Secretive Marsh Bird Breeding Population and Habitat Objectives Summary

1 INTRODUCTION

Secretive marsh birds include members of the rail, grebe, bittern and coot families that are strongly associated with emergent wetlands. Many of these species are difficult to observe and are not monitored effectively unless through specialized, targeted surveys. The 2022 State of the Birds report noted that, although many wetland-dependent species such as waterfowl are experiencing population increases, almost one-third of waterbirds, including secretive marsh bird species, are in decline (North American Bird Conservation Initiative 2022).

Secretive marsh birds are a high priority bird guild for the Lower Mississippi Valley Joint Venture (LMVJV) partnership. In 2006, the Southeast Waterbird Plan (SEWP) outlined population estimates, population goals, and habitat goals at that time (Hunter et al. 2006). The SEWP has served as the planning foundation for the LMVJV for waterbirds. The lack of updated planning until now represents the paucity of data and biological information for this bird guild, especially in the LMVJV geography. The LMVJV geography includes two Bird Conservation Regions (BCR) – the Mississippi Alluvial Valley (MAV) and West Gulf Coastal Plain/Ouachitas (WGCPO). The LMVJV currently has a project underway to better understand King Rail (*Rallus elegans*) habitat needs and associations. However, in the interim, the LMVJV has a need to set population and habitat objectives for secretive marsh birds.

1.1 PRIORITY SPECIES

Based on the SEWP and confirmation from waterbird experts, the LMVJV has selected a suite of priority breeding and non-breeding secretive marsh birds. Information is much more limited for non-breeding secretive marsh birds. Non-breeding waterbirds will be discussed in a future comprehensive secretive marsh bird plan. Therefore, our current objectives are focused on population and habitat goals for breeding secretive marsh birds. Priority breeding marsh bird species include: King Rail, Least Bittern (*Ixobrychus exilis*), Purple Gallinule (*Porphyrio martinicus*), Pie-billed Grebe (*Podilymbus podiceps*), Common Gallinule (*Gallinula galeata*), and American Coot (*Fulica americana*; Table 1).

King Rail are of significant conservation concern continentally, labeled as a Yellow Watch List species (Panjabi et al. 2022) and Tipping Point species (North American Bird Conservation Initiative 2022). They are also of greatest conservation concern regionally, classified as Immediate Management need (IM) in the MAV and Management Attention (MA) in the WGPCO (Panjabi et al. 2021; Table 1). Designation as IM signifies species of regional concern that have high regional threat scores combined with a large population decline. Conservation action is recommended to reverse or stabilize significant, long-term population declines where lack of action may put species at risk of extirpation. Designation as MA signifies species of regional concern with moderate threats and undergoing moderate to large declines. Management and conservation actions are recommended to reverse or stabilize significant, long-term population declines where threats are moderate (Panjabi et al. 2021).

Priority status for the other secretive marsh bird species results from uncertainty or small decreases in their population trajectory and threats which are not well-known. Although other priority species do not rank as high in regional concern score, they are an important planning responsibility for the LMVJV. Additionally, we need to work towards a better understanding of their population status in our geography.

Table 1. Priority breeding secretive marsh bird species in the Lower Mississippi Valley Joint Venture region listed in order of regional concern scores. Population trends are described qualitatively based on the Avian Conservation Assessment Database scoring. Regional Concern Scores represent the combination of population size, threats during the breeding season, population trends, and breeding density. Higher concern score indicates a greater degree of known threats or decreasing trends. MA represents Management Attention is warranted and IM presents Immediate Management is needed.

Species	**Population Trend**	**Regional Concern Score (WGCPO/MAV)**
King Rail	Significant large decrease to moderate decrease	16 (MA)/17(IM)
Least Bittern	Uncertain to small decrease	13/14
Purple Gallinule	Uncertain to small decrease	13/13
Pied-billed Grebe	Uncertain to small decrease	11/12
Common Gallinule	Uncertain to small decrease	11/11
American Coot	Uncertain to small decrease	10/11

2 METHODS AND RESULTS

We used a step-down process for establishing regional breeding population estimates and deriving regional habitat goals. We first established a U.S. and Canada based total population estimate, then estimated the percent of the U.S. and Canada population in our LMVJV region to derive a regional population estimate.

*Total U.S. & Canada Population * Regional Percent Population = Regional Population Estimate*

From the regional population estimate, we then calculated a regional habitat goal based on the species with the greatest documented territory/home range size requirement. The regional habitat goal serves as our overarching habitat objective for breeding secretive marsh bird species.

*Regional Population Estimate * Habitat Requirement = Regional Habitat Goal*

Next we estimated current habitat for breeding secretive marsh birds. This represents the portion of the goal that should be actively maintained as secretive marsh bird habitat. We then used our estimates of amounts of emergent wetland habitat compared to the regional habitat goal to calculate a goal of additional habitat needed.

