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EDUCATION

- Ph.D.** Ecology, Kansas State University (USA) 2016
Title: *Effects of climate change on the breeding ecology and trophic interactions of Arctic-breeding shorebirds.*
Advisor: Brett K. Sandercock, Ph.D.
- M.S.** Behavioral Ecology, Ewha Womans University (Korea) 2009
Title: *The effects of wind on the structure, shape, and orientation of nests in Korean Black-billed Magpie (Pica pica sericea).*
Advisor: Jae Chun Choe, Ph.D.
- B.A.** Biology Education, Kongju National University (Korea) 2006

ACADEMIC POSITIONS

- Post-doctoral researcher**, Alexander von Humboldt Research Fellow 2019
Dept. of Behavioural Ecology and Evolutionary Genetics, MPIO
Advisor: Bart Kempenaers, Ph.D.
- Research Scientist**, Dept. of Fish and Wildlife Conservation, Virginia Tech 2018
Advisor: James D. Fraser, Ph.D.
- Research Associate**, Dept. of Fish and Wildlife Conservation, Virginia Tech 2017
Advisor: James D. Fraser, Ph.D.
- Post-doctoral researcher**, Dept. of Fish and Wildlife Conservation, Virginia Tech 2016–2017
Advisor: James D. Fraser, Ph.D.

PUBLICATIONS

Peer-reviewed

- 14 **Kwon E**, Weiser EL, Lanctot RB, Brown S, Gates R, Gilchrist HG, Kendall SJ, Lank DB, Liebezeit JR, McKinnon L, Nol E, Payer DC, Rausch J, Rinella DJ, Saalfeld S, Senner NR, Smith PA, Ward D, Wisseman RW, Sandercock BK. *Geographic variation in the intensity of*



phenological mismatch between Arctic-breeding shorebirds and invertebrate prey.
Ecological Monographs 00(00):e01383. DOI: 10.1002/ecm.1383

13. Brown S,...**Kwon E**,... *et al.* 2019. *No evidence for disruption of global patterns of nest predation in shorebirds.* Science DOI: 10.1126/science.aaw8529. *60 authors
12. Weiser EL,...**Kwon E**,... *et al.* 2018. *Effects of leg flags on nest survival of four species of Arctic-breeding shorebirds.* Journal of Field Ornithology *Accepted*. *24 authors.
11. **Kwon E**, Houghton LM, Settlage RE, Catlin DH, Karpanty SM, Fraser JD. 2018. *Estimating transient populations of unmarked individuals at a migratory stopover site using generalized N-mixture models.* Journal of Applied Ecology DOI:10.1111/1365-2664.13243
10. **Kwon E**, Catlin DH, Karpanty SM, Fraser JD, Muizniek B. 2018. *Presence of ghost crabs and piping plover nesting success.* Journal of Wildlife Management DOI: 10.1002/jwmg.21422.
9. **Kwon E**, English WB, Weiser EL, Franks SE, Hodkinson D, Lank DB, Sandercock BK. 2017. *Delayed egg-laying and shortened incubation duration of Arctic-breeding shorebirds coincide with climate cooling.* Ecology and Evolution DOI: 10.1002/ece3.3733.
8. Weiser EL,...**Kwon E**,... *et al.* 2018. *Effects of environmental conditions on reproductive effort and nest success of Arctic-breeding shorebirds.* Ibis DOI: 10.1111/ibi.12571. *38 authors.
7. Weiser EL,...**Kwon E**,... *et al.* 2017. *Life-history tradeoffs revealed by seasonal declines in reproductive traits of Arctic-breeding shorebirds.* Journal of Avian Biology DOI: 10.1111/jav.01531. *36 authors.
6. Weiser EL, Lanctot RB, Brown SC, Bentzen R, Bêty J, Boldenow M, English W, Franks S, Gates R, Koloski L, **Kwon E**, Lamarre JF, Lank DB, Liebezeit J, McKinnon L, Nol E, Rausch J, Saalfeld S, Senner NR, Ward D, Woodard P, Sandercock BK. 2017. *Environmental and ecological conditions at Arctic breeding sites have limited effects on true survival rates of adult shorebirds.* The Auk: Ornithological Advances 135, 29–43.
5. English WB, **Kwon E**, Sandercock BK, Lank DB. 2017. *Effects of predator exclosures on reproductive success in red-necked phalaropes.* Wader Study 124, 26–32.
4. Lank DB, Xu C, Harrington B, Morrison RIG, Gratto-Trevor CL, Hicklin PW, Sandercock BK, Smith PA, **Kwon E**, Rausch J, Pirie Dominix LD, Hamilton DJ, Paquet J, Bliss SE, Neima SG, Friis C, Flemming SA, Anderson AM, Ydenberg RC. 2017. *Long-term continental changes in wing length of a long-distance migratory shorebird as a response to changing predation danger.* Ecology and Evolution 7, 3243–3256.
3. Brown S,...**Kwon E**,... *et al.* 2017. *Migratory connectivity of semipalmated sandpipers and implications for conservation.* The Condor: Ornithological Applications 119, 207–224. *23 authors.
2. Bulla M,...**Kwon E**,... *et al.* 2016. *Unexpected diversity in socially synchronized rhythms of shorebirds.* Nature 540, 109–113. *76 authors.



