Bird Assemblages as an Indicator of Riparian Quality

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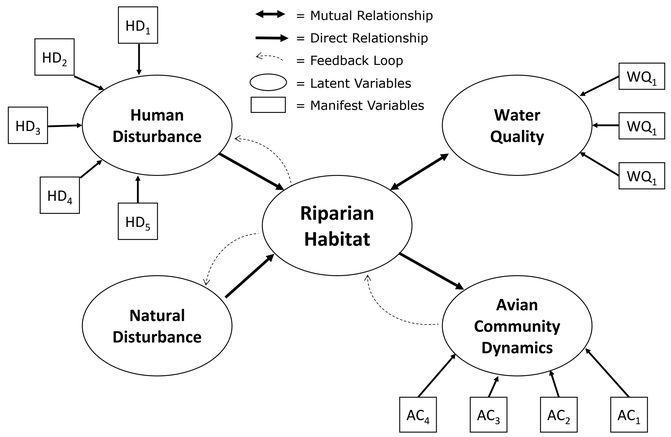
Purpose

- Human disturbance can have a significant impact on the integrity of the surrounding riparian areas and the species they contain.
- Birds function as a useful indicator of environmental factors, and are relatively easy to monitor.
- We wanted to explore the extent to which avian species assemblages and water quality data could be used to assess the influence of human disturbance on riparian integrity.



Structural Equation Model of Relationships Affecting Riparian Integrity

Field Methods

- Avian census using point counts at 15-18 monitoring stations in each of 3 iUTAH experimental watersheds.
- Monitoring stations were co-located with existing GAMUT aquatic sites (3 stations per site).

Census & Disturbance Assessment at Blacksmith Fork GAMUT

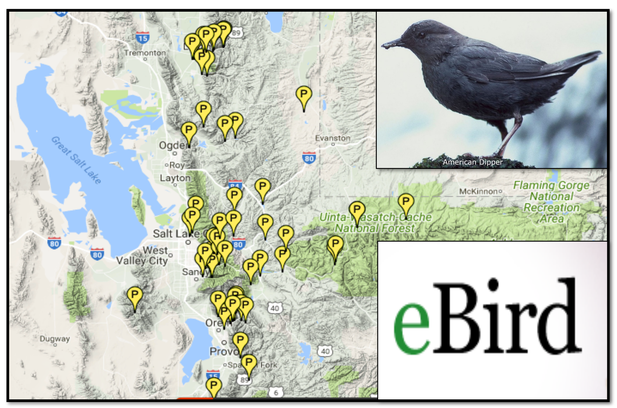
Human Disturbance Assessment

- Human disturbance was assessed at each monitoring station using 25 parameters in 5 disturbance categories (adapted from Bryce et al. 1999), resulting in a score of 0-25 based on the number of parameters present.

Red Butte Creek 900W GAMUT: Disturbance Score of 20 (highest)

Extant Data

- Birds observations from the field were supplemented with records from eBird.org.
- Records retrieved were limited to the vicinity of field sites, and the 2013-2017 breeding seasons.



Map of American Dipper sightings from eBird.org.

- Water quality parameters retrieved for all GAMUT aquatic sites: specific conductance, temperature, and turbidity (data.iutahepscor.org).

Analysis

- Descriptive analysis of the avifauna of the 3 watersheds (abundance, richness, diversity, evenness, conservation value)
- Comparison of water quality and avifaunal parameters with respect to site disturbance.

Results

Descriptive Analysis

- Total number of birds: 188 (LR), 129 (RBC), 188 (PR).
- Total species: 83 (LR), 49 (RBC), 72 (PR)
- Similarity among watersheds:

	LR	RBC	PR
LR	**1.0**		
RBC	0.64	**1.0**	
PR	0.66	0.59	**1.0**

Sorensen Similarity Matrix of Species Found in Each Watershed

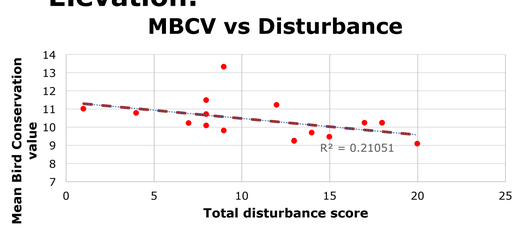
Confounding Factors

- **Different Watersheds:**

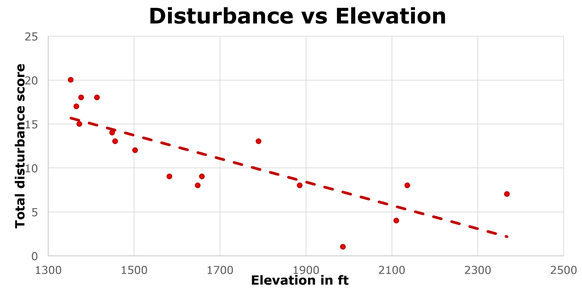
	LR	RBC	PR
LR	**1.0**		
RBC	0.61	**1.0**	
PR	0.63	0.53	**1.0**

Similarity Matrix of Species Found in Each Watershed from eBird

- **Elevation:**



As human disturbance increases, conservation value decreases



Lower elevation correlates to increased human disturbance

Deriving Meaningful Metrics

- Avian Census Data Summary Example:

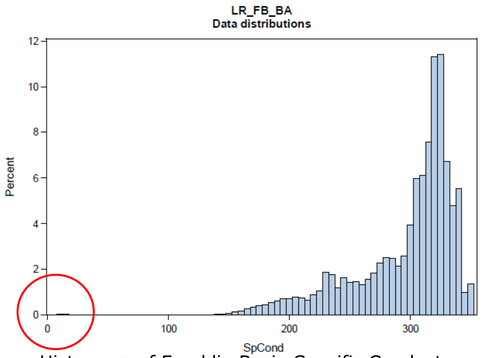
Site 1	TAB: 48	S: 16	H': 2.4407

N = 1

- Water Quality Data Example:

Site 1	SpCond
2014-06-20 20:00:00	258.3
2014-06-20 20:15:00	7.645
2014-06-20 20:30:00	258.3
2014-06-20 20:45:00	258.3
2014-06-20 21:00:00	258.2
2014-06-20 21:15:00	258.3
2014-06-20 21:30:00	258.3
…	…
2017-07-05 06:00:00	279.2

N = 211,670



Histogram of Franklin Basin Specific Conductance

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iFellows Program

Photo of American Dipper and Western Tanager courtesy of U.S. Fish and Wildlife Service National Digital Library.