COSEWIC
Assessment and Status Report

on the

Yellow Rail
Coturnicops noveboracensis

in Canada

SPECIAL CONCERN
2001

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 – November 2001

Common name
Yellow Rail

Scientific name
Coturnicops noveboracensis

Status
Special Concern

Reason for designation
Relatively small population, declining because of continuing habitat losses, especially on the wintering grounds. Further decline could go undetected because of the secretive nature of the species.

Occurrence
Northwest Territories, British Columbia, Alberta, Saskatchewan, Manitoba, Ontario, Quebec, New Brunswick

Status history
Designated Special Concern in April 1999. Status re-examined and confirmed in November 2001. Last assessment based on an existing status report.

COSEWIC
Executive Summary
from the 1999 Status Report

Yellow Rail
Coturnicops noveboracensis

Description

The Yellow Rail (*Coturnicops noveboracensis*) resembles a week-old chicken. Its minute size, buffy plumage with black and white markings, very short tail, light eyebrow, and small bill are reminiscent of a quail; hence its genus name *Coturnicops*, meaning "that looks like a quail". It is one of the smallest rails in the world, weighing only 60 g (females weigh slightly less) and measuring 15-19 cm, only slightly longer than a House Sparrow (*Passer domesticus*). The tips of the secondary remiges are white, forming a white wing patch that is visible in flight. As in all rails, the body is laterally compressed, and the long toes are used to maneuver through the aquatic vegetation.

Adult and young Yellow Rails can sometimes be confused with Soras (*Porzana carolina*), and the two species' breeding ranges overlap considerably in Canada. However, adult Soras have a black face and throat and a grey breast. Also, adults and young have longitudinal stripes on the back, in contrast to the Yellow Rail's transversal stripes. In addition, the absence of a white wing patch in adult and young Soras is an excellent way of distinguishing the two species in flight.

Distribution

Except for a very small area in Mexico where a few birds may still breed, the Yellow Rail breeds exclusively in Canada and the northern U.S. It winters near the east coast from North Carolina to eastern Texas. Its imperfectly known breeding distribution seems to be quite local and disjunct.

Population size and trends

According to the authors of the report, there might be roughly a few thousand pairs of Yellow Rails breeding in the Hudson/James Bay region, and another roughly 2,000 pairs in the rest of Canada. The U.S. may have about 600-750 breeding pairs. Habitat has declined and is still declining throughout its southern breeding range, albeit more slowly than formerly. It may also be declining in certain parts of the Hudson/James Bay region as a result of habitat degradation by Snow Geese (*Chen caerulescens*). The relatively small wintering range is also declining.

Habitat

Nesting Yellow Rails are typically associated with marshes dominated by sedges, true grasses, and rushes, where there is little or no standing water (generally 0-12 cm) and where the substrate remains saturated throughout the summer. They can be found in damp fields and meadows, on the floodplains of rivers and streams, in the herbaceous vegetation of bogs, and at the upper levels (drier margins) of estuarine and salt marshes. Nesting habitats usually have a dry mat of dead vegetation from previous growing seasons. A greater diversity of habitat types is used during migration and winter than during the breeding season. In winter, Yellow Rails are known to use coastal wetlands and rice fields.

General biology

Yellow Rails probably start breeding when they are a year old. Pair formation likely occurs on the breeding grounds. Males may breed successively with two or more females, at least in captivity. When several pairs breed in the same marsh, activity areas of nesting birds overlap somewhat.

Females have only one brood per season, although females that do not hatch their first clutch may renest. Both males and females share the first stage of nest building, making crude scrapes in the vegetation. The nest usually rests on the ground or just a few centimeters above it, and is typically covered with a concealing canopy of dead vegetation. The 7-10 eggs are laid a day apart. Incubation, carried out by the female alone, usually begins when laying is complete and continues for 17-18 days. Hatching is synchronous, and within a few hours the semiprecocial young can stand. Hatching success is likely very high. Two days after hatching, the entire brood follows the hen away from the nest. The chicks begin to feed themselves at about five days, are no longer brooded at three weeks, and fledge by 35 days. Age at independence is unknown.

During daylight hours the Yellow Rail usually walks or runs, but almost never flies unless disturbed. It is particularly difficult to see upon approach, because, like other rails of its genus it usually remains stationary in the vegetation rather than fleeing as do other rails. Males call much more often and regularly at night than during daytime. Yellow Rail adults eat invertebrates and seeds. The diet of chicks is unknown.

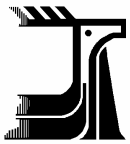
Limiting factors

Wetland loss by agriculture and human development is unquestionably the greatest threat to the Yellow Rail, both in Canada and in the U.S., and there is no doubt that the population has been affected by habitat loss and degradation. Habitat loss is occurring even in the last pristine stronghold, the Hudson/James Bay region. However, it is unclear how much of a problem this currently poses to Yellow Rails, and there is uncertainty regarding the future dynamics of the enormous Snow Goose population.

Habitat loss is also a concern regarding the smaller U.S. breeding population. The status of habitat elsewhere in the U.S. is also important because the entire global population migrates through that country. However, the most important limiting factor for Yellow Rails, regardless of where they breed, is habitat loss on the wintering grounds, which has been so extensive that the wintering range may no longer be contiguous. In Texas and elsewhere in the U.S. wintering grounds, the species seems to be largely restricted to a narrow band of coastline, and coastal marshes throughout the Gulf states are threatened. The size of the known wintering range is no more than 7% the size of the breeding range.

Protection

The Yellow Rail has concern status in each of the six U.S. states in which it is known to breed. In addition, it is listed as a Migratory Nongame Bird of Special Management Concern, which identifies migratory non-game birds that, without additional conservation action, are likely to become candidates for listing under the U.S. Endangered Species Act.



COSEWIC MANDATE

The Committee on the Status of Endangered Wildlife in Canada (COSEWIC) determines the national status of wild species, subspecies, varieties, and nationally significant populations that are considered to be at risk in Canada. Designations are made on all native species for the following taxonomic groups: mammals, birds, reptiles, amphibians, fish, lepidopterans, molluscs, vascular plants, lichens, and mosses.

COSEWIC MEMBERSHIP

COSEWIC comprises representatives from each provincial and territorial government wildlife agency, four federal agencies (Canadian Wildlife Service, Parks Canada Agency, Department of Fisheries and Oceans, and the Federal Biosystematic Partnership), three nonjurisdictional members and the co-chairs of the species specialist groups. The committee meets to consider status reports on candidate species.

DEFINITIONS

Species	Any indigenous species, subspecies, variety, or geographically defined population of wild fauna and flora.
Extinct (X)	A species that no longer exists.
Extirpated (XT)	A species no longer existing in the wild in Canada, but occurring elsewhere.
Endangered (E)	A species facing imminent extirpation or extinction.
Threatened (T)	A species likely to become endangered if limiting factors are not reversed.
Special Concern (SC)*	A species of special concern because of characteristics that make it particularly sensitive to human activities or natural events.
Not at Risk (NAR)**	A species that has been evaluated and found to be not at risk.
Data Deficient (DD)***	A species for which there is insufficient scientific information to support status designation.

* 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.

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.

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Canada

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

COSEWIC Status Report

on the

Yellow Rail

Coturnicops noveboracensis

in Canada

Robert Alvo
Michel Robert

1999

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SPECIES INFORMATION

DISTRIBUTION

Global distribution

Except for a very small area in Mexico where a few birds may still breed, the Yellow Rail breeds exclusively in Canada and the northern U.S., with Canada comprising about 90% of its breeding range (3,266,000 of 3,641,000 km^2; Figure 1). Its imperfectly known breeding distribution seems to be quite local and disjunct (Clements 1991, Bookhout 1995).

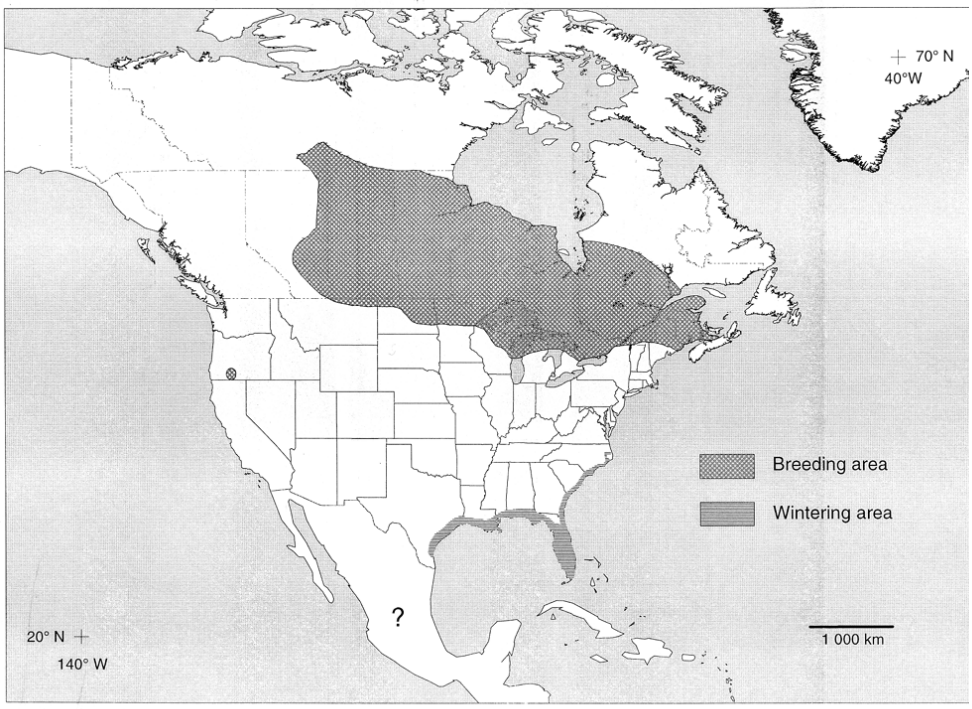

Figure 1. Breeding and wintering areas of the Yellow Rail (adapted from Bookhout 1995).

Some taxonomic works (e.g. Dickerman 1971) recognized two subspecies of Yellow Rail: *Coturnicops noveboracensis noveboracensis*, which breeds in the northern U.S. and southern Canada and winters in the southern U.S., and *C. n. goldmani*, which has been found only in San Pedro Techuchulco and Lerma, Valley of Toluca, State of México, Mexico (Blake 1953, Ripley 1977, Howell and Webb 1995). Unfortunately, the darker Mexican subspecies (Dickerman 1971) has not been reported since 1964, and much of the area where it was observed in the past has been drained since that time (Bookhout 1995, Howell and Webb 1995). However, according to Howell and Webb (1995), it could occur elsewhere in the Rio Lerma drainage west to Lake Chapala, Mexico.

United States

Breeding

The U.S. breeding distribution is largely limited to the north-central states (Figure 1), where the southern limit of its range crosses north-eastern Montana, central North Dakota, northern Minnesota, northern Wisconsin, and northern Michigan (Coffin and Pfannmuller 1988, Bookhout 1995). A small population was recently rediscovered in south-central Oregon, which constitutes the first proof of nesting in the western U.S. since 1950 (Stern *et al.,* 1993), and it is possible that Yellow Rails breed in other areas in the western U.S. (K. Popper, pers. comm.). There have been four records during the breeding season in locations scattered over the southeast half of South Dakota, and breeding may occur in the northern half of the state because breeding habitat seems to occur there (E. Dowd Stukel, pers. comm.). Yellow Rails may breed in Wyoming (D. Wile, pers. comm.). It is highly likely that they breed in Maine, despite their apparent low numbers and lack of confirmation to date (Gibbs *et al.,* 1991; T. Hodgman, pers. comm.). The species may breed very locally elsewhere in the northeastern U.S., such as in northern New Hampshire, Vermont and New York (Gibbs *et al.,* 1991).

Elsewhere it formerly nested in east-central California, central Ohio, and northern Illinois (Dawson 1921, Dunn 1988, Roberson 1993, Bookhout 1995, AOU 1998, The Nature Conservancy 1998). The last confirmed summer occurrences of the species in these states date from 1990 (D. McGriff, pers. comm.), 1944 (Peterjohn 1989), and 1984 (J. Herkert, pers. comm.), respectively. The recent California date and the observation of one bird on 15 July 1985 at Mono Lake County Park, which is within the state's former nesting area (D. McGriff, pers. comm.), suggest that breeding may still occur in California. The species is now considered a rare migrant and accidental summer visitor in Ohio (Thompson 1994), through which it undoubtedly passes during migration, and where it may have been a very local and rare summer resident at several extensive sedge meadows (Peterjohn 1989).

