



# Birds of the Colorado River in Grand Canyon: a Synthesis of Status, Trends, and Dam Operation Effects

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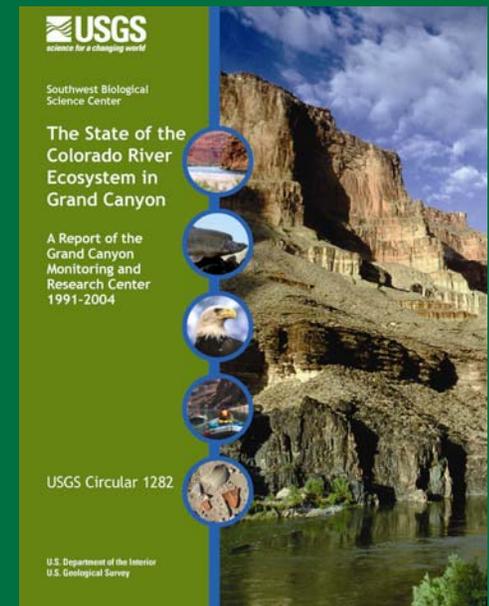
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# Overview

- Summarize pre-dam and post-dam conditions
- Review status, habitat, and dam operations effects
  - Breeding riparian birds
  - Waterfowl / aquatic birds
  - Key species:
    - Southwestern Willow Flycatcher
    - Bald Eagle
- Describe considerations and challenges in determining dam operations effects



# Pre-Dam Conditions

- **Limited riparian due to higher and scouring flows**

Few riparian breeding birds

- **Higher sediment levels**

Higher turbidity

Few waterfowl



# Post-Dam Conditions

**Presence of dam = increased riparian habitat  
and increased bird abundance and diversity**



# Recent Bird Research *(partial list)*

Brown 1987, 1988, 1989, 1991, 1992, 1993; Brown and others 1983, 1987, 1989, 1998; Brown and Stevens 1992, 1997; Brown and Trossett 1989; Ellis and Monson 1989; Felley and Sogge 2005; Spence and Pinnock 1993; Grahame and Pinnock 1995; Hualapai Tribe and SWCA 1995; Johnson 2000; Kearsley and others 2004; Leibfried and Montgomery 1993; Petterson and Spence 1997; Sogge and others 1997, 1998, 2005; Spence 1997; Spence and others, 2002; Spence, 2004; Stevens and others 1997; van Riper and Sogge 2004; Ward 2000; Yard 1998; Yard and others 2004



# Riparian Breeding Birds

- Approximately 30 breeding species
- Most are Neotropical migrants
- Bird community similar to other Southwest riparian
- Few recent significant changes



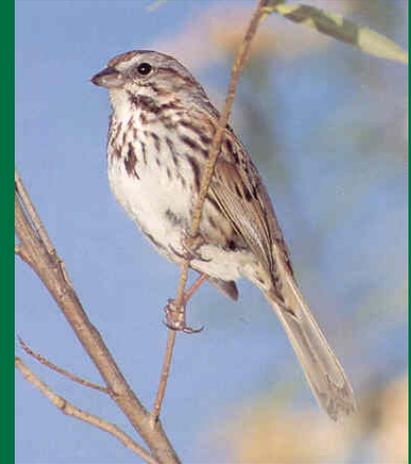
## 15 Most Common Breeding Species (in alphabetical order)

COMMON NAME	SCIENTIFIC NAME
Ash-throated Flycatcher	<i>Myiarchus cinerascens</i>
Bell's Vireo	<i>Vireo bellii</i>
Bewick's Wren	<i>Thryomanes bewickii</i>
Black-chinned Hummingbird	<i>Archilochus alexandri</i>
Blue Grosbeak	<i>Passerina caerulea</i>
Blue-gray Gnatcatcher	<i>Polioptila caerulea</i>
Bullock's Oriole	<i>Icterus bullockii</i>
Common Yellowthroat	<i>Geothlypis trichas</i>
House Finch	<i>Carpodacus mexicanus</i>
Lesser Goldfinch	<i>Carduelis psaltria</i>
Lucy's Warbler	<i>Vermivora luciae</i>
Mourning Dove	<i>Zenaida asiatica</i>
Song Sparrow	<i>Melospiza melodia</i>
Yellow Warbler	<i>Dendroica petechia</i>
Yellow-breasted Chat	<i>Icteria virens</i>

# Riparian Breeding Birds

## Dam Operation Effects

- Few direct effects
- Indirect effects primarily through vegetation; possibly food base



# Riparian Breeding Birds

## Bird Community - Habitat Relationships

What are predictors of bird abundance, species richness, and diversity?

