

Bird Collisions & Architecture

A Panel Discussion on the Economics, Ecology,
and Design Methods to Reduce Bird Strike Incidence

Friday, April 7, 2017

Signe Skott Cooper Hall Auditorium
University of Wisconsin-Madison
701 Highland Avenue



Facilities Planning & Management
UNIVERSITY OF WISCONSIN-MADISON

continuing education credits available through:



Presentation & Discussion Panelists:

Stanley Temple - moderator

Professor Emeritus, UW-Madison Forest & Wildlife Ecology
Senior Fellow, Aldo Leopold Foundation

Matt Reetz

Executive Director, Madison Audubon
www.madisonaudubon.org

Anna Pidgeon

Faculty, UW-Madison Forest & Wildlife Ecology
www.forestandwildlifeecology.wisc.edu

Stefan Knust

Director of Sustainability, Ennead Architects
www.ennead.com

Sponsored by:

UW-Madison Facilities Planning & Management
Campus Planning & Landscape Architecture (CPLA)
Capital Planning & Development (CPD)

ALA Wisconsin - Southwest Chapter
U.S. Green Building Council - Wisconsin
Wisconsin Chapter - American Society of Landscape Architects

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UW-Madison Facilities Planning & Management
Campus Planning & Landscape Architecture (CPLA)
Capital Planning & Development (CPD)

AIA Wisconsin - Southwest Chapter
U.S. Green Building Council - Wisconsin
Wisconsin Chapter - American Society of Landscape Architects





WISCONSIN CHAPTER EVENTS

APRIL 2017

& CHAPTER SPONSORED EVENTS*



Art of Gardening Symposium* | April 1, 2017

10:00am-4:00pm

UW-Madison Arboretum

Organized by Friends of Allen Centennial Garden, Sponsored in part by WI ASLA

[More Information.](#)



Bird Collisions & Architecture: A Panel Discussion* | April 7, 2017 | 1.5 HSW CEU (LA CES)

1:30pm-3:00pm

UW-Madison, Signe Skott Copper Hall Auditorium

Organized by UW-Madison Facilities Planning & Management, Sponsored in part by WI ASLA

[Register Here.](#)



Arboretum Volunteer Work Day | April 8, 2017

9:00am-12:00pm

University of Wisconsin-Madison Arboretum

[Sign Up Here.](#)



Chicago's Millennium Park and the Innovation of Cultural Landscapes* | April 13, 2017

Pending 2 HSW CEU (LA CES) | 6:30pm – 8:30pm

UW-Madison, Union South

Organized by Friends of Allen Centennial Garden, Sponsored in part by WI ASLA

[Register Here.](#)



38th Annual Jensen-Longenecker Awards Banquet* | April 21, 2017

5:30pm Cocktail Hour, 6:30 Banquet and Awards Ceremony, 8:30pm Live Music and Gallery

UW-Madison, University Club

Organized by UW-Madison Dept. of Landscape Architecture, Sponsored in part WI ASLA

[More Information.](#)



WI ASLA State Advocacy and ASLA Advocacy Day in Washington D.C. |

Throughout April & April 27, 2017

[ASLA Government Affairs](#)

Contact president@wiasla.com if you're interested in getting involved.



UW-Madison Dept. of Landscape Architecture Senior Capstone Presentations | May 2 & 3, 2017

5pm-8:30pm | UW-Madison Mechanical Engineering RM 1163



Taliesin Sketch Event | Date Pending, May 2017

Taliesin, Spring Green, WI
Stay Tuned, Details Coming!

Sponsored by Anova & WI ASLA



Wisconsin Chapter ASLA Instagram Take Over | May 19, 2017

<https://www.instagram.com/landscapearch/>



#WLAM2017 #WIASLA2017

Agenda

Matt Reetz - Madison Audubon (15 min.)

Anna Pidgeon - UW-Madison Faculty (15 min.)

Stefan Knust - Ennead Architects (15 min.)

**Stanley Temple - UW-Madison Professor Emeritus
MODERATOR (18 min.)**

Attendee Q&A (18 min.)

Objectives

1.
Understand the importance of birds and their human relationships, most specifically in the urban environment.
2.
Understand the value of birds and their environmental indicator status.

Objectives

3.
Learn about LEED Pilot Credit 55 (pc55) and its application to projects.
4.
Identify strategies to deter collisions for both new architectural projects and retrofit applications.

Credits

AIA

ASLA

USGBC*

- 1. Pick up sheet of paper in back upon arrival**
- 2. Fill out sheet of paper**
- 3. Leave in back of room (FORM BOX) upon departure**

***Will be approved mid April – sign sheet on back table, USGBC will reach out to you personally**

Matt Reetz

Matt is in his third year as the Executive Director of Madison Audubon Society. Matt earned a BS from the University of Illinois, and Master's and PhD degrees in wildlife ecology and conservation from the University of Florida, during which he conducted field research on a variety of birds both internationally and stateside. Matt then worked as a biologist for Florida's state wildlife agency and a college biology professor before returning to his Wisconsin roots. At UW-Madison he completed two post-doctorate research projects on threatened bird species before joining the nonprofit world.

Anna Pidgeon

Anna is an associate professor in the forest and wildlife ecology department at UW-Madison. She received her BS University of Minnesota Wildlife Management & Life Science Education, MS Central Washington University, and a PhD UW-Madison Department of Wildlife Ecology. She is particularly motivated by questions about habitat needs of vertebrate species, and in conservation challenges posed by human manipulation of habitat.

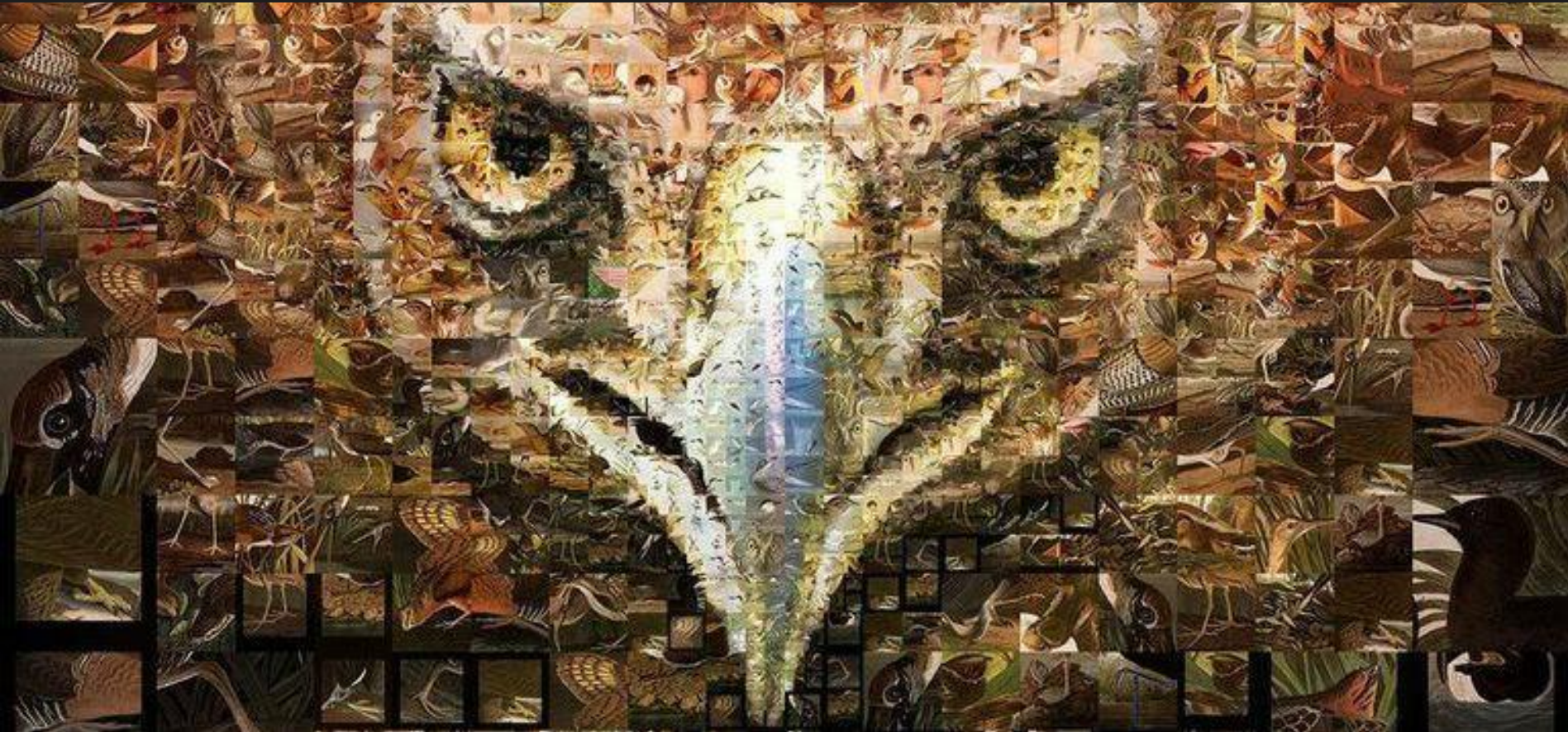
Stefan Knust

Stefan Knust is the Director of Sustainability at Ennead Architects in New York City. Ennead Architects co-developed LEED Pilot Credit 55 - Bird Collision Deterrence. Stefan has been practicing architecture for over 20 years on new and existing building projects, typically for institutional clients that serve the public realm. Stefan received a Bachelor of Science in Architectural Studies from the University of Illinois and a Master of Architecture from the University of Pennsylvania. Mr. Knust is a certified U.S. Passive House Consultant, is active on the Committee for the Environment in his local chapter of the AIA, and co-chairs an ASTM committee that is developing a testing standard for indexing bird-collision deterrent materials. Stefan has been spending portions of his summers in upper Wisconsin since early childhood.

Stan Temple

Stan is the Beers-Bascom Professor Emeritus in Conservation in the Department of Forest and Wildlife Ecology at the University of Wisconsin-Madison. For 32 years he held the academic position once occupied by Aldo Leopold, and during that time he won every teaching award for which he was eligible. He is currently a Senior Fellow with the Aldo Leopold Foundation. He has received special recognitions for his contributions to ecology and conservation from the Society for Conservation Biology, The Wildlife Society, the Wisconsin Society for Ornithology, the American Ornithologists' Union, the Explorer's Club, the Wildlife Conservation Society, the American Association for the Advancement of Science and the Wisconsin Academy of Sciences, Arts and Letters. He has been President of the Society for Conservation Biology and Chairman of the Board of The Nature Conservancy in Wisconsin. He also started his career collecting and counting bird collisions at the Cleveland Terminal Tower in Ohio.

The *Eco*-nomics of Birds



Matthew Reetz, PhD
Executive Director

madison
AUDUBON
society

Who Cares?

“Conjuring a world without birds is a thing I don’t dare imagine, like the death of a child. Their fate is our own.”

—Joel Sartore, Photographer

Why Conserve Birds?

1. *Intrinsic* value – birds have value in an of themselves (for no human purposes)
2. *Instrumental* value – birds serve a purpose that benefits humans



Economic Ornithology

ECONOMIC RELATIONS OF WISCONSIN BIRDS (1882)



FRANKLIN HIRAM KING
KESSINGER LEGACY REPRINTS



THE YELT YELLOW-THROATED VIREO.

BIRDS IN THEIR RELATIONS TO MAN

*A Manual of Economic Ornithology for the
United States and Canada*

BY
CLARENCE M. WEED, D.Sc.
STATE NORMAL SCHOOL, LOWELL, MASSACHUSETTS
AND
NED DEARBORN, D.Sc.
BUREAU OF BIOLOGICAL SURVEY, WASHINGTON, D.C.

ILLUSTRATED
SECOND EDITION, REVISED



PHILADELPHIA AND LONDON
J. B. LIPPINCOTT COMPANY
1916

Why Birds Matter

*Avian Ecological Function
and Ecosystem Services*



Edited by
Çağan H. Şekercioğlu,
Daniel G. Wenny
& Christopher J. Whelan

CHAPTER TWO

Why Birds Matter Economically

Values, Markets, and Policies

Matthew D. Johnson and Steven C. Hackett

Four Categories of Instrumental Value

1. Provisioning – natural products directly used by humans for food, clothing, medicines, tools, etc
2. Cultural – recreational opportunities, inspirational, spiritual
3. Regulating – pest control and carcass removal
4. Supporting – pollination, seed dispersal, water purification, nutrient cycling, etc.

The Auk 128(1):1–14, 2011

© The American Ornithologists' Union, 2011.

Printed in USA.

PERSPECTIVES IN ORNITHOLOGY

THE NEED TO QUANTIFY ECOSYSTEM SERVICES PROVIDED BY BIRDS

DANIEL G. WENNY,^{1,8} TRAVIS L. DeVault,² MATTHEW D. JOHNSON,³ DAVE KELLY,⁴
CAGAN H. SEKERCIOGLU,^{5,9} DIANA F. TOMBACK,⁶ AND CHRISTOPHER J. WHELAN⁷

Provisioning Value (food, medicine...)

- Wisconsin = \$124 million spent on migratory bird hunting



Fyn Kynd Flickr Creative Commons

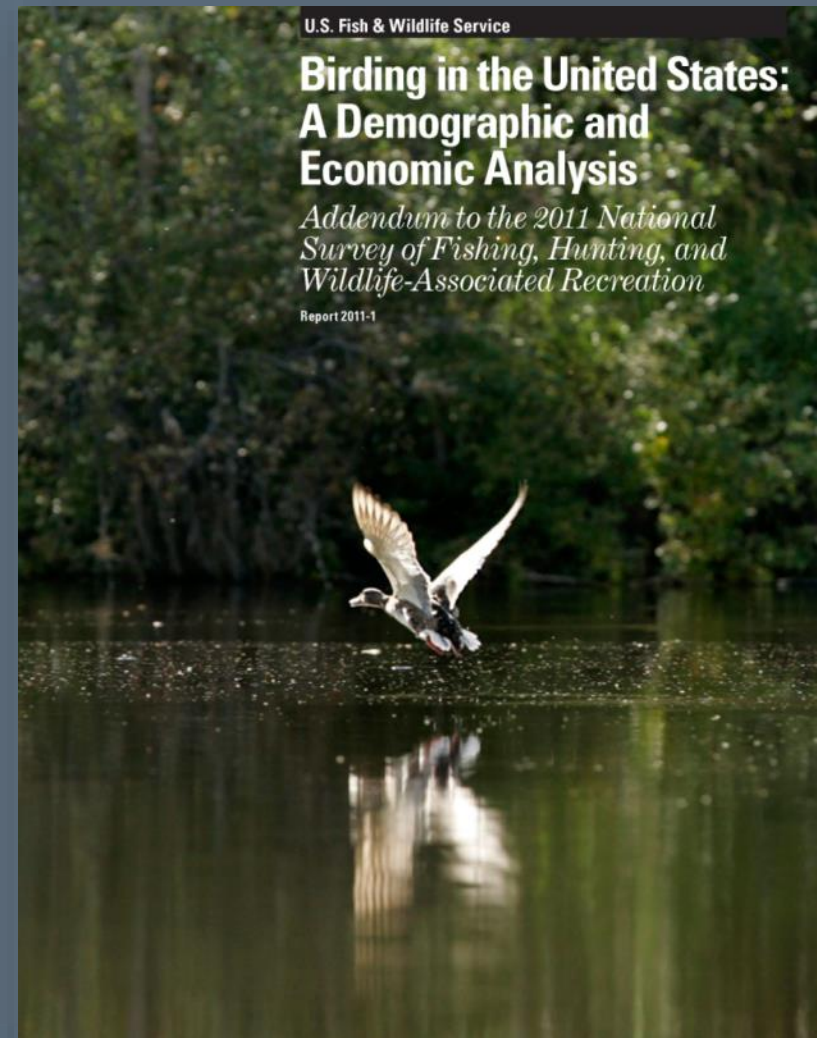
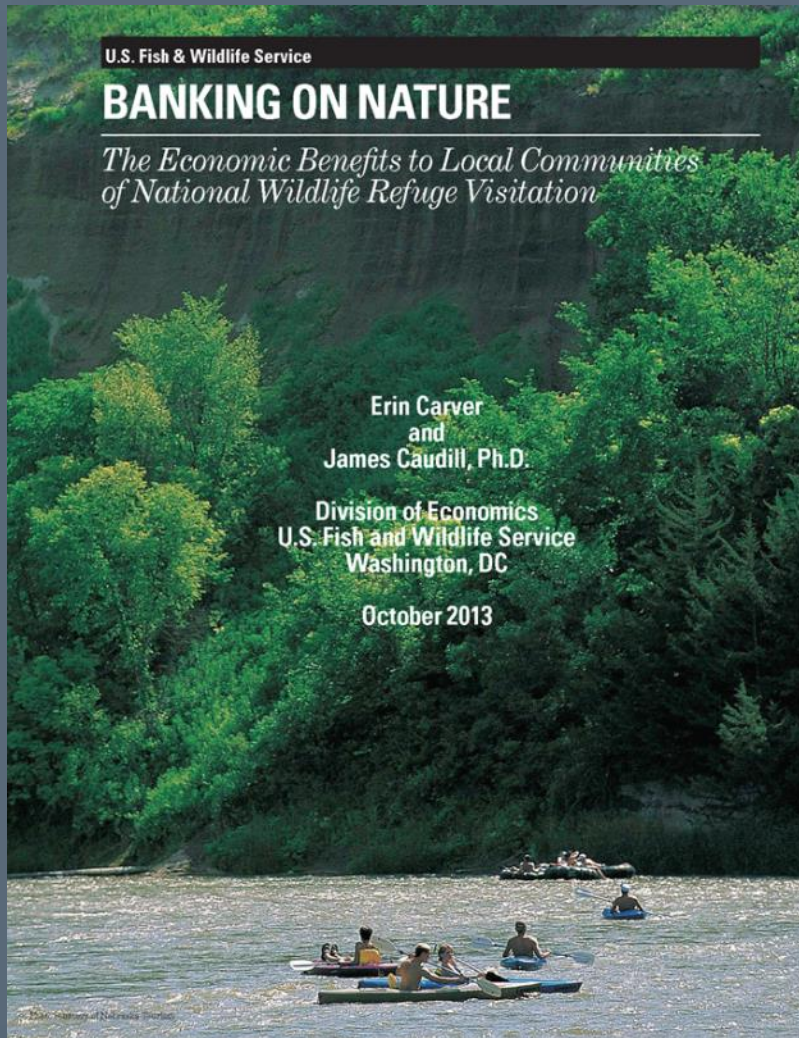
Provisioning Value (food, products...)

“To keep every cog and wheel is the first precaution of intelligent tinkering” - Aldo Leopold

- Researchers discovered a clock in the avian brain that regulates seasonal insulin resistance
 - Resulting in new Type II diabetes drug treatments
- Aviation industry owes much to the model of bird flight



Cultural Value (Recreational)



A big flock

Chart 1. Birders in the United States: 2011

(16 years of age and older.)