The last confirmed breeding record in Illinois was a nest with eggs and an adult taken before 1876. Since that time there have been very few records, mostly during migration. The most recent confirmed observation was made on 22 May, 1984. Virtually all observations in the state are sightings of birds flushed by observers wading through marshes, or by machines mowing in Greater Prairie-Chicken (*Tympanuchus cupido*) sanctuaries. People have been on the lookout for Yellow Rails in Illinois because it has been on the state's Endangered list, and tapes have been played in appropriate habitat to elicit a response from this species. There is an unconfirmed 9 June, 1998 record. The confirmed nesting record from the last century was from the north-central part of the state and may have been a case of accidental breeding (J. Herkert, pers. comm.).

The most recent observation of a Yellow Rail in South Dakota was made 11 May, 1976. This bird may have been a migrant. However, there was a 24 June, 1948 record, which would have been during the breeding season (E. Dowd Stukel, pers. comm.).

The presence of Yellow Rails is accidental in Washington and Idaho (Tweit and Skriletz 1996, The Nature Conservancy 1998). Historical reports (e.g. Knight 1908, Bent 1926, Harris 1945) suggest that the species bred in several states in the northeast, but most of these records (if not all) have been disputed or are poorly documented (Gibbs *et al.,* 1991). Even though Audubon (*in* Bookhout 1995) reported (in 1842) that the "*Yellow-breasted Rail is a constant resident in the Peninsula of the Floridas, as well as in the lower parts of Louisiana, where I have found it in all seasons*", and also stated that it began breeding on the Florida Keys and around New Orleans (Louisiana) in March, there has apparently never been any subsequent confirmation (or any information) of breeding by the Yellow Rail at these latitudes (Bookout 1995). In our view, it is possible that the "Yellow-breasted Rail" that Audubon referred to did not correspond to the Yellow Rail (or at least not to the nominal sub-species).

The Yellow Rail is thus distributed very locally in the U.S. during the breeding season. There seem to be very few breeding sites that are consistently used by many individuals. The best known are in Oregon (Wood River Valley, Klamath Marsh National Wildlife Refuge, Sycan Marsh, and Big Marsh), North Dakota (Kidder County), Minnesota (McGregor Marsh), and Michigan (Seney National Wildlife Refuge).

Wintering

The Yellow Rail winters near the coast in the southeastern U.S. and the Gulf of Mexico, from North Carolina to eastern Texas (Figure 1), although most birds located in fall and winter are detected in rice fields in southwestern Louisiana and eastern Texas, as well as at the Anahuac National Wildlife Refuge, Texas (Oberholser 1938, Cardiff and Smalley 1989, Robert 1997). It is a fairly common winter visitor in the *Spartina* marshes and tall-grass pastures along the coast of Texas, and in the rice fields farther inland (Holt 1993). Based on birders' observations, it seems to winter in a narrow band (within about 48 km) along the upper and central coast of Texas, but it may use rice fields and wetlands farther inland prior to and during migration (K. Mizell and K. Arnold, pers. comm., Cardiff and Smalley 1989). The Yellow Rail is apparently common in salt marshes during March and April at the Brazoria-San Bernard National Wildlife Refuge Complex on the mid-Texas coast (C. Cordes, pers. comm.).

In the early part of this century, it was apparently a rather rare winter resident in Alabama, but was fairly common at times during migration (Howell 1924). In neighbouring Florida, it is a very rare but regular winter visitor, but it is unknown from the Keys (Robertson and Woolfenden 1992, Stevenson and Anderson 1994). The only site specifically mentioned for observing Yellow Rails in a recent birdfinding guide for Florida (Pranty 1996) is the Apalachicola National Forest in the Panhandle; except for migrants that struck television towers, the great majority of reports occurred near the coast (Stevenson and Anderson 1994).

The Yellow Rail is a rare winter visitor to wet old field habitats in the Coastal Plain of South Carolina (Carter 1993). It has also been found farther inland as far as Richland County, at the upper edge of the coastal plain. Much apparently suitable

coastal habitat is devoid of the bird. It may be more widespread than generally realized, although it is nonetheless suspected to be uncommon in South Carolina in winter and migration (J. Cely, pers. comm.). It is a rare wintering bird in coastal North Carolina (Pearson *et al.,* 1942), where there are about two reports a year. Most birds are reported in brackish marshes and wet broomsedge fields, within about 15 km from the coast (H. LeGrand, pers. comm.).

A few individuals have wintered on the west coast from Oregon south to California (Savaloja 1981, Dunn 1988, Roberson 1993, AOU 1998). Autumn and winter records from the West Indies, including Cuba, are exceptional (Barrows 1912, Bent 1926, Ripley 1977, Raffaele *et al.,* 1998).

Canada

The known Canadian distribution includes the Mackenzie District of the Northwest Territories, eastern Alberta, central Saskatchewan, most of Manitoba and Ontario, the southern half of Québec, New Brunswick, and northern Nova Scotia (Godfrey 1986, Erskine 1992). The species does not winter in Canada.

Yukon

The Yellow Rail is not known to occur in the Yukon (Yukon Renewable Resources, Yukon Birds: Field Checklist).

Northwest Territories

It breeds very locally in the southern Mackenzie District in the portion lying between Great Slave Lake and the Alberta border (Godfrey 1986).

British Columbia

Until recently, the Yellow Rail was considered hypothetical (Campbell *et al.,* 1990). Although breeding has never been confirmed, there have been recent observations in the breeding season (e.g. Taylor 1993, Sherrington 1994, Bowling 1997) suggesting that there may be a small number of locally distributed birds in the Peace River region in the northeast, and also possibly in the Kootenay region in the southeastern portion of the province (W. Campbell, pers. comm.). Nevertheless, its breeding status is still accidental (S. Cannings, pers. comm.).

Alberta

It breeds in the eastern half of Alberta from the Lake Athabasca region south at least to Ribstone Creek and west to Cochrane where it nested until the 1950s (Salt and Salt 1976, Godfrey 1986). Except for one 10 km x 10 km square in the northeast part of the province, it was detected only in a few squares in east-central Alberta between 1987 and 1991 (Semenchuk 1992). Rand (1948) did not mention the Yellow Rail in his

summary of the status of the birds of southern Alberta, which he considered to be the portion of the province south of a line connecting the Red Deer River and Banff. The species' centre of abundance in the province is the east-central portion (Pinel *et al.,* 1991, McGillivray and Semenchuk 1998).

Saskatchewan

The Yellow Rail occurs in extensive fens and sedge marshes, which are scarce in Saskatchewan. It is therefore an uncommon and local summer resident over its range, which extends from the fringes of the Southern Boreal Region south through the Parklands. Records from the Grasslands are rare. It is considered an irregular summer resident in east-central Saskatchewan, from Kelvington to Kelsey Trail (Hooper 1992).

Manitoba

It nests locally throughout Manitoba from Churchill south to Brandon (Lane 1962, Salt and Salt 1976, Chartier 1994). It has long been known from Churchill (Fuller 1938), and indications of breeding there include the capture of four males with enlarged testes in late July 1937 (Fuller 1938) and a female with a large brood patch on 21 July 1964 (J. Jehl, pers. comm.). Possibly the only breeding site in the Grasslands Region is Douglas Marsh (near Brandon), which is close to the Trans Canada Highway and is easily accessible by foot (Bennett 1981, Cuthbert *et al.,* 1990, R. Alvo, pers. obs.). The species is less common in southeastern Manitoba than elsewhere in southern Manitoba (Cleveland *et al.,* 1995).

Ontario

The only area of the province where it occurs regularly and in substantial numbers is along the entire Ontario portion of the west coast of Hudson/James Bay (Austen *et al.,* 1994). Breeding has been confirmed at Attawapiskat, Cape Henrietta Maria (Speirs 1985) and North Point (Elliot and Morrison 1979), and the species was "common" at Winisk, Moosonee, and Fort Severn (Speirs 1985). It was found during the atlas period in 11 of 12 blocks of 100 km x 100 km in 1981-1985 (Cadman *et al.,* 1987) and there are other records from the region.

There have been a few records from the eastern Lake Superior area, and a bird was reported from Big Trout Lake in the Kenora District in 1984 (Austen *et al.,* 1994). While seemingly rather isolated in Ontario, the Rainy River population is actually contiguous with the northern Minnesota population (the U.S. stronghold). Yellow Rails are widespread in Minnesota's northwest, which is adjacent to the Rainy River area. They "*seem quite partial to the Highway 72 vicinity*" in northern Lake of the Woods County, Minnesota (Eckert 1983). We know of no-one who has searched the small portion of Ontario located on the west side of Lake of the Woods, but the species has been found within 5 km of Ontario at Indian Bay (Manitoba), which is accessible by land only from the Manitoba side.

Given the proximity of known Yellow Rail range in northern Michigan (e.g. Seney National Wildlife Refuge) and northern Wisconsin, along with reports of Yellow Rails from Quetico Provincial Park (D. Elder, pers. comm.) and a recent observation on western Manitoulin Island (Cadman *et al.,* 1987), the entire northern coast of the Great Lakes from southern Georgian Bay (only 50 km from Holland Marsh) to the Manitoba/Ontario border could potentially have Yellow Rails. Numerous large sedge meadows occur on western Manitoulin Island (J. Jones, pers. com.).

In southern Ontario, the Yellow Rail has been recorded sporadically in summer at a few widely scattered marshes (present in only six of 1824 atlas squares (Cadman *et al.,* 1987)), only two of which have recent breeding evidence – Richmond Fen, in the Ottawa region, and Holland Marsh, along the south shore of Lake Simcoe (Sankey 1987, Goodwin 1992, Page and Cadman 1994). Birds were heard during three consecutive years after 1991 in the Carden Plain, north of Toronto, but not in 1997 or 1998.

Québec

The Québec stronghold is probably along James Bay, where it has been reported in various marshes from Cabbage-Willows Bay (in the southern part of Rupert Bay) north to Chisasibi (formerly Fort-George) (Todd 1963, Consortium Gauthier & Guillemette-GREBE 1992a). In southern Québec, however, it was reported in only 14 of 2464 (0.6%) 10 km x 10 km atlas squares visited between 1984 and 1989 (Gauthier and Aubry 1996). Almost all the summer records are from only a few locations along the St. Lawrence River. Breeding has been confirmed only at Coin-du-Banc (on the Gaspé Peninsula) and Ile aux Grues (in the St. Lawrence estuary) (Terrill 1943, Robert *et al.,* 1995, Robert and Laporte 1997). However, it has been observed and may breed at a few other sites, all of which (except for Saint-Fulgence on the Saguenay River where few individuals have been found over the years) are located along the St. Lawrence River. A number of these sites are occupied irregularly and/or during migration (Robert *et al.,* 1995).

There are a few records from Québec's interior (David 1980, Cyr and Larivée 1995, Robert *et al.,* 1995). Only the Abitibi region has reasonably good breeding evidence. Birds have been heard, and one specimen was collected, at La Ferme near Amos in the 1950s (Father C. Larose, pers. comm.). Birds were heard at Marais Antoine in 1984, 1985, 1995, 1996 and 1998 (Robert *et al.,* 1995; M. Robert, pers. obs.), and at the Marais Maine in 1996, in both cases in potential breeding habitat (M. Robert, pers. obs., van de Walle 1997). It is thus considered an exceptional breeder in that region (van de Walle 1997). Breeding may occur in fens in the province's vast interior, but recent surveys for the species in half a dozen of them have not borne fruit (M. Robert, pers. obs.).

New Brunswick

A nest with eggs taken near Milltown in 1881 is the only proven breeding in the Maritimes (Erskine 1992). The only site where it is known to occur regularly is Grand Lake Meadows, in the upper estuary of the St. John River, southeast of Fredericton. The species' presence in the Midgic and Jolicure marshes near Sackville in many summers since 1949 also suggests breeding there (Erskine 1992).

Nova Scotia

Tufts (1961) considered the Yellow Rail a very rare summer resident in Nova Scotia. Amherst Point is apparently the only locality where Yellow Rails were heard in recent (1986 and 1989) years (Erskine 1992).

Prince Edward Island

The Yellow Rail is not known to occur in Prince Edward Island (Anonymous 1991, Erskine 1992).

Newfoundland

The Yellow Rail was not mentioned in Montevecchi and Tuck's (1987) treatise on the birds of Newfoundland, not even as a vagrant, and there have been no reports since then (W.A. Montevecchi, pers. comm.). It is casual in Labrador, where it has been observed at Hamilton Inlet (Godfrey 1986).

PROTECTION

Status designations and ranks for the Yellow Rail, at the global, national and sub-national levels, are given in Table 1.

Global

The Yellow Rail is not listed by the International Union for the Conservation of Nature and Natural Resources (IUCN), although the closely related Swinhoe's Rail (*Coturnicops exquisitus*) of Asia is considered Vulnerable (IUCN 1996). Some authors (e.g. Ripley 1977, Bookhout 1995) consider the Swinhoe's Rail and the Yellow Rail the same species, while others consider them part of a holarctic superspecies (Olson 1973). The Nature Conservancy has expressed some concern for the Yellow Rail's long-term global status by ranking it G4 (The Nature Conservancy 1998).

