PROPOSED

Species at Risk Act
Recovery Strategy Series

Recovery Strategy for the King Rail (*Rallus elegans*) in Canada

King Rail



2010

Canada

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PREFACE

The federal, provincial, and territorial government signatories under the Accord for the Protection of Species at Risk (1996) agreed to establish complementary legislation and programs that provide for effective protection of species at risk throughout Canada. Under the *Species at Risk Act* (S.C. 2002, c.29) (SARA), the federal competent ministers are responsible for the preparation of recovery strategies for listed Extirpated, Endangered, and Threatened species and are required to report on progress within five years.

The Minister of the Environment and the Minister responsible for the Parks Canada Agency are the competent ministers for the recovery of the King Rail and have prepared this strategy, as per section 37 of SARA. It has been prepared in cooperation with the Province of Ontario, Walpole Island First Nation, Essex Region Conservation Authority, Bird Studies Canada, and Ducks Unlimited Canada as per section 39(1) of SARA.

Success in the recovery of this species depends on the commitment and cooperation of many different constituencies that will be involved in implementing the directions set out in this strategy and will not be achieved by Environment Canada, the Parks Canada Agency, or any other jurisdiction alone. All Canadians are invited to join in supporting and implementing this strategy for the benefit of the King Rail and Canadian society as a whole.

This recovery strategy will be followed by one or more action plans that will provide information on recovery measures to be taken by Environment Canada, the Parks Canada Agency and other jurisdictions and/or organizations involved in the conservation of the species. Implementation of this strategy is subject to appropriations, priorities, and budgetary constraints of the participating jurisdictions and organizations.

ACKNOWLEDGMENTS

This Recovery Strategy was prepared by the National King Rail Recovery Team. Members include: Angela McConnell (chair, 2009 to present), Laurie Maynard (past chair) and John Haggeman (Environment Canada), Paul Ashley (formerly Environment Canada), Dan Lebedyk (Essex Region Conservation Authority), Jon McCracken (Bird Studies Canada), and Allen Woodliffe (Ontario Ministry of Natural Resources).

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EXECUTIVE SUMMARY

The King Rail (*Rallus elegans*) is a secretive marsh bird. Within its Canadian range it resides in large expanses of shallow freshwater marshes that merge with scrubby swales. Its small population size and the limited availability of suitable habitat prompted the Committee on the Status of Endangered Wildlife In Canada (COSEWIC) to assess the King Rail as Endangered in Canada in 2000. It is listed as Endangered on Schedule 1 of the federal *Species at Risk Act.* The species is also listed as Endangered on the Species at Risk in Ontario List and is protected under Ontario's *Endangered Species Act, 2007*.

The King Rail breeds in eastern North America. Its populations are declining throughout its range. In Canada, this species is only found in Ontario, representing the northernmost limit of its range. Small populations are thought to be thinly spread across southern Ontario, occurring in coastal marshes on Walpole Island First Nation, Lake St. Clair, along Lakes Erie and Ontario, and in interior marshes around the Bruce Peninsula, Lake Simcoe, and Kingston areas.

There are unknowns regarding the feasibility of recovery of the King Rail. Nevertheless, in keeping with the precautionary principle, this recovery strategy has been prepared as per section 41(1) of SARA, as would be done when recovery is determined to be feasible. This recovery strategy addresses the unknowns surrounding the feasibility of recovery.

Habitat loss and degradation through housing development and conversion to agricultural uses are believed to be the main threats to the survival of the species in Ontario. Other threats to the King Rail may include invasive species, predators, human disturbance, changes in ecosystem dynamics, pollution and biological resource use (e.g. hunting). However, the attribution of some of these impacts to King Rail is speculative and requires further investigation.

The population and distribution objective for the King Rail is to maintain the current King Rail population throughout its Canadian range. The strategies recommended to meet this objective are given in the section on Strategic Direction for Recovery and include: surveying and monitoring of King Rail populations and their habitats, development and implementation of effective protection and management tools, stewardship of the species and its habitat, and collaborative research activities with international partners that will contribute to an improved understanding of the species. These strategies will be supported by communications products and continuous evaluation based on accumulation of data and experience.

Critical habitat cannot be identified due to limitations of current information. Current, confirmed breeding and location information for King Rail is lacking, making critical habitat identification in Ontario impossible at this time. Wetland size, vegetation species composition and King Rail territory size must be determined before critical habitat can be identified. A schedule of studies for the identification of critical habitat is outlined in this document**.**

One or more action plans will be posted on the SAR Public Registry for the King Rail by 2016. The action plan(s) may include an area-based, multi-species approach for some areas.

RECOVERY FEASIBILITY SUMMARY

Based on the following four criteria outlined by the Government of Canada (SARA Policies, 2009), there are unknowns regarding the feasibility of recovery of the King Rail. Nevertheless, in keeping with the precautionary principle, a recovery strategy has been prepared as per section 41(1) of SARA as would be done when recovery is determined to be feasible. This recovery strategy addresses the unknowns surrounding the feasibility of recovery.

1. **Individuals of the wildlife species that are capable of reproduction are available now or in the foreseeable future to sustain the population or improve its abundance.**

   Yes, although numbers appear to be low, individuals capable of reproduction are believed to be present within the Canadian range. As well, individuals capable of reproduction are present throughout the North American range.

2. **Sufficient suitable habitat is available to support the species or could be made available through habitat management or restoration.**

   Unknown. Marsh habitat remains available or could be made available through habitat management across the Ontario range. However, as determined from recent National Wildlife Area surveys conducted by Environment Canada, for unknown reasons, the birds may not use existing suitable habitat. The amount of optimal suitable habitat remaining in Ontario for King Rail is not currently known because of the lack of information on this species' microhabitat needs.

