DoD Environmental Planning and Conservation Webinar Series

Nexus between Energy Conservation, Light Reduction, and Reducing Bird Collisions with Structures

Eric Kershner, Jo Anna Lutmerding, and Joelle Gehring, U.S. Fish and Wildlife Service;
and Trish Cutler, U.S. Army

April 25, 2023

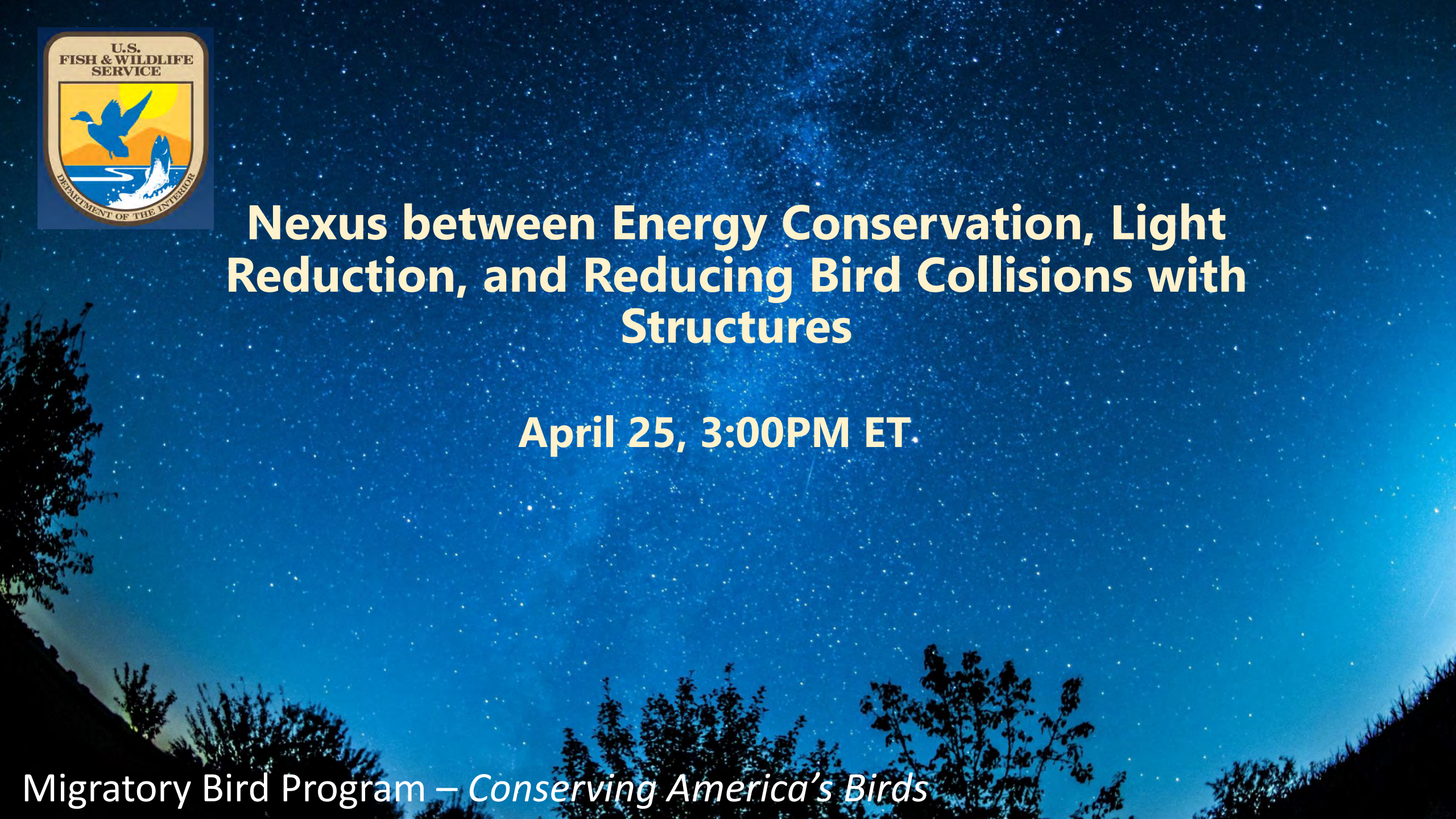
Please mute your phones

Audio Dial-In: 410-874-6749

Participant Code: 204-527-527#

www.denix.osd.mil/nr/

Twitter: @DoDNatRes



Nexus between Energy Conservation, Light Reduction, and Reducing Bird Collisions with Structures

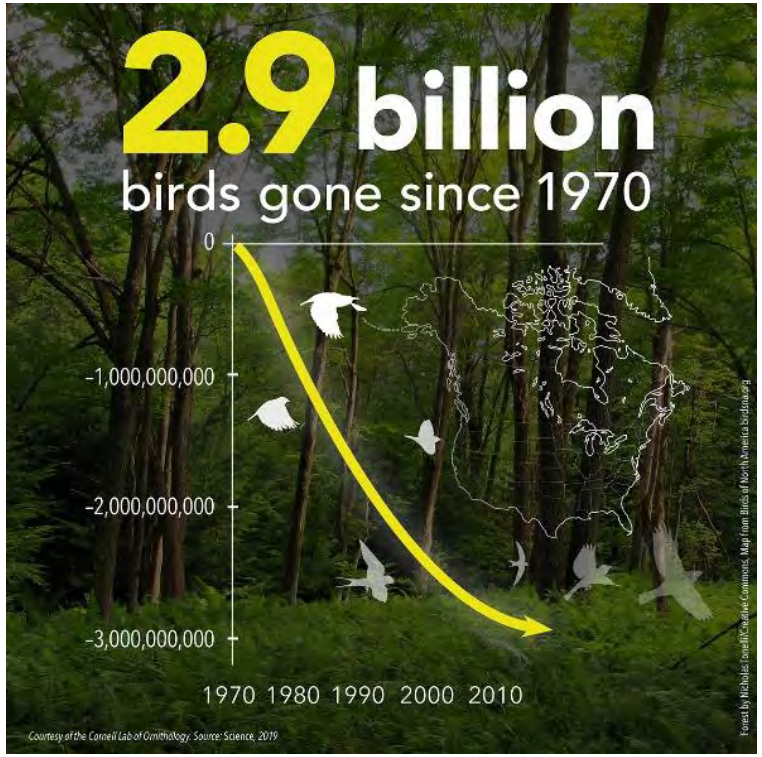
April 25, 3:00PM ET

Migratory Bird Program – *Conserving America's Birds*

Value of the night sky

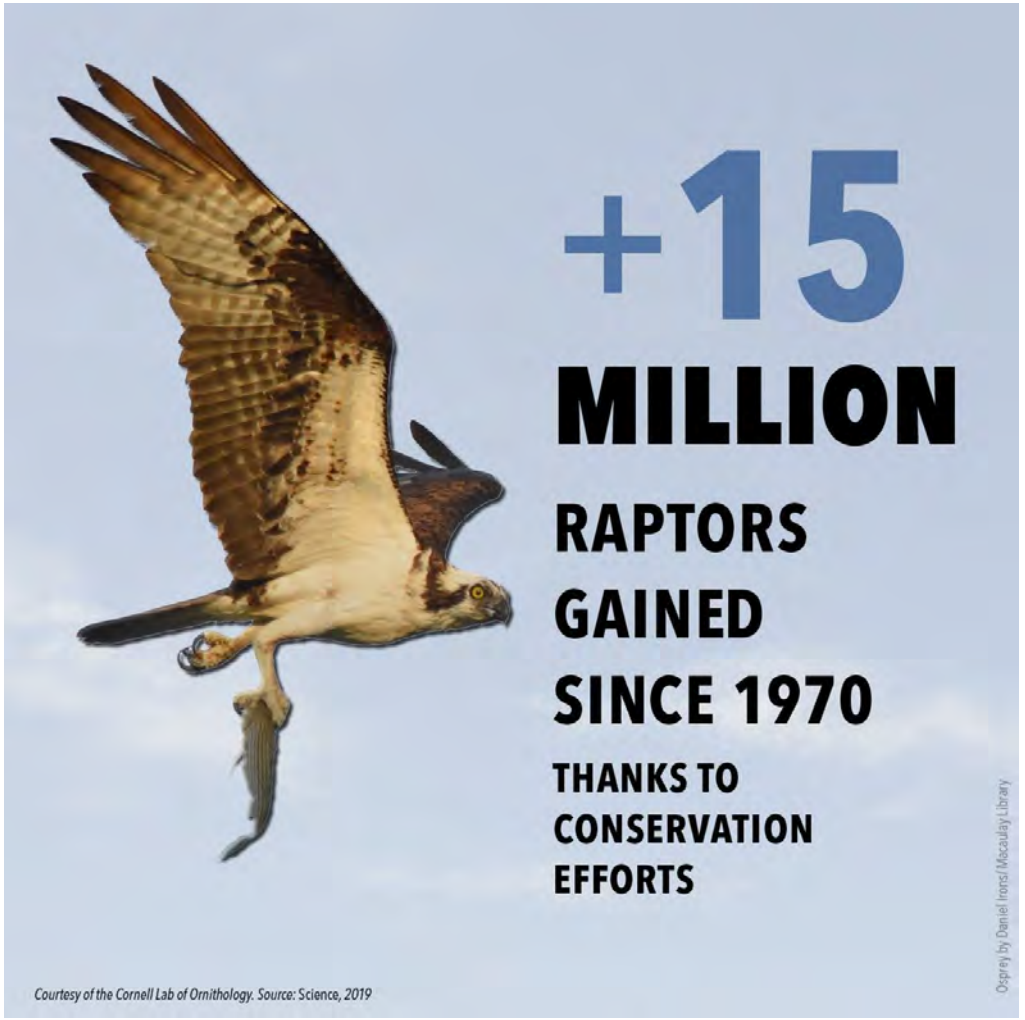
The night sky connects people across time and space

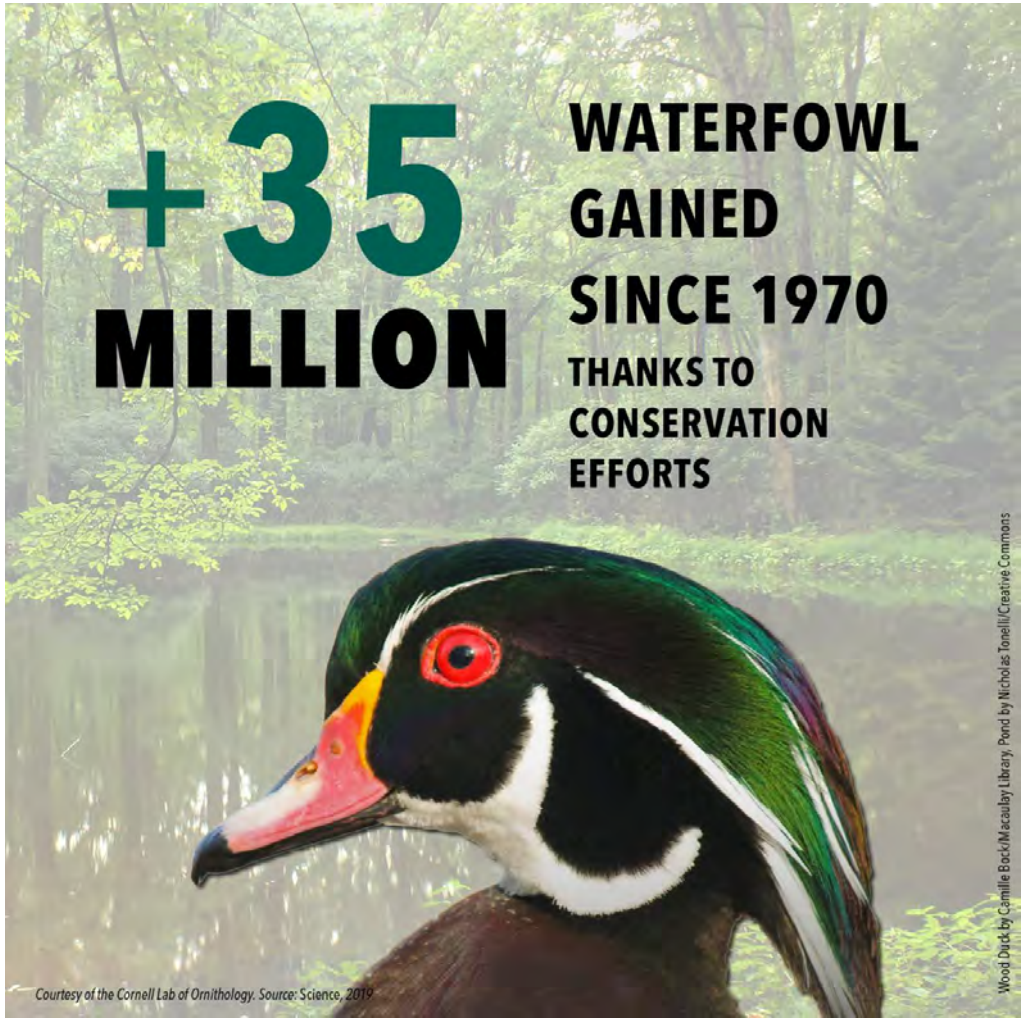
Recovering Three Billion Birds



Rosenberg et al. Science 2019

Reasons for Optimism





Rosenberg et al. Science 2019

Glass collisions kill almost 1 billion birds per year

>99% of collisions at homes and low-rise buildings

Why do bird collide with glass?