1. Weiser EL,...**Kwon E**,... *et al.* 2016. *Effects of geolocators on demographic rates of 16 species of Arctic-breeding shorebirds*. *Movement Ecology* 4:12. *50 authors.

In review/revision

2. Grond K,...**Kwon E**,... *et al.* *Composition and Drivers of Fecal Microbiota Communities in Arctic-Breeding Shorebirds*. In review with mSphere.
1. Monk JD, **Kwon E**, DeRose-Wilson A, Robinson SG, Bellman HA, Karpanty SM, Catlin DH, Fraser JD. *Assessing the Effectiveness of Piping Plovers (Charadrius melodus) as a Surrogate Species for Migratory Shorebird Conservation*. In review with *Journal of Wildlife Management*.

In preparation

- 3 **Kwon E**, Robinson S, Weithman CE, Fraser JD, Catlin DH, Karpanty SM, Altman J. *Contrasting long-term population trends of beach-nesting shorebirds under shared environmental forcing*.
2. **Kwon E**, Weiser EL, Lanctot RB, Brown S, Gates R, Gilchrist HG, Kendall SJ, Lank DB, Liebezeit JR, McKinnon L, Nol E, Payer DC, Rausch J, Rinella DJ, Saalfeld S, Senner NR, Smith PA, Ward D, Wisseman RW, Sandercock BK. *Different mating strategies of Arctic-breeding shorebirds led to varying extent of phenological mismatch*. In preparation for *Ecology Letters*.
1. Weiser EL,...**Kwon E**,... *et al.* *Model-based estimates of population trends and the importance of vital rates in Arctic-breeding shorebirds*. In preparation for *The Condor*. *39 authors.

RESEARCH EXPERIENCE

Postdoc Research, Dept. of Fish & Wildlife Conservation, Virginia Tech **2016–2019**
Historical data analysis and management recommendations for Cape Hatteras National Seashore.
Major advisor: James D. Fraser

- Constructing a database of a long-term field data from 1989–2018 on reproductive ecology of species of concern (piping plover, American oystercatcher, colonial water birds, sea turtle).
- Identifying environmental and ecological drivers of long-term population trends in beach-nesting shorebirds.
- Testing a state-space model to estimate the abundance of an unmarked shorebird population at a stopover site.

Ph.D. Research, Division of Biology, Kansas State University **2010–2015**
Breeding ecology and trophic interactions of arctic-breeding shorebirds under climate change.
Major advisor: Brett K. Sandercock

- Monitored breeding population of three species of migratory shorebirds at Nome, AK during 2011–2014.
- Tested long-term temporal variation in the timing of breeding and reproductive



performance of three shorebird species.

- Coordinated a large dataset with Arctic Shorebird Demographics Network, and tested the phenological mismatch between the timing of shorebird hatching and peak invertebrate abundance at ten Arctic sites.
- Described migration route, wintering location, and migration rate of sandpipers using light-level geolocators.