3. **The primary threats to the species or its habitat (including threats outside Canada) can be avoided or mitigated.**

   Unknown. It is possible that some of the key threats to the species, such as habitat loss and degradation from housing development and conversion to agricultural uses, may be avoided or mitigated through recovery actions. However, it is unknown if all the known and potential threats, such as invasive species and predation, can be avoided or mitigated effectively. Moreover, the reasons for the decline of this species throughout North America are not clear.

4. **Recovery techniques exist to achieve the population and distribution objectives or can be expected to be developed within a reasonable timeframe.**

   Unknown. Many techniques exist that could contribute to the recovery of King Rail, including habitat management and restoration, and invasive species control; however, an improved understanding of the biology of the King Rail and threats to the species is required before the recovery techniques can be identified and their effectiveness assessed.

As the small Canadian population of King Rail occurs at the northern part of its continental range, and the vast majority of its continental distribution and population occurs further south in the United States, it is important to note that population changes at the continental level may have a significant effect on recovery feasibility in Canada. As the continental population of King Rail is

experiencing an ongoing downward population trend, its range may contract away from the current periphery, and individuals may immigrate towards the centre of the range. In such a case, despite best efforts described in this strategy to ensure that sufficient suitable habitat is available and key threats are mitigated, the numbers of King Rail in Canada may continue to decline.

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1. COSEWIC SPECIES ASSESSMENT INFORMATION

Date of Assessment: November 2000

Common Name (population): King Rail

Scientific Name: *Rallus elegans*

COSEWIC[1] Status: Endangered

Reason for Designation: The population of this species in Canada is very small and shows continued decline. Few patches of remaining habitat are large enough and of sufficient quality to support this species. It is also considered endangered or critically imperiled in all adjacent states.

Canadian Occurrence: Ontario

COSEWIC Status History: Designated Special Concern in April 1985. Status re-examined and designated to Endangered in April 1994. Status re-examined and confirmed in November 2000.

1. - COSEWIC – Committee on the Status of Endangered Wildlife in Canada

2. SPECIES STATUS INFORMATION

The King Rail *(Rallus elegans)* is considered apparently globally secure (G4) and is an apparently secure breeder in the United States (N4B, N4N) (NatureServe 2009). The species is listed as a possibly extirpated breeder (SHB) in one state, critically imperiled (S1) or a critically imperiled breeder (S1B) in 16 States, and imperiled (S2) or an imperiled breeder (S2B) in five States (Appendix B). In Canada, the species is considered a critically imperiled breeder (N1B) and an imperiled breeder in Ontario (S2B) (NatureServe 2009). It has been estimated that less than 1% of the King Rail's global population occurs in Canada (Page 1994, Cadman et al. 2007, BirdLife International 2008).

Currently, the King Rail is listed as Endangered under both the Canadian *Species at Risk Act* and the *Species at Risk in Ontario List*. Additionally, it is listed as a Species of Concern under the U.S. *Endangered Species Act*. The status of the King Rail in Canada is currently being reviewed by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) and is anticipated to be completed in 2011.

3. SPECIES INFORMATION

3.1 Species Description

The King Rail is the largest rail in North America averaging 38 cm in length (Meanley 1992). It is a compact, cinnamon-coloured bird with black and white barred sides, a short tail and short, rounded wings (Meanley 1992). Its back is streaked with black and it has a long, decurved, yellow bill (Environment Canada 2006). Males and females are similar in appearance, but the males are slightly larger (Meanley 1992). Juveniles are similar in appearance to adults but have darker backs and muted brown abdomens.

The King Rail is a secretive bird that resides in marsh habitats and is rarely observed. The species has a variety of calls, including an evenly spaced series of up to 10 “kik-kik-kik”. During the breeding season, the most common call is the “gelp-gelp-gelp”, which is used when a bird is startled and as an “all is well” signal when a pair is reunited (Meanley 1957). Both male and female birds are known to call, although they often use different calls (Meanley 1992).

The King Rail is similar in appearance to the Virginia Rail. However, the King Rail is twice the size of the Virginia Rail and does not have grey cheek patches (Austen et al. 1994). It is also similar to the more common Clapper Rail, however, the Clapper Rail is smaller, grayish in color, is generally restricted to saltwater marshes and the barring on the flanks is less defined (Wildlife in Connecticut 2000). Other rails have differing plumage, are much smaller and, therefore are not often confused with the King Rail.

3.2 Population and Distribution

The King Rail breeds in fresh and brackish wetlands from the Gulf Coast to southern Ontario, from the Atlantic Coast to about the 100th meridian in the Great Plains, and in Cuba and the interior of Mexico (Meanley 1992) (Figure 1). The King Rail traditionally winters in marshes of the southeastern Atlantic and Gulf coastal plains from the Delaware Valley to southeastern Georgia, Florida, and westward through Louisiana, Texas, and Arkansas (Meanley 1992).

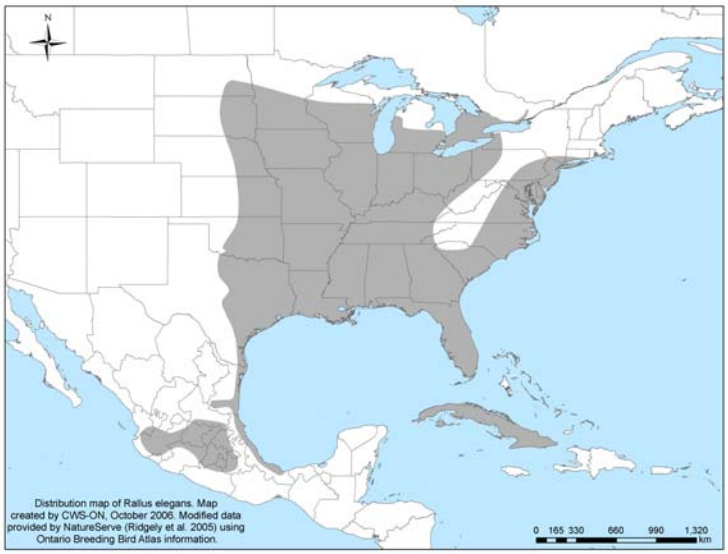


Figure 1. Global Distribution of King Rail.
"Data provided by NatureServe in collaboration with Robert Ridgely, James Zook, The Nature Conservancy - Migratory Bird Program, Conservation International – Centre for Applied Biodiversity Science, World Wildlife Fund – U.S., and Environment Canada - WILDSPACE."

