

# INTEGRATED WATERBIRD *Management & Monitoring*

PUBLICATION SUMMARY

*A continental landscape where non-breeding waterbirds have the right habitat, in the right place, at the right time.*



American Black Duck. Henry McLin

Balancing Habitat Delivery for Breeding Marsh Birds and Nonbreeding Waterfowl: An Integrated Waterbird Management and Monitoring Approach at Clarence Cannon National Wildlife Refuge, Missouri. U.S. Geological Survey Open-File Report 2017 1051, 28 p.

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## THE PROBLEM

At Clarence Cannon National Wildlife Refuge in eastern Missouri, staff need to manage high quality emergent marsh and moist-soil habitat across multiple wetland units to benefit both nesting marsh birds and migrating waterfowl. However, the desired vegetation communities to meet the seasonal needs of these guilds are different and represent competing objectives. Often, managers address competing objectives by assigning wetland management strategies at the unit scale. But for focal species that span multiple habitats across a complex of wetland management units, management decisions are more complex. To balance habitat delivery, managers at Clarence Cannon need to know how to allocate specific habitat for each guild across the refuge's 17 units.

## THE IWMM APPROACH

We used decision analysis to address the challenge of competing objectives and identify potential resource allocations for the two guilds. In this approach, we identified combinations of management actions, or portfolios, which could be taken across the 17 units to help inform and balance habitat delivery given refuge objectives and constraints. To predict outcomes for unit scale strategies, we evaluated alternative management approaches applied at the unit scale and leveraged IWMM bird and vegetation survey data with other information.

## METHODOLOGY

To develop guidance for balanced habitat delivery, we first identified nonbreeding dabbling duck use-days and king rail occupancy of managed units during breeding season as measurable management objectives. Next, we identified three unique combinations of growing season water regime and soil disturbance as composite management actions that could be taken to meet needs for high-energy waterfowl and breeding marsh bird habitat: intense moist-soil management (moist-soil), intermediate moist-soil (intermediate), and perennial management, which idles soils disturbance (perennial). Portfolios were then created by assigning every management action to one of the three composite actions. Each portfolio has a refuge-scale benefit, as a utility score, for both objectives across all units.



*Fig 1. Intensively managed units at Clarence Cannon NWR provide habitats for nesting king rails and dense concentrations of wintering waterfowl. Variations in water level and vegetation management at the management unit scale influence habitat quality for both.*

*Image credits: William R. Coatney (mixed flock); Noppadol Paothong, Missouri Department of Conservation (king rails); and Mick Hanan, U.S. Fish and Wildlife Service (dabbling duck concentration).*

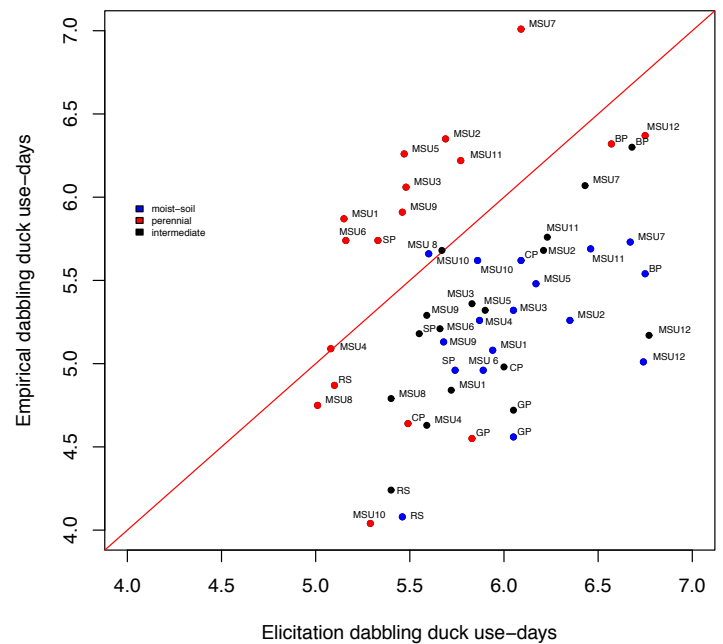
## RESULTS/FINDINGS

The decision analysis created numerous refuge-wide scenarios, or portfolios, each representing a unique mix of options (one for each of 17 units) and associated benefits (i.e., outcomes with respect to multiple management objectives). Portfolio analyses included optimized solutions constrained for waterfowl energetic carrying capacity (at 1,174 acres of moist-soil), and management costs. Of the three composite management actions, the intermediate action provided the greatest benefit towards both king rail and dabbling duck objectives (Table 1). Nevertheless, a mix of composite management actions across all units within the complex was preferred to maximize total benefit while recognizing constraints and multiple objectives. This approach assumes all units stay in an herbaceous state and reinforces the need to suppress or reverse afforestation within this set of management units for the continued benefit of king rails and dabbling ducks.

*Table 1. Benefits of three composite management actions to waterfowl and King rails.*

Action	Utility	DUDs per acre (log scale number of days)	Probability of king rail occupancy (percent)
Moist-soil	0.415	7.1 ± 1.9	14.2
Intermediate	0.424	6.9 ± 1.9	20.2
Perennial	0.357	6.8 ± 1.9	8.2

For units receiving moist-soil and intermediate composite management actions, estimated dabbling duck use-days derived from empirical observations was lower than use-days from expert judgment in all but a single comparison. The empirical data indicated greater use of units managed with the perennial action than was predicted using expert judgment (Fig. 2). Dabbling duck response per composite action is already linked to ongoing IWMM monitoring efforts. However, the king rail response to management needs to be updated by monitoring king rail occupancy concurrently with vegetation cover and hydrology. For multiple reasons, waterbird responses do not always follow preconceived benefits for a particular habitat type. Objective and concurrent assessments of bird-use and habitat condition at the management unit scale can help clarify this relationship.



*Fig 2 Empirical dabbler use in relation to expert estimates of dabbler use by unit and composite management action.*

### FOR MORE INFORMATION

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