- Birds do not see clear or reflective glass
- Reflections create illusion of habitat or open sky
- Birds are attracted to lights

Daytime vs. Night

- Daytime collisions – reflections, attraction to interior plants, or flight paths

- Nighttime collisions – attracted to and disoriented by lights

Value of the night sky

The night sky supports healthy, natural ecological functioning

Our future is bright

- Nighttime lighting is increasing 9% each year globally

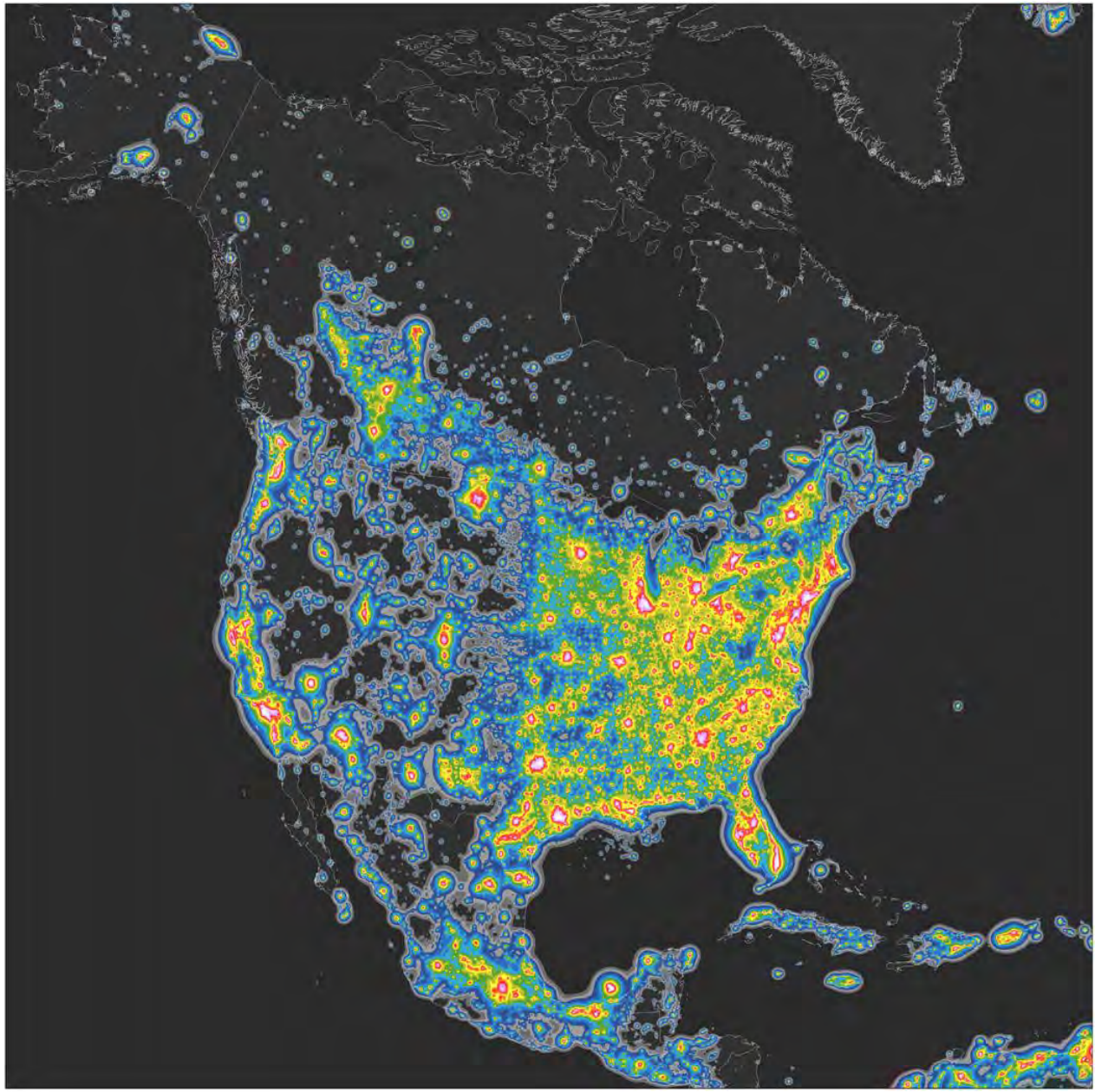
- >80% of people live under a lit sky

Protected Areas

<1/3 Key Biodiversity Areas have pristine skies globally

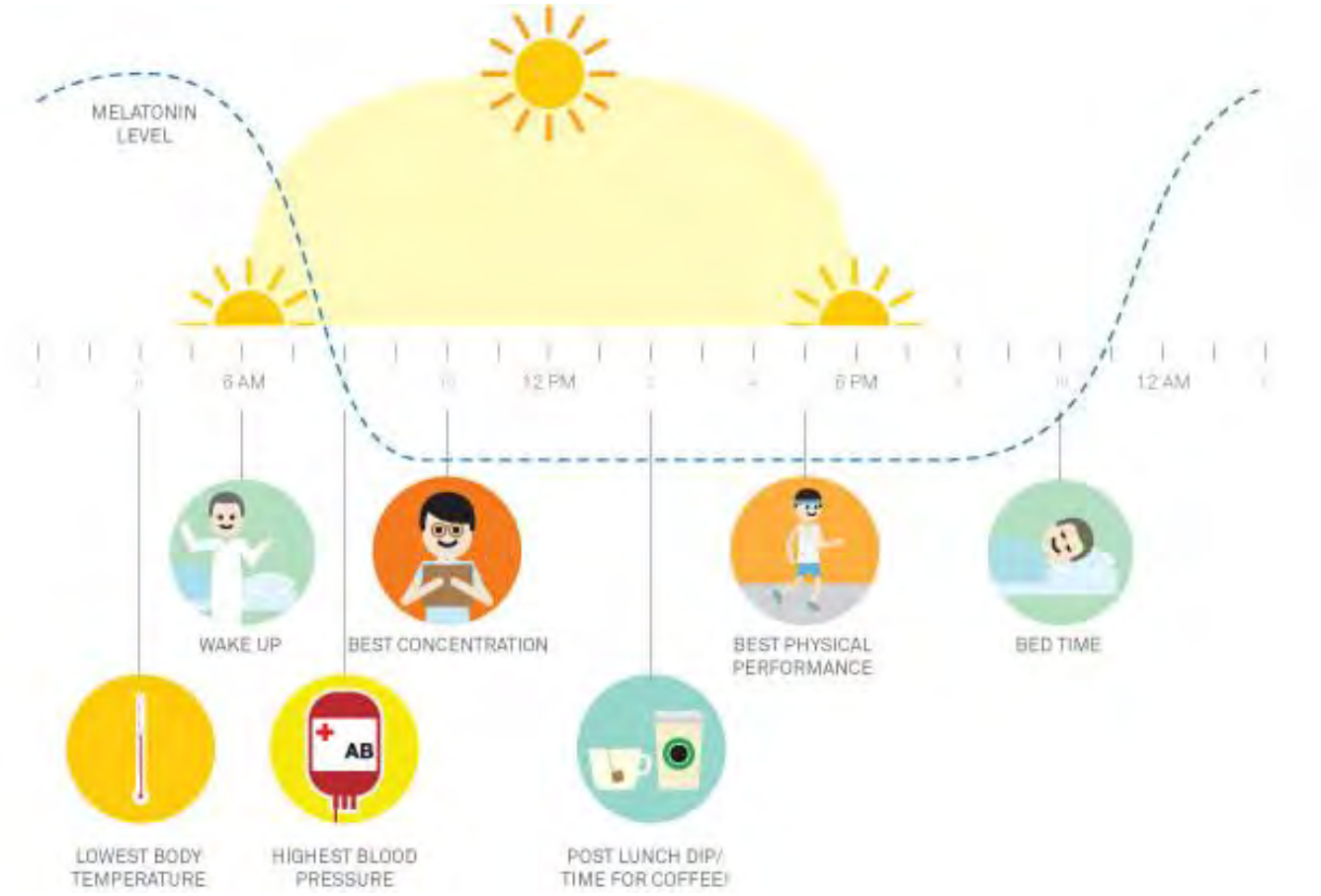
Almost ½ of the U.S. has light pollution

Nearly every National Park in the U.S. has light pollution



Falchi et al. 2016

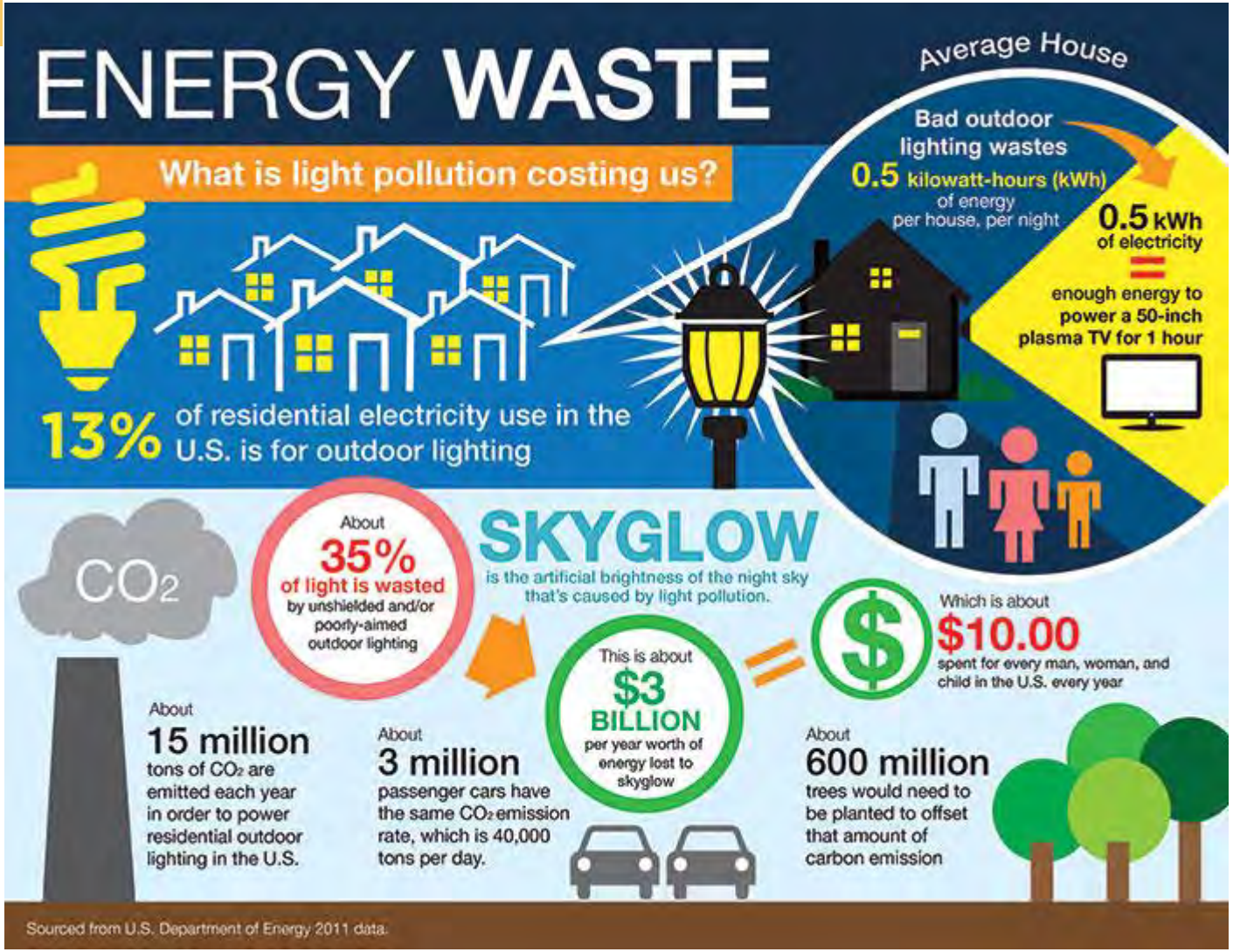
Effects of Nighttime Lighting on People



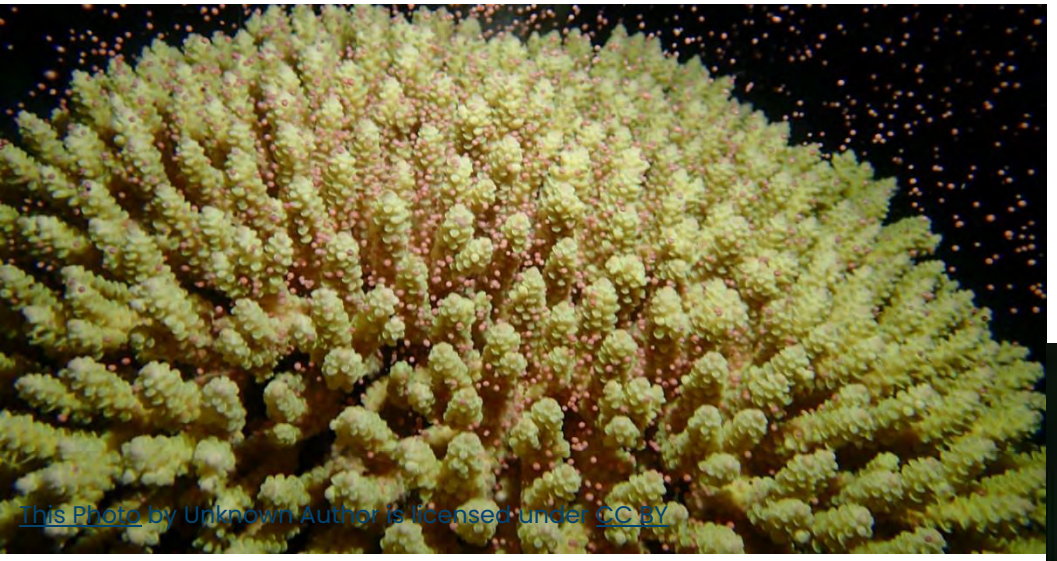
Nighttime Lighting and Safety and Security

