

A landscape photograph of a valley with a rainbow in a cloudy sky. The rainbow is the central focus, arching across the sky. The valley below is green and rolling, with a small white building visible on the right side. The sky is filled with dark, heavy clouds, suggesting a recent storm or an approaching one. The overall mood is serene and hopeful.

Essential conversations:
Using collaborations with farmers to
build strong conservation research

Anna Mangan
Center for Collaborative Conservation
Cohort 6 Fellow

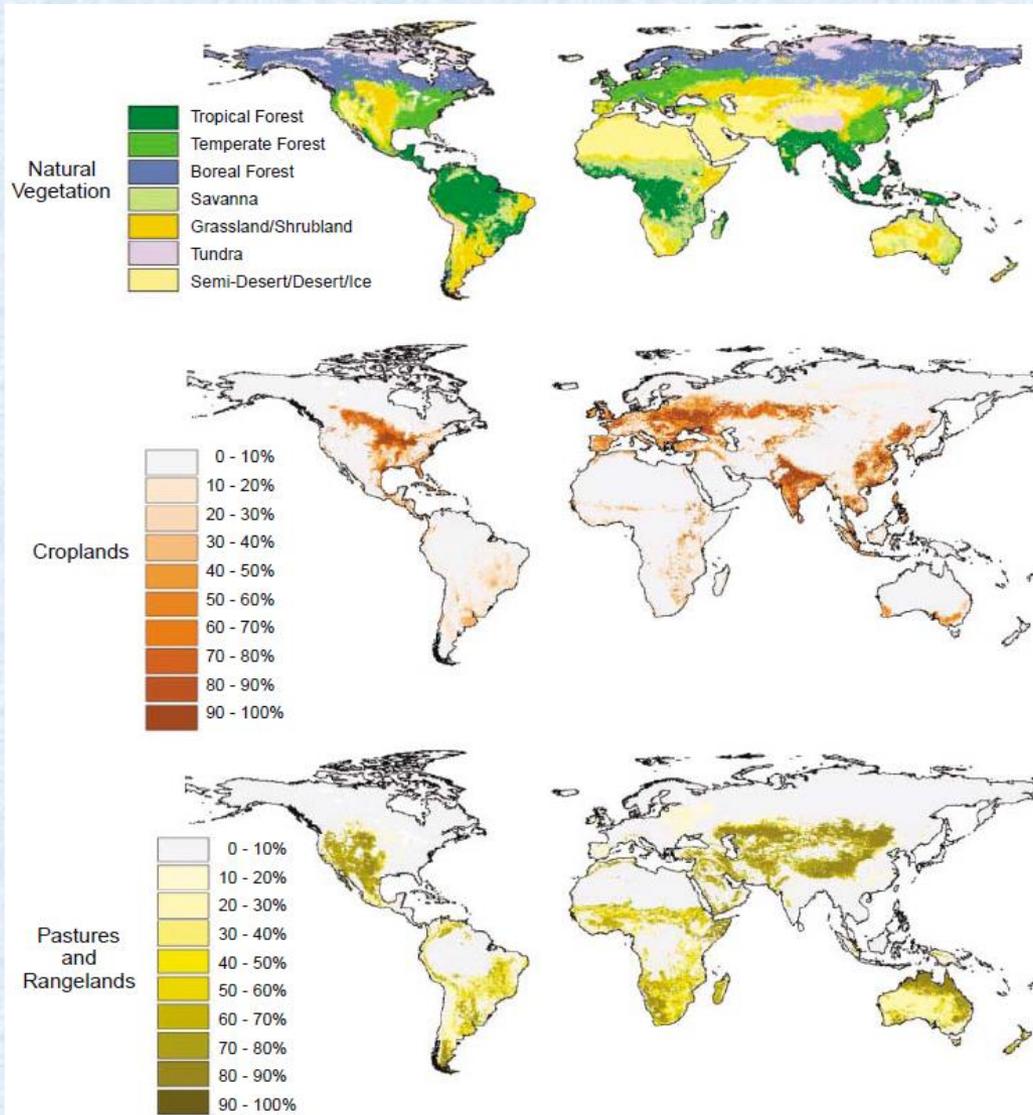
Conservation

Research

Collaborations

Challenges &
Opportunities

Introduction

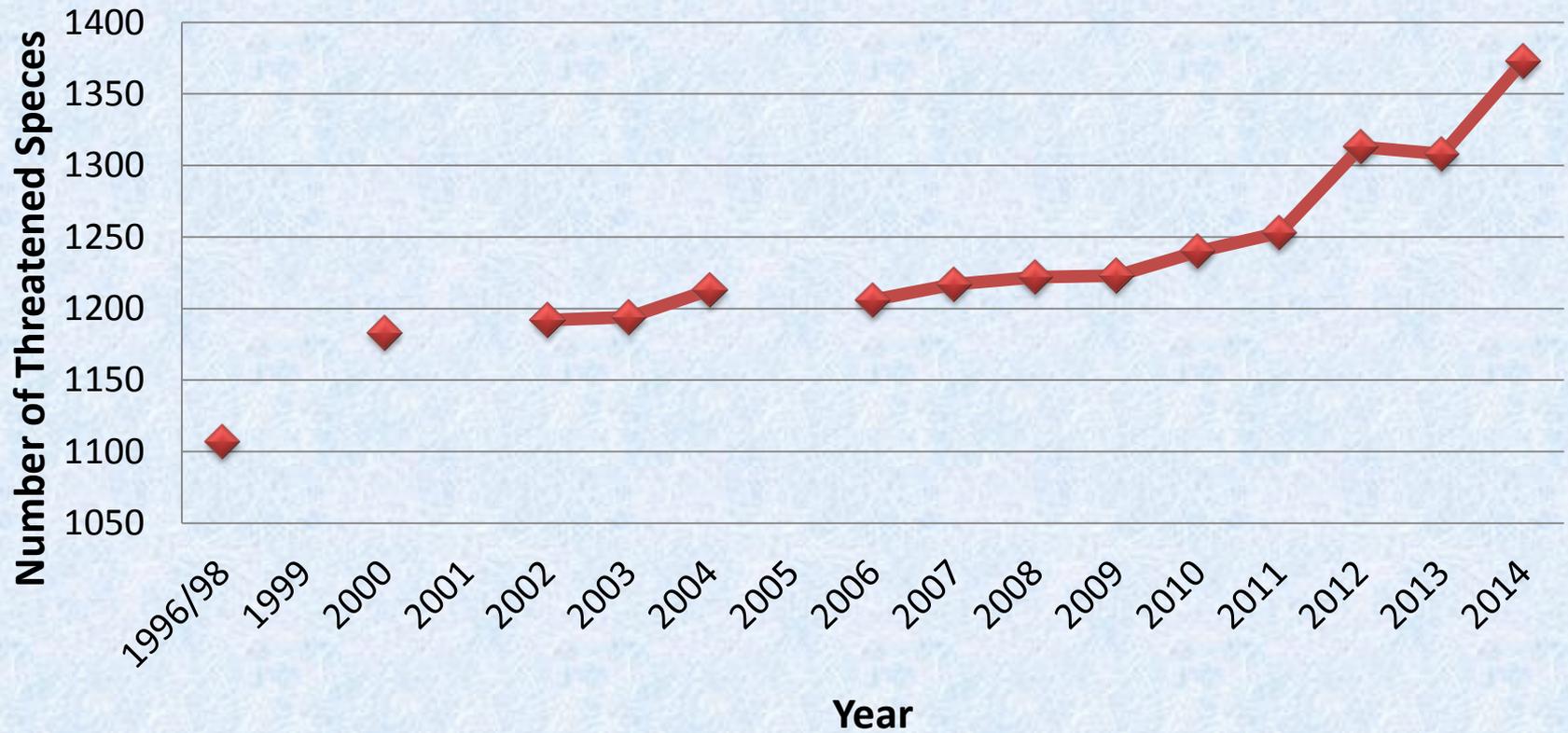


← Potential
vegetation

← Actual extent

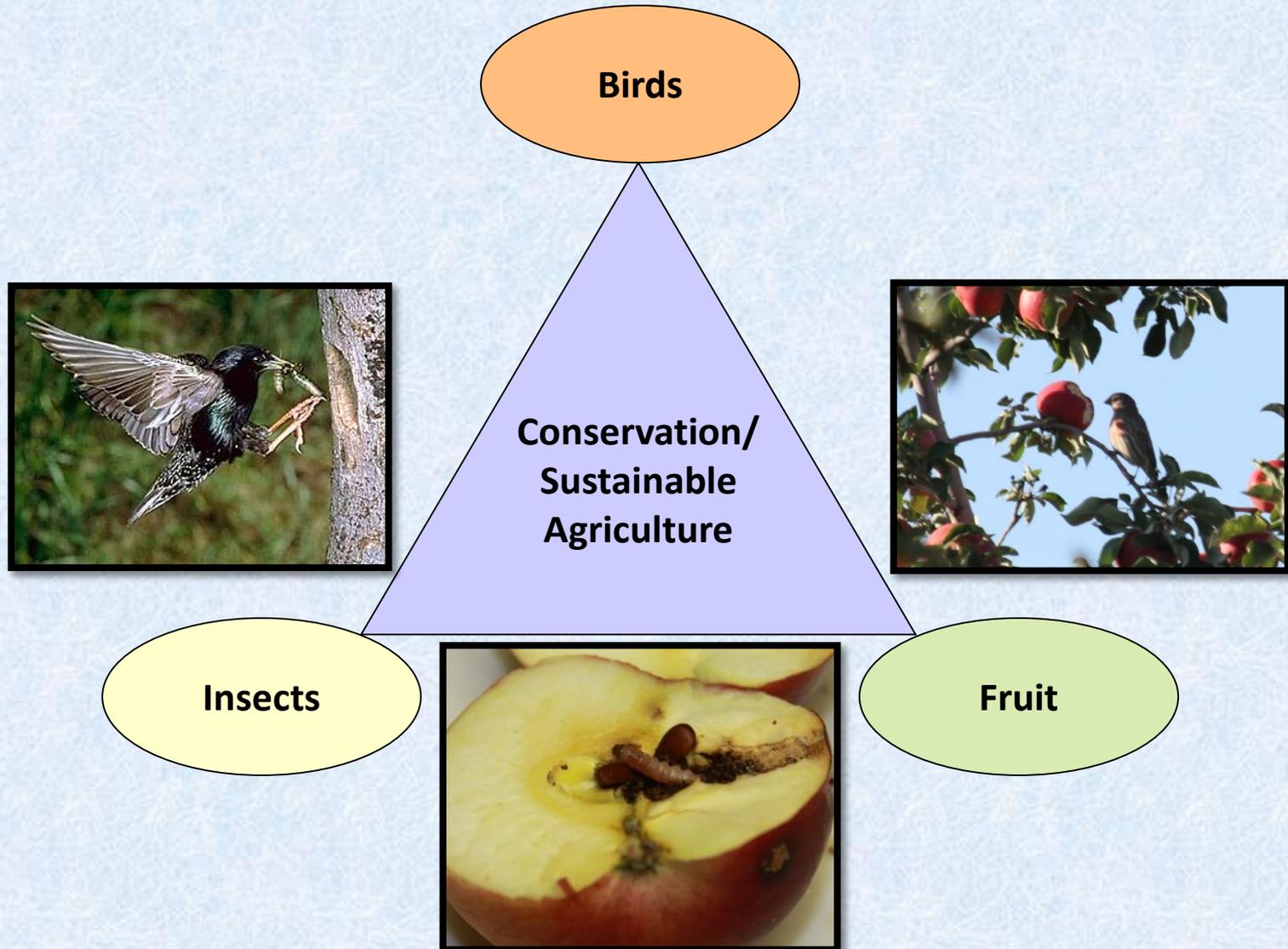


IUCN Red List of Threatened Bird Species



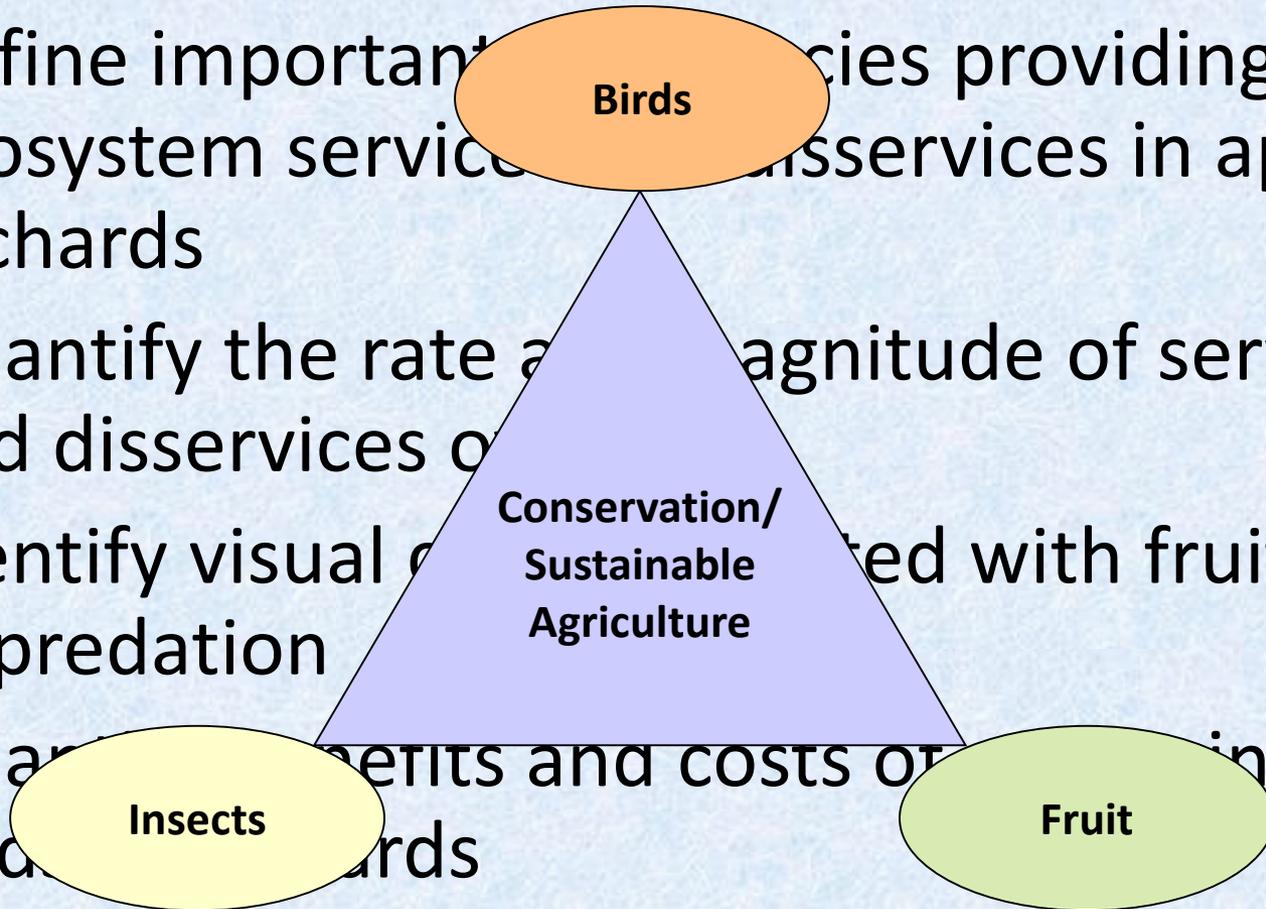
Data from IUCN 2014

Project Overview



Objectives

1. Define important species providing ecosystem services and disservices in apple orchards
2. Quantify the rate and magnitude of services and disservices of
3. Identify visual damage associated with fruit depredation
4. Quantify benefits and costs of



Objectives

1. Define important bird species providing ecosystem services and disservices in apple orchards
2. Quantify the rate and magnitude of services and disservices over time
3. Identify visual cues associated with fruit depredation
4. Quantify benefits and costs of maintaining birds in orchards¹