United States

The Yellow Rail is listed as a Migratory Nongame Bird of Special Management Concern, which identifies migratory non-game birds that, without additional conservation action, are likely to become candidates for listing under the U.S. *Endangered Species Act*. This concern is based on its dependence on vulnerable or restricted habitats (USFWS 1995). It has concern status at the state level in all six states where it is known to breed (i.e., Oregon, Montana, North Dakota, Minnesota, Wisconsin, and Michigan), as well as in Idaho, South Dakota and Illinois (Table 1). It will likely be removed from the Endangered list in Illinois because it has not been found there in recent years during the breeding season, except for an unconfirmed 1998 record (J. Herkert, pers. comm.). It is ranked N3B,N4N for the U.S., meaning that it is rare or uncommon as a breeder, but as a non-breeder it is widespread, abundant, and apparently secure, albeit with concern for the long-term (The Nature Conservancy 1998).

Hunting this species is illegal throughout the U.S., but hunting of other rail species is legal in a number of states (J. Serie, pers. comm.).

Table 1. Conservation designations for the Yellow Rail.

Scale	System or Agency[1]	Designation or Rank[2]	Source[3]	Comments
World	IUCN[1]	Not listed, but Swinhoe's Rail is vulnerable.	IUCN 1996	Swinhoe's Rail and Yellow Rail sometimes considered conspecific.
World	The Nature Conservancy Global Rank	G4	TNC 1998	Apparently secure but of long-term concern.
United States	U.S. Endangered Species Act	Not listed	TNC 1998	
United States	USFWS	Migratory Nongame Bird of Special Management Concern	USFWS	Could become a candidate for listing under the U.S. ESA.
United States	The Nature Conservancy	N3B,N4N	TNC 1998	See text.
BREEDING (U.S.)				
Washington	NHP	SA	J. Fleckenstein	
Oregon	NHP	S1	K. Popper	Small population size and limited amount of protected and acceptable habitat available.
Oregon	State	Sensitive Critical	K. Popper	
Oregon	Forest Service	Sensitive	K. Popper	
Idaho	NHP	SA	C. Harris	Only two records.
Idaho	State	Protected non-game species.	C. Harris	
Montana	NHP	S1	P. Hendricks	
Montana	State	Migratory bird.	P. Hendricks	Has state legal status under The Non-game and Endangered Species Conservation Act.
Wyoming	NHP	SU	M. Neighbours	Six confirmed sightings, including one indicating breeding behaviour, near Jackson, on the National Elk Refuge, in 1998.
North Dakota	NHP	S2	TNC 1998	
North Dakota	State	Threatened	TNC 1998	
South Dakota	NHP	SU	E. Dowd Stukel	No nesting documented; a few scattered breeding season records.
Minnesota	NHP	S3	R. Baker	
Minnesota	State	Special Concern	R. Baker	Legal status, but no formal protection. Could be removed, because is more common than once thought.
Wisconsin	NHP	S1	B. Smith	Very few breeding records in uncommon habitat.

Table 1. Conservation designations for the Yellow Rail.				
Scale	**System or Agency[1]**	**Designation or Rank[2]**	**Source[3]**	**Comments**
Wisconsin	State	Threatened	B. Smith	Few occurrences, limited potential habitat.
Illinois	NHP	SH	J. Herkert	
Illinois	State	Listed Endangered	J. Herkert	Will likely be removed (see text).
Michigan	NHP	S1S2	J. Hayward	
Michigan	State	Threatened	J. Hayward	
Ohio	TNC	SX	TNC 1998	
Maine	NHP	SP	T. Hodgman	
Maine	State	Special Concern	T. Hodgman	Additional data may lead to Threatened status.
WINTERING (U.S.)				
Texas	NHP	S3	D. Scott	
Louisiana	NHP	Unranked	TNC 1998	
Mississippi	NHP	S2	TNC 1998	
Alabama	NHP	SZ	J. Johnson	Uncommon winter resident, with only 11 records.
Florida	NHP	SZ	K. Nesmith	
Georgia	NHP	Unranked	TNC 1998	
South Carolina	NHP	Unranked	J. Cely	Uncommon
North Carolina	NHP	S2	TNC 1998	
BREEDING AND/OR WINTERING (U.S)				
California	NHP	S1S2	D. McGriff	Used to breed, very secretive, and few or no recent surveys.
California	State	Special Concern	D. McGriff	Administrative designation (not related to state Endangered Species Act); thought to be declining.
BREEDING STATUS (CANADA)				
Canada	Dunn (1997)	High concern, and very high Canadian supervisory responsibility score		At least 90% of global range is in Canada.
Yukon	N/A	N/A		No records.
NWT	No CDC	N/A		
British Columbia	CDC	SA	S. Cannings	Not known to breed.
Alberta	CDC	S2S3	J. Rintoul	
Alberta	Alberta's Wildlife Act	Undetermined	Alberta Environmental Protection 1996	Not enough information
Saskatchewan	CDC	S3	J. Keith	
Manitoba	CDC	S4	J. Duncan	Consensus of 33 reviewers.
Ontario	CDC	S3S4	G. Van Drunen	

Table 1. Conservation designations for the Yellow Rail.				
Scale	**System or Agency[1]**	**Designation or Rank[2]**	**Source[3]**	**Comments**
Ontario	Austen *et al*. 1994	Endangered (southern O.) Insufficient information (northern O.)	Austen *et al*. 1994	
Québec	Loi sur les espèces menacées	Likely to be designated	Beaulieu 1992	
Québec	CDC	S2		
Québec	Robert 1989	Vulnerable	Robert 1989	
New Brunswick	CDC	Unranked	S. Gerriets	
Nova Scotia	CDC	Unranked	S. Gerriets	
PEI	N/A	N/A		No records.
Newfoundland and Labrador	N/A	N/A		Not known to breed.

1. IUCN – International Union for the Conservation of Nature and Natural Resources.
   NHP- Natural Heritage Program
   CDC- Conservation Data Centre
2. Brief definitions of SRANKs (state or subnational conservation ranks) using The Nature Conservancy system. More detailed definitions are available by contacting any Conservation Data Centre (Canada) or Natural Heritage Program (U.S.).

   S1 = Critically imperiled.
   S2 = Imperiled.
   S3 = Rare or uncommon.
   S4 = Widespread, abundant, and apparently secure, but with concern for the long-term.
   S5 = Demonstrably widespread, abundant, and secure.
   S#S# = Range rank, indicating range of uncertainty.
   S? = Unranked
   SU = Unrankable
   SE = Exotic
   SA = Accidental
   SZ = Zero occurrences
   SP = Potential
   SR = Reported
   SRF = Reported falsely
   SH = Historical
   SX = Extinct
   HYB = Hybrid
   SSYN = Synonym

   B = Breeding status; N = Non-Breeding status
   For the purpose of simplification, the breeding status (B or N) has been deleted (e.g. S1B becomes S1, and S2N becomes S2).

   Qualifiers:
   ? = Inexact or uncertain; C = Captive or cultivated only

3. References to people in the Information Source column are personal communications.

Canada

The Yellow Rail is protected under the *Migratory Birds Convention Act* and accompanying regulations pertaining to hunting (Government of Canada 1989, Canadian Wildlife Service 1991). It is illegal to hunt rails anywhere in Canada, except in Ontario and in the Yukon. The bag and possession limits (all rails combined) in Ontario are 10 and 20, respectively (Canadian Wildlife Service 1998).

The Yellow Rail is considered a high concern species in Canada and a species with a very high Canadian supervisory responsibility score, reflecting the high proportion (about 90%; Figure 1) of its global range in Canada (Dunn 1997).

Northwest Territories

A new Northwest Territories endangered species legislation will allow for the protection of species at risk. For the time being, the territorial government relies on the COSEWIC list (L. Self, S. Carrière, pers. comm.). The Yellow Rail has no SRANK (see Table 1, footnote 2, for definitions of SRANKs; Figure 2).

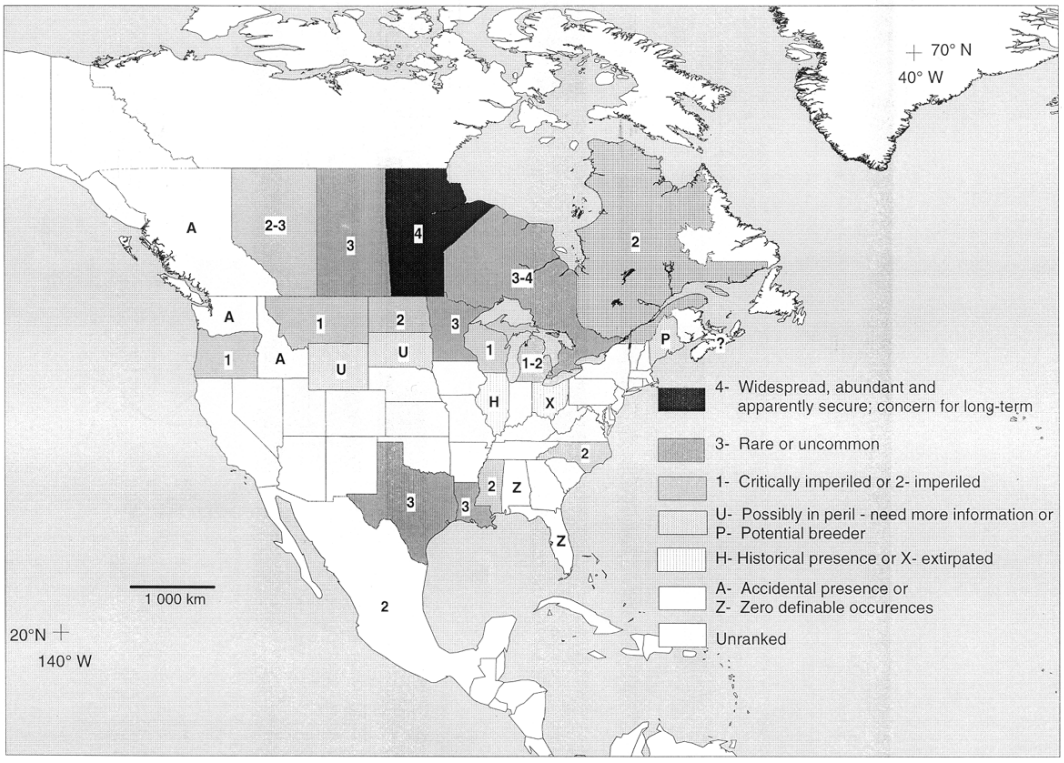

Figure 2. SRANKS or the Yellow Rail in Canada and the U.S., and NRANK for Mexico. (The Nature Conservancy 1998).

British Columbia

This species is on the Yellow list (S. Cannings, pers. comm.), which includes indigenous taxa that are not considered to be at risk in British Columbia. Because it has not been determined to be present consistently, in which case it would be ranked S1, it is still ranked SA (S. Cannings, pers. comm.).

Alberta

The Alberta government has designated 11 species as Endangered or Threatened under *Alberta's Wildlife Act*, but the Yellow Rail is not one of them. Its status in Alberta is “undetermined” because of insufficient information (Alberta Environmental Protection 1996). It is ranked S2S3B (J. Rintoul, pers. comm.).

Saskatchewan

Part 5 of the *Saskatchewan Wildlife Act, "Protection of Wild Species at Risk"*, was proclaimed during the summer of 1997. No species are designated yet. Seven animal species are currently being considered for designation, but the Yellow Rail is not one of them. It is ranked S3 (J. Keith, pers. comm.).

Manitoba

The Endangered Species Act received royal assent on March 1990. Under this Act, 23 animal and species are listed as Endangered, Threatened or Extirpated; the Yellow Rail is not listed. It is ranked S4B,SZN (Duncan 1996). While it was estimated that there are likely more than 100 locations in Manitoba with suitable habitat, its presence and/or breeding has been documented at only a few of these (J. Duncan, unpublished data).

Ontario

Twenty-four species are currently listed in regulation under Ontario's Endangered Species Act (I. Bowman, pers. comm.), but the Yellow Rail is not among them. It is ranked S3S4 (G. Van Drunen, pers. comm.). An Ontario status report recommended “Endangered” status for southern Ontario, and concluded that there was insufficient information for northern Ontario (Page and Cadman 1994, Austen *et al.,* 1994).

Québec

No animal species have yet been designated under Québec's *Loi sur les espèces menacées ou vulnérables*, which was adopted in 1989. However, the Yellow Rail, considered vulnerable in Québec (Robert 1989), is one of 76 animal taxa listed on the *Liste des espèces de la faune vertébrée menacées ou vulnérables susceptibles d’être ainsi désignées* (List of Species Likely to be Designated Threatened or Vulnerable under the Act) (Gazette officielle du Québec 1993). Fortunately, it is being considered in all

projects subjected to an environmental impact assessment under the *Loi sur la qualité de l'environnement* (Robert *et al.,* 1995). It is ranked S2 (P. Aquin, pers. comm.).