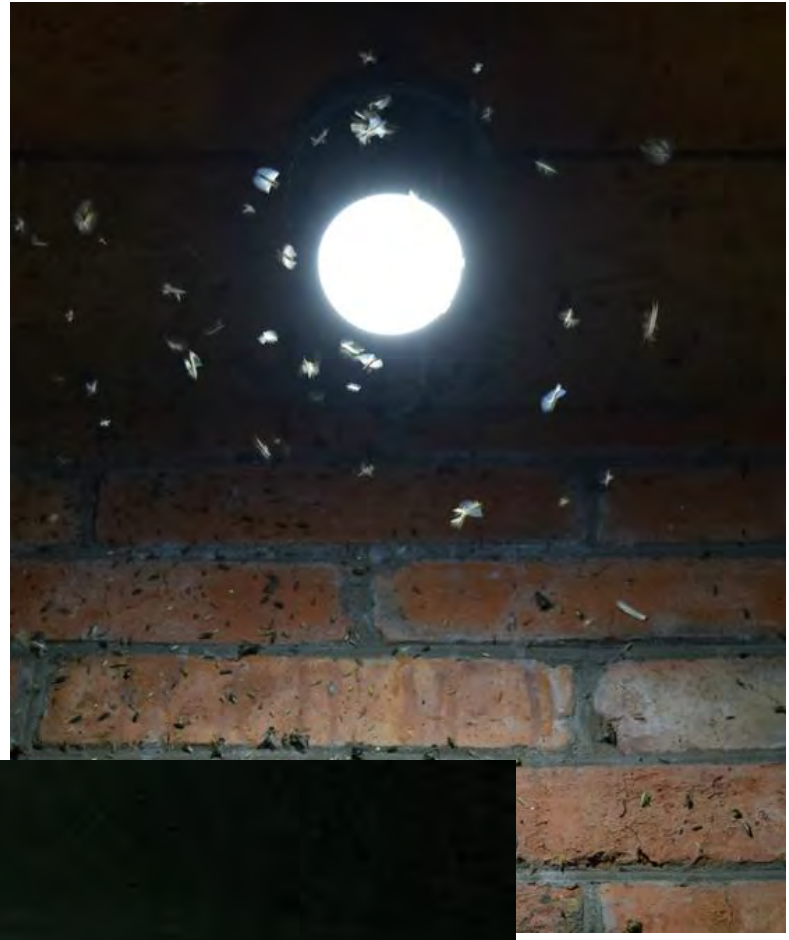
- Glare and reduced visibility
- False sense of security

