanes and bottom slope were the best predictors of the distribution of wintering Velvet Scoters. Spring migration route of tracked birds stretched from the Gulf of Finland in the Baltic Sea to the Barents and Kara Seas with recorded stopovers in the White Sea. Breeding areas of tracked birds were precisely identified in the high Arctic of Russia, from Arkhangelsk district in the west to Taimyr Peninsula in the east, providing insight into their breeding and post-breeding ecology. The study was supported by the EU LIFE+ programme as a part of the DENOFLIT project, aimed at identifying and designating important marine areas for biodiversity conservation.

1C4: SPATIAL ECOLOGY

GRAVEL BARS CAN BE CRITICAL FOR BIODIVERSITY CONSERVATION: A CASE STUDY ON SCALY-SIDED MERGANSER IN SOUTH CHINA

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Gravel bars are a characteristic component of river landscapes and are increasingly recognized as key sites for many waterbirds, though detailed studies on the ecological function of gravel bars for waterbirds are rare. In this study, we surveyed the endangered Scaly-sided Merganser *Mergus squamatus* along a 40 km river section of Yuan River, in Central China, for three consecutive winters. We derived the landscape metrics of river gravel bars from geo-rectified fine resolution (0.6 m) remote sensing data. We then built habitat suitability models (Generalized Linear Models - GLMs) to study the effects of landscape metrics and human disturbance on Scaly-sided Merganser presence probability. We found that 1) the Scaly-sided Merganser tended to congregate at river segments with more gravel patches; 2) the Scaly-sided Merganser preferred areas with larger and more contiguous gravel patches; and 3) the number of houses along the river bank (a proxy for anthropogenic disturbance) had significantly negative impacts on the occurrence of the Scaly-sided Merganser. Our results suggest that gravel bars are vital to the Scaly-sided Merganser as shelters from disturbance, as well as sites for feeding and roosting. Therefore, maintaining the exposure of gravel bars in regulated rivers during the low water period in winter might be the key for the conservation of the endangered species.

1C5: SPATIAL ECOLOGY

ANNUAL FIDELITY TO MOLTING, STAGING AND WINTERING AREAS BY WHITE-WINGED SCOTERS IN EASTERN NORTH AMERICA

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Fidelity to molting, staging and wintering areas is poorly documented in sea ducks. By minimising transmission frequency, we were able to extend the life of satellite transmitters up to 3 years which allowed insights into fidelity to molting sites and into factors leading to change in molting location. It also allowed us to look at fidelity to staging and wintering areas. In 2010, 19 White-winged Scoters were captured during molt near Forestville in the St. Lawrence Estuary, Quebec, Canada. Satellite transmitters yielded interesting insights into fidelity to molting areas, staging areas and migration routes. Most individuals that forgo breeding returned to molt in Forestville (9/12). However, most birds that went to a breeding area (7/9) molted at an alternate site and did not show strong fidelity to the Forestville molt site. Breeding birds also molted later than non-breeding birds. Individual White-winged Scoters tended to use similar staging areas between years with fall migration being less variable than spring migration. Fall migration routes varied between birds molting at the same site in the St. Lawrence Estuary with some birds migrating south west along the St. Lawrence to the Great Lakes and others, migrating south overland to the Atlantic coast. Birds showed consistency in their fall migration patterns between years. Fidelity to wintering areas was also high with most birds wintering at the general location in subsequent years.

1C6: SPATIAL ECOLOGY

HABITAT USE AND MOVEMENT ECOLOGY OF BLACK SCOTERS AND COMMON EIDERS DURING WINTER IN SOUTHERN NEW ENGLAND

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Southern New England provides critical habitat for sea ducks during winter and migratory staging periods and is a priority area for developing offshore wind energy facilities. However, little is known about the movement ecology and habitat use of common sea duck species including black scoters (*Melanitta americana*) and common eiders (*Somateria mollissima*) in this region. We used satellite telemetry to track black scoters (n = 75) and common eiders (n = 24) and then delineated their migratory phenology, length of stay on winter grounds, winter home range size and site fidelity, key habitat characteristics associated with core-use areas, and relative probabilities of use across a 3,800-km^2 marine spatial planning area. Black scoters spent nearly 5 months in southern New England, with wide variation among individuals in the size of winter utilization distributions (range 16–12,367 km^2), in their fidelity to core-use areas between winters, and in the frequency of short forays to regions as far south as South Carolina. Common eiders also spent about 5 months in southern New England during winter although they were relatively sedentary with small mean individual core use areas (mean = 39 km^2) and utilization distributions (mean = 199 km^2). Winter core use areas inhabited by both species were located closer to shore, at shallower water depths, with fine- to coarse-sediment grain size, and higher probability of hard-bottom occurrence relative to available areas. Resource selection functions and habitat-use models indicated that a 5-turbine wind energy facility proposed for relatively shallow (<20 m deep), nearshore habitats (<5 km), over hard-bottomed or coarse-sand substrate will likely displace foraging black scoters and common eiders wintering, whereas a proposed 200-turbine facility in federal lease block zones located farther offshore will more likely affect seaducks moving among core-use areas and during migration between wintering and breeding grounds.

1C7: SPATIAL ECOLOGY

LOST OR PIONEER? DISPLACEMENT, VAGRANCY AND EXTRALIMITAL BREEDING IN COMMON EIDER

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Globally Common Eider *Somateria mollissima* occur within well-defined breeding and wintering distributions. Where these are spatially separated, eiders also follow well-defined migratory corridors between them. However, some individuals stray beyond their normal distributional ranges, or migratory corridors. These can represent lost (or doomed), and/or pioneering birds. In most circumstances these comprise young/pre-breeding aged individuals.
This paper summarises 1. examples of regular displacement of migratory individuals, 2. extremes of vagrancy, and 3. examples of extralimital breeding.

Small numbers of eiders migrating SW along the Baltic flyway in autumn get displaced into Central Europe in most years. Occasionally, there are bigger displacement events, which result in hundreds or even thousands of birds being displaced. Observations and ringing data indicate that most of these displaced birds are yearlings undertaking their first migration. There is no evidence that these displaced young birds return to their natal range. Most individuals probably soon perish as they cannot find sufficient suitable food. Those that do, can remain at such suitable sites for many months or even years. However, only in a few cases does a cohort of individuals survive long enough to attempt nesting. This has occurred on Central European lakes (at least 8 locations) and rivers (2), along the northern shores of the Mediterranean/Adriatic seas (2), and on the coasts of France and Southern England (6+). There is only one example where extralimital breeding has led to the establishment of a new self-sustaining population; on the Black Sea coast of Ukraine, where nesting (up to 2000 nests) has persisted for almost forty years. Therefore, virtually all displaced/vagrant/lost eiders are doomed, while only an exceptional few become pioneers.

1D1: FORAGING

CLIMATE-DRIVEN GEOMORPHIC HABITAT ALTERATION AND IMPLICATIONS FOR FORAGING SEA DUCKS IN COASTAL ESTUARIES

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Coastal estuaries are key stopover and wintering areas for North American sea and bay ducks, where they forage on benthic bivalves in intertidal and subtidal shoal habitats. Suspension-feeding bivalve communities in these systems are known to be strongly influenced by freshwater and oceanic inputs that deliver sediments and nutrients to shallow estuaries. Sea-level rise, increased storm events, and altered freshwater and sediment inputs may affect geomorphic characteristics that can influence invertebrate prey composition and accessibility for foraging birds. To evaluate potential changes in estuarine prey availability and foraging areas for sea and bay ducks, we used models of geomorphic change under different climate and sediment scenarios in San Francisco Bay (SFB), California. We coupled results of 1D and 2DV models assessing the influence of sediment size, tidal range, and wave exposure on mudflat profiles with extensive existing datasets on bivalve abundance, biomass and size class, as well as waterfowl abundance, foraging and movement data, collected over the span of three decades. We used spatially-explicit GIS-based analyses to map expected bivalve densities in response to changing physical conditions and compared the current and projected extent of shoal habitats through the next half of a century with local knowledge of avian foraging ecology to estimate likely alteration of their foraging resources. Elucidating the processes controlling estuarine benthic invertebrate abundances and foraging area availability can help us anticipate how future climatic changes may affect wintering sea duck populations.

1D2: FORAGING

FOOD SOURCES OF WINTERING VELVET SCOTER AND LONG-TAILED DUCK ON THE SE BALTIC SEA: TRIPLE STABLE ISOTOPE AND GUT CONTENT ANALYSIS

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Changes on the feeding resources in the wintering areas might be an important issue contributing substantially to overall sea duck populations decline over the last decades in the Baltic Sea. The Lithuanian coastal waters of the SE Baltic Sea is an important wintering site for the benthivorous Velvet Scoter (*Melanitta fusca*) and Long-tailed Duck (*Clangula hyemalis*), which might be impacted by apparent recent anthropogenic and environmental changes in the feeding habitats such as invasive species effect, decreased eutrophication and changed hydrological conditions.

This study combines isotopic approach and stomach content analysis for identification of energy sources maintaining Velvet Scoter and Long-tailed Duck during wintering period in the SE Baltic Sea. Stable isotope ratios of carbon, nitrogen and sulfur ($\delta^{13}C$, $\delta^{15}N$ and $\delta^{34}S$, respectively) were measured in blood samples of captured alive sea ducks and samples of benthic invertebrates. Mixing model incorporating stable isotope ratios allowed us to estimate potential food sources for the sea ducks. Our results suggested a good agreement between isotopic approaches and stomach content analysis for Velvet Scoter and revealed some changes over the fifteen years. Both methods showed relatively simple diet composition, bivalves from soft bottom habitat were the most important food items. The stomach content of Velvet Scoter was dominated by *Cerastoderma glaucum* which had not been found previously.
Diet of Long-tailed duck consisted mainly on fish while bivalves from hard bottom dominated in previously estimations. Variation in stable isotope ratios of different individuals revealed broad range of feeding objects or migration of this species.

These results provide an insight that shifts in feeding objects might occurred during a 15 years period, however high fat scores indicate sufficient feeding conditions for the sea ducks in this area.

1D4: FORAGING

DEVELOPMENT OF A MONITORING PROGRAM FOR COMMON EIDERS USING AERIAL COUNTS OF MALES IN SPRING

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The meat, eggs and down of Common Eiders (*Somateria mollissma*) are harvested though-out their circumpolar range. Despite their importance in recreational and subsistence harvests their populations' remain mostly unmonitored. Options for monitoring include counts at migratory bottlenecks, nest counts at colonies or aerial counts during the breeding and wintering periods. Most of the successful long-term monitoring programs had relied nest counts of colonies. Although nest counts may provide high quality information on population trend, these methods are labor and time intensive making them difficult to scale up to the population level, especially in inaccessible remote areas. Aerial counts of males during the spring have formed the backbone of most waterfowl monitoring programs in North America, and aerial counts of adult male Common Eiders have been used as an index of breeding population size. Unlike most species of waterfowl, Common Eiders nest colonially and the counts are dependent on visual estimates of the males that may be inaccurate. We assessed repeatability and accuracy of male counts of eiders from three survey replicates across nine major colonies/archipelagos. For each replicate, we acquired a high elevation photo mosaic of the archipelago and a visual estimate of the adult males. Preliminary results suggest there is considerable variability in the estimates of the number of males among the replicates for both visual and photo estimates. The coefficient-of-variation for the photo estimates ranged from 1 to 79% while it ranged from 18 up to 120% for the visual estimates. The photo estimates averaged 2.2 times, and ranged up to 8 times, higher then corresponding visual estimates. For three of the survey areas we had corresponding estimates from nest counts. The nest counts averaged 2.2 and 2.9 times corresponding photo and visual estimates, respectively. We suggest aerial estimates may significantly underestimate population size, and because of the low repeatability observed, may not provide reliable information on population trend.

1D4: FORAGING

DIET AND NUTRITION OF KING EIDERS AND LONG-TAILED DUCKS ARRIVING TO BREED AT KARRAK LAKE

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The relative contribution of nutrient reserves vs. exogenous nutrients for egg formation has implications for cross-seasonal effects on reproduction and recruitment to sea duck populations. We studied body composition, and diet of both King Eiders, *Somateria spectabilis*, and Long-tailed Ducks, *Clangula hyemalis*, shot as they arrived to breed at Karrak Lake, about 60 km inland from the south shore of Queen Maud Gulf in Canada's central arctic. From 13 to 21 June in each of 2009 to 2011, we shot 28 (19 female, 9 male) King Eiders and 43 (18 female, 25 male) Long-tailed ducks shortly after their arrival at Karrak Lake, where they nest at relatively high densities. Ten morphometric measurements were recorded. Major organs of all birds were dissected and weighed, and proximate analysis of carcasses was done to determine whole body fat, protein, and mineral. Esophageal contents were removed and sorted to Genus and Species, where possible, but at least to Order (Diptera, Trichoptera, Coleoptera, Plecoptera, Aranea) or Family (most common were Anthomyiidae, Chrinomidae, Tipulidae, Limnephilidae, Nemouridae, Circulionidae, and Syrphidae) in most cases. The number of individuals in each identifiable taxonomic group found in each esophagus was counted and aggregate mass of such groups was recorded, followed by proximate analysis. Finally, we conducted stable Carbon and Nitrogen isotope analysis of liver, breast muscle, abdominal fat (Carbon only), oviduct, developing follicle (lipid and lean dry portion, separately), and any oviducal eggs (albumen, yolk lipid and lean dry yolk, separately); as well, stable isotope analysis was done on identifiable taxonomic groups of esophageal contents separately for lipid and lean dry fractions. Final stable isotope results have not been received from the contracted laboratory, but program SIAR will be used to compare the relative estimated contributions of endogenous nutrients toward various egg components in both King Eiders and Long-tailed Ducks.

1D5: FORAGING

A HOTSPOT OF DIVING DUCKS AND PREY INFLUENCED BY A HYDROGRAPHIC FRONT ON NANTUCKET SHOALS, MASSACHUSETTS

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I examine the spatial dispersion of two numerically dominant sea ducks that forage on Nantucket Shoals in winter: Long-tailed Ducks (*Clangula hyemalis*) and White-winged Scoters (*Melanitta fusca*). I related these findings to hotspots of prey (clams and pelagic amphipods) that influence persistent at-sea foraging patterns. Core feeding areas of Long-tailed Ducks and White-winged Scoters were located over southwest Nantucket Shoals and associated with a strong hydrographic frontal zone where clams and pelagic amphipods are historically abundant. Overlapping sea duck distributions likely reflect a flexible foraging strategy, and to some degree, a mechanism of information transfer related to feeding facilitation. It is possible that social cues provided by feeding flocks contribute to the spatial stability of this core foraging area offshore.

1D6: FORAGING

FATNESS ≠ FITNESS: EVIDENCE OF BODY MASS OPTIMIZATION IN SEA DUCKS THROUGH THE ANNUAL CYCLE

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It is increasingly recognized that determination of “good” and “poor” body condition is context dependent. Birds optimize body mass as they reconcile costs and benefits associated with accumulating and carrying somatic nutrients, and these costs and benefits vary depending on the environmental conditions encountered and the period of the annual cycle. We present data from several sea duck species that indicate body mass optimization, not maximization, at various points in the annual cycle. On wintering areas, female harlequin ducks achieved similar body mass prior to spring migration, irrespective of their access to abundant herring spawn. Similarly, although spring-migrating surf scoters showed strong distributional and behavioral responses to herring spawn, body mass did not increase markedly until just prior to inland migration. During remigial molt, surf and white-wing scoters maintained stable body mass, despite low foraging effort. Similarly, Barrow’s goldeneye body mass increased through remigial molt and fall-staging despite little foraging; however, absolute values of body mass varied across locations. Similar to many waterfowl, body mass of surf scoters decreased from mid- to late-winter, and also was positively correlated with latitude. Finally, within British Columbia and Washington, white-winged scoter body and lipid mass varied significantly among locations with very different environmental conditions. We conclude that in cases of shortages in food availability, body mass undoubtedly declines as somatic nutrients are catabolized. However, in many instances where food is not limiting, our data indicate that sea ducks optimize body mass and modulate foraging effort to achieve that optimization. Therefore, we contend that variation in foraging effort offers a more sensitive metric of habitat conditions than body mass variation. Finally, the conventional assumption that high body mass or energy stores indicate high quality individuals or habitats is poorly supported; in fact, the contrary may be more likely, i.e., individuals in higher quality or more predictable habitats may not need to carry large reserves.

2B1: MARINE DRIVERS OF POPULATION CHANGE

INTERACTIONS BETWEEN PLANKTON, BLUE MUSSELS AND COMMON EIDERS IN THE BALTIC SEA

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The Baltic blue mussel is a key species in the Baltic Sea food web and an important food source for breeding common eiders and wintering long-tailed ducks. For sea ducks, which when foraging, swallow mussels whole, the variation in the soft body content of mussels is of special importance. I investigated the spatial and yearly variation of the soft body content of blue mussels during winter and during the pre-breeding period of eiders. Water temperature affected soft body mass loss in mussels during winter. An extensive spring bloom of the flagellate, *Prymnesium polylepis*, dramatically affected the breeding propensity of eiders. The *P. polylepis* bloom most likely affected the quality of blue mussels at pre-breeding foraging sites close to the eiders' breeding sites. Furthermore, the mean soft body content of blue mussels during the pre-breeding period seems to correlate with clutch size and juvenile production of eiders. The results suggest that interactions at lower trophic levels may significantly affect the reproductive success of sea ducks.

2B2: MARINE DRIVERS OF POPULATION CHANGE

PRE-BREEDING BODY CONDITION OF PACIFIC COAST SURF SCOTERS: IMPLICATIONS FOR BREEDING PROPENSITY

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Pre-breeding body condition in waterfowl is tied to migration speed and reproductive success on the breeding ground. Spring migration of the surf scoter (*Melanitta perspicillata*), a declining North American sea duck species, along the Pacific coast is characterized by prolonged stopovers at key sites in British Columbia and Southeast Alaska. During this time scoters may be building stores to fuel migration and reproduction by consuming both benthic invertebrate prey as well as Pacific herring (*Clupea pallasi*) roe. The objective of our study was to evaluate body condition and breeding propensity of female surf scoters at major coastal spring stopover sites and on the boreal forest breeding area in Canada. We collected a total of 50 female surf scoters at 3 spring stopover sites, Haines, Juneau, Ketchikan in Alaska, and on the breeding area in Yellowknife, NWT, Canada. We measured body condition via proximate analyses, and evaluated breeding status using plasma yolk precursor (vitellogenin) determination as well as ovary and oviduct examination. Variation in breeding propensity was modeled in relationship to latitude, size-adjust body condition, and age class using generalized linear models. Our preliminary results suggest birds improved their condition as they migrated north and along the Pacific coast, and that body condition influenced breeding propensity. These preliminary findings underscore the importance of spring stopover sites for subsequent reproductive success.