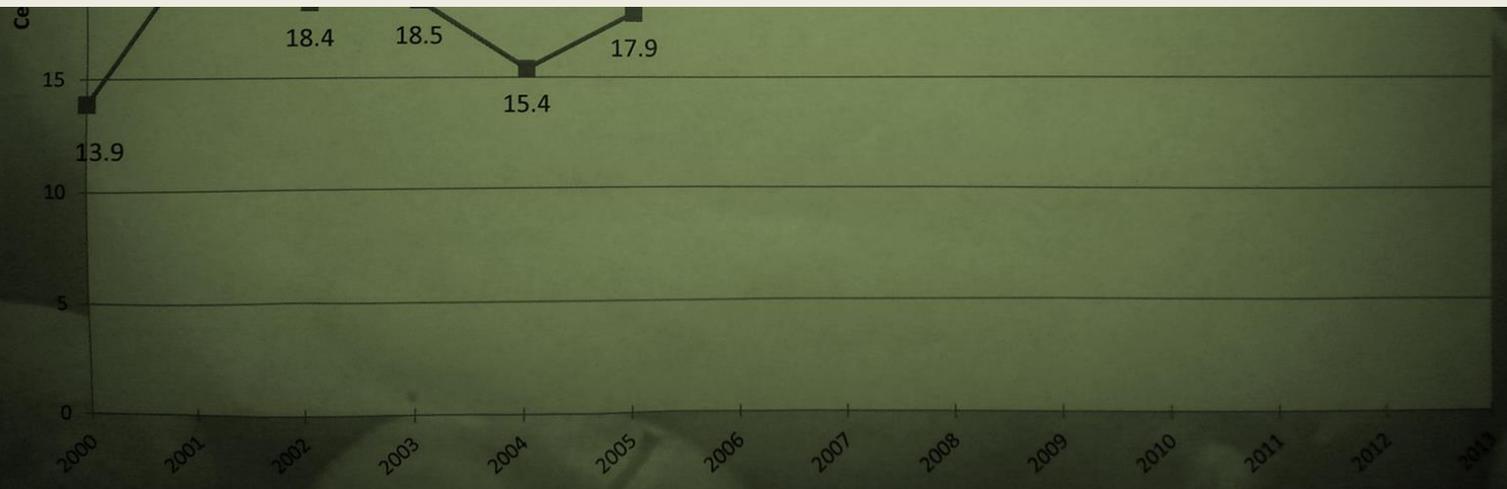
Site Selection

Colorado Apples - Historical Prices

2000-2013

Criteria for site selection

1. Sufficient fruit, bird and insect presence
2. Minimal use of bird control techniques and pesticides
3. Producer willingness to participate



Data from National Agricultural Statistics Service 2015

Field Methods

- Transects
- Mist-nets
- Behavioral observations
- Exclosures and paired controls





