COSEWIC
Assessment and Status Report

on the

King Rail
Rallus elegans

in Canada

ENDANGERED
2011

COSEWIC
Committee on the Status
of Endangered Wildlife
in Canada

COSEPAC
Comité sur la situation
des espèces en péril
au Canada

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COSEWIC
Assessment Summary

Assessment Summary – May 2011

Common name
King Rail

Scientific name
Rallus elegans

Status
Endangered

Reason for designation
This large member of the rail family is associated with marshes of various description – especially those that are large and relatively complex. Its breeding range extends from southern Ontario through much of the eastern U.S. In Canada, precise information on the population size, population trend, and breeding distribution of this rare and secretive species is somewhat limited. Nevertheless, the best available evidence indicates that the Canadian population remains small (fewer than 100 individuals). The major threat is degradation of high-quality marsh habitats across its range.

Occurrence
Ontario

Status history
Designated Special Concern in April 1985. Status re-examined and designated Endangered in April 1994. Status re-examined and confirmed in November 2000 and in May 2011.

COSEWIC
Executive Summary

King Rail
Rallus elegans

Wildlife species description and significance

The King Rail is a relatively large waterbird with a long bill, long legs, short stubby tail, and short rounded wings. It is close to twice the length of the Virginia Rail, which is otherwise similar in appearance except for its grey cheeks. Like most rails, the King Rail has many different calls. There are three main types, mostly given during the breeding season: a contact call, described as "*jupe-jupe-jupe"*; a courtship or mating call – "*kik-kik-kik*"; and the "*kek-burr"* call. Virginia Rails have similar calls, but they can be relatively easily distinguished with experience.

In some American states the King Rail is hunted as a game bird. In Canada it is sought by birdwatchers eager to catch a glimpse of this rare, secretive bird.

Distribution

The King Rail's range extends over most of the eastern U.S., except in the higher elevations of the Appalachian Mountains. However, the species is not common anywhere, except for some Gulf States and in the lower Mississippi Valley. It breeds in Canada only in parts of southern Ontario. Most individuals likely winter in the southern U.S. along the Gulf and Atlantic coasts.

Habitat

This species occupies a wide variety of freshwater marsh habitat types. In many parts of its range, cattail marshes are important. Large marshes, especially those that contain a range of water level conditions and a mosaic of habitats, are thought to be the preferred habitat in Canada, but smaller wetlands are also sometimes used.

Biology

The King Rail is a relatively early spring migrant, returning from its wintering grounds to Ontario in April or early May. In the U.S., the size of the breeding territory varies depending upon habitat quality, but no estimates of territory size are available for Ontario birds. Nests are placed in uniform vegetation, which is used to cover and hide the nest. Dead marsh vegetation is used to form a shallow cup into which 10 to 12 eggs are laid in May or June. The incubation period is about 21 days. Young birds are capable of leaving the nest and following their parents shortly after hatching. The King Rail's diet is dominated by crayfish.

Population sizes and trends

Over the past century, the King Rail is believed to have experienced severe declines through much of its range. While thought to be less common and less widely distributed now in Canada than historically, the King Rail has probably always been relatively scarce here, as is the case elsewhere in the northern parts of its breeding range in the United States. Although recent surveys have turned up several new sites for King Rails, its population is still estimated to consist of no more than about 30 to 50 pairs (60-100 mature individuals). Many sites in Ontario are not necessarily occupied every year.

Threats and limiting factors

Loss and degradation of wetland habitat have been the greatest factors in the decline of the King Rail in Ontario and across its range. Wetland habitat degradation can occur due to erosion (resulting in higher turbidity) and runoff of pesticides and chemical fertilizers. The invasion of marshes by introduced plants such as European Common Reed can seriously change the character of the marsh and render it unsuitable. The presence of Common Carp can also impact water quality, thereby reducing numbers of invertebrate prey available to rails. Decreasing numbers of crayfish, one of the main prey items of King Rail, could affect its survival and ability to raise young.

Hunting for King Rails is permitted in 13 U.S. states, which could impact the Canadian population during fall migration and winter. Diseases, such as West Nile Virus, have been recorded in closely related species and could also affect King Rails. Fatal collisions with human-made structures and cars have been documented.

Protection, status, and ranks

The King Rail was considered a game bird throughout its range in the past, but is now protected under Canada's *Migratory Birds Convention Act,* with no hunting season in Ontario. COSEWIC previously assessed this species as Endangered in 2000; presently, the species and its residence are protected in Canada by the *Species at Risk Act*. The King Rail and its habitat are also protected under Ontario's *Endangered Species Act, 2007*. NatureServe ranks it as 'apparently secure' globally and as 'imperiled' in Canada and Ontario. It is considered Threatened or Endangered in all adjacent U.S. states.

TECHNICAL SUMMARY

Rallus elegans
King Rail Râle élégant
Range of Occurrence in Canada: Ontario

Demographic Information

Generation time (average age of adult birds in the population)	Unknown, but likely 2-4 yr
Is there a projected continuing decline in number of mature individuals?	Unknown
Estimated percent of continuing decline in total number of mature individuals within 5 years	Unknown
Suspected percent reduction or increase in total number of mature individuals over the last 10 years - Decline is documented in some U.S. populations, but unknown in Canada	Unknown
Suspected percent reduction or increase in total number of mature individuals over the next 10 years	Unknown
Suspected percent reduction or increase in total number of mature individuals over any 10 year period, including both the past and the future.	Unknown
Are the causes of the decline clearly reversible and understood and ceased?	Not applicable
Are there extreme fluctuations in number of mature individuals?	No

Extent and Occupancy Information

Estimated extent of occurrence - Measured as a minimum convex polygon based on recent Canadian breeding season records from 2000 to 2009.	94,160 km²
Index of area of occupancy (IAO) – 2 km x 2 km grid - IAO cannot be calculated with any precision at this time, but is <500 km^2 based on the small population size	<500 km²
Is the total population severely fragmented?	No
Number of locations	Unknown, but believed to be >10
Is there an inferred continuing decline in extent of occurrence?	No
Is there an inferred continuing decline in index of area of occupancy?	No
Is there a projected continuing decline in number of populations?	Not applicable
Is there a projected continuing decline in number of locations?	Unknown
Is there an observed continuing decline in area and/or quality of habitat? - decline in both quality (e.g., due to invasive species) and quantity - wetland in southern Ontario has declined by 72% since European settlement; an additional 3.5% from the original wetland extent was lost between 1982 and 2002 (see **Habitat Trends**).	Yes
Are there extreme fluctuations in number of populations?	No
Are there extreme fluctuations in number of locations?	No
Are there extreme fluctuations in extent of occurrence?	No
Are there extreme fluctuations in index of area of occupancy?	No

Number of Mature Individuals (in each population)

Population	N Mature Individuals
Ontario (one population) Estimated 30-50 pairs (assuming all territorial individuals are mated)	Circa 60-100
Total	Circa 60-100

Quantitative Analysis

Not done	

Threats (actual or imminent, to populations or habitats)

Loss and degradation of wetland habitats, toxins, invasive species, collisions with human-made structures/cars, decreasing numbers of prey (crayfish), disease, and hunting on wintering grounds.

Rescue Effect (immigration from outside Canada)

Status of outside population(s)? USA: Small and declining populations in all neighbouring states (considered Threatened or Endangered); larger populations occur in southeastern states but they too are declining.	
Is immigration known or possible?	Unknown but probable
Would immigrants be adapted to survive in Canada?	Yes
Is there sufficient habitat for immigrants in Canada?	Yes, but the amount of good quality habitat is declining
Is rescue from outside populations likely? - Small and declining populations in neighbouring states.	No

Current Status

COSEWIC: Endangered, May 2011
Ontario: Endangered, September 2009

Status and Reasons for Designation

Status:	**Alpha-numeric code:**
Endangered	D1

Reasons for designation:

This large member of the rail family is associated with marshes of various descriptions – especially those that are large and relatively complex. Its breeding range extends from southern Ontario through much of the eastern U.S. In Canada, precise information on the population size, population trend, and breeding distribution of this rare and secretive species is somewhat limited. Nevertheless, the best available evidence indicates that the Canadian population remains small (fewer than 100 individuals). The major threat is degradation of high-quality marsh habitats across its range.