Birder Demographics

Chart 4. Birders' Participation Rate by Education: 2011

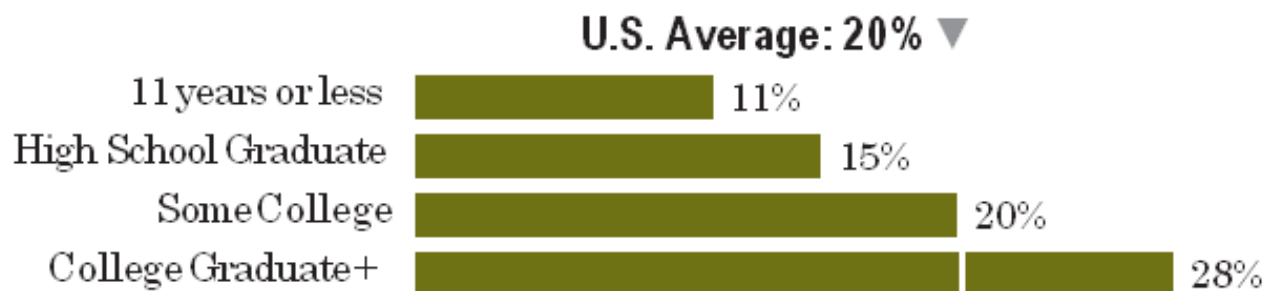


Table 2. Income Distribution of the U.S. Population and Birders: 2011

(Population 16 years of age and older. Numbers in thousands.)

<i>Income</i>	<i>U.S. Population</i>	<i>Number of Birders</i>	<i>Participation Rate</i>
Less than \$20,000	30,550	4,455	15%
\$20,000 to \$29,999	23,154	3,661	16%
\$30,000 to \$49,999	40,036	7,734	19%
\$50,000 to \$74,999	33,850	8,432	25%
\$75,000 or more	66,177	15,862	24%

Table 9. Summary of Economic Impacts

Birders	46,741,000
Total Expenditures	\$40,942,680,000
Total Output	\$106,977,730,000
Jobs	666,000
Employment Income	\$31,391,977,000
State Tax Revenues	\$6,000,203,000
Federal Tax Revenues	\$7,089,387,000

Deep pockets

Chart 10. Trip-Related Expenditures
(Total Expenditures: \$14.9billion)

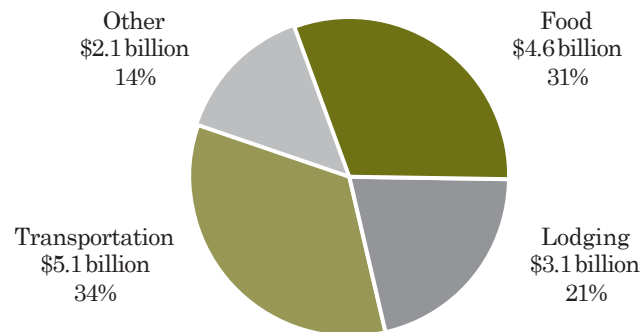


Figure 1. Participation by Region of Residence: 2011
(Population 16 years of age and older.)

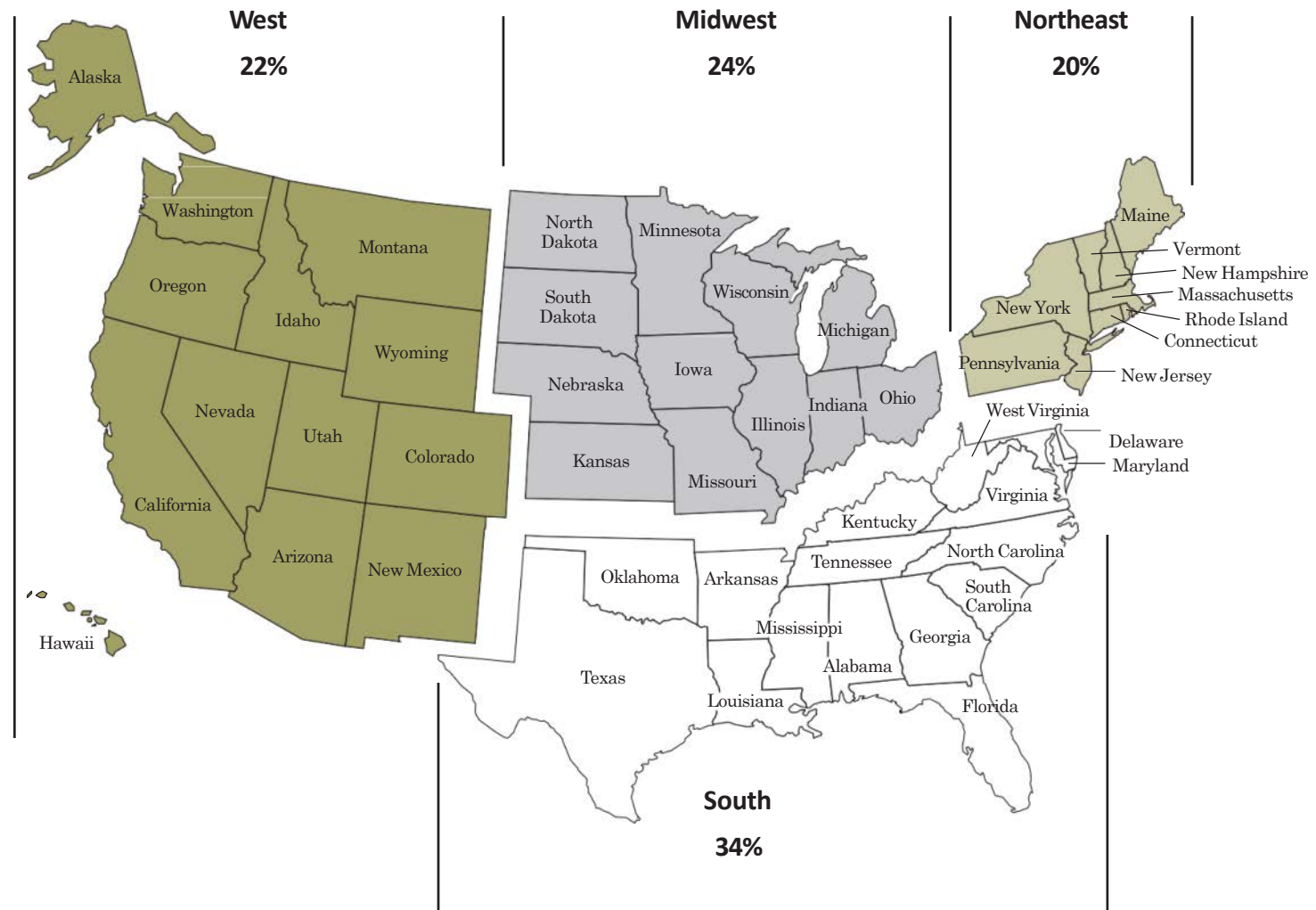


Chart 9. Birding Avidity by State: 2011
(Population 16 years of age and older.)

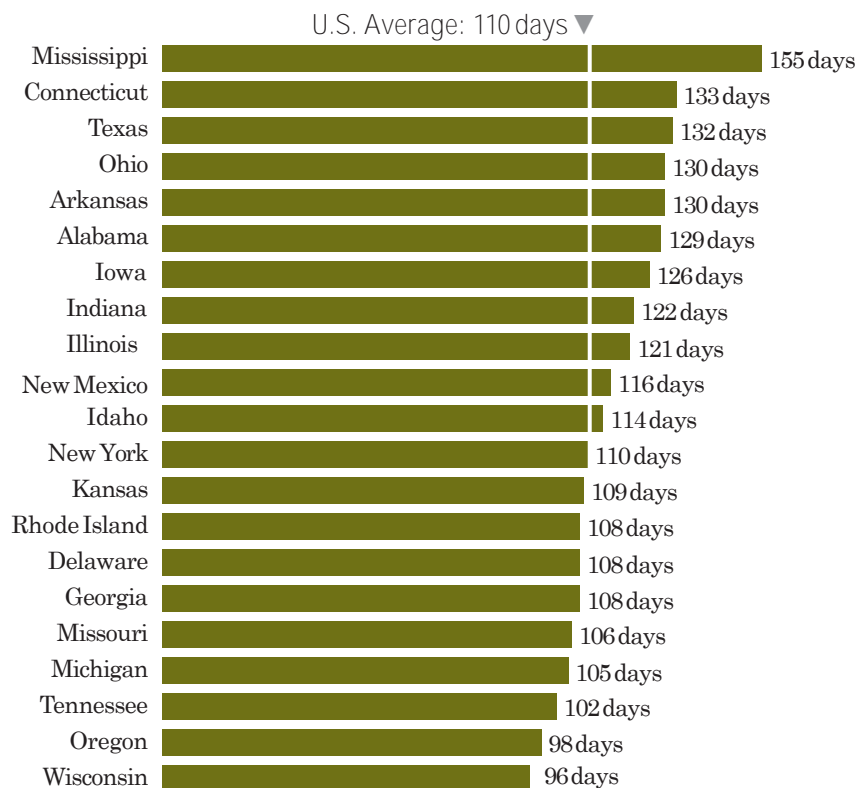
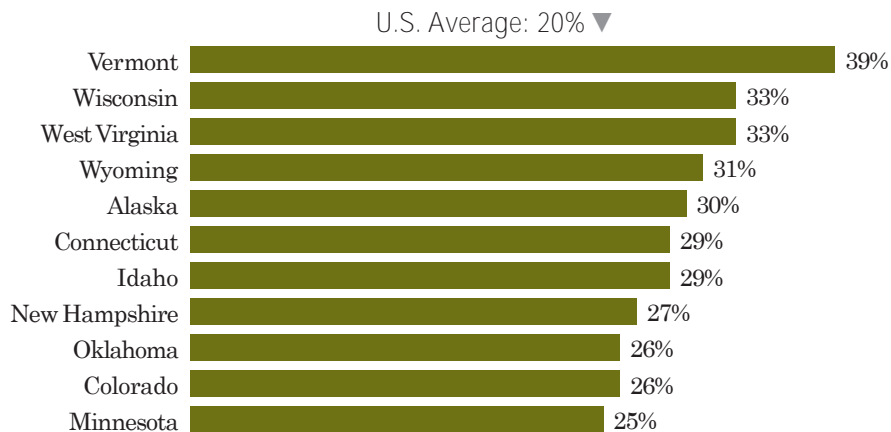


Chart 7. Birding Participation Rates by State Residents: 2011



Four Categories of Instrumental Value

1. Provisioning – natural products directly used by humans for food, clothing, medicines, tools, etc
2. Cultural – recreational opportunities, inspirational, spiritual
3. Regulating – pest control and carcass removal
4. Supporting – pollination, seed dispersal, water purification, nutrient cycling, etc.

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Regulating and Supporting Values

Birds provide significant & well-documented ecosystem services

- Control of rodents, mosquitoes, agricultural pests
- Nutrient cycling (e.g., vultures)
- Pollination
- Seed dispersal



How can we estimate the value of these services?

Avoidance Costs

Costs that would have occurred in absence of service

- Healthy vulture population avoids costs of elevated human disease because vultures remove carcasses = fewer dogs and fewer bites to humans from rabid dogs
- Estimated that healthy vulture populations avoid human health costs of up to USD \$2.4 billion/year



Ecological Economics

Volume 67, Issue 2, 15 September 2008, Pages 194–204



ARKIVE
v.arkive.org



© Mike Lane / Biosphoto

Counting the cost of vulture decline—An appraisal of the human health and other benefits of vultures in India

Anil Markandya^{a, b}, , , Tim Taylor^a, Alberto Longo^c, M.N. Murty^d, S. Murty^d, K. Dhavala^d

 [Show more](#)

<http://dx.doi.org/10.1016/j.ecolecon.2008.04.020>

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Replacement Costs

Costs to replace service with human-made substitutes

- Economic valuation of oak tree seed dispersal service provided by Eurasian jays
- Replacement cost for this service was estimated as USD \$4,900 to \$22,500 per pair of jays



available at www.sciencedirect.com



www.elsevier.com/locate/ecolecon



ANALYSIS

Economic valuation of a seed dispersal service in the Stockholm National Urban Park, Sweden

Cajsa Hougner^a, Johan Colding^{b,*}, Tore Söderqvist^b



Factor-income Value

Enhancement of income associated with the service

- One Barn Swallow: 60 insects per hour, 850 day
- Purple Martin may eat as many as 2,000 mosquitoes in one day

Animal Conservation

ZSL
LET'S WORK
FOR WILDLIFE

[Explore this journal >](#)

Pest reduction services by birds in shade and sun coffee in Jamaica

M. D. Johnson, J. L. Kellermann, A. M. Stercho

First published: 26 November 2009 [Full publication history](#)

DOI: 10.1111/j.1469-1795.2009.00310.x [View/save citation](#)



- Measured coffee berry yield inside and outside bird exclosures
- Bird pest control contributed ~USD \$310/ha/yr = 10% of Jamaica's per capita gross national income

Hedonic Value

Change in value of marketed good associated with the service

- Common in valuing open space as a desired characteristic of residential properties
- Predictive regression model of home prices vs. various attributes
- Addition of one desirable bird species = ↑\$32k in home value

Urban Ecosyst
DOI 10.1007/s11252-011-0209-0

Bird diversity indicates ecological value in urban home prices

Michael C. Farmer • Mark C. Wallace • Michael Shiroya



Economic Consequences of Bad PR?



Summary

- Birds have widespread and significant economic value nationally, state-wide, and locally
- Economic value is both direct (e.g., sales) and indirect (services)
 - Birding, tourism, and feeding contribute billions to the economy
 - Ecosystem services are hard to value but significant
- Value may offset costs of bird-friendlier architecture

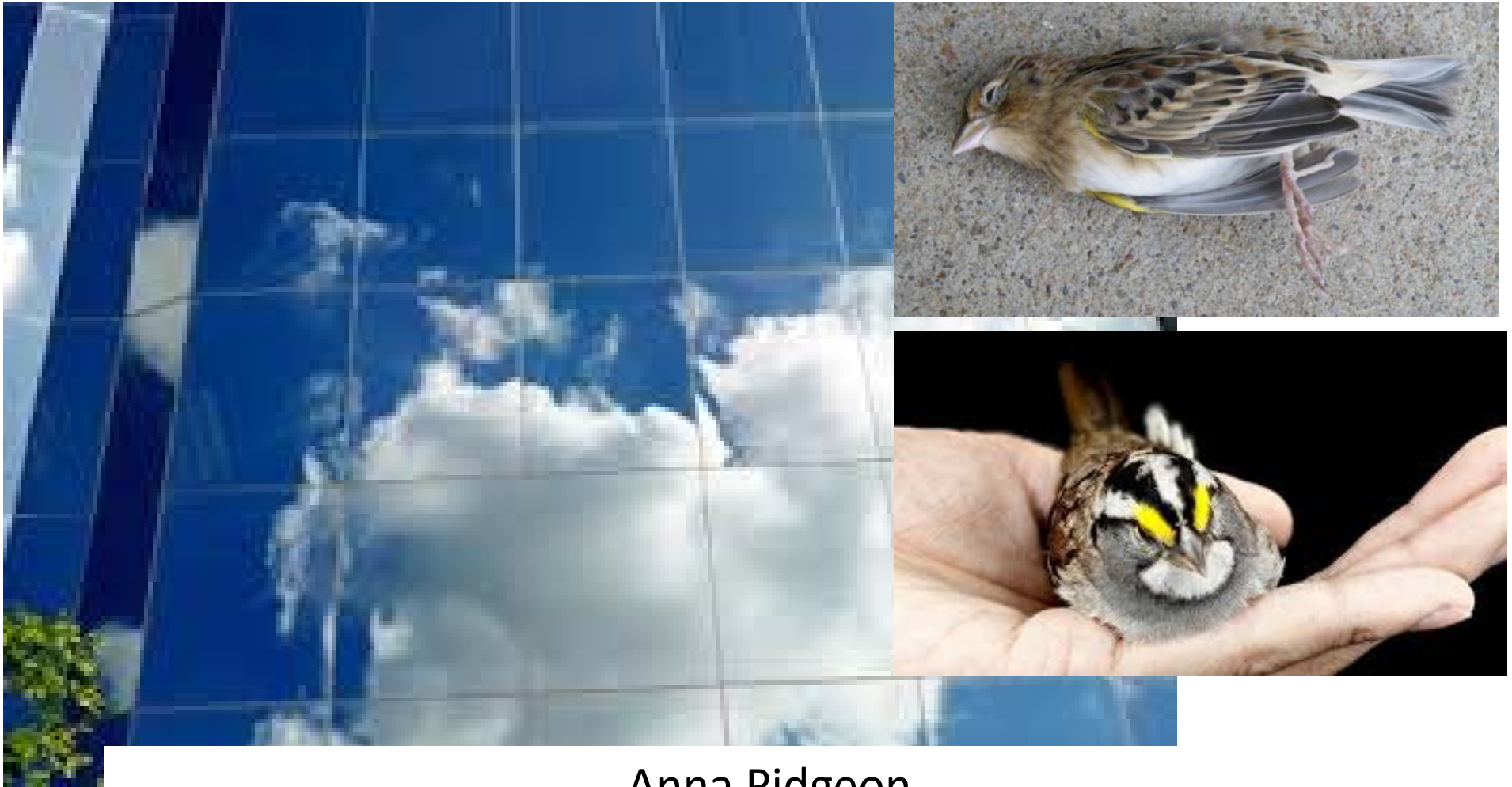
The ecology and significance of bird-building mortality



Anna Pidgeon

Associate Professor, Department of Forest and Wildlife Ecology

The ecology and significance of bird-building mortality



Anna Pidgeon

Associate Professor, Department of Forest and Wildlife Ecology





*Susan Spear,
Cornell Lab*



Pass through effects





Image credit Tim O'Connell

5 November 2016 – Fox Sparrow and Dark-eyed Junco

November 6, 2016
Tim O'Connell
[Leave a comment](#)

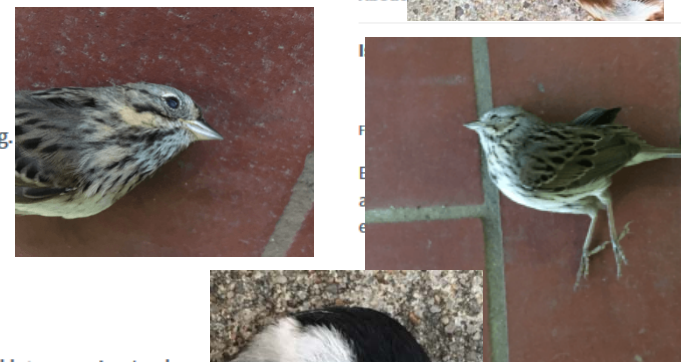
I did not get a chance to check the Noble Research Center until 4:00 pm today but when I did there was a sad sight in the northeastern alcove. It looks for all the world like these two were traveling together, although I certainly can't establish that to be the case: AHY-F Dark-eyed Junco, fat... [Read More](#)



3 November 2016 – 2 Lincoln's Sparrows

November 3, 2016
Tim O'Connell
[Leave a comment](#)

The south portico was the scene for the sad demise of two HY Lincoln's Sparrows this morning. The other was fat = 3.