Western Colorado Research Center



Farmers

Montana Palanada

Colorado State University WARNER COLLEGE OF NATURAL RESOURCES

CENTER FOR COLLABORATIVE conservation



Valley Organic Growers Association

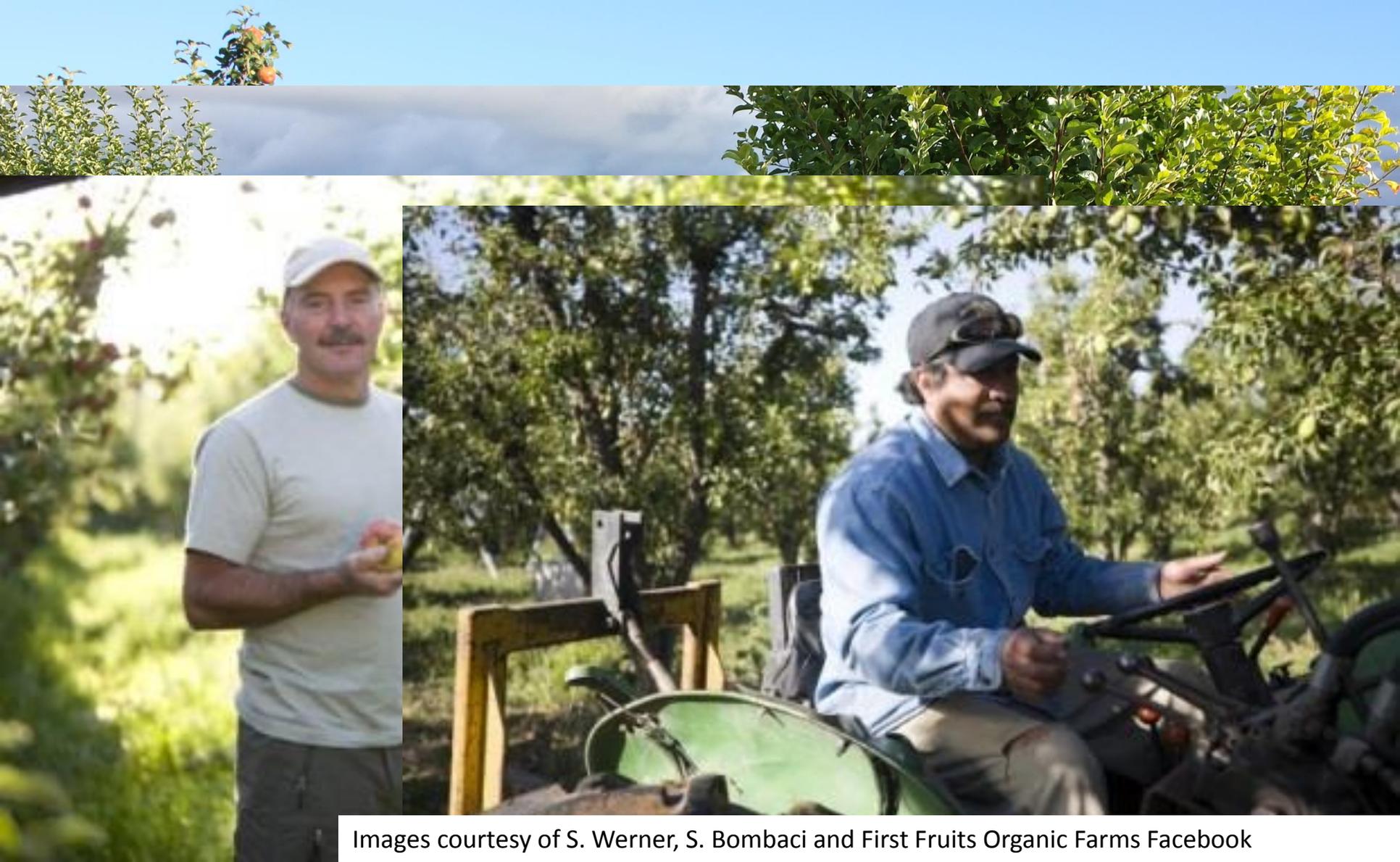


Organic Farmers



Collaborators

First Fruits Organic Farms



Images courtesy of S. Werner, S. Bombaci and First Fruits Organic Farms Facebook

Mesa Winds Farm and Winery



Images courtesy of www.mesawinds.com

White Buffalo Farm



Image courtesy of www.whitebuffalofarm.org

National Wildlife Research Center & Arkion[®] Life Sciences

NWRC Mission

Apply scientific expertise to resolve human-wildlife conflicts while maintaining the quality of the environment shared with wildlife



Arkion[®] Life Sciences Mission

To discover, develop and successfully market innovative products in the animal and human food industry, that enhances the quality of life. We also want to build a reputation for being creative and employing cutting edge technologies for developing bioactive products.

Preliminary Results

Species Code	Apples	Insects	Total Detections
EUST	1	3	57
LEWO	1		6
HOFI	*	1	227
PIJA	*		20
AMRO		83	32
BRBL		25	10
BCHU		18	73
CHSP		16	11
LAZB		16	10
RCKI		12	
BLGR		2	1
WEKI		1	9
CORA		1	1
DEJU		1	
BARS		*	14
CONI		*	
VGSW		*	

Species Code	Apples	Insects	Total Detections
MODO			33
AMGO			22
WEME			20
AMKE			13
LEGO			13
CEDW			12
EUCD			11
BUOR			8
WEWP			7
BBMA			6
YWAR			6
BHCO			5
TUVU			4
YRWA			4
AMCR			3
NOFL			3
BAWW			1
BTHU			1
DOWO			1
HAWO			1
KILL			1
RBNU			1
RTHA			1
RWBL			1
WESJ			1



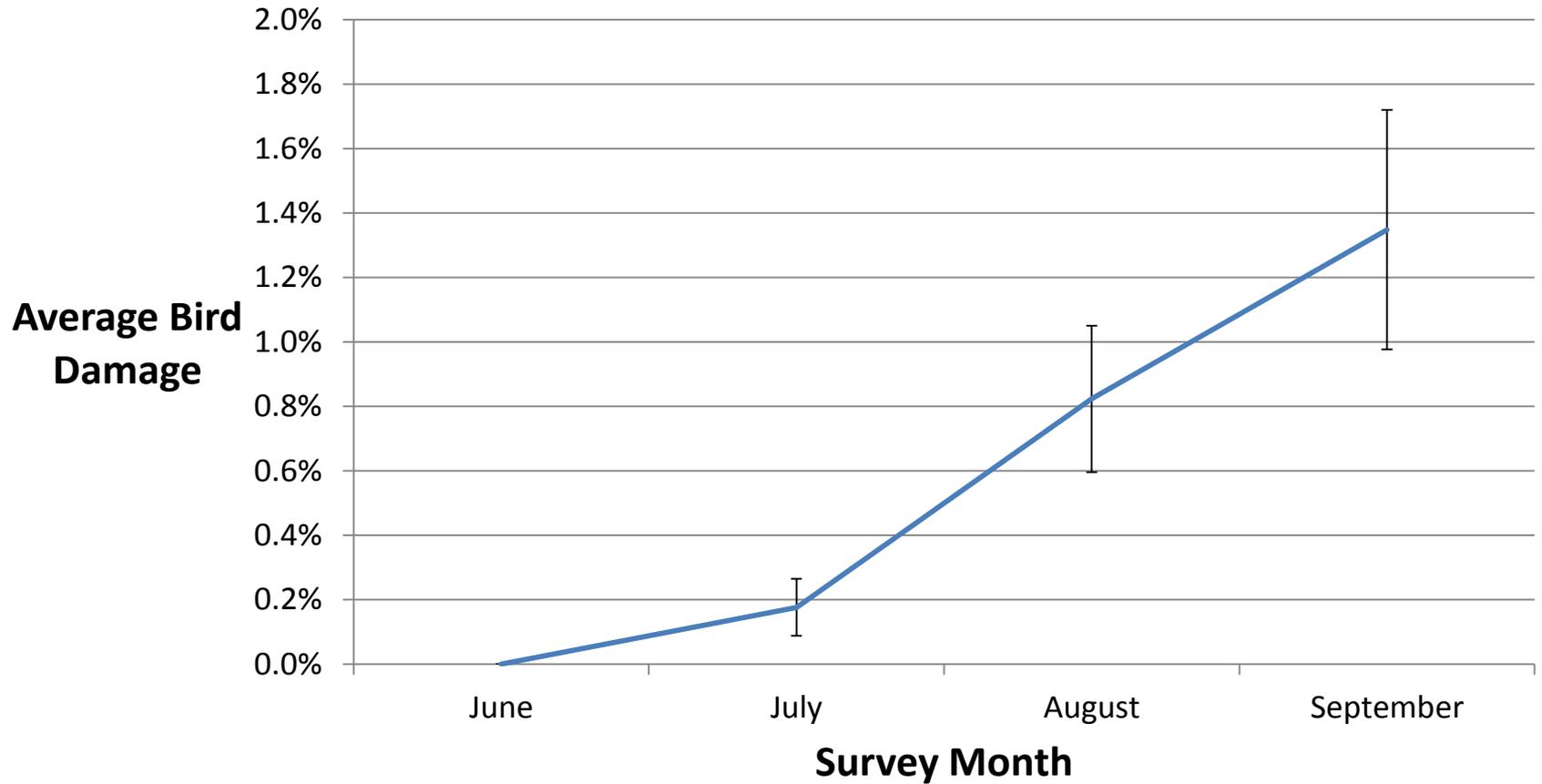
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CONI		*	
VGSW		*	