A recent report indicated that the King Rail had greatly declined in the United States Midwest, where it was formerly a locally common breeder and is now a rare summer resident (Russell 2004). The same report estimated that the entire population in the Midwest region, including Ontario and the eastern Great Plains of Arkansas and Oklahoma, contains between 137-443 pairs (Russell 2004). The main reason for the population decline throughout North America is believed to be habitat loss (McCracken and Sutherland 1987; Carroll 1988; Eddleman et al. 1988; Peterjohn and Rice 1991; Rabe 1991; Meanley 1992).

In Canada, the King Rail is found only in Ontario, which is at the extreme northern edge of its breeding range. The King Rail is believed to be thinly spread across southern Ontario in the marshes of the St. Clair River delta and adjacent Lake St. Clair, in a number of the coastal marshes of Lake Erie and Lake Ontario, in extreme southeastern Georgian Bay and at a number of inland sites north to Bruce and Simcoe counties, Durham Regional Municipality, Hastings, Lennox and Addington and Frontenac counties (McCracken and Sutherland 1987; Kozlovic 1998; Cadman et al., 2007). One of the largest populations is believed to coincide with the largest block of extant habitat, which includes the marshes within Walpole Island First Nation and on the eastern shore of Lake St. Clair, but updated information on this population is needed.

Bird surveys were conducted for the Ontario Breeding Bird Atlas (OBBA) from 1981-1985 and 2001-2005, and the Ontario Rare Breeding Bird Program (ORBBP) in the early 1990s. Additionally, targeted surveys were conducted in 1997 and 1999. The results of these surveys suggest that there is a breeding population of somewhere between 20 and 52 pairs in southern Ontario (Woodcliffe in Cadman et al. 2007). It should be noted, however, that survey results may provide low population estimates because the King Rail inhabits large interior areas of marshes that are not easily surveyed. Also, due to the secretive nature of the species, detection is

very difficult, (between 20 and 55%) which complicates survey protocols and interpretation of the results (Conway et al., 2008).

Data gathered during the second Ontario Breeding Bird Atlas (2001-2005) indicated the presence of King Rail in 19 atlas squares (each square being 10 by 10 km), an increase from the 16 squares reported during the first breeding bird atlas in 1981-85 (Cadman et al. 1987; Cadman et al., 2007) (Figure 2); However, none of these occurrences confirmed breeding activity by King Rail. In the second atlas, King Rail occurrences were recorded in 10 squares in which they were reported as absent in the first atlas, and reported as absent in seven squares in which they had recorded occurrences in the first atlas (Cadman et al. 2007).

From 2007-2009, species-specific surveys were conducted by Environment Canada, Canadian Wildlife Service, and Bird Studies Canada at St. Clair, Long Point, Big Creek, and Prince Edward Point National Wildlife Areas in southern Ontario. The King Rail specific surveys were conducted following a different protocol than the Breeding Bird Atlas or the Marsh Monitoring Program. Studies have indicated that species-specific surveys result in a higher detection rate for many secretive marsh birds than multi-species surveys (Gibbs and Melvin 1993; Tozer 2002). Nonetheless, no King Rails were detected during these surveys. It is unknown whether the failure to detect indicates absence from the areas. Further surveys are required, perhaps combined with detectability studies, to help determine the species' status in these areas.

While King Rail experts suspect that there has been little to no change in the very small population size or distribution of the species within Ontario since the last COSEWIC status report was released in 2000 (McCracken pers. comm.), more information is required to determine the current distribution, abundance, population trends, and key populations within the province. There have been no known, confirmed breeding records for King Rail within the province in over 20 years. All sites with past King Rail detections therefore require current surveys to verify if the species still inhabits the area and, where possible, to confirm breeding. Revised species-specific survey protocols will assist in obtaining this needed information.