New Brunswick

The Yellow Rail has no official status in New Brunswick, nor was it reviewed by the former Endangered Species Committee. Nevertheless, there is concern (M. Sullivan, pers. comm.). It has not received an SRANK (S. Gerriets, pers. comm.).

Nova Scotia

An offical status evaluation has not been conducted because it is not known as a regularly breeding bird (M. Elderkin, pers. comm.). It has no SRANK (S. Gerriets, pers. comm.).

POPULATION SIZE AND TREND

United States

Breeding

The heart of the breeding range in the U.S. is in Minnesota, where recent work has boosted the number of "element occurrences" (The Nature Conservancy 1998) to 178, which can be aggregated into 70 "sites" (R. Baker, pers. comm.; Table 2). McGregor Marsh (Minnesota), the best known site, has about 30 pairs (Eckert 1983, Savaloja 1984). The Seney National Wildlife Refuge in northern Michigan, the best known of that state's estimated 5-10 sites (as inferred from the S1S2 rank), had about 52 singing males in the early 1980s (Bart *et al.,* 1984, Bookhout 1995), and one to 85 singing males from 1995 to 1998 (R. Urbanek, pers. comm.). After the south-central Oregon population was re-discovered in 1982 (Stern *et al.,* 1993), research in the ensuing years showed that there were three or four general sites (Wood River Valley, Klamath, Sycan, and Big Marsh). In 1998, only three of the sites had rails and a total of 128 were heard. K. Popper (pers. comm.) estimates 200 pairs for the whole population. In Montana, the Yellow Rail breeds only in the far northeastern corner of the state in northeastern Sheridan County. The total number of records for the state is less than 10, but it appears that the species breeds in this area regularly. There are probably fewer than five localities in the state (P. Hendricks, pers. comm.). Given their SRANKS, and without any further information, North Dakota and Wisconsin should have about 6-20 sites and about 1-5 sites, respectively (Table 2).

Table 2. Rough estimates of the number of pairs, number of summer locations and population trend for the Yellow Rail throughout its global range (see text for details).

Province, Territory or State	Number of pairs[1]	Number of summer locations	Source and/or reasons	Population trend
CANADA				
Hudson/James Bays	A few thousand?	Strip of coastal habitat ca. 1,700 km long.	Our estimate.	Stable? Snow Goose problem a concern.
NWTs	20-100	4–20	Our estimate based on small range.	Unknown.
Alberta	500+?	Hundreds?	40 known sites; much unsurveyed potential habitat.	Has likely declined. Still declining, but more slowly.
Saskatchewan	500+?	Hundreds?	60 known sites; much unsurveyed potential habitat (A. Smith).	Has likely declined. Still declining, but more slowly.
Manitoba (not including Hudson Bay)	500+?	Hundreds?	26 known sites; much unsurveyed potential habitat (P. Taylor, R. Koes).	Has likely declined. Still declining, but more slowly.
Ontario (not including Hudson/James Bays	Central Ont. (incl. Rainy River region): 115-125 Southern Ontario: 12-30	4-6 1-2	Austen *et al.,* 1994, D. Elder. Austen *et al.,* 1994 Page and Cadman 1994	Has declined. Now stable? Probably declined greatly.
Québec (not including James Bay)	Interior Québec: 20-80 Southern Québec: 20-80	2-16 6-15	Our estimate. Robert *et al.,* 1995	Has probably declined. Has declined, probably greatly.
New Brunswick	0-50	0-10	Erskine 1992	Has probably declined; now stable?
Nova Scotia	0-50	0-10	Erskine 1992	Unknown.
CANADA TOTAL	1687-2015 + a few thousand?	250-800 + a strip of coastal habitat ca. 1,700 km long.	Numerous.	Has likely declined and continues to decline, albeit more slowly, throughout Canadian range, except in Hudson/James Bay region where there is a new concern.
U.S.				
Oregon	200	4	K. Popper	Habitat has declined greatly, but now seems stable.
Montana	20	4		No information.
Wyoming	10	1	D. Wile	No information
North Dakota	30-100	6-20	Inferred from SRANK of S1S2	No information.
Minnnesota	350	70		Habitat under constant threat.
Wisconsin	5-25	1-5	Inferred from SRANK of S1	
Michigan	25-50	5-10		Best known site threatened.
U.S. TOTAL	640-755	91-114	Numerous sources.	Has declined and continues to decline.

Table 2. Rough estimates of the number of pairs, number of summer locations and population trend for the Yellow Rail throughout its global range (see text for details).

Province, Territory or State	Number of pairs[1]	Number of summer locations	Source and/or reasons	Population trend
WORLD				
WORLD TOTAL	H/J Bays : a few thousand. The rest : 2327-2770 pairs.	H/J Bays : 1700 km coast. The rest : 341-914 sites.	Numerous sources.	H/J Bays : Stable until recent concern due to Snow Geese. The rest : Has declined and continues to decline, but more slowly.

[1]When the number of pairs was estimated using the number of sites, we assumed a mean of 5 pairs per site.

We have made some rough estimates of the number of summer locations and the number of breeding pairs in each state using available information. Assuming an average of five pairs in each site (unless an estimate already exists), we estimate 600-750 pairs at about 100 sites in the U.S. (Table 2).

Wetland drainage is probably responsible for the loss of the southernmost breeding areas during this century, as well as the loss of several breeding sites located in the northern U.S. (Bookhout 1995). For example, in Oregon, ditching and draining of wetlands for agriculture have been responsible for the loss of several known breeding sites since 1985 (Stern *et al.,* 1993). In Michigan, Yellow Rail habitat in the Seney Wildlife Refuge is threatened in the long term by the virtual elimination of the prescribed fire program, which itself is a result of heavier restrictions for prescribed burning (R. Urbanek, pers. comm.). In Minnesota, Yellow Rail habitat is under constant threat of either being drained or flooded for agricultural, industrial, and/or waterfowl management projects (Coffin and Pfannmuller 1988).

Overall, although the Yellow Rail has probably always been a rare species of limited distribution in the U.S., there is ample evidence that there has been some reduction in its numbers and range. It has been extirpated as a breeding species from at least three states, and there is also good evidence that many breeding sites have disappeared from states in which it still breeds. There is no evidence of increases in numbers or range anywhere in the U.S.

Wintering

Estimating true numbers of Yellow Rails is particularly difficult on the wintering grounds, where the birds are not only secretive, but they do not vocalize or respond to recordings (K. Mizell, pers. comm.). Yellow Rails are especially common in the salt marsh zone along the Texas coast in March-April, but are difficult to locate during winter. In winter the species may rely more on fresh marsh areas (C. Cordes, pers. comm.). It is clear that at least some wintering habitat types used commonly are declining under continual pressure (see Habitat Trends).

Canada

Northwest Territories

Given the species' small range in the Northwest Terrritories, we suggest that no more than 100 pairs may breed in this area, which represents the northern extremity of its range; but this is no more than an educated guess.

British Columbia

Several years ago there were only four records of the Yellow Rail in British Columbia (Campbell *et al.,* 1990), but the species is now recorded almost every year somewhere in the province. Nowhere has it been recorded year after year (S. Cannings, pers. comm.), but because of the small number of surveys conducted, this does not necessarily mean that it has not occupied any sites in successive years. Nevertheless, the recent increase in observations is likely due to an increased effort to survey wetlands in the province's interior for birds, and to include night-time observations (W. Campbell, pers. comm.).

Alberta

The Yellow Rail is thought to be locally common (McGillivray and Semenchuk 1998), although efforts to census them have been few and without significant success (Semenchuk 1992). There are 40 known locations of presence during the breeding season (Table 2). While there were no reports of Yellow Rails in Alberta from 1961 to 1970 (T. Sadler, pers. comm.), there were 18 from 1973 to 1980. This change corresponded to an explosion of ornithological data in the 1970s (Pinel *et al.,* 1991).

The species was reported in only 16 of 2206 squares surveyed during the Atlas. Breeding was not confirmed anywhere, but was considered probable in six squares and possible in 10 (Semenchuk 1992). No information is available on population trends *per se*, but the species' habitat has been eroded considerably, largely for agriculture, and it continues to be eroded for agriculture, and more recently for a wide variety of industrial endeavours (see Habitat Trends).

Saskatchewan

Of the 724 maps at the 1:50,000 scale covering the province (each map sheet covers on average about 900 km^2), only 37 (5%) have evidence of possible or probable breeding – nowhere in the province has breeding been confirmed (Smith 1996). There are 60 known locations of Yellow Rail presence during the breeding season in Saskatchewan (Table 2). A. Smith (pers. comm.) suggests that there could be many more breeding sites in Saskatchewan than the number of known sites and the atlas data would suggest. (There are very few birders in Saskatchewan, and they tend to visit the same sites rather than explore far afield.) According to Smith, considerable amounts of potential habitat for this species exist in the Parklands and the southern

Boreal Forest, but it is not known to what extent Yellow Rails use this habitat. Indeed, some new sites harbouring this species have been discovered since the Saskatchewan Atlas (Smith 1996) was published.

Apart from one site (Peter Marsh) where up to 22 birds have been heard, at most sites only one to five birds are generally heard. Numbers at a given site likely vary from year to year according to water conditions. A. Smith (pers. comm.) suggests that there are likely more than 100 breeding sites in the province, and these may harbour several hundred to 1000 birds. As is the case with Alberta, no information is available on population trends *per se* in Saskatchewan, but the species' habitat has been eroded considerably for agriculture and continues to be (see Trends in Quality and Quantity of Critical Habitat).

Manitoba

There are 26 known locations of Yellow Rail presence during the breeding season in Manitoba (Table 2). Even though it is considered uncommon (Manitoba Avian Research Committee 1986), there are thought to be more than 100 recent occurrences with at least 3000 individuals (Duncan 1996). R. Koes (pers. comm.), with about 30 years birding experience in the southern third of the province and in the Churchill area, feels that "*there are undoubtedly more than 100 breeding sites in Manitoba, and likely hundreds*". He argues that there are vast areas of potential habitat in the Parklands, the southern Boreal Forest and the Hudson Plains that are not often visited by birders, particularly at night. P. Taylor (pers. comm.) states that it is extremely difficult to estimate the Manitoba population or trends, but suggests that the Yellow Rail population is in the thousands rather than hundreds. Occupancy of particular sites often varies from year to year according to water levels, but some sites are occupied every year.

R. Koes (pers. comm.) suggests that the Yellow Rail in Manitoba is probably much more common and widespread than many people suspect. In his view, it is probably not a rare bird in the province. Although there was likely considerably more habitat 100 years ago than now, R. Koes suggests that the conversion of this habitat, mostly for agriculture, has decreased considerably. Yet it must be noted that the species' habitat has been and still is being eroded considerably (see Trends in Quality and Quantity of Critical Habitat).

P. Taylor (pers. comm.) writes, and some of his comments may apply to the Parklands and Southern boreal forest regions of the three prairie provinces: "*It is a little ironic that we probably know the best localities in the extreme south and north, and very little about the main breeding range in central Manitoba. However, that is true of most Manitoba birds…I have visited the [Lee Lake Wildlife Management Area] in daylight, and there are huge expanses of sedge fen that look perfect for this species. Such habitat is widespread in that part of the Interlake region, and would merit more intensive surveys for this species. I suspect that this region, in addition to large marshes bordering Lakes Winnipeg and Manitoba, represents the most important Yellow Rail habitat in Manitoba. Unfortunately it is somewhat remote and extremely under-birded!*"

Ontario

The Yellow Rail likely had a widespread breeding distribution historically in Ontario. Today, the Hudson Bay Lowland is clearly Ontario's stronghold (Cadman *et al.,* 1987). Abundance estimates from the Atlas (Cadman *et al.,* 1987) indicate that the Yellow Rail is locally common at least at some sites on the Hudson/James Bay coasts: two 100 km x 100 km blocks were estimated to contain 101-1000 pairs, two 2-10 pairs, and one 11-100 pairs. Cliff Hope and two other observers estimated 100 birds on 17 July 1940 at Fort Severn (Speirs 1985). Of the 12 Atlas blocks of 100 km x 100 km covering Ontario's north coast, all have had observations of Yellow Rails. During the atlas itself, only 11 did, but in the remaining one (in which Cape Henrietta Maria lies) breeding was confirmed before field work was conducted for the Atlas (Speirs 1985) (Appendix 2).

In the remainder of the Ontario range, breeding is apparently scattered and numbers of Yellow Rails are thought to be small. In the Rainy River region, their last stronghold, Big Marsh, at the mouth of the Rainy River in Lake of the Woods, is protected by the provincial government. This 6 km x 1 km area has much sedge meadow. The observations made every year of 1-6 individuals are made in a small accessible portion representing only about 5% of the Big Marsh (D. Elder, pers. comm.). The Ontario Rare Breeding Bird Program estimated that more than 100 pairs summered in the Rainy River region annually between 1981 and 1990 (Austen *et al.,* 1994), and that number still seems a reasonable reflection of the current situation (D. Elder, pers. comm.). There have also been occasional reports from Quetico Provincial Park (D. Elder, pers. comm.).