MSc Research, Division of EcoScience, Ewha Womans University

2006–2010

The effects of wind on the structure, shape, and orientation of nests in Korean black-billed magpie.

Major advisor: Jae Chun Choe

- Monitored ~200 pairs of breeding magpies per year during 2006–2009.
- Measured and compared structural properties of magpie nests at four sites with varying wind condition.
- Compared the structural variation in magpie nests induced by environmental differences between Norway and Korea (collaborative research with Dr. Magne Husby, Nord-Trøndelag University College, Norway).
- Conducted computational modeling of magpie nests (collaborative research with the Biomimetic Engineering Lab, Sungkyunkwan University, Korea).

TEACHING & MENTORING

Graduate teaching assistant

2011–2015

Taught undergraduate courses for eight semesters at Kansas State University. Responsibilities as a teaching assistant included lecturing, setting up laboratory activities, leading dissections, preparing exams, and grading.

- BIOL198 Principles of Biology (2011–2013) Class of 80 students in studio lab setting
- BIOL201 Organismic Biology (2013–2015) Class of 40 students in general biology lab setting

Research supervisor

2011–2014

Trained and supervised 5 lab assistants and 8 field assistants at Arctic field site over four years. Since working with me, six of 13 field assistants have started their own graduate studies in the field of wildlife biology at Kansas State University, University of Washington, University of Nevada-Reno, University of Windsor, and University of Oxford.

Invited lecturer

2008

Taught elementary school students the concept of evolution and natural selection during summer science program at Ewha Natural History Museum in Seoul, Korea.

Consultant

2008

Supervised and featured in a documentary film entitled “Nests, marvelous architecture” produced by the Korean Broadcast System. Provided knowledge on the evolution of nests in birds and innovative designs of bird nests.

VOLUNTEER WORK

Field research assistant: Monitoring breeding ecology of black-billed magpies
Seoul National University, Seoul, Korea; 2005–2009



- Monitored nest initiation, incubation, and brood rearing of 60 breeding pairs per year.
- Measured clutch size and egg morphology, and estimated hatching success of 60 nests per year.
- Measured body condition of average 180 chicks per year, and color-banded them.

Research assistant: Variation in feather color induced by local climate, sex and age in painted redstarts (*Myioborus pictus*) from Arizona

Seoul National University, Seoul, Korea; 2007

- Measured breast feather coloration of 166 painted redstarts using spectrophotometer (Oceanoptics USB 2000).

Research assistant: Genetic sexing analysis with blood samples from black-billed magpies

Seoul National University, Seoul, Korea; 2006

- Sampled blood from brachial veins of ~50 nestlings.
- Extracted genomic DNA from blood samples using DNeasy Tissue Kit (QIAGEN).
- Determined sex using PCR-based technique (P2-P8 primers).

Field assistant: Geographic variation in the acoustic signals of black-billed magpies in South Korea and Japan

Ewha Womans University, Seoul, Korea; 2006

- Assisted in locating nests and individuals of black-billed magpies across two geographically distinct sites in South Korea.

Research assistant: Structural coloration as a quality indicator in black-billed magpies

Seoul National University, Seoul, Korea; 2005

- Dissected ~200 dead magpies and measured weight of spleens and depth of pectoral muscle.
- Dissected intestinal organs and preserved inner contents.
- Counted the number of endoparasites and preserved the biosamples for identification.

REPORTS & OTHER PUBLICATIONS

Kwon E, DB Lank, WE English, and BK Sandercock. 2014. Effects of environmental change on Arctic-breeding shorebirds. Final report for the National Science Foundation.

Kwon E, DB Lank, WE English, and BK Sandercock. 2013. Decadal changes in the demography of sandpipers near Nome, Alaska. Final report for the Alaska Department of Fish and Game.