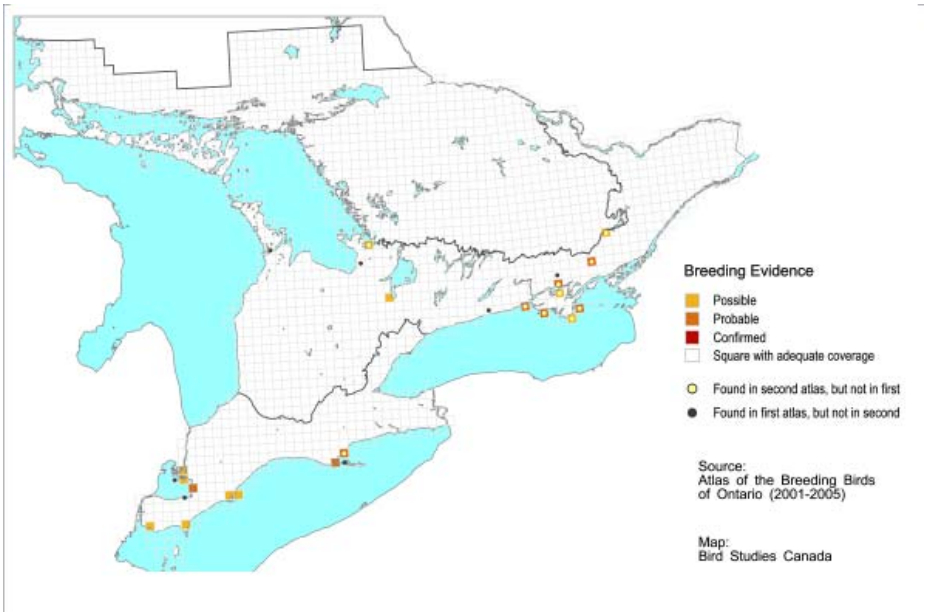


Figure 2. King Rail Distribution in Canada. (**Cadman et al. 2007)**

3.3 Needs of the King Rail

The King Rail inhabits wetlands and is renowned for its solitary, secretive behaviour. It is frequently active at night, being more often heard than seen (Kaufman 1996). The King Rail has been described as a "damp habitat species" residing in marshes with the lowest water levels of any inland-breeding rallid (Meanley 1953). Across its range, King Rails are found in freshwater, brackish, and saltwater marshes as well as in swamps, wet meadows, streamsides, roadside ditches, and upland fields near marshes (Meanley 1969). Additionally, managed impoundments and undyked wetlands are utilized by the species in Canada and the United States (Reid et al. 1994; Lang 2000). Prime breeding habitat is found in relatively shallow wetlands having water depths typically less than 25 cm and dense emergent vegetation, hummocky topography, swales, and mudflats (Reid et al. 1994). In Ontario, the species nests in freshwater marshes, preferring shallow-water marshes that often merge with shrubby swales (McCracken and Sutherland 1987).

The King Rail's cryptic behaviour and preference for shallow hemi-marsh[1], with dense cover and patches of open water, limit the ability to conduct the research and monitoring necessary to identify key habitat characteristics required for breeding, foraging, dispersal, and migration. The majority of research that has been undertaken is based on United States populations. Minimum wetland area requirements are not known for King Rails, although a number of marsh-dependent bird species are adversely affected by habitat fragmentation, isolation, and are sensitive to human disturbance (Brown and Dinsmore 1986). In the 1990s, most of Ontario's King Rail population was known to be concentrated in the wetland impoundments of the St. Clair River delta. These areas have a high diversity of wetland vegetation as well as a diversity of adjacent habitats which may be attractive features for the King Rail because they provide suitable nesting, foraging, and

[1] Hemi-marsh consists of diverse stands of emergent vegetation intermixed with equal areas of open water.

moulting microhabitats. Although King Rails have been observed to defend territory boundaries, territory size is unknown (Meanly 1957).

An interspersion of wet and dry areas is essential for King Rail breeding activity to occur (Meanley 1992). Sites used in the spring and during the nesting period have relatively shallow water (2.5-25 cm) and dense vegetation (Reid et al. 1994). Dense stands of vegetation also provide nesting material, protective cover, and physical support for the birds when moving over deep water (Hohman et al. 1994). Nests of King Rails have canopies and ramps of plant material leading down from the entrance. King Rails often construct several brood nests[2], without canopies, near the egg nest (Meanley 1992).

The distribution of King Rail populations may be limited by the species' habitat specificity, that is, the amount and/or quality of available suitable breeding habitat (Page 1994). Although the complete suite of habitat requirements is not known, wetland size, the amount of interspersion between water and vegetation, aquatic plant community structure and composition, water depth, and density of emergent vegetation may play some role in the King Rail's habitat choices. As a result, it is uncertain as to how much of the available habitat in Canada is suitable for breeding King Rails and/or whether there is an underlying reason why King Rails are not using apparently suitable habitat. Due to the fact that they occur at the northern periphery of the species' range, King Rail populations in Canada may also be limited by immigration from source populations within the adjacent United States.

Sites used by foraging broods are relatively drier than nest sites, often having small mudflats and water depths less than 10 cm, with tall, dense vegetation that provides protective cover (Reid et al. 1994). Relatively dry swales and surrounding upland vegetation furnish foraging habitat and could be used as refuges by King Rails during extreme flooding conditions (Anderson and Ohmart 1985).

King Rails have been observed arriving at the nesting grounds at Lake St. Clair in April (Haggeman, 2006) and the species' arrival on the nesting grounds is thought to be similar for other Ontario sites. Egg dates in Ontario range from 18 May to 17 July, but this information is based on relatively few nests (Peck and James 1983). Limited data from Ontario suggest an average clutch size of 8 to10 eggs (Peck and James 1983). Both parents incubate the eggs and the incubation period ranges from 21 to 24 days (Godfrey 1986; Meanley 1992).

Young are semi-precocial. Adults feed the young and lead them to good foraging areas (Meanley 1969). Parental care extends for five or six weeks after hatching in the northern portions of the species' range (Meanley 1969; Reid et al. 1994). No studies of fledgling survival have been conducted in North America.

King Rails feed largely on crustaceans and aquatic insects but also take some vertebrate prey and plant material (Meanley 1992). Crayfish are the principal food item in freshwater marshes in spring and summer, with beetles, fish, frogs, grasshoppers, crickets, and plants also being consumed (Reid 1989). Plant material constitutes another important food source during the

[2] Brood nest is a secondary nest built as an alternate place for parents to brood young once they have fledged from the nest.

winter months (Meanley 1956). It is possible that the distribution or size of King Rail populations may be in part limited by prey specialization (Anderson and Ohmart 1985). It is unknown if the King Rail experiences competition for prey items or nesting sites from other wetland bird species.

4. THREATS

4.1 Threat Assessment

Table 1. Threat Assessment Table.