In southern Ontario, which has lost a large proportion of its wetlands, the Yellow Rail population has been almost extirpated (Austen *et al.,* 1994). In the early-1900s, it was found regularly, albeit in small numbers, in large marshes of southern Ontario from the St. Clair River east to Toronto (Austen *et al.,* 1994). In recent years, however, it has been recorded only sporadically in summer at a few widely scattered marshes in southern Ontario (it was found in only six of 1824 Atlas squares (Cadman *et al.,* 1987)), only two of which have recent breeding evidence – Richmond Fen, in the Ottawa region, and Holland Marsh, along the south shore of Lake Simcoe (Sankey 1987, Goodwin 1992, Page and Cadman 1994). Up to 20 males have been heard at Richmond Fen, and a nest with eggs was found in 1982 (Austen *et al.,* 1994). The species was found in the Holland Marsh area during the Atlas in the 1980s, but not since 1989, despite the fact that there do not appear to have been any significant changes to the habitat during that period (Austen *et al.,* 1994, R. Ridout, T. Hofmann, pers. comm.). It may still breed in the less accessible east portion of the Holland Marsh, which is about 6 km long by 1.5 km wide (T. Hoffman, G. Bennett, pers. comm.). From 12 to 30 pairs might breed annually in southern Ontario (Page and Cadman 1994).

Québec

The Yellow Rail is considered a rare summer resident in Québec (David 1996). Even though no surveys have been carried out specifically for this species in the coastal

marshes of James Bay, this region probably harbours as many, if not more, Yellow Rails than the rest of Québec. Todd (1963) noted that they were "plentiful" in July 1941 at Neck of Land, just north of Boatswain Bay. Numerous large bays, notably Rupert and Boatswain Bays, contain vast suitable high marshes (M. Robert, pers. obs.). The presence of Yellow Rails in a number of those coastal marshes suggests that dozens (or even hundreds) of pairs breed in that vast region (Robert *et al.,* 1995), despite the fact that nesting has never been confirmed there. The number breeding there may have changed little, because the region has been subjected to little disturbance (Robert *et al.,* 1995). Nevertheless, two potential threats are hydro-electric development and overgrazing by Snow Geese, which has been responsible for major habitat changes on the west coast of Hudson Bay (see Trend in quality and quantity of critical habitat for details).

The situation is much different elsewhere in Québec. There are very few Yellow Rails inhabiting the St. Lawrence and Saguenay corridor. Up to 9 have been heard in the Lake Saint-François National Wildlife Area and its surrounding areas (Robert and Laporte 1996), 3 at Île du Moine (ÉPOQ database), 5 at Cap Tourmente (ÉPOQ database), 20 at Île aux Grues (Robert and Laporte 1996), 2 at Sainte-Anne-de-la-Pocatière (Campagna 1931, Meredith 1935), 9 at Cacouna (Robert and Laporte 1996), 3 at Pointe-aux-Outardes (Robert and Laporte 1996), 4 at the rivermouths of the Gaspé Peninsula (Robert and Laporte 1996), 5 at Coin-du-Banc (Terrill, unpublished data, Canadian Museum of Nature), 8 at Saint-Fulgence (Cormier and Savard 1991, Savard and Cormier 1995), and 2 at Saint-Gédéon (Robert and Laporte 1996). The remaining reports of Yellow Rails along the St. Lawrence corridor involve only one individual. In the Abitibi region, up to 3 were heard at Marais Antoine in June and July 1995 (Robert *et al.,* 1995), and 7 were heard at Marais Maine in June 1996 (van de Walle 1997). It should be noted that the numbers given above are historical maxima and that the number of individuals heard at these sites is usually smaller. At most of these sites the species' occurrence is irregular or uncommon (see below).

The irregular nature of this species' occupation of sites seems to be generalized in southern Québec. At Saint-Fulgence (Saguenay River), it was first found in 1964 and was reported irregularly until 1996 (Browne 1967, Cormier and Savard 1991, Robert and Laporte 1996); it does not seem to have been present since then (G. Savard, pers. comm.). Similarly at Cap Tourmente it was first reported in the early 1970s and has been observed only irregularly during the past decades (Otis *et al.,* 1993, Robert and Laporte 1996); contrary to Saint-Fulgence, however, it has been heard at Cap Tourmente during the past few years (S. Labonté, pers. comm.). Its presence seems to be irregular also at Marais Antoine and Marais Maine in the Abitibi region, where several individuals were heard in 1996 (see above) but where a thorough survey the following year yielded none (M. Robert, pers. obs.). At Marais Antoine, it is possible that the desertion was associated with water level changes for a waterfowl management project (water level management for waterfowl at Marais Antoine was initiated in autumn 1996).

The number of Yellow Rails breeding in southern Québec is likely much lower than it used to be. Numerous marshes along the shores of the St. Lawrence River

disappeared this century, and since the Yellow Rail uses the higher portions of marshes, which are often the first and easiest to be drained, the population must have been affected by the loss of habitat to humans (see Habitat). For example, the number of birds breeding at sites along the river at Sorel or Yamachiche or at sites along the estuary (e.g. Château-Richer, Sainte-Anne-de-Beaupré, La Pocatière, Kamouraska) must have been considerably larger than today (see Campagna 1931, Meredith 1935).

Despite the Yellow Rail's seeming irregular occupation of sites in southern Québec, there are sites that are known to have been traditionally used over the past few decades. At Coin-du-Banc, for example, Terrill (unpublished data) observed Yellow Rails regularly from 1939 to 1949, and the species was still present in 1997 (P. Poulin, pers. comm.). In the area of the Lake Saint-François National Wildlife Area, the species started to be reported at the end of the 1960s and it still occurs there (Bannon 1992, 1993, Robert and Laporte 1996, M. Robert, pers. obs.).

Most of the marshes along the St. Lawrence River and the Saguenay River with habitat suitable for Yellow Rails were surveyed in the early 1990s (Robert and Laporte 1996), and the results showed the extent to which the species is uncommon and locally distributed there. Yellow Rail habitat is rare along the St. Lawrence River and its tributaries. At present, the largest areas are at Lake Saint-François (in Québec's extreme south-west) and on the south shore of the St. Lawrence River (east of Québec City), especially at Île aux Grues. About 130, 530 and 30 ha of suitable habitat were found at Lac St-Saint-François, Île aux Grues and Cacouna, respectively, over the last few years. No more than 40 males were found at the three sites combined each year, although sometimes the number was much lower (Robert and Laporte 1996). Given these results, it is probable that the main localities in southern Québec are all known, but Yellow Rails could potentially also use other sites.

In summary, the Yellow Rail inhabits a specific type of marsh that is rare in southern Québec. Most of the suitable sites are known and they harbour few rails. Furthermore, the few large fens that have been visited in Québec's interior do not seem to harbour the species (M. Robert, pers. obs.), suggesting that most of the individuals inhabiting southern Québec frequent the St. Lawrence corridor and a few of the large rivers feeding it. There is little room for Yellow Rails to expand in the St. Lawrence and Saguenay corridors (Robert *et al.,* 1995). At most a few new sites will be found in the future, and these will likely harbour few individuals. We suggest that 20-80 pairs currently breed in southern Québec, and that about the same number breed in Québec's interior (Robert *et al.,* 1995).

New Brunswick

Erskine (1992) suggested that fewer than 50 pairs breed in New Brunswick. In fact, the only site where the Yellow Rail is known to occur regularly in New Brunswick is Grand Lake Meadows, in the upper estuary of the St. John River, where three to 24 calling males have been heard annually from 1991 to 1996. During that period, the area with Yellow Rails varied from 35 to 131 ha (P. Kehoe and G. Forbes, pers. comm.).

Even though the habitat seems very good for Yellow Rails, breeding has never been confirmed there. Water levels in the St. John River may be too high for the species during the breeding season and it is possible that the birds observed at Grand Lake Meadows have been molting birds that bred elsewhere, such as in Québec or in the interior of New Brunswick. Efforts are currently underway to determine whether the species breeds at Grand Lake Meadows (P. Kehoe, pers. comm.).

After 11 years of aerial and ground wetland surveys throughout New Brunswick, P. Kehoe (pers. comm.) found that of about 20,000 ha of wetland in the St. John River Valley downstream from Fredericton (including tributaries of the river), there are about 4000 ha of potential habitat for Yellow Rails, i.e. sedge meadows. According to the latest figures from the provincial government, 11% of the 20,000 ha (2300 ha) of the Lower Saint John River (Fredericton south to Saint John) have been impounded. Only a portion of this would have been sedge meadow, and it is not known whether these areas had Yellow Rails, as the species has been heard only at Grand Lake Meadows (G. Forbes, pers. comm.). In the province's interior there are about 30 sites with sedge meadows that could have breeding Yellow Rails (P. Kehoe, pers. comm.). Night surveys for Yellow Rails at these interior sites are needed.

Several Yellow Rails were heard in recent years at the Tantramar marshes near Sackville. This was the area of a "colony" in the 1940s-1970s (G. Forbes, pers. comm.).

Nova Scotia

Erskine (1992) suggested that fewer than 50 pairs breed in Nova Scotia.

SUMMARY OF POPULATION SIZE, NUMBER OF BREEDING LOCALITIES AND TRENDS

The nature of the Yellow Rail's global range dictates that any discussion of its Canadian status must consider the U.S. status as well. Thus Table 2 summarizes what is known regarding Yellow Rail numbers, the number of summer locations and population trends throughout its global range. The information presented varies greatly in degree of confidence level, and is simply the best information available to us.

Given the seemingly continuous range of the Yellow Rail in the Hudson/James Bay region, at least at the scale of one site per 100 km x 100 km blocks, it is probably safe to conclude that there could be a few thousand pairs there. We estimate roughly another 2,000 pairs for Canada, and about 600-750 more breeding in the U.S. We will not even attempt to estimate the number of sites in the Hudson/James region. However, the estimated global population of 2300-2800 pairs breeding elsewhere than in the Hudson/James Bay region breeds on an estimated 300-900 sites. Outside the Hudson/James Bay region, we know of 187 Canadian sites where it has been found during the breeding season and where it might still occur (Figure 3).

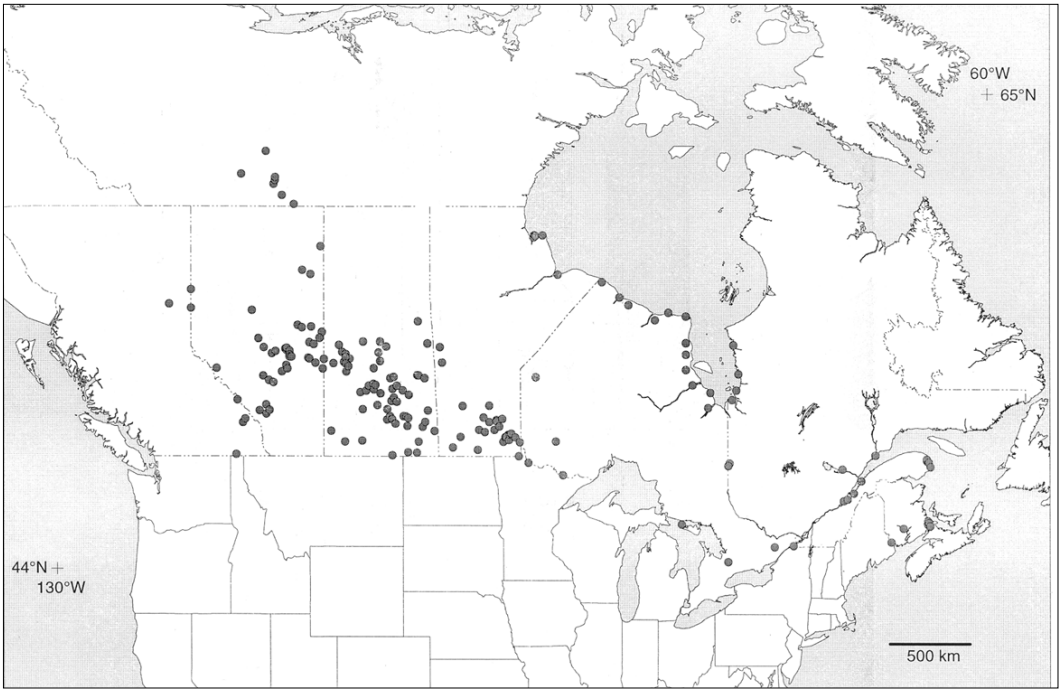

Figure 3. Sites where the Yellow Rail has been found in Canada during the breeding season and wher it could still occur.