**Patch Size (area)**

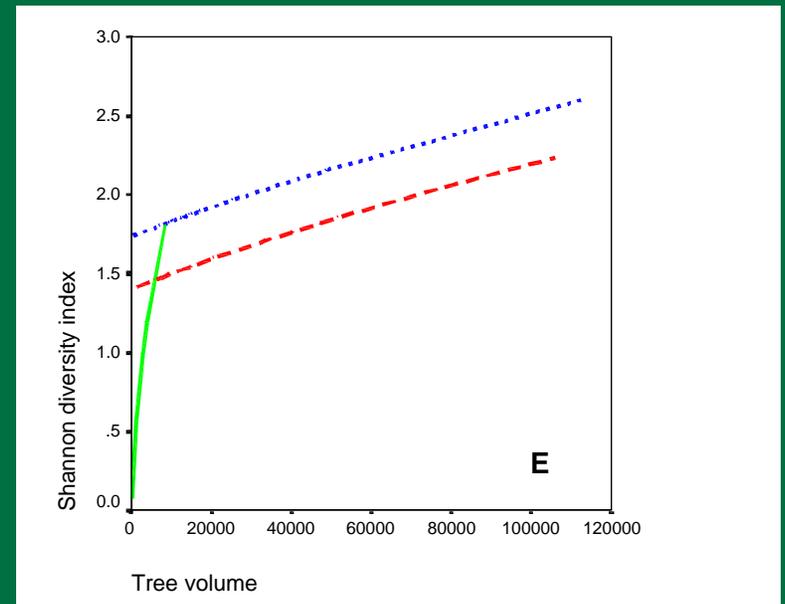
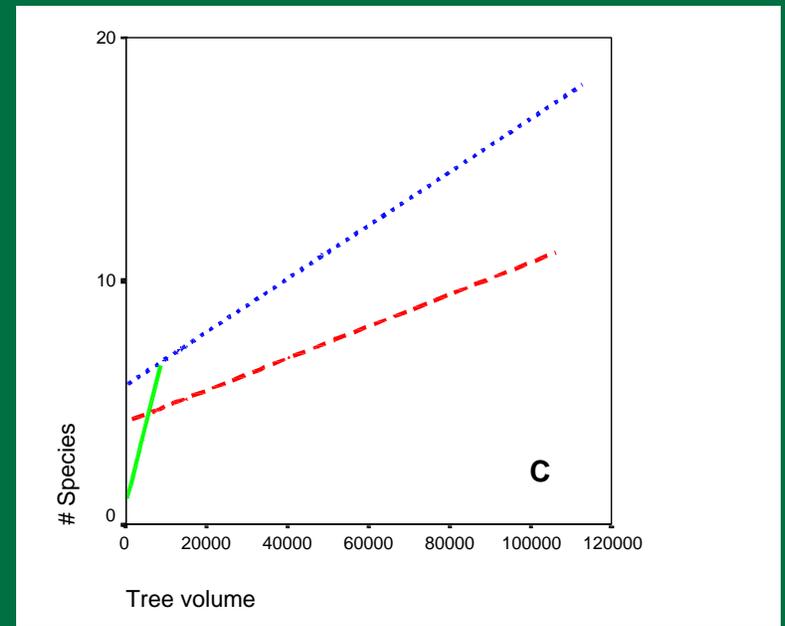
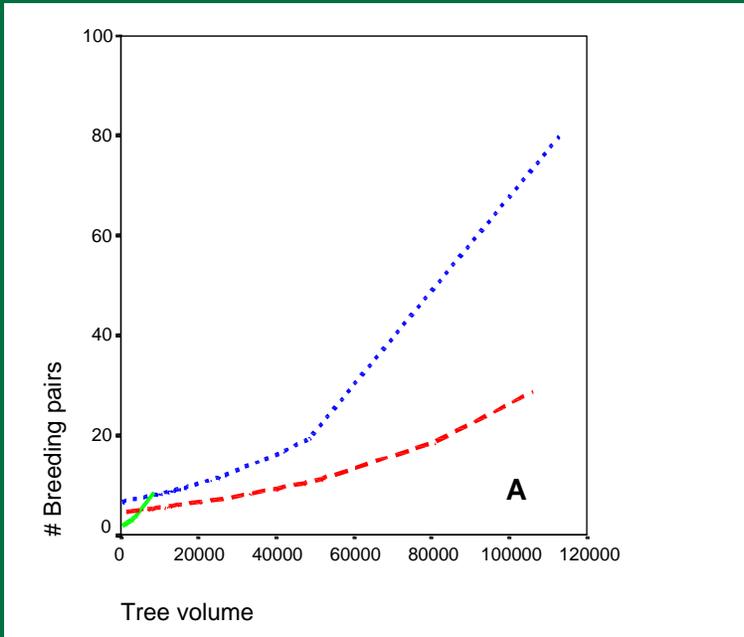
**Volume of larger woody trees/shrubs**