Nighttime Lighting, Energy, and Emissions



Effects of ALAN on wildlife





Horton 2019

All bird species

19%

Migratory

North American bird species

70%

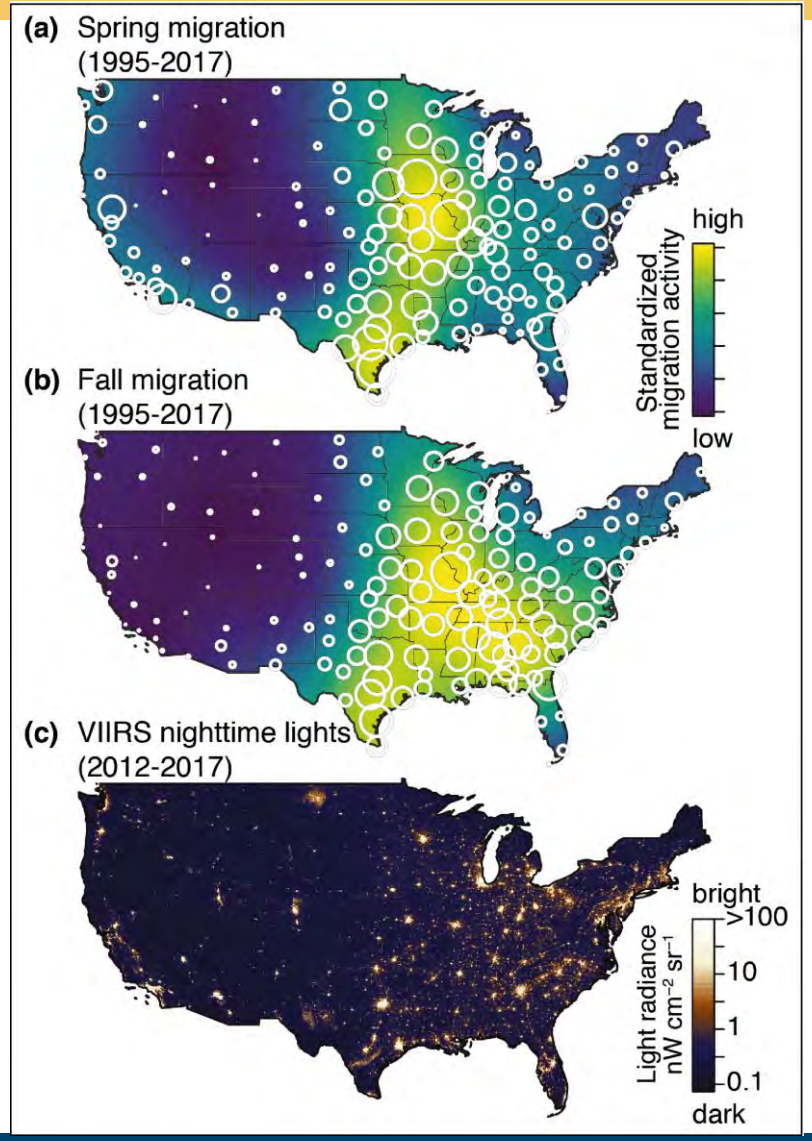
Migratory

North American migratory birds

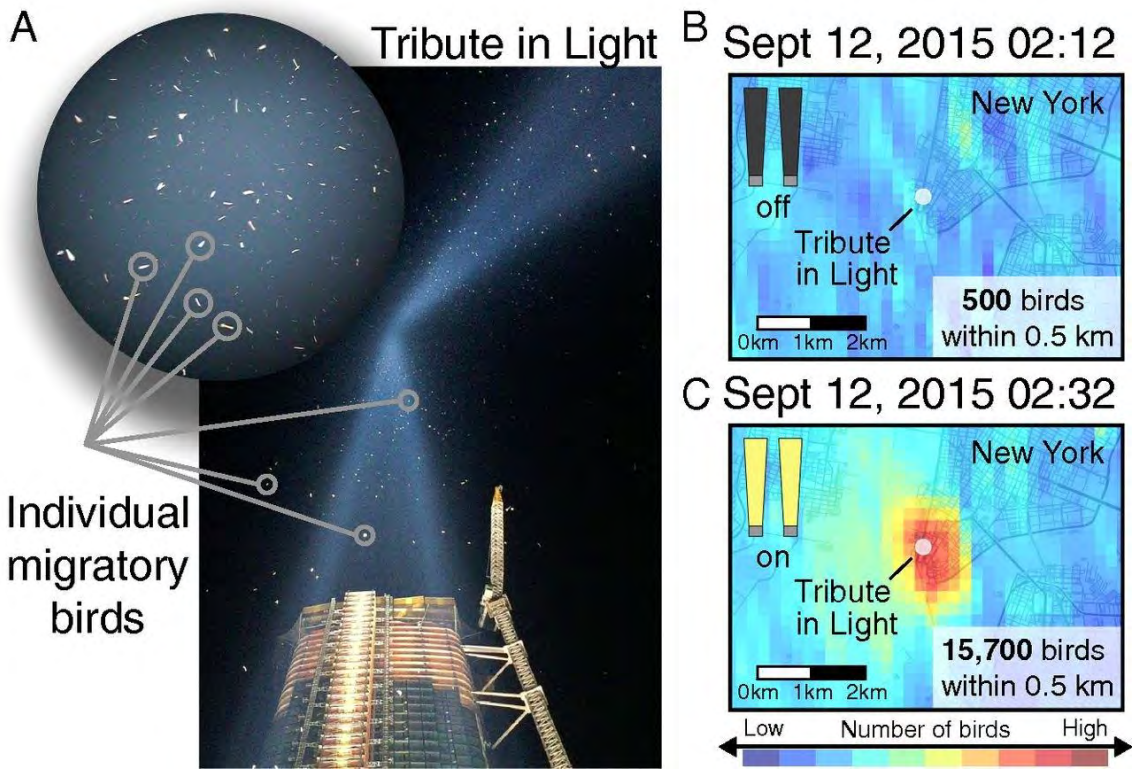
80%

Migrate at night

Effects of ALAN on birds



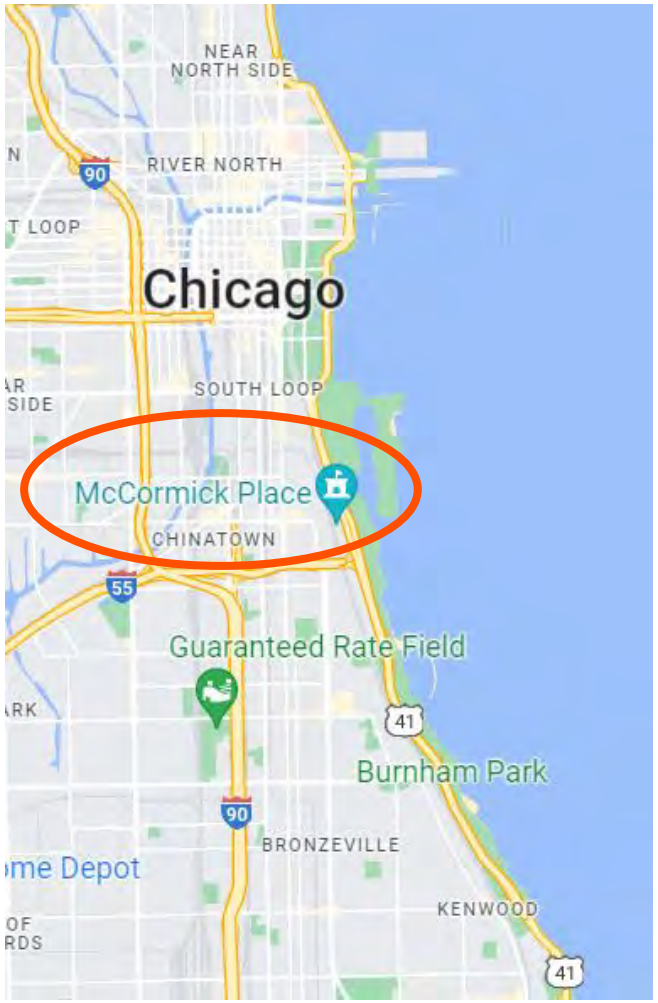
Horton et al. 2019



Van Doren et al. 2017

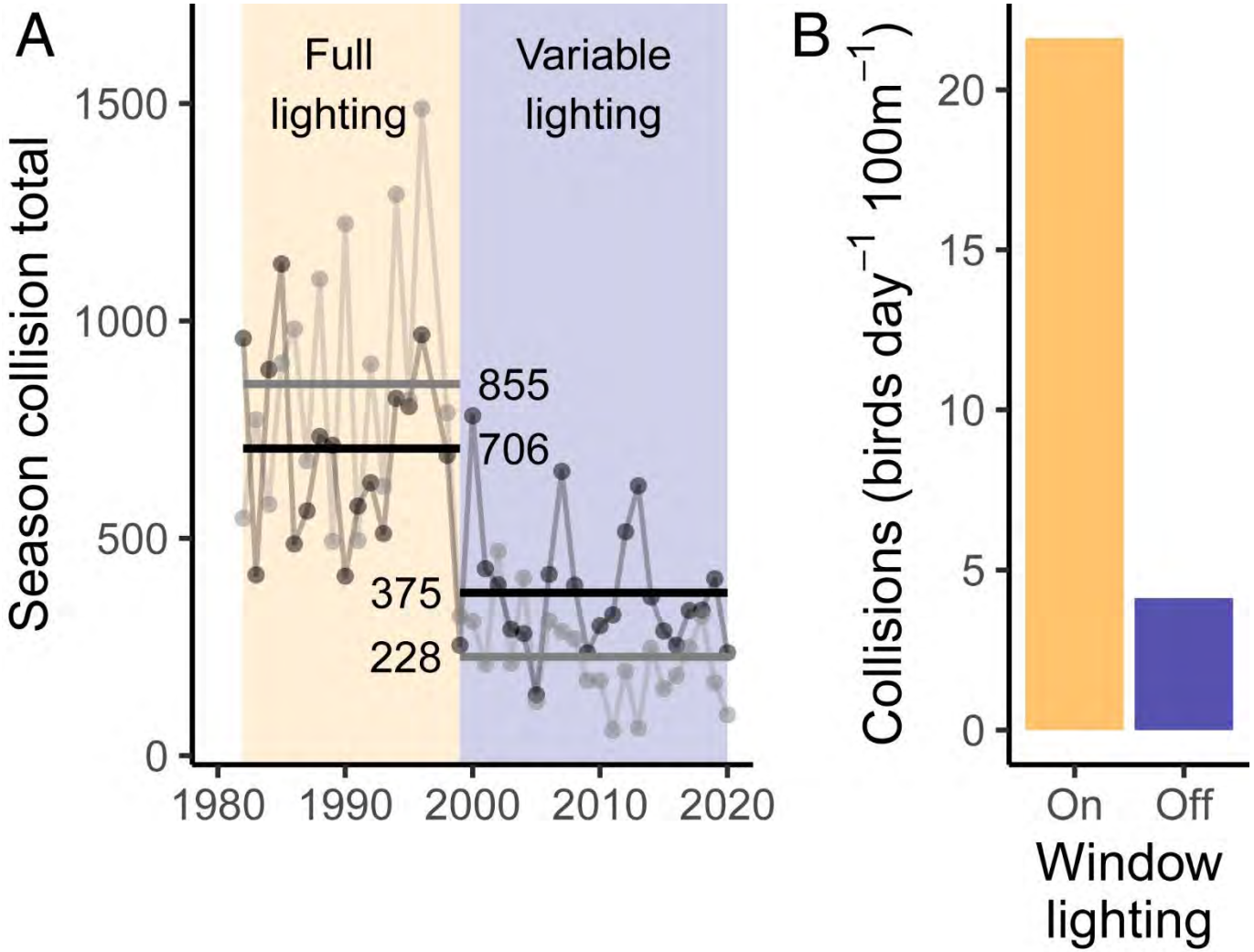
© Airam Rodríguez

Light and window collisions



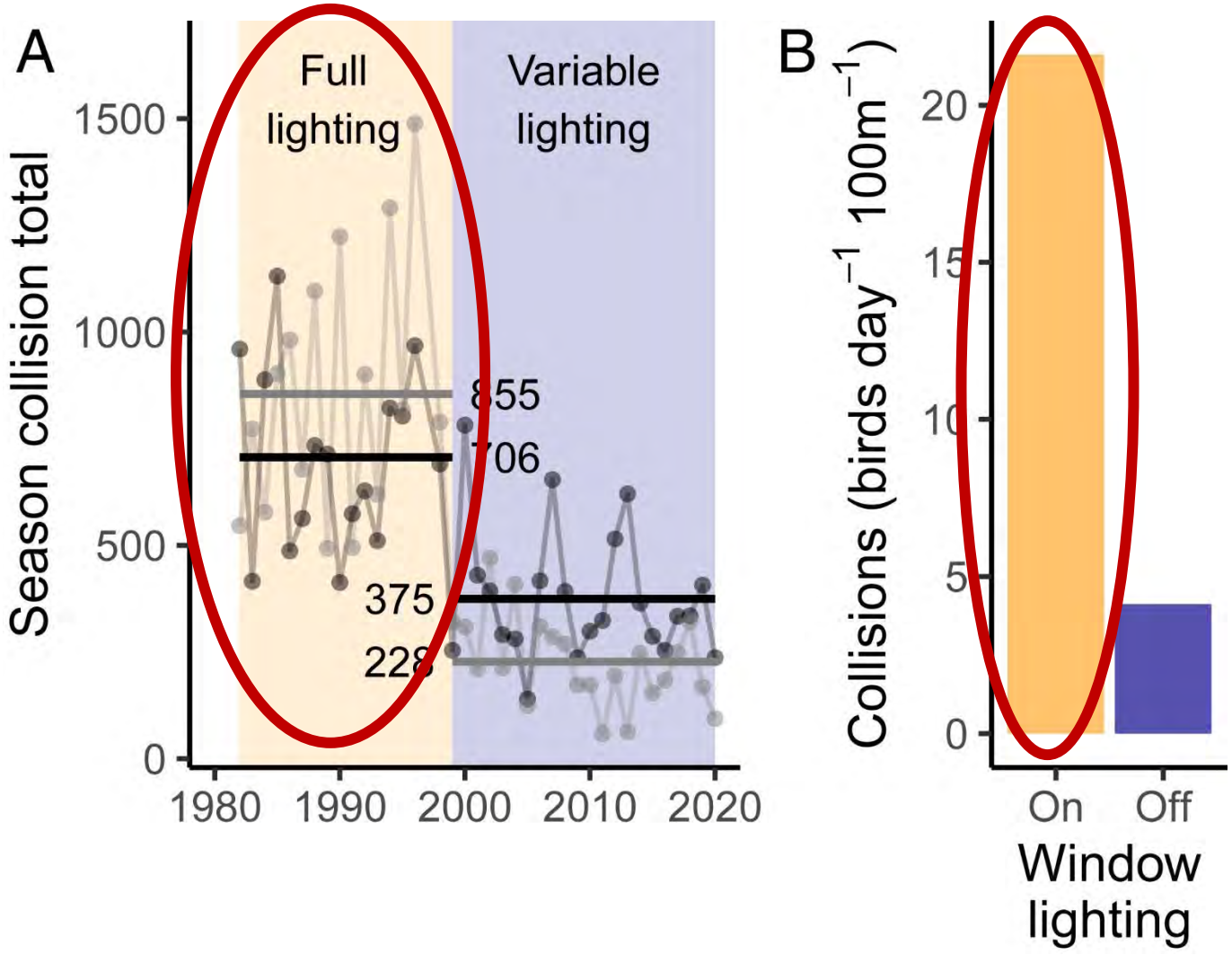
Van Doren et al. 2021

Light and window collisions



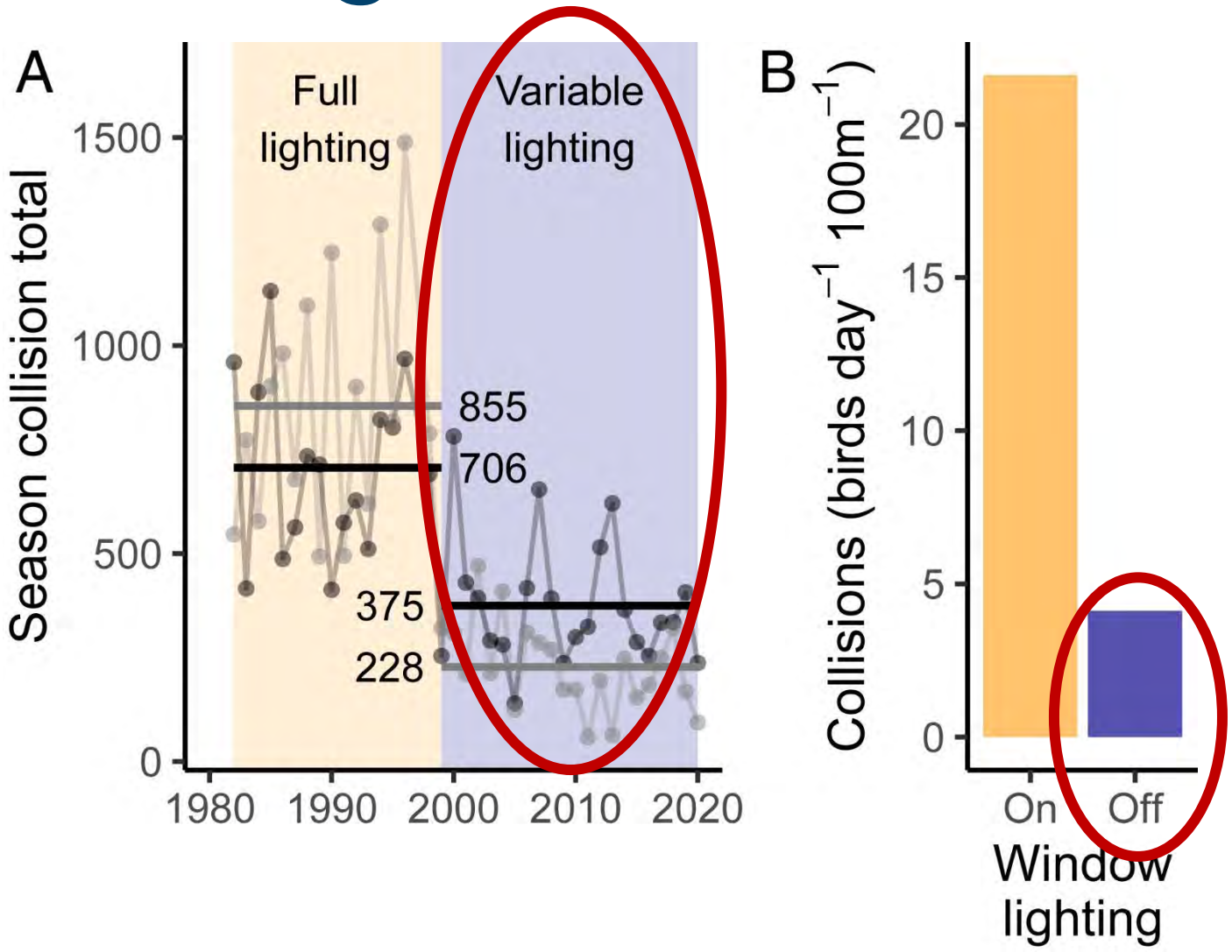
Van Doren et al. 2021

Light and window collisions



Van Doren et al. 2021