Applicability of Criteria

Criterion A (Decline in Total Number of Mature Individuals): Does not meet criterion; insufficient information is available to quantify population trend.
Criterion B (Small Distribution Range and Decline or Fluctuation): Does not meet criterion. Although IAO is less than 500 km^2 and a declining trend in habitat quality (and likely population size) is apparent, the species is believed to occur in >10 locations and is not believed to exhibit extreme fluctuations.
Criterion C (Small and Declining Number of Mature Individuals): Does not meet criterion. Although the population consists of <2500 individuals and there is an inferred continuing decline in population size, there are no extreme fluctuations in the number of individuals, nor evidence that the Canadian population is structurally discrete.
Criterion D (Very Small or Restricted Total Population): Meets Endangered D1 because the Canadian population (estimated at no more than 100 birds) consists of <250 mature individuals.
Criterion E (Quantitative Analysis): Not done.

PREFACE

Since the previous update status report was written (James 2000), a second Ontario Breeding Bird Atlas project was completed (2001-2005; Cadman *et al.* 2007). This permitted a comparison of numbers and distribution of King Rails documented during the first atlas period (1981-1985; Cadman *et al.* 1987) with those found during the second. As part of the Breeding Bird Atlas project, targeted King Rail surveys were conducted in Prince Edward County and surrounding areas, which resulted in the discovery of some new sites where this species was found. Other targeted surveys have also been conducted in recent years by the King Rail Recovery Team. Updated Breeding Bird Survey trend results from the U.S. were also available for this report.

COSEWIC HISTORY

The Committee on the Status of Endangered Wildlife in Canada (COSEWIC) was created in 1977 as a result of a recommendation at the Federal-Provincial Wildlife Conference held in 1976. It arose from the need for a single, official, scientifically sound, national listing of wildlife species at risk. In 1978, COSEWIC designated its first species and produced its first list of Canadian species at risk. Species designated at meetings of the full committee are added to the list. On June 5, 2003, the *Species at Risk Act* (SARA) was proclaimed. SARA establishes COSEWIC as an advisory body ensuring that species will continue to be assessed under a rigorous and independent scientific process.

COSEWIC MANDATE

The Committee on the Status of Endangered Wildlife in Canada (COSEWIC) assesses the national status of wild species, subspecies, varieties, or other designatable units that are considered to be at risk in Canada. Designations are made on native species for the following taxonomic groups: mammals, birds, reptiles, amphibians, fishes, arthropods, molluscs, vascular plants, mosses, and lichens.

COSEWIC MEMBERSHIP

COSEWIC comprises members from each provincial and territorial government wildlife agency, four federal entities (Canadian Wildlife Service, Parks Canada Agency, Department of Fisheries and Oceans, and the Federal Biodiversity Information Partnership, chaired by the Canadian Museum of Nature), three non-government science members and the co-chairs of the species specialist subcommittees and the Aboriginal Traditional Knowledge subcommittee. The Committee meets to consider status reports on candidate species.

DEFINITIONS (2011)

Wildlife Species	A species, subspecies, variety, or geographically or genetically distinct population of animal, plant or other organism, other than a bacterium or virus, that is wild by nature and is either native to Canada or has extended its range into Canada without human intervention and has been present in Canada for at least 50 years.
Extinct (X)	A wildlife species that no longer exists.
Extirpated (XT)	A wildlife species no longer existing in the wild in Canada, but occurring elsewhere.
Endangered (E)	A wildlife species facing imminent extirpation or extinction.
Threatened (T)	A wildlife species likely to become endangered if limiting factors are not reversed.
Special Concern (SC)*	A wildlife species that may become a threatened or an endangered species because of a combination of biological characteristics and identified threats.
Not at Risk (NAR)**	A wildlife species that has been evaluated and found to be not at risk of extinction given the current circumstances.
Data Deficient (DD)***	A category that applies when the available information is insufficient (a) to resolve a species' eligibility for assessment or (b) to permit an assessment of the species' risk of extinction.

* Formerly described as "Vulnerable" from 1990 to 1999, or "Rare" prior to 1990.

** Formerly described as "Not In Any Category", or "No Designation Required."

*** Formerly described as "Indeterminate" from 1994 to 1999 or "ISIBD" (insufficient scientific information on which to base a designation) prior to 1994. Definition of the (DD) category revised in 2006.

Environment Canada / Environnement Canada
Canadian Wildlife Service / Service canadien de la faune

Canada

The Canadian Wildlife Service, Environment Canada, provides full administrative and financial support to the COSEWIC Secretariat.

COSEWIC Status Report

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WILDLIFE SPECIES DESCRIPTION AND SIGNIFICANCE

Name and classification

The common name of *Rallus elegans* (Audubon, 1834) is King Rail in English and Râle élégant in French. The taxonomy of the species is as follows:

Class: Aves
Order: Gruiformes
Family: Raillidae
Genus: *Rallus*
Species: *Rallus elegans*

The King Rail is one of the largest members of the rail family. Nine species within the family occur in North America (Eddleman *et al*. 1988), six of which breed in Canada: Yellow Rail (*Coturnicops noveboracensis*); King Rail; Virginia Rail (*R. limicola*); Sora (*Porzana carolina*); Common Moorhen (*Gallinula chloropus*); and American Coot (*Fulica americana*).

Three subspecies of King Rail are recognized by some authorities: *R. elegans* elegans of Canada, the U.S. and the Gulf coast of Mexico; *R. e. ramsdeni* of Cuba; and *R. e. tenuirostris* of central Mexico (Poole *et al*. 2005). The Mexican breeding population has also been treated as a subspecies of Clapper Rail (*R. longirostris*) by some authorities (Anderson and Ohmart 1985).

The King Rail is most closely related to the Clapper Rail. The two species occupy somewhat different habitats, with King Rails occuring primarily in freshwater marshes and Clapper Rails occurring in saltwater coastal marshes, though both do occur in brackish conditions (Meanley 1969; Eddleman and Conway 1998). The Clapper Rail does not occur in Canada. Although the two species are sympatric in the U.S., the range of the Clapper Rail is much more narrowly restricted to marine coastal situations (Eddleman and Conway 1998).

Hybridization is not an issue in Canada, but cases of apparent hybridization between sympatric King and Clapper rails have been documented on a number of occasions in the southern U.S. (Meanley and Wetherbee 1962; Poole *et al*. 2005). By analyzing allozymes and mitochrondrial DNA, Avise and Zink (1988) determined that the two species were very closely related. Indeed, Dickerman (1971) earlier suggested that King and Clapper rails should be combined into a single species, *R. longirostris*. However, based on morphological and behavioural characteristics, Olson (1997) later maintained that the two should remain as separate species despite documented hybridization. Morphometric (wing, tarsus and culmen) measurements were used to differentiate King and Clapper rails in a recent study in southern Louisiana and Texas (Perkins 2007). Some researchers believe that the King Rail forms a 'superspecies' complex with the Clapper Rail and the Plain-flanked Rail (*Rallus wetmorei*; Chan *et al*. 2006); the latter is an endangered species endemic to Venezuela (BirdLife International 2010). The King Rail is the only member of this possible 'superspecies' complex that breeds in Canada. Moreover, the American Ornithologists' Union (AOU 2010) continues to recognize King Rail and Clapper Rail as two distinct species.

Morphological description

The King Rail is a relatively large marsh bird, having a total length ranging from 39 to 48 cm (Godfrey 1986). It has a short, often upturned tail, and short rounded wings. The legs are long, and the beak is long and slightly decurved (James 2000). The body is narrow or laterally compressed to facilitate movement through dense marsh vegetation. Males and females are similar in appearance, having a slate-coloured crown, a white throat, buffy eye stripe, prominent tawny edges to the back feathers, chestnut underparts, and heavily barred black-and-white sides (James 2000). This species is close to twice the size of the Virginia Rail, which is otherwise similar in appearance, except that it has extensive grey in the cheeks and the barring is not as prominent on the lower flanks and undertail coverts (Godfrey 1986). Juvenile King Rails are similar to adults, but are darker above and duller brown below (James 2000).

Like most rallids, the King Rail has many different vocalizations and these are often the only means of detecting its presence at a particular location. There are three main call types, primarily given during the breeding season: a primary contact call, variously described as a deep, grunting "*jupe-jupe-jupe-", "cheup-cheup-cheup-"*, or "*gelp-gelp-gelp*"; a courtship or mating call consisting of strident, staccato "kik" or "kek" notes ("*kik-kik-kik*"); and the "*kek-burr"* call, consisting of evenly spaced, distinctive *keks*, followed by a trilled *brrrr* (Poole *et al.* 2005). The Virginia Rail produces several similar calls, but with experience they can be readily distinguished from those of the King Rail.