There is almost no information on population trends, but there is enough direct information regarding Yellow Rail habitat trends, which, when combined with known landscape changes, gives a fairly clear picture of what has likely happened to populations in different parts of its range. There is no reason to believe that Yellow Rails are increasing anywhere in the global range at any time of year. On the contrary, there is ample evidence showing that the species' habitat has declined and is still declining throughout its southern range, albeit more slowling. In the remaining portion of its range, the Hudson/James Bay region, it may also be declining in certain areas– certainly the Snow Goose problem cannot be helping it (see Trend in quality and quantity of critical habitat for details). The relatively small wintering range is declining.

HABITAT

Habitat definition

The Yellow Rail prefers marsh habitat with dense, fairly low herbaceous vegetation with little or no standing water (generally 0-12 cm) where the substrate remains saturated throughout the summer. It can be found in damp fields and meadows, on the floodplains of rivers and streams, in the herbaceous vegetation of bogs, and at the upper levels (drier margins) of estuarine and salt marshes (Bookhout 1995, Robert 1996, Robert and Laporte, in prep.).

Previous studies have found that sites harbouring Yellow Rails during the breeding season are usually in marshes large enough to support several pairs (>10 ha) (Walkinshaw 1939, Terrill 1943, Brewer *et al.,* 1991, Gibbs *et al.,* 1991, Robert and Laporte, in prep.). However, Bookout (pers. comm.) has found them during the breeding season in sedge meadows as small as 0.5 ha in Michigan. They also have been found during the breeding season in numerous 1 ha sites in the Cold Lake area of Alberta (W. Smith, pers. comm.), several 2-3 ha sites at Churchill and in southern Manitoba (R. Koes, pers. comm.), and in numerous 3-4 ha sites in the Rainy River region of northwestern Ontario (D. Elder, pers. comm.). In Alberta, T. Sadler (pers. comm.) has never encountered Yellow Rails in sedge meadows larger than 2 ha; rather, he has found them in numerous sedge meadows less than 1 ha.

Nesting Yellow Rails are typically associated with marshes dominated by sedges, true grasses, and rushes, particularly by fine-stemmed emergents of the genera *Carex*, *Spartina*, *Juncus*, *Calamagrostis*, *Scirpus*, *Eleocharis*, and *Hierochloe.* Nesting habitats usually have a dry mat of dead vegetation from previous growing seasons (Dawson 1921, Peabody 1922, Roberts 1932, Fuller 1938, Devitt 1939, Walkinshaw 1939, Huber 1960, Stalheim 1974, Savaloja 1981, Stenzel 1982, Bookhout et Stenzel 1987, Gibbs *et al.,* 1991, Grimm 1991, Stern *et al.,* 1993, Bookhout 1995, Robert and Laporte 1996, Robert and Laporte, in prep.). Although one of twelve nests discovered by Maltby (1915) did not have one, this concealing canopy nevertheless is quite characteristic of Yellow Rail nesting habitat, and females pull it back over the nest if disturbed (Stalheim 1974, Stenzel 1982, Robert and Laporte, in prep.). Stenzel (1982) suggested that a senescent vegetation canopy allows the birds to move freely without visual detection. It might be particularly important during the first weeks after spring arrival of the rails, when the green vegetation has not yet grown enough to offer them much concealment (Robert and Laporte, in prep.).

Although *Carex* sedges often characterize habitats used by Yellow Rails during summer (Bookhout and Stenzel 1987, Gibbs *et al.,* 1991, Stern *et al.,* 1993, Robert and Laporte, in prep.), many other fine-stemmed plants may also predominate. The importance of *Carex* in Yellow Rail habitats may simply be due to the hydrophytic nature of the genus, its tendency to occupy shallow or damp areas and, more importantly, its extensive variation and distribution in temperate latitudes of North America (Marie-Victorin 1995). Because of this, Robert and Laporte (in prep.) believe that *Carex* sedges should not be considered as the only indicator plant species (Stenzel 1982, Gibbs *et al.,* 1991) of Yellow Rail habitats. Rather, the Yellow Rail may tolerate considerable variation in certain subtle features of its summer habitats, such as plant species composition, stem density, and height of vegetation, as do other rail species (Rundle and Fredrickson 1981, Flores and Eddleman 1995, del Hoyo *et al.,* 1996). Habitat selection might be influenced primarily by plant physiognomy and maximum water levels.

The Yellow Rail uses a greater diversity of habitat types during migration and winter than during the breeding season. In fall, as well as using wet meadows and coastal marshes, it may occur in rice fields, dry hay fields, and cereal fields (Bent 1926, Ripley 1977, Savaloja 1981, Godfrey 1986, Cardiff and Smalley 1989). On Texas

wintering grounds, it is often found in coastal marshes dominated by *Spartina patens* (Stalheim 1974, Anderson 1977, Lane and Tveten 1984), while in Louisiana, it is often found in rice fields (Lowery 1974, Cardiff and Smalley 1989). It is also observed in coastal *Spartina* marshes during spring migration (Shoch 1990). In South Carolina it is found in short-grass low meadows and power-line right of ways running through certain wetlands that are mowed on a regular basis (J. Cely, pers. comm.).

Habitat distribution

In Canada, a large proportion of habitat suitable for Yellow Rails occurs along the west coast of Hudson Bay (Manitoba and Ontario) and along the James Bay coast (Ontario and Québec). In our view, this poorly known region is potentially a major stronghold for the species. In Ontario, the shores of James Bay and Hudson Bay are extremely flat, forming an extensive coastal plain that is poorly drained and dominated by open fens and bogs interspersed with treed fens and bogs of Black Spruce (*Picea mariana*) and Tamarack (*Larix laricina*) (Cadman *et al.,* 1987). The Hudson Bay Lowland of Ontario comprises about 260,000 km^2, or one quarter of the province (Wilson and McRae 1993), and it would be useful to attempt to assess the proportion of the whole region that could be suitable for Yellow Rails.

Even though no Yellow Rail surveys have been conducted on the Québec side of James Bay, we already have a good idea of the amount of potential habitat there (Robert *et al.,* 1995). There may be about 20,000 ha of marsh south of the Castor River (Consortium Gauthier & Guillemette - GREBE 1992b), including both low and high-marshes. High-marshes, littoral meadows and back marshes respectively cover 1635, 1075 and 211 ha of Cabbage-Willows Bay and 1073, 37 and 1222 ha of Boatswain Bay. Elsewhere in the Rupert Bay estuary, these cover 1186, 239 and 700 ha, respectively (Consortium Gauthier & Guillemette - GREBE 1992c). This represents, in theory, a little more than 7000 ha of potential Yellow Rail habitat in Boatswain Bay and Rupert Bay, which cover the majority of potential habitat for this species on the Québec side of James Bay. Northward of the Castor River, the coastal marshes are less numerous and less vast than in south-eastern James Bay. Of the 264 marshes mapped by (Dignard *et al.,* 1991), less than 10 are larger than a few square kilometres. They are mostly located in the upper portions of large bays such Dead Duck Bay, Aquatuc Bay, Baie des Oies, Paul Bay and Bay of Many Islands.

Eastern Alberta seems to contain considerable amounts of potential habitat, as do the Parklands and southern Boreal Forest of Saskatchewan, and the Parklands and southern Boreal Forest of Manitoba. The Peace Parklands of northwestern Alberta, which extend about 300 km north, almost to the border with the Northwest Territories, is an isolated extension of aspen parkland. It contains sedge meadows that, once dry, are used for nesting by several waterfowl species (B. Caverley, pers. comm.). Yellow Rails have not been found in this region, but likely little if any surveying has been done. Southern Ontario has lost a large proportion of its wetlands (Austen *et al*. 1994), and the population, which likely used to have a widespread breeding distribution in the province, has been reduced to one or two sites (Cadman *et al.,* 1987).

In southern Québec, sedge meadows cover 1480 ha between Cornwall (Ontario) and Trois-Rivières and they are restricted to the Lake Saint-François region (Aménatech 1992a). From Trois-Rivières to Montmagny, most suitable habitats are located at Île aux Grues and Cap Tourmente and cover more or less 900 ha (Robert *et al.,* 1995, Robert and Laporte 1996). Overall, approximately 2400 ha of marshes between Cornwall and Montmagny are probably suitable for breeding Yellow Rails. Elsewhere along the St. Lawrence River, no precise estimates exist of the area covered by high-marshes like the ones inhabited by Yellow Rails. A number of marshes are located on the south shore of the St. Lawrence estuary, between Saint-Jean-Port-Joli and Matane, a result of the large areas of fine deposits found there. The largest marshes on the south shore are those of Isle-Verte (1369 ha), Rivière-du-Loup (325 ha), Trois-Pistoles (252 ha), Saint-André (200 ha) and Kamouraska (150 ha). Along the north shore of the St. Lawrence estuary, the steep shoreline largely precludes the presence of marshes. The largest marshes are those of Outardes Bay (593 ha), Baie-Saint-Paul (304 ha), Milles-Vaches Bay (249 ha) and the Îlets Jérémie (121hectares) (Desponts *et al.,* 1995, Robert *et al.,* 1995). Along the shoreline of the gulf of the St. Lawrence River, large marshes are rare and usually confined to river-mouths where fine sediments accumulate, particuliarly in sites protected by long littoral tongues and in deep bays. On the Gaspé Peninsula, the largest marshes (200-400 ha) are those of Gaspé, Malbaie, Paspébiac and Restigouche (Desponts *et al.,* 1995). Of course only a fraction of all these areas consists of high-marsh that could be suitable for Yellow Rails. Finally, it is possible that some large fens in the Abitibi and Lac-Saint-Jean regions harbour some Yellow Rails.

Potential habitat in New Brunswick includes the Grand Lake Meadows portion of the St. John River estuary, plus about 30 sedge meadow sites in the province's interior (P. Kehoe, pers. comm.).

Trend in quality and quantity of critical habitat

General

Loss of wetlands to human activity is probably the most serious factor affecting Yellow Rail populations (Bookhout 1995). Negative effects on Yellow Rail habitat might be particularly important because of this species' occupation of the drier parts of marshes (Eddleman *et al.,* 1988).

Another very important factor affecting the amount of sedge meadow habitat at a given place and time is climatic conditions: the number of sites in an area varies from year to year according to water levels. If wet conditions persist for several years, sedge meadows will become cattail/rush marshes, whereas if dry conditions persist, willows and grasses will encroach (W. Smith, pers. comm.).

United States

About half of the coastal wetlands in many eastern states have been lost to dredging and filling (Eddleman *et al.,* 1994), and since the mid-1950s, estuarine wetland loss in the U.S. coastal zone has accelerated to about 0.5% annually (Schneider and Pence 1992). By the mid-1970s, only 46% of the original wetlands in the conterminous U.S. remained, and the rate of loss continued at more than 160,000 ha annually a decade ago. The most threatened habitats include palustrine and riverine wetlands, which are important for several rail species. Agricultural development is responsible for 87% of recent losses in the U.S., with urban, industrial and reservoir development accounting for the rest (Eddleman *et al.,* 1988).

An important factor in the loss of both breeding and wintering habitat in the U.S. is that laws concerning the draining of wetlands may or may not apply to drier wetlands of the type that Yellow Rails use. It is very easy to farm the edges of wetlands that Yellow Rails use. Thus, habitat loss is a large concern regarding Black Rails (*Laterallus jamaicensis*) and Yellow Rails in the U.S. In the midwest, for example, very little or no habitat remains for Yellow Rails, as this habitat disappeared a long time ago. Unfortunately, there seems to be little information on the status of the Yellow Rail in the midwest beforehand (B. Eddleman, pers. comm.).

The apparent increase in the Oregon Yellow Rail population documented in the last few years may be due to a delayed effect of the end of the drought in the early 1990's. There is probably more acceptable nesting habitat due to increased water depths, as well as better nesting habitat due to more live and senescent vegetation (K. Popper, pers. comm.). However, the Oregon population is under similar threats faced by other populations, mainly the ditching and draining of wet meadows for agricultural use and overgrazing of nesting habitat. One of the problems in the Klamath Basin is the cleaning of existing ditches. Not only do people drain a field in which the water table has risen in response to the ditches slowly filling in with sediment and vegetation, but the ditches may be deepened further than their original depth. This may have negative effects not only on the land surrounded by the ditches and canals, but also on adjacent land where Yellow Rails breed. On the other hand, Yellow Rail nesting areas on public (federal) lands may become flooded late in the season (July) due to flood-irrigation occurring on adjacent private lands. Water levels strongly affect the presence and movement of the rails, so water management is of great importance to the continued health of the populations in Oregon and elsewhere in the U.S. The current habitat trend in south-central Oregon is relatively stable, with fluctuation from year to year depending on precipitation/water levels. Historically, there has been a drastic reduction, with only about 15% of the historic wetlands remaining in the Upper Klamath Basin (K. Popper, pers. comm.).