Threat	Level of Concern[1]	Extent	Occurrence	Frequency	Severity[2]	Causal Certainty[3]
Habitat Loss or Degradation						
Housing development	High	Widespread	Current	Continuous	High	High
Conversion for agricultural uses	High	Widespread	Current	Continuous	High	High
Loss of wintering ground habitat	Unknown	Widespread	Current	Unknown	Unknown	Unknown
Invasive Species						
Invasive species (plants and animals)	High	Widespread	Current	Seasonal	High	High
Natural Processes or Activities						
Predation	High	Widespread	Current	Seasonal	High	Unknown
Potential Threat	**Level of Concern[1]**	**Extent**	**Occurrence**	**Frequency**	**Severity[2]**	**Causal Certainty[3]**
Disturbance or Harm						
Species surveys	Unknown	Local	Anticipated	Seasonal	Unknown	Unknown
Changes in Ecological Dynamics or Natural Processes						
Water levels	Unknown	Local	Current	Seasonal	Unknown	Unknown
Natural succession	Medium	Widespread	Current	Seasonal	High	Unknown
Burning marsh vegetation	Unknown	Local	Current	Seasonal	Unknown	Unknown
Pollution						
Industrial effluent	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown
Biological Resource Use						
Hunting and trapping on migration corridors and wintering grounds	Unknown	Local	Unknown	Seasonal	Unknown	Unknown

[1] *Level of Concern: signifies that managing the threat is of (high, medium or low) concern for the recovery of the species, consistent with the population and distribution objectives. This criterion considers the assessment of all the information in the table).*

[2] *Severity: reflects the population-level effect (High: very large population-level effect, Moderate, Low, Unknown).*

[3] *Causal certainty: reflects the degree of evidence that is known for the threat (High: available evidence strongly links the threat to stresses on population viability; Medium: there is a correlation between the threat and population viability e.g. expert opinion; Low: the threat is assumed or plausible).*

4.2 Description of Threats

Habitat loss and degradation

Housing development / Conversion for agricultural uses

Loss of wetland habitat is a serious threat to King Rails in Ontario. Historically, the most extensive King Rail habitat in Ontario was located in the southwestern portion of the province, where more than 80% of the wetlands have now been eliminated (Snell 1987; James 2000; Cadman et al. 2007; Zeran 2009). The rate of large-scale wetland loss in southern Ontario appears to have abated in recent years, but wetlands continue to be drained for housing development and/or conversion to agricultural uses. Since King Rail prefer large expanses of shallow-water marsh, incremental habitat fragmentation and degradation as a result of human disturbance remains a concern (Maynard and Wilcox 1996). Further, populations in smaller wetlands may be subject to higher predation rates than those occurring in larger wetlands (James 2000).

Loss of wintering ground habitat

Impacts on habitat in the wintering grounds may also pose problems. Wetlands in the Gulf coast states are under increasing human pressures, raising concerns about further habitat loss and degradation (Reid et al. 1994).

Invasive Species

Marshland invasions by the European subspecies of Common Reed (*Phragmites australis* ssp. *australis*), Purple Loosestrife (*Lythrum salicaria*), Reed canary grass (*Phalaris arundinacea*), Flowering Rush (*Butomus umbellatus*) and Hybrid cattail (*Typha* x *glauca*), are likely to alter and degrade King Rail habitat (Whitt et al 1999, COSEWIC 2000, Wilcox et al., 2003, Cooper 2008). Such invasions, combined with a lack of water level fluctuations, may lead to the formation of monospecific vegetation stands that decrease interspersion of water in wetland habitats and reduce the availability of prey items and nesting sites. For example, the decline of King Rails in Delaware is attributed to the replacement of cordgrass *(Spartina cynosuroides)* and bulrushes (*Scirpus americanus* and *S. olneyi)* by Common Reed (Eddleman et al. 1988).

In addition to invasive plant species, the presence of Mute Swans (*Cygnus olor*) and Common Carp (*Cyprinus carpio)* are likely to degrade King Rail habitat. The Mute Swan's extremely aggressive disposition, coupled with its voracious appetite, make it a strong competitor with substantial regional impacts on native species. They are known to regularly attack other species of waterfowl, as well as other wetland-dependent birds (Petrie 2002). They also maintain large territories and can force native species to nest and feed in less-preferred locations. Additionally, the Mute Swan's feeding behaviour often results in the destruction of native vegetation, and at high densities, can result in a substantial decline in the availability of aquatic vegetation (Petrie 2002). Common carp, on the other hand, are known to significantly reduce invertebrate prey available to a number of species of waterbirds (Gibbs and Melvin 1992). Their feeding

activity has severe impacts on wetland habitats because they uproot and destroy vegetation and increase the turbidity of the water, which can lead to declines in waterfowl and important native fish species. Invasive species are a widespread threat to King Rails and are expected to remain a key threat to the species and its habitats in the future.

Natural Processes or Activities

Predation

Predators such as Red Fox *(Vulpes vulpes)*, Raccoon *(Procyon lotor)*, Virginia Opossum (*Didelphis virginiana*), Snapping Turtles *(Chelydra serpentine)*, Northern Harrier (*Circus cyaneus)*, Great Horned Owl (*Bubo virginianus)*, American Crow *(Corvus brachyrhynchos)*, snakes and feral cats can be responsible for heavy losses of adult rails, young and eggs. Many species, including the King Rail, do not have defenses against such predators, and with the increase in habitat fragmentation have been required to live in smaller habitats, which increase their susceptibility to predation (Winter and Wallace 2006). Intense predation pressures may even offset the beneficial effects of habitat expansion and enhancement on rail recovery. In California, a local population of endangered Clapper Rails doubled in size only after the initiation/implementation of an intensive fox trapping program (Foin et al. 1997). It is unknown whether high predation rates are limiting the King Rail population in Ontario, although anecdotal information indicates that increased densities of mink (*Neovison vison*) coincided with decreased sightings of King Rails detected in marshes within Walpole Island First Nation in 1999 (Lang 2000).