Population spatial structure and variability

Unlike the closely related Clapper Rail, the genetic structure of geographically distinct populations of King Rail has not been studied in detail. However, some studies have compared the genetic structure of King and Clapper rails (Avise and Zink 1988; Chan *et al.* 2006; see **Name and classification** above).

No information is available on the structure of the population in Canada, nor how it interacts with populations in the adjacent U.S. The number of viably discrete populations in Canada is unknown.

Designatable units

Only one subspecies, *R. e. elegans*, breeds in a restricted area of Canada (southern Ontario) and there is no evidence that more than one designatable unit is involved, either genetically or spatially.

Special significance

Unlike Canada, the U.S. treats the King Rail as a game species, where it is legally hunted in 13 states. Due to its highly secretive nature and restricted range in Canada, the King Rail is much sought after by birdwatchers (Woodliffe 2007). No Aboriginal Traditional Knowledge is currently available for this species in Canada.

DISTRIBUTION

Global range

Including the various subspecies, the King Rail is found from southern Ontario south as far as Cuba and Mexico (Figure 1). Although patchy in many areas, the U.S. range covers much of the eastern half of the country, but excludes the Appalachian Mountains and most of New England. Wintering migrants and year-round residents occur along the coastal Eastern Seaboard, and in the southern states as far west as Texas, south to Cuba, the Mexican Gulf coast and interior Mexico (Poole *et al.* 2005). Two distinct subspecies are found in interior Mexico (*R. e. tenuirostris*) and Cuba (*R. e. ramsdeni*).

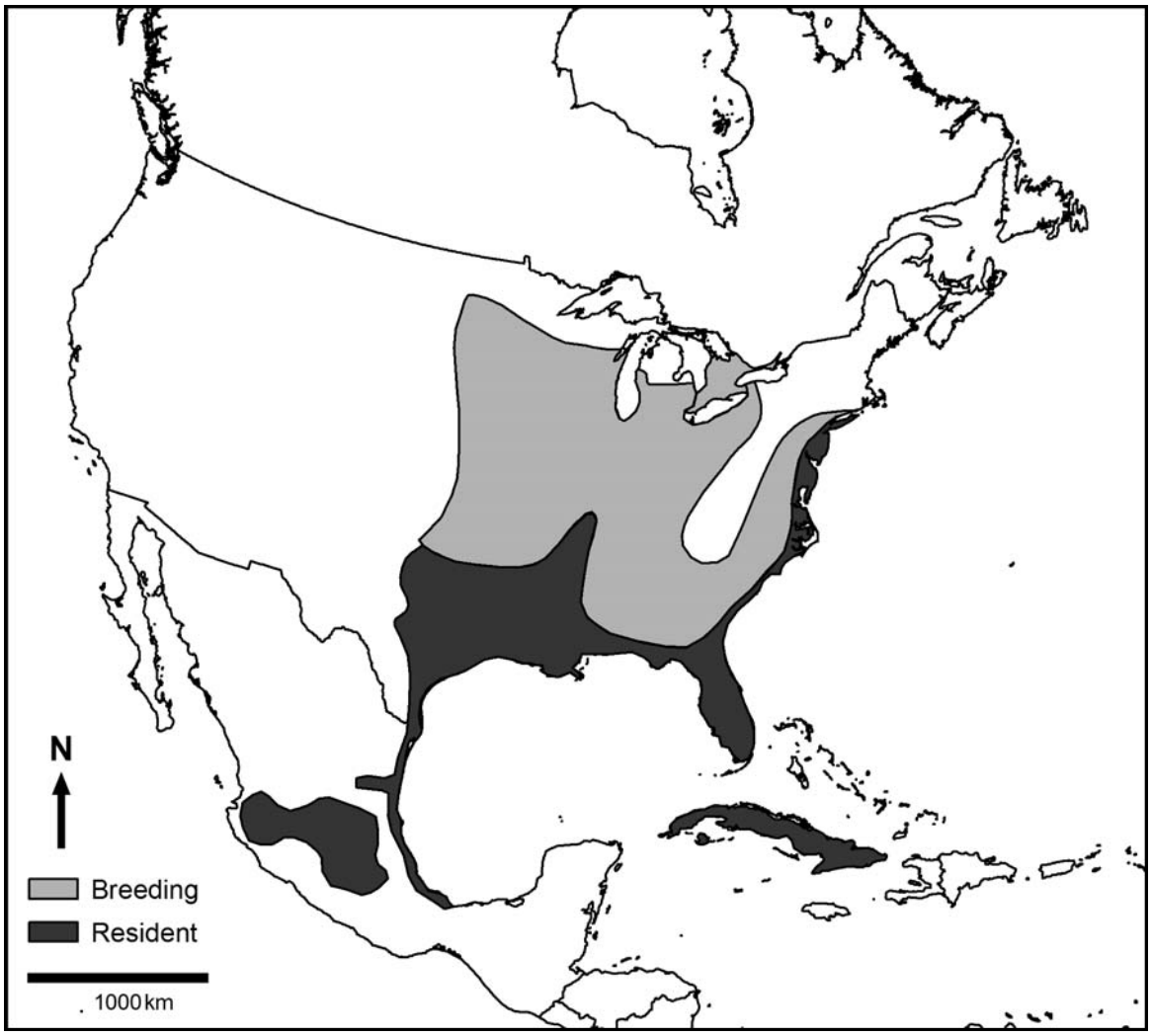

Figure 1. Global range of the King Rail (modified from NatureServe) (Ridgely *et al*. 2003 and Environment Canada 2010a).

Canadian range

In Canada, the King Rail breeds only in southern Ontario, which is at the northern limit of its range. It is accidental in Manitoba, Quebec, New Brunswick, Nova Scotia, Prince Edward Island, and Newfoundland. Its distribution in Ontario is patchy, but most of the recent breeding season records from 2000 to 2010 occur along the Great Lakes shoreline (Figure 2). In the previous COSEWIC report, James (2000) suggested that breeding season reports from areas outside the traditionally known breeding sites along Lake St. Clair and Lake Erie (e.g., those in the Bruce Peninsula and Simcoe County) were likely not permanent breeding sites. Instead, he suggested that birds may not return annually to these small marshes, and that most were likely unmated.