Berenbaum MR translated by JC Choe and **E Kwon**. 2009. Buzzword. Hyohyung Publishing Company, Seoul, Korea (book)

Kwon E and J Hwang. 2008. Animal Behavior for Elementary Students. Sungwoo Books, Seoul, Korea (book)

AWARDS

Distinguished Research Poster, 1st Associative Symposium for Ecological Societies, Korea 2008

Distinguished Research Poster, 62nd Meeting of the Korean Association of Biological Sciences 2007



PRESENTATIONS (lead only)

Invited seminars

- 2019 Effects of climate change on the breeding ecology and trophic interactions of Arctic-breeding shorebirds. Korea Polar Research Institute, South Korea
- 2017 Adaptive migration timing and phenological mismatch in Arctic-breeding shorebirds. Virginia Tech, Blacksburg, Virginia
- 2017 “Only if we understand, will we care. Only if we care, will we help.” Virginia Tech, Blacksburg, Virginia
- 2015 Study of bird migration. Science Symposium of Korean Wildcat, Kansas State University, Manhattan, Kansas
- 2014 Test of ecological mismatches in an Arctic network. Emporia State University, Emporia, Kansas
- 2014 Breeding ecology and trophic interactions of Arctic-breeding shorebirds under climate change. Science Symposium of Korean Wildcat, Kansas State University, Manhattan, Kansas
- 2014 Climate change: spring timing of birds and bugs. Strait Science Series, University of Alaska Fairbanks Northwest Campus, Nome, Alaska
- 2014 Trophic interactions and migration ecology of Arctic-breeding shorebirds. Benedictine College, Atchison, Kansas
- 2011 Population dynamics of Arctic-breeding shorebirds under environmental change. Ewha Womans University, Seoul, Korea

Oral presentations

24. Kwon E, Weiser EL, Lanctot RB, Brown S, Gates R, Gilchrist HG, Kendall SJ, Lank DB, Liebezeit JR, McKinnon L, Nol E, Payer DC, Rausch J, Rinella DJ, Saalfeld S, Senner NR, Smith PA, Ward D, Wisseman RW, Sandercock BK. 2018. *Geographic variation in the intensity of phenological mismatch between Arctic shorebirds and their invertebrate prey*. **27th International Ornithological Congress**. Vancouver, Canada.
23. Kwon E., Weithman CE, Catlin DH, Karpanty SM, Fraser JD. 2018. *Contrasting responses of neighboring populations of piping plovers toward habitat creation, conservation, and potential disturbance*. **42nd Annual Waterbird Society meeting**. Vancouver, Canada.
22. Kwon E *et al.* 2018. *Monogamous shorebirds breed earlier and match with food peak better than sympatrically breeding polygamous shorebirds*. **Social Evolution Conference**. Hortobágy, Hungary. *Author list same as presentation #24.



21. Kwon E *et al.* 2018. *Monogamous shorebirds breed earlier and match with food peak better than sympatrically breeding polygamous shorebirds.* **136th American Ornithological Society Meeting.** Tucson, Arizona. *Author list same as presentation #24.
20. Kwon E., Weithman CE, Catlin DH, Karpanty SM, Fraser JD. 2018. *Contrasting responses of neighboring populations of piping plovers toward habitat creation, conservation, and potential disturbance.* **136th American Ornithological Society Meeting.** Tucson, Arizona.
19. Kwon E *et al.* 2017. *Monogamous shorebirds breed earlier and match with food peak better than sympatrically breeding polygamous shorebirds.* **7th Western Hemisphere Shorebird Group meeting.** Paracas, Peru. *Author list same as presentation #24.
18. Kwon E, LM Houghton, AD DeRose-Wilson, RE Settlage, DH Catlin, SM Karpanty, JD Fraser. 2017. *Using the Dail-Madsen model to estimate abundance of migratory shorebirds at a stopover site.* **7th Western Hemisphere Shorebird Group meeting.** Paracas, Peru.
17. Kwon E, LM Houghton, AD DeRose-Wilson, RE Settlage, DH Catlin, SM Karpanty, JD Fraser. 2016. *Using the Dail-Madsen model to estimate abundance of migratory shorebirds at a stopover site.* **40th Annual Waterbird Society meeting.** New Bern, North Carolina.
16. Kwon E, WB English, EL Weiser, SE Franks, DJ Hodkinson, DB Lank, BK Sandercock. 2016. *Sympatric species respond differently to climate cooling at a subarctic site.* **6th North American Ornithological Conference.** Washington D.C.
15. Kwon E *et al.* 2015. *Temporally mediated geographic effects on the intensity of phenological mismatch.* **6th Western Hemisphere Shorebird Group Meeting.** Wallops Island, Virginia. *Author list same as presentation #24.
14. Kwon E *et al.* 2015. *Temporally mediated geographic effects on the intensity of phenological mismatch.* **Annual meeting of the American Ornithologists' Union (133rd Stated Meeting) and Cooper Ornithological Society (85th Stated Meeting).** Norman, Oklahoma. *Author list same as presentation #24.
13. Kwon E, DB Lank, RB Lanctot, S Brown, BK Sandercock. 2014. *Test of ecological mismatches in an Arctic network.* **12th Alaska Bird Conference.** Juneau, Alaska
12. Kwon E, DB Lank, RB Lanctot, S Brown, BK Sandercock. 2014. *Test of ecological mismatches in an Arctic network.* **Annual meeting of the American Ornithologists' Union (132nd Stated Meeting), the Cooper Ornithological Society (84th Stated Meeting), and the Society of Canadian Ornithologists.** Estes Park, Colorado
11. Kwon E, DB Lank, RB Lanctot, S Brown, BK Sandercock. 2014. *Temporal gradient of prey availability and shorebird breeding phenology in the Arctic.* **Division of Biology BioForum.** Manhattan, Kansas
10. Kwon E and BK Sandercock. 2013. *Tracking annual movement of long-distance migratory sandpipers using light logging geolocator.* **International PhD course in Ecology of Animal Migration.** Lund, Sweden