2B3: MARINE DRIVERS OF POPULATION CHANGE

CLIMATE AND NUTRIENT EFFECTS ON POPULATION TRENDS OF DUCKS

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Animal populations are increasingly affected by human impacts, although the magnitude of such effects on population size and population trends largely remains unknown. We analyzed long-term data on population trends of ducks including sea ducks in Europe, using the IWC database combined with additional data from other sources, to quantify the relative importance of climate and nutrient leaching from farmland due to fertilizer use as drivers of population trends. We used mean temperature in Europe as general index of climate and fertilizer use by farmers as an index of release of nitrogen and phosphorus to the marine environment. High levels of fertilizer use on farmland in Europe has been associated with increased abundance of phytoplankton, algae, invertebrates and fish in the marine environment, but also increased hypoxia and bottom death. Effect sizes for population trends in relation to environmental factors were estimated for different species as Pearson's product-moment correlation coefficients. Species most strongly negatively affected by increasing temperatures had southernmost distribution ranges at low latitudes, a non-herbivorous diet and a small total breeding range, while species that benefitted from increasing temperatures had southernmost distribution ranges at high latitudes, a herbivorous diet and a large total breeding range. The effect of low latitudes may either be an effect of short-stopping, or of fertilizer use being greater at southern latitudes. Species most strongly negatively affected by fertilizer use had southernmost distribution ranges at low latitudes and they were generally herbivores, while species that benefitted from increased fertilizer use had southernmost distribution ranges at high latitudes and they had other diets than plants. These findings suggest that multiple drivers are responsible for population trends of ducks, and that the effects of increased fertilizer use do not primarily affect herbivores as one could have anticipated.

2B4: MARINE DRIVERS OF POPULATION CHANGE

NUTRIENTS AND MUSSEL STOCKS DRIVE FECUNDITY IN THE EIDER DUCK POPULATION OF THE BALTIC /WADDEN SEA

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Marine areas across Europe had been enriched for decades by nutrient, which primarily derive from fertilizer use on farmland. However, since the 1990's the release of nutrients has been controlled due to national environmental schemes and the nitrogen concentration in the seas has decreased. Since most animal populations are resource limited, we expect that the changing conditions are reflected in vital population variables such as fecundity and survival. Sea ducks are ideal species to test these assumptions spending most of their life time in the marine environment, from which intensive monitoring data exist. Here we focus on fecundity in eider ducks *Somateria mollissima*. We identify significant drivers behind annual changes in fecundity (juveniles/adult females measured by wing collected by hunters) in the Baltic/Wadden Sea flyway population of eider duck that has declined for more than two decades. Fecundity in eider ducks increased with the amount of nutrients in sea-water as a driver for mussel stocks in the previous autumn, it decreased with the extent of ice cover in the Baltic Sea in the previous winter season, but it increased with the extent of ice cover with a time lag of one and three years. These results suggest that environmental parameters (winter climate) and anthropogenic activities (usage of fertilizer on farmland, which is subsequently transported to the marine environment stimulates plankton growth and eventually mussel stocks) are key drivers that regulate fecundity and hence overall population size of the eider duck in the Baltic/Wadden Sea flyway, by acting directly and indirectly on their main food resource. We hypothesize that the Baltic/Wadden Sea eider duck population will continue to decrease due to decreasing amounts of nutrients in the marine environment and amelioration of winter climate in Northwestern Europe caused by climate change.

2B5: MARINE DRIVERS OF POPULATION CHANGE

UNDERSTANDING INTRA- AND INTER-POPULATION HETEROGENEITY: INFLUENCE OF WINTER ENVIRONMENTAL CONDITIONS ON COMMON EIDERS NESTING IN THE ARCTIC

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Heterogeneity in the way populations and individuals within a population react to variations in climatic conditions is critical to understanding how wildlife may cope with a warming climate and changing environment. Although many studies have examined the impact of environmental conditions on a single population, analysing data from geographically dispersed study sites may facilitate the detection of causal relationships between demographic parameters and environmental factors, helping to the mechanisms regulating populations.

The Common Eider (*Somateria mollissima*) is a marine duck with a circumpolar distribution known to be affected by climatic conditions at different phases of its annual cycle. Mark-recapture data were collected in one subarctic (Grindøya Island, Norway) and two arctic (Southampton Island, Nunavut, Canada and Prins Heinrich Island, Svalbard, Norway) populations over 28, 17 and 14 years, respectively. Based on these long-term datasets we assessed the impact of the winter North Atlantic Oscillation (NAO) and local winter conditions on adult annual survival and return rates to the nesting colony.

We found that heterogeneity among individuals was present in each population and was associated with different responses to winter climate fluctuations. For example, on Grindøya Island, some individuals were strongly impacted by windy and stormy winters whereas other individuals were not. Depending on the population, heterogeneity could emerge from differences in individual wintering or reproductive strategies.

Our results emphasize the importance of taking into account differences among individuals within populations to improve our understanding of the response of arctic wildlife to on-going climate change.

2B6: MARINE DRIVERS OF POPULATION CHANGE

SEA ICE CONDITIONS DRIVE BREEDING PROPENSITY AND TIMING OF BREEDING IN ARCTIC-NESTING COMMON EIDERS

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Variations in sea ice conditions near the nesting site can strongly affect breeding success of arctic seabirds. We investigated the impact of early season sea ice conditions on the reproduction of common eiders (*Somateria mollissima*) breeding at East Bay, Southampton Island, Nunavut, CA. East Bay is characterised by a thick annual ice cover which melts in summer. Female eiders nesting at this site partly rely on nutrients acquired locally during the pre-laying and laying period to produce their eggs. Also, individuals that time laying to match duckling hatching just prior to fully ice-free conditions obtain the highest duckling survival probability. Using Radarsat images acquired in June from 2002 to 2013, we measured the seasonal change in water concentration at river mouths at East Bay in order to track the availability of potential foraging areas for pre-breeding eiders. The timing of ice-breakup (i.e., date of 1% water concentration) varied greatly between years, ranging from June 10th to June 30th and was strongly correlated with the date of ice-free condition, which occurred in July. This indicates that such environmental cues could be used by eiders to adjust their timing of breeding. As expected, we found a strong correlation between the timing of ice-breakup in early summer and the timing of eider arrival date and laying date. Moreover, the timing of ice-breakup in early summer strongly affected female breeding propensity: much fewer individuals captured during the pre-laying period were resighted nesting in the colony when the ice-breakup was late. This strongly suggests that the timing of water accessibility in early summer is crucial for eiders reproductive decisions and success. A better understanding of the sea ducks flexibility in response to variations in sea ice conditions is important to understand the potential impacts of the rapid changes in arctic sea ice.

2B7: MARINE DRIVERS OF POPULATION CHANGE

CASCADING ECOLOGICAL IMPACTS OF CLIMATE CHANGE: ADVANCING SEA ICE BREAK-UP ALTERS PREDATOR-PREY DYNAMICS IN THE CANADIAN ARCTIC

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Climate change can influence species directly by modifying their physical environment or indirectly by altering interactions among organisms. Changes affecting the ecology of top predators are a particular concern because variations in predator behaviour have the potential to restructure food webs and lead to cascading ecological impacts in prey populations. Polar bears (*Ursus maritimus*) are an apex predator in the circumpolar Arctic adapted to use sea ice as a platform to hunt for seals and other marine mammals. Advancement in the timing of spring sea ice break-up has reduced polar bears' access to seals and has been associated with increased predation of ancillary resources by bears, including the eggs of colonial nesting waterfowl and seabirds. In this study, we use long-term monitoring data from the largest known common eider (*Somateria mollissima)* breeding colony in the Canadian Arctic to examine relationships between ice conditions, polar bear arrival on shore, and egg depredation. We estimate a positive correlation between spring ice break-up and bear arrival, as well as a negative correlation between break-up date and the duration of stay by individual bears. While exposure to bears is highest for eiders that initiate nests later in the breeding season, the proportion of days on which bears have been present before the median annual laying date has more than doubled during the past two decades. Nest success has declined proportionately raising concern about the long-term viability of prey populations unaccustomed to intensive depredation by bears.

2C1: TECHNIQUES AND TECHNOLOGY

MICROSCOPIC IDENTIFICATION OF WATERFOWL EGGSHELLS

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Archaeological midden deposits around Lake Mývatn contain layers of fragmented eggshells, indicating large scale harvesting of waterfowl eggs over the entire eleven hundred year period of human presence there. A relative scarcity of waterfowl bones in the same middens indicates that the birds were rarely hunted on the breeding grounds and that the present day sustainable harvesting of eggs and the protection of adult birds may have a long tradition. Our goal is to identify the species being harvested. Using a modern reference collection of 17 lake bird species and 8 other native species we describe the eggshell micromorphology with emphasis on the internal egg surface. We use advanced scanning electron microscopy to increase the taxonomic resolution of eggshell identification, hoping to bring it to a species level. Dating is achieved by tephrochronology, supported by radiocarbon dating. Given the preliminary results we are optimistic, but it remains to be seen how well the modern eggshell morphology relates to archaeological samples which most often show some signs of decay. The identification of waterfowl egg fragments at the species level may have applications in various management situations, including breeding biology and predation pressure.

2C2: TECHNIQUES AND TECHNOLOGY

EMPLOYING DIGITAL STILL IMAGING AND OBSERVER COUNTS TO ESTIMATE BIAS IN AERIAL SURVEYS OF WINTERING SEA DUCKS

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To better understand the bias in aerial survey abundance estimation that results from aircraft and observer effects, we conducted a study to estimate availability bias, detection, and misidentification by collecting images and observer counts of wintering sea ducks. We employed a fixed-wing aircraft with two digital still-image cameras and two observers to survey multiple 50m-wide strip-transects. A forward-facing (FF) camera attached to the wing strut captured images of the transect 250-300m ahead of the aircraft, while a point-of-view (POV) camera mounted to the rear window captured images of the transect abeam of the aircraft. Comparing the FF to POV camera counts allowed estimation of availability bias, or aircraft effect (the proportion of birds that flew out of the transect or dove due to the aircraft). Analyses suggested that 5-30% of sea ducks dove or flew off-transect as the aircraft approached: 5% for goldeneye, 20% for long-tailed duck and surf scoter, 25% for white-winged scoter, and 30% for bufflehead. Comparing the POV camera to observer counts allowed estimation of detection (the percentage of birds within the transect that were detected by observers) and misidentification. Estimates of birds detected on transects ranged from 50% to 95%, varying by species and observer, with long-tailed duck detection being slightly higher than other species. Misidentification of surf and white-winged scoters was about 1% and 4-6%, respectively. Our results suggest that, due to a combination of aircraft and observer effects, current survey estimates could be increased by a factor of 1.3 to 2.2 depending on species. We are developing methods for additional studies to address these biases, as well as effects of transect width and aircraft type.

2C3: TECHNIQUES AND TECHNOLOGY

ANALYZING HABITAT USE BY SEA DUCKS USING HIGH PRECISION GPS TELEMETRY

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Satellite telemetry (Argos based) that is commonly used for studying sea duck migrations and coarse scale habitat use has been instrumental in advancing our understanding about biology of sea ducks. However, use of satellite telemetry becomes limited if we are interested in fine resolution patterns, which could be relevant in fragmented marine landscapes or when analyzing applied questions related to human use of marine environment. To assess high resolution distribution patterns and movements we equipped common eiders (*Somateria mollissima*) with GPS transmitters, a novel approach for studying sea ducks. With the detailed GPS data we were able to assess differences in habitat use during day and night. During daylight hours the birds were more concentrated in good foraging habitats, shallower water. While during the dark hours they were more dispersed also over deeper areas. However, there were also clear individual differences in the diurnal patterns with some birds having distinct night roosting sites. We further assessed the extent of daily movements and modelled the relationships between the collected data and environmental variables using species distribution models. High resolution GPS telemetry allows obtaining new knowledge regarding habitat use, fine-scale movements and nocturnal activities. Such datasets and analysis results are invaluable when answering basic questions about species biology and using such knowledge for sea duck management and conservation.

2C4: TECHNIQUES AND TECHNOLOGY

EXPERIMENTAL SURVEY WORK CHARACTERIZING THE WINTER DISTRIBUTION OF SEA DUCKS ALONG THE ATLANTIC COAST OF THE UNITED STATES

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During the winter, thousands of sea ducks are found along the Atlantic coast of the United States, where they may be affected by wind power turbines, marine traffic, aquaculture, sand mining, and other coastal development. Potential impacts are difficult to predict, because traditional winter waterfowl surveys do not cover the marine habitats used by sea ducks. We describe the results of an experimental survey, conducted by the U.S. Fish & Wildlife Service in 2008-11, and again in 2014. The survey aims to estimate winter population sizes and determine the distribution of long-tailed duck *Clangula hyemalis*, white-winged *Melanitta fusca*, surf *M. perspicillata*, and black scoter *M. Americana*, as well as provide insight into the distribution of common eider *Somateria mollissima* along the U.S. portion of their wintering range. Spatial patterns of high density transects were consistent among years for all species except black scoter, which is the most widely distributed species and exhibits the most inter-annual variation in distribution and abundance. Over 75% of sea ducks were observed in less than 20 m of water, closer than 4 NM from the coast and over seabed with slope shallower than 1°. Common eider and long-tailed duck were observed closer to shore and over steeper ocean bottoms than the three scoter species. Abundance estimates are sensitive to the highly aggregated distribution of wintering sea ducks, and we discuss ongoing efforts to improve our understanding of distribution and abundance by accounting for detection, identification, and count biases.

2C5: TECHNIQUES AND TECHNOLOGY

EXPLAINING AND PREDICTING SEADUCK HABITATS USING SPECIES DISTRIBUTION MODELS

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Understanding sea duck habitat preferences and being able to predict their distributions is important for effective conservation and management of these birds. The objective of this study was to develop distribution models describing habitat use of different seaduck species and allowing for predicting bird distributions. We used aerial surveys to collect data on seaduck distributions in the southern Baltic Sea. Bird observations were linked to spatially and temporally matching environmental features, and we used species distribution models to characterize environmental variables shaping the distribution patterns. We used the same modeling approach for explaining and predicting distributions of common eider *Somateria mollissima*, common scoter *Melanitta nigra*, and long-tailed duck *Clangula hyemalis*. We tested different modelling algorithms; generalized linear models (GLM) and generalized additive models (GAM) using different error distributions and evaluated the performance of these models for the objectives of our study. We found that most of the tested methods characterized seaduck habitats well, and that hurdle GAMs provided the most accurate predictions of species distribution.

2C6: TECHNIQUES AND TECHNOLOGY

DEUTERIUM DILUTION: A NON-LETHAL METHOD FOR MEASURING BODY COMPOSITION OF COMMON EIDERS.

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Anthropogenic disturbances introduced into habitat used by wintering common eider (*Somateria mollissima*) as well as diseases have the potential to negatively impact their body condition. Biologists presently lack an accurate, non-lethal method for measuring body composition of sea ducks that allows them to assess body condition. Our goal was to validate the deuterium dilution method for measuring body composition American common eiders (*S. m. dresseri*). We captured 19 eiders during winter in southern New England, injected each eider with 1,066 ± 4.5 mg of 99.9% deuterium oxide, allowed them to rest for 90 minutes and then collected approximately 200 ul of blood from each eider. We euthanized eiders after collecting blood and performed a carcass analysis. We measured deuterium concentration in blood water using an isotope ratio mass spectrometer, from which we estimated total body water. Deuterium over-estimated body water by 13.30 ± 0.73% (R^2 = 0.931). We derived linear regression models using combinations of 5 variables to estimate wet lean and fat mass. Using a jack knife validation, we determined that the top two models predicted with 2.04 and 2.02 % relative error, respectively, and the top ranked fat mass model predicts with 20.24% relative error. Using these models, we estimated the body composition of 86 captured, and released eider. We determined that both male and female eiders significantly increased fat mass in late winter compared to early winter, whereas wet lean mass of males remained constant throughout the winter, while wet lean mass of females was significantly less than males during late winter and decreased compared to early winter. Deuterium dilution enables field biologists to obtain relatively accurate measurements of eider body composition without needing to kill the bird to perform extensive and expensive total carcass analyses.

2C7: TECHNIQUES AND TECHNOLOGY

MONITORING SEA DUCKS USING A HIGH DEFINITION AERIAL VIDEO SURVEY TECHNIQUE

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Increasing human activities at sea require solid data on sea duck abundance and distribution in order to properly assess human impacts and cope with the conservation demands of the declining sea duck populations. Surveying sea ducks in their wintering areas is challenging due to their wide wintering range, their offshore distribution and the birds' high sensitivity to disturbance. Surveying sea ducks from ships and by conventional low-flying visual aerial survey methods usually causes strong responsive behaviour of the birds to the survey platform, which results in biased estimates of bird numbers and affects sea duck distributions during the survey. In order to obtain unbiased survey data, high definition survey techniques have been developed offering the possibility to cover large areas by high definition imaging with a ground resolution of 2 cm when flying at a survey altitude of 1800 ft. This digital survey method is also advantageous over visual survey methods due to the ability to validate the survey data, accurate flock counts without the need for distance correction and safety. Digital surveys conducted in the German North and Baltic Seas prove the method is highly appropriate for monitoring sea ducks at sea. Moreover, our analyses suggest a substantial underestimation of sea duck numbers by traditional visual survey techniques, particularly for sensitive species such as the Common Scoter *Melanitta nigra*. We present preliminary results of survey flights in the German North and Baltic Seas including distribution and abundance of sea ducks in two special protected areas.

2D: PARTNERS PANEL DISCUSSION

ABORIGINAL AND INDUSTRIAL PARTNERSHIPS TO BENEFIT SEA DUCK CONSERVATION

Special Session hosted by: *Grant Gilchrist*, Canadian Wildlife Service, Environment Canada, Ottawa, Canada; Grant.Gilchrist@EC.GC.CA

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The 5th International Sea Duck Conference is pleased to host a Special Session and Panel Discussion addressing how researchers can establish partnerships in support of Sea Duck conservation and research. Because sea duck research is expensive, and we must often work in remote locations which require well trained research teams, academic and government institutions have struggled to fund sea duck research to the levels required. As a result, we must explore new avenues of research partnerships and constructive collaborations.