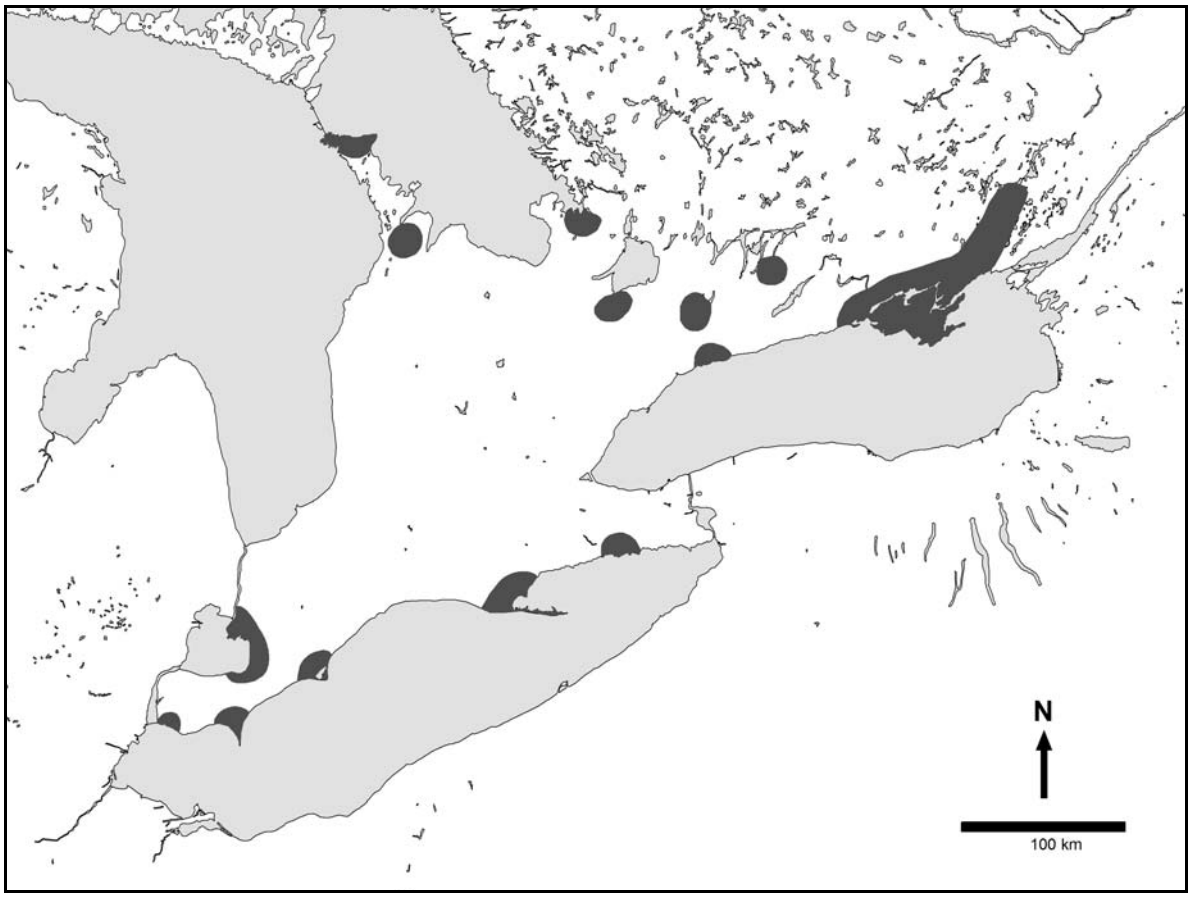

Figure 2. Canadian range of the King Rail based on breeding season occurrence records from 2000 to 2009. The sizes of polygons depicted in black are exaggerated for illustrative purposes. Not all occurrences represent mated pairs, nor are all sites necessarily occupied annually.

In James (2000) and Page (1994), the Canadian breeding range maps show only one location in eastern Ontario. Although Snyder (1941) reported the King Rail to be relatively common in Prince Edward County marshes, little evidence was provided to support that contention (McCracken and Sutherland 1987; James 2000). From 2000 onward, however, there has been increasing evidence from Prince Edward County and the surrounding area. Extensive surveys from Presqu'ile Provincial Park to Cataraqui Marsh in Kingston, from 2000 to 2003, were conducted by D. Craighead for the Ministry of Natural Resources and the Ontario Breeding Bird Atlas (D. Craighead pers. comm. 2010). He found the species in several previously (at least recently) unreported sites. Nevertheless, it is still believed that most King Rails nesting in Canada are found in the Lake St. Clair marshes, which has been the case for the past century (Woodliffe 2007).

Recent records of King Rails in areas north of the traditional range have been reported. One was recorded in a marsh near Sault Ste. Marie in 2007 and a road-killed bird was found in North Bay on May 27, 2010 (D. Sutherland pers. comm. 2010). As intriguing as they are, such extra-limital records of what are almost certainly non-breeding "vagrants" are not unexpected. There is insufficient evidence to conclude that these constitute an expansion in breeding range (D. Sutherland pers. comm. 2010).

The Extent of Occurrence (EO) for King Rails was calculated as 94,160 km^2 using the minimum convex polygon method for the breeding range of the species in Canada. This polygon included observations of King Rails only during the breeding season (May 15 to July 1; Ontario Breeding Bird Atlas 2007) from 2000 to 2009 (see Figure 2). An index of area of occupancy (IAO) for this species cannot be calculated with any precision at this time, because insufficient information is available on breeding densities, coupled with what appears to be high year-to-year variation in site occupancy. Nevertheless, IAO can be reasonably estimated to be <500 km^2, based on the small population size.

Number of 'locations' is unknown (partly because not all sites are occupied every year), but there are probably somewhat more than 10. Across locations, the threats judged to be most likely and most severe are declines in the area of quality breeding habitat stemming from a) aggressive species of invasive plants (particularly *Phragmites australis austrailis*), and b) water level regulation on Lake Ontario that results in dense monotypic stands of cattail (*Typha* spp.) in shoreline marshes (see **Habitat trends** and **THREATS AND LIMITING FACTORS**). Though widespread, the nature and intensity of these threats are somewhat individualized to each location.

Search effort

Through most of its range, the King Rail is rare, hard to detect and especially difficult to observe, due to its secretive nature and the heavily vegetated and often inaccessible marshes it inhabits (Woodliffe 2007). Generic monitoring programs, such as the Breeding Bird Survey (BBS) do not adequately survey marsh habitats (Robbins *et al.* 1986). Because of this, coupled with the species' rarity, no King Rails have been recorded on any BBS routes in Canada (BBS 2010).

Breeding Bird Atlases

The Ontario Breeding Bird Atlas projects provide snapshots of the Canadian breeding distribution of King Rail at 20-year intervals. Fieldwork for the first and second atlasses was carried out between 1981-85 and 2001-05, respectively (Cadman *et al.* 1987; Cadman *et al*. 2007). Within the Canadian range of this species, most atlas squares (10 km x 10 km) received a minimum of 20 hours of survey coverage, a level of effort considered adequate to detect the majority of species occurring in a square. The second atlas incorporated results from other monitoring programs, including the Marsh Monitoring Program and directed searches for King Rail (see below).

Marsh Monitoring Program

The use of call-broadcasts in targeted surveys that are carried out in marshes greatly increases the likelihood of King Rail detection compared to passive, non-targeted surveys (Conway and Gibbs 2005).

The Marsh Monitoring Program (MMP) has been operating across the Great Lakes Basin since 1995, and has covered several hundred sites in marshes across the region. While this program does not include a King Rail call broadcast component, the species does respond to Virginia Rail broadcasts, which are part of the MMP's protocol. Several King Rail records have resulted from this program: five from 1995-1999 and six from 2000-2009 (Bird Studies Canada unpubl. data).

Special Surveys

Targeted surveys using King Rail call broadcasts were undertaken in 1997 and 1999, focusing on surveying nearly all sites that had a record of historical occupancy (Kozlovic 1998; Lang 1999). A similar King Rail survey protocol using call broadcasts has been adopted by the Canadian Wildlife Service for several years (A. McConnell pers. comm. 2009). Surveys using this protocol have been employed at several sites in recent years (e.g., the Lake St. Clair and Long Point National Wildlife Areas), but a large-scale survey has not been repeated since 1999. Notably, no targeted surveys for King Rail have been conducted recently in the large marshes at Walpole Island on Lake St. Clair.

Other Sources

Several recent reports of this rare species are the result of casual observations by bird watchers, who post their sightings on a popular listserve ('Ontbirds') maintained by the Ontario Field Ornithologists. In Ontario, breeding occurrences are tracked by the provincial Natural Heritage Information Centre (NHIC) species element database.

HABITAT

Habitat requirements

Across its breeding range, the King Rail occupies a variety of habitats: freshwater marshes, brackish wetlands, successional marsh-shrub swamps, and even cultivated rice fields in its southern range (Poole *et al.* 2005). It is believed to inhabit the widest variety of habitats of any rail species (Meanley 1969). Throughout its range, but particularly in the north, cattails seem to be an important plant for King Rails (Poole *et al.* 2005).

Darrah and Krementz (2009) reported that King Rails nesting in the U.S. midwest preferentially used wetlands characterized by high levels of open water/vegetation interspersion and where there was little or no cover by woody vegetation. However, in southern Ontario, D. Sutherland (pers. comm. 2010) notes that some shrub cover is often a component of King Rail breeding sites. In Ontario, large marshes seem to be preferred habitat, particularly areas that have open shallow water interspersed with drier areas (McCracken and Sutherland 1987; Woodliffe 2007). Marshes that contain a range of water level conditions and a mosaic of habitats are thought to be the preferred habitat in Canada (see below).

Individuals are occasionally found in relatively small wetlands (Sutherland 2009, as cited in Gray Owl Environmental, Inc. 2009). Minimum wetland size requirements are unknown (Brown and Dinsmore 1986).

Water depth is an important factor in habitat selection by most rail species. For King Rail, a spectrum of wetland habitats seems to be required during the course of a breeding season – from nesting through the production of fledged young (Poole *et al.* 2005). For nesting, water depths generally range from 0 cm (moist ground) to 20-25 cm (Eddleman *et al.* 1988; Reid *et al.* 1994). In Ontario, it is believed that water should be no deeper than 25 cm in order to provide suitable King Rail habitat (Environment Canada 2010a). Foraging areas would generally have shallower water depths than for nesting, typically <10 cm, with some dry areas and dense cover nearby in which the young can hide (Meanley 1956; Eddleman *et al.* 1988; Reid *et al.* 1994; Woodliffe 2007).