Light and window collisions



Van Doren et al. 2021

Solutions

Increasing concern and response across sectors

World Migratory Bird Day

Dim the Lights for Birds at Night

14 May and 8 October 2022

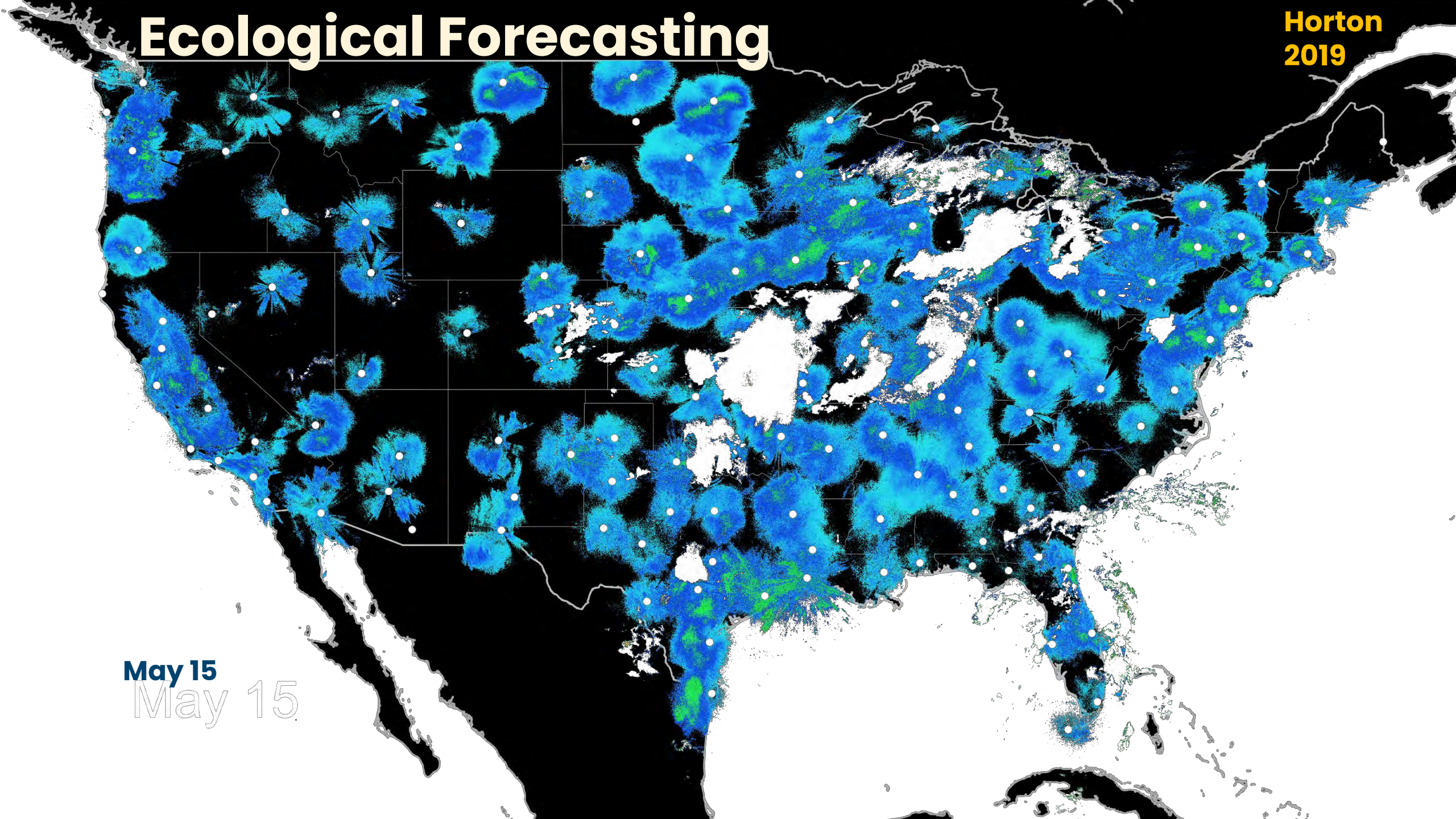
World Migratory Bird Day

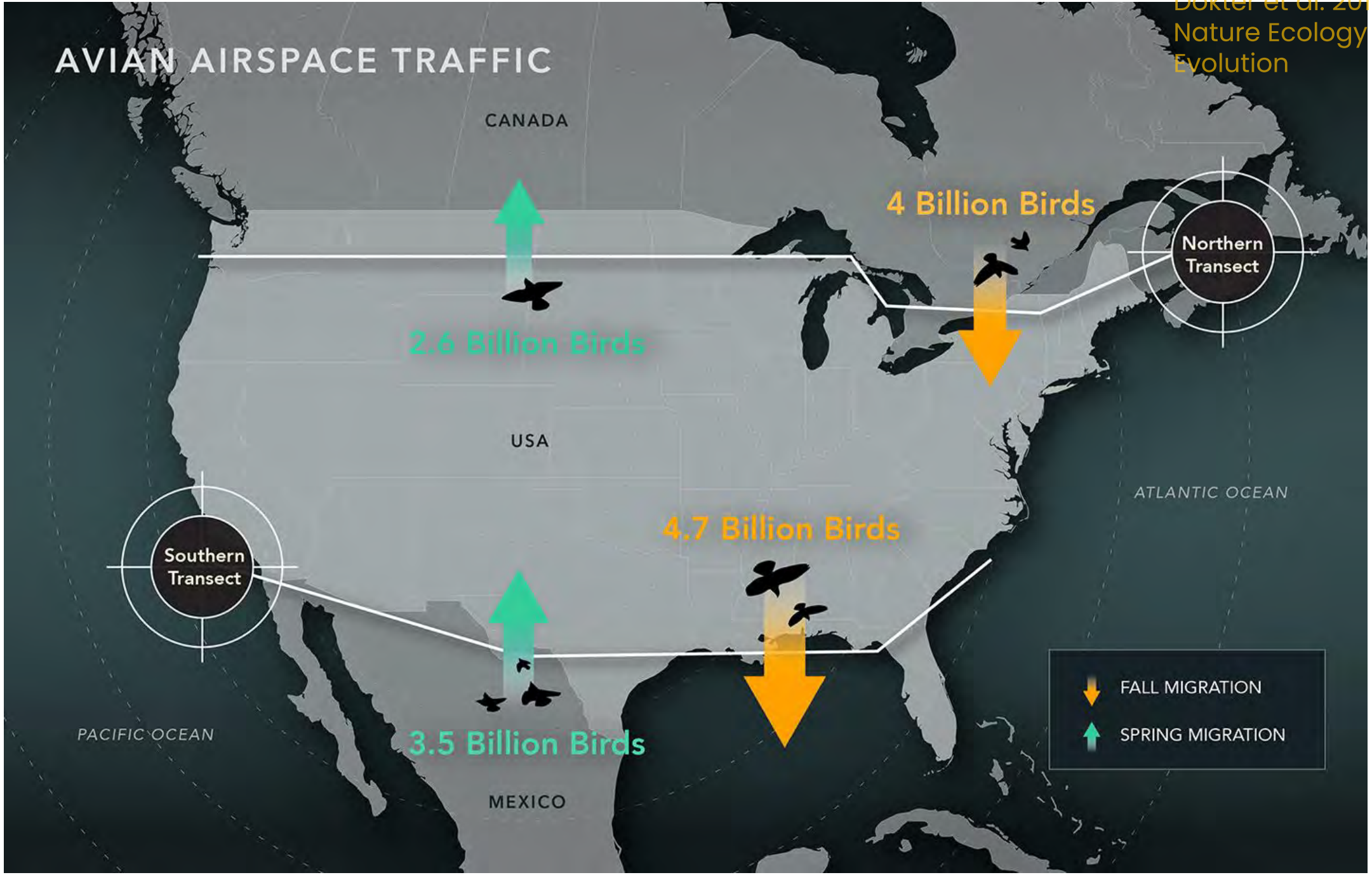
CMS AEWA Environment for the Americas

www.worldmigratorybirdday.org

Ecological Forecasting

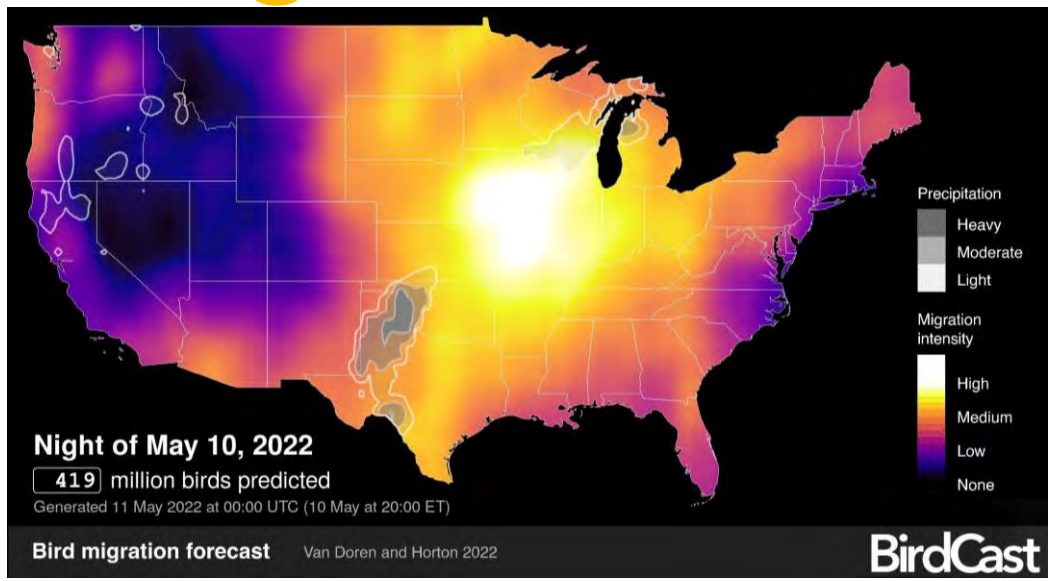
Horton
2019

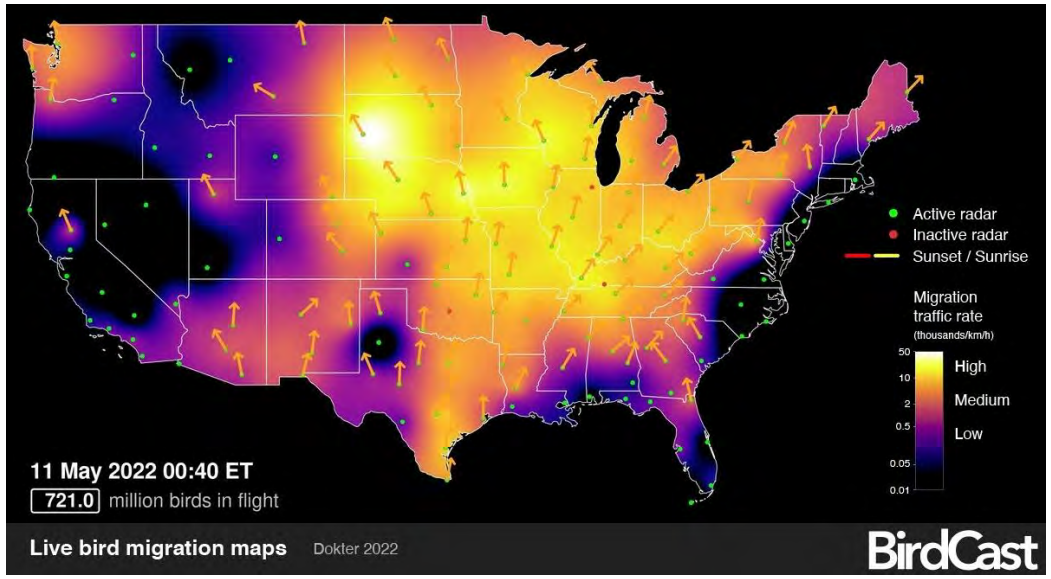


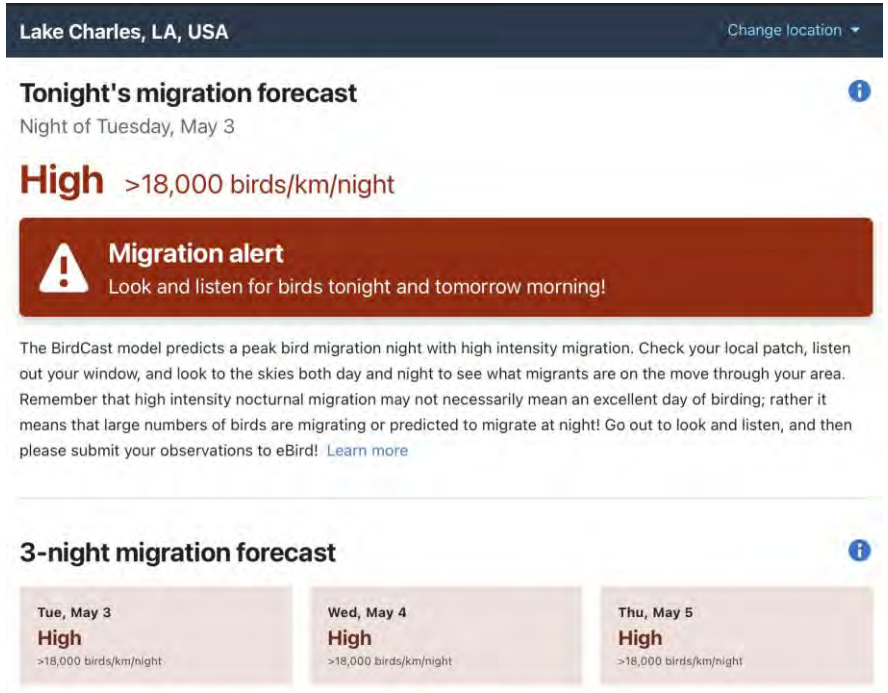


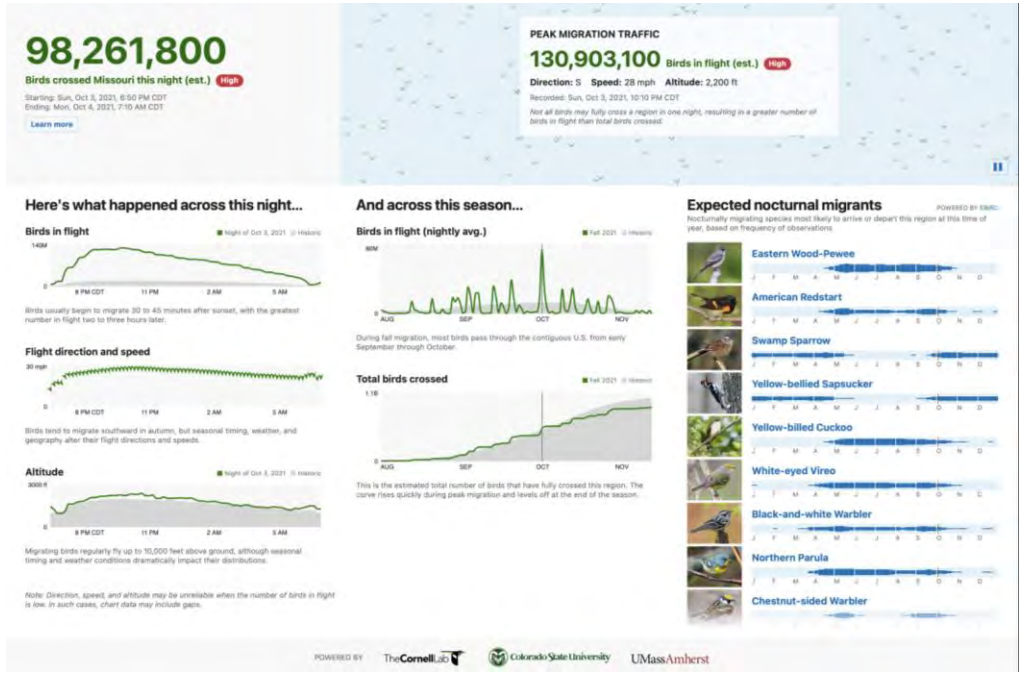
Dokter et al. 2018, Nature Ecology and Evolution

Migration Monitoring Tools and Data









Human Dimensions

Understanding:

- Perceptions
- Comfort
- Fears
- Response to information

Lighting Best Practices – What to do

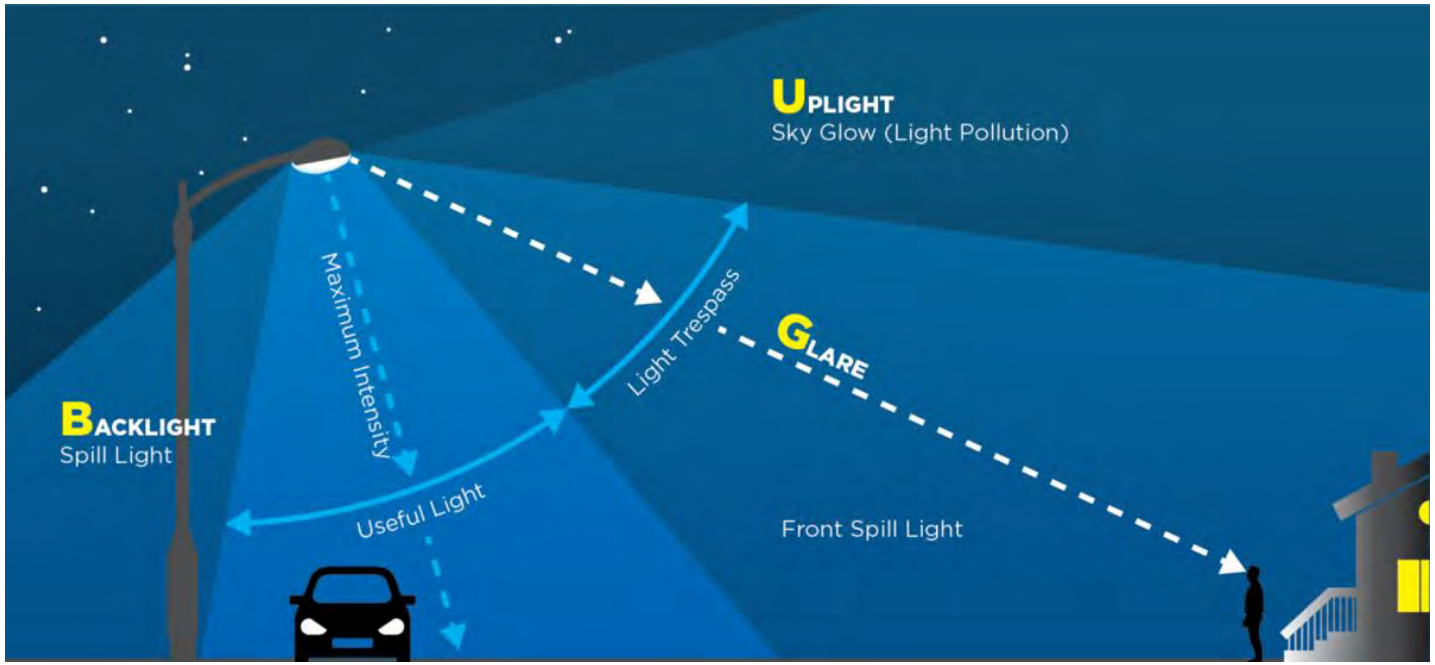
1. Evaluate
2. Plan
3. Act
4. Spread the word

Lighting Best Practices

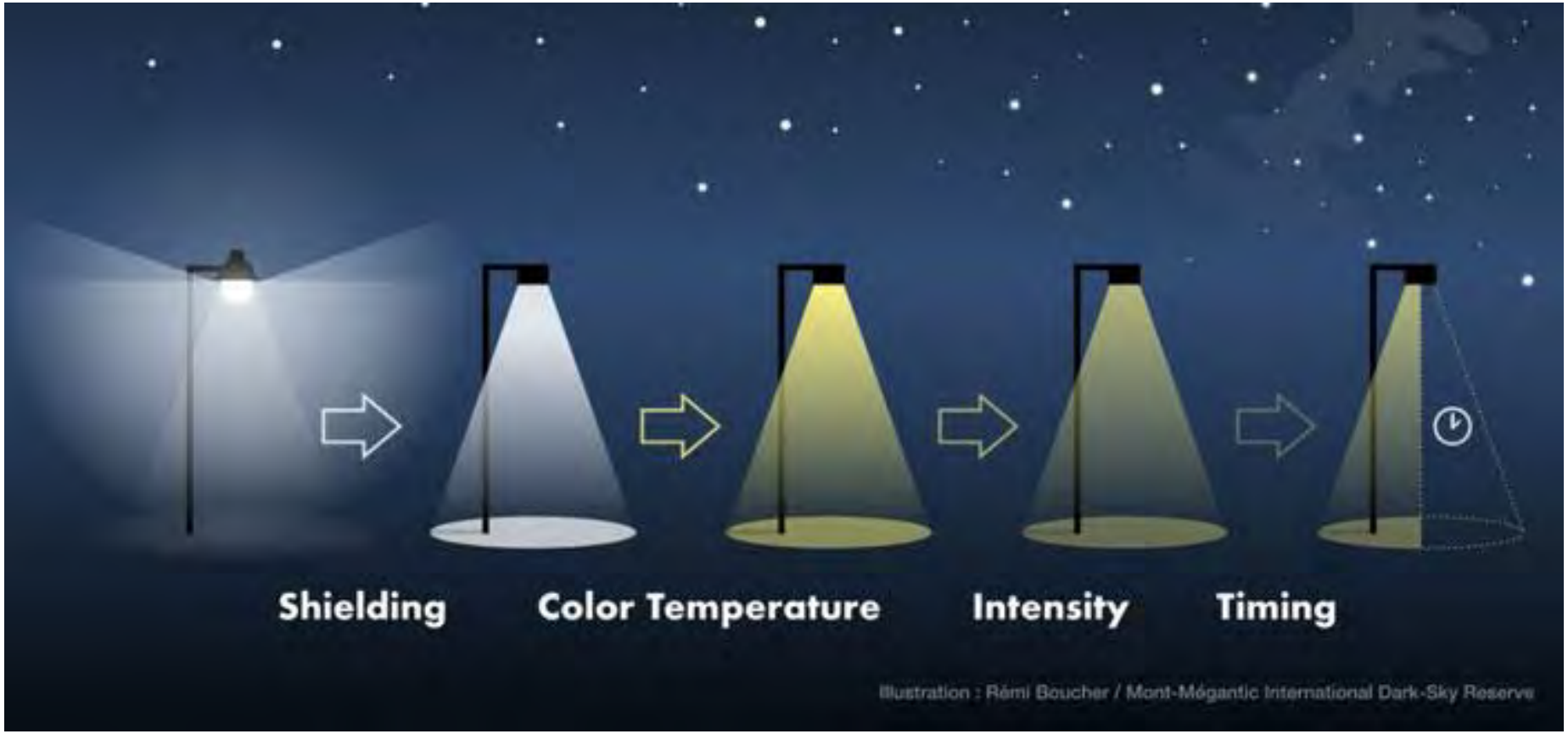
1. Avoid lighting

Lighting Best Practices

2. As little lighting as possible, where and when it's needed



Lighting Best Practices



New vs replace vs retrofit

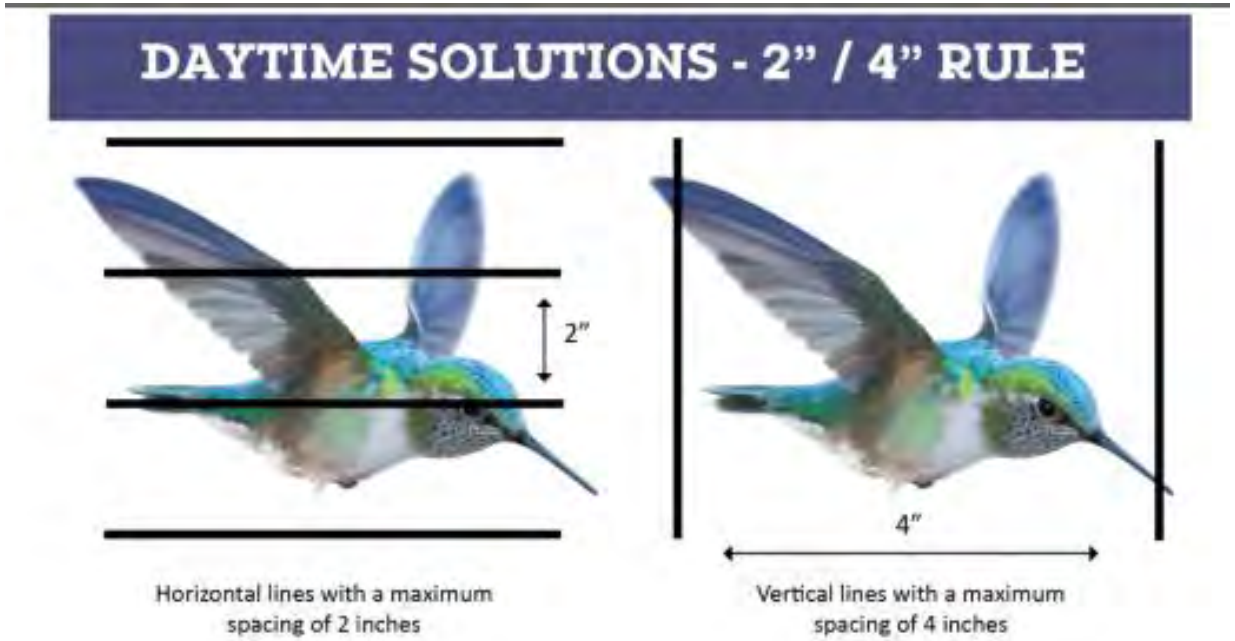
- Incorporate into new construction plans
- Replace existing lights
- Retrofit existing lights

What can we do?!

Immediate – low to no cost

Glass Solutions

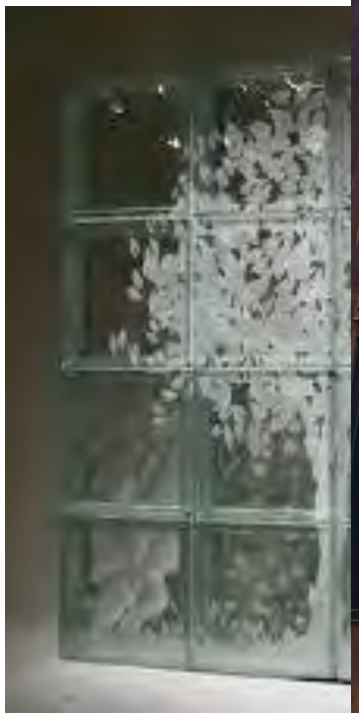
- **Stickers, strips, and films**
- **Zen curtains**
- **Soap, paint**



What can we do?!

Long-term – glass type and building architecture

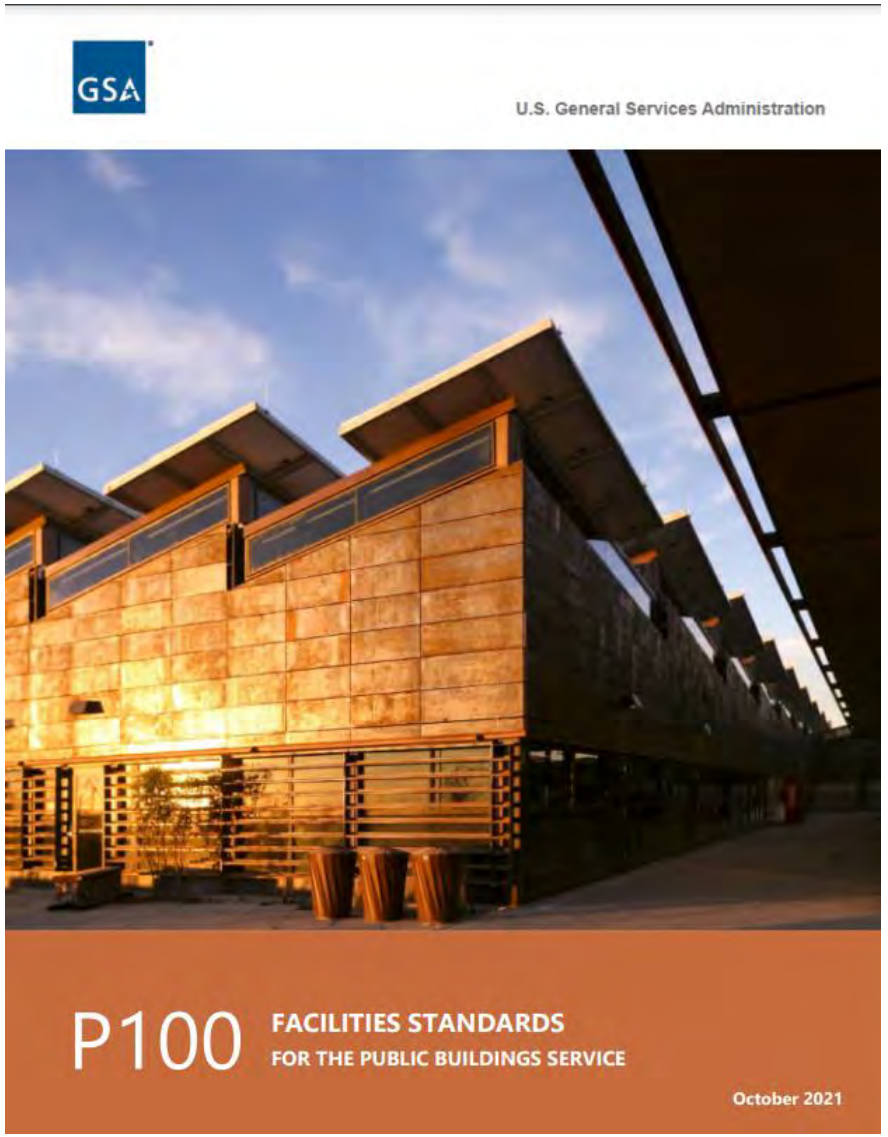
- **Screens and netting**
- **Etching and fritting**
- **New technologies and glass types**
- **Glazing**



Why should we act?

- Migratory Bird Treaty Act
- Endangered Species Act
- Executive Order 13186
- Council MOU between DoD and USFWS
- DoD Climate Adaptation Plan

Why should we act?