2 November 2016 – at first no casualties, but then . . .

November 3, 2016
Tim O'Connell
[Leave a comment](#)

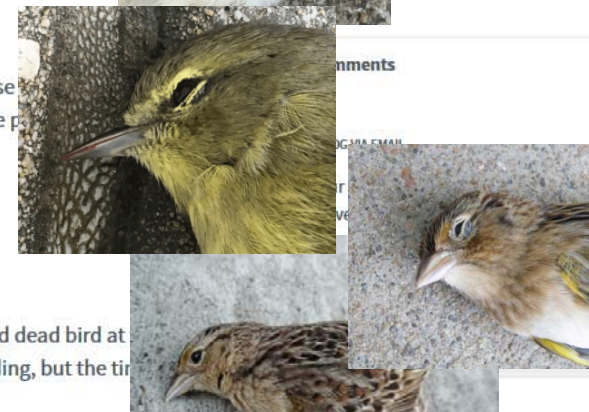
I received a message of a Carolina Chickadee dead at the southwestern alcove that was found late morning/early afternoon. This one looked like a HY-U bird, and it was at least a 2 on my fat score index. It seemed odd to me that a chickadee would be laying down fat at this time of... [Read More](#)



31 October 2016 – Orange-crowned Warbler

November 1, 2016
Tim O'Connell
[Leave a comment](#)

It felt like a big flight overnight, with migrant flight calls every time I walked outside. At least one of those was this unfortunate little Orange-crowned Warbler: This was an AHY-U bird with fat = 2. As evident from the photo, the southwestern alcove appears not to have been saved by... [Read More](#)



30 October 2016 – 2 Grasshopper Sparrows

October 30, 2016
Tim O'Connell
[Leave a comment](#)

I found a trapped Grasshopper Sparrow at the main North entrance to the NRC today, and then a second dead bird at the southeastern alcove. The trapped bird took quite a bit of effort to eventually guide away from the building, but the time was worth it if I was able to keep it from... [Read More](#)



19 October 2016 – Lincoln's Sparrow and Common Yellowthroat

October 19, 2016
Tim O'Connell
[Leave a comment](#)

Flight calls abounded last night as I walked the dog at least thrice. Those calls – little tsips! – were like sparrows flowing from the north after three straight days of strong winds blowing from the south. Paul Hurtado's Nexrad radar birds page confirmed a big push in... [Read More](#)



Image credits Tim O'Connell



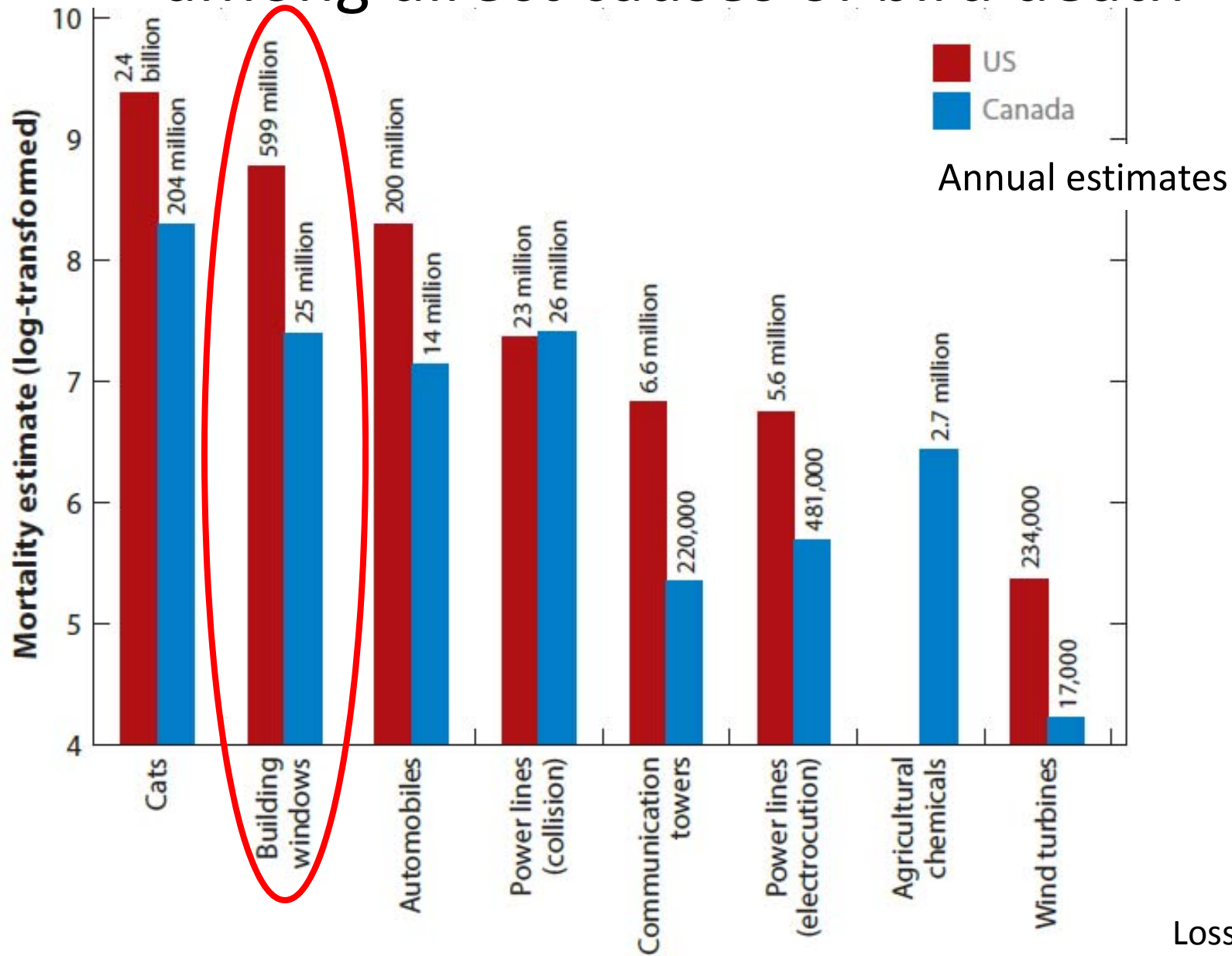
Image credit Tim O'Connell

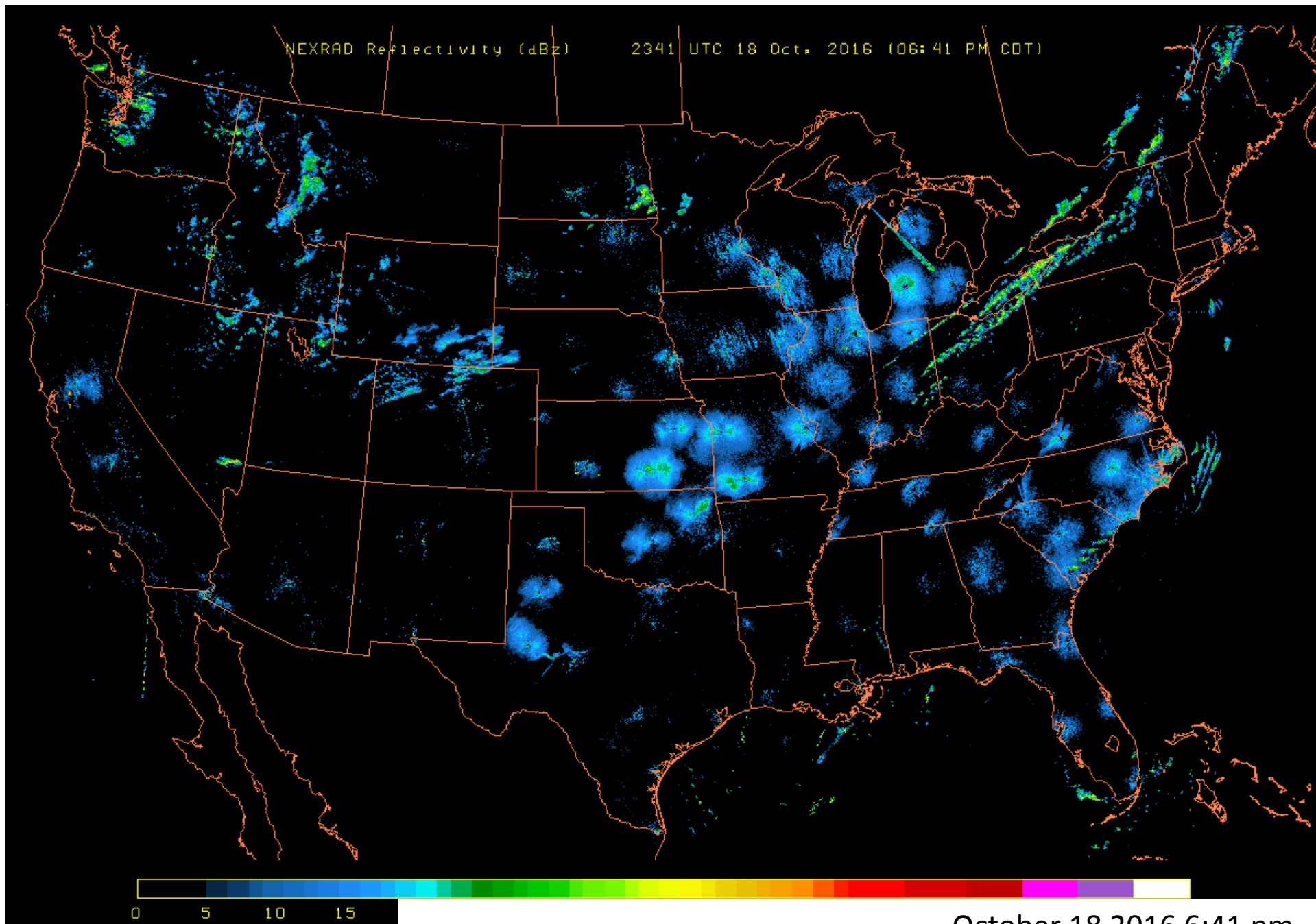
Estimates of annual bird-building mortality across the U.S.

	Deaths per building (median)	95% of estimates fall in this range	Number of buildings in the US	Annual death toll
High rises	24	5 – 77	21 thousand	0.5 million
Low rises	22	6-56	15 million	245 million
Residences	2	1-3	123 million	253 million

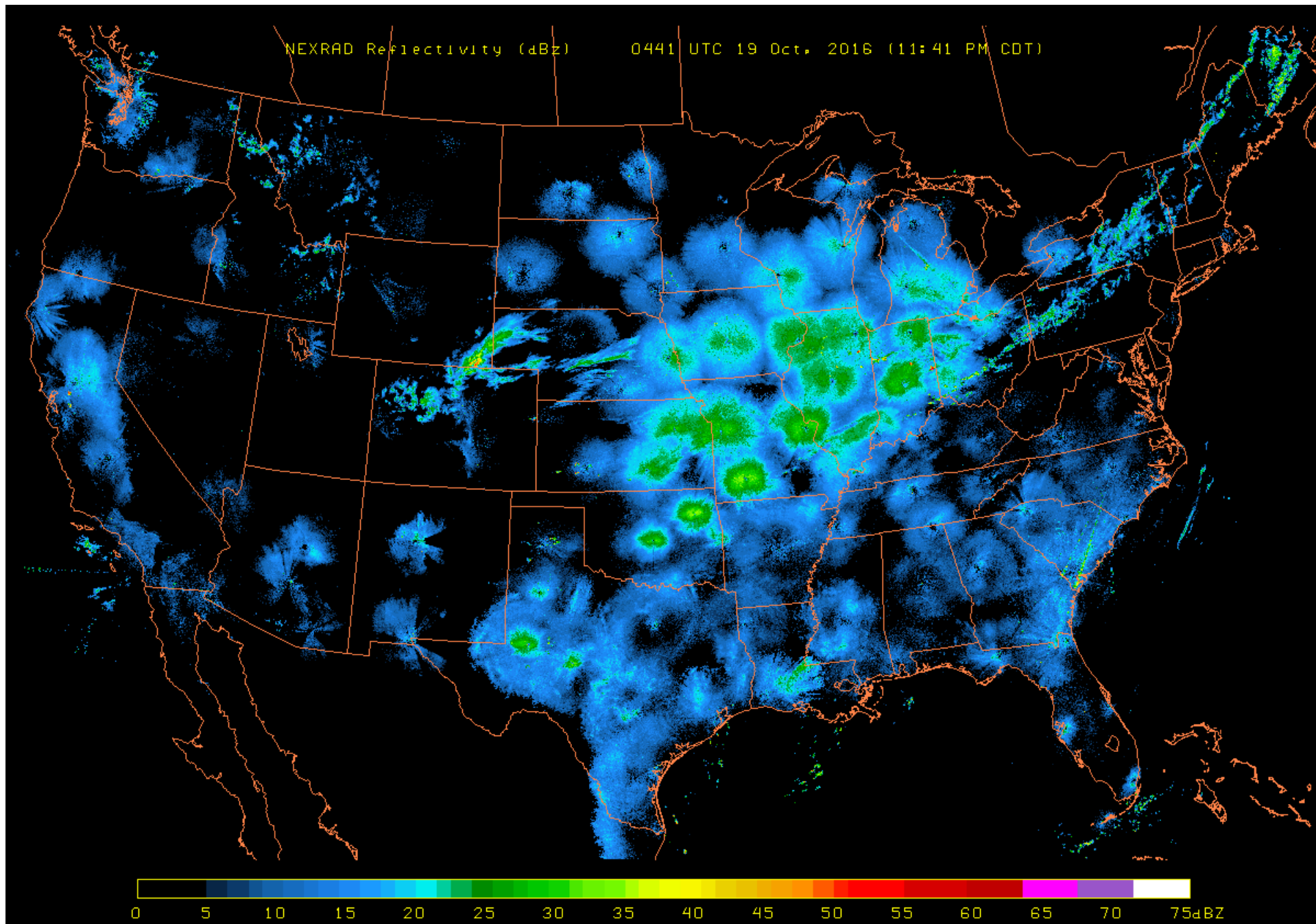
Adapted from Loss et al 2014

How do building collisions rank among direct causes of bird death

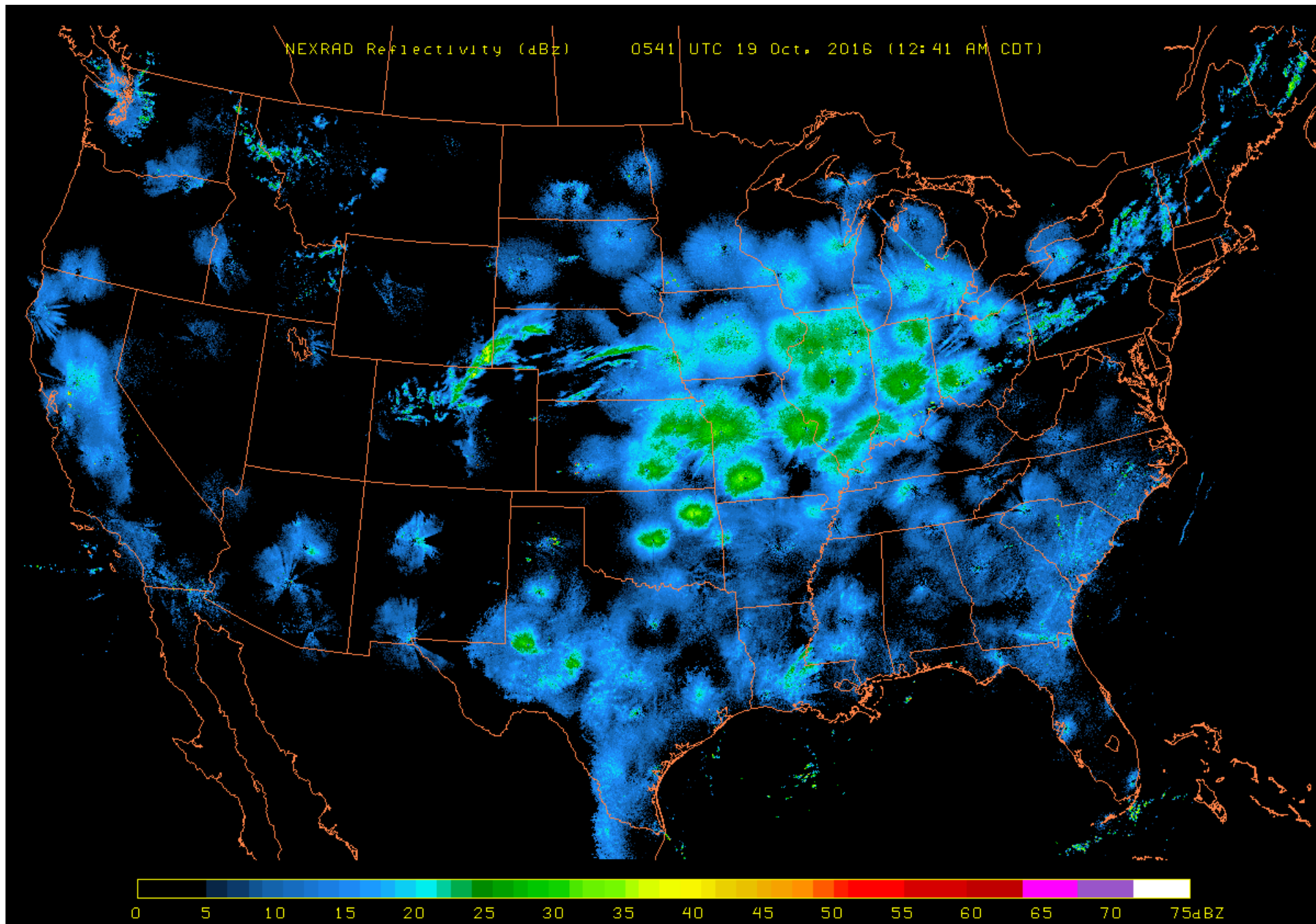




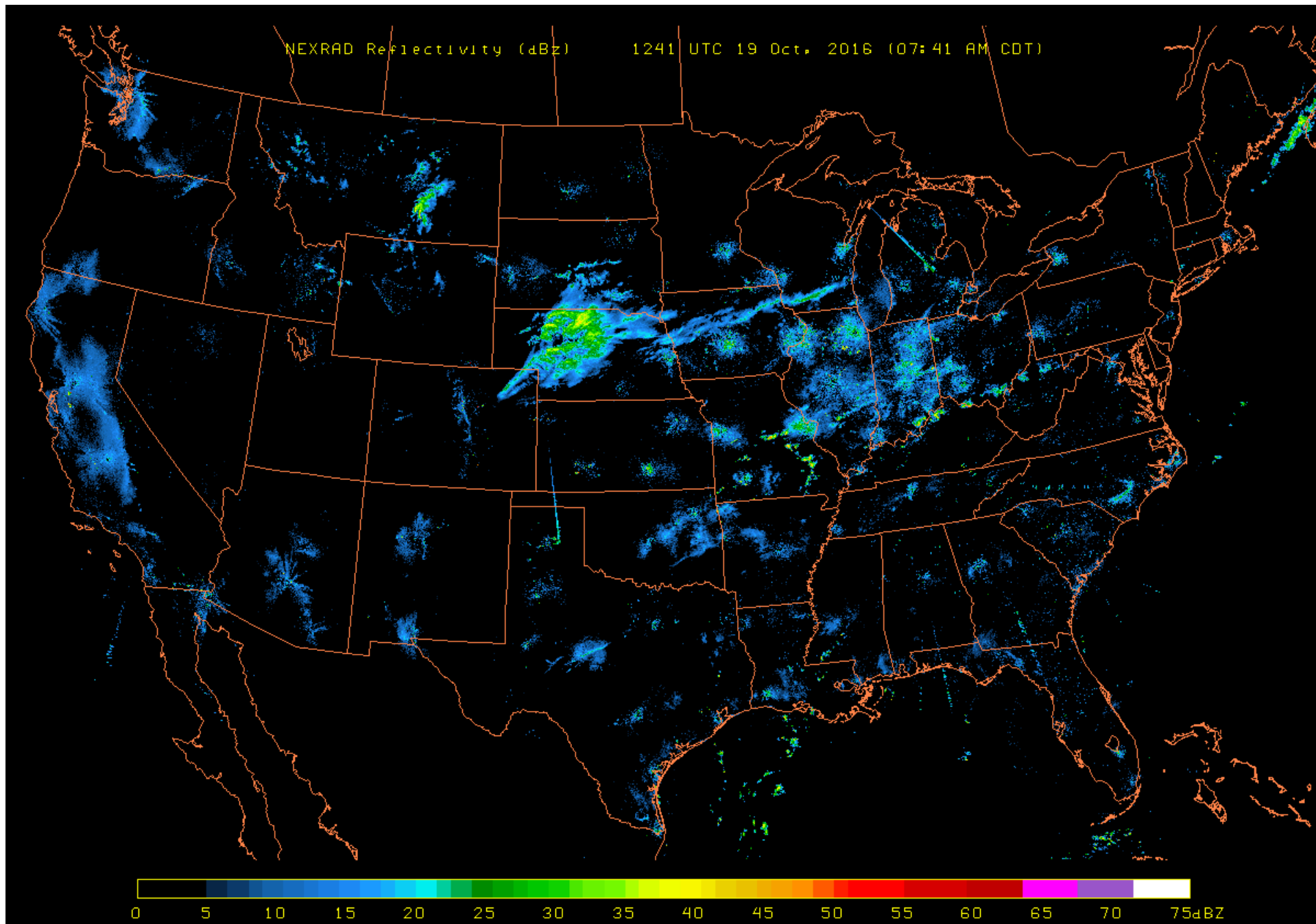
October 18 2016 6:41 pm
http://www.pauljhurtado.com/US_Composite_Radar/2016-10-18/