**Location along river (e.g., Reach)**

Sogge et al. 1998, 2005; Spence 2004,  
Kearsley and Lightfoot 2004



# Bird-Habitat Relationship Models



# Aquatic Birds – Wintering Waterfowl

- **Primarily winter (non-breeding)**
- **Concentrated above RM 1.6**
- **Habitat factors**  
Cold, clear river flows =  
aquatic food base
- **Species composition and abundance highly variable**



10 Most Common Wintering Waterfowl  
(in alphabetical order)

COMMON NAME	SCIENTIFIC NAME
American Coot	<i>Fulica americana</i>
American Wigeon	<i>Anas Americana</i>
Bufflehead	<i>Bucephala albeola</i>
Common Goldeneye	<i>Bucephala clangula</i>
Common Merganser	<i>Mergus merganser</i>
Gadwall	<i>Anas strepera</i>
Green-winged Teal	<i>Anas crecca</i>
Lesser Scaup	<i>Aythya affinis</i>
Mallard	<i>Anas platyrhynchos</i>
Ring-necked Duck	<i>Aythya collaris</i>

# Aquatic Birds – Wintering Waterfowl

## Dam Operations Effects

- No Direct Effects
- Indirect effects few; primarily through water volume and depth



# Southwestern Willow Flycatcher

- Federally Endangered
- Neotropical migrant
- Rare in CRE
- Population probably not self-sustaining



# Southwestern Willow Flycatcher

## Dam Operation Effects

- No Direct Effects
- Indirect Effects  
primarily through  
vegetation, and  
possibly prey



# Bald Eagle

- Federally listed as threatened
- Winter visitor
- Found primarily from dam to LCR  
Concentrations at Nankoweap Creek
- Winter distribution  
influenced by many factors



# Bald Eagle

## Dam Operations Effects

- No Direct Effects
- Indirect Effects through prey availability in mainstem and spawning tributaries