Appropriations language - 2022 refers to HR 117-83

“Applies to DOI and related agencies”

Bureau of Land Management, United States Fish and Wildlife Service, National Park Service, United States Geological Survey, Bureau of Ocean Energy Management, Bureau of Safety and Environmental Enforcement, Office of Surface Mining Reclamation and Enforcement, Bureau of Indian Affairs, Bureau of Indian Education, Office of the Special Trustee for American Indians, Office of the Secretary, Insular Affairs, Office of the Solicitor, Office of Inspector General,

Title II--Environmental Protection Agency,

Title III--Related Agencies: Office of the Under Secretary for Natural Resources and Environment, Forest Service, Indian Health Service, National Institute of Environmental Health Sciences, Agency for Toxic Substances and Disease Registry.

Other Related Agencies: Council on Environmental Quality and Office of Environmental Quality, Chemical Safety and Hazard Investigation Board, Office of Navajo and Hopi Indian Relocation, Institute of American Indian and Alaska Native Culture and Arts Development, Smithsonian Institution. National Gallery of Art, John F. Kennedy Center for the Performing Arts, Woodrow Wilson International Center for Scholars, National Endowment for the Arts, National Endowment for the Humanities, Commission of Fine Arts, National Capital Arts and Cultural Affairs, Advisory Council on Historic Preservation, National Capital Planning Commission, United States Holocaust Memorial Museum, Presidio Trust, World War I Centennial Commission

Appropriations language

BIRD COLLISIONS ON FEDERAL PROPERTY

…At a minimum, all agencies are directed to take low cost or no cost action, such as turning off interior lights at night or applying films or other adhesives to glass windows to reduce bird collisions….

© Eric Kershner

What is the USFWS doing to address glass collisions?

- New webpage with glass and lighting information and resources
- Combining energy conservation & collision reduction
- Targeted lighting recommendations
- Incorporating lighting into IPaC
- Collisions videos (towers and lights)
- Diverse partnerships (NWRS, DoD, USCG, marine environments)
- Teaching facilities management to apply products and manage lights
- Great American Outdoors Act construction is bird-safe
- Building collaboration among U.S., Canada, and Mexico
- Regional *Points of Contact* and communication strategies
- Sharepoint for Service employees with survey of FWS facilities

Resources available through the Service

REDUCING BIRD COLLISIONS WITH BUILDINGS AND BUILDING GLASS BEST PRACTICES

US FISH AND WILDLIFE SERVICE
DIVISION OF MIGRATORY BIRD MANAGEMENT
FALLS CHURCH, VIRGINIA

JANUARY 2016
UPDATED FEBRUARY 2021

Methods to Reduce Bird Collisions with Glass When Remodeling and Designing New Facilities
Migratory Bird Program, U. S. Fish and Wildlife Service
Falls Church, Virginia
November 2020

Every year nearly one billion birds fatally collide with glass in the U.S. While most people consider bird collisions with glass to be an urban phenomenon involving tall, mirrored-glass skyscrapers, the reality is that 56% of collision mortality occurs at low-rise buildings (i.e., one to four stories), 44% at urban and rural residences, and <1% at high-rise buildings (Loss et al. 2014). Many government facilities and refuge visitor centers fit the description of the buildings involved in most bird collisions. Fortunately, low-cost, attractive glass treatments are available for existing buildings, while new builds and remodels can incorporate bird-safe building design and specialized glass. Many of bird-safe measures simultaneously reduce energy costs. Recent research quantifying that bird populations in North America have declined by nearly three billion birds over the last 50 years, deserves a strong response from federal agencies and an increased focus on tangible actions that result in measurable conservation outcomes, such as reducing bird collisions with glass.

Minimizing bird collisions with glass is consistent with 116-100 – Department of the Interior, Environment and Related Agencies Appropriations Bill 2020; the Government Services Administration (GSA) P100 Facilities Standards for the Public Buildings Service; and a continuously growing public concern about bird population declines. In June 2020, the House of Representatives passed H.R. 2, the Bird Safe Buildings Act, which mandates all public buildings managed by GSA to be designed or altered in a bird friendly manner. Leadership in Energy and Environmental Design (LEED) acknowledges the importance of bird-friendly design and related measures through associated credits. In addition, taking steps to reduce bird collisions with glass supports the intention of Executive Order 13186: Responsibilities of Federal Agencies to Protect Migratory Birds.

Birds do not see clear or reflective glass as a barrier. Glass creates a lethal illusion of clear airspace. The majority of collisions occur during the day when birds can see landscape reflections in the glass (e.g., clouds, sky, vegetation, or the ground); or birds see through glass to perceived habitats (e.g., potted plants or vegetation inside buildings). When inclement weather occurs during spring and fall bird migrations, birds can be attracted to lighted facilities; resulting in collisions, entrapment, excess energy expenditure, exhaustion, and occasionally large-scale nighttime mortality events.

1

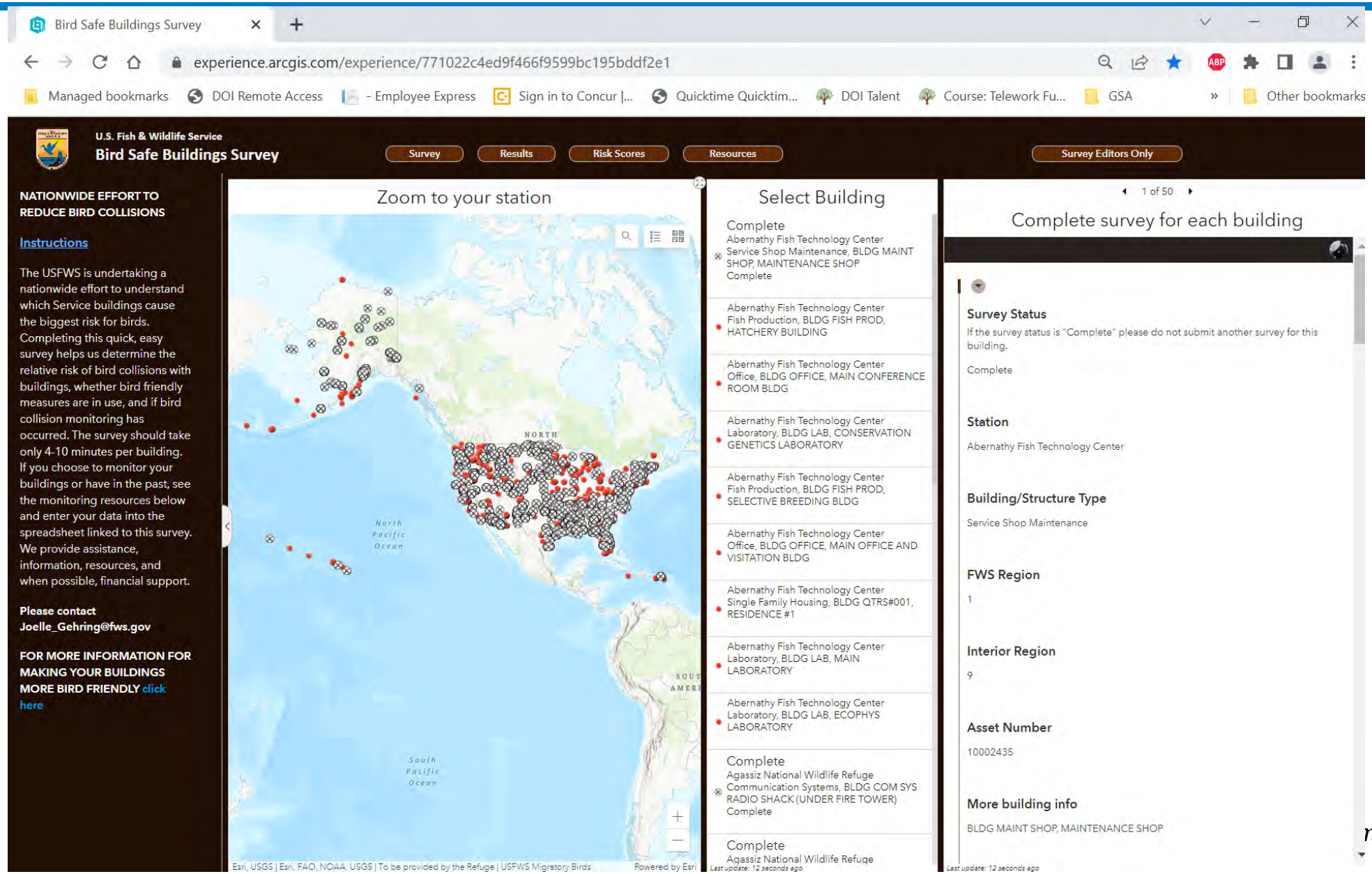
LOW-COST METHODS TO REDUCE BIRD COLLISIONS WITH GLASS

Every year, nearly one billion birds collide with glass in the U.S. While most people consider bird collisions with glass to be an urban phenomenon involving tall, mirrored-glass skyscrapers, the reality is that 56% of collision mortality occurs at low-rise buildings (i.e., one to four stories), 44% at urban and rural residences, and <1% at high-rise buildings (Loss et al. 2014). Many government facilities and refuge visitor centers fit the description of the buildings involved in most bird collisions.

Fortunately, low-cost, attractive solutions are available to building owners and managers. Recent research quantifying the loss of nearly three billion birds in North America over the last 50 years deserves a strong response from federal agencies and an increased focus on tangible actions that result in measurable conservation outcomes, such as reducing bird collisions with glass.

The U.S. Fish and Wildlife Service helped fund a bird-safe window retrofit demonstration at the Oregon Museum of Science and Industry.

Building Survey

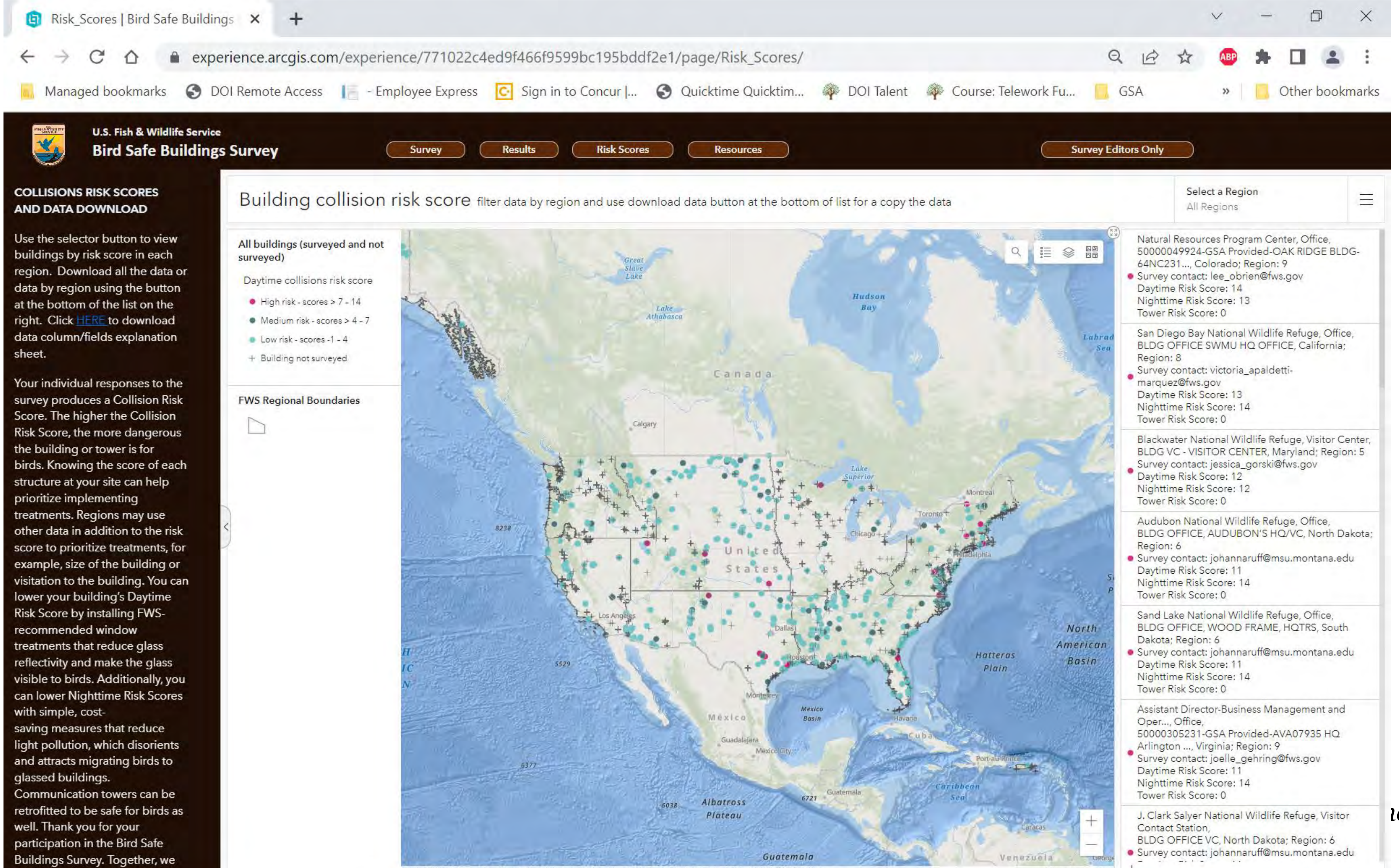


nerica's Birds

6.8 million birds/year in the U.S. and Canada

(Longcore et al. 2012)