9. Kwon E, DB Lank, RB Lanctot, BK Sandercock. 2013. *Temporal gradient of prey availability and shorebird breeding phenology in the Arctic*. **5th Western Hemisphere Shorebird Group meeting**. Santa Marta, Colombia
8. Kwon E, DB Lank, BK Sandercock. 2013. *Changes in breeding phenology and reproductive success of long-distance migratory shorebirds*. **Division of Biology BioForum**. Kansas State University, Manhattan, Kansas
7. Kwon E and BK Sandercock. 2012. *Age-specific demography and population dynamics of the Western Sandpiper (Calidris mauri)*. **Kansas Ornithological Society Fall Meeting**. Winfield, Kansas
6. Kwon E, DB Lank, BK Sandercock. 2012. *Changes in breeding phenology and reproductive success of long-distance migratory shorebirds: comparative study over two decades*. **5th North American Ornithological Conference**. Vancouver, British Columbia
5. Kwon E and BK Sandercock. 2012. *Changes in breeding phenology of Arctic-breeding shorebirds: comparative study over two decades*. **Kansas Natural Resources Conference**. Wichita, Kansas
4. Kwon E and BK Sandercock. 2011. *Changes in breeding phenology of Arctic-breeding shorebirds: comparative study over two decades*. **Kansas Ornithological Society Fall Meeting**. Great Bend, Kansas
3. Kwon E and BK Sandercock. 2011. *Age-specific demography and population dynamics of the Western Sandpiper (Calidris mauri)*. **4th Western Hemisphere Shorebird Group Meeting**. Vancouver, Canada
2. Kwon E and BK Sandercock. 2011. *Age-specific demography and population dynamics of the Western Sandpiper (Calidris mauri)*. **Division of Biology BioForum**. Kansas State University, Manhattan, Kansas
1. Kwon E, S-I Lee, JC Choe. 2010. *Adaptive extended phenotype: structure and shape of nests reflects local wind conditions in the Black-billed Magpie Pica pica*. **Kansas Ornithological Society Fall Meeting**. Overland Park, Kansas

Poster presentations

6. Kwon E, DB Lank, RB Lanctot, S Brown, BK Sandercock. 2014. *Temporal gradient of prey availability and shorebird breeding phenology in the Nearctic*. **26th International Ornithological Congress**. Tokyo, Japan
5. Kwon E and BK Sandercock. 2011. *Age-specific demography and population dynamics of the Western Sandpiper (Calidris mauri)*. Joint meeting of the **Association of Field Ornithologists**, the **Cooper Ornithological Society**, and the **Wilson Ornithological Society**. Kearney, Nebraska
4. Kwon E, S-I Lee, JC Choe. 2008. *Effects of wind on nest shape and breeding success of the Black-billed Magpie (Pica pica sericea)*. **12th International Behavioral Ecology Congress**. Ithaca, New York