Having established productive research programs in association with Aboriginal and/or Industry partners, panelists have been invited to discuss their expertise. Panelist have been asked to launch the session by reviewing their personal 'Lessons Learned' and then will open a dialogue between scientists, Resource Developers and Aboriginal Communities about current issues and concerns regarding sea duck conservation and development. The panel discussion will touch on how research partnerships are formed, managed, and maintained so that knowledge is generated and disseminated to a diversity of partners, while ensuring scientific integrity.

3B1: BEHAVIOR

CONTRASTING FEEDING STRATEGIES AMONG WINTERING COMMON EIDERS LINKED TO WHITE-TAILED SEA EAGLE PREDATION

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Southwest Greenland is an international important wintering area for Greenland and Canadian common eiders (*Somateria mollissima borealis*). They distribute both in the shallow habitats along the outer coastline and in the fjords which are generally very deep. In the fjord systems, eiders are typically dominated by adult birds gathered in large communal roosts on deep waters, which is in contrast to the coastal habitats that are dominated by younger birds with a more even spatial distribution on more shallow waters (< 50m). We hypothesized that fjord habitats served as a refuge during daytime when coastal areas are heavily disturbed by fishing and hunting activity. Surprisingly, satellite tracking of the eiders did not support this hypothesis, but revealed that there was little or no exchange between fjords and coastal habitats during the winter. Instead, observations of the feeding activity of the eiders indicated that predation by white-tailed sea eagles (*Haliaeetus albicilla groenlandicus*) was the key to understand the segregation between the fjord habitats and coastal habitats. We found that eiders in the fjords were feeding along the shoreline, but only during twilight and at night, whereas coastal birds were primarily diurnal feeders. Occasionally juvenile birds initiated feeding during daytime in the fjord, but were discontinued due to interactions with white-tailed eagles. Even in April when day length had increased by 5.9 hours (compared to February) the eiders appeared to rely on nocturnal feeding. The more extensive shallow waters in the coastal areas allow eiders to forage and feed at daytime at larger distances from land - presumably out of reach of eagle predation. We suggest that the nocturnal feeding strategy observed in the fjord is an effective anti-predator mechanism allowing eiders to utilize these habitats.

3B2: BEHAVIOR

CHANGES TO THE MOLT PATTERN OF MALE HARLEQUIN DUCKS MAY BE HAVING POPULATION LEVEL EFFECTS

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A small population of harlequin ducks (*Histrionicus histrionicus*) wintering in southern British Columbia has been surveyed intensively during the last 30+ years. In the 1980s and 1990s, males consistently returned to the study area in June-July to molt their body and flight feathers. Females followed 1-2 months later and long-term pair bonds were re-established once the females completed their own molts, usually by mid-late October. However, since the mid-2000s males have been consistently molting elsewhere and they now return to the study area ca. 2+ months later than usual and in pre-basic plumage. The following factors may be responsible for this change in molt pattern during what might be considered a relatively vulnerable (flightless) period for the males: 1) increasing levels of recreational disturbance from humans (*Homo sapiens*) and/or 2) increasing levels of predation risk from bald eagles (*Haliaeetus leucocephalus*). Coinciding with this change in molt pattern, the number of males overwintering in the study area has declined significantly, suggesting a local population level effect. In contrast, females have not altered their return times, molt patterns, or abundance levels. Recent surveys indicate that two nearby coastal sites are also experiencing delayed returns by males. Monitoring and applied research efforts are needed to answer the following questions: 1) is this change in molt behavior happening throughout the Salish Sea?; 2) if so, is it having similar local population level effects or even larger scale effects?; 3) why is this happening?; and finally 4) what, if anything, can be done management-wise? In the meantime, plans are underway to mark males with satellite transmitters to determine their current molt (timing/location) patterns and winter-breeding affiliations. Results of this study have implications for wildlife conservation in regions where both human and eagle populations are increasing.

3B3: BEHAVIOR

PERSONALITY AND STATE DRIVE SOCIALITY IN A FACULTATIVELY SOCIAL BIRD

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The costs and benefits of group living vary with personality, with behavioral consistency forcing individuals to accept different social positions within groups. Therefore, personality may underpin many aspects of social organization. We hypothesize that the direction of the relationship between sociability and boldness, a fundamental axis of personality, is linked to potential trade-offs between predator and conspecific avoidance, with individuals emphasizing either higher survival or lower social stress, respectively. To address this problem, we determined how group size preference and group forming duration depended on boldness in response to a threatening stimulus (flight initiation distance, FID) and state (body condition, breeding experience) in facultatively social eiders (*Somateria mollissima*) from a population in southwestern Finland, Baltic Sea, during 2009-2011.Females form coalitions or care for the young solitarily and there is high predation pressure on breeding adults and young, providing a strong incentive for brood-tending females to cooperate. Because less sociable individuals may be more susceptible to social stress, baseline and handling-induced corticosterone concentrations of incubating females were included as potential predictors of sociability. The relationship between boldness (FID) and the number of coalition partners ranged from positive (females in good body condition) to negative (females in poor body condition), arguing against a general relationship between boldness and sociability. The number of coalition partners also decreased with advancing female breeding experience. Interestingly, shyness (long FID) delayed group formation. Despite a pronounced need for safety in numbers by shy females in poor body condition, their entry into groups may be constrained by their personality, suggesting a possible trade-off between predator and conspecific avoidance. Understanding the relationship between personality and cooperativeness is essential because the mix of behavioral types in a population can be crucial to predicting how that population will respond to rapid environmental change, as currently faced by Baltic seaducks.

3B4: BEHAVIOR

SMART ENOUGH TO SENSE DANGER? RESPONSIVENESS TO PREDATION RISK DEPENDS ON BRAIN SIZE IN FACULTATIVELY SOCIAL EIDERS

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Information facilitates adaptation to the environment by reducing uncertainty, yet individual investment in information acquisition is highly variable. One possible solution to this paradox is the speed-accuracy trade-off inherent in decision-making, the resolution of which may depend on cognitive ability, as proxied by relative brain size. However, these potential trade-offs remain virtually unexplored in natural populations. We hypothesized that large brain size is (i) beneficial under challenging conditions and allows better matching of antipredator responses to the actual threat level, and (ii) associated with accurate but slow risk-assessment, which can be costly under benign conditions. To test this, we studied how relative head size in female eider ducks (*Somateria mollissima*) affected their reproductive decisions and fitness under variable predation risk and breeding phenologies. The results supported our hypotheses. First, females with depredated nests had smaller brains than expected in a peak predation year. Second, large-brained females increased their speed of forming anti-predator brood-rearing coalitions in more dangerous years. Third, large-brained females had a delayed breeding schedule, and their nests were more likely to be depredated in an early low-predation year. Thus, predation risk and annual phenology may exert temporally fluctuating selection on relative brain size, maintaining variation in cognitive ability. These alternative cognitive strategies are likely to be present also in other sea ducks. From a sea duck conservation perspective, predicting what future balance will be struck between potentially opposing selection pressures on brain size – climate change-driven shifts in breeding phenology and large-scale changes in predation regime, typically of anthropogenic origin – is a far from trivial challenge.

3B5: BEHAVIOR

HIGH RATES OF NEST ABANDONMENT IN RED-BREASTED MERGANSERS: POTENTIAL EFFECTS OF BROOD PARASITISM

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Theory predicts that offspring abandonment is beneficial when current reproduction is outweighed by its costs. Conspecific brood parasitism (CBP) may incur fitness costs to host females, such as lower clutch size and reduced egg success. Nest desertion and subsequent renesting, therefore, may be an adaptive host response if parasitism is detected early in the laying period. Little effort has been made to examine the extent of CBP among nests abandoned during egg-laying, and whether it differs from clutches that reach the incubation stage. Our study focused on the prevalence of CBP in a coastal colony of Red-breasted Mergansers (*Mergus serrator*) in eastern New Brunswick, Canada, and that is characterized by high rates of nest abandonment during egg-laying (~30% of nests/year). A combination of field observations and microsatellite markers were used to compare 1) rates of CBP and 2) level of concealment (number of grass tunnels leading to a nest and distance to shore) between a sample of 20 nests abandoned during egg-laying and nests reaching incubation. We found that abandoned nests were generally heavily parasitized; 52% of all genotyped eggs were laid parasitically, each nest contained an average of 3 parasitic eggs (range 1-6), and an average of 3 females contributed eggs to a clutch (range 2-5). Conversely, only 35% of incubated clutches received parasitic eggs during the laying period, and generally no more than 2 parasitic eggs were in each of these nests. We found little difference in the level of concealment between abandoned and incubated nests, suggesting that abandoned nests were not easier to detect by parasitic females. Our results provide some of the first evidence that, among ground-nesting sea ducks, nest desertion during the earliest stages of breeding may be linked to intraspecific interaction.

3B6: BEHAVIOR

BRAIN SIZE-DEPENDENT BREEDING STRATEGIES IN A SEA DUCK

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The optimal compromise between decision speed and accuracy may depend on cognitive ability: larger brain size may select for accurate but slow decision-making, beneficial under challenging conditions but costly under benign ones. However, how animals balance their breeding phenology and reproductive performance depending on brain size and state remains largely unexplored. We predicted that (i) large-brained individuals have a delayed breeding schedule due to thorough nest-site selection and/or prolonged resource acquisition, (ii) good condition facilitates early breeding, and (iii) increased cognitive ability accrues benefits mainly to individuals challenged by environmental/intrinsic constraints. To test these predictions, we examined how the relative head size of female eiders (*Somateria mollissima*) of variable body condition affected their breeding schedule, hatching success and offspring quality. The results supported our predictions. First, large-brained females experienced a marked delay in their breeding schedule with increasing breeding dispersal distance. Second, increasing body condition generally advanced the timing of breeding. Third, larger head size increased hatching success mainly among late breeders and those in poor body condition, and the increase in duckling body condition with increasing maternal head size was confined mainly to poor-condition mothers. Our study shows the presence of brain-size dependent reproductive strategies within a single population.

3B7: BEHAVIOR

BOLDNESS AND STRESS RESPONSIVENESS INFLUENCE NEST-SITE SELECTION IN COMMON EIDERS

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We investigated how personality differences among Common Eiders (*Somateria Mollissima)* influence their nest site selection. Female eiders choose sites with widely varying characteristics. Some nests under bushes are almost completely obscured from potential egg predators flying overhead. Other nests on open rock ledges are exposed to the sky but have many alternative escape routes. Nests also vary in distance to the nearest shoreline. It is puzzling why selection has not produced one preferred type of nest site. One solution is that eider individuals have different stress tolerances which may affect nest site selection. We found that boldness, as indicated by flight initiation distance (FID) as we approached the nest, was consistent and repeatable among individuals, and that this measure of stress tolerance was correlated with nest site cover. Bold individuals with short FID's and lower handling induced body temperatures nested in more covered sites while shy individuals nested in open sites. Furthermore, females with short FID's and lower handling induced corticosterone levels nested further from the shore. Thus, stress responsiveness seems to influence nest site selection. Nest success was related to nest cover, with highest success found in intermediate cover and lower success in the most and least covered nests. This suggests stabilizing selection, although the large number of nests that have either low and high cover suggests that other factors, perhaps selection acting on personality, might be causing the wide range of nest sites that are selected.

3C1: EMERGING DISEASES

TRACKING AVIAN CHOLERA IN NORTHERN CANADA

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Avian cholera, a bacterial disease caused by infection with *Pasteurella multocida*, was first detected in common eider (*Somateria mollissima*) colonies in the eastern Canadian Arctic in 2004. Since then, it has caused large-scale mortality of eiders, particularly on East Bay Island, Nunavut. The recent emergence of this disease prompted an investigation of the diversity of *P. multocida* to examine the relatedness of strains from the Canadian Arctic to those obtained from outbreaks in other parts of North America. *P. multocida* isolates collected from 2004 to 2011 from eider colonies in Nunavut and Nunavik were compared to isolates collected over the past ~20 years using two genotyping methods. Isolates were genotyped using repetitive element palindromic polymerase chain reaction (REP-PCR) and multilocus sequence typing (MLST). REP-PCR fingerprints showed 29 distinct profiles and MLST grouped the isolates into 15 sequence types and five clonal complexes. REP-PCR and MLST results generally corresponded with *P. multocida* serotypes. Serotype 4 and 3x4 isolates from Nunavut and Nunavik showed a high degree of relatedness. Serotype 1 isolates from Newfoundland, Saskatchewan, southern Quebec, and the eastern Arctic were related; these isolates also showed some genetic similarity to isolates from California and Nebraska, but most US isolates were distinct from Canadian isolates. Serotype 3, 4 and 3x4 isolates from southern Quebec were not related to isolates from the eastern Arctic. Further analysis of MLST results showed that isolates fell into one of two groups with limited genetic diversity, suggesting extensive movement of *P. multocida* across the continent and that *P. multocida* from wild birds is essentially similar across North America. However, the REP-PCR results, which explore relatedness of isolates on a finer scale, point to some population structuring. These results indicate that *P. multocida* strains may be exchanged among northern outbreaks, and potentially between northern and southern Canada.

3C2: EMERGING DISEASES

DEMOGRAPHIC AND POPULATION-LEVEL EFFECTS OF AN EMERGING INFECTIOUS DISEASE IN AN IMMUNOLOGICALLY NAÏVE HOST

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Infectious disease is a potentially important driver of wildlife population dynamics; however the demographic effects of disease in free-ranging hosts have proven difficult to quantify. Avian cholera is a highly virulent disease of birds that has circulated among common eider (*Somateria mollissima*) populations in Europe and North America for several decades. The disease has recently appeared in the Canadian Arctic, where high annual mortality, coupled with near total reproductive failure on affected colonies has raised fears over local extirpation and severe population decline. In this study we use data from a marked population of northern common eiders (*S. m. borealis*) at East Bay Island, Nunavut to estimate vital rates before and during a multi-year epizootic. During the initial years of the epizootic, we estimated annual mortality rates as high as 37% among breeding-age females. Overall colony abundance declined by 44% over a 4 year period from 2006 to 2009, from a peak of approximately 8600 nesting pairs to fewer than 4800 nesting pairs. Since 2009, mortality rates have converged with pre-epizootic levels and the declines in abundance abated. However, nesting success remains below replacement level and there has been no evidence for population recovery. Female eiders typically do not recruit into the breeding population for three or more years after they hatch, yielding fresh cohorts of unexposed individuals for several years after the initial onset of disease. Disease dynamics modelling suggests this temporal lag both prolongs and amplifies the degree of population injury in when host abundance is large, but increases likelihood of epidemic fade-out in small populations.

3C3: EMERGING DISEASES

CYCLIC MASS MORTALITY OF COMMON EIDERS IN THE NORTHEASTERN UNITED STATES IS ASSOCIATED WITH A NOVEL ORTHOMYXOVIRUS

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Since 1998, cyclic mortality events in common eiders (*Somateria mollissima*), numbering in the hundreds to thousands of dead birds, have been documented along the coast of Cape Cod, Massachusetts, USA. Although longitudinal disease investigations have uncovered potential contributing factors responsible for these outbreaks, detecting a primary etiological agent has proven enigmatic. Here, we identify a novel orthomyxovirus, tentatively named Wellfleet Bay virus (WFBV), as a potential causative agent of these outbreaks. Genomic analysis of WFBV revealed that it is most closely related to members of the *Quaranjavirus* genus within the family *Orthomyxoviridae*. Similar to other members of the genus, WFBV encodes a baculovirus gp64-like glycoprotein, tentatively suggesting it is tick-transmitted in nature. Although WFBV shows low to moderate levels of sequence similarity to *Quaranfil virus* and *Johnston Atoll virus*, the original members of the *Quaranjavirus* genus, additional antigenic and genetic analyses demonstrated that it is closely related to the recently identified Cygnet River virus (CyRV) from South Australia, suggesting that WFBV and CyRV may be geographic variants of the same virus. Although the identification of WFBV in part may resolve the enigma of these mass mortality events, the details of the ecology and epidemiology of the virus remain to be determined.

3C4: EMERGING DISEASES

PATTERNS OF WELLFLEET BAY VIRUS SEROPREVALENCE IN THE COMMON EIDER

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From 1998 to the present, mortality events have been reported on a nearly annual basis in American common eiders (*Somateria mollissima dresseri*) on Cape Cod, Massachusetts. Early investigations of these events revealed consistent lesions in affected birds, indicating a shared etiology, and a novel Orthomyxovirus, tentatively named Wellfleet Bay virus (WFBV), has been isolated from multiple birds collected during these events. Concern that WFBV could adversely affect common eider population stability prompted a serologic survey to determine the prevalence, geographic distribution, seasonality, and demographic patterns of previous WFBV infection in multiple common eider populations. Antibodies against WFBV were detected using a microneutralization assay. Seroprevalences of WFBV in the American common eiders sampled were: Nova Scotia 3.5% (3/85), Maine 3.2% (33/341), Massachusetts 31.7% (46/145), Rhode Island 3.6% (5/137), and Quebec 2.7% (5/195). No antibodies against WFBV were found in two populations of the adjacent subspecies, the northern common eider (*S.m. borealis*), sampled in Nunavut, Canada and Iceland (0/96 and 0/34, respectively). Opportunistic sampling of sympatric species has identified WFBV antibodies in two herring gulls (*Larus argentatus*), two ring-billed gulls (*Larus delawarensis*), and one white-winged scoter (*Melanitta fusca*) in Massachusetts. Statistical analysis of seroprevalence by location, season, and demographic characteristics is underway. Preliminary results indicate that Massachusetts represents an epicenter of WFBV transmission, and that WFBV exposure likely is limited to the American subspecies of common eider and its sympatric species. Further investigation of Massachusetts and its role in WFBV epidemiology is warranted.

3C5: EMERGING DISEASES

AN INVESTIGATION INTO THE POTENTIAL SOURCE POPULATIONS OF COMMON EIDERS AFFECTED BY WELLFLEET BAY VIRUS THROUGH DNA COMPARISON WITH EIDER BREEDING POPULATIONS IN THE U.S. AND CANADA

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Recent mortality events of common eiders (*Somateria mollissima*) associated with the Wellfleet Bay virus (WFBV) on Cape Cod, MA, USA have led to questions regarding the geographic origin and potential population impacts (if any) of this disease on common eiders. Eiders that were previously banded in Maine, Nova Scotia and Québec have been found dead on Cape Cod, although the limited number of recoveries continues to be insufficient for identifying the source population(s) of eiders affected. Given the number of breeding common eiders associated with nearby Boston Harbor Islands has remained stable at approximately 300-500 pairs and mortality events are approximately half that number annually, is unlikely that (but currently unknown), eiders involved in the mortality events on Cape Cod are from the local population.