October 18 2016 11:41 pm



October 18 2016 12:41 pm



October 18 2016 7:41 am

Night lights
are
disorienting

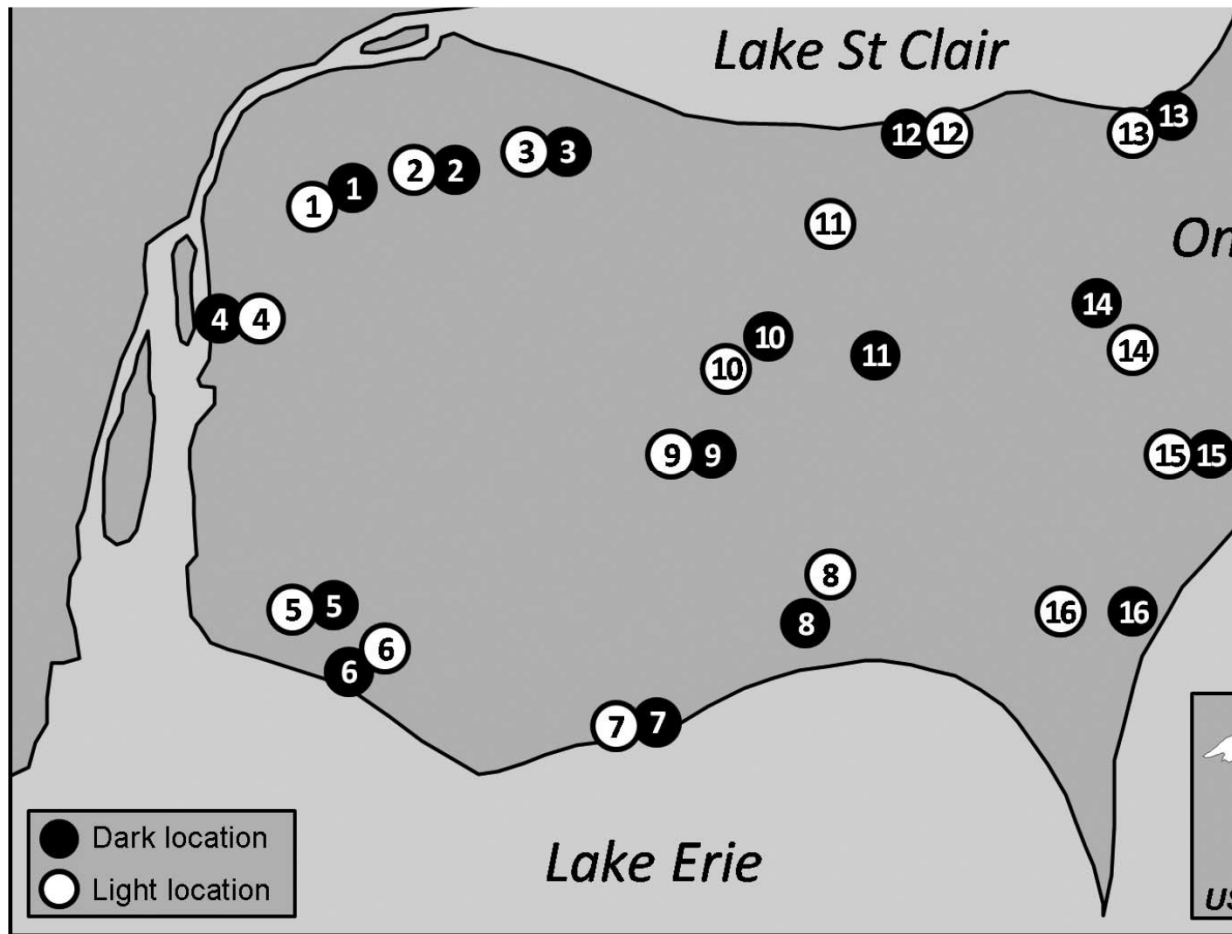


Photo credit FLAP

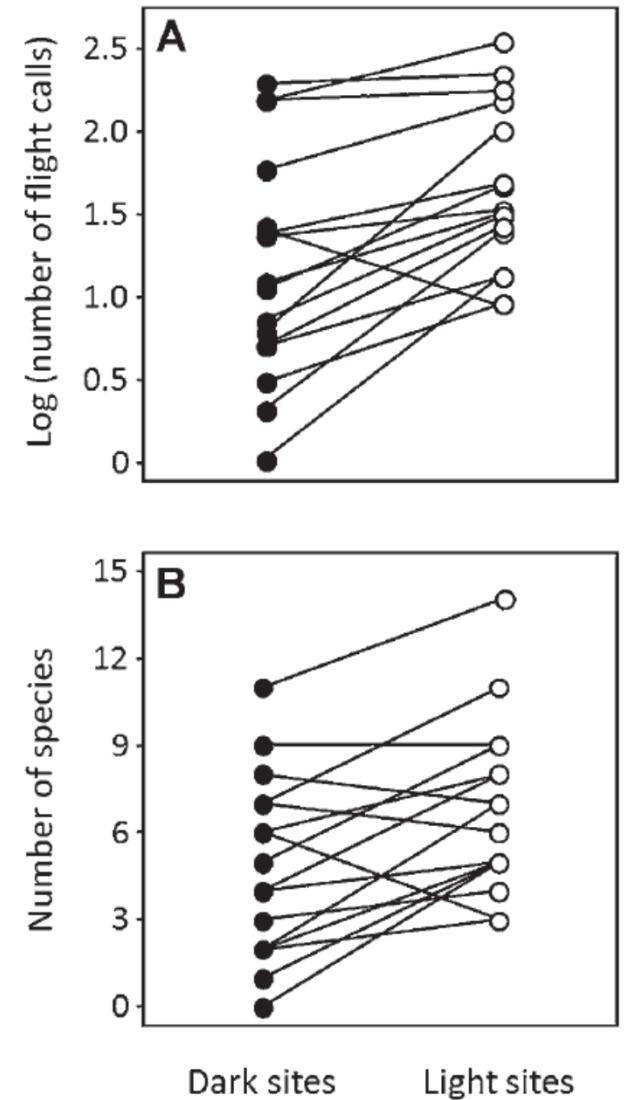




Ground level lights in semi-rural, low density residential areas



Light locations= street lights, building lights
Dark sites= no artificial light nearby



Watson et al. 2016

What can be
done?

Photo credit FLAP

Residences – retrofitting



“Acopian strings”

Add patterns



American Bird Conservancy BirdTape

Netting installed feet from window



Photo US Fish and Wildlife Service

Put feeders close to house to
avoid fatal collision speed



Take home messages

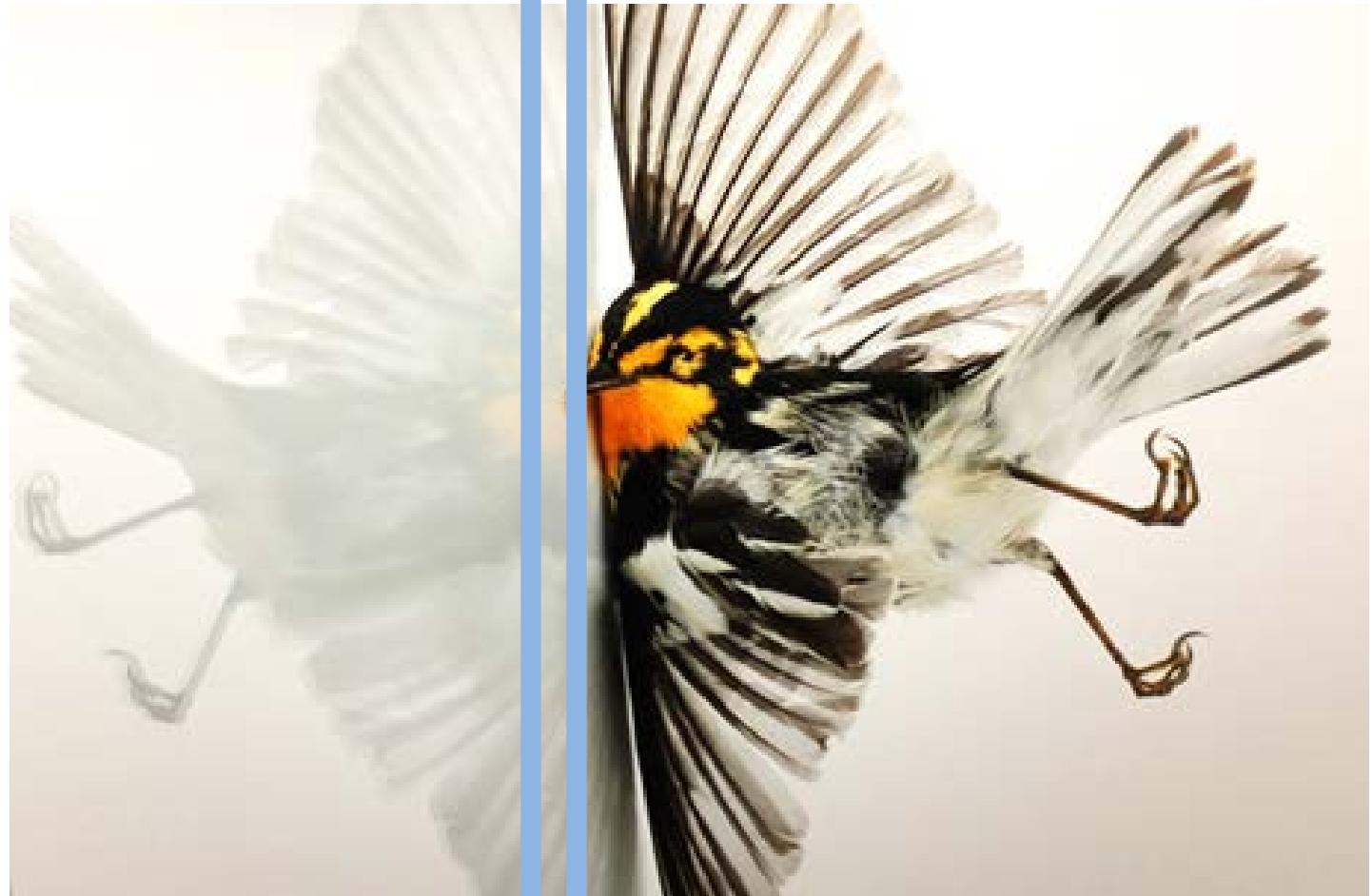
Birds face increasing challenges to survival amid the expanding built environment.

Bird-collision mortality can be minimized through considerations of:

- materials used in building facades,
- building shape,
- landscaping, and
- night time lighting regimes.



COLLISIONS: Is this a Building Performance problem?



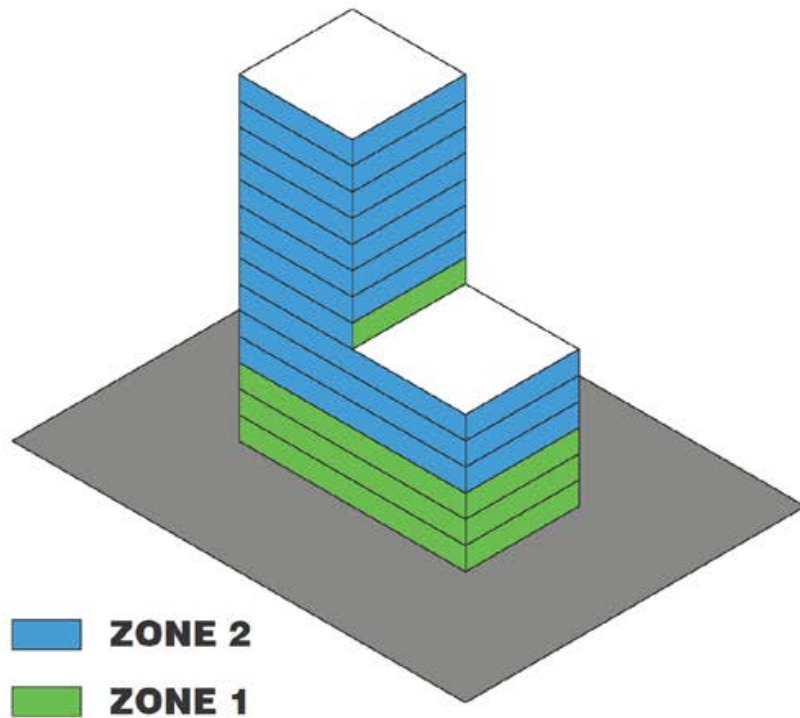
DAYTIME COLLISIONS: Reflections = Fly-through Conditions



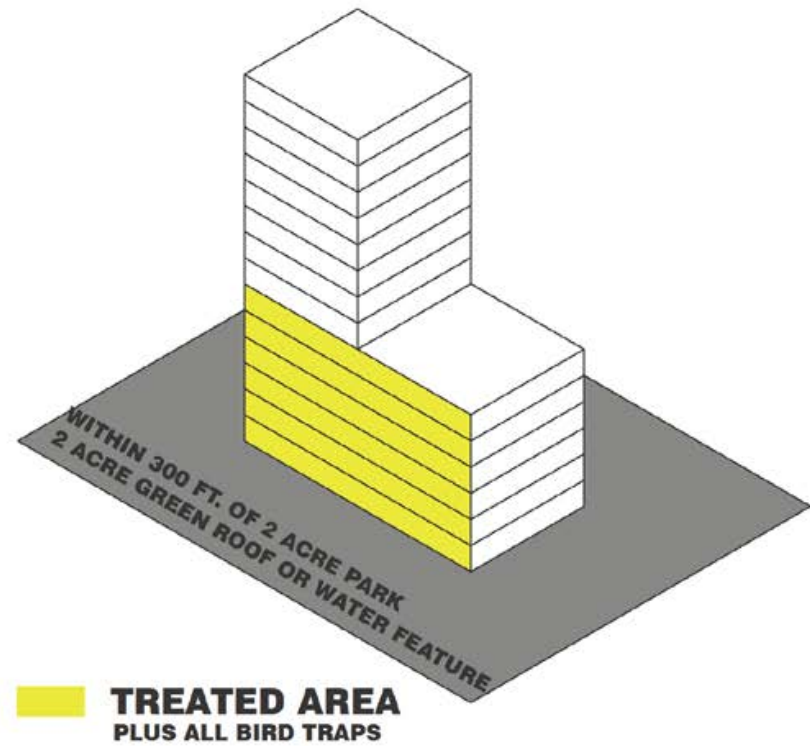
COLLISIONS: Challenging Questions for Architects:

1. How many of you have heard or seen a bird hit glass?
2. Would you, as an architect, be willing to integrate bird-safe design into your buildings?
3. How many of your clients would be willing to include bird-safe design as part of their program?
4. If not, what do you think would be their primary reason?
 - a. Fear of extra cost?
 - b. Unwillingness to experiment with new technologies?
 - c. Lack of concern for the issue?
 - d. Lack of regulations mandating it?
 - e. Compromise of views?
5. How open would you (or your clients) be to moving away from the current trend of all-glass buildings?

MITIGATION: Design Guidance

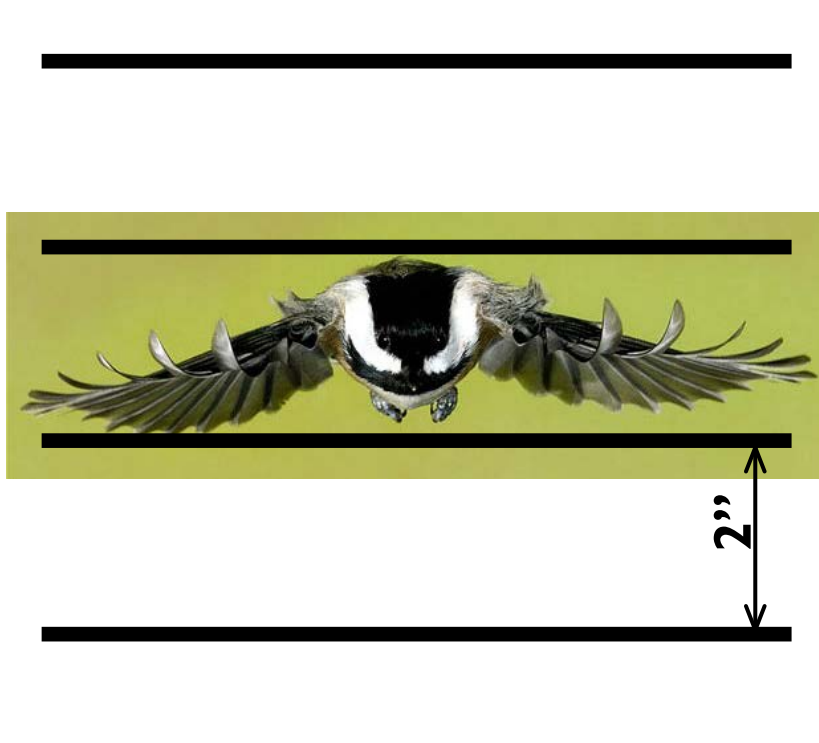


LEED PILOT CREDIT # 55

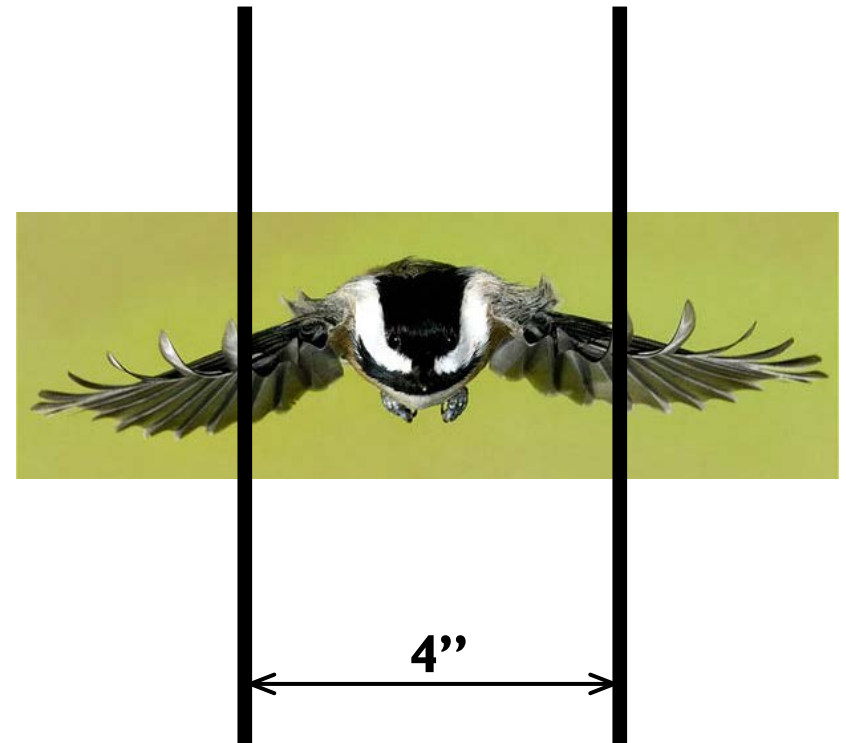


**SAN FRANCISCO BIRD-SAFE
BUILDING STANDARD**

FUNDAMENTALS : The 2" x 4" RULE



Horizontal lines with a maximum spacing of 2"