3. Kwon E, SC Yu, S-I Lee, JB Choi, JC Choe. 2008. *A computational approach on the benefits of streamlined nest shape in Korean Black-billed Magpies*. **1st Associative Symposium for Ecological Societies**. Seoul, Korea
2. Kwon E, WJ Kim, J Choi, J Hwang, S-I Lee, JC Choe. 2007. *The effects of morphological characteristics of nests on the breeding success of Korean Black-billed Magpies*. **62nd Annual Meeting of the Korean Association of Biological Sciences**. Seoul, Korea
1. Kwon E, S-I Lee, JC Choe. 2007. *The effects of wind on the orientation and morphological characteristics of the nests of Korean Black-billed Magpies*. **125th Annual Meeting of the American Ornithologist's Union**. Laramie, Wyoming

GRANTS

National Geographic AI for Earth Innovation Grant, 2019

A sponsored Microsoft Azure account worth US\$15,000 (grant offer rejected)

American Ornithological Society Postdoc Travel Grant, 2018

US\$ 1,000 for travel to Vancouver, Canada to present at the conference

Western Hemisphere Shorebird Group Student Travel Grant, 2015

US\$ 960 for travel to Wallops Island, Virginia to present at the conference

Alaska Bird Conference Student Travel Grant, 2014

US\$ 1,700 for travel to Juneau, Alaska to present at the conference

International Ornithological Congress Travel Grant, 2014

US\$ 800 for travel to Tokyo, Japan to present at the conference

College of Arts and Sciences, Kansas State University, Student Research Travel

US\$ 2,000 to support field work and workshop travel costs, 2013 – 2014

Graduate Student Council and Biology Graduate Student Association at Kansas State University

US\$ 1,550 for travel to conferences and workshops, 2013 – 2014

STATISTICAL & ANALYTICAL SKILLS

Parameter estimation

- Experienced in estimating apparent survival rate of marked individuals, daily nest survival rate, abundance of unmarked individuals in an open population using state-space models.
- Completed two semester courses on population modeling using program MARK (Kansas State University, 2010/2011).
- Attended a four-day workshop on 'Estimating avian abundance and occupancy with marked and unmarked individuals' (NAOC-V, Vancouver 2012).

Multivariate analysis

- Experienced in synthesizing raw point count and presence/absence data to compare the structure and similarities among ecological communities.
- Trained in direct and indirect ordination analyses such as CA, CCA, PCA.



- Completed a semester course on multivariate statistical analysis using R (Kansas State University, 2013).

Software

- Experienced with generalized linear models, mixed models, structural equation modeling, data visualization, data simulation and management using R.
- Proficient with SPSS, Sigma Plot, MS Office suite, R.

Additional training

- Ecology of Animal Migration workshop (Lund University, Sweden 2013).
- Geolocator workshop on R package ‘FLightR’ and ‘SGAT’ (University of Oklahoma, Oklahoma 2015).
- National Science Foundation Grant Proposal Writing workshop (Mountain Lake Biological Station, Virginia 2018).

PROFESSIONAL & ACADEMIC SERVICES

Program organizer, Arctic Field Training Program provided by CH2M HILL Polar Services (CPS), Manhattan, Kansas (2012)

Reviewer, periodicals and agencies:

Ecosphere (2019), Ringing & Migration (2019), Methods in Ecology and Evolution (2018), Functional Ecology (2018), Wildlife Society Bulletin (2018), Polar Biology (2018), Ardea (2017), Journal of Field Ornithology (2011), Nature Serve. Nature Serve Climate Change Vulnerability Index (NSCCVI) assessment for Semipalmated Sandpiper (*Calidris pusilla*) (2011)

Secretary, Biology Graduate Student Association, Kansas State University (2011–2012)

Member of 5 professional societies:

The Waterbird Society (2016–present)
American Ornithological Society (2011–present)
Association of Field Ornithologists (2011–present)
Wilson Ornithological Society (2011–present)
Kansas Ornithological Society (2011–2014)