Habitat loss for wintering Yellow Rails has been so extensive in the U.S. that the wintering range may no longer be contiguous. It would be very useful for research to be done on this possibility (T. Bookout, pers. comm.). In Texas and elsewhere in the U.S. wintering grounds, the species seems to be largely restricted to a narrow band (e.g.

48 km) of coastline (K. Mizell, K. Arnold, pers. comm.). Coastal marshes throughout the Gulf states are threatened. In Texas, for example, all of the coastal marshes used by this species, which are located along the northern portion of the coast, are threatened by development or agriculture. A major factor is the reduction of federal government subsidies for rice farming, which is inducing farmers to sell their land for development or to use it for cattle grazing (K. Mizell, pers. comm.). In addition, rice fields along the Gulf coast are being converted to other uses. The rate of conversion is not significant, but it is steady. In Texas, where pumping ground water is necessary for rice culture, rice fields are being converted to pasture and residential areas. In Louisiana, where both ground water and stored water (in canals) are used for growing rice, the trend is to replace rice with sugar cane. The federal rice subsidy has been steadily reduced each year, and in a couple more years it will be unavailable to farmers. For this reason, many farmers are either selling out to other interest groups or, in the case of Louisiana, are converting to sugar cane which still benefits from a federal subsidy. The general trend in native wetland acreage in Texas and Louisiana is also down (C. Cordes, pers. comm.).

Canada

Hudson/James Bays

In the Hudson Bay Lowlands of northern Manitoba, a major influence on coastal habitat, possibly including habitat for Yellow Rails, is overgrazing by Snow Geese (D. Hussell, pers. comm.). This species has increased tremendously in numbers over the past three decades. It has learned to exploit farmland on its U.S. wintering grounds and on its U.S. and Canadian migratory stop-over sites, rather than relying on saltwater and freshwater marshes, which are not always as productive. As a result, birds tend to be in peak physical condition when they arrive on their breeding grounds, and breeding success has been much higher than in the past. However, the population has become so large that overgrazing is becoming a considerable problem, not only for the geese, a number of which starve before they fledge, but also for other species (Abraham and Jeffries 1997, K. Ross pers. comm.).

The high density area of the Snow Goose colony at La Pérouse Bay, east of Churchill, for example, has moved a number of kilometres away from its original location, leaving behind severely altered habitat (exposed peat, extensive salt pannes, dead willow thicket) (K. Ross, pers. comm.). The geese have caused substantial changes to all inter-tidal habitats at La Pérouse Bay. There is much less vegetation, and large areas of dead willows are present in the coastal zone. Nearly all shoots of *Carex aquatilis* are grazed up to 10 km from the coast. In the vicinity of the coast, extensive moss carpets are present (Abraham and Jeffries 1997). Regarding La Pérouse Bay, R. Rockwell (pers. comm.) writes: "*In the 1960s and early 1970s we used to hear them [Yellow Rails] regularly. I have not heard any since 1982. For the last 3 years [1996-1998] I have made a concerted effort with dragging, listening, etc. and have been unsuccessful. My best guess is they are no longer in the region they once occupied. [This is] not a big surprise since much of that is a degraded wasteland*."

This habitat degradation is at various stages along the James Bay and southern Hudson Bay coasts, which coincide with the Yellow Rail's breeding range. There could be an impact on the Manitoba and Ontario populations, although at present the effect would be quite local (K. Ross, pers. comm.). All areas along the Hudson/James Bay coast that have Snow Geese nesting colonies have been impacted, and many staging areas as well (K. Abraham, pers. comm.).

Northwest Territories

Habitat changes in the Slave River Lowlands of the Northwest Territories, which fall within the Yellow Rails's very small known range in the territory, are causing concern for Moose (*Alces alces*). Logging has been ongoing in the area for over 50 years. In addition, prescribed burning of willow-choked meadows is being done by the territorial government to improve the habitat for American Bison (*Bison bison*) (Bradley *et al.,* 1996). Without knowing specifics of exactly where Yellow Rails may breed and where these habitat changes are occurring, it is difficult to comment on potential effects.

Prairies

In prairie Canada, the number of wetlands available to waterfowl (and presumably also to Yellow Rails) is subject to broad annual fluctuations, and this reflects the highly variable nature of temperatures and precipitation throughout the midcontinent (Turner *et al.,* 1987). From a largely pristine environment at the turn of the century, the prairie-parkland region now comprises the largest expanse of agricultural land in Canada. The demand for increased agricultural production was formerly met by breaking large tracts of new lands. As the supply of suitable new lands decreased, farmers strived for increased production through more-intensive operations on their existing land holdings. These activities include draining, filling, haying and cultivating of wetlands, and the clearing and cultivating of marginal lands, resulting in the progressive and incremental degradation of waterfowl (and presumably Yellow Rail) habitat (Turner *et al*., 1987). As of 1986, about 40% of the original wetlands in Prairie Canada had been lost (Canada/United States Steering Committee 1986).

A study conducted on more than 10,000 potential wetlands across the prairie-parkland region from 1981 to 1985 showed that wetland margins (the area contiguous with and extending 10 m beyond the outer edge of the wet meadow zone of the wetland) were consistently altered at a faster rate than were the wetland basins (defined as the centre of the wetland to the outer edge of the wet meadow zone). Degradation of wetlands decreased with wetland permanency, and this likely reflected the higher vulnerability of less permanent wetlands. Degradation rates of both wetland basins and margins were found to be increasing (Turner *et al.,* 1987).

Large dyking and damming projects were traditionally used to create or improve waterfowl habitat; such management was usually applied to areas 10 ha or greater. Although sedge meadows were flooded and therefore rendered useless for Yellow Rails, new sedge meadows would apparently develop around the edge of the

impoundment and these new sedge meadows were secured from drainage. Furthermore, while the natural sedge meadows had been subject to random water level fluctuations, sedge meadows that formed after damming would be managed to keep them as sedge meadow over the long term (T. Sadler pers. comm., B. Calverley pers. comm.).

Recent research has shown that one of the greatest limiting factors for successful waterfowl breeding is nesting habitat for upland nesting species. As a result, the new Prairie CARE program under the North American Waterfowl Management Plan, which became fully operational in 1991, focusses mainly on creating and improving upland nesting cover. In the Parkland region, extensive upland areas are seeded to create nesting cover, while grazing and haying have been eliminated except for wildlife management purposes. This kind of management, which is done in cooperation with landowners through a number of different types of agreements, is targeted in areas with high wetland densities (e.g. 100-150 potholes/square mile). It helps not only waterfowl, but apparently also species such as Sedge Wrens (*Cistothorus platensis*), Le Conte's Sparrows (*Ammodramus leconteii*) and Yellow Rails, which use areas of dense nesting cover surrounding wetlands (T. Sadler pers. comm., Brett Calverley pers. comm.).

Alberta

In Alberta, industrial development is occurring in many areas of the province at a very rapid rate. Conventional oil and gas development is expanding throughout much of the province, whereas heavy oil extraction is increasing in the north. All oil and gas development creates infrastructure that can affect habitat, including roads, above-ground and below-ground pipelines, powerlines, and seismic lines (G. Hamilton pers. comm., D. Hervieux pers. comm.). This development is expanding on the landscape scale and is thus affecting many habitat types, including wetlands. Two bird species that often nest in the same areas as Yellow Rails, but for which enough is known to assess their status in Alberta, are the Sedge Wren and the Willet (*Catoptrophorus semipalmatus*). Both are on the Yellow B list, meaning that they they warrant management attention. Both have suffered breeding habitat losses from drought conditions combined with wetland drainage (Alberta Environmental Protection 1996).

Peatland extraction is a new industry that is extending into non-forested portions of some northern Alberta areas (D. Moyles, pers. comm.). Even though Yellow Rails are not directly associated with peatlands, this activity could potentially affect water levels of the mined area and its surroundings, which could harbour sedge meadows. Recent documentation of the occurrence of Yellow Rails in the extensive Red Lake Peatland of Minnesota suggests that, with the continued destruction of wetlands in other parts of the species' range, peatlands may constitute an important refuge for the species (Coffin and Pfannmuller 1988).

Land clearing and drainage of wetlands for crop and pasture are problems in both known Alberta Yellow Rail strongholds: the Cold Lake and Buffalo Lake areas. Logging is another factor in the Cold Lake area. When land clearing and logging do not destroy

wetlands directly, the hydrological regime is usually altered such that the shallow wetlands remain dry for longer periods of time and disappear after a few years (W. Smith pers. comm.).

Saskatchewan

The recent elimination by the federal government of the Crow Rate, a subsidy for grain production that stimulated land clearing, has made it much less feasible economically to clear land for agriculture. This should have a positive effect on wildlife habitat in general, including Yellow Rail habitat. During the past four years, wet conditions have reflooded many areas in southern Saskatchewan. Nevertheless, in the long term, wetland habitat continues to be lost to agriculture. An estimated 40,000 ha of wildlife habitat are lost each year in Saskatchewan, mostly to forest clearing, cultivation of grassland, and pothole drainage. Most of the drainage is occurring in the south-east quarter of the province. Fortunately, about 10,000 ha of habitat are being protected each year by Ducks Unlimited and other partners through the North American Waterfowl Management Plan, of which some may be suitable for Yellow Rails (B. Macfarlane, pers. comm.).

Manitoba

In southern Manitoba, there is still a considerable amount of wetland being drained for agriculture. Even though drainage has become less feasible economically (reduced public subsidies) and politically (increased cooperation between agencies) as in Saskatchewan, and in fact is illegal, it is still done on a small scale by individual farmers, particularly with small seasonal potholes/basins. These changes are difficult to quantify, particularly at the natural community level (e.g. sedge meadow). However, it is clear that Yellow Rail habitat continues to be lost to agriculture, albeit at a reduced level than formerly (D. Hudd, pers. comm.).

Ontario

The Canadian Shield north of road or rail access has been little affected by direct human activity (Cadman *et al.,* 1987). However, the forest industry is pushing north and logging will likely continue north to the tree line (Cumming 1997). Yellow Rails in the Rainy River region have lost a considerable number of small (3-4 ha) sites in which they could be heard 25 years ago to wetland drainage (D. Elder, pers. comm.). However, one large site remains and is protected.

In southern Ontario, habitat has declined to the point where the species has almost been extirpated as a breeder. Of the 2.3 million ha of wetlands originally found in southern Ontario south of the Canadian Shield, fewer than 12% remain today. This loss has been largely a result of human settlement and agriculture. The area in which the greatest proportion of wetlands has been drained is the extreme southwest. Probably the best Ontario example of a known Yellow Rail breeding site being greatly degraded is Holland Marsh, on the south shore of Lake Simcoe, which has been surrounded by a

drainage ditch since the 1920s largely for agriculture (Day 1927), and where only small habitat patches remain (R. Harris, pers. comm.). In 1927, about 280 ha of the marsh were reclaimed and brought under cultivation for market gardens (Devitt 1967). Already in the 1960s Devitt (1967) wrote that: "*this section of the marsh has been drained and given over to market gardens causing the Yellow Rails to abandon the area*". The Le Conte's Sparrow, which also used to breed at the Holland Marsh, was also much affected. Even though the Yellow Rail may still breed there (G. Bennett, pers. comm.), this area is only a ghost of its former self.

Numerous small wet meadows in the Rainy River district have been drained with ditches over the past 25 years. D. Elder (pers. comm.) has witnessed the loss of Yellow Rails from many of these sites during this period.

Quebec

In Québec, loss of habitat by the draining and filling in of many wetlands found along the St. Lawrence River is the most important limiting factor for the Yellow Rail (Robert *et al.,* 1995). There is no doubt that Yellow Rail sites along the St. Lawrence River are rarer today than in the past, because the extent of wetlands there has declined considerably over the past few decades. About 40% of the original coastal marshes along the St. Lawrence River have been converted (lost) from 1950 to 1978 (Bouchard et Millet 1993). Furthermore, it seems that many of the converted marshes were high-marshes because, being drier than the lower-marshes, they are easier to drain and dyke (Robert *et al.,* 1995). For example, the construction of dykes in the St. Lawrence estuary caused the highest portion of salt marsh to retreat several metres (Couillard and Grondin 1986) and also caused the disappearance of many sites that might have been used by Yellow Rails. Also, the intertidal marshes of the Kamouraska area, which stretch over 26 km between Pointe Saint-Denis and Rivière des Caps on the south shore of the St. Lawrence River, and which used to cover 9.33 km^2, covered only 3.91 km2 in 1986. Thus, 542 ha disappeared.