Mist-Netting Results

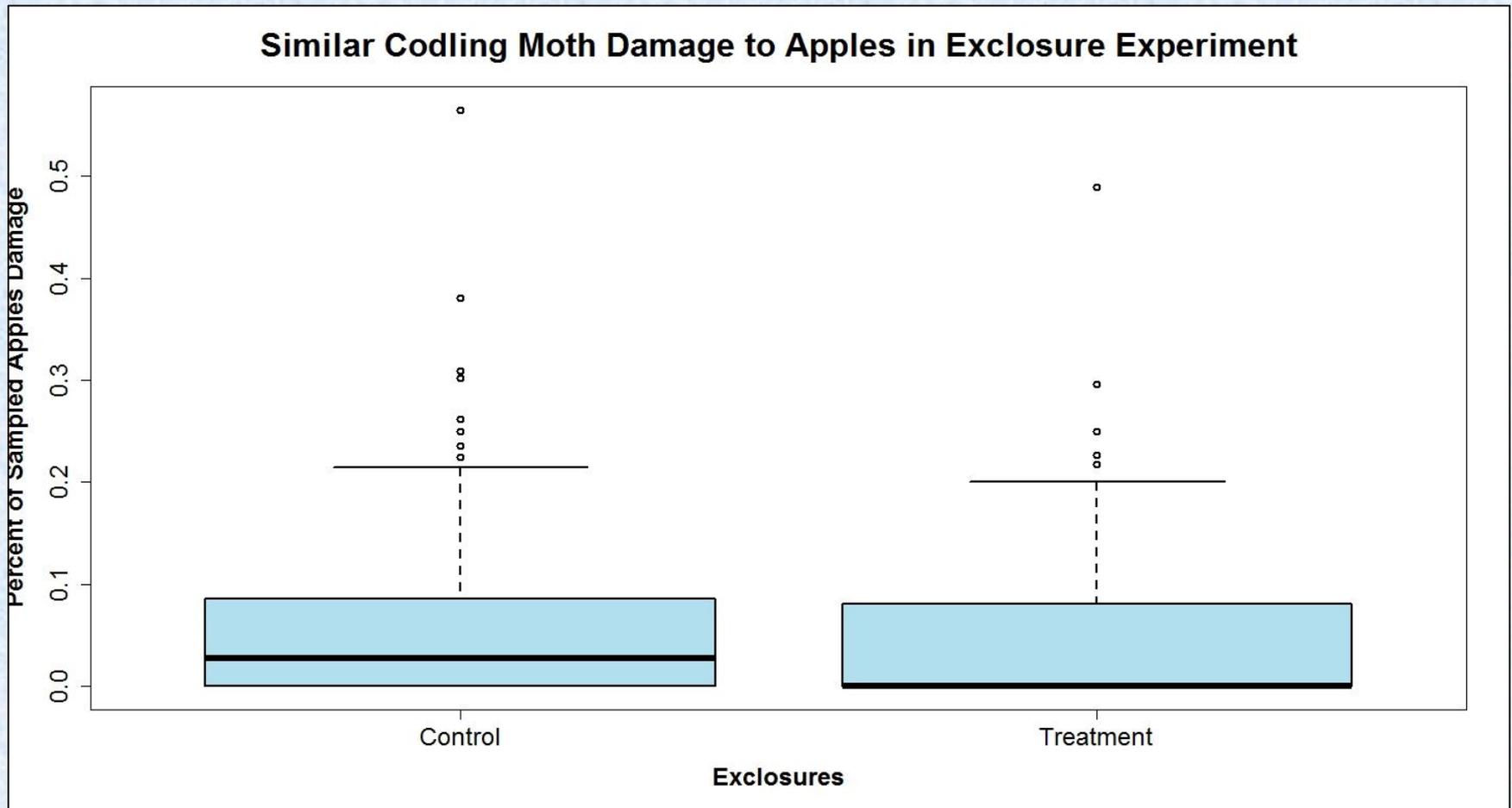
Species Code	Fecal Samples
AMGO	3
AMRO	17
BARS	1
BCHU	5
BHCO	5
BHGR	2
BRBL	1
BUOR	8
CHSP	6
DUFL	1
GRCA	1
GTTO	1
HOFI	9
LAZB	1
LEGO	4
RCKI	1
RNSA	2
RWBL	1
SOSP	1
WAVI	3
WEWP	1
YWAR	6