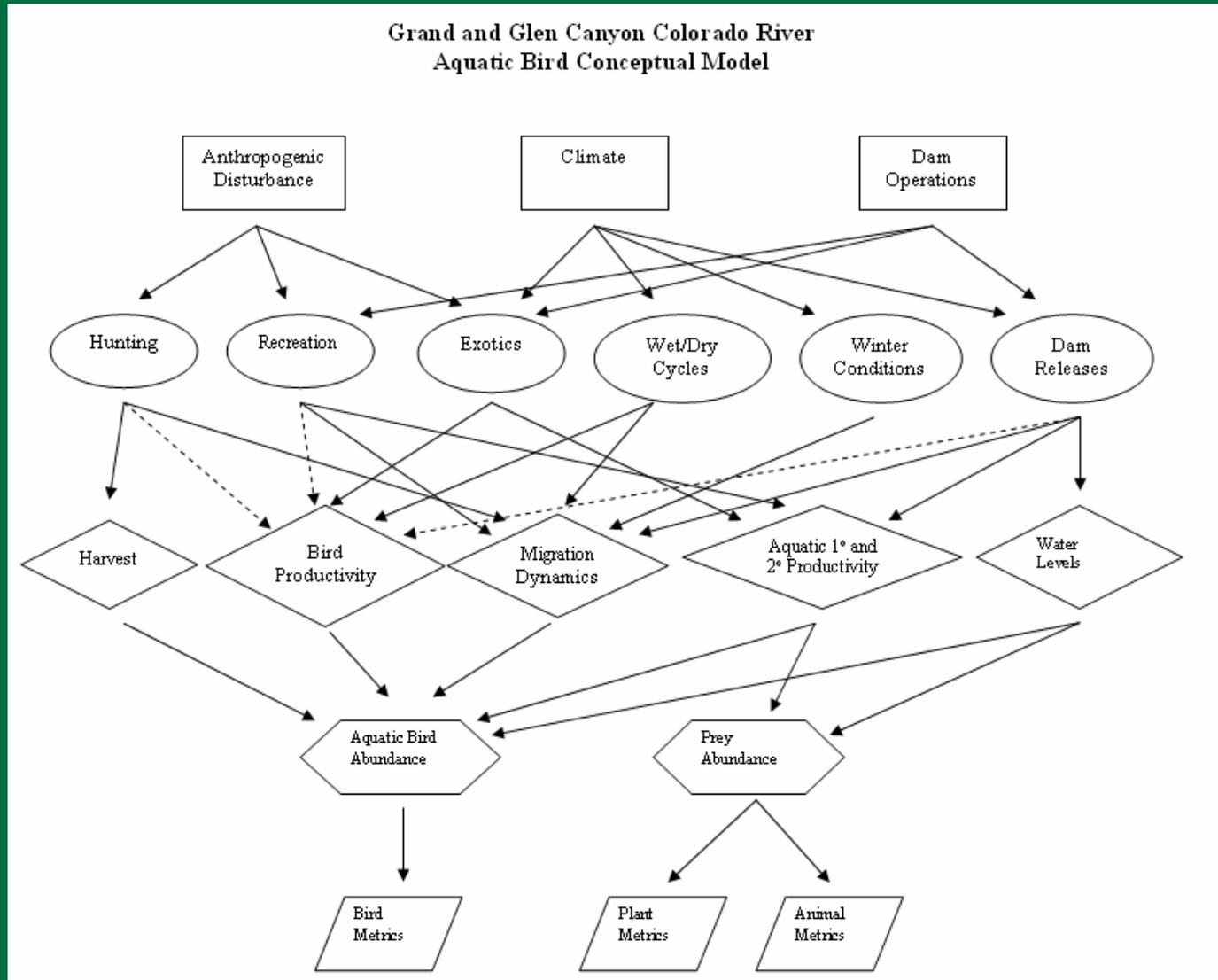


# Considerations and Challenges

## Linking effects and metrics



# Actual linkages are complex



## Considerations and Challenges

**Migratory bird populations strongly influenced by migration and wintering grounds conditions**



## Considerations and Challenges

# Bird monitoring techniques may have limited power to detect change

### Per Spence 2004:

- trends could not be detected for 24 of 32 riparian breeding species
- 5 – 30 years of sampling to detect 10% population change
- Rarely detected species can not be effectively monitored



# Synthesis / Summary

- Dam-regulated flows have resulted in increased habitat and bird community
- Few changes in bird community over last 10 years
- Direct effects of current dam operations are few
- Indirect effects are manifested through changes to habitat
- Interpretation of bird monitoring and effects data must consider:

Conceptual models of flow effects are complex

Birds influenced by many factors outside CRE

Monitoring techniques have limitations