Potential Threats

Disturbance or Harm

Species surveys

It is unknown whether single or repeated marsh bird surveys negatively impact the behaviour of King Rails in surveyed wetlands (i.e., surveys themselves may be a threat to the species). In particular, birdcall playbacks could cause a change in breeding or territorial behaviour, which may in turn affect nesting success. The impacts of the physical disturbances associated with surveys, such as trampling, canoe access, and accidental attraction of predators to nests, are unknown.

Changes in Ecological Dynamics or Natural Processes

Water levels

The King Rail uses a variety of habitats throughout its annual life cycle. A study from Missouri suggested that King Rails avoid water depths greater than 44 cm and strongly prefer water depths less than 25 cm (Reid 1989). The author also found that open mudflats with shallow water up to 7.5-cm deep were the primary habitat used during brood rearing, but that foraging sites prior to and after brood rearing had tall, dense vegetation with water up to 24.5 cm deep (Cooper 2008). This dependence on habitats associated with varying water levels suggests that changes to natural water level fluctuations could have detrimental effects on King Rails. Although changing water levels in the Great Lakes might benefit the King Rail, this variation could also have an impact on the amount of coastal wetland habitat available to the species

in unmanaged marshes. As water levels decrease, there is a corresponding increase in wetland habitat in some areas (as wetlands expand lakeward). However, these same decreasing water levels can lead to habitat loss in other areas of the Great Lakes (as the wetlands become isolated from the lake and dry up).

Shoreline structures and dykes often prevent coastal wetlands from expanding landward when water levels are high. This can impact on the amount and diversity of wetland habitat available to the King Rails at any one time. Additional research into the effects of water level variation on King Rail habitat is necessary to determine the King Rail's need for dynamism in water levels.

Natural succession
A decrease in interspersion of open water within wetland habitat, occurring through natural succession or from a decline in muskrat (*Ondatra zibethicus*) populations (whose presence can open up dense areas of cattails by providing channels), can limit the quality and quantity of habitat available to the King Rail.

Burning marsh vegetation
Burning of emergent marsh vegetation has been undertaken at some King Rail habitat sites. The impact of this is not well known (James 2000, Cooper 2008). It is uncertain whether the seasonal burning of emergent marsh vegetation decreases stem density, thereby opening up the marsh and increasing habitat for King Rail, or leads to a decrease in habitat during the early part of the breeding season, and therefore impacts on the breeding of the species in that area. It is also unknown if the timing of the burns has a negative or positive impact on King Rail habitat. Additionally, studies have shown that although burning Common Reed (*Phragmites australis ssp. australis*) decreases stem density in the short term, it also can to stimulate rhizome growth and ultimately increase stand size. More study is required to determine whether the burning of marsh vegetation is a threat or a benefit to King Rail populations and when/if such management should be undertaken.

Pollution

Industrial effluent
Land-use changes have increased the volumes of transported sediment, nutrients, and chemicals into some wetlands (Russell et al. 1995). High levels of toxins from industrial discharges and agricultural run-off in marshes can lead to toxicity during embryo or fetal development that may result in developmental (Lonzarich et al. 1992) or morphological defects. Toxins may also poison adult King Rails or significantly reduce the aquatic invertebrate community, reducing food supply (Reid et al. 1994).

Biological Resource Use

Hunting and trapping on migration corridors and wintering grounds
In some regions of the United States, humans continue to utilize the King Rail for sport hunting and food. Hunting of King Rails is permitted in 13 Gulf and Atlantic States, but the relative impacts of harvesting this species are not well documented (Reid et al. 1994). The harvest was estimated to be 300 King Rails in 2004 and 200 in 2005 (Cooper 2008). The hunting season

in the U.S. can be up to 70 days in length and is undertaken between September 1 and January 28th (Cooper 2008). This timing may affect some of the individuals within the Canadian population that migrate through and/or winter in the southern U.S. Hunting King Rails was a permitted activity historically in Canada but, it is no longer permitted under the *Migratory Birds Convention Act, 1994* (c.22) regulations. Concern has been raised in the U.S. about the impacts of hunting on the migration corridors and wintering grounds. The U.S. Fish and Wildlife Service (USFWS) recommends that hunting of King Rails where populations of concern migrate or winter be evaluated to determine if there is a negative impact on those populations (Cooper 2008).

5. POPULATION AND DISTRIBUTION OBJECTIVE

There is limited information on current King Rail populations in Canada, and a lack of confidence in the available data. Additionally, the current distribution of the King Rail in Ontario is relatively unknown. Therefore, the short-term objective is to maintain the current population of King Rail throughout its range in Canada. This objective addresses the primary criteria used in the COSEWIC status determination, which are that the population in Canada is very small and shows continued decline, and that there are few remaining habitat patches of sufficient size and quality to support the species. Moreover, King Rail is also endangered in those U.S. states adjacent to Canada. Longer term population and distribution objectives will be developed once more information is available.

As the small Canadian population of King Rail occurs at the northern part of its continental range, and the vast majority of its continental distribution and population occurs further south in the United States, it is important to note that population changes at the continental level may have a significant effect on recovery feasibility in Canada. As the continental population of King Rail is experiencing an ongoing downward population trend, its range may contract away from the current periphery, and individuals may immigrate towards the centre of the range. In such a case, despite best efforts described in this strategy to ensure that sufficient suitable habitat is available and key threats are mitigated, the number of King Rail in Canada may continue to decline.