Based on habitat assessments done in southern Ontario in 1997 and 1999 by Kozlovic (1998) and Lang (1999), King Rail habitat was primarily cattails (~51%), with a large component (~21%) of European Common Reed (*Phragmites australis australis*). Grasses, Purple Loosestrife (*Lythrum salicaria*) and various sedges represented smaller percentages of the vegetation. Lang (1999) noted that open water with scattered coverage of floating-leaved plants (e.g., water lilies) was an important component of King Rail sites. In the two survey years, water depths at survey stations where King Rails were documented ranged from 0 to 60 cm, and averaged about 26 cm. Most King Rail occurrences were in dyked marshes, suggesting that water level management may be an important element. On two occasions, King Rails were heard calling from nearby flooded fields.

Habitat trends

A detailed assessment of wetland loss by county across southern Ontario was done in the 1980s (Snell 1987). It reported that 68% of original wetlands south of the Canadian Shield had been drained or converted, mostly for agricultural purposes. In the extreme southwestern part of the province, the loss exceeded 90%. A recent update to Snell's report was completed by Ducks Unlimited Canada (2010). According to this study, 2,026,591 ha of wetlands existed in southern Ontario prior to European settlement, but by 2002, only 560,844 ha remained: a reduction of 72%. During the period from 1982 to 2002, it was determined that an additional 3.5% or 70,854 ha of wetlands were lost (Ducks Unlimited Canada 2010). Many of the counties in which King Rails occur have experienced extremely high levels of wetland loss. For example, before European settlement (around 1800), 56.4% of Kent County was estimated to have been wetland, but by 2002 this percentage was reduced to 0.8%. The wetland loss values from the Snell (1987) and Ducks Unlimited Canada (2010) studies are likely to be underestimates, because neither included wetlands under 10 ha in size. These two studies could not distinguish between types of wetland (i.e., much of the reported recent losses may have been swamps rather than marshes, the latter of which are the preferred habitat of King Rail).

Most of the wetlands inhabited by King Rail in Ontario are coastal wetlands that are hydrologically connected or adjacent to the Great Lakes. There are over 48,000 ha of evaluated coastal wetlands in Ontario from Lake Huron to the upper St. Lawrence River (Table 1). Of these coastal wetlands, 80% (39,050 ha) are marsh. It has been estimated that, as of 1984, about 35% (1064 ha) of the coastal wetlands along the lower Great Lakes had been converted to other uses (McCullough 1985). Along the eastern shore of Lake St. Clair, from 1965 to 1984, 30% of privately owned marshes were drained, primarily for agriculture (McCullough 1985). Using maps from 1789 to 1979, Whillans (1982) estimated that 43% of marshland (1920 ha) was lost along the Lake Ontario shoreline east of the Bay of Quinte.

Table 1. Area of coastal wetland, marsh, publicly owned and privately owned wetlands in Ontario by Great Lakes system.[a]

Lake/River	Total wetland including marsh (ha)	Marsh (ha)	% Marsh	Total publicly owned wetland (ha)	Total privately owned wetland (ha)	% Publicly owned total wetlands
Lake Huron	7405	3195	43	3621	3784	49
St. Clair River	87	80	92	12	75	14
Lake St. Clair [b]	2523	2252	89	366	2157	14
Detroit River	1136	1099	97	703	433	62
Lake Erie	19330	17879	92	13293	6036	69
Niagara River	85	45	53	2	83	2
Lake Ontario	11334	8781	77	6333	4688	56
St. Lawrence River	7018	5719	81	4940	1983	70
Total	**48918**	**39050**	**80**	**29270**	**19239**	**60**

[a] Calculated from Environment Canada and Ontario Ministry of Natural Resources (2003), which only listed evaluated wetlands >2 ha in size and within 2 km of shore.

[b] Note: Walpole Island wetlands were not evaluated and are not included.

In parts of Ontario, the rate of wetland loss has subsided, owing to directed conservation efforts on behalf of the remaining wetlands. Since 1995, wetlands evaluated as provincially significant in Ontario have been largely protected through the Provincial Policy Statement of the *Planning Act*. In many cases, however, permits may still be issued, meaning that agricultural conversion or drainage of wetlands continues, albeit at a much lower rate than historically.

In some areas, burning wetland vegetation in fall or winter is a measure taken to curb the spread of European Common Reed. If a large proportion of a marsh is burned each year, there is insufficient vegetation remaining for King Rails to nest in when they return in early spring (A. Woodliffe pers. comm. 2010). The extent of this temporary loss of habitat has not been evaluated.

BIOLOGY

Most of the basic information on King Rail biology is based on data collected by Meanley (1969) during intensive studies of this species conducted over many years, primarily in Arkansas and Louisiana.

Life cycle and reproduction

King Rails return from their wintering grounds to Ontario from mid- to late April (Woodliffe 2007) into the beginning of May. Some individuals may return to the same territory or even the same nest location in consecutive years (Meanley 1969; Peck and James 1983).

Territory defence, pair formation and various vocalizations are often accompanied by displays by the male (Meanley 1969). King Rail calls are primarily given during the mating/nesting season (see **Morphological description** above), with different calls for mate attraction and for maintaining contact with a mate or young (Poole *et al.* 2005).

Nests are usually built in shallow water areas on a site apparently chosen by the male (Meanley 1969). The nests are generally placed in areas of uniform vegetation and are all well concealed (Meanley 1969). Peck and James (1983) stated that Ontario King Rail nests were generally built among grasses, bulrushes and cattails, and that they were positioned 10-46 cm above the water level. Nests are usually built with vegetation found nearby and are lined with finer rushes and grasses. Surrounding vegetation is often used to form a canopy, which makes nests difficult to find (Peck and James 1983).

Eggs have been found in Ontario between May 18 and July 17 (n = 12 nests; Peck and James 1983). Mean clutch sizes range from 10.5 to 11.2 eggs (Reid *et al.* 1994). Incubation is done by both sexes (Meanley 1969) after the last egg is laid and generally lasts 21-23 days (Reid *et al.* 1994). Nest success is believed to be relatively high, at least in some regions. For example, in Arkansas, Meanley (1969) found that 80% of laid eggs hatched, and he estimated 50% survival of young until 2 weeks of age. The King Rail is semi-precocial (Reid *et al.* 1994), meaning that young leave the nest soon after hatching and are under parental care for several weeks, at least until they are capable of flight.

The King Rail generally feeds in the early morning and late in the day (Meanley 1956; Reid 1989) in areas with good plant cover and in relatively open areas where they are close to cover (Poole *et al.* 2005). The King Rail is omnivorous, but crustaceans and insects are preferred food types, with crayfish being particularly important in freshwater habitats (Reid *et al.* 1994). It will also feed on fish, frogs and plant seeds (Meanley 1969). An examination of King Rail stomach contents by Meanley (1956) found that animal matter made up 90% or more of the spring and summer diet and the proportion decreased to 74% in the fall.

Definitive information on King Rail longevity is unavailable, but an estimate of 5-9 years has been made (Connecticut Department of Environmental Protection 1999). The longevity record for the closely-related Clapper Rail is 7.5 years (Clapp *et al.* 1982). In one study, annual survival of adult Clapper Rails was 49-67% (Eddleman 1989). No information is available on King Rail generation time, but it is likely somewhere between 2-4 years.

Physiology and adaptability

Little is known about King Rail physiology or adaptability. This species is considered to occupy the widest variety of habitats of any rail species (Meanley 1969), but, as discussed in **Habitat requirements**, the King Rail may require a variety of specific habitats and water levels at certain periods of its breeding cycle.

Dispersal and migration

Immature individuals are suspected to disperse widely: only one of 41 juveniles banded in Maryland during the summer were still in the same area in the fall (Poole *et al.* 2005).

The King Rail migrates primarily at night (Poole *et al.* 2005) via the Atlantic and Mississippi 'flyways' (Meanley 1969). During migration, it uses marshes that are damp or have shallow water, including seasonally flooded freshwater wetlands and streams (Reid *et al.* 1994).