Results! Dashboard



…erica's Birds

Midwest Bird Friendly Challenge

serving America's Birds

Southwest Bird Friendly Design

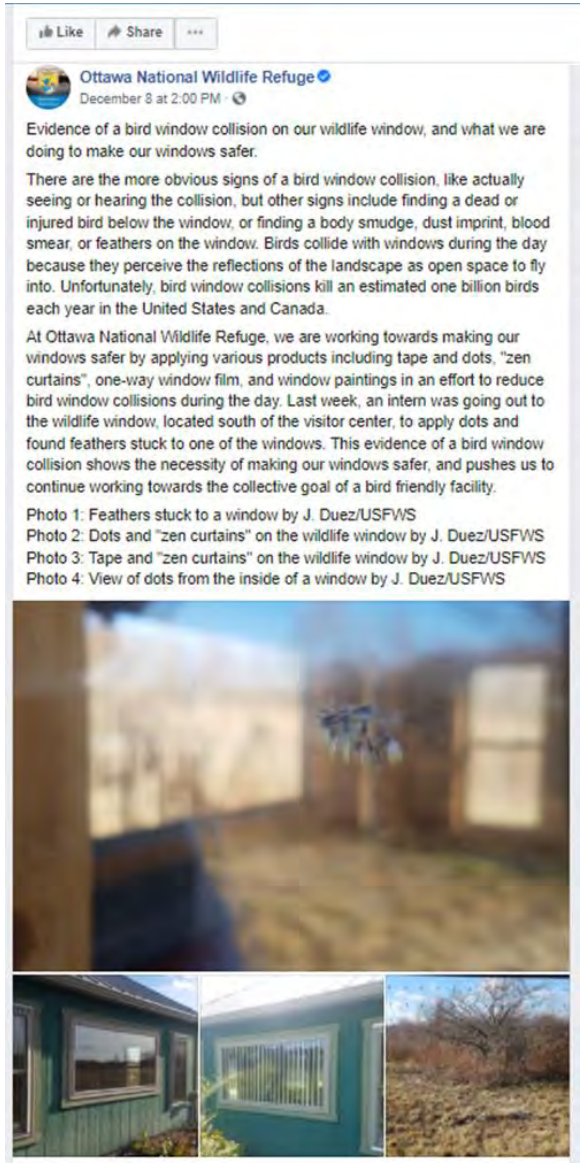
Valle de Oro National Wildlife Refuge

National Park Service, Everglades National Park

R. DiPietro

Share the good news!

Social media posts and other outreach



Like Share ···

Ottawa National Wildlife Refuge
December 8 at 2:00 PM ·

Evidence of a bird window collision on our wildlife window, and what we are doing to make our windows safer.

There are the more obvious signs of a bird window collision, like actually seeing or hearing the collision, but other signs include finding a dead or injured bird below the window, or finding a body smudge, dust imprint, blood smear, or feathers on the window. Birds collide with windows during the day because they perceive the reflections of the landscape as open space to fly into. Unfortunately, bird window collisions kill an estimated one billion birds each year in the United States and Canada.

At Ottawa National Wildlife Refuge, we are working towards making our windows safer by applying various products including tape and dots, "zen curtains", one-way window film, and window paintings in an effort to reduce bird window collisions during the day. Last week, an intern was going out to the wildlife window, located south of the visitor center, to apply dots and found feathers stuck to one of the windows. This evidence of a bird window collision shows the necessity of making our windows safer, and pushes us to continue working towards the collective goal of a bird friendly facility.

Photo 1: Feathers stuck to a window by J. Duez/USFWS
Photo 2: Dots and "zen curtains" on the wildlife window by J. Duez/USFWS
Photo 3: Tape and "zen curtains" on the wildlife window by J. Duez/USFWS
Photo 4: View of dots from the inside of a window by J. Duez/USFWS

#birdcollisions

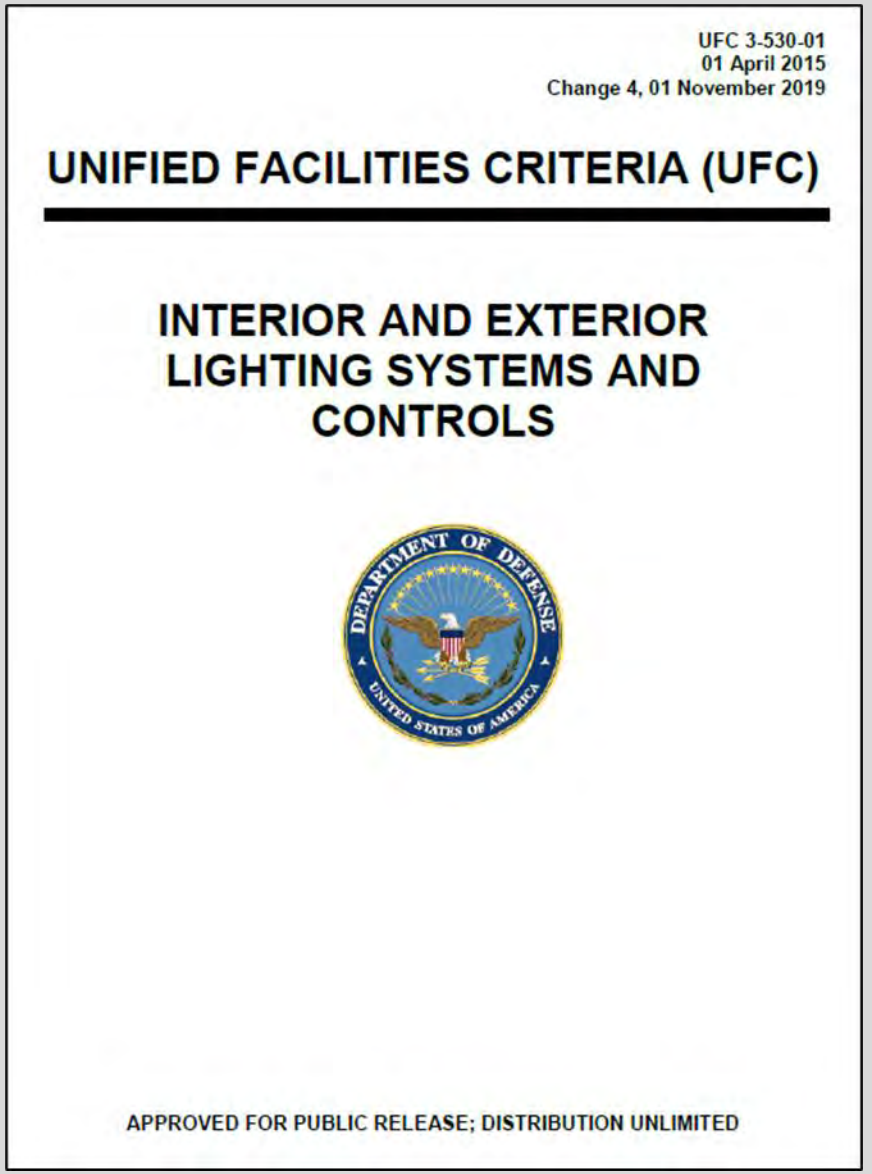
Dark Skies as an Asset

White Sands Missile Range

- Tracking of celestial objects
- Concealment of testing
- Night-vision equipment testing or use

Ground-Based Electro-Optical Deep Space Surveillance (GEODSS)

DoD Unified Facilities Criteria



UFC 3-530-01
01 April 2015
Change 4, 01 November 2019

UNIFIED FACILITIES CRITERIA (UFC)

INTERIOR AND EXTERIOR LIGHTING SYSTEMS AND CONTROLS

APPROVED FOR PUBLIC RELEASE; DISTRIBUTION UNLIMITED

DoD Unified Facilities Criteria

FC 3-530-01 INTERIOR AND EXTERIOR LIGHTING SYSTEMS AND CONTROLS

- 4-1.3.1 Direct Glare: Avoid direct glare from luminaires and excessive contrast of surfaces. Use shielded light sources and as low a wattage as possible.
- 4-1.3.2 Light Pollution/Trespass: Use fully shielded or IES U0 luminaires to eliminate direct light above the horizontal plane. Refer to maximum allowable uplight (U) and backlight (B) ratings in specific lighting zones.
- 4-2 Lighting Zones: Lighting zones reflect the base (or ambient) light levels desired for an area. Adopt the lowest possible lighting zone.
- 4-3 Lighting Controls (switches, timers, dimmers, etc.)
- 4-4.2 Light Source Technology: Use a CCT of no greater than 4100K to reduce skyglow.
- 4-4.2.1 Use amber LEDs in place of Low Pressure Sodium (LPS) for sensitive environments such as wildlife habitat, observations, wildlife nesting, or to meet dark sky requirements (observatories). Incorporate Fish and Wildlife, State, and local governing authority recommendations for lighting systems design and installation.
- 6-2.7.3 High Level of Protection (HLOP). Use controlled lighting, except when dictated by local threat environment. (then “Glare Projection” can be used)

Tilt and Light Quality

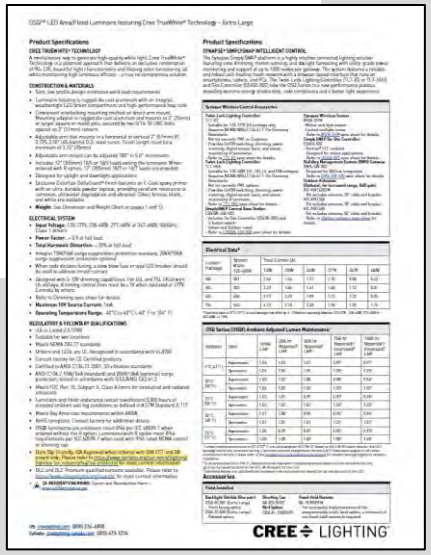
CREE LIGHTING

OSQ™ Series

Share

The OSQ Series Flood luminaire blends extreme optical control, advanced thermal management and modern aesthetics. The rugged cast aluminum housing is built to last with a weathertight LED driver compartment. Versatile mounting options offer simple installation. Its slim low-profile design minimizes wind load requirements and blends seamlessly.

- 10 YEAR WARRANTY
- IDA DARK SKY APPROVED
- DLC PREMIUM
- 90+ HIGH CRI OPTIONS
- LPW HIGH EFFICACY OPTIONS
- VERSATILE MOUNTING

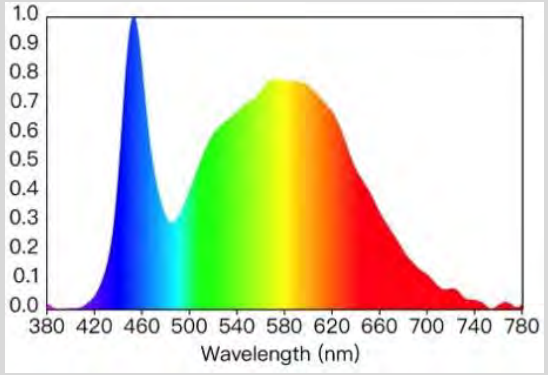


- Dark Sky Friendly, IDA Approved when ordered with 30K CCT and DA mount only. Please refer to https://www.darksky.org/our-work/lighting/lighting-for-industry/fsa/fsa-products/ for most current information

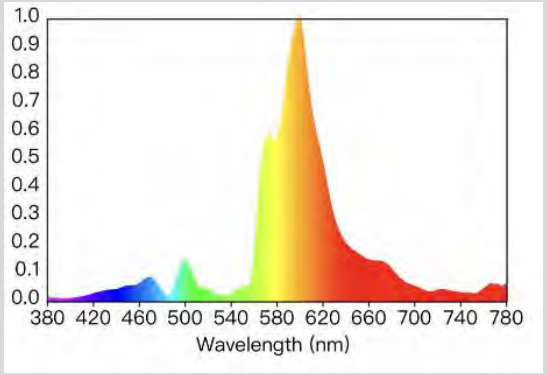
Results

SOURCE AND SPECTRUM

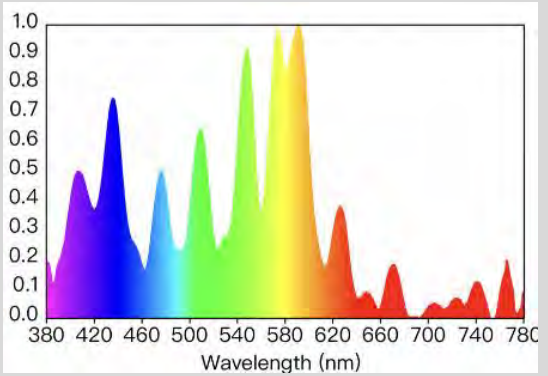
Source	Count	Median	
		Spectral Peak (nm)	CCT (K)
LED	729	450	3908
Sodium Vapor	106	600	1900
Metal Halide	52	590	4478
Incandescent	5	780	2884
Fluorescent	2	540	3822
All Sources	**894**	**450**	**3908**



LED



HP Sodium Vapor



Metal Halide

Results

TILT AND UPLIGHTING

Tilt (degrees)	Count
0	666
10	4
30	74
45	34
60	58
80	17
90	31
>90	4

	Pole	Bollard	Building	Other	Total
No Uplight	562	48	18	1	629
Uplight	122	55	77	5	259

- What resonates with you?
- Where are opportunities for progress at work and home?
- What tools would you like us to share?