Common eiders are unique among sea ducks as they exhibit fine scale spatial genetic structure at both mitochondrial and nuclear markers. Thus, it may be possible to assign birds collected during the annual mortality events to breeding colonies based on their genetic signature. This study is designed to develop a multi-locus data matrix containing reference breeding colonies sampled throughout Maine, Nova Scotia, Newfoundland, and the Gulf of St. Lawrence. Under a scenario of genetic structure among breeding colonies, we are working toward probabilistically assigning common eiders involved in annual mortality events to breeding areas using the data matrix to examine the spatial distribution and proportion of local and migratory birds involved in die off events on Cape Cod.

3C6: EMERGING DISEASES

EXPERIMENTAL INOCULATION OF THE COMMON EIDER WITH WELLFLEET BAY VIRUS

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Wellfleet Bay virus (WFBV) is an Orthomyxovirus isolated from common eiders (*Somateria mollissima*) collected during recurrent epornitics in Massachusetts. Other viruses in the *Quaranjavirus* genus are tickborne, but routes of transmission have not been identified for WFBV. In the summer of 2012, three groups of eider ducklings were inoculated with WFBV by intradermal, oral, or tracheal routes. Two to three sham-inoculated birds were cohoused with each group, and a sham-inoculated control group was maintained. All birds were observed for clinical signs. Blood samples were collected at multiple time points; serologic testing was conducted using a microneutralization assay. Oropharyngeal and cloacal swabs were collected throughout the study, and birds from each group were euthanized at multiple times points. At necropsy, tissues were collected for virologic testing and histologic examination. Swabs and tissue samples were tested by virus isolation and confirmatory reverse transcription PCR (rt-PCR). Histologic examination was conducted by routine methods, and immunohistochemical staining (IHC) was applied to affected tissues. Minimal clinical disease was observed in the majority of inoculated birds. Seroconversion occurred in all inoculated groups but not in control nor in contact control birds. Histologic lesions included splenic and hepatic necrosis. Isolates of WFBV were obtained from oropharyngeal swabs, cloacal swabs, and multiple tissues collected before seven dpi. Samples collected 8-30 dpi were negative by virus isolation. Confirmatory rt-PCR and IHC results are pending. These results indicate that WFBV can be transmitted experimentally by multiple routes, although direct transmission to co-housed birds did not occur. Successful transmission via intradermal inoculation and the lack of direct transmission support but do not confirm that WFBV may be arthropod-borne. Minimal clinical disease suggests that field strains of WFBV may be more virulent than the experimental strain or additional factors may be associated with the development of more severe disease.

3C7: EMERGING DISEASES

WELLFLEET BAY VIRUS AND SEA DUCK CONSERVATION: MORE QUESTIONS THAN ANSWERS

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Recent investigations to determine the ecology and epidemiology of Wellfleet Bay virus (WFBV) have resulted in several important findings: a) a description of the novel virus, b) clinical signs and pathology associated with natural and experimental WFBV infection, c) geographic range of the virus in common eiders (*Somateria mollissima*) based on antibody prevalence, and d) seasonal movements and body condition of common eiders in the affected population. This work has given us a greater understanding of WFBV and common eiders, but has also generated many more questions than answers. Still unknown are: 1) the transmission route(s) of the virus, 2) other host species, 3) possible vectors, 4) the influence of dual infections (could this be a disease complex, role of the eider immune response), 5) the connection between the Boston Harbor Islands and Wellfleet Bay, 6) relationship to Cygnet River virus, 7) what lies behind the timing and tendency of the outbreaks to affect one sex at a time, 8) whether WFBV is signaling negative changes in sea duck health and habitats, and 9) the threshold at which common eiders will be impacted by the virus at a population scale. We will continue our investigations, as the answers to these questions will be critical in helping us to determine and manage for the impacts of WFBV on common eiders and other avian species.

3D1: POPULATION DYNAMICS

ENVIRONMENTAL CONDITIONS IN EARLY LIFE, RECRUITMENT AGE AND PERFORMANCE AT FIRST BREEDING IN COMMON GOLDENEYE FEMALES

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Environmental conditions experienced early in life may have long-term impacts on life history traits and reproductive performance. We investigated whether ambient temperature experienced during the first two weeks of life and weather severity during the first two winters effected recruitment age and relative timing of breeding in the year of recruitment in common goldeneye (*Bucephala clangula*) females. Our sample consisted of 135 female recruits hatched in a study population in central Finland between 1985 and 2011. About 56% of the recruited females bred for the first time when 2 years old (range 2-6 years). Individuals facing colder ambient temperatures during the first two weeks posthatch or more severe winter conditions during the first two winters did not recruit at an older age. For those females that recruited at the age 2 years, the first breeding was usually late relative to the population mean that year (median difference 7.5 days, range from -7 to 21 days). However, the magnitude of the delay in the timing of breeding was not affected by the climatic conditions faced by these individuals during the first two weeks posthatch or during the two winters before the first breeding attempt. Our results suggest that some sort of developmental buffering enables common goldeneye females to mitigate the impacts of harsh climatic conditions experienced early in life, at least in terms of first breeding. Negative impacts on later breeding performance, lifetime reproductive success and other life history characteristics such as longevity may still exist.

3D2: POPULATION DYNAMICS

CLIMATE –DRIVEN CHANGES IN WINTER ABUNDANCE OF A WATERBIRD OF CONSERVATION CONCERN IN RELATION TO EU PROTECTED AREAS

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Evidence is accumulating that species are responding to climate change by changing their distributions, creating debate about the effectiveness of existing networks of protected areas (PAs). As a contribution to this discussion, we here show that the centre of gravity of a wintering waterbird population of special conservation concern, the Smew (*Mergellus albellus* L.), has shifted north-eastwards along the north-west and central European flyway during 1990–2011 due to increasing winter temperatures in northern Europe. Both, Special Protection Areas for birds (SPAs) specifically classified for Smew (sSPAs) under the EU Birds Directive and the overall SPA network (oSPA, including sites classified for species other than Smew) accommodated climate-driven distribution changes in the north-eastern part of the wintering range by supporting increasing numbers of Smew in traditional and newly colonised areas and ameliorated the effect of climate change in the traditional core of the distribution, reducing the rate of decline. However, we also highlight significant gaps in the current site-safeguard network suggesting that urgent policy responses are needed. Given rapid changes in species distributions, we urge regular national and international assessments of the adequacy of the EU Natura 2000 network to ensure coherence in site safeguard networks for this and other species.

3D3: POPULATION DYNAMICS

HABITAT-SPECIFIC BREEDING POPULATION DYNAMICS OF DUCKS IN FINNISH BOREAL ZONE

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Boreal zone is the key breeding area for many European waterbirds that overwinter in the coastal and inland water ecosystems of the Western and Central Europe. Wetlands of the boreal zone can be roughly classified into two different groups: nutrient poor oligotrophic and nutrient rich eutrophic water ecosystems. It has been earlier shown that eutrophic lake specialist species have declined compared to generalists and species preferring oligotrophic lakes. However, it is not known if there are habitat-specific differences in population dynamics of the species, which occur in the both habitats. We used monitoring data of the Finnish waterbird breeding counts since 1986 to evaluate habitat-specific population trends in five generalist ducks: Eurasian Wigeon *Anas penelope*, Mallard *Anas platyrhychos*, Eurasian Teal *Anas crecca*, Tufted Duck *Aythya fuligula* and Common Goldeneye *Bucephala clangula*, which mostly overwinter in the coastal waters of West Europe. Populations did better in oligotrophic wetlands compared to eutrophic wetlands. Our findings support the idea that the waterbird populations of the eutrophic wetlands are in serious trouble. This is likely due to over-eutrophication of these ecosystems, which means that management actions should be taken to halt the loss of biodiversity. We present two bird indicators to follow the status of waterbird populations in oligotrophic and eutrophic water ecosystems in Finland.

3D4: POPULATION DYNAMICS

DYNAMICS OF WINTERING LONG-TAILED DUCKS IN THE BALTIC SEA

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The estimated numbers of the Long-tailed Duck *Clangula hyemalis* in the Baltic Sea, where the western Siberian and northern European populations overwinter, have declined by ca. 65% from 4.6 million birds in 1993–1995 to 1.6 million birds in 2007–2009, which has led to reclassifying the species in 2012 to globally threatened species in the IUCN Red List. There is an agreement that direct mortality factors such as oil spills, by-catch in fishing nets and hunting cannot fully explain the decline. Here, we study the role of environment change on the breeding grounds, the Taimyr Peninsula, Siberia, behind the decline. We have shown earlier that during the last two decades, the juvenile/adult ratio has decreased, suggesting lessening reproduction success. Probably as the consequence of global climate warming, affecting also the Arctic winter, lemming cycles (*Lemmus sibirica* and *Dicrostonyx torquatus*) have broken and the springs and summers of food shortage for lemming predators have become more frequent. The breeding success of some ground-nesting birds is connected with annual lemming cycles, because the predators shift to eggs and young during poor rodent years. On the basis of state-space population modeling on the series of spring migration counts from the Gulf of Finland and juvenile proportions in Danish wing samples of the Long-tailed Duck and Siberian lemming index, starting from 1968, we show that the lemming abundance can be used as a proxy for predation-induced breeding failures, and we suggest this is as a key population limiting factor and substantial driving force of the population decline.

3D5: POPULATION DYNAMICS

ENVIRONMENTAL INFLUENCES ON GOLDENEYE ABUNDANCE AND DISTRIBUTION AT A HYPERSALINE LAKE

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North American waterfowl winter throughout a large geographic area and the choice of wintering site has a direct impact on survival and fitness. Climatic and food variables are the most commonly cited factors influencing abundance and distribution of wintering migratory waterfowl. We conducted stratified aerial surveys over 5 winters at a northern latitude, hypersaline wintering site, Great Salt Lake (GSL), Utah, to examine the importance of this wintering area and the influence of weather and food on the density and distribution of goldeneye (common [*Bucephala clangula*] and Barrow's [*Bucephala islandica*]). Goldeneye abundance estimates ranged from 7,000 to 44,000 indicating the GSL may host, on average, up to 30% of the Pacific Flyway wintering goldeneye population. Change in density of goldeneye was most influenced by, and positively correlated with, food quantity, and salinity influenced goldeneye distribution. The GSL is an important wintering area for these sea ducks and provides abundant food for individuals that are able to survive the hypersaline conditions. This study is unique as ice cover does not occur on saline bays of the GSL therefore habitat and food availability do not change with decreasing temperatures. We suggest goldeneye endure the hypersaline conditions on the GSL to exploit the abundant food supply and remain close to primary breeding regions to optimize energetic costs associated with wintering, migrating, and breeding. Goldeneye occur in saline habitats in much of their wintering range and their ability to obtain food may be a more important factor influencing abundance than their ability to thermoregulate or osmoregulate. Our results are consistent with food limitation during winter as the density of brine fly larvae, the principle food of wintering goldeneye on the GSL, was the primary factor in wintering sea duck density.

POSTER ABSTRACTS

P1: POSTER PRESENTATION

DISTRIBUTION AND NUMBERS OF NON-BREEDING WATERBIRDS IN THE GULF OF RIGA

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The Gulf of Riga is a shallow (max 67 m) sub-basin of the brackish-water Baltic Sea, largely surrounded by land. Although several studies have carried out offshore counts of marine waterbirds in the Gulf of Riga, it has never been assessed holistically as a united ecosystem. The first joint Estonian-Latvian transect aerial surveys were carried out in 2011-2012 as cross-border cooperation between Estonia and Latvia

Field transects were chosen so that they would systematically cover the whole study area. Total length of transects was 2000 km in the Latvian part and 2200 km in the Estonian part of the Riga Gulf. Surveys on each transect were carried out every season (spring, summer and autumn and winter) using distance sampling approach.

To test relationship and build models describing relationship between species/species groups and environmental variables, a number of ecogeographical variables such as depth, availability of different bottom substrates, shipping intensity, season specific fishing effort measures and others were collected both for data collection sub-units and cells of 1-km prediction grid. The obtained GAM models allowed describing seasonal habitat preferences explaining observed distribution of waterbirds, create density distribution maps and estimate population size for analysed species and species groups.

P2: POSTER PRESENTATION

DEMOGRAPHICS AND GROSS PATHOLOGY OF DIVING DUCKS KILLED DURING TWO OIL SPILLS IN CALIFORNIA

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We examined the prevalence of grossly apparent disease, and the age and sex ratios of Surf and White-winged Scoters (*Melanitta perspicillata and M. fusca*) and Greater and Lesser Scaup (*Aythya marila and A. affinis*), killed in the 2007 *Cosco Busan* Oil Spill in San Francisco Bay, CA and the 1997 *M/V Kure* Oil Spill in Humboldt Bay, CA. In addition, we documented the prevalence of two diseases, aspergillosis and parasitism by acanthocephalan parasites, in waterfowl killed during these spills. We conducted necropsies on 288 carcasses from *Cosco Busan* and 24 from *M/V Kure*. No sex bias was detected in Surf Scoters from *Cosco Busan*, despite documented male biases at breeding sites, and no age biases were documented in the whole sample. Within male scoters, there was a bias towards juveniles. There was no sex bias in Greater Scaup from *Cosco Busan*, but there was a slight bias towards adult males compared to juvenile males. Anatomical validation sexing and aging Surf Scoters using plumage characteristics revealed major difficulties in differentiating females from juvenile males, and may result in significant inaccuracies when used as the sole technique for documenting demographics. Overall, 8% of all diving ducks examined from *Cosco Busan* exhibited putative aspergillosis fungal plaques. When birds were rehabilitated during the spill response, Greater Scaup were more likely to exhibit aspergillosis plagues than Surf Scoters (21% versus 8%). In this spill, 21% of all diving ducks were infected with acanthocephalan parasites, and Surf Scoters had a greater prevalence of infection than Greater Scaup (41% versus 7%).

P3: POSTER PRESENTATION

TRAINING TOOLS FOR AERIAL OBSERVERS

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Waterfowl are difficult to identify to species and to accurately enumerate during aerial surveys. Sea ducks are particularly challenging because some closely related species appear similar from the air; most notably eiders, scoters, mergansers, and goldeneyes. During many aerial surveys, these species are recorded only to a general species group, confounding estimates of species-specific trends or abundance. We developed photo- and video-based, as well as computer animated, training tools to aid observers in identification of waterfowl species and for estimating numbers of birds in flocks. Although identification tools were developed for North American waterfowl, many of the sea duck species also occur in Europe and Asia. Examples of both printed and video-based training materials will be available for demonstration at the conference.

P4: POSTER PRESENTATION

LESSONS LEARNED FROM THE NORTH AMERICAN SEA DUCK JOINT VENTURE

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The Sea Duck Joint Venture (SDJV) was formed in 1999 as part of the North American Waterfowl Management Plan. Since then, the SDJV has financially supported more than 90 research and monitoring projects throughout North America, and has undoubtedly accelerated the pace of learning and informed management for sea ducks. Several lessons have been learned from the SDJV experience that may be useful for a similar program that is being considered for Europe. Most important among these are: 1) designated and financially supported coordinator(s), 2) a source of funding that can be used as seed money to stimulate research, 3) a web site that provides a central point for information about sea ducks, and 4) a technical team representing diverse disciplines and a mix of research and management backgrounds that takes a broad continental perspective of sea duck conservation and management. The intent of this presentation is to stimulate discussion between North American researchers familiar with the SDJV and our European colleagues who may benefit from our experiences in North America.

P5: POSTER PRESENTATION

ANNUAL CYCLE MOVEMENTS, SITE FIDELITY, AND POPULATION DELINEATION OF BARROW'S GOLDENEYES IN WESTERN NORTH AMERICA

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We implanted Pacific Barrow's Goldeneyes (*Bucephala islandica*) with satellite transmitters during breeding, molting, and wintering periods. Our objectives were to describe migration routes, seasonal habitat affiliations, and degree of site fidelity within and across years. We will use these data to describe population structure and delineate appropriate management units. Adult males marked on breeding ponds in the Fraser Plateau of British Columbia molted over a large but annually consistent area from central Alberta to northern Northwest Territories; notably, about 30% of these males molted on Cardinal Lake, Alberta each year. Adult males and females from the Fraser Plateau and males marked during remigial molt on Cardinal Lake consistently wintered along the Pacific Coast from southern Washington to just north of Vancouver Island, which constitutes the southern portion of the species primary winter range in western North America. Hatch year birds marked on Fraser Plateau breeding areas did not travel to the coast in association with their mothers or siblings, but they ultimately overwintered in the same general region as their parents. Birds marked at wintering sites along the coasts of British Columbia and Alaska had different migration and distribution patterns and they appear to constitute largely discrete population segments throughout the annual cycle. Finally, adult birds showed high levels of site fidelity to breeding, molting, and wintering sites, and this finding has important management and conservation implications.

P6: POSTER PRESENTATION

VARIATION IN EIDERDOWN QUALITY IN RELATION TO REGIONS, CLIMATIC FACTORS AND THE CLEANING PROCESS OF THE DOWN

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Nest down of common eider (*Somateria mollissima*) has unique properties not found in other insulation materials. The collection of eiderdown mainly takes place in Iceland, Canada, Norway (including Svalbard) and Greenland. Annual world production fluctuates between four and five tons. Iceland provides approx. 70 % of the total annual world production. The eiderdown is mainly used to make duvets. Despite the marketing and the desirable insulation properties of the eiderdown, there haven't been done much research on different parameters for eiderdown quality. However, in 2013 we found some interesting differences in three measurements of quality: fill-power (in^3/oz), thermal resistance (R_{ct}) and cohesion in eiderdown samples for different countries.

These first results also indicated that fill power and thermal resistance are positively correlated. We also found negative correlations between the fill-power/thermal resistance and the cohesion power. The question is whether the fill-power or thermal resistance is related to variations between regions or if it's related to different cleaning procedures of the down (hand-cleaned vs. machine-cleaned, type of rinsing, etc).