Vertical lines with a maximum spacing of 4"

CURRENT RESEARCH



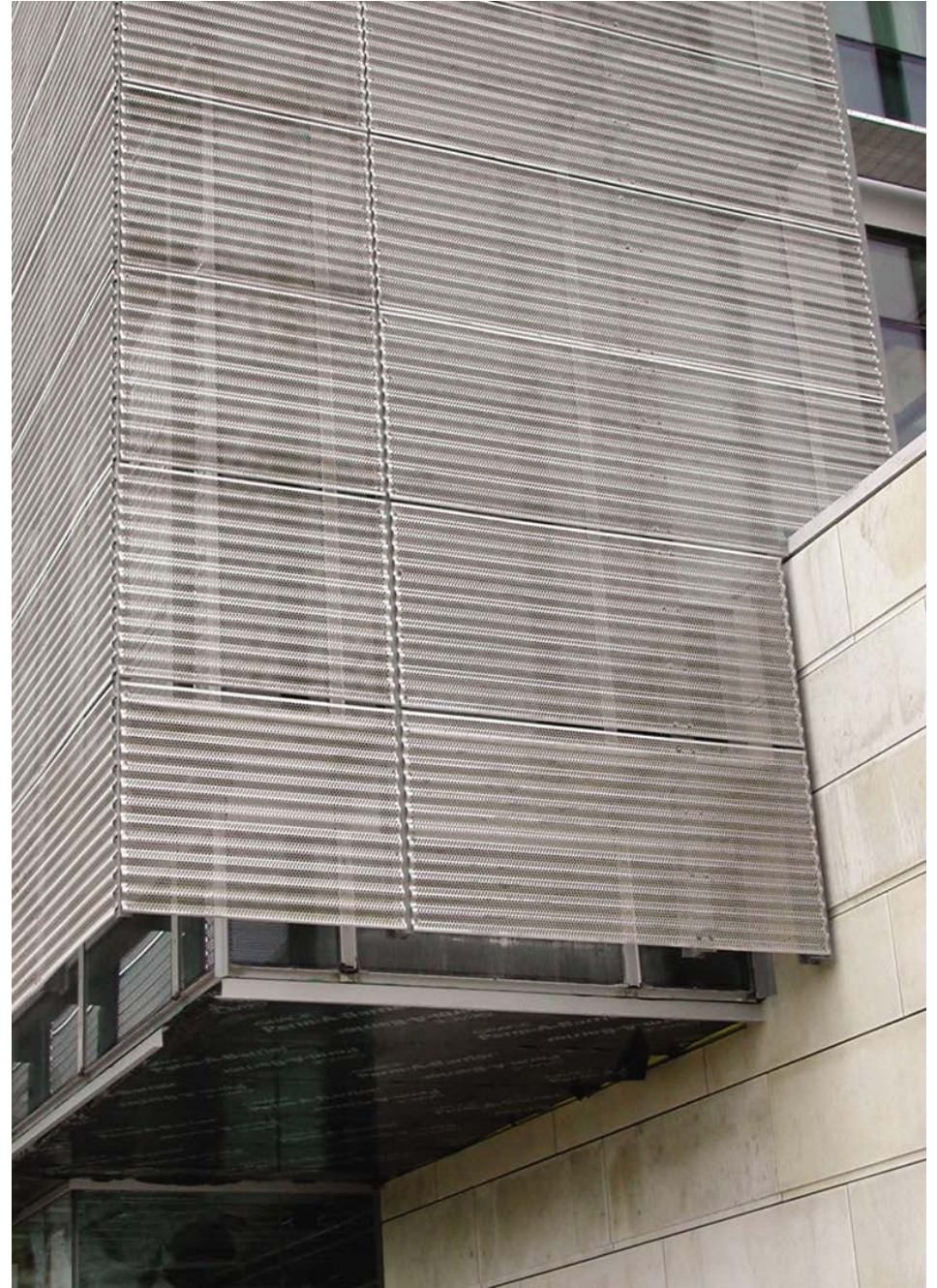
DAYTIME SOLUTIONS: Patterns on Glass



DAYTIME SOLUTIONS: Screens



© Ennead Architects

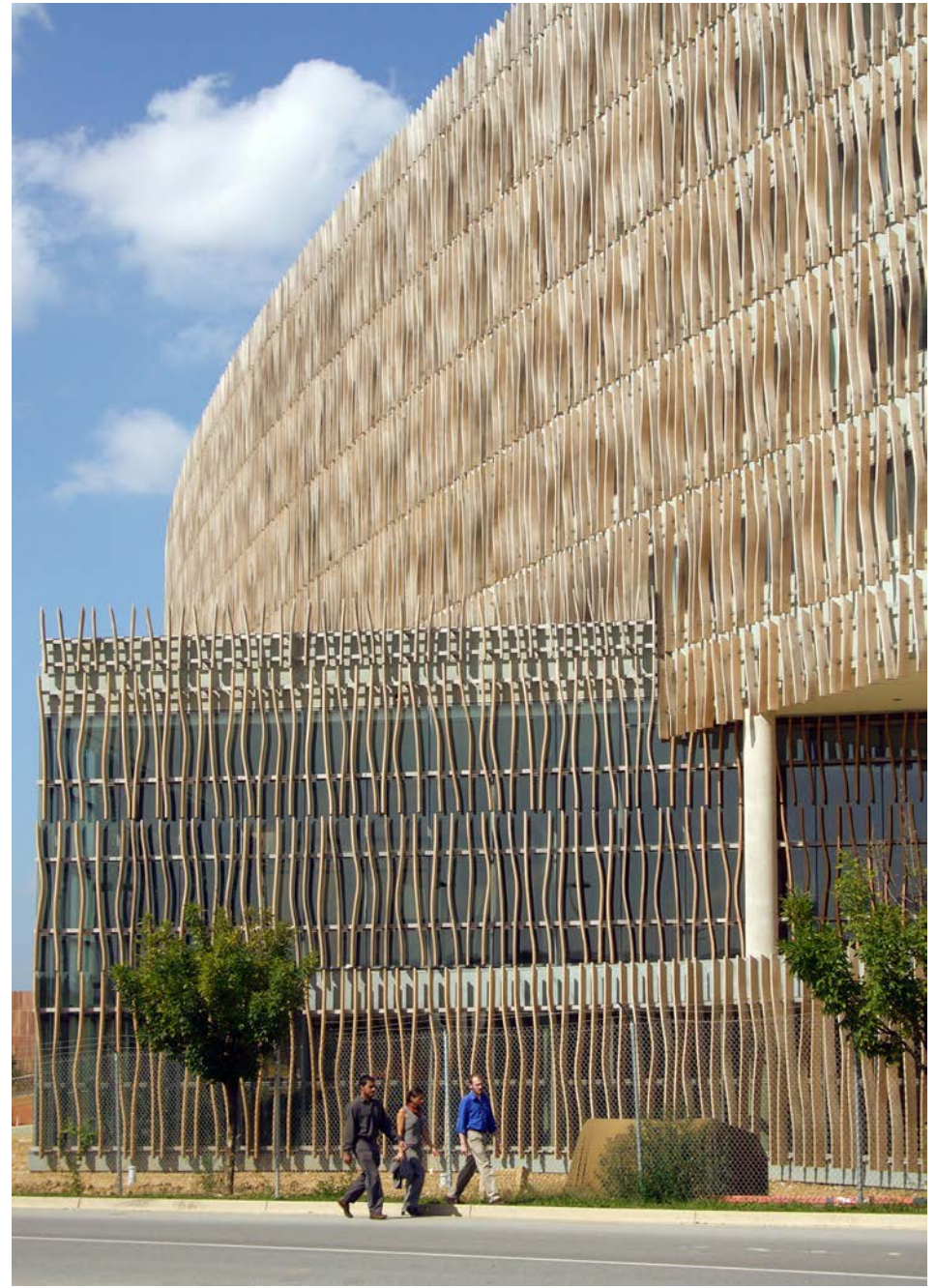


© Ennead Architects

DAYTIME SOLUTIONS: Sunshades



© Aislinn Weideler/Ennead Architects



© R. Anthony Fieldman

DAYTIME SOLUTIONS: Channel Glass



© Richard Barnes

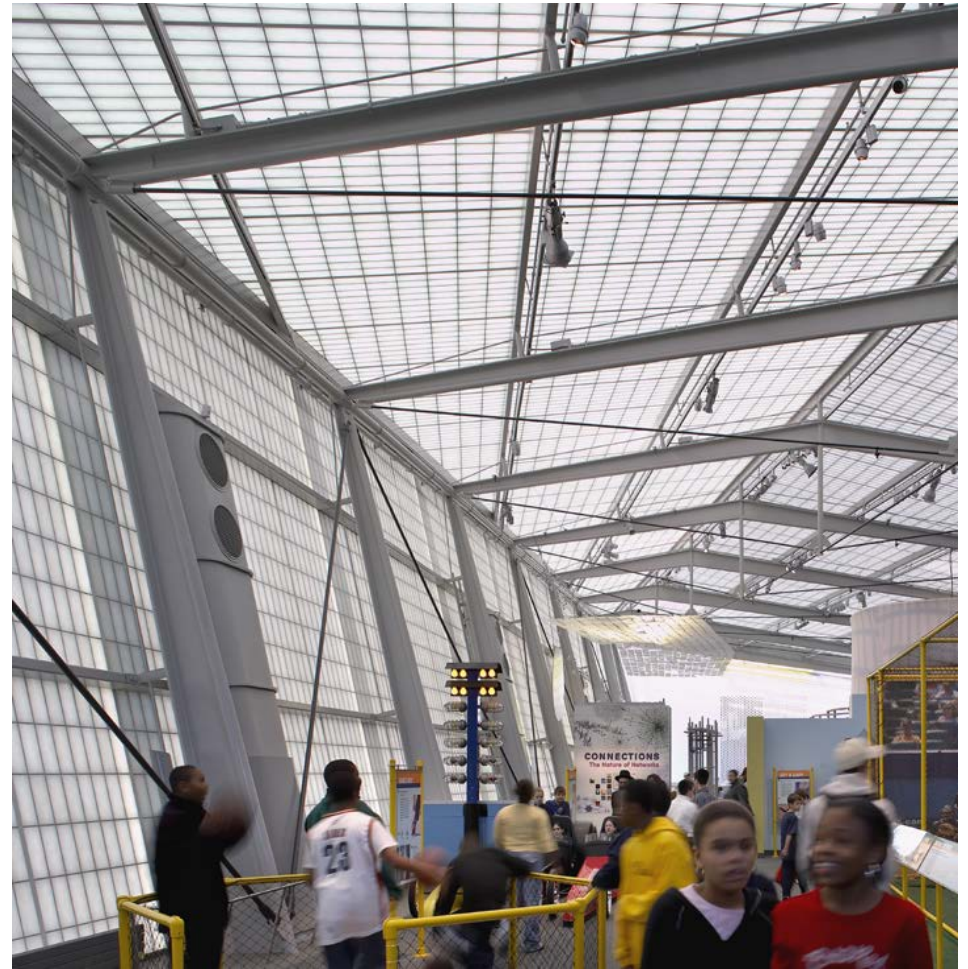


© Richard Barnes

DAYTIME SOLUTIONS: Translucent Fiberglass Panels



© Jeff Goldberg/Esto



© Jeff Goldberg/Esto

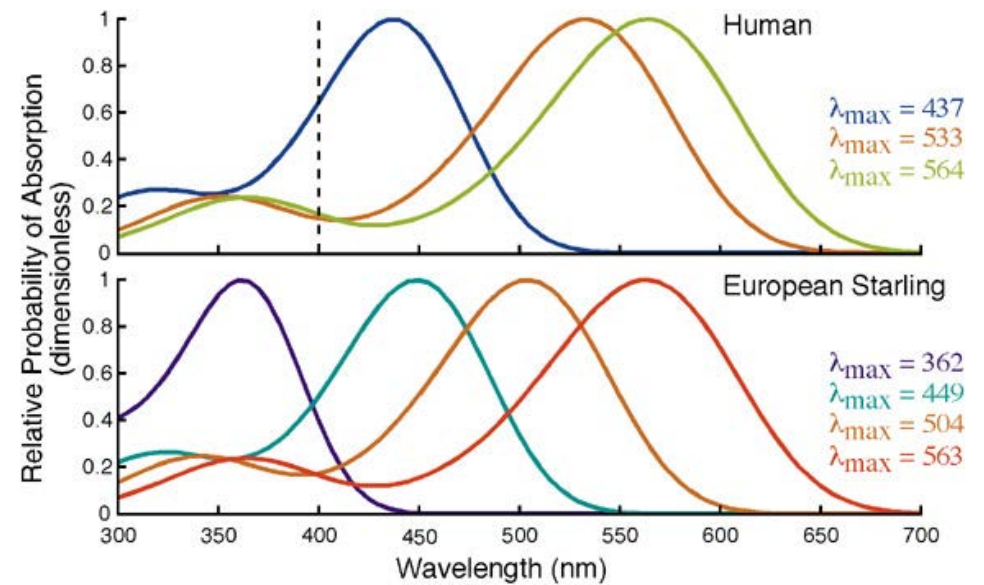
DAYTIME SOLUTIONS: Films



DAYTIME SOLUTIONS: Specialty Glass - Ornilux



© Arnold Glas



© Arnold Glas

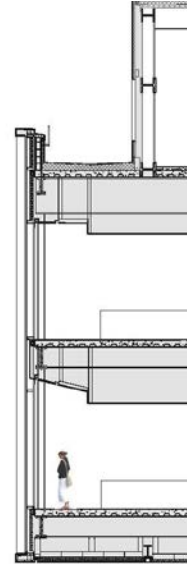
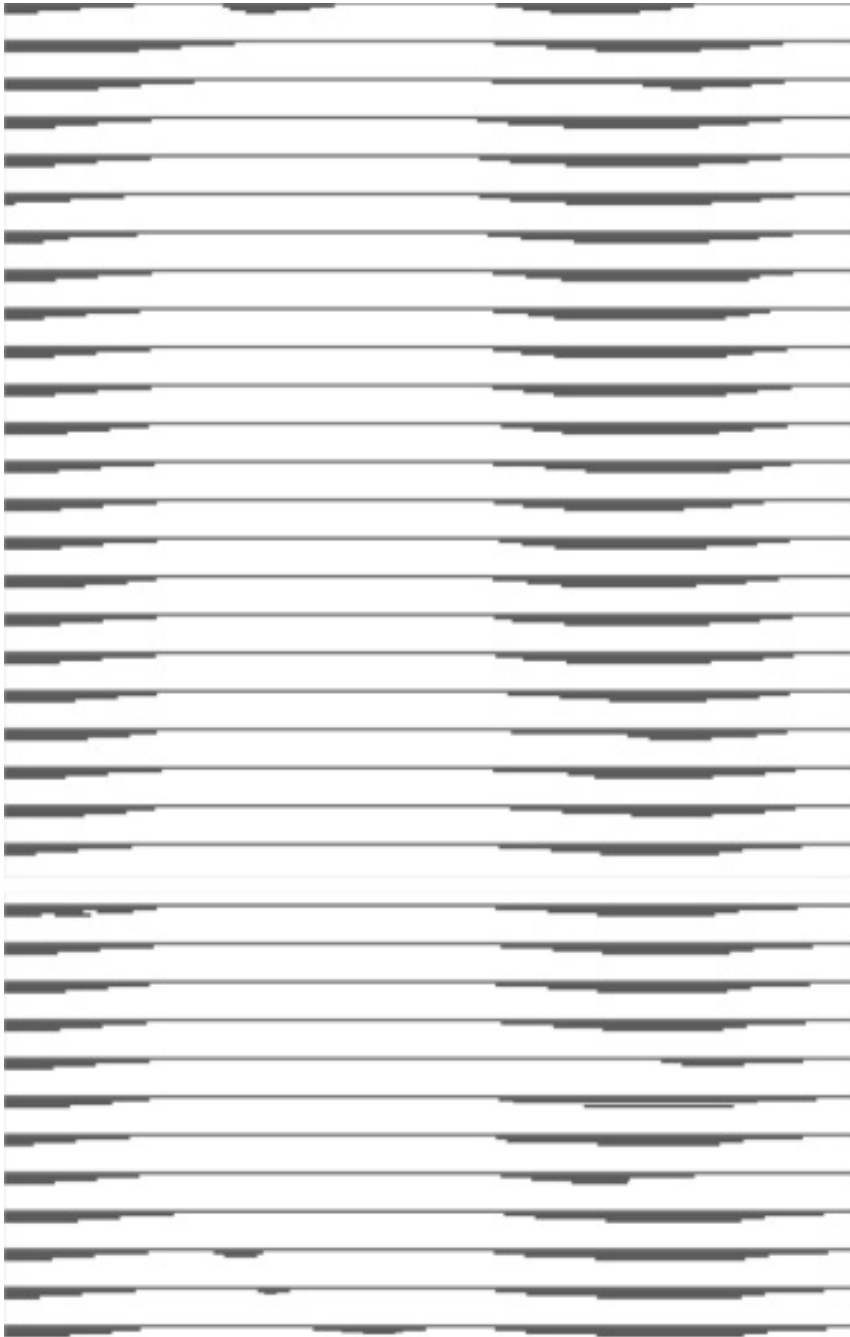
MITIGATION: Vassar College – Bridge for Laboratory Sciences



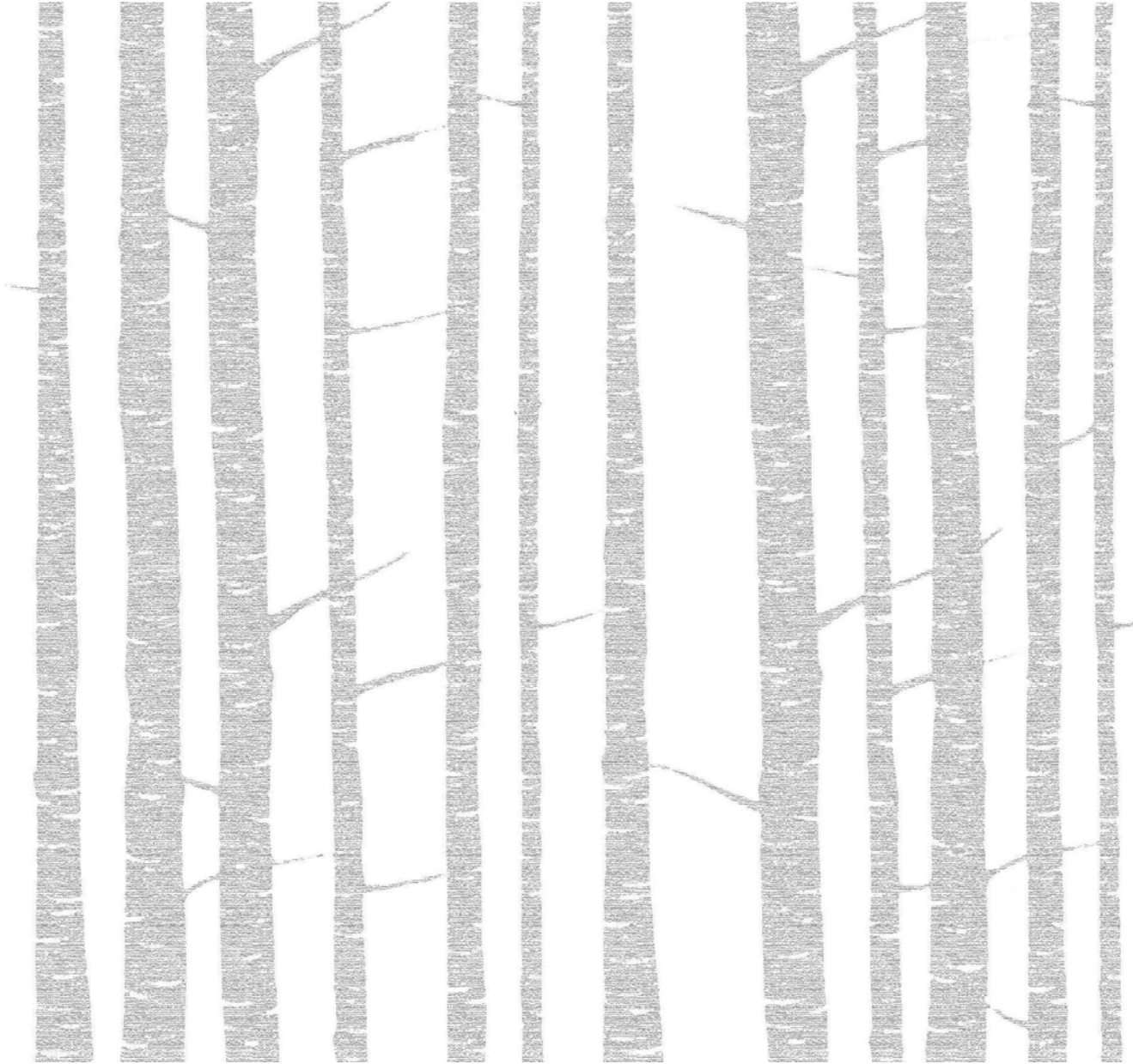
MITIGATION: Vassar Science Project



MITIGATION: Vassar Science Project



MITIGATION: Vassar Science Project



MITIGATION: Vassar Science Project



MITIGATION: Vassar Science Project



INTERIOR
"HUMAN SCALE"
GREY
1/2" O.C.