The changes to these intertidal marshes are of anthropogenic origin. They were largely a result of dyking to convert lands for agriculture, and they occurred between 1930 and 1986 (Pelletier *et al.,* 1990). Many lagoons and marshes along the St. Lawrence River were also converted by filling and by various types of constructions. For example, the installation of harbour infrastructure at Cacouna beginning in 1965 resulted in the direct loss of 1.08 km^2 of marsh, as well as changes to the hydrodynamic and sedimentation regimes of the site that changed the plant community structure (Pelletier *et al.,* 1990). In addition, infrastructure put in place along the St. Lawrence River, for example Highway 20 near Sainte-Anne-de-la-Pocatière and Rivière-du-Loup, and Highway 138 between Québec City and Sainte-Anne-de-Beaupré, must also have contributed to the loss of numerous Yellow Rail marshes in southern Québec (see Campagna 1931). Overall, at least 50% of the potential Yellow Rail habitat along the St. Lawrence River and the Saguenay River disappeared over the past few decades (Robert *et al.,* 1995).

Potential effects on Yellow Rails of dyking areas to increase water levels for the benefit of waterfowl have not been examined in Québec. Nevertheless, the Marais Antoine in the Abitibi region was flooded in 1996 and the species was not found in the area in 1997 (M. Robert, pers. obs.). No Yellow Rails were heard during the 1998 nesting season; however, one individual was heard during the first week of August (R. Deschênes, pers. comm.). This site is known to have had Yellow Rails and considerable habitat for the species before flooding. While flooding may have initially reduced Yellow Rail habitat, J.-P. Laniel (pers. comm.) suggests that the amount of such habitat is likely to increase over the years following flooding because expansion of the wetland should have resulted in a larger perimeter in which sedge meadow would colonize (as often occurs after such management in the prairies). It remains to be seen to what extent sedge meadow re-colonizes and how many years it takes for Yellow Rails to return.

Maritimes

In the Maritimes, wetlands suffered more from human actions since 1600 than most other habitats, although only dumping and sewage were widespread influences on them before 1900. Dyking of saltmarshes for hayland and pasture began around the upper Bay of Fundy in the late 1600s (Erskine 1992), and this habitat would have been lost to any Yellow Rails present, as it was to Nelson's Sharp-tailed Sparrows (*Ammodramus nelsoni*) and Willets. The drainage of fresh marshes, ponds, and lakes for agriculture was done locally and on a small scale before World War II, but became widespead afterward and continued until about 1960, with a slowing or even a slight reversal of that trend since then. The reversal of the trend would have been caused by the development of impounded marshes, especially for waterfowl (Erskine 1992). An estimated 10% of New Brunswick's freshwater wetlands have been lost, whereas about 65% of its coastal wetlands have been lost (K. Connor, pers. comm.).

Along the Lower St. John River, there were likely few habitat changes to the 8,000 ha floodplain wetlands before the Mactaquac hydroelectric dam was built upstream of Fredericton in the 1970s. The effects of this development on the hydrology and nutrient cycling of downstream wetlands are unclear (P. Kehoe, pers. comm.). More recently, conversion has been occurring due to dyking of semi-permanent meadows for waterfowl (G. Forbes, pers. comm.). In fact, almost all sedge meadows in the province could be managed in some form, e.g. impoundment or open water management through either level ditching or blasting potholes. However, this is unlikely to occur in New Brunswick because of the financial constraint and the environmental awareness that is now present through the Department of Natural Resources and the Coastal Habitat program. Until the mid-1980s the New Brunswick government had little interest in wetland conservation, and virtually no regulatory process. In the 1970s and 1980s many wetlands were managed (i.e. altered) through Ducks Unlimited Canada's program of water stabilization. This program was and still is beneficial to ducks as well as a variety of species (e.g. Black Terns (*Chlidonias niger)* and Pied-billed Grebes (*Podilymbus podiceps*)). Until the late 1980s no one saw a need to regulate or change the strategy. Impoundments were attractive to many species, while undeveloped sedge

meadow seemed endless and devoid of the wildlife diversity found on managed sites (P. Kehoe, pers. comm.). However, Ducks Unlimited Canada's projects have converted an estimated 2300 ha of seasonally flooded wetlands to permanently flooded wetlands (K. Connor, pers. comm.).

All this is changing. Ducks Unlimited Canada, along with the provincial and federal governments through the Eastern Habitat Joint Venture partnership, is developing a management strategy for the St. John River floodplain that will conserve habitat for its own value as well as delineate the areas where some management, impoundment and restoration may be desirable for multi-species goals. The first step is the profiling of floodplain communities and their habitat associations. This phase is in its second year (P. Kehoe, pers. comm.).

Rate of habitat change

The wintering habitat may be more limiting than breeding habitat for Yellow Rails because of the great pressures along the Gulf Coast and because the wintering range is much smaller than the breeding range. It is difficult to estimate the rate of loss of wintering habitat, because little is known about which habitats are used by Yellow Rails and which ones are not used. The loss of rice fields that is occurring and that will continue because of economic factors is a concern. K. Mizell's work and other work planned by the U.S. Fish and Wildlife Service on wintering habitats of Yellow Rails and Black Rails (C. Cordes, pers. comm.) should shed some light on the Yellow Rail's status on the wintering grounds.

Yellow Rail habitat loss was likely fairly rapid earlier this century throughout southern Canada, but it seems to have slowed somewhat. The same situation has occurred in the U.S. breeding range. In Canada, partners of the North American Waterfowl Management Plan play a great role in protecting and re-establishing wildlife habitat, particularly in Prairie Canada, which is probably a stronghold for the Yellow Rail. These agencies are becoming increasingly sensitive to the plight of species other than waterfowl. The recent focus on upland nesting habitat for waterfowl and other birds is a positive step for a number of bird species, including the Yellow Rail. However, habitat loss is occurring particularly rapidly in Alberta at a landscape scale as a result of intense industrial activity.

The Snow Goose problem is also a concern because it is affecting the only pristine stronghold of the Yellow Rail. Bag limits have been increased recently to attempt to curb the problem (S. Wendt, pers. comm.). However, it is not clear that this will solve the problem (C. Gratto-Trevor, pers. comm.).

Protection of habitats

Available information suggests that a sizable proportion of the Yellow Rail's global population may breed in the Hudson Bay/James Bay Lowlands, which does not appear to have any major threats despite the Snow Goose problem and the fact that there is little official habitat protection in the region. Special management to impede

vegetational succession (e.g. burning, flooding, drying) is not an issue in this region, where the Yellow Rail habitat is kept as such by the natural tides. We do not have detailed information on the proportion of Yellow Rail sites in Prairie Canada that are protected, but some clearly are. In Ontario, the Big Marsh in the Rainy River region is protected by the provincial government (D. Elder, pers. comm.). Richmond Fen is not protected, but is under no immediate threat. In Québec, about half of the sites harbouring Yellow Rails are in protected areas (Robert *et al.,* 1995) (e.g. the Lake Saint-François National Wildlife Area, the Cap Tourmente National Wildlife Area, and Boatswain Bay).

Nevertheless, in Québec as elsewhere, simple habitat protection does not guarantee that Yellow Rail habitat will be maintained because plant succession may gradually transform the area to a site no longer suitable for rails (Jean and Bouchard 1991, Robert *et al.,* 1995, Robert and Laporte 1996). In addition, protected marshes may be subject to wildlife management implemented to favour certain species, notably waterfowl; this management may be to the detriment of Yellow Rail habitat because wetlands of greatest importance to rails are shallower and have greater coverage by emergent vegetation than those typically managed for waterfowl (Eddleman *et al.,* 1988, M. Robert, pers. obs.). However, waterfowl management on wetlands used for breeding by inland rail species (e.g. Yellow Rails) can be compatible with maintenance of rail habitat. For example, appropriate timing of dewatering and shallow flooding, using gradual dewatering, maximizing perennial vegetation that serves as nesting habitat, flooding different impoundments in different years, and avoiding land-levelling, are all methods that can be used to benefit Yellow Rails without compromising waterfowl. Techniques and timing to be implemented vary according to whether the site is used by Yellow Rails in spring migration, fall migration, breeding or wintering (Eddleman *et al.,* 1988).

Degree of specialization

Yellow Rail habitat selection might be influenced primarily by plant physiognomy and maximum water levels (Robert and Laporte, in prep.) According to Robert and Laporte (in prep.), the species may tolerate considerable variation in certain subtle features of its summer habitats, such as plant species composition, stem density, and height of vegetation, as do other rail species (Rundle and Fredrickson 1981, Flores and Eddleman 1995, del Hoyo *et al.,* 1996). For example, habitats recently described in Québec were located in hydrographic environments that differ from one another: Cacouna was characterized by infrequent high salt-water tidal flooding, Île aux Grues by infrequent very high brackish-water tidal flooding, and Lake Saint-François National Wildlife Area by very poor drainage in a tide-free freshwater environment. Previous studies conducted in Maine (Gibbs *et al.,* 1991) and Michigan (Bookhout and Stenzel 1987) have also suggested that habitat variables often differ from one location to another. Furthermore, although *Carex* sedges often characterize habitats used by Yellow Rails during summer (Bookhout and Stenzel 1987, Gibbs *et al.,* 1991, Stern *et al.,* 1993, Robert and Laporte, in prep.), many other fine-stemmed plants may also dominate their habitat. Therefore, *Carex* sedges should not be considered as the only indicator plant species (Stenzel 1982, Gibbs *et al.,* 1991) of Yellow Rail habitats (Robert and Laporte, in prep.).

Although the presence of a senescent vegetation mat is a significant feature of nesting areas, Yellow Rails also inhabit marshes not covered by such a mat at other times and for purposes other than nesting (Robert and Laporte, in prep.). Furthermore, fire and/or mowing may also have an effect on Yellow Rails, by temporarily eliminating habitat and reducing the area of potential nesting habitat by the lack of the senescent vegetation mat. It should be noted, however, that mowing, like burning, can sometimes be beneficial if it is timed correctly, because it prevents the usual vegetative succession and thus may help perpetuate this habitat type (Stenzel 1982). For example, periodic burning is necessary for the maintenance of breeding areas at Seney National Wildlife Refuge in Michigan (R. Urbanek, pers. comm.), where the meadows dominated by the sedge *Carex lasiocarpa* are a transition stage preceding the establishment of wet conifer swamps (Stenzel 1982). Fire may also have played an important role in maintaining Yellow Rail habitats in the Lake Saint-François National Wildlife Area; alder (*Alnus*) scrubs have rapidly invaded the wet meadows there since property acquisition by the Canadian government in 1971, when burning was usually suppressed (Jean and Bouchard 1991). It seems that Yellow Rails do not use freshly burned marshes, at least not until the green vegetation has grown sufficiently to offer concealment to the birds. Furthermore, because fire destroys the senescent vegetation mat, burned areas will not be useable for nesting by Yellow Rails until the first or second spring after a fire, depending upon whether the fire occured in the spring or in the fall (Robert and Laporte, in prep.).

Habitat needs of the Yellow Rail may be less restrictive during migration than during the breeding season. During migration, the species is occasionally found in dry meadows and even on croplands (Salt and Salt 1976). As is the case with all rail species, Yellow Rails may be found in atypical habitats during migration, such as in cities, for example. This is likely due to the fact that they migrate at night (see General biology) and land at day break; given that habitat loss for wintering Yellow Rails has been so extensive in the U.S., it is not difficult to imagine that some rails must be forced to land even if it cannot see any suitable habitat.

GENERAL BIOLOGY

The Yellow Rail's biology was recently summarized by Bookhout (1995). Most of what is known about the nesting behaviour comes from Stalheim (1974, 1975), who studied birds in semi-captivity, and Stenzel (1982), who radio-tracked breeding birds in northern Michigan. Several publications have appeared since Bookhout (1995) (e.g. Robert et Laporte 1997, Robert *et al.,* 1997) and others based on work from Québec (M. Robert and P. Laporte), New-Brunswick (G. Forbes and P. Kehoe), Oregon (M. Stern and K. Popper) and Texas (K. Mizell and D. Slack) should appear soon.

Breeding

Yellow Rails probably start breeding when they are a year old. Pair formation likely occurs on the breeding grounds (Bookhout 1995). Females have only one brood per

season, although females that do not hatch their first clutch may renest (Stenzel 1982). Both males and females share the first stage of nest building, making crude scrapes in the vegetation. The hen finishes off the selected nest by herself, and continues to add to it throughout incubation and brooding (Stalheim 1974). The nest usually rests on the ground or just a few centimeters above it, and is typically covered with a concealing canopy of dead vegetation. Its walls are about 6-16 cm thick, made of fine vegetation woven into a cup 7-10 cm in diameter and 3-8 cm deep (Bookhout 1995, Robert and Laporte 1996). Yellow Rails may build more than one nest, using extra ones for brooding (Stenzel 1982).

The 7-10 eggs are laid a day apart. Incubation, carried out by the female alone, usually begins when laying is complete and continues for 17-18 days. Hatching is synchronous, and within a few hours the semiprecocial young can stand. Two days after hatching, the entire brood follows the hen away from the nest. The chicks have a small claw, or wing-claw, on each wing that they use to grip the vegetation as they roam around and when they climb back into the nest. They begin to feed themselves at