Reid *et al.* (1994) reported that coastal Louisiana likely has the greatest concentration of wintering King Rails in the U.S. In an analysis of feathers using multiple stable isotopes to differentiate between resident King Rails and migrants originating from outside the wintering area, Perkins (2007) discovered that 99% of 187 winter-caught birds in southern Louisiana and Texas were year-round residents. This presumably reflects the large southern population of King Rails that are permanent residents inhabiting the Gulf of Mexico region, relative to much smaller numbers of migrants that originated from more northerly latitudes.

Interspecific interactions

The King Rail has been observed to exclude both Sora and Virginia Rails from its territory (Meanley 1969). Virginia Rails often respond vigorously to King Rail broadcast calls. While King Rails will also respond to Virginia Rail calls, it is not a vigorous response (J. McCracken pers. comm. 2010).

Nests placed in the interiors of marshes have higher success rates than those placed on edges (Reid 1989). Primary nest predators include Raccoon (*Procyon lotor*), Red Fox (*Vulpes vulpes*), Mink (*Mustela vison*), and Striped Skunk (*Mephitis mephitis;* Reid *et al.* 1994).

POPULATION SIZES AND TRENDS

Sampling effort and methods

As noted in the **Search effort** section, the King Rail is a difficult species to survey, because of its secretiveness, the inaccessibility of its habitat, and its overall rarity in Canada. For estimates of abundance, this status report relies upon occurrence records from the second Ontario Breeding Bird Atlas (2001-05), the Marsh Monitoring Program (2000-09), special targeted surveys that have been conducted in several areas, and reports from casual bird watchers. No statistical estimates of the precision of the abundance estimate are available.

Likewise, no monitoring programs are currently in place to reliably estimate population trends of King Rails in Canada. At the continental scale, the Breeding Bird Survey has some, albeit limited, power to detect King Rail population trends. The intensive, targeted surveys using King Rail broadcasts that were conducted by Kozlovic (1998) and Lang (1999) in southern Ontario have not been repeated, but could provide some trend information in the future. The Marsh Monitoring Program, which has been running across the Great Lakes Basin since 1995, has a principal goal of monitoring populations of marsh birds. However, because King Rails are so rarely detected in Ontario, the sample sizes are too small to provide trend estimates. Breeding bird atlases can provide some trend information based upon presence/absence data, but they are only conducted at 20-year intervals. See the **Search effort** section for more information about sampling effort and methods.

Abundance

The global population size of the King Rail is unknown; however, one estimate for the Canadian and U.S. population is about 70,000 birds (35,000 pairs; Cooper 2008). The vast majority of these inhabit the southeastern U.S., while only 137 to 443 pairs are estimated to breed in the Upper Mississippi River Valley/Great Lakes region, which includes the Canadian population.

Cosens (1985) suggested that there could be as many as 300 pairs of King Rails in Ontario. However, this was based upon extrapolations that included a crude estimate of the amount of potential habitat in the province. This almost certainly resulted in an inflated estimate of population size. All recent estimates of King Rail numbers in Ontario have been below 100 pairs. Austen *et al.* (1994) reported the population as between 20 and 52 pairs, while Page (1994) put it at 40-51 pairs. James (2000) estimated fewer than 50 pairs.

James' (2000) estimate was based largely on intensive directed searches undertaken across many sites in southern Ontario in 1997 and 1999. These searches concentrated on areas at which King Rails had been reported in the past. The 1997 search tallied a total of 32 calling birds, the majority of which were in the Lake St. Clair area, and especially Walpole Island (Kozlovic 1998). In 1999, similar targeted searches revealed 27 King Rails (Lang 1999). Since then, targeted surveys have not been as extensive or complete. Walpole Island has not been systematically surveyed since the late 1990s, though it did receive coverage during the second breeding bird atlas (2001-05).

From 2007 to 2009, King Rail surveys were concentrated at some historic sites, especially the St. Clair, Long Point, Big Creek, and Prince Edward Point National Wildlife Areas. No King Rails were detected (Environment Canada 2010a). In 2010, the Canadian Wildlife Service commissioned King Rail surveys at eight areas: Big Creek Marsh (Essex County), Hillman Marsh (Essex County), Rondeau Provincial Park and Rondeau Bay Marshes, Long Point National Wildlife Area, Big Creek National Wildlife Area, Presqu'ile Provincial Park and Gosport Marshes, Big Island Marsh, and Millhaven Creek/Mud Lake Marsh. These surveys yielded three King Rail detections: two at Hillman Marsh and one at the Presqu'ile Provincial Park/Gosport Marsh Complex (Jon McCracken pers. comm. 2010; Kari Van Allen pers. comm. 2011).

Recent reports of King Rail observations from several non-traditional "new" sites (see **Canadian range** above) might suggest that there are more individuals that have simply gone undetected in areas that have not been previously surveyed. While this may well indeed be partly true, details of the majority of these records suggest that they involved unpaired birds or non-breeding vagrants. The possible exception is some of the new sites from around eastern Lake Ontario. Even then, these sites are rarely occupied in successive years, and frequently involve birds that are not detected on more than one visit.

Based on records from 2000 to 2010, the current population of King Rails in Canada is difficult to estimate with precision. Still, there is no reason to believe that it has changed substantially since the previous COSEWIC status report (i.e., James 2000). The current population is believed to consist of 30 to 50 pairs. This corresponds to a maximum of 60-100 mature individuals, assuming that all calling birds are mated, which is optimistic at best. The estimate also assumes that the number of King Rails at Walpole Island has not fundamentally changed since it was last surveyed in the late 1990s. This assumption seems reasonable, given that there has been no noticeable change in King Rail numbers in other nearby marshes that have been surveyed at Lake St. Clair.

Fluctuations and trends

Although declines are suspected, the trend for the Canadian King Rail population is unknown. It is not known how many individuals once inhabited Ontario marshes, nor how many of these marshes were occupied. However, it is clear that severe declines have taken place in the northern parts of the species' range in the U.S. during the past century (Poole *et al.* 2005; Cooper 2008). For example, in Ohio it was formerly the most numerous nesting rail, where it was widely distributed within the western Lake Erie marshes in the 1930s; only a few pairs were left by the 1960s (Peterjohn and Zimmerman 1989).

It is also known that historically, Ontario suffered a tremendous loss of wetland habitat in the southwestern part of the province (Snell 1987; Ducks Unlimited 2010) where King Rails have been most numerous.

Although King Rails have been recorded at several new sites in Ontario since the last status report was produced, this probably reflects increased levels of awareness coupled with the conduct of intensive surveys in "new" areas. During the first Ontario Breeding Bird Atlas field-work (1980-1985), King Rails were reported in 16 10 km x 10 km squares (McCracken and Sutherland 1987). From 2000 to 2005, during field-work for the second Breeding Bird Atlas, King Rails were found in 19 squares (Figure 3; Woodliffe 2007). There were seven squares in which King Rails had been found in the first atlas but not in the second. Conversely, evidence of at least possible breeding was recorded in 10, primarily eastern Ontario, squares in which the species had not been reported previously (Figure 3). Because there was more targeted survey coverage during the most recent atlas period, there was little, if any, real change in occurrence statistics between the two atlas periods.