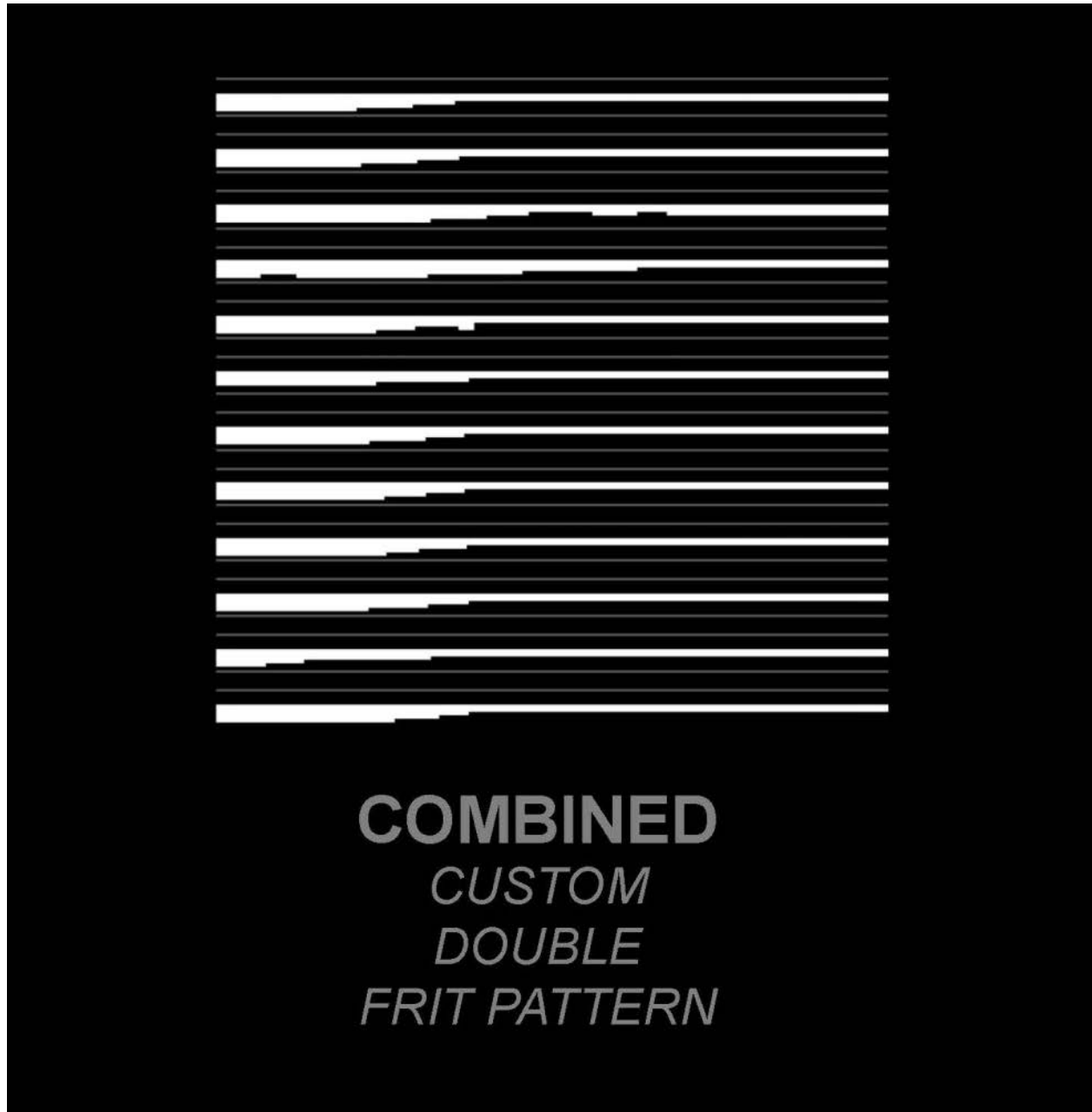
STANDARD LINE PATTERN



EXTERIOR
"BIRD SCALE"
WHITE
1 1/2" O.C.

CUSTOM LINE PATTERN

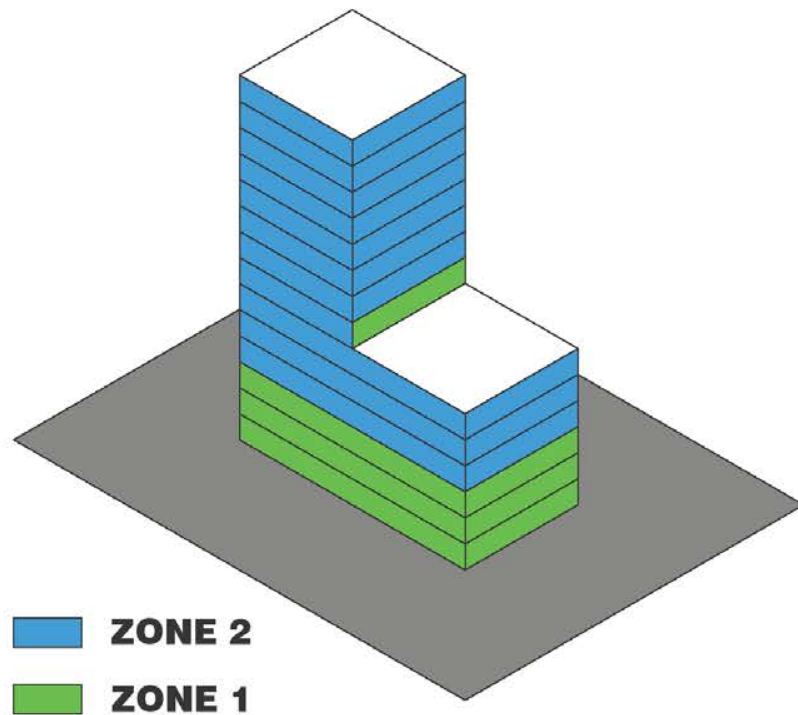
MITIGATION: Vassar Science Project



MITIGATION: Vassar Science Project



MITIGATION: LEED Pilot Credit 55 – Bird Collision Deterrence



LEED PILOT CREDIT # 55 BIRD COLLISION DETERRENCE

FOR NEW CONSTRUCTION & EXISTING BUILDINGS (EBOM)

ZONE 1: HIGH HAZARD

FIRST 3 FLOORS ABOVE GRADE
FIRST FLOOR ABOVE GREEN ROOF

ZONE 2: MEDIUM HAZARD

FLOOR 4 TO ROOF

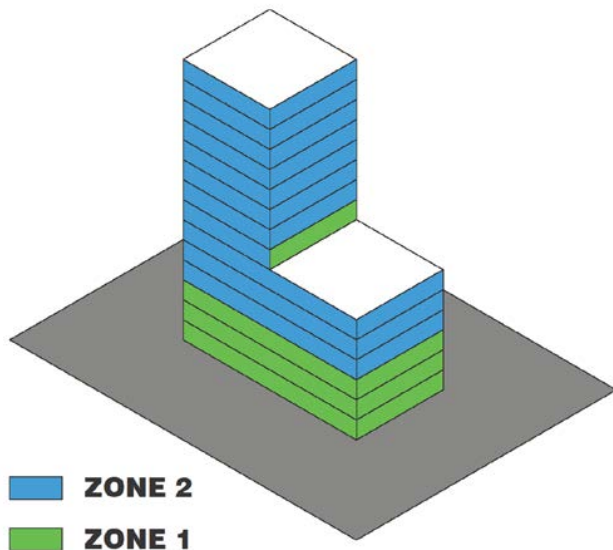
ALL FACADE MATERIALS ARE ASSIGNED
A THREAT FACTOR, BASED ON FLIGHT
TUNNEL TESTS, THEN ENTERED INTO A
FORMULA TO ACHIEVE A BUILDING RATING

- TREATMENT OF GLAZED CORNERS AND FLY-THROUGH CONDITIONS
- SHIELDED AND CONTROLLED LIGHTING DESIGN
- 3 YEARS POST-CONSTRUCTION MONITORING

MITIGATION: LEED Pilot Credit 55 – Bird Collision Deterrence

BUILDING DATA	
Number of Stories	0
Building Height	0
Total Façade Area	0
Façade Zone 1 Area	0
Façade Zone 2 Area	0
Adjusted Building Façade Area ³	0

ZONE 1 HIGH RISK FACTOR CALCULATION (HRF)	
Material Type with Threat Factor >75	HR Material Area (HRA)
material 1	0
material 2	0
material 3	0
High Risk Area (HRA) Totals=	0
HRF= (HRA/Z1 Area) <15%	#DIV/0!



Zone 1 ONLY	Zone 1 (Z1) ONLY CALCULATION GRADE TO 36 FT ¹ & 12 FT ABOVE GREEN ROOF ²		
Z1 Material Type	Threat Factor	Material Area (A)	Factored Area (FA)
material 1	0	0	0
material 2	0	0	0
material 3	0	0	0
Z1 Area Totals=		0	0

Total Zone 1 ONLY Building BCTR =	#DIV/0!
-----------------------------------	---------

Zone 1	Zone 1 (Z1) CALCULATION ⁴ GRADE TO 36 FT ¹ & 12 FT ABOVE GREEN ROOF ²		
Z1 Material Type	Threat Factor	Material Area (A)	Factored Area (FA)
material 1	0	0	0
material 2	0	0	0
material 3	0	0	0
Z1 Area Totals=		0	0

Zone 2	Zone 2 (Z2) CALCULATION FAÇADE >36 FT		
Z2 Material Type	Threat Factor	Material Area (A)	Factored Area (FA)
material 1	0	0	0
material 2	0	0	0
material 3	0	0	0
Z2 Area Totals=		0	0

Total Building BCTR =	#DIV/0!
-----------------------	---------

Total Building BCTR

MITIGATION: LEED Pilot Credit 55 – Bird Collision Deterrence

Bird Collision Deterrence: Summary of Material Threat Factors

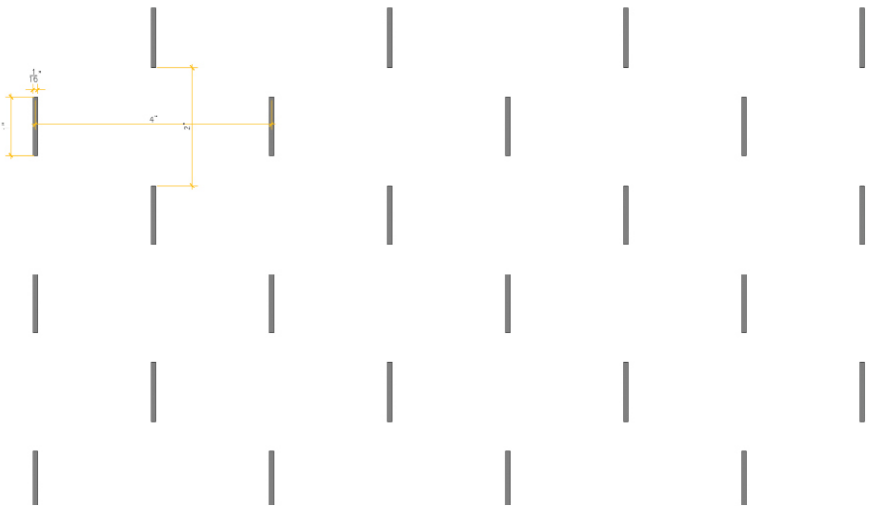
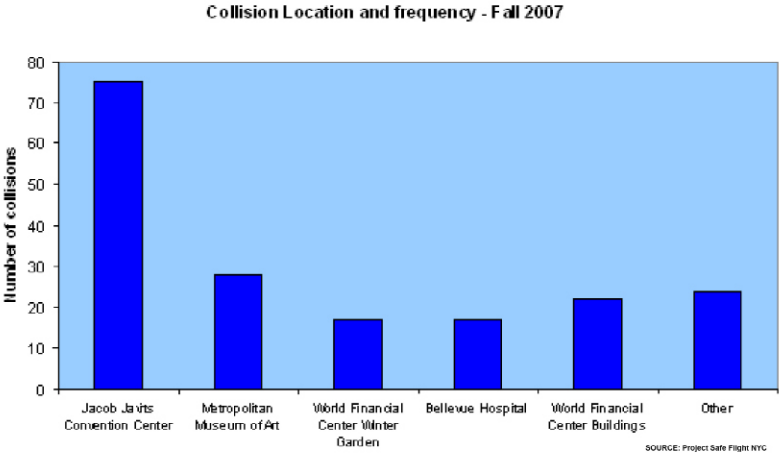
The American Bird Conservancy

October, 2011

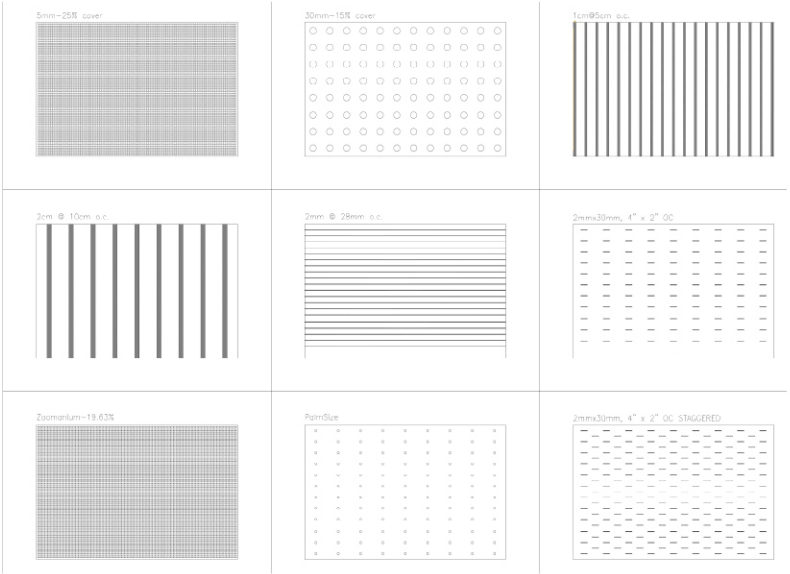
Façade Material Type	Threat Factor
Opaque Material	0
Plexiglass	
Clear plexiglass with 5/64" thick black filament in horizontal arrangement spaced 1-3/16" apart (Evonik Paraglas or similar)	9
Translucent Plastics- all colors except clear	
Fiberglass panel, single pane or insulated (Kalwall or similar)	2
Corrugated fiberglass panel, single pane or insulated (Resolite or similar)	2
Glass	
Clear Glass, single pane or insulated	100
Glass with pattern on interior (#2) surface, single pane or IGU. 1/8" minimum line thickness or dot diameter. 2" maximum space between horizontal elements and 4" maximum space between vertical elements.	
<u>Examples:</u>	
Medium grey ceramic frit - 1/8" vertical lines spaced 1/2" apart, 20% coverage (Viracon V-948 or similar)	10
Dark grey ceramic frit - 1/8" horizontal lines spaced 1/2" apart, 20% coverage (Viracon V-901 or similar)	6
White ceramic frit - 1/8" dia. dots w/20% coverage (Viracon 5065 or similar)	41
White ceramic frit - 1/8" dia. dots w/40% coverage (Viracon 5006 or similar)	24
Glass with continuous frit on interior (#2) surface, single pane or IGU	25
Glass continuously etched (translucent level 4) on interior (#2) surface, single pane or IGU (Carvart or similar)	25
Clear wire glass with maximum 2" wire spacing, single pane or IGU (wire on outer pane).	20
Glass IGU with 1/2" thick white polycarbonate inner layer, 2" maximum diameter honeycomb (Panelite or similar)	25
Glass with pattern on exterior (#1) surface, single pane or IGU. 1/8" minimum line thickness or dot diameter. 2" maximum space between horizontal elements and 4" maximum space between vertical elements.	