This project will take the down-testing further, fine-tuning the testing of down samples. We will develop methods further and build equipment for testing the different quality parameters in eiderdown. The project aims to collect down samples (down from 10 nests) from 10-12 eider colonies in Iceland, and also down samples from Norway, Svalbard, Greenland, the Faroe Islands, Denmark, Canada and Russia.

P7: POSTER PRESENTATION

THE PROMISE OF COMMUNITY-BASED MONITORING: OPPORTUNITIES TO MEASURE SEADUCK TRENDS IN ARCTIC CANADA

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Inuit have practiced Community-Based Monitoring (CBM) for generations. Recently, CBM has emerged as a focused approach by governments, industries, and scientists to tackle wildlife management and development issues in northern Canada. CBM is defined and used differently by various organizations. It has the potential to empower and advance the cooperative wildlife management regimes established by settled land claims agreements because it draws on Inuit knowledge and skills, and generates information that can be used by communities, regions, territories, and Canada as a whole.

This poster will discuss opportunities through CBM that can promote scientific and traditional dialogue and investigation about climate change, coastal wetlands, and sea ducks. The promise of CBM has the potential to: 1) enable enhanced scientific and traditional knowledge; 2) create a baseline profile of sea duck population abundance and contaminant levels; and 3) help understand climate change impacts on waterfowl and their habitats. CBM is critical not only to maintain the rich ecosystems for waterfowl health, but also to maintain the important role waterfowl play in the culture, tradition, and food resources of the region.

These ideas will be presented through an understanding of how CBM is taking hold spatially in Canada's Arctic. The Inuvialuit Settlement Region's Community Based Monitoring Program has created a networked approach to empowering locally driven research; while the west Kitikmeot and Manitoba coastline of Hudson Bay are emerging as areas where CBM could take root in the future. CBM can yield critical trend data pertaining to feeding, breeding, moulting, and brood rearing habitat for sea ducks. Initial discussions have suggested declines in eider, scoter, long-tailed duck, and brant, while snow and Ross' geese have significantly expanded populations. This information will be essential in creating Arctic specific management and policy framework during a time of rapid environmental change.

P8: POSTER PRESENTATION

MANAGING HUNTED POPULATIONS THROUGH SEX-SPECIFIC SEASON LENGTHS: A CASE OF THE COMMON EIDER IN THE BALTIC-WADDEN SEA FLYWAY POPULATION

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Management of harvested wildlife populations aims to protect species from overexploitation and ultimately extinction, by regulating exploitation towards achievable sustainable levels. However, assessments of impact and sustainability of implemented management actions on a population level are scarce. This study assesses effects of changes in hunting season length imposed on the Baltic-Wadden Sea Common Eider *Somateria mollissima* population, including differential restriction on hunting of the sexes. The potential impact of these changes on the population was assessed by simple demographic matrix projections. Since the early 1990s, this population has declined at c. 6.3% per annum, and the male:female ratio amongst shot birds has fallen from 3:2 to about 4:1. Concerns in Denmark regarding the conservation status and sustainability of contemporary levels of exploitation resulted in shortening the open season by 44 and 46 days for females and 13 and 15 days for males from the hunting seasons 2004/05 and 2011/12 onwards respectively. These reduced the kill of adult females by 82%, adult males by 31%, juvenile females by 58% and juvenile males by 55%. The observed reduction in the kill of adult females following both changes in 2004/05 and 2011/12 matched the expected changes based on the seasonal distribution of sexes in the bag prior to the change. Hunters compensated to varying degrees post 2004/05 by killing more adult males, but shot markedly fewer juvenile birds than expected. Demographic modelling of the female population showed that the effects of the reduced hunting would correspond to an increase in the annual population growth rate from the previous -6.3% to -3.6% (post 2004) and -1.6% (post 2011). The model also predicted that a full ban on hunting female eiders (adults and juveniles) would lead to a positive population growth rate of 0.7%. Taking into account the conservative model estimates and natural variations in annual breeding success, the implemented changes in sex-specific regulation of hunting may potentially be an effective management tool to halt the decline of the Baltic-Wadden Sea eider population, potentially rendering such levels of hunting sustainable under prevailing conditions. Combining annual surveys, bag statistics, age ratios and simple modelling proved effective to guide management actions towards sustainable exploitation of this population, and may likewise prove supportive to future schemes of more strict adaptive management.

P9: POSTER PRESENTATION

QUANTIFICATION ON IMMUNOGLOBULIN G LEVELS IN EIDER EGG YOLK

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Steller's (*Polysticta stelleri*) and spectacled eider (*Somateria fischeri*) populations have declined significantly, and spectacled eiders and the Alaska breeding Steller's eiders are listed as threatened under the Endangered Species Act. Newly hatched birds are especially vulnerable to infection because their immune system is not fully developed and they depend on maternal immunoglobulins (Ig) transferred from the yolk. Determining the susceptibility level of eider ducklings to disease is important to conservation efforts for both species; therefore, maternal investment of IgG in yolk was investigated. During the breeding seasons of 2007-2013, yolk samples were collected from eggs laid by captive spectacled and Steller's eiders at the Alaska SeaLife Center. This project had three objectives: 1) measure the IgG content of the eider egg yolk, 2) determine if IgG levels varied within a hen's clutch, and 3) determine if average IgG levels of hen's eggs varied between years. We hypothesized that the first egg in a hen's clutch would contain the highest levels of IgG and that levels would decline between early and later laid eggs. IgG levels within a clutch were variable and not related to the order within the clutch. The average IgG content of yolk typically ranged between 0.2 and 0.4 mg/ml, and the levels varied between years for most hens. There are few publications on the maternal transfer of IgG in sea ducks and this project is the first to establish IgG baselines in eggs from eider hens maintained in a relatively controlled environment.

P10: POSTER PRESENTATION

SURVIVAL ESTIMATES FOR SURF AND WHITE-WINGED SCOTERS MOLTING ON THE SALISH SEA IN WASHINGTON STATE, USA, AND BRITISH COLUMBIA, CANADA

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The Sea Duck Joint Venture (SDJV) 2013-16 Implementation Plan lists a priority for conducting an assessment of the harvest potential of scoters, starting with compilation of relevant demographic information. Annual adult survival is a key demographic parameter to include in this assessment, and has a direct relation to annual harvest. Prior to our project, large scale marking projects had not been completed in western North America to provide the necessary recovery data to evaluate annual survival rates of scoters. The goal of our study was to evaluate the feasibility of marking scoters during molt to estimate survival. We used floating gill nets to capture 2,402 Surf Scoters (*Melanitta perspicillata*) and 659 White-winged Scoters (*M. fusca*) during the summers of 2007, 2008, and 2009 on the Salish Sea in Washington State (WA), USA, and British Columbia (BC), Canada. Capture locations included Boundary Bay and the Fraser River Delta in BC and Forbes Point and Padilla Bay in WA. All birds were marked with USGS metal tarsal bands, identified to species and sex, and aged using bursal depth measurements. Based on tarsal band recapture and recovery information through April 2014, the mean annual survival probability for adult surf scoters was 0.57 (95% CI: 0.46 – 0.67) with male survival of 0.53 (0.37 – 0.69) and female survival of 0.59 (0.45 – 0.71). For white-winged scoters, mean annual adult survival probability was 0.69 (0.32 - 0.91) with male survival of 0.62 (0.28 – 0.87) and female survival of 0.90 (0.39 – 0.99). This study demonstrated that it is feasible to improve our estimates of survival for scoters through molt banding. This information will be a valuable addition to ongoing SDJV modeling efforts focused on determining the harvest potential of North American sea duck stocks, and should inform planning efforts to implement a flyway-scale molt banding project.

P11: POSTER PRESENTATION

INFLUENCE OF MARICULURE ON WINTER SEA DUCK DISTRIBUTION AND ABUNDANCE IN PUGET SOUND, WASHINGTON STATE

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Shellfish mariculture is a valuable and expanding industry in Washington State, in particular in southern Puget Sound. Concurrently, long-term monitoring efforts throughout Puget Sound reveal varying levels of decline in a significant number of over-wintering sea duck species. However, reasons for these declines are not well understood and the need for winter habitat assessments throughout Puget Sound is evident. The overlapping distributions of mariculture industry and marine bird use in nearshore environments identify a high probability of interaction. This study identified and evaluated associations of four sea duck species/groups, Bufflehead (*Bucephala albeola*), Scoters (*Melanitta perspicillata, M. fusca, and M. americana*) , Goldeneye (*B. islandica and B. clangula*) and Mergansers (*Lophodytes cucullatus, Mergus merganser, and M. serrator*), in relation to a changing mariculture landscape. Our findings illustrate that shellfish mariculture in South Puget Sound is both expanding and intensifying; expanding almost 3 study sites annually by medium and large acreage operations and growing at an annual rate of 127 acres. Our results suggest that sea ducks exhibit species or group-specific responses to mariculture. Evaluating the location and intensity of mariculture operations in the South Puget Sound, Bufflehead and Scoter species abundances were positively associated with the industry to different degrees. Only Bufflehead, however, maintained significant positive associations over time. Alternatively, Goldeneye and Merganser species abundances demonstrated negative associations with shellfish mariculture, however responses varied by intensity of culture operations. The influence of shellfish mariculture on winter sea duck populations is clear, however variability by species demonstrate that while the industry may coexist or benefit some, it can prove deleterious for others. This study highlights the complexity in defining spatially and temporally dynamic sea duck-mariculture relations. We recommend continued research to better understand species-specific habitat use and availability in relation to mariculture development and activity of winter sea duck populations.

P12: POSTER PRESENTATION

PRE-BREEDING ENERGETIC MANAGEMENT IN AN ARCTIC-BREEDING SEADUCK

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Effective acquisition and management of energetics prior to reproduction should strongly influence fitness-related reproductive decisions (timing of breeding and reproductive investment). However, because capturing individuals before the decision to reproduce is so difficult, and because capture often leads to the abandonment of reproduction, we know little about variation in the underlying mechanisms mediating these key life-history decisions. Here we examine key physiological parameters predicted to influence energetic management by sampling individuals of a carefully-monitored, free-living colony of a seasonally-breeding seaduck (Arctic-breeding common eiders – *Somateria mollissima*) up to three weeks prior to reproduction. We focused on baseline plasma Glucocorticoids (i.e., corticosterone; CORT), very-low density lipoprotein (VLDL) and vitellogenin (VTG) for their respective roles in driving daily and annual energetic balance, rate of condition gain (fattening) and follicular investment. We found that baseline CORT increased significantly from arrival to the initiation of reproductive investment (period of rapid follicular growth - RFG), an indication that this hormone may stimulate foraging behaviour to facilitate both lipid deposition in females as well as investment in egg production. In support of this, we found that plasma VLDL increased throughout the pre-breeding period, peaking as predicted during RFG. Female eiders exhibited unprecedentedly high levels of plasma VTG well before their theoretical RFG period, a potential novel strategy for pre-emptively depositing available protein stores into follicles while females are simultaneously fattening. This study provides some of the first data available examining the temporal dynamics and interaction of the energetic mechanisms driving variation in reproductive decisions and success in diving seaducks.

P13: POSTER PRESENTATION

EFFECTS OF DANISH ACTION PLAN ON REDUCING SHOTGUN WOUNDING OF COMMON EIDER 1997-2014

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Hunting using shotguns inevitably causes non-lethal wounding of game that are hit by pellets but not retrieved by the hunter. To assess the extent of wounding amongst legally hunted Eiders in Denmark, X-ray investigations undertaken in the 1990's detected shotgun pellets among 34% adult females and 35% adult males. It was estimated that at that time, for every Eider that was shot and retrieved, another was wounded.

To reduce such wounding, a national action plan was implemented in Denmark in 1997. Since then, hunters have been subject to information campaigns from both the Ministry of Environment and the Hunting Association to improve their hunting techniques to minimize crippling.

The objective of this investigation was to follow up on the action plan by monitoring the number of Eiders with shotgun pellets 1998-2014 to see if there have been acceptable changes in infliction rates.

Male and female Eiders were collected using rifle or #BB shotgun pellets (4.6 mm). In addition, females were collected on the nests in the breeding period. #BB pellets were easily distinguished from ordinary (legal) shotgun pellets in X-ray images.

Overall, wounding has been reduced by more than 75% in males and 100% in females during 1997-2014. The latest data collected in 2013-2014 showed that percentages of Eiders with inflicted shotgun pellets were 12% and 8% for 109 males and 74 females, respectively.

Even though Eiders are still inflicted with shotgun pellets in 2014, the reduction since 1997 is statistically significant for both males and females. Therefore, the results are taken to indicate that the Danish action plan has had a positive impact on the wounding of Eiders.

P14: POSTER PRESENTATION

EXPLORING THE CAUSES FOR A DECLINE IN COMMON EIDERS ON THE FINNISH COAST USING VITAL RATES AND STOCHASTIC LIFE TABLE RESPONSE EXPERIMENT ANALYSIS

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Common eiders (*Somateria mollissima*) are currently rapidly declining in the northern Baltic Sea. The decline observed on the coast of Finland started earlier in a marginal population in the Gulf of Finland, and more recently in the core breeding area. On the range margin, the decline has been slower, and exceedingly fast in the core area. We explored the population growth rates of the common eider with a female-based, age-structured matrix models at two breeding sites, one in the Gulf of Finland (Söderskär) and one closer to the core breeding area (Tvärminne). We further examined the Söderskär population prior to the decline. From both sites data on female survival and production of fledglings were available. We conducted stochastic life table response experiment (SLTRE) analyses to quantify the contributions of vital rates between study sites (Tvärminne versus. Söderskär) and study periods (Söderskär past vs. present).The stochastic growth rates (log λ_s) were clearly different between the data sets used. A reduction in mean fecundity was by far the most important factor differentiating the current and past Söderskär population, which the SLTRE analysis confirmed. Our SLTRE analysis showed that the observed difference in growth rates between Söderskär (present) and Tvärminne was primarily due to reduced survival of adult and only secondarily to reduced fecundity. At Tvärminne, the decline was much more rapid than at Söderskär due to high female mortality. At Tvärminne, mitigating high annual mortality of females would be the primary target for conservation management, while at Söderskär improving duckling survival might help to reverse the decline.

P15: POSTER PRESENTATION

POPULATION ECOLOGY OF LONG-TAILED DUCKS AT KARRAK LAKE, NUNAVUT

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We estimated several vital rates of Long-tailed Ducks nesting on islands of Karrak Lake, Nunavut (67º 14' N, 100º 15' W) during 1998-2013. We found 14-62 nests annually, for which nest survival varied by year (from 0.14 to 0.90), but on average was 0.30. We used annual nest success and the number of nests found to estimate the number of nests on the study area which averaged 48, but ranged annually from 18 to 96. There did not appear to be any trend in numbers over time. As well, we captured and individually marked 84 nesting females. We used these capture histories in Pradel models implemented in Program Mark to estimate apparent survival (ϕ), capture probability (p) and number of new female recruits per adult female, i.e. recruitment rate, (f). We also calculated the derived estimate of the annual rate of population change (i.e., $\lambda = \phi + f$). The best model was {ϕ(.), p(t), f(.)} by 2.74 AIC units. Annual apparent survival was 0.85 (95% CL: 0.76 – 0.92). Capture probability ranged from 0.07 to 0.28, and mean recruitment rate was estimated to be 0.12 (95% CL: 0.06 – 0.21). Thus, mean annual rate of population change was estimated as 0.98 (95%CL: 0.90 – 1.05), suggesting population stability. This is in marked contrast to the population growth exhibited by King Eiders on the same study area, which increased from 180 to over 300 nests over the same period.

P16: POSTER PRESENTATION

SITE FIDELITY OF SPECTACLED EIDER IN CHAUN-DELTA, WESTERN CHUKOTKA, RUSSIA

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Demography of Spectacled eider is unstudied in Russia breeding ground even taking into account the Russian breeding unit is the largest and of key importance for the species productivity and recruitment. We investigated adult female side fidelity on Ayopechan Island Chaun-Delta, in 2002-2013. In general field methods were according to Ayopechan Island Field protocol (v.2010), a slightly modified from Kigigak Island Field protocol, Yukon-Kuskokwim Delta, AK. We set up 52 square nest searchplots (1 km2 each) in 2003 and we reduced the number of plots in use to 40 by 2007 by elimination of plots unsuitable for Spectacled eider nesting. At least 40 plots were in use annually. All nests were located on each plot and nests were revisited in 10-day intervals; GPS coordinate was taken for each nest. We captured females at their nests 0 to 5 days prior to predicted hatch date with bow-trap or with small net attached to the rope 25 m long. A total of 132 females were marked individually in 2002-2012. Forty two females showed recaptures in the years following capture year. We have investigated and measured the distance between nests of the same individual in different years (in Google Earth image). Spectacled eider demonstrated two types of side fidelity: close site fidelity to the environs of previous year nest and distant site fidelity to Ayopechan Island in general. In the first case distance of movement (distance between two nests of the same female) was less than 500 m, and in the second case the distance was over 1 km. No intermediate strategy was reported during our study. Distant site fidelity was typical after unsuccessful nesting, while all successful females demonstrated close site fidelity in following year.

P17: POSTER PRESENTATION

PREVALENCE AND POTENTIAL SOURCES OF ELEVATED STRONTIUM IN WATERFOWL EGGS IN INTERIOR ALASKA

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Several studies have implicated strontium as a contaminant of concern in avian population declines. Previous work on contaminants in eggs of waterfowl breeding in Interior Alaska found an inverse relationship between egg strontium concentrations and eggshell thickness and measurable levels of radioactive strontium in egg contents and shell. Strontium is a naturally occurring alkaline earth metal with no known biological function in birds. It is chemically similar to calcium, which can lead to substitution for calcium in tissues, affecting physiological processes and mechanical characteristics. Radioactive strontium isotopes are only produced by nuclear fission. We measured strontium concentrations in the eggs of five species of waterfowl in Interior Alaska at three locations. To determine potential sources, we compared eggshell chemistry with food and water chemistry at breeding sites. We also examined eggshell carbon and nitrogen isotope ratios to assess if trophic level and/or nutrient allocation strategy affected eggshell strontium concentrations. Preliminary data suggests eggshell strontium varied by species, site, and year and was related to local water chemistry and the nutritional strategy of the hen during egg laying. These results will be useful to managers in evaluating strontium as a potential contaminant affecting sea ducks.