Estimated Current Habitat – Regional Habitat Goal = Additional Regional Habitat Goal

Given the uncertainty in population estimates for this suite of species, we generated a conservative regional habitat goal. Our overall goal is to provide and maintain sufficient high quality emergent

wetland habitat for the estimated regional population. Methodology for calculating specifics components of our estimates are described below.

2.1 Total Population Estimates

In order to establish regional population estimates, we first used total population estimates from the U.S. and Canada. The most reliable published source of these population estimates was from Rosenberg et al. (2019), which we compared to the SEWP (Table 5a) estimates derived from BBS data. Rosenberg et al. (2019) relied heavily on BBS information with updated modeling and estimation approaches as described in Stanton et al. (2019). Our Waterbird Working Group agreed with moving forward using the total population estimates from Rosenberg et al. (2019) in Table 2.

Table 2. Population estimates (number of individuals) for priority secretive marshbird species based on Breeding Bird Survey (BBS) data in Rosenberg et al. (2019) for U.S. and Canada.

Species	Population Estimate in U.S. and Canada (number of individuals)
King Rail	63,219
Least Bittern	131,773
Purple Gallinule	19,522
Pied-billed Grebe	1,138,963
Common Gallinule	500,214
American Coot	5,517,522

2.2 Percent Population in LMVJV Region

Three sources were available to derive a percent of the total U.S. and Canada population that is estimated to be in the LMVJV region. These three sources included the SEWP, Avian Conservation Assessment Database (ACAD), and eBird. Specific descriptions of how each calculates percent population is described below.

SEWP: Population estimates (pairs within each state or BCR) were based on expert opinion, and were then grouped into categories. General population estimates from Breeding Bird Survey (BBS) were used to calculate percent of the regional population represented by each BCR, as well comparing the region to total U.S. and Canada combined and global populations.

ACAD: This percent population was derived from global population and global percent breeding. We calculated a U.S. based population estimate based on estimates (global pop*global percent breeding) in Bird Conservation Regions. Then we re-calculated the percent of the US population in each BCR. The percent of US population in LMVJV represents the combination of BCR 25 and 26. Global population estimates were based on either: 1) eBird derived percent pop (years: 1970-2017); 2) BBS derived percent pop (years: 2005-2014); or 3) eBird and BBS derived percent pop. Percent global population for King Rail, Least Bittern, and Purple Gallinule were based on eBird frequencies; Pied-billed Grebe and Common Gallinule were based on BBS data; and American Coot was based on eBird and BBS.

eBird: We used STEM Relative Abundance (RA) estimates for each species, summed the relative abundance estimates (breeding season mean relative abundance) from STEM models across the LMVJV region (BCR 25 & 26) and then divided it by the sum of the relative abundance estimates across all US/CA BCRs (similar to the eBird global percent population that uses the entire breeding range). The

STEM model RA is based on 2021 habitat data. For each species the breeding season dates to achieve a breeding season mean relative abundance were: COGA: 24 May - 6 Jul; PUGA: 10 May-24 Aug; KIRA: 17 May-20 Jul; PBGR: 31 May-28 Jun; LEBI: 7 Jun-20 Jul; AMCO: 31 May-7 Sep.

Table 3 compares estimates of percent population in the LMVJV (WGCPO & MAV) from the SEWP, with ACAD derived percent population for the U.S. and Canada, and eBird STEM RA for the U.S. and Canada. Given the uncertainty in determining a regional percent population, the Waterbird Working Group agreed to use the average of all three sources.

Table 3. Percent of total breeding population (U.S. and Canada) estimated in the LMVJV region (WGCPO & MAV) based on three data sources: estimated breeding percent in the Southeast Waterbird Plan (SEWP), estimated breeding percent based on Avian Conservation Assessment Database (ACAD), and eBird STEM relative abundance (RA) for breeding as well as the average of all three sources.

Species	SEWP Percent of US/CA breeding population in LMVJV	ACAD Percent of US/CA breeding population in LMVJV	eBird RA Percent of US/CA breeding population in LMVJV	Average percent of sources
King Rail	2.0	10.5	1.9	4.79
Least Bittern	2.3	8.06	9.4	6.59
Purple Gallinule	0.06	17.26	10.2	9.17
Pied-billed Grebe	0.12	0.47	3.8	1.46
Common Gallinule	0.98	4.18	8.1	4.42
American Coot	0.04	0.01	0.08	0.04

2.3 Regional Population Estimates

Using population estimates from Rosenberg et al. (2019), and given the uncertainty in determining a regional percent population, we calculated a LMVJV-wide population estimate for breeding pairs using the average of the percent population (Table 4). When compared to estimated number of pairs stated in the SEWP (KIRA: 803; LEBI: 3,377; PUGA: 100; PBGR: 1,700; COGA: 900; AMCO: 1,198), experts felt that the numbers in Table 4 were a reasonable starting point for determining habitat needs.

Table 4. Proposed regional LMVJV population breeding estimates for priority secretive marshbird species based on percent population estimates from Table 3. Estimated population values are represented as pairs.