6. BROAD STRATEGIES AND GENERAL APPROACHES TO MEET OBJECTIVES

6.1 Actions Already Completed or Currently Underway

Recovery activities that have already been undertaken fall into a number of different categories including: King Rail survey and monitoring, habitat survey and monitoring, communications/education/outreach, protection/management/stewardship, and coordination with the United States.

King Rail Surveys and Monitoring

- A draft King Rail Survey Protocol was established to collect information on King Rail, its habitat and wetland dependent birds. This protocol allowed for the inclusion of both traditional and local knowledge as well as technical review by bird experts. This protocol has been field tested in wetlands throughout King Rail range in Ontario (Canadian Wildlife Service 2010).
- Targeted King Rail surveys were conducted at St. Clair (2007 and 2008) and Prince Edward Point (2009), Long Point (2007 and 2008) and Big Creek (2007 and 2008) National Wildlife Areas (Environment Canada, Canadian Wildlife Service – Ontario, unpublished data). No King Rails were detected through these targeted surveys.
- Multi-species surveys for wetland dependent birds at risk were field-tested and evaluated in several Simcoe County wetlands. Species surveyed included King Rail, Least Bittern, Yellow Rail, and Black Tern (2000-2002). One King Rail was observed during these surveys in a coastal marsh along Georgian Bay (French and Bowles 2002).

Habitat Surveys and Monitoring

- Wetland plant ecology at King Rail occurrence sites has been investigated (Kozlovic 1998; Lang 2000; French and Bowles 2002; Gray Owl Environmental Inc. 2009).
- Habitat assessments have also been conducted as a part of the development of a national King Rail Protocol (Canadian Wildlife Service 2010)

Protection, Management, and Stewardship

- Wetlands adjacent to areas where King Rails have been observed in the Lake St. Clair area were restored.
- Methods for the management of invasive plants found at King Rail occurrence sites have been investigated.

Outreach, Education, and Communication

- A King Rail identification fact sheet was developed with input from marsh managers, landowners and birders. It was distributed to Ontario Breeding Bird Atlassers, Marsh Monitoring Program volunteers, non-government organizations and the general public.
- Rural and urban landowners were consulted on their knowledge and perception of species at risk (including King Rail), waterfowl, wetland values and function and current and proposed stewardship techniques.

International Coordination

- Canadian King Rail experts contributed to the development of a King Rail Conservation Plan as part of the USFWS “Focal Species Strategy for Migratory Birds”. In the United States, the USFWS King Rail Conservation Plan will guide future management and conservation of the King Rail.

6.2 Strategic Direction for Recovery

Table 2. Recovery Planning Table.

Threat or Limitation	Priority	Broad Strategy to Recovery	General Description of Research and Management Approaches
• All • Information gaps	High	King Rail Surveys and Monitoring	• Determine the distribution, population size, and population trends of the King Rail in Canada by reviewing existing records, conducting new targeted surveys and monitoring key populations once they have been identified.. • Determine home range and territory size • Determine effects of threats and potential threats, • Evaluate feasibility/appropriateness of completing a Population Viability Analysis
• Habitat loss and degradation • Information gaps	High	Habitat Surveys and Monitoring	• Conduct field surveys to identify characteristics and location of King Rail breeding habitat • Monitor availability of suitable breeding habitat
• Habitat loss and degradation • Invasive Species	High	Protection, Management, and Stewardship	• To the extent possible, protect habitat through existing plans, policies, tools and practices • Develop and implement new conservation, management and stewardship plans/tools as necessary • Assess impacts of management activities on King Rail and its habitat, and other species • Restore habitat if necessary and appropriate using the best available techniques • Determine the effects of various non-native species on King Rail habitat; Revise best management practices as necessary
• Habitat loss and degradation	High	Outreach, Education, and Communication	• Develop and deliver outreach products to landowners, wetland managers, and wetland users • Collaborate with existing wetland conservation programs
• Biological resource use • Information gaps	High	International Coordination	• Collaborate with United States and Mexico to identify and implement King Rail conservation and recovery (e.g., migratory routes, wintering grounds) • Communicate with USFWS about examination of King Rail hunting on migratory stopover and wintering sites

7. CRITICAL HABITAT

7.1 Identification of the Species' Critical Habitat

At this time, the information required to identify critical habitat for the King Rail is not available and further survey efforts are required to gather such information. In particular, due to its secretive nature and the small number of occurrences regularly documented in Ontario, it is difficult to locally identify marshes that are essential to the King Rail's persistence, breeding and recovery in Ontario.

Current geospatial information for this species is inadequate. During the second Ontario Breeding Bird Atlas, King Rails were recorded in 19 Atlas squares (each square being 10 by 10 km); however, none of these records were of confirmed breeding occurrences and only 8 were identified as probable breeding occurrences. Between 2007 and 2009 species-specific surveys conducted within 3 of the 8 probable breeding sites did not detect any King Rails. This lack of breeding and location data presently makes it impossible to identify critical habitat within Ontario. In order to identify critical habitat, locations of King Rail occurrences need to be confirmed.

Information about the King Rail's recent presence at sites known to house individuals historically, and the habitat/microhabitat characteristics and functions required by breeding King Rails is lacking, which prevents the identification of critical habitat at this time. Therefore, the identification of critical habitat for the King Rail will be completed, if possible, in an action plan following the activities and timelines outlined in the Schedule of Studies.

Information on King Rails on Walpole Island First Nation and their habitat is currently limited. The identification of critical habitat on Walplole Island First Nation, contingent on King Rail presence being confirmed on the First Nation lands, will be considered in consultation with the Walpole Island First Nation and may be described within a multi-species at risk action plan developed with the Walpole Island First Nation.