P18: POSTER PRESENTATION

MANAGING WETLANDS FOR WATERFOWL – URGE OF AID FOR DIVING DUCKS AND PISCIVORES

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The value of ecosystem services provided by wetlands and birds has been realized quite recently. In contrast half of the world's wetlands have been lost in the past century while ones remaining have degraded. In Finland declining trends of waterbirds favoring eutrophic waters (including many diving ducks) are suggested to result from general degradation of habitat quality. This is supported by the conservation values of nationally important wetlands which have declined less on sites where notable management has taken place. Yet only little evidence based knowledge is available on the best and cost-efficient management actions to improve quality of natural wetland for waterbirds. In South Finland 18 wetlands were managed in years 2004–2012 to enhance the conditions of migrating and breeding birds. Actions were to reduce vegetation by cutting, cattle grazing and dredging. To evaluate the management actions to different bird guilds we used linear mixed models. Every guild benefitted on some of the actions whereas only piscivores showed negative effects. The total costs revealed overall actions to be favorable for dabbling ducks, geese, black-headed gull and especially waders whereas piscivores and diving ducks showed negative or no effects. Separate analysis on endangered species revealed that not only the common species were to benefit from the management actions. Only cattle grazing increased the numbers of endangered species and in general seemed to show best results. Results indicate that these management actions couldn't enhance conditions for diving ducks and piscivores and therefore ways to improve them would be needed. Results suggest that the management should be sustained as otherwise the achieved results will be lost. We highlight the importance of planning the actions of management in a way that the effects could be properly assessed and provide evidence based information on the best local management methods.

P19: POSTER PRESENTATION

RESULTS FROM OVER 30 YEARS OF MONITORING OF WINTERING SEA DUCKS IN NORWAY

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Since 1980, wintering populations of sea ducks have been monitored in 10 study areas, from 58 ºN to 70 ºN, along the Norwegian coast. Population trends for the different species often differed along the latitudinal gradient covered, and on long- (whole study period) and short- (last 10 years) time scales. On a national scale, wintering populations of long-tailed ducks (*Clangula hyemalis*), common eiders (*Somateria mollissima*) and steller's eiders (Polystica stelleri) decreased, whereas the wintering populations of common and velvet scoters (*Melanitta nigra* and *M. fusca*) were stable. For long-tailed ducks and common eiders the decrease was most pronounced along the coast from Central Norway to Lofoten. For the common eider this decrease is also reflected in the development of the breeding population. This study raises concern for the wintering populations of some sea ducks.

P20: POSTER PRESENTATION

A COMPARISON OF HEALTH AND BEHAVIORAL EFFECTS OF THREE EXTERNAL TRANSMITTER ATTACHMENT TECHNIQUES ON SURF SCOTERS

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As the question attempting to be answered by telemetry studies changes from one of migration routes, breeding and wintering areas to fine scale habitat utilization, implantable transmitters are proving inadequate. With sparse temporal data, low precision locations, and high mortality rates, implantable transmitters are less suitable than GPS transmitters for answering questions at a fine scale level. Based on historical findings, sea ducks are thought to be too sensitive to the effects of external transmitters, however, very few studies have recently examined the question in light of the rapidly changing technologies. We tested three different methods of attaching solar-powered GPS transmitters on surf scoters (*Melanitta perspicillata*). Treatments were sutured transmitters (n=3), Teflon harnesses (n=5) and silicon harnesses (n=4). Weights, hematology and serum chemistry analysis, behavioral time budgets and dive performance were recorded and compared across the three treatments. Hematology parameters measured were PCV, TS, RBC, and H/E counts, while serum chemistry results that proved useful were uric acid, AST, total protein, and creatine kinase. PCV, RBC, uric acid,total protein, and H/E ratio all showed significant effects related to transmitter attachment method. Of these, the H/E ratio is the only test which was significantly impacted by one treatment more than another. The suture method had higher H/E ratios than both the silicon and Teflon methods. All treatments experienced significant weight-loss, however no one treatment caused more than another. Time budgets were significantly affected by the Teflon treatment. Dive data analysis is in progress. We recommend further investigation into the effects of the silicon harnesses, such as field deployment and long term testing, as those subjects experienced the lowest occurrence of ill effects.

P21: POSTER PRESENTATION

A COMPARISON OF MERCURY CONCENTRATIONS IN COMMON EIDERS AND PREY ITEMS FROM THE NORTHEASTERN UNITED STATES

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Mercury (Hg) is a persistent contaminant, and readily available to most fish and wildlife through atmospheric deposition and localized industrial point sources. Methylmercury, the organic and highly toxic form of mercury, is bio-magnified through marine and freshwater food chains and at certain levels can be harmful to wildlife. Determining Hg concentrations in wildlife by analysis of whole blood is important in understanding contaminant accumulation through consumption of local food sources. Mercury accumulated over time in long-lived species, such as the Common Eider (*Somateria mollissima*), can be an added physiological stressor and impact the overall health of an individual bird or population. We collected and analyzed blood samples from eiders captured in Maine, Massachusetts, and Rhode Island between 2009 and 2014. In total, samples from 160 eiders were analyzed and the results were compared with previously published literature from across North America. Blue mussels and periwinkle snails were collected and analyzed from capture locations in Maine and Massachusetts to explore predator/prey contaminant level relationships. Eiders sampled in Plum Island Sound, MA contained significantly higher Hg levels than those sampled in all other locations, and higher than any blood mercury concentrations reported for eiders in published literature. Blue mussels collected in Boston Harbor were significantly higher in Hg than those collected in both Maine and Plum Island Sound. Future studies should focus on identifying key biomarkers and effect level thresholds to help quantify potential physiological and reproductive effects of mercury in eiders and other sea ducks.

P22: POSTER PRESENTATION

A COLLABORATIVE INVESTIGATION OF AN EMERGING DISEASE ISSUE IN THE NORTHEASTERN US: WELLFLEET BAY VIRUS

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In Massachusetts, multi-agency collaborative wildlife disease investigation involving common eiders (*Somateria mollissima*) has been underway for several years. Die-offs of these sea ducks have been occurring annually on Cape Cod beaches since at least 2006, and have affected thousands of birds. The mortality events are taking place approximately 20 miles from an important common eider overwintering area in Nantucket sound. The morbidity and mortalities have been occurring on a publicly accessed National Seashore, creating concern among its visitors.

In 2010, the multi-agency investigation discovered a new virus, tentatively named Wellfleet Bay Virus, after the location where it was first detected. Funding from the US Fish and Wildlife Service's Avian Health and Disease Program has thus far enabled the collection of several thousand biological samples, hundreds of necropsies, viral transmission studies, genetics studies, and a satellite telemetry study of the affected common eider population. More than eighteen agencies/institutions have taken part in aiding this investigation to understand the potential impacts of this virus and implications for common eider management decisions. This on-going wildlife disease investigation is a model for interagency collaboration.

P23: POSTER PRESENTATION

MULTI-SPECIES ASSESSMENT OF TRACE ELEMENT BURDENS IN ARCTIC SEA DUCKS

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Trace elements have been suggested as causes of decline in many arctic-breeding sea ducks, but geographic and dietary sources are poorly known for many elements. Trace element burdens in sea ducks often exceed those in other waterfowl, and some levels may harm health or reproduction. We sampled blood and livers from common eiders (*Somateria mollissima*), king eiders (*S. spectabilis*), spectacled eiders (*S. fischeri*), Steller's eiders (*Polysticta stelleri*), and long-tailed ducks (*Clangula hyemalis*) from May to November 2000 to 2012 at multiple sites across Alaska's North Slope. Samples were analyzed for Cd, Cu, Hg, Pb, and Se by inductively-coupled mass spectrometry or atomic absorption (Hg only). Spectacled eiders had the highest levels of some elements (e.g., Cd and Cu); in liver, Cu was much higher (mean 2648 ppm) than published values in free-living waterfowl. However, Cu in blood of spectacled eiders was low and did not differ from other species. Pb in liver was highest in juvenile Steller's eiders, at levels suggested to have caused historic decline of spectacled eiders; however, adult king eiders had the highest levels of blood Pb. Levels of Hg in both liver and blood were highest in adult Steller's eiders. Se was highest in adult spectacled eiders but did not differ among the other three species; juveniles of all species were lower than adults. Element levels in liver varied between adult and hatch-year birds of all species, and in blood of spectacled eiders (no blood was collected from young of other species). Cross-species comparisons of wintering and staging areas, diets, and physiology of different age classes helps to explain observed variation in trace element concentrations. High Cu in spectacled eiders may be from biomagnification in marine habitats. Future research will emphasize comparisons of trace element concentrations to health metrics and geospatial correlates in nesting sea ducks.

P24: POSTER PRESENTATION

EFFECTS OF HEMOLYSIS ON COMMON EIDER PLASMA BIOCHEMISTRY

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Plasma biochemistries are routinely evaluated in avian research to assess disease, nutritional status, and diet. These data can yield important biological information, although sample contamination can significantly alter results. This can occur in field studies when releases of cellular contents from lysed blood cells contaminate plasma. Enzyme concentrations and stable isotope ratios are often different between cells and plasma; therefore, hemolysis can affect the validity of data and subsequent interpretations. To evaluate this in sea ducks, we collected blood from Pacific common eiders (*Somateria mollissima v-nigra)* nesting on Beaufort Sea barrier islands, separated red blood cells from plasma shortly after collection, and froze samples in the field. In the lab, we treated plasma samples with aliquots from serial dilutions of hemolyzed blood from frozen blood samples. We then measured enzymes and carbon and nitrogen stable isotope ratios in baseline and treated samples to assess the effects of increasing levels of contamination. Results from this project will allow researchers to assess the effects of hemolysis on biomarker values.

P25: POSTER PRESENTATION

SURGICAL AND HUSBANDRY TECHNIQUES FOR SEA DUCKS AND DIVERS MARKED WITH IMPLANTABLE TRANSMITTERS: EXAMPLE OF SURGERIESS PERFORMED IN LITHUANIA

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We used satellite telemetry to investigate movements of Velvet Scoters, Red-throated Divers and Long-tailed Ducks during the wintering period on the Lithuanian coast of the Baltic Sea. The diving birds were captured on wintering grounds using the night lighting technique. The surgery procedure was adopted from veterinarians at the USGS-Patuxent Wildlife Research Center. PTT-100 transmitters manufactured by Microwave Telemetry were surgically implanted into the bird's abdominal cavity to right abdominal air sac place. Isoflurane gas were used for general anesthesia for both induction and maintenance. In some cases diving birds were additionally premedicated. Two types of transmitters dressed with nylon mesh were implanted: larger ones weighed 46 g and smaller 31 g. The transmitter's 20 cm antenna exited the skin laterally to the sacral vertebrae. After the surgeries birds were spritzed analgesics and antibiotics to the incision place. Also they were injected with fluids, carefully washed with water and left for preening. The surgeries lasted about 30 minutes; duration for recovery was approximately 1 hour in room temperature. The next 3-7 hours birds were kept at a temperature of +1-(-4) °C. In total after 6-7 hours after surgery birds were force fed with small fish and released close to the capture site. In 2012-2013 transmitters were implanted to 20 birds, 14 of them survived longer than 1 month, 3 birds survived about 10 days, and 3 birds produced no signals. The seabirds were successfully tracked for over 6 months from the wintering areas to the breeding grounds. Higher survival rate was recorded for birds with better body condition, force feeding and antibiotic treatment.

P26: POSTER PRESENTATION

THE ROLE OF WINTERING SEABIRDS IN THE COASTAL FOOD WEB: ECOPATH MODEL AND TRIPLE STABLE ISOTOPE APPROACH

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Wintering seabirds occupy an important role in a marine food web. However, estimation of their role in the marine food web remains problematic. Inaccessibility of offshore habitats, difficulties applying conventional methods, and need of nondestructive research methods for seabird encourage use of alternative methods. Few such tools, mass-balance ecosystem models and stable isotope analysis are increasingly applied in marine ecosystems.
We developed a food web model using the ECOPATH software to estimate the trophic interactions among 40 functional groups, including invertebrates, fish and seabirds for transitional Lithuanian coastal zone in the SE Baltic Sea. This allowed us to characterize the role of wintering piscivorous seabirds and benthivorous sea ducks by estimating their trophic position, prey overlap, mixed trophic impact in the ecosystem. Moreover we applied stable isotope analysis to identify the energy sources for wintering Velvet Scoter (*Melanitta fusca*), Long-tailed Duck (*Clangula hyemalis*), piscivorous Red-throated Diver (*Gavia stellata*), Black-throated Diver (*Gavia arctica*), Great Crested Grebe (*Podiceps cristatus*), Common Guillemot (*Uria aalge*), and Razorbill (*Alca torda*). Stable isotope ratios of carbon, nitrogen and sulfur ($\delta^{13}C$, $\delta^{15}N$ and $\delta^{34}S$) were measured in blood samples of captured alive seabirds and samples of common fish and benthic invertebrates. The trophic niches of the wintering seabirds were estimated and applicability of the triple-isotope analysis discussed.

P27: POSTER PRESENTATION

LINKAGE OF THE KING EIDER POULATION IN NORTHEAST GREENLAND: MIGRATION, MOULT AND DISCOVERY OF A NEW OFFSHORE WINTERING AREA AT SPITSBERGENBANKEN

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In late July 2009, two female king eiders were caught on the breeding grounds in Myggbukta, Northeast Greenland and equipped with satellite transmitters. Both individuals were tracked for approximately two years. The birds remained in the Myggbukta area until the onset of the autumn migration in the beginning of August (median day of departure 9 August, range 2 August – 15 August). Both individuals moved directly to the southwest coast of Spitsbergen where they apparently moulted within known moulting areas of the Svalbard breeding population. They spent the autumn from approximately 12 August – 13 November along the southwest coast of Spitsbergen, before moving to the shallow offshore Spitsbergenbanken in the Barents Sea and the coast of Bjørnøya (Bear Island) for the winter (median dates 13 November - 6 April). In spring, the king eiders returned to the southwest coast of Spitsbergen (median arrival 6 April) where they stayed for some time before returning on the spring migration to Greenland.

During a ship-based survey in the offshore winter location at Spitsbergenbanken in April 2013, a previously unknown wintering ground with approximately 10.000 king eiders was discovered. The birds were concentrated in a partly ice-covered area 79 km from shore and of about 20 m depth. The number of king eiders indicated that Spitsbergenbanken is a wintering area for both the East Greenland and the Svalbard breeding populations. The discovery has important conservation implications due to the expanding petroleum and shipping activity in the Barents Sea.

P27.5: POSTER PRESENTATION

INCREASING IMPORTANCE OF INLAND WINTERING AREAS FOR THREE SEADUCK SPECIES WITH DIFFERENT TREND IN NUMBERS OF A FLYWAY POPULATION

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The numbers of Common Goldeneye, Goosander and Smew was found increasing on the long-term scale in the Czech Republic between 1966 and 2013. Simultaneously, these three species show different trend of the respective European flyway population with stable numbers of Goldeneyes, decreasing Goosanders and increasing Smews. In aim to consider possible differences in sensitivity of the species to variable climatic conditions, we analysed the effect of December and January temperature on both numbers and adult sex ratio (ASR) of individual species using long-term (1966-2013) International Waterbird Census (IWC) data. Wintering numbers of all species are significantly negatively correlated with January temperature on Baltic coast. Therefore, colder winters cause the movement of individuals from the Baltic coast. We found out that December temperature preceding IWC count affected adult sex ratio only in Goosander with increasing proportion of females in colder December while the ASR of Common Goldeneye and Smew was not affected by temperature. Long-term increase of males was found only in Goosander. Goosanders show increasing numbers in the Czech Republic and decreasing numbers of the flyway population and therefore there are likely range changes. Moreover, population decline is close connected with lower survival of females and following increase of male-skewed ASR in the population. In addition, we found out the differences in preference of wetland type. Common Mergansers use mostly rivers while Common Goldeneyes use similarly rivers and reservoirs. Smew was found most abundant in reservoirs.

P28: POSTER PRESENTATION

UPDATE ON SURGERY TECHNIQUES FOR IMPLANT SURGERY OF SATELLITE TRANSMITTERS IN SEADUCKS

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Since 1996, transmitters with percutaneous antennas have been surgically implanted in seaducks and diving ducks in general. Techniques have evolved to improve the comfort and survival of the seaduck patients. Nylon mesh is hand-stitched around the transmitter package to enable veterinary surgeons to anchor the transmitter in the coelomic cavity of the seaducks. In testing various agents to improve visualization of the surgery site without removing feathers, we have found that all agents, whether mechanical (various types of tape products) or chemical (chlorhexidine, alcohol, surgical jelly) cause some degree of subsequent feather wetting as compared to control seaducks in tests with captive birds. A botanical face-mask product tested caused the least amount of feather wetting compared to the control ducks. Analgesic and tranquilizing medications have been used to improve patient comfort and increase the survival post-surgery, and can help reduce the levels of anesthetic agent (isoflurane) needed to maintain a surgical plane of anesthesia. (Mention of specific products does not imply US Government endorsement.)

P29: POSTER PRESENTATION

LOOKING FOR WELLFLEET BAY VIRUS IN COMMON EIDER: CLINICAL PATHOLOGY STUDIES

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Wellfleet Bay virus (WFBV) has been identified as causing periodic winter mortality events in common eider (*Somateria mollissima*) around Cape Cod, Massachusetts, USA. WFBV appears to be deadly for common eider, causing wintering mortality of hundreds to thousands of eider. Currently WFBV mortality is limited to one locality and, but we need to understand the epidemiology of this virus to determine possible impacts to eider populations. Over the past four years, we have been able to perform clinical pathology studies of common eider wintering on Narragansett Bay, Rhode Island, USA, and from a different population breeding on the islands in Boston Harbor, Massachusetts, USA. In Narragansett Bay (2011) the incidence of antibody positive common eider was 4.6% (3 out of 65 eider sampled); in Massachusetts (2012 & 2013), antibody prevalence was 31.7% (46/145). Clinical pathology results for these two localities, including complete blood counts and serum chemistries, showed no significant differences between common eider with positive antibody titers to WFBV and those with no antibody titers to WFBV.

P30: POSTER PRESENTATION

DO ANOTHROPOGENIC ACTIVITES INFLUENCE THE DISTRIBUTION OF MOULTING SEADUCKS?

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Sea ducks (including mergansers) moult their flight feathers during summer. Since the birds shed their flight feathers almost simultaneously, they are flightless during the moult. Therefore sea ducks are particularly susceptible to disturbance by human offshore activities. However, the effects of such disturbances on seabirds are too poorly understood to allow for either proper spatial planning or conservation management actions.