Façade Material Type	Threat Factor
<u>Examples: (all Eckelt 4 Bird or similar)</u>	
Orange ceramic frit- 1/4" vertical lines on 3½" centers	10
Orange & black ceramic frit- ½" alternating color vertical lines on 3½" centers	15
Black ceramic frit- 5/8" vertical "dot-screened" lines on 4" centers	10
Orange & black ceramic frit- 5/8" alternating color vertical "dot-screened" lines on 4" centers	10
Orange & black ceramic frit- 1" alternating color vertical "dot-screened" lines on 4 1/4" centers	10
Glass continuously etched (translucent level 4) on exterior (#1) surface, single pane or IGU (Carvart or similar)	5
Specialty Glass Products	
Coated glass with 1/16" UV reflective lines arranged in an irregular "webbed" pattern with 2" maximum spacing on interior (#2) surface, IGU (Ornilux Mikado or similar)	34
Translucent channel glass with cast "orange peel" or linear textured surface- 9" maximum face width (Pilkington Profilit or similar)	10
Glass block, 8" x 8" x 4" deep with "wavy" translucent appearance and polished surface (Pittsburgh Corning Decora or similar)	20
Glass block, 8" x 8" x 4" deep with grooved textured surface (Pittsburgh Corning Argus or similar)	10
Adhesive Films for Glass Retrofit	
Matte perforated vinyl signage film applied to outer (#1) surface (Scotchgal or similar)	2
Patterned film on interior (#2) surface. 1/8" minimum line thickness or dot diameter. 2" maximum space between horizontal elements and 4" maximum space between vertical elements.	see glass
Patterned film on exterior (#1) surface. 1/8" minimum line thickness or dot diameter. 2" maximum space between horizontal elements and 4" maximum space between vertical elements.	see glass
Adhesive decals applied to outer (#1) surface, spaced as indicated for patterned film above	10
Protective Screen External to Glass (fixed in place)	
Horizontal or vertical slats with 1/8" minimum face thickness and 2" maximum space between horizontal elements and 4" maximum space between vertical elements.	5

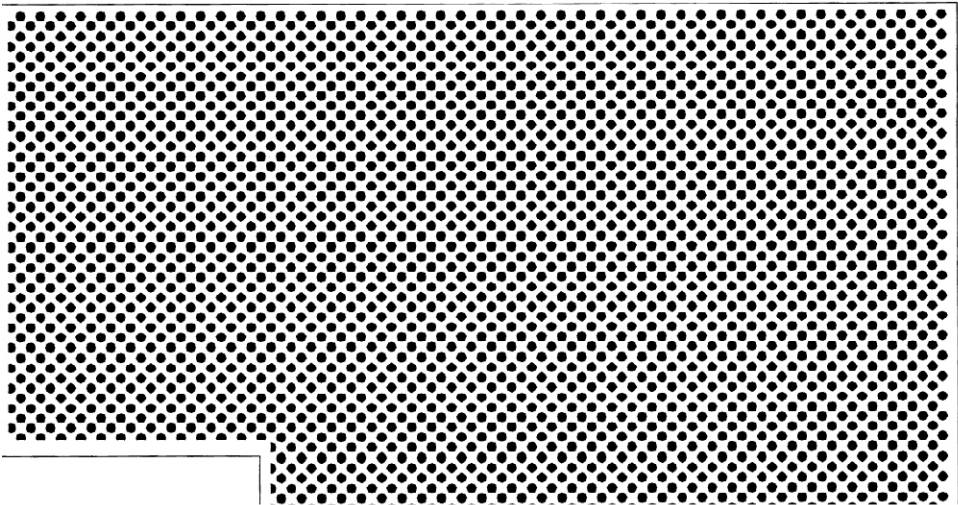
MITIGATION: LEED Pilot Credit 55 – Bird Collision Deterrence



PROPOSED BIRD SAFE FRIT PATTERN

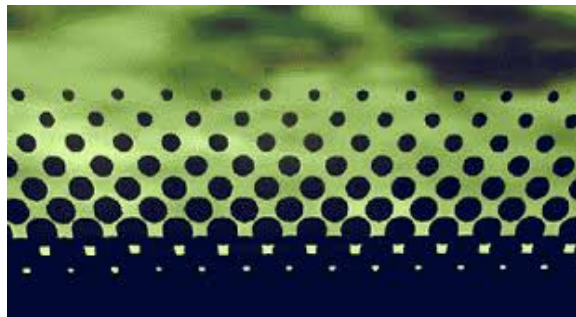
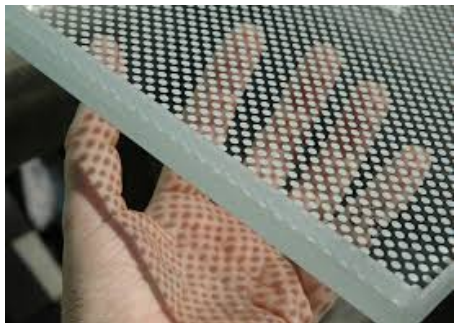
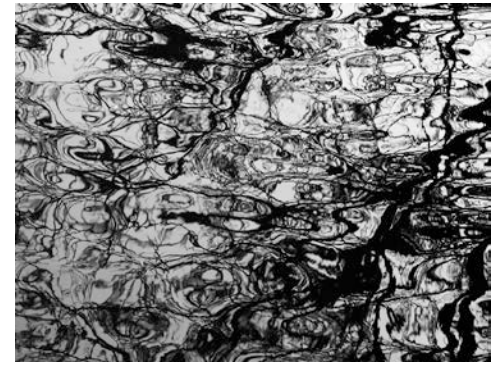
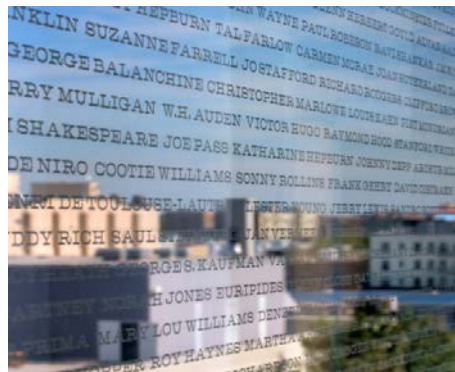
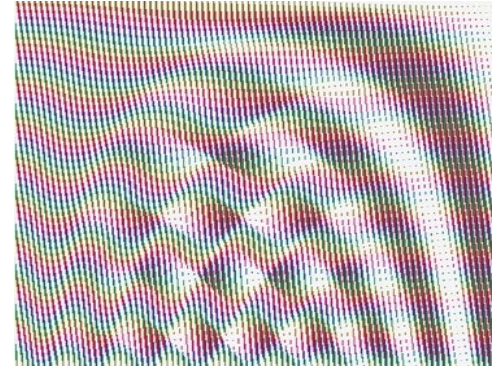


FRIT STUDIES



PROPOSED FRIT PATTERN (30%)

MITIGATION: LEED Pilot Credit 55 – Bird Collision Deterrence



MITIGATION: LEED Pilot Credit 55 – Bird Collision Deterrence



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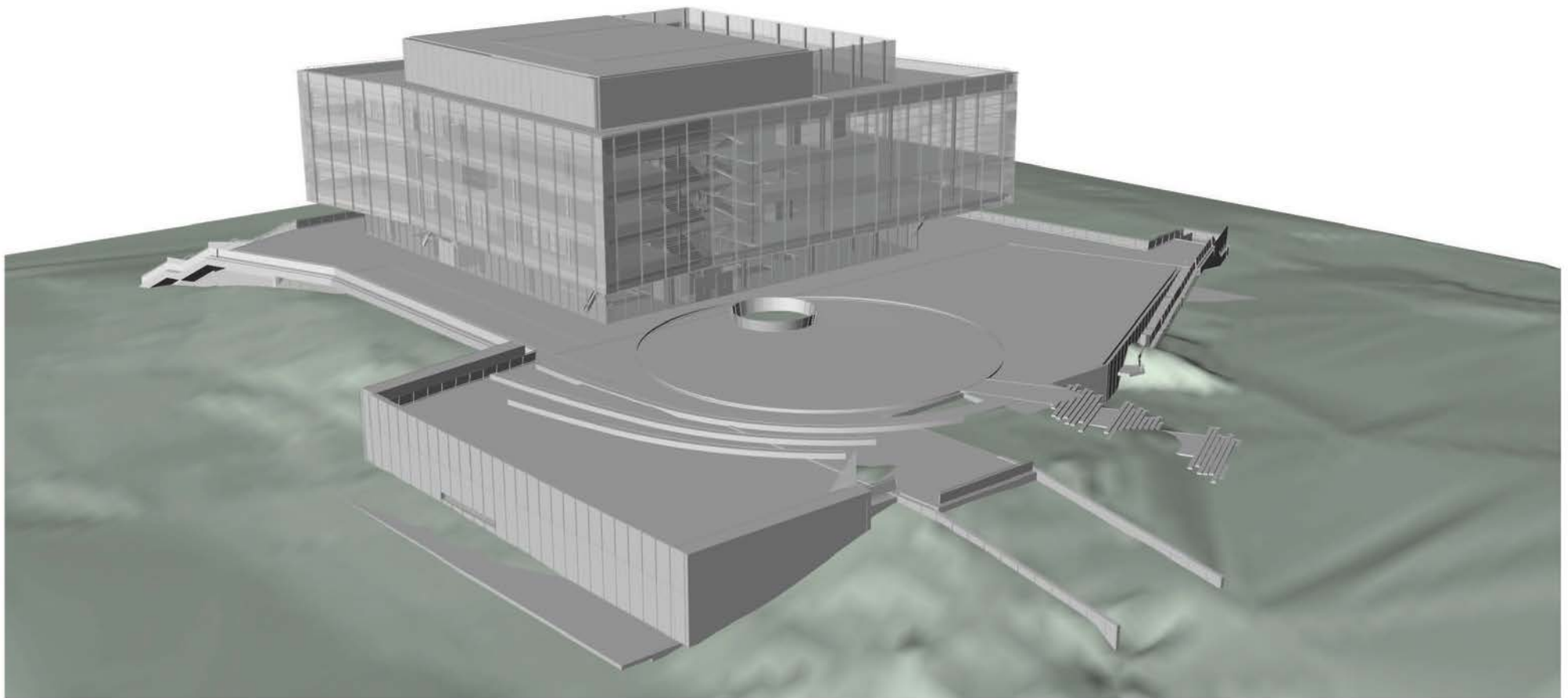
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MITIGATION: LEED Pilot Credit 55 – Bird Collision Deterrence



MITIGATION: LEED Pilot Credit 55 – Bird Collision Deterrence



pre-req → MODEL

MODEL → AGBEA → BGBEA (Below Grade...)

AGBEA → ZONE 2 → MTy.1A, MTy.2A, MTy.3A

AGBEA → ZONE 1 → MTy.1A, MTy.2A, MTy.3A

MTy.1A, MTy.2A, MTy.3A → MTy.1 MTF, MTy.2 MTF, MTy.3 MTF

MTy.1 MTF, MTy.2 MTF, MTy.3 MTF → Z2 MTF, Z1 MTF, Z2 MTF, Z1 MTF, Z2 MTF, Z1 MTF

Z2 MTF, Z1 MTF, Z2 MTF, Z1 MTF → Z2 FA, Z1 FA

Z2 FA, Z1 FA → TFA

TFA → BCR

INTERSECT	INTERSECT								
1	2	"AGBEA"	"ABEA"	"MTy"	"MTF"	"ZFA"	"TFA"	"BCR"	
		ABOVE GRADE BUILDING ELEVATION AREA	ADJUSTED BUILDING ELEVATION AREA	MATERIAL TYPE AREA (per Zone)	MATERIAL THREAT FACTOR (per Type)	ZONE MATERIAL FACTORED AREA (per Type)	TOTAL FACTORED AREA	BIRD COLLISION THREAT RATING	
		(GSF)	(GSF)	(GSF)	(0-100)	F (GSF)	(GSF)	(0-100)	

Supers

Material Factored Area per Zone

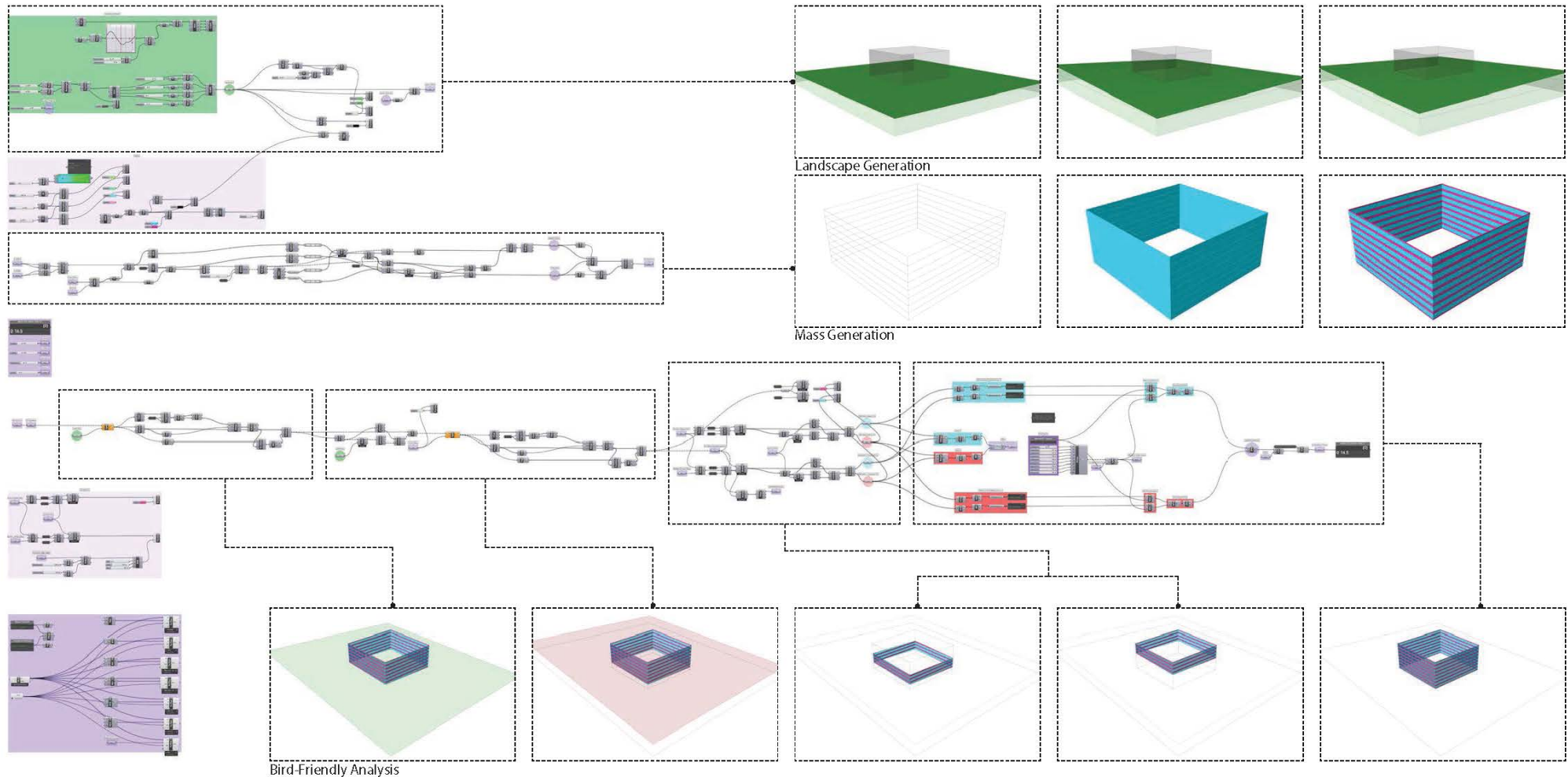
MTy.1 FA + MTy.2 FA + MTy.3 FA : Z2 FA + Z1 FA

BCR = TFA / ABEA

1/15

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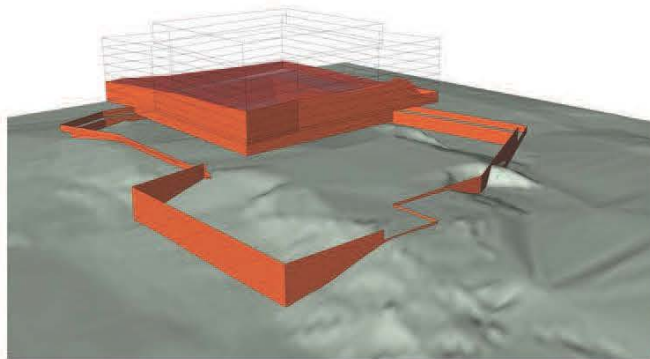
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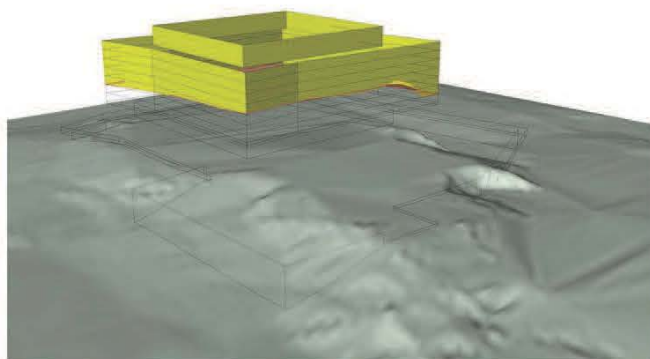
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General Mass Bird-Friendly Script Overview

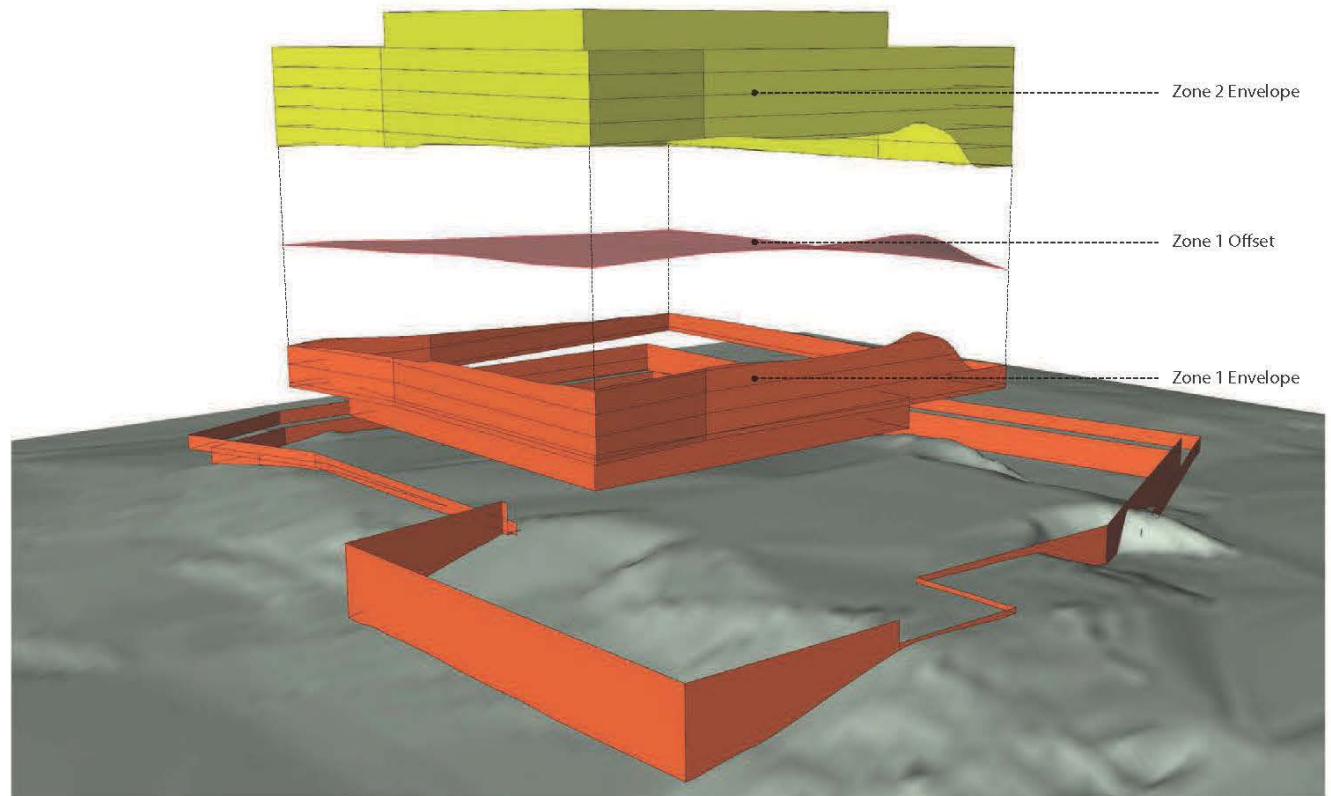
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Zone 1 Envelope