Exclosure Experiment Results

Bird Damage By Month



Exclosure Experiment Results



FIRSTFRUITS

FIRSTFRUITS

MESA FARMS

Paonia Site

- American crow
- American goldfinch
- American kestrel
- American robin
- Black-billed magpie
- Black-chinned hum
- Brewer's blackbird
- Brown-headed cow
- Bullock's oriole
- Cedar waxwing
- Common raven
- Downy woodpecker
- Eurasian collared-d
- Green-tailed towhe
- House finch
- House sparrow
- Lesser goldfinch
- Mourning dove
- Northern flicker
- Pinyon jay
- Red-winged blackbi
- Say's phoebe
- Violet-green swallow
- Warbling vireo
- Western meadowlark
- Western wood-pewee
- Yellow warbler

*These lists include all bird

Rogers Mesa Sites

- American crow
- American goldfinch
- American kestrel
- American robin
- Barn swallow
- Black-billed magpie
- Black-capped chickadee
- Black-chinned hummin
- Blue grosbeak
- Brewer's blackbird
- Broad-tailed humming
- Brown-headed cowbird
- Bullock's oriole
- Cedar waxwing
- Chipping sparrow
- Common nighthawk
- Common raven
- Dark-eyed junco
- Downy woodpecker
- Eurasian collared-dove
- European starling
- Hairy woodpecker
- House finch
- Killdeer
- Lazuli bunting
- Lesser goldfinch

*These lists include all bird s

- American crow
- American goldfinch
- American kestrel
- American robin
- Barn swallow
- Black-chinned hummingbird
- Brown-headed cowbird
- Brewer's blackbird
- Bullock's oriole
- Cedar waxwing
- Chipping sparrow
- Common raven
- Downy woodpecker
- Dusky flycatcher
- European starling
- Gray catbird
- House finch
- Lesser goldfinch
- Lewis's woodpecker
- Mourning dove
- Pinyon jay
- Red-winged blackbird
- Swainson's hawk
- Violet-green swallow
- Western meadowlark
- Yellow warbler



*This list includes all bird species that v

- American robin
- Black-and-white warbler
- Black-billed magpie
- Black-chinned hummingbird
- Black-headed grosbeak
- Bullock's oriole
- Common raven
- Downy woodpecker
- Eurasian collared-dove
- House finch
- Lazuli bunting
- Lesser goldfinch
- Violet-green swallow
- Warbling vireo
- Western kingbird
- Western scrub-jay
- Yellow warbler



... that were seen, heard or captured during our 2014 field season*



ations



234K / 17K

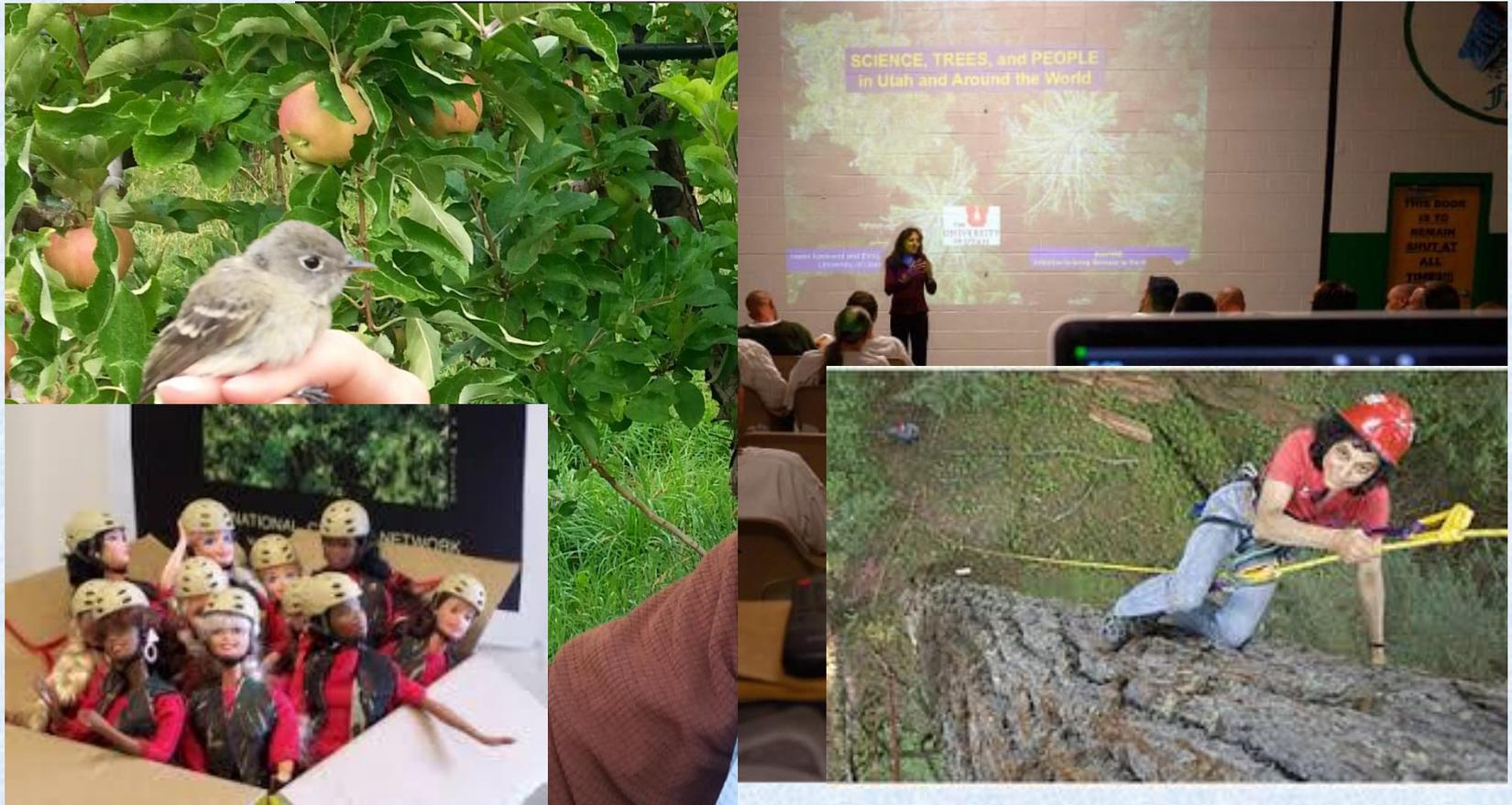
birds are killed by wind turbines annually