In summer 2014 and 2015, we investigate potential disturbance effects of human activities on the distribution and density of moulting common eider (*Somateria mollissima*), common scoter (*Melanitta nigra*), velvet scoter (*Melanitta fusca*) and red-breasted merganser (*Mergus serrator*) in nearshore waters of central Kattegat, Denmark. The primary objective of the study is to describe the relationship between bird density and the presence of smaller, non-commercial ships and recreational vessels, but also to document distribution patterns of sea ducks in Special Protection Area (SPA) Sejerøbugten, which is one of the most important moulting areas for sea ducks in Denmark. The study area covers around 645 square kilometers.

We use aerial high-resolution imaging surveys to map distribution of moulting sea ducks at regular intervals during summer. Semi-automated radar tracking of ships and vessels will be used to describe human activities in space and time in the area. In addition, we use existing data on benthos abundance to map distribution of food resources to sea ducks.

Monitoring and modeling results will be used to describe the distribution of sea ducks in relation to potential effects of human activities, water depths, food abundance, etc. at fine spatial and temporal scales. Detailed knowledge about the frequency and timing of human activities and an improved understanding of their offshore distributions in relation to the spatio-temporal habitat use of sea ducks is critical to marine spatial planning. Therefore, the results of the project will provide a foundation on which to build more comprehensive zoning and management in Danish SPA's designated for sea ducks.

P31: POSTER PRESENTATION

USING SPECIES DISTRIBUTION MODEL TO ESTIMATE THE WINTERING POPULATION OF THE ENDANGERED SCALY-SIDED MERGANSER IN CHINA

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The Scaly-sided Merganser *Mergus squamatus* is a globally endangered species restricted to eastern Asia. Estimating its population is difficult and considerable gap exists between population in breeding grounds and wintering sites. In this study, we built a species distribution model (SDM) using Maxent, a machine learning method to predict the potential wintering habitat for Scaly-sided Merganser in China, with presence-only data and environment variables. Area under the receiver operating characteristic (ROC) curve method suggests high predictive power of the model. The most significant environmental variables were precipitation of driest month, mean temperature of warmest quarter, and elevation. Suitable conditions for Scaly-sided Merganser are predicted in the middle and lower reaches of the Yangtze River, especially in Jiangxi, Hunan and Hubei Provinces. Suitable habitat is predicted along 4116 km of river and 1235 km^2 of lakes and reservoirs. Based on survey results from three consecutive winters (2010-2012) and literature reviews, we estimate that the entire wintering population of *M. squamatus* in China to be 3673 individuals, which is within the lower range of World Population Estimates (WPE).

P32: POSTER PRESENTATION

NUTRIENT ALLOCATION IN WATERFOWL

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The application of stable isotopes and fatty acids (FA) to describe animal diets and trace nutrients has revolutionized the way we study animal ecology. This is particularly true for birds, which have a variety of tissues that are easy to collect without destructive techniques. However, despite advances in these methods, key parameters in isotopic and FA models still require controlled laboratory investigation or ground-truthing for many species on isotopically distinct diets. By incorporating valid species-specific baseline values of isotopic discrimination factors and FA calibration coefficients, we can determine how nutrients are allocated from resources to tissues (blood, fat, feather, claw, eggs) and quantify diets. For example, a recent major development in the way we understand endogenous (e.g., nutrients from the body, termed 'capital') and exogenous (e.g., nutrients from the diet, termed 'income') contributions to eggs by laying female birds involves diets that differ in stable isotopes of source nutrients. This approach has been largely successful in quantifying nutrient allocations, but relies on an untested assumption that the isotopic link between endogenous body tissues to eggs laid under a strictly capital strategy resembles that of a carnivorous bird under a purely income strategy. The true capital discrimination factor remains elusive because it is generally difficult to get birds to lay in captivity without food. To study nutrient allocation to body tissues and eggs, we are using captive waterfowl (large carnivorous common eiders, omnivorous lesser scaup, and herbivorous black ducks) to determine isotopic discrimination factors and FA calibration coefficients for birds on single-source, homogenous diet that differ in source nutrients (fish meal of marine origin or corn-based terrestrial source). These results will provide the baseline data and foundation for future work to improve models incorporating compound specific stable isotopes and FA to understand the ecology of waterfowl.

P33: POSTER PRESENTATION

A LONG TERM STUDY OF BREEDING WATERFOWL POPULATIONS IN THE FINNISH BALTIC SEA

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I have studied the breeding waterfowl populations on the island of Aasla (60°18'N/21°57'E) in the archipelago of the Baltic Sea, near Turku, SW Finland, in 1975-2014, i.e. during 40 consecutive years. The study area is at the fringe of the inner archipelago zone and covers c. 40 sq. km including both terrestrial and aquatic habitats. The sea around the study area is brackish and the study island includes a few freshwater lakes. The methods and the study area are described by Rönkä et al. 2005, 2011 and Saari 2013. The breeding waterfowl counts were performed three times during the spring: in late April - early May; in mid-May, and in late May - early June and the counts took about one week to perform each. The bird groups counted were the ducks, divers, grebes, cormorants, rails and auks. Here I present the long term population data for the most common local ducks: the eider, goldeneye, goosander, red-breasted merganser, velvet scoter, tufted duck, pochard, mallard, teal, wigeon and shoveler. Some rarer birds are briefly covered. Generally speaking all the above mentioned duck species have been declining during the second half of the study period one reason being a poor breeding success.

P34: POSTER PRESENTATION

SPRING AND FALL MIGRATION OF SCOTERS IN EASTERN NORTH AMERICA: ROUTES, TIMING AND DURATION

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In eastern North America, scoters winter along the Atlantic coast from Maine to South Carolina and breed in northern Canada. Recent studies using satellite telemetry have revealed similarities and differences in spring and fall migration strategies of Surf (*Melanitta perspicillata*), Black (*M. Americana*) and White-winged (*M. fusca*) scoters. In spring, Black Scoters migrate along the Atlantic coast passing through the Maritimes and stage in Chaleur Bay for several weeks before continuing north through the St. Lawrence Estuary and Gulf to James Bay. Surf Scoters follow a similar coastal route through the Maritimes but stage in greater numbers in the St. Lawrence. An unknown proportion of Surf Scoters migrates overland from the Maine coast directly to the St. Lawrence, a route also used by some Common Eiders (*Somateria mollissima*). White-winged scoters initiate their spring migration later than Black and Surf; some migrate overland to the St. Lawrence, some follow the coastal Atlantic route, but others migrate overland directly to the Great Lakes before moving on to James Bay. In fall, Black scoters migrate overland directly from James Bay to the Atlantic coast of the New England States, whereas most Surf and White-winged scoters stage several weeks in the St. Lawrence before departing for the Atlantic coast. These migration patterns likely developed just after the last glaciations. These different migration strategies are interesting and may in part be related to breeding and wintering locations as well as constrained by species characteristics. Knowledge about migration timing and routes are important as it affects sex and species vulnerability to sport and subsistence harvests as well as exposing birds to different other anthropogenic stresses.

P35: POSTER PRESENTATION

NARROWING THE FOCUS OF THE WELLFLEET BAY VIRUS INVESTIGATION: ANNUAL MOVEMENT PATTERNS OF SATELLITE-MARKED COMMON EIDERS BREEDING IN BOSTON HARBOR, MASSACHUSETTS, USA

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Between 1998 and 2011, 11 recognized mortality events occurred in Common Eiders (*Somateria mollissima*) along the coast of Cape Cod, Massachusetts, USA. The numbers of eiders involved in these outbreaks ranged from 30 to 2,800 individuals, with estimated total losses exceeding 6,000 birds. In 2010, a novel orthomyxovirus tentatively named Wellfleet Bay Virus (WFBV) was isolated from the tissues of four of these birds.

In 2012, biologists along the North American Atlantic coast visited several Common Eider nesting colonies in order to collect blood samples to screen for the presence of the WFBV. Colonies from Nova Scotia, Canada, and Maine and Massachusetts, USA were sampled. Also, wintering eiders from Rhode Island were screened for the virus. Overall, 6% of eiders from Nova Scotia, 0% from Maine, and 4% from Rhode Island tested positive. In Massachusetts, 41% tested positive and one nesting colony in Boston Harbor contained 96% of eiders testing positive for WFBV.

In the spring of 2013, we initiated an annual movement study aimed at following the trail of the eiders breeding in Boston Harbor. We implanted 12 Common Eiders with satellite transmitters in the spring of 2013 and an additional 19 in 2014. The transmitters have the ability to provide location data for 2.5 years. Ten of the eiders from 2013 provided movement data. Molting locations varied, including areas of Maine, Massachusetts, and Boston Harbor. One of the marked birds died in November 2013, at the same location and time period as the eider WFBV die-off that season. Eiders wintered in two locations; Boston Harbor area and Nantucket Sound area. Data collected from this study provides a better understanding of the annual movements of eiders from a high virus outbreak area and their potential interactions with other Atlantic populations of eiders.

P36: POSTER PRESENTATION

A COMPARISON OF MERCURY CONCENTRATIONS IN BLOOD TISSUE OF SEA DUCKS FROM THE ATLANTIC AND GREAT LAKES REGIONS

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Determining mercury concentrations in sea ducks by analysis of whole blood is important in understanding contaminant accumulation through consumption of local food sources and has been rarely studied in most sea duck species. Mercury is a persistent contaminant, and readily available to most fish and wildlife through atmospheric deposition and localized industrial point sources. Levels of methylmercury, the organic and highly toxic form of mercury, is bio-magnified through marine and freshwater food chains and at certain levels can be harmful to wildlife. Exposure to dietary mercury can be highly variable among species of sea ducks due to prey selection, foraging strategies, and the proximity of wintering and breeding locations to contaminated areas. A total of 406 combined blood samples were collected from Black Scoter (*Melanitta americana*), Surf Scoter (*Melanitta perspicillata*), White-winged Scoter (*Melanitta deglandi*), and Long-tailed Duck (*Clangula hyemalis*) during capture efforts and handling of sea ducks, as part of the North American Sea Duck Joint Venture's Atlantic and Great Lakes Sea Duck Migration Study. Blood samples were also collected from 125 Atlantic wintering sea ducks, including Common Eider (*Somateria mollissima*), Black Scoter, and White-winged Scoter, as part of separate satellite telemetry and avian influenza studies. Sampling locations included New Brunswick and Lake Ontario, Canada, and Maine, Massachusetts, Rhode Island, New York, Delaware, Maryland, and North Carolina, U.S.A. Mercury was detected in all samples. Concentrations ranged from 0.001 to 1.76 parts per million (ppm) wet weight in whole blood. Overall, Common Eider contained significantly higher mercury concentrations, followed by White-winged Scoter, Black Scoter, Long-tailed Duck, and Surf Scoter. All species were sampled at multiple locations and provided site comparisons. Mercury concentrations varied significantly by sites for all species except Black Scoters.

P37: POSTER PRESENTATION

INITIAL DETECTION AND LABORATORY INVESTIGATION OF DISEASE CAUSED BY WELLFLEET BAY VIRUS, AN EMERGING PATHOGEN OF COMMON EIDERS *(SOMATERIA MOLLISSIMA)*

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A previously unrecognized virus, now named Wellfleet Bay Virus (WFBV), was first isolated in 2006 from two dead Common Eiders (*Somateria mollissima*) from Cape Cod, Massachusetts, submitted for necropsy to the USGS National Wildlife Health Center (NWHC) during a large Common Eider mortality event. Eiders infected with the novel virus had necrotizing hepatitis and hepatic necrosis. Based on genetic analysis of five different RNA segments, the virus was determined to be a novel orthomyxovirus (family *Orthomyxoviridae*, genus *Quarjavirus*). Since the initial isolation in 2006, the NWHC has identified hepatic necrosis, with variable splenic and pancreatic necrosis, concurrent with Wellfleet Bay virus infection in dead Common Eiders from five separate mortality events occurring in the Wellfleet Bay region of Cape Cod (9/2007, 10/2007, 5/2009, 11/2009, 10/2011). In 2010, the NWHC conducted an initial laboratory inoculation trial with WFBV in juvenile eiders. Sixteen healthy eider ducklings were inoculated with WFBV in a controlled laboratory setting. Four (25%) inoculated eiders became severely ill and had to be euthanized. Clinical signs in ill birds included lethargy, pallor of mucous membranes, difficulty walking, and weight loss. Net weight loss over the course of the ten day trial occurred in eight birds (50%), including birds that became overtly ill. No control birds became ill and all experienced net weight gain over the course of the trial. All inoculated eiders developed serum antibodies by Day 4 following inoculation. At necropsy, lesions consistent with those seen in free-flying eiders were present in inoculated birds that became ill, and variably in inoculated birds with weight loss. Control birds did not develop similar lesions. Virus was re-isolated from multiple tissues from inoculated birds that were euthanized early in the trial, suggesting that active viremia in infected eiders is short-lived.

P38: POSTER PRESENTATION

ASSOCIATION OF MICROPHALLID INFECTIONS AND SEASONAL PERIWINKLE CONSUMPTION OF COMMON EIDERS IN SKERJAFJÖRÐUR, SW-ICELAND

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Common eider *Somateria mollissima* is the most common duck species in Iceland with an estimated winter population of 930,000 birds. Approximately 250,000 pairs breed on islets, low-lying coasts and coastal lakes all around the island. After a huge spring bloom of plankton in 1991 oil and other substances from decomposing zooplankton drifted ashore in Strandir, NW Iceland. Thousands of eiders, mainly ducklings, oiled and subsequently died in this natural catastrophic event. Dissection and parasitological examination of beached adult birds confirmed extensive helminth infections. Limited background knowledge on eider parasites in Iceland encouraged us to initiate a study on the subject, and also examine food composition and identify prey species in order to evaluate consumption of food-transmitted parasites. For this purpose 78 eiders were shot (under license) on four occasions in 1993 (February, May and June, before and after breeding, and in November) from an apparently healthy population (3000 breeding pairs) living in Skerjafjörður, SW Iceland. Ten females and ten males were sampled each time except in November (8 males). Altogether 32 intestinal helminth species were identified; 11 digeneans, 10 cestodes, 8 nematodes and 3 acanthocephalans. Four of the digenean species were microphallids of the "*pygmaeus*" group; *Microphallus pygmaeus, M. piriformes, M. pseudopygmaeus* and *M. triangulatus*. These parasites are relatively small and short-lived species that rapidly mature to adults in small intestines of eiders that ingest infected periwinkles (*Littorina saxatilis* or *L. obtusata*). In the survey female eiders consumed significantly more periwinkles than males. Most prominent difference was noticed in the post nesting period when the females (some caring for ducklings) intensively fed on periwinkles close to the littoral zone but males avoided this food source. Comparison of microphallid infection intensities of the eiders and proportions of periwinkles in their diet showed significant association throughout the study period.

P39: POSTER PRESENTATION

WINTER ACTIVITY BUDGET OF SPECTACLED EIDER: SOME RESULTS OF DEPTH/TEMPERATURE LOGGER USE

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Spectacled eider *Somateria fischeri* activity budgets during wintering at Bering Sea leads are remaining enigmatic. Newly developed depth/temperature loggers received wide use on fishes and seabirds and provided satisfactory results. In 2010-11 we deployed three loggers manufactured by Cefas, UK, on females trapped at their nests and known to nest in Chaun Delta, Chukotka, for at least one year prior to the year or deployment (site fidelic nesting females). In 2012 and 2013 we deployed two loggers manufactured by Lotek, Canada. All loggers were attached to plastic leg bands. Two Cefas loggers were retrieved after two years of work in 2012. No Lotek loggers were retrieved yet; however a female with Lotek tag was recorded by camera-trap in summer 2013. Poor recovery of loggers is related to low nest success in spectacled eider at study area; a majority of nests were depredated prior to discovery. From two retrieved tags one had suffered some water ingress and second provided 5-days long record from early November 2010. Diving activity, depth, and duration of dives were recorded.

P40: POSTER PRESENTATION

MOLTING COMMON EIDERS IN MAINLAND NORWAY

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A complete aerial count of moulting common eiders along the Norwegian mainland was performed during 2010 - 2013 as a part of the Norwegian SEAPOP programme. Comparable counts have been done in the 80-ies and in the 90-ies in parts of the area, but the entire coastline has not been covered completely before. Generally, it has been a substantial decline in number of moulting eiders in Norway compared to earlier counts. Observed overall decreases in the moulting population reflects the decreases observed in the breeding population, even though the moulting population might include birds from more easterly populations in the north, and more southerly populations in the south.

P41: POSTER PRESENTATION

POPULATION STATUS OF HARLEQUIN DUCKS WINTERING IN ICELAND

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The population of Harlequin Ducks *Histrionicus histrionicus* wintering in Iceland was estimated to be 14,000 birds in a survey that took place in 1998-2001. In February and March 2014, we counted Harlequin Ducks on 45% (266 km) of the coastline areas censused from land in the original survey. The aim was to estimate the population status in comparison with the previous survey results. The repeated counts were made on coastline sectors distributed all over the wintering area of Harlequin Ducks in Iceland. The results indicate a 16% decline in the wintering population. The decline was limited to the West and Northwest coast of Iceland, while numbers on the Southwest, Northeast and East coast were similar. The proportion of juvenile males had also declined from 9% to 4%. The observed decline should be of concern as Harlequin Ducks in Iceland have a high conservation value. We therefore strongly recommend further population studies, including a long-term monitoring programme.

P42: POSTER PRESENTATION

RETENTION TIME AND EFFECTS OF RADIO TRANSMITTER ATTACHMENT ON THE BEHAVIOR OF CAPTIVE LONG-TAILED DUCKS DURING WINTER

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The attachment of external tracking devices can have negative consequences for the health and fitness of carriers, but these effects may be poorly understood. We tested a novel self-adhesive tape-based technique in sea ducks to attach an external transmitter to the back of captive long-tailed ducks (*Clangula hyemalis*), and compared the retention time and effects of two types of radio-transmitter attachments during winter. After conducting baseline behavioral observations, we attached dummy transmitters with two subcutaneous anchors ('Prongs') or with adhesive tape/sutures ('Tape'), with a third group serving as Control. We monitored the retention time and transmitter attachment sites of each individual throughout the study. Following transmitter attachment, we observed significant changes in activity budgets of Prong and Tape birds. Prong and Tape birds reduced locomotor activity (-58%/-54%) and time spent in water (-48%/-35%), but they increased maintenance behavior (+98%/+151%). While Tape bird behavior eventually returned to normal, this was not the case for Prong birds. Mean retention time for the tape attachment technique was 26.0±3.2 days, while the Prong attachment in four out of five birds lasted for the entire pre-determined attachment period (i.e. 59 days). Our results indicate that a tape based attachment technique might not be suited for a sea duck study extending over several months. The behavioral changes associated with transmitter attachment in our captive ducks could significantly alter the energy budget of this small sea duck in the wild, with potential consequences for survival.