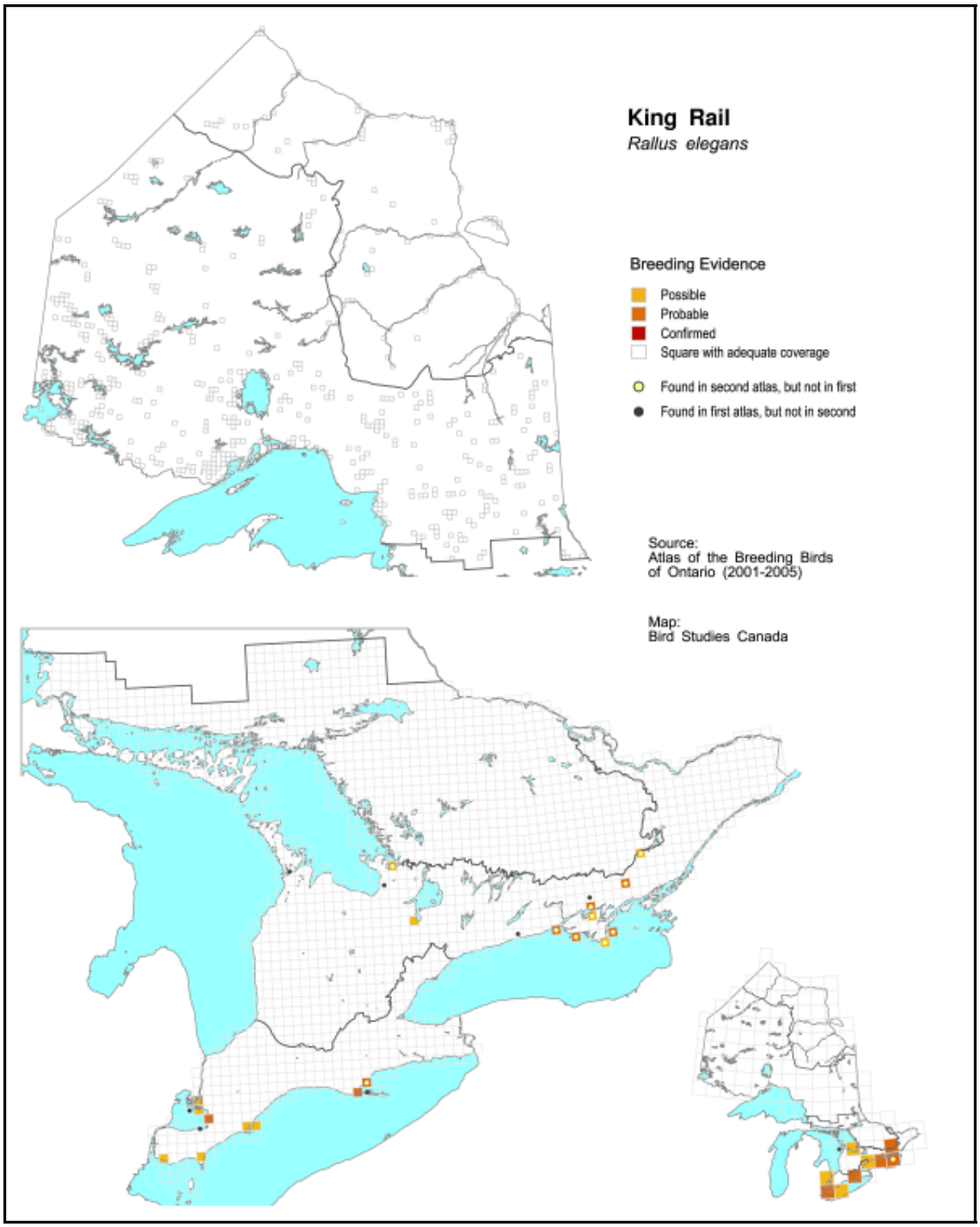

Figure 3. King Rail breeding evidence obtained during the 2001-2005 Ontario Breeding Bird Atlas project (from Woodliffe 2007). Squares are 10 km x 10 km. Black dots show sites where King Rails were detected in the first atlas (1981-1985) but not the second; squares with open circles show the opposite.

No confirmed breeding records were obtained during the second atlas. Indeed, there have been no confirmed breeding records (nests or fledged young) in Canada in over 2 decades (Environment Canada 2010a). However, the lack of concrete nesting evidence should not be construed as indicating that the species has not actually nested. Nests and broods of King Rail are very difficult to find.

In the U.S., Breeding Bird Survey (BBS) data from 85 routes were used to estimate an overall decline in King Rail observations of 4.6% per year between 1966 and 2009 (95% CI = -7.6% to -1.7%; Sauer *et al.* 2011). While BBS results for this species must be viewed with caution owing to low sample sizes and poor coverage of suitable habitat, the confidence intervals around the trend estimate suggest that the decline is real.

Several U.S. states have recently completed their second breeding bird atlases (Table 2). Because many are still in progress, it is difficult to draw conclusions, but in Maryland and Washington, D.C. the number of blocks in which King Rails were found decreased by half during the second atlas (Table 2). In the other states with completed second atlas projects, there is relatively little change in the number of blocks with evidence of King Rails.

Table 2. Number of survey squares with King Rails from U.S. breeding bird atlases that have been completed or have their second atlas project in progress.

State	1st Atlas Dates	No.	2nd Atlas Dates	No.
Michigan	1983-1988	13	2002-2008	9
Delaware	1983-1987	18	2008-2012 [a]	7
Indiana	1985-1990	5	2005-2011 [a]	8
Maryland & DC	1983-1987	74	2002-2006	37
Massachusetts	1974-1979	9	2007-2011 [a]	5
Iowa	1985-1990	7	2008-2012 [a]	1
New York	1980-1985	5	2000-2005	5
Ohio	1982-1987	9	2006-2010 [a]	9
Pennsylvania	1983-1989	5	2004-2008	6

[a] In progress

Rescue effect

Although the King Rail does migrate and is capable of dispersal, because King Rail populations in all adjacent states to Canada are listed as Threatened or Endangered and likely declining, these neighbouring regions would be unlikely to serve as an effective source of rescue for the Canadian population.

THREATS AND LIMITING FACTORS

Wetland loss and degradation

The loss of wetlands and degradation in their quality are widely accepted as the major limiting factors and threats facing King Rail populations (McCracken and Sutherland 1987; Eddleman *et al.* 1988; Carroll 1988; Rabe 1991; Peterjohn and Rice 1991; Poole *et al.* 2005). The vast majority of remaining wetlands in southern Ontario are swamps (approximately 86%), while marshes, the preferred habitat of the King Rail, represent only 13% of wetlands (Ontario Ministry of Natural Resources 2008).

Wetlands can become degraded in many ways, including through excessive inputs of sediment, nutrients and pesticides from runoff. Good water quality is important not only for maintaining an abundance of aquatic macroinvertebrates to serve as potential prey for King Rails, but also for permitting visual identification of prey. Turbid water makes hunting by sight difficult, if not impossible. Wetlands can become degraded through inappropriate land use on adjacent lands, including poor agricultural practices and urban stormwater runoff in the upstream watershed.

In Ontario, the formation of dense cattail monocultures in Great Lakes coastal wetlands is believed to lower the quality of the wetland as habitat for King Rails (Wormington 2008). Dense cattail growth resulting from decreased water level fluctuations due to water level regulation (Keddy and Reznicek 1986) is most evident in Lake Ontario coastal marshes (Wilcox *et al.* 2005). With future climate change it is projected that Great Lakes water levels will be lower and that the seasonal water level cycle will be altered (Mortsch *et al.* 2006). Tall and dense cattail monocultures that exclude other wetland plants could also be the result of the vigour exhibited by the hybrid cattail, *Typha x glauca* (*T. angustifolia x latifolia*), which currently tends to dominate coastal marshes on the lower Great Lakes (D. Sutherland pers. comm. 2010).

Invasive species

Numerous invasive species have become established during the last century in the Great Lakes watershed. Of concern to King Rail populations are some invasive plant species, particularly European Common Reed which rapidly outcompetes and displaces native emergent wetland vegetation such as cattail. Wilcox *et al.* (2003) demonstrated an alarming exponential increase in European Common Reed, in the Long Point area of Ontario, which was found to be displacing cattail, meadow marsh and sedge/grass habitats. Purple Loosestrife and Flowering Rush (*Butomus umbellatus*) could also be problematic in some marshes (Environment Canada 2010a). European Frog-bit (*Hydrocharis morsus-ranae*), can blanket the water surface in marshes and continues to spread in southern Ontario. Its dense growth may limit the visibility of prey items to foraging King Rails.

Large populations of invasive Common Carp (*Cyprinus carpio*) create extremely turbid conditions in wetlands, resulting in decreased submerged aquatic plant growth and fewer aquatic macroinvertebrates (Lougheed *et al.* 2004).

Collisions with artificial structures

As is the case with many nocturnal migrants, King Rails have been documented striking television towers, tall buildings, and lighthouses (Poole *et al.* 2005). Birds have also been found dead beneath telephone wires and impaled on barbed wire (Poole *et al.* 2005). Collisions with vehicles are likely common where roads pass through marshes. A recent report surfaced of a King Rail found dead by the road outside of its normal Ontario range on May 27, 2010 (D. Sutherland pers. comm. 2010). Although it is unknown to what extent collisions with artificial structures threaten the Canadian population, this threat continues to escalate across the King Rail's breeding and wintering range and along its migration routes, with increased development of road networks, increased vehicular traffic, and increasing numbers of tall structures on the landscape.