6.6M / 26.5 M

birds are killed by power lines (collision and electrocution combined) annually

Challenges and Opportunities

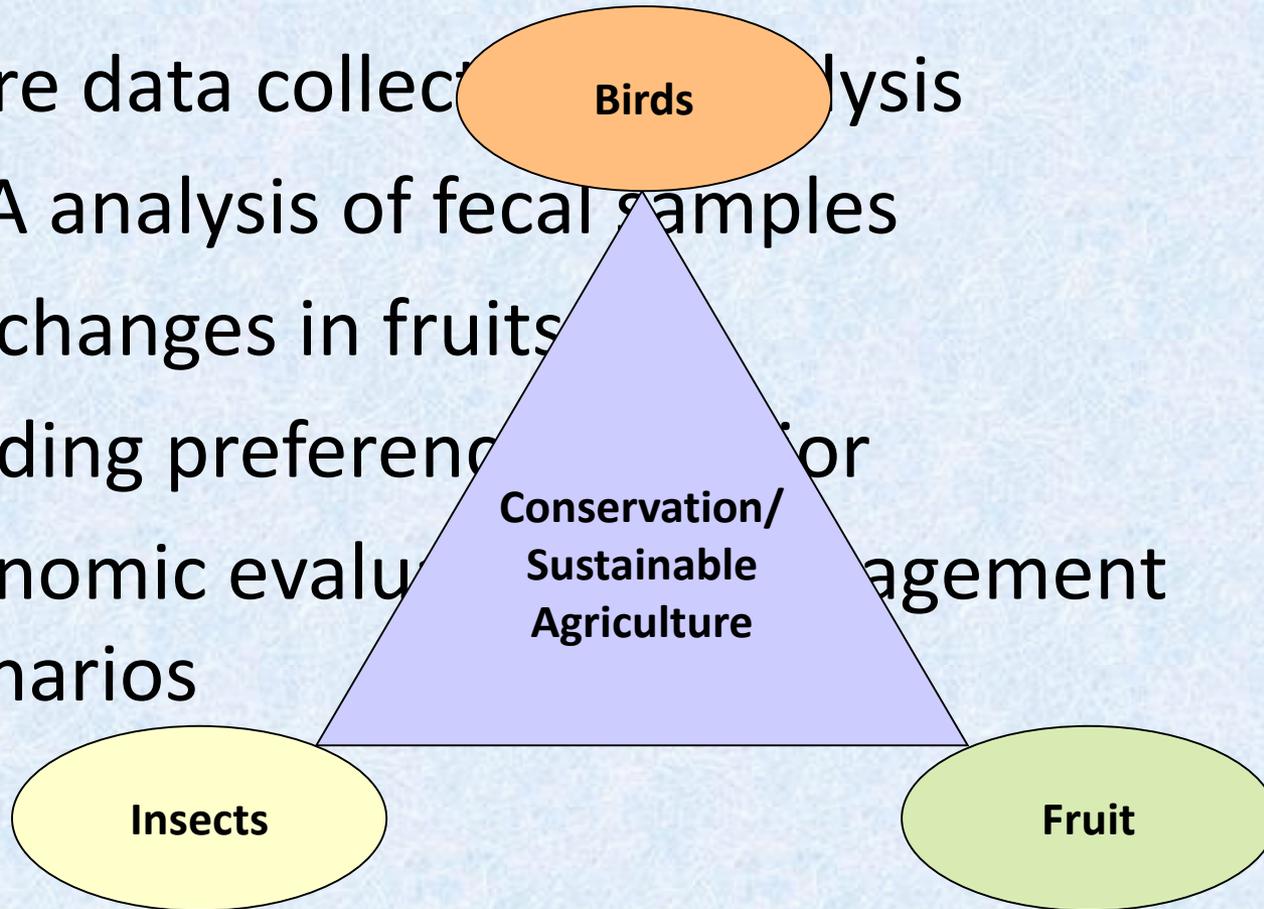


Images from The National Science Foundation, The Salt Lake Tribune and The Research Ambassador Program



Moving Forward

- More data collection and analysis
- DNA analysis of fecal samples
- UV changes in fruits
- Feeding preferences for
- Economic evaluation of management scenarios



Acknowledgements

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MESA WINDS
FARM & WINERY



Resources

- Foley, J., R. Defries, G. Asner, C. Barford, G. Bonan, S. Carpenter, F. S. Chapin, M. Coe, G. Daily, H. Gibbs, J. Helkowski, T. Holloway, E. Howard, C. Kucharik, C. Monfreda, J. Patz, I. C. Prentice, N. Ramankutty, and P. Snyder. 2005. Global consequences of land use. *Science* 309:570-574.
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Thank You!



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