Species	LMVJV estimate (pairs) using average percent population in the region
King Rail	1,514
Least Bittern	4,340
Purple Gallinule	895
Pied-billed Grebe	8,333
Common Gallinule	11,055
American Coot	1,195

2.4 Regional Habitat Estimates and Goals

We determined the number of acres of potential emergent wetland habitat using a remotely-sensed classification produced by the LMVJV (https://static1.squarespace.com/static/5bb3865d2727be6f94acf2fc/t/631a6648c8168c60cb29bb55/1662674506346/Emergent+Marsh+Classification+Summary_final.pdf). The target habitat in the classification was palustrine emergent wetland with minimal woody vegetation and open water, namely marshy areas with erect, rooted, herbaceous hydrophytes, with <10% woody vegetation cover and <10% open water. The association of this palustrine emergent wetland with sufficient open water is important for some marsh bird species, but our classification was targeted at finding the areas of sufficiently dense emergent vegetation. Our emergent wetland layer was then adjusted for the needs of secretive marsh bird home ranges.

Based on a literature review of territory size and home ranges, of which notably limited information was available, we calculated habitat acreages to support the estimated number of breeding pairs based on the population estimates in Table 4. Assuming the needs of the species with the greatest habitat requirement within emergent marsh, Least Bittern, would satisfy the need of all species, the total habitat goal is 42,095 ha (103,975 ac). This represents a baseline objective of emergent marsh in suitable condition for secretive marsh bird species.

Table 5. Habitat requirements of priority secretive marsh bird species based on estimated LMVJV population size and average territory size or home range from the literature review. Species are listed in order of the size of their habitat requirement.

Species	LMVJV Pair Estimate	Territory size or home range (ha) per pair	Habitat Requirement per species (ha)	Habitat Requirement per species (ac)
Least Bittern[1]	4,340	9.7	42,095	103,975
Common Gallinule[2]	11,055	1.2	13,266	32,766
Pied-billed Grebe[3]	8,333	1.31	10,917	26,964
King Rail[4]	1,514	4.4	6,662	16,455
American Coot[5]	1,195	1	1,195	2,953
Purple Gallinule[6]	895	1.03	922	2,278

[1]Mean home range was 9.7 ha (range 1.8-35.7 ha), depending on whether the birds used one or two areas during the breeding season (Bognar and Balsadarre 2002).
[2]In Louisiana, mean home range sizes determined by radiotelemetry were: nesting adults, 1.2 ha (n = 12); non-nesting adults, 5.7 ha (n = 2); juveniles, 6.0 ha (n = 6; Matthews 1983)
[3]Average home range 1.31 ha (n = 44; Glover 1953)
[4] Home range sizes at 3 sites were 4.4 ha ± 0.6 SE; 11.9 ± 4.1 SE; and 27.3 ha ± 5.5 SE depending on the amount of open water (Pickens and King 2013). We chose the more conservative value given small sample sizes.
[5]Home range size dependent on habitat, but not area sensitive so used 1 ha minimum wetland size (Brown and Dinsmore 1986)
[6]Home range (minimum polygon method) for 4 nesting Purple Gallinules as established by radiotelemetry was 1.03 ha in a Louisiana impoundment (range 0.63–1.68; Matthews 1983)

According to our emergent wetland data layer, there is a total of 89,964 acres of emergent marsh that is approximately 10 ha (25 ac) or greater in size. Based on a preliminary assessment, the wetland classification has an accuracy of approximately 65%. Therefore, we reduced the estimated available amount by 35%, resulting in total emergent wetland of 25 ac or greater estimated to be 58,477 acres.

With an estimated overall habitat goal for secretive marsh birds of 103,975 acres and the estimated existing habitat of 58,477 acres, an additional 45,498 acres of emergent wetland habitat is needed, and the current 58,477 acres need to be maintained in suitable condition for secretive marsh birds.

3 Discussion and Next Steps

Emergent wetland habitat is not a common habitat feature within the LMVJV region. However, the LMVJV partnership recognizes that emergent marsh, such as permanent and semi-permanent wetland composed of sedges, rushes, arrowhead, etc., is an important habitat component for a variety of birds and other wildlife. Most wetland habitat is provided as annual waterfowl habitat or through flooded forested wetlands. Recently, Malone et al. (2023) outlined a number of management strategies for waterfowl that complement management for secretive marsh birds, as well as practices that may not be compatible but could be altered to benefit secretive marsh birds. With the current estimated habitat need of 103,975 acres, it is important for partners to consider their ability to improve current habitat to achieve our objectives for secretive marsh birds.

We recognize that there is a degree of uncertainty with parameters that have been used in estimating population and habitat goals. The Waterbird Working Group will continue to address uncertainties in our biological planning for secretive marsh birds, especially uncertainty in population statuses and estimates. We will refine habitat estimates based on occupancy models and habitat needs, as new/improved data are available. We will continue validation of emergent marsh data layer, and we will continue to promote habitat management for secretive marsh bird species.

4 Citations

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