Pollutants

There is no information about the effects of pollutants on King Rails, but closely related Clapper Rails were found to produce 31% non-viable eggs at one site in California, likely due to various contaminants (Schwarzbach *et al.* 2006). In this study, significantly higher levels of several trace elements (e.g., strontium, barium, chromium, lead) in deformed embryos, and mercury, in the highly toxic methylmercury form, were found in all eggs tested. The authors concluded that a combination of contaminants, including organochlorine pesticides, reduced Clapper Rail productivity.

Wintering King Rails are believed to be concentrated in the Gulf coast states. The 2010 oil spill in the Gulf of Mexico, and other smaller spills, could severely degrade suitable coastal wetland habitat, although King Rails are generally found in fresh or brackish water rather than in salt water.

Decreasing crayfish populations

Crustaceans (e.g., crayfish, crabs) are considered the most important food items for the King Rail, where its diet has been studied in the U.S. (Poole *et al.* 2005). The importance of crayfish in King Rail diets in Canada is not known, but it is suspected to be a common prey item. A recent study has shown that crayfish diversity and population sizes are decreasing in Ontario inland lakes (Edwards *et al.* 2009). There are currently no data available to determine whether this phenomenon is occurring in Great Lakes coastal wetlands occupied by King Rails.

West Nile Virus

The impact of West Nile Virus on the King Rail populations is unknown. However, dead Clapper Rails, Virginia Rails and Soras have all tested positive for the virus (Centers for Disease Control 2010), suggesting that the King Rail could also be affected by this disease.

Hunting and trapping

In Ontario, the King Rail cannot be hunted as per Environment Canada's *Migratory Bird Hunting Regulations* (2010b), but in 13 U.S. states it continues to be taken, along with the congeneric Clapper Rail (Office of the Federal Register 2009a, b). Daily bag limits in the U.S. range from 1 to 15 King and Clapper rails combined. As such, King Rails nesting in Canada (and the adjacent U.S.) are likely subject to hunting pressure during fall migration and on the wintering grounds.

While hunting is a potential threat to the Canadian population, there is no quantitative information available about the severity of this threat. Estimates from the U.S. Fish and Wildlife Service suggest that the annual take is fewer than 1000 birds (Raftovich *et al.* 2009; Richkus *et al.* 2008; U.S. Fish and Wildlife Service 2007), which is probably not a significant impact on the overall population.

In the U.S. and Canada, there are also reports of King Rails becoming unintended casualties in muskrat traps (Poole *et al.* 2005; Environment Canada 2010a). For example, one Maryland trapper reportedly caught 50 King Rails during one trapping season (Poole *et al.* 2005).

PROTECTION, STATUS, AND RANKS

Legal protection and status

The King Rail is protected under the *Migratory Birds Convention Act*, which prohibits killing, harming, or collecting adults, young or the eggs. Under this Act, the King Rail cannot be hunted in Canada. It is also listed as Endangered under Schedule 1 of the *Species at Risk Act* (SARA). As a result, it is an offence to kill, harm, harass, capture, possess, collect, buy, trade or sell this species. Additionally, it is an offence to damage or destroy the residence of one or more individuals of this species wherever they are found in Canada. Ontario's *Endangered Species Act, 2007* also prohibits the killing, capturing, possessing, selling or trading of this species, and damaging or destroying its habitat.

The King Rail is not listed as at risk federally in the U.S., but the U.S. Fish and Wildlife Service has identified it as a "focal species" of management concern that will receive increased attention (Cooper 2008). The species is listed as Endangered in 10 states, Threatened in 2 and of some conservation need in an additional 8 states (Table 3). States designating the King Rail with some level of conservation status are generally in the Midwest or Northeast; all those bordering Ontario have afforded this species at least Threatened status. Thirteen of the 33 states in which the King Rail is known or is believed to breed do not currently designate the species at any level of conservation concern.

Table 3. Conservation status of the King Rail in the United States. Status from NatureServe (2009); state listings from Cooper (2008) and/or a web search of state wildlife departments, April 2010.

State	Status [a]	State Listing
Alabama	S3B,S4N	Moderate Concern
Arkansas	S1B,S3N	Special Concern
Connecticut	S1B	Endangered
Delaware	S2	Species of Concern
District of Columbia	S2N	
Florida	SNR	
Georgia	S4S5	
Illinois	S2	Endangered
Indiana	S1B	Endangered
Iowa	S1B	Endangered
Kansas	S2B,S2N	
Kentucky	S1B	Endangered
Louisiana	S4	
Maine	S1?N	
Maryland	S3S4B,S2N	Species of Conservation Need
Massachusetts	S1B,S1N	Threatened
Michigan	S1	Endangered
Minnesota	S1B	Endangered
Mississippi	S3B,S3N	
Missouri	S1	Endangered
Nebraska	S1	
New Hampshire	SHB	
New Jersey	S3B,SNRN	Special Concern
New York	S1B	Threatened
North Carolina	S3B,S3N	
Ohio	S1	Endangered
Oklahoma	S1B	
Pennsylvania	S1B	Endangered
Rhode Island	S1B,S1N	Species of Concern

State	Status [a]	State Listing
South Carolina	SNR	
South Dakota	S1S2B	
Tennessee	S2	Deemed in need of management
Texas	S3B	
Virginia	S2B,S3N	
West Virginia	S1B	
Wisconsin	S1B	Species of Concern

[a] S1 = Critically Imperiled; S2 = Imperiled; S3 = Vulnerable; S4 = Apparently Secure; S = Secure; SNR = Unranked; B = Breeding; N = Non-breeding

Non-legal status and ranks

The species was last assessed by COSEWIC in 2000 as Endangered. According to NatureServe (2009), the King Rail is ranked G4 globally (apparently secure), N2B (imperiled) in Canada and S2B (imperiled) in Ontario. Breeding populations are ranked as S1 (critically imperiled) for 18 states, S2 (imperiled) for five states and S3 (vulnerable) for seven, primarily southern, states (Table 3). Nine of these states allow hunting of King Rail, despite the S1 to S3 rankings.

The International Union for Conservation of Nature (IUCN) currently places the King Rail in the lowest concern category globally (i.e., Least Concern; BirdLife International 2009). The species was re-assessed by IUCN in 2009 and it was determined that despite a decreasing population trend, because its range is "extremely large" and the population is not believed to be <10,000 nor decreasing by >10% over 10 years, its status does not currently need to be downgraded (BirdLife International 2009). The IUCN evaluation was based on the entire global range of the species, including all recognized subspecies, and extremely limited information on trend estimates. Global population estimates vary widely from 2500 to >1,000,000 individuals (NatureServe 2009), undoubtedly due to the secretive nature of this species.

Habitat protection and ownership

Many of the large coastal wetland complexes in Ontario are found on publicly owned lands, such as National Parks, Provincial Parks, Conservation Areas, and National Wildlife Areas. Other coastal wetlands are municipally owned, under First Nations ownership or are privately owned and managed hunt clubs. Environment Canada and the Ontario Ministry of Natural Resources (2003) produced *The Ontario Great Lakes Coastal Wetland Atlas,* which summarized available information on evaluated wetlands along Great Lakes shorelines. This atlas includes an estimate of public/private ownership for all wetlands listed. Using the areas of wetland provided in the atlas, total wetland and marsh areas were calculated, as were areas of publicly and privately owned wetlands for each lake or river system encompassing the range of King Rail in Ontario (see Table 1). Except for Lake Huron, most evaluated coastal wetlands were marshes, which could potentially provide suitable habitat for King Rail. The

amount of public owned wetland varies widely across the Great Lakes coastal wetlands, with greater than 50% public ownership of wetlands along the Canadian side of the Detroit River, Lake Erie, Lake Ontario and the St. Lawrence River. The values for Lake St. Clair do not include Walpole Island First Nations wetlands, because they have not been evaluated. Despite this omission, it is apparent that few Lake St. Clair coastal wetlands are in public ownership.

Even when wetlands are in public ownership, degradation of coastal wetlands still occurs due to activities or agricultural/urban land use beyond the boundaries of the public area. Erosion and nutrient or pesticide runoff from upstream in watersheds lead to degraded water quality in coastal wetlands, which can decrease the potential food supply for King Rail. Likewise, protected wetlands are not protected against invasive species.

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The original COSEWIC status report for King Rail was prepared by S.E. Cosens in 1985. The first update report by A.M. Page was finalized in 1994 and a second update, by R.D. James, was completed in 2000. Their past efforts are appreciated.

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COLLECTIONS EXAMINED

No collections were examined.