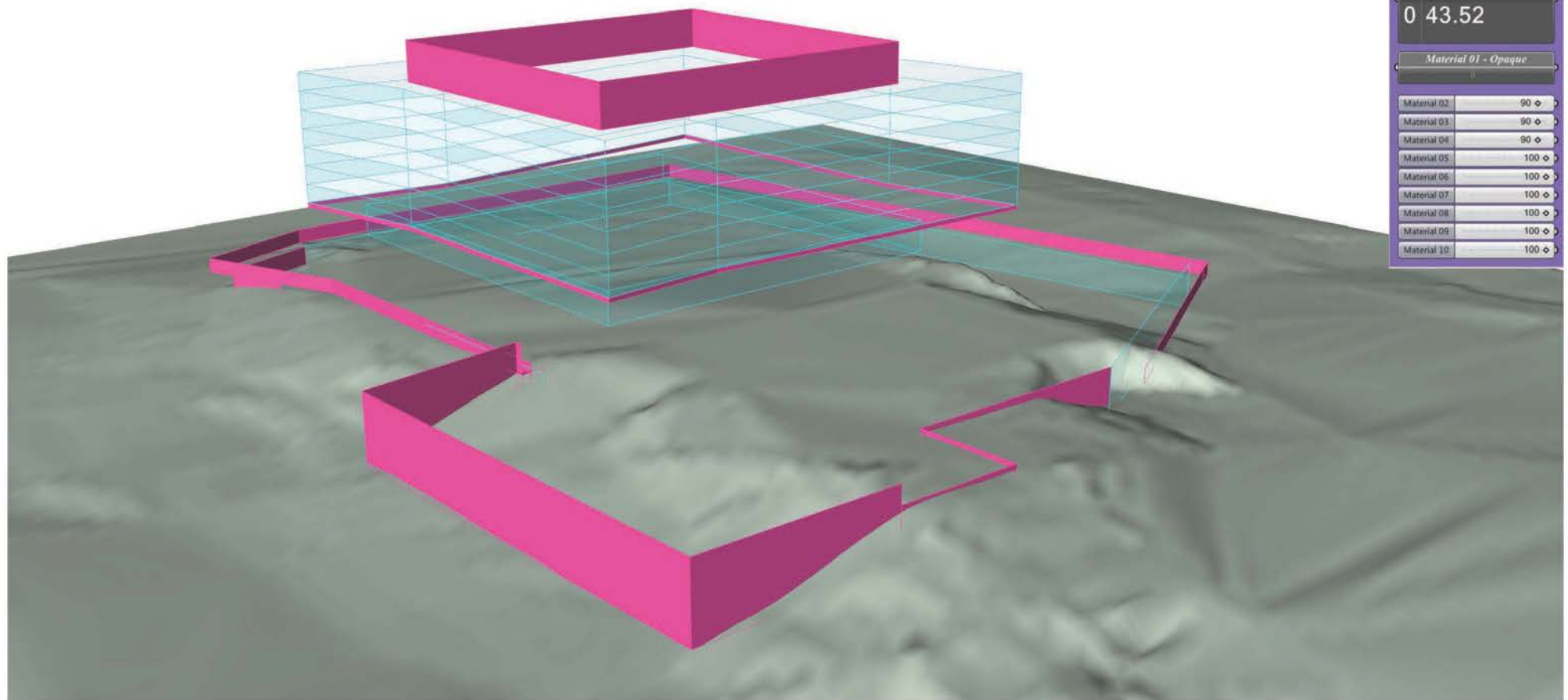
Zone 2 Envelope



Zone 1+2 Exploded Axo

MITIGATION: LEED Pilot Credit 55 – Bird Collision Deterrence

■ Opaque Material
■ Transparent Material

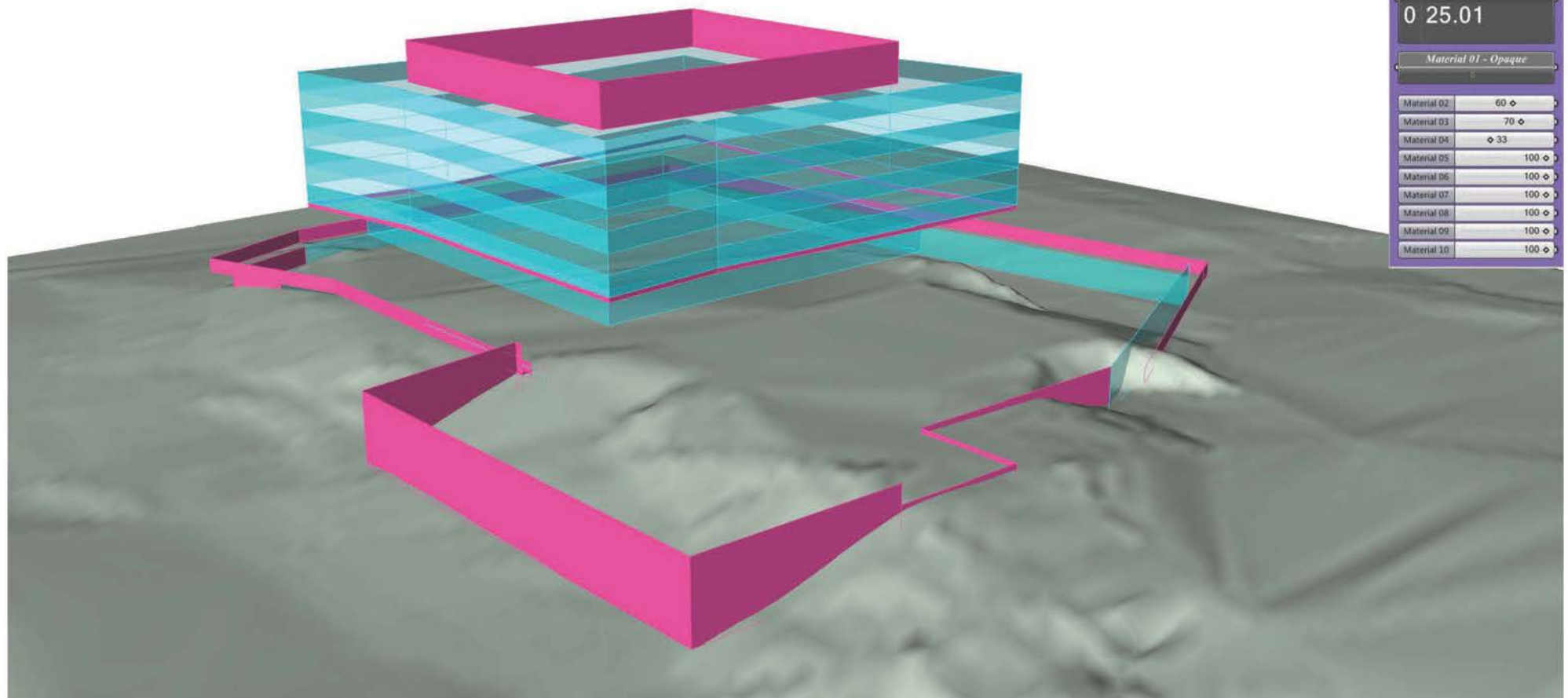


Project "X"

Material Threat Factor + Transparency 01

MITIGATION: LEED Pilot Credit 55 – Bird Collision Deterrence

■ Opaque Material
■ Transparent Material



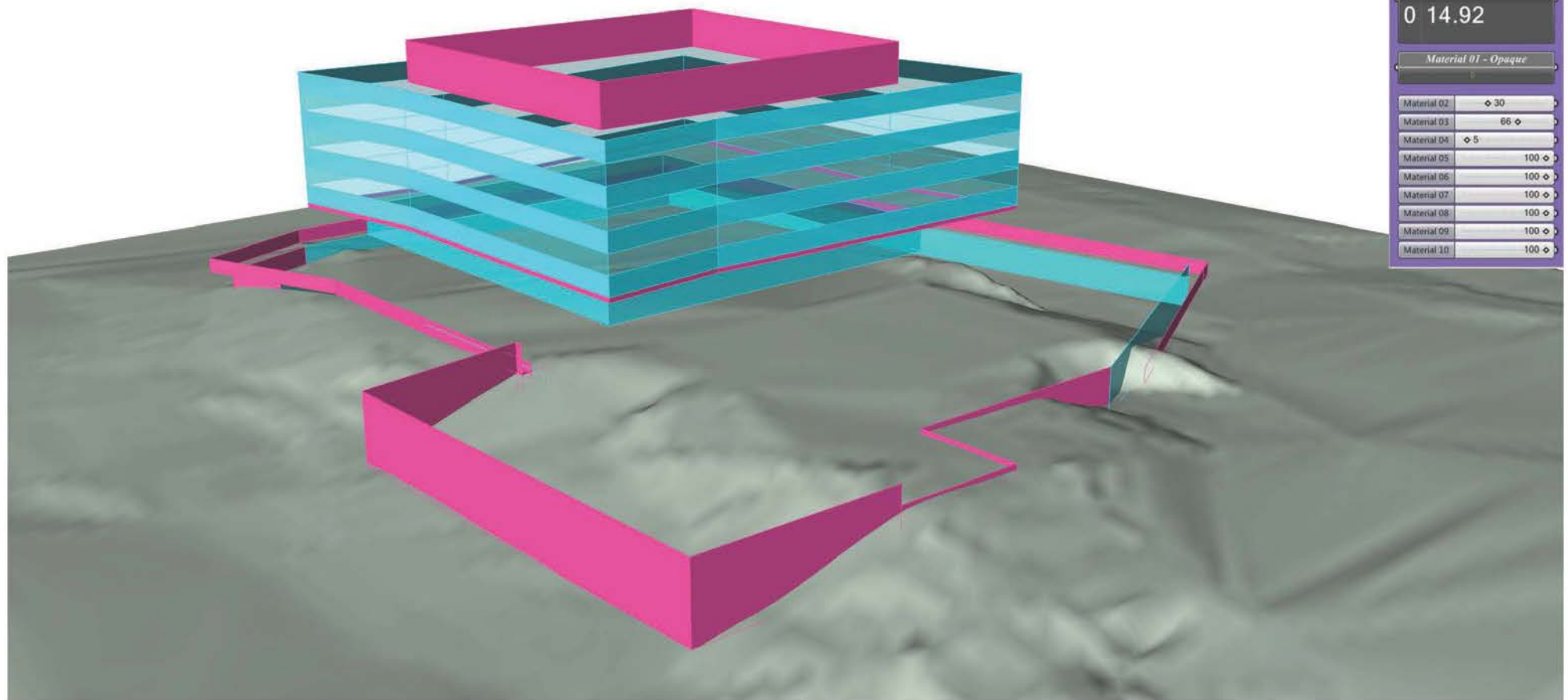
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Project "X"

Material Threat Factor + Transparency 02

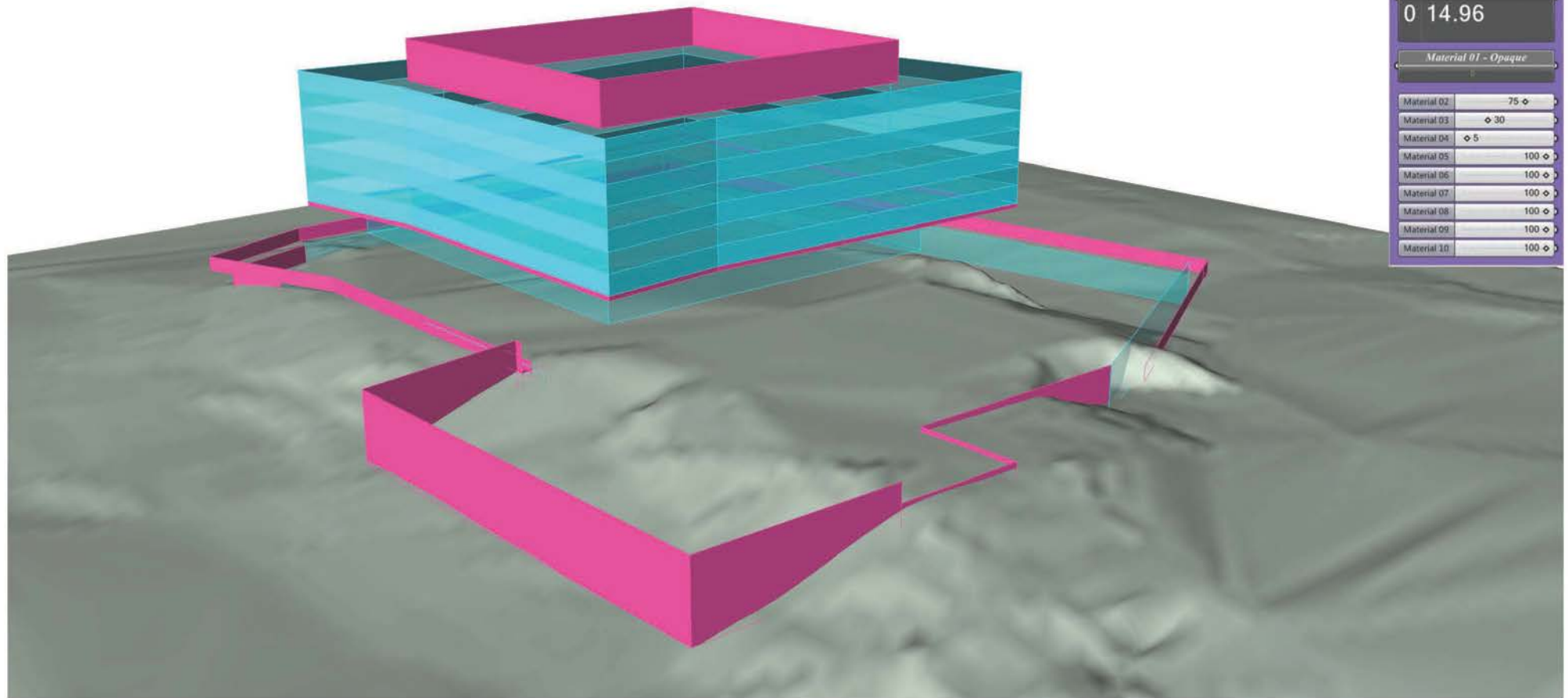
MITIGATION: LEED Pilot Credit 55 – Bird Collision Deterrence

■ Opaque Material
■ Transparent Material



MITIGATION: LEED Pilot Credit 55 – Bird Collision Deterrence

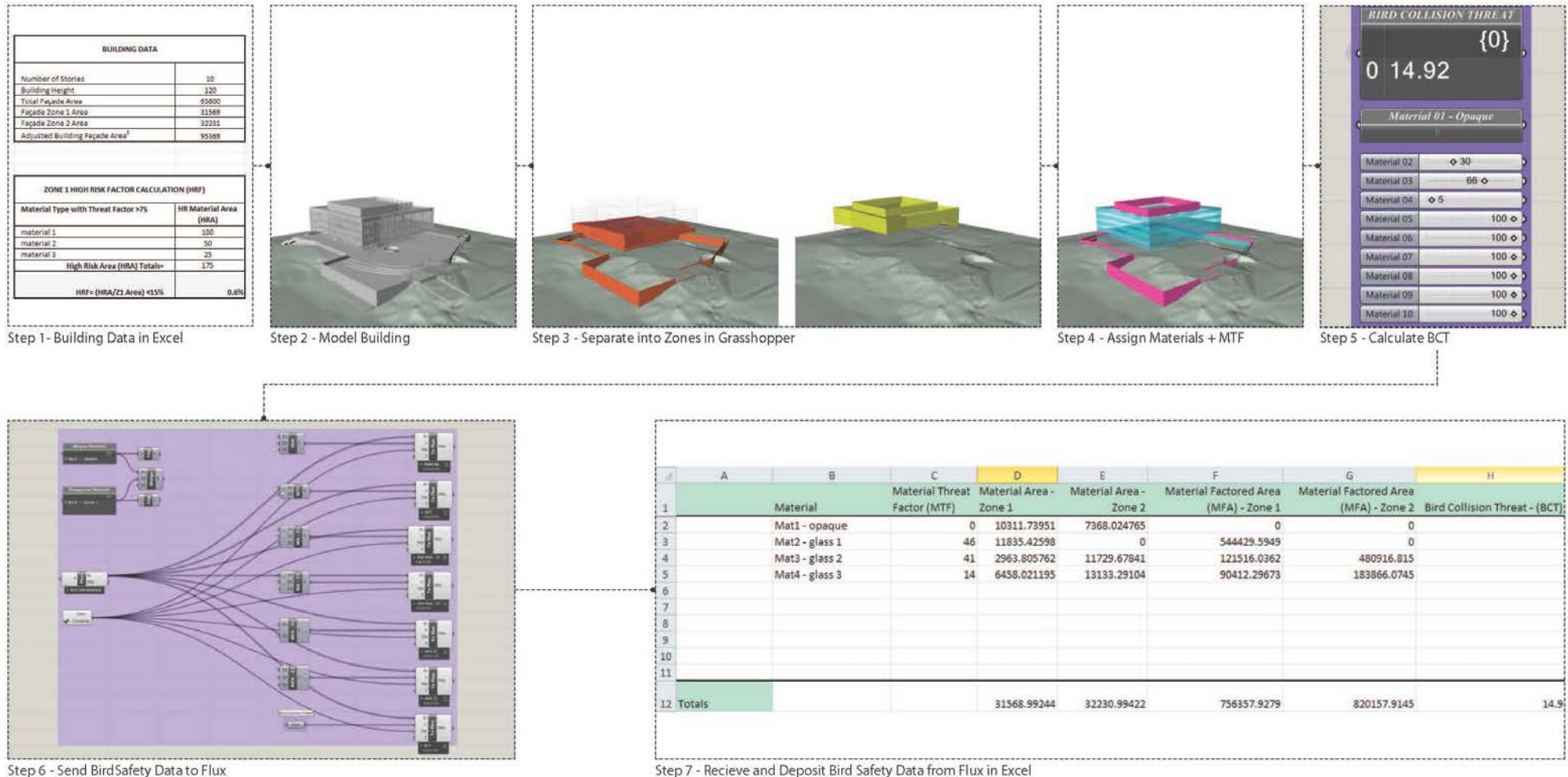
■ Opaque Material
■ Transparent Material



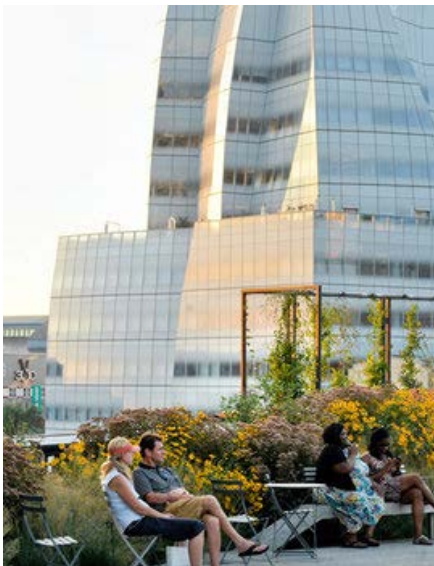
Project "X"

Material Threat Factor + Transparency 04

MITIGATION: LEED Pilot Credit 55 – Bird Collision Deterrence



MITIGATION & ADAPTATION Performance Driven Design Thinking



Thank You.