Important bio-physical characteristics that will be considered in the identification of critical habitat include:

- Confirmed presence of King Rails and breeding evidence;
- Presence of adequate amount of suitable habitat including:
    - shallow emergent marsh with interspersion of open water and vegetation, as well as dry/damp areas;
    - hummocky topography;
    - an appropriate range of water depths required for nesting and brood rearing;
    - water level fluctuation within managed impoundments.

7.2 Schedule of Studies to Identify Critical Habitat

The Schedule of Studies describes the additional survey work needed to determine the current population distribution and population strongholds for the species in Canada. It outlines activities, in order of priority, toward the incremental identification of critical habitat for King Rail. The results of the initial activities may necessitate modification of the order or nature of subsequent activities.

Table 3. Schedule of Studies.

Description of Activity	Rationale	Timeline
Conduct King Rail surveys to determine presence and location of potential breeding pairs across the Canadian range.	Identification of current King Rail occurrences, distribution, breeding and habitat information.	2016
Use existing databases and traditional and local knowledge to help identify bio-physical habitat/microhabitat features for King Rail.	Aid in the identification of known King Rail key characteristics of suitable and likely critical habitat.	2016
Determine criteria for identifying critical habitat.	Ensure confidence in method and data used to identify critical habitat.	2016
Apply criteria to available data and identify proposed critical habitat for King Rail.	Identification of proposed critical habitat to be incorporated into one or more action plans.	2016

8. MEASURING PROGRESS

The performance indicators presented below provide a way to define and measure progress toward achieving the population and distribution objectives. Specific progress towards implementing the recovery strategy will be measured against indicators outlined in subsequent action plans.

To measure progress, every five years, success of recovery strategy implementation will be measured against the following performance indicators:

- Having determined the distribution of the King Rail in Ontario by 2016 ;
- Having maintained the population of the King Rail throughout its range by 2016

9. STATEMENT ON ACTION PLANS

One or more action plans will be posted on the Species at Risk Public Registry by 2016. The action plan(s) may include an area-based, multi-species approach for some areas.

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APPENDIX A: EFFECTS ON THE ENVIRONMENT AND OTHER SPECIES

A strategic environmental assessment (SEA) is conducted on all SARA recovery planning documents, in accordance with the *Cabinet Directive on the Environmental Assessment of Policy, Plan and Program Proposals*. The purpose of a SEA is to incorporate environmental considerations into the development of public policies, plans, and program proposals to support environmentally sound decision-making.

Recovery planning is intended to benefit species at risk and biodiversity in general. However, it is recognized that strategies may also inadvertently lead to environmental effects beyond the intended benefits. The planning process based on national guidelines directly incorporates consideration of all environmental effects, with a particular focus on possible impacts upon non-target species or habitats. The results of the SEA are incorporated directly into the strategy itself, but are also summarized below in this statement.

While this recovery strategy will clearly benefit the environment by promoting the recovery of the King Rail, several potentially adverse effects were also considered. The strategy calls for habitat management, which could lead to a decrease in habitat for waterfowl and other species in some managed marshes. Conversely, wetland protection and management is expected to benefit a number of species including Spotted Turtle.

The needs of other wetland dependent species at risk, such as Least Bittern, Spotted Turtle, Lake Chubsucker, and Spotted Gar and their habitats will be considered during the recovery process. Once core breeding habitats of the King Rail are identified and management options assessed, any negative effects of implementation of this recovery strategy will be mitigated such that the benefits of King Rail recovery outweigh the adverse effects on other species and ecosystem function. Integrated and adaptive management practices will be emphasized and take into consideration an ecosystem approach to address the needs of all species at risk in the same habitat. Strategies for the King Rail are compatible with many of the approaches identified in draft Recovery Strategies for other species at risk including the Walpole Island Ecosystem Recovery Strategy (Bowles, 2005), Showy Goldenrod, Pink Milkwort, Small White Lady’s Slipper, and Eastern Prairie-fringed Orchid.

APPENDIX B: SUBNATIONAL RANKS FOR THE KING RAIL

Subnational ranks for the King Rail (NatureServe 2009)

S-Rank	**State/Province**
S1 – Critically Imperiled	Michigan, Missouri, Nebraska, Ohio
S1B – Critically Imperiled Breeder	Connecticut, Indiana, Kentucky, Minnesota, New York, Oklahoma, Pennsylvania, West Virginia, Wisconsin
S1B, S1N – Critically Imperiled Breeder, Critically Imperiled Non-breeder	Massachusetts, Rhode Island
S1B, S3N – Critically Imperiled Breeder, Vulnerable Non-breeder	Arkansas
S1S2B – Critically Imperiled to Imperiled Breeder	South Dakota
S1N – Critically Imperiled Non-breeder	Iowa
S1?N – Critically Imperiled Non-breeder (uncertain)	Maine
S2 – Imperiled	Delaware, Illinois, Tennessee
S2B – Imperiled Breeder	Ontario
S2B,S2N – Imperiled Breeder, Imperiled Non-breeder	Kansas
S2B, S3N – Imperiled Breeder, Vulnerable Non-breeder	Virginia
S2N – Imperiled Non-breeder	District of Columbia
S3B – Vulnerable Breeder	Texas
S3B, S3N – Vulnerable Breeder, Vulnerable Non-breeder	Mississippi, North Carolina
S3B,S4N – Vulnerable Breeder, Apparently Secure Non-breeder	Alabama
S3S4B, S2N – Vulnerable to Apparently Secure Breeder, Imperiled Non-breeder	Maryland
S3B, SNRN – Vulnerable Breeder, Not yet ranked as a Non-breeder	New Jersey
S4 – Apparently Secure	Louisiana
S4S5 – Apparently Secure to Secure	Georgia
SHB – Historic Breeder	New Hampshire
SNR – Not yet ranked	Florida, South Carolina