P42.5: POSTER PRESENTATION

DO SEA DUCKS MINIMISE THE FLIGHTLESS PERIOD? : INTER AND INTRA-SPECIFIC COMPARISONS OF WING MOLT

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Wing moult is a crucial event in the annual life cycle of waterfowl as it is energetically costly, last several weeks, and is a period of high vulnerability due to simultaneous moulting of flight feathers. In waterfowl, wing moult can be considered as an energy-predation trade-off, meaning that larger individuals would minimize the flightless period by increasing feather growth rate and energy expenditure. Another strategy would be to reduce body mass at the end of the flightless period, thereby reducing wing-loading to increase flight capability. We studied the timing of wing moult, primary growth rates, flightlessness duration, and the pattern of body mass variation in 5 captive seaduck species (*Melanitta fusca, M. perspicillata, Clangula hyemalis, Histrionicus histrionicus,* and *Somateria mollissima)* ranging in size of 0.5-2.0 kg. Among these 5 seaduck species, feather growth rates weakly increased with body mass ($M^{0.059}$) and no correlation was found at the intra-specific level. As a consequence, larger seaduck species and especially larger individuals had a longer flightless period. Although birds had access to food *ad libidum*, body mass first increased and then decreased the latter coinciding with maximum feather growth rate. At the regain of flight ability, studied seaducks were not lighter than at the beginning of wing moult, suggesting that they were not using a strategic reduction of body mass to reduce the flightless period. Therefore, we cannot find any support for the hypothesis stating that seaducks minimise the flightless period. We suggest that the moulting strategy of seaducks may be the result of a compromise between using an intense moult strategy (simultaneous moult) and a low feather growth rate without prejudice to feather quality.

P43: POSTER PRESENTATION

SPATIALLY EXPLICIT DEPLETION MODELS HIGHLIGHT BEHAVIOURAL DECISIONS OF FORAGING SEA DUCKS

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For animals that forage on non-renewable resources, depletion is a likely mechanism driving species distributions patterns. Spatial depletion models (SDMs) are particularly relevant to predict the effects of resource depletion on forager distributions. These models usually predict that foragers will target the most profitable patch until their intake rate decreases to the level expected in the next best patch. Consequently, individuals gradually spread out over an increasing range of patches as depletion progresses. We tested if a simple SDM could explain the seasonal distribution patterns of the common scoter *Melanitta nigra* at a wintering area of the coast of France (a 30x8 kilometres sea band), both within and between years (5 years). Calibrated with empirical data, the model was based on energetic requirements, diving capacities, and the number of observed scoters along each wintering season (one count per month). The model was then applied on biomasses of potential preys measured the first year over the study site (27 sampling points). We found that SDMs performed best (i.e., fitted better to observed data) with preferred prey of common scoters (i.e. the wedge clam *Donax vittatus*). In addition, SDMs predicted well the tendency of scoters to spread from the best feeding spot (area of a few dozen kilometre square) to others patches later in the season. However, SDMs did not predict scoter distribution at the small scale (patches of 500×500m), as scoters were distributed over larger areas than predicted. Moreover, while SDMs predicted a continuous spread throughout the winter, scoters unexpectedly displayed shifts between main feeding patches, especially in the two years with highest wintering population sizes. Our interpretation is that these discrepancies arise from the gregarious behaviour of scoters, which may prevent group splitting and lead to sequential use of feeding spots by groups of relatively constant size. Our results confirm that prey depletion proximately affects spatial distribution of scoters, and ultimately the wintering population size. This supports the resource limitation hypothesis in explaining the overall decline of most sea ducks in Western Europe.

P44: POSTER PRESENTATION

150 YEARS OF SOUTHWARDS RANGE EXPANSION OF NESTING COMMON EIDER ALONG THE WESTERN COASTS OF THE BRITISH ISLES: THE WRONG DIRECTION FOR A CLIMATIC DRIVER?

Chris Waltho

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In the British Isles the southern edge of the common eider breeding range along the North Sea coasts has changed little over centuries. However, on the west coasts breeding eiders have shown a steady expansion southwards since around 1850. During this period there has been the colonisation of Ireland, NW England and Wales by breeding eiders. Contemporary accounts suggest that the initial stages of this expansion were driven by protective measures on the Isle of Colonsay, in western Scotland. This paper records range expansion as the year of first breeding, and this is related to the distance from Colonsay. This demonstrates that expansion has extending more than 400 km in 150 years, progressed at an average rate approximately 2.5 km per annum. This sustained range expansion southwards, in a period with northward shifts in climate, suggests a non-climatic driver.

P45: POSTER PRESENTATION

MINK EFFECTS ON NESTING COMMON EIDER AT LOCH FYNE, FIRTH OF CLYDE, SCOTLAND, SUGGEST RECRUITMENT FAILURE RATHER THAN DIRECT PREDATION OF INCUBATING FEMALES

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Loch Fyne is the longest (100 km) sea loch in Scotland. Nesting eiders have been monitored by Clive Craik during 1994-2010. This recorded the number of nests on fifteen islands, the major sites, Eilean Aoghainn and Sgat Mor, initially supporting more than 100 nests each. Separately, a post-moult census has been organised by Chris Waltho, during 1997-2010. This census also measured the sex ratio. Clive Craik has reported that the presence of mink in the Loch Fyne area is impacting a range of nesting seabirds. Sustained mink predation of incubating female eiders is expected to show as a more rapid decline in female numbers than in males at the post-breeding census. There were dramatic declines in the number of eider nests at two major nesting islands, Eilean Aoghainn and Sgat Mor, resulting in the abandonment of these nesting sites during mid-2000s. This has been attributed to the effects of mink. The post-moult census shows that, despite the overall decline in numbers, the sex-ratio diverged little during the period of decline. The factor(s) driving the decline appear to be acting similarly on males and females. This suggests that the decline in nests at mink affected sites were less the result of direct heavy predation of nesting females, but more the result of the females recognising and responding to the increased predation risk, by altering their nesting behaviour to avoid the predation risk, through non-breeding. There is no compensatory increase in of the numbers of eider nests at other nesting sites on the loch, so there is no evidence of switching to safer sites. The steady decline in the post-moult numbers suggests a problem with recruitment. It is concluded that the presence of mink here has caused a collapse in breeding, together with a steady population decline, primarily through deterring nesting rather than through wholesale predation of adult females.

P46: POSTER PRESENTATION

DETERMINING OFFSHORE USE OF SEADUCK SPECIES IN FEDERAL WATERS OF THE MID-ATLANTIC UNITED STATE USING SATELLITE TRACKING

Alicia M. Wells-Berlin, Ronald E. Therrien, Lucas Savoy, ***Glenn H. Olsen****, Scott Ford, Carrie Gray, Caleb Spiegel, James Woehr and Scott Johnston*

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Offshore wind energy is one of the fastest-growing segments of the world energy market, offering a clean and abundant source of electricity to meet growing demands. However, offshore wind facilities may have detrimental impacts on many bird species, exposing them to increased mortality through turbine collisions, and altering behavior and flight pathways. To evaluate the potential for detrimental effects to marine birds posed by wind turbines in Federal waters, there is a need to collect information on the distribution and behavior (e.g., flight pathways, seasonal use timing, etc.) of a broad suite of birds in these areas. The goal is to determine fine-scale occurrence and local movement patterns of red-throated loons, surf scoters, and northern gannets in Federal waters of the mid-Atlantic U.S. during migration and winter, using platform terminal transmitter satellite tracking tags (PTTs). For this presentation we will focus on just results for surf scoters. A total of 185 surf scoters (76 males, 109 females) have been radio-tagged, with 84 marked on wintering areas, 15 tagged on a molting area near Nain, Labrador, 80 tagged during fall near Forestville, Québec, and 6 tagged at Chaleur Bay, New Brunswick/Quebec. Surf scoters exhibit strong site fidelity to their wintering grounds and their migration pathways. Preliminary data suggest they stay within 10 nm of the coastline and may not be influenced by the proposed wind energy areas controlled under BOEM jurisdiction, but the state plans may have an impact on this species. There is some indication that this species moves quite a bit within a wintering area, such as the Chesapeake Bay, and some move between wintering areas, such as between Delaware and Chesapeake Bays. Ultimately switching to the GMT transmitters with GPS capabilities will fill in the missing points that are needed to better define localized habitat utilization.

P47: POSTER PRESENTATION

SPATIAL VARIATION IN POLYCYCLIC AROMATIC HYDROCARBON EXPOSURE IN BARROW'S GOLDENEYE IN COASTAL BRITISH COLUMBIA

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Despite the history of industrial activity in coastal British Columbia, hydrocarbon exposure among marine bird populations is largely unknown. We are investigating spatial variation in contemporary hydrocarbon exposure by measuring polycyclic aromatic hydrocarbon (PAH) contamination in blue mussels and subsequent biomarker indications of exposure in Barrow's Goldeneye.

British Columbia supports 60% of the global numbers of Barrow's Goldeneye (*Buchephala islandica*). In winter, Barrow's Goldeneye congregate along sheltered coastline to forage on blue mussels (*Mytilus spp.*). Goldeneyes feeding along industrialized coastlines are more likely to ingest mussels contaminated by hydrocarbons; these individuals are expected to be particularly susceptible to toxic effects from sustained hydrocarbon exposure.
In 2014, 41 Barrow's Goldeneye (29 males, 12 females) were captured at six wintering sites in Douglas Channel, British Columbia. Liver biopsies from each bird were analyzed for hepatic enzyme 7-Ethoxyresofurin-O-deethylase (EROD) activity as an indicator of cytochrome P450 (CYP1A) expression induced by PAH exposure. Composite mussel samples also were obtained at each of the six capture sites. Each mussel sample was analyzed for presence of compounds that induce CYP1A expression in avian liver, including PAHs, PCBs, and dioxins. Mussel tissue contamination and goldeneye EROD activity measured at each site will be used to investigate patterns in the spatial distribution of trophic exposure to PAHs.

This study will provide a contemporary reference point of hydrocarbon contamination in coastal British Columbia. Results will be useful for guiding long-term monitoring programs and informing recovery endpoints for marine bird populations in the event of an accidental hydrocarbon release associated with existing and future industrial development.

P48: POSTER PRESENTATION

COMPARING VOCALIZATIONS AND HEARING THRESHOLDS IN AQUATIC BIRD SPECIES

Sally E. Yannuzzi, Sara C. Therrien, Alicia M. Wells-Berlin and ***Glenn H. Olsen***

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The dominant frequencies in the vocalizations of aquatic bird species closely align with their frequency of best hearing. Hearing thresholds for eight species of aquatic birds were estimated using the auditory brainstem response, and were compared to a spectrographic analysis of vocalizations. The dominant frequency (the frequency with the greatest power) in their vocalizations typically corresponded well to each species' frequency of best hearing, with the exception of the common eider (*Somateria mollisima*). While the rest of the birds had dominant frequencies between 1-3 kHz, the common eider emitted vocalizations that were of a significantly lower frequency (0.44 kHz) than their frequency of best hearing (2.4 kHz). While reasons for this are unknown, we suspect that the duckling vocalization may align closer to the common eider's frequency of best hearing in order to aid duckling survivability.

P49: POSTER PRESENTATION

ACCOUNTING FOR MISSED DIVING BIRDS DURING VISUAL AND DIGITAL AERIAL SURVEYS

***Ramūnas Žydelis**, Monika Dorsch, Georg Nehls, Stefan Heinänen, Henrik Skov*

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Most of the time sea ducks forage by diving, and some species can spend a substantial proportion of daytime underwater. A lot of diving birds could be overlooked while underwater during aerial surveys due to the short exposure time to an observer, and this is even more so for digital surveys which are becoming increasingly used. The objective of this study was to come up with correction coefficients that could be applied for aerial and digital survey data in order to account for missed diving birds. We used observations of foraging activities of common eiders *Somateria mollissima* and long-tailed ducks *Clangula hyemalis* wintering in the southern Baltic Sea. Calculated correction coefficients are not static and vary depending on progress of bird wintering season, day length, ambient temperature, and water depth at a given site. Literature sources suggest that bird foraging activities may vary between different areas, tidal stages and years, all of which may also affect correction coefficients. We demonstrate that using correction coefficients has big influence on seaduck abundance estimates and argue that applying them should not be oversimplified as correction coefficients are dynamic, species- and often site-specific.

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Long Point Waterfowl's
Avian Energetics Lab

Long Point Waterfowl's Avian Energetics Lab provides unique services not offered elsewhere in North America. We commonly process birds for our clients, but we also process mammals, reptiles, amphibians and fish.

Our Services Include:

Composition of carcass or specific tissue: fat, protein and ash content

***Custom necropsis*:** internal/external measurements as specified by the customer

***Ingested food items*:** sorted, identified, dried and weighed

***Feathers*:** wet, dry and protein weights, moult scoring

Reproductive tissue and egg analysis: fat, protein and ash content

Data entry and calculations:
All work is conducted under the strictest of quality control, using well established standard protocols. Rates are reasonable and affordable.

Over 100 scientific papers have been published through data supplied by the Long Point Waterfowl Avian Energetics Lab.

Selected Publications:

Brady, C., S. A. Petrie, M. L. Schummer, S. S. Badzinski, N. Belzile, and Y-W. Chen. 2013. Effects of dietary selenium on health and survival of captive wintering lesser scaup. Environmental Pollution 175: 8-15.

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Anteau, M. J., and A. D. Afton. 2009. Lipid reserves of Lesser Scaup (*Aythya affinis*) migrating across a large landscape are consistent with the Spring Condition Hypothesis. Auk 126:873-883.

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LONG POINT
WATERFOWL

Bio flight

Aerial Data Acquisition

Why We Wanted To Participate At The 5th International Sea Duck Conference

To promote our business you properly think, and yes of course that's part of it. We love to fly, and we are damn good at it. But that's actually not the main reason.

We know, that our existence rely on us being able to anticipate the needs of our customers.

Nothing beats the understanding we get of your specific need, than being at conferences like these, meeting you and learning from you. Furthermore we have come to learn - which is often the case - that the more you learn of a subject, the more interesting it becomes. We expect to come home with a lot of new knowledge, that we can then translate into better flying experiences, for our future customers.

If you have a study coming up that involves getting out into the field, we'd be honored to be considered as your way of getting there. We believe we can offer you the best, most reliable service on the marked.

We hope we have inspired you to get out there and see for your self.

Best Regards

Kasper Roland

Kasper Roland Huberg
Chief Operating Officer

Mads Brandt

Mads Brandt Petersen
Sales Manager

Why Should You Consider Bio Flight On Your Next Data Acquisition Mission?

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Our planes are all equipped with large photo hatches, that allows easy installation of many camera systems. This makes our planes suitable to digital surveys where you can capture images like this of the Common Scooter. The image is shot from 1800 feet.

We created a comprehensive poster for the poster presentation on Tuesday evening. If you missed it you can click the poster to watch it Online, or go to ***www.bioflight.dk/5th-international-sea-duck-conference-2014***

Please don't hesitate to contact us with any questions you might have. Contact info can be found on the poster, or on our website.

SCIENCE PROGRAM

5th International Sea Duck Conference

8 - 12 Sept 2014,Radisson BLU Saga Hótel , Reykjavík, Iceland

TIME	TUESDAY 9-Sep-14	WEDNESDAY 10-Sep-14	THURDAY 11-Sep-14
07:00 - 8:30	***Breakfast served*** *@ Radisson BLU Saga Hótel - Súlnasalur (included with room)*		
08:30 - 09:45	**Opening remarks & announcements**		
	Plenary: Dr. Arnþór Garðarsson	**Plenary:** Dr. James R. Lovvorn	**Plenary:** Dr. Sveinn Are Hanssen
09:45 - 10:15	*Coffee break*		
10:15 - 12:00	**Breeding Ecology**	**Marine Drivers of Population Change**	**Behavior**
10:15 - 10:30	Hennin*	Larsson	Merkel
10:30 - 10:45	Steenweg	Takekawa	Boyd
10:45 - 11:00	Simon*	Møller	Seltmann
11:00 - 11:15	Petersen	Laursen	Öst
11:15 - 11:30	Legagneux*	Guéry*	Craik
11:30 - 11:45	Provencher*	Jean-Gagnon*	Jaatinen
11:45 - 12:00	Jónsson	Iverson*	Steele
12:00 - 13:30	***Lunch Served*** *@ Radisson BLU Saga Hótel - Súlnasalur (included in registration)*		
13:30 - 15:15	**Spatial Ecology**	**Techniques & Technology**	**Emerging Diseases**
13:30 - 13:45	Bentzen	Einarsson	Harms*
13:45 - 14:00	MacCallum	Silverman	Iverson*
14:00 - 14:15	Dagys	Heinänen	Allison
14:15 - 14:30	Qing*	Silverman	Ballard*
14:30 - 14:45	Lepage	Žydelis	Dwyer
14:45 - 15:00	Osenkowski	McWilliams	Ballard*
15:00 - 15:15	Waltho	Weiß	Dwyer
15:15 - 15:45	*Coffee break*		
15:45 - 17:30	**Foraging**	**Partners Panel Discussion**	**Population Dynamics**
15:45 - 16:00	De La Cruz	Aboriginal Communities	Pöysä
16:00 - 16:15	Morkūnė*	Aquaculture	Pavón-Jordán*
16:15 - 16:30	Gilliland	Off-shore Wind	Lehikoinen
16:30 - 16:45	Alisauskas	Natural Resources	Rintala
16:45 - 17:00	White	Restoration &	Roberts*
17:00 - 17:15	Esler	Remediation	Discussion
18:00	***Dinner break*** *(on your own)*		**BANQUET** BLU Saga Hótel Súlnasalur *@ 18:00*
19:00	**POSTER SESSION** BLU Saga Hótel Súlnasalur	**NOWAC Workshop** BLU Saga Hótel Katla	

NOWAC: Nordic Waterbirds and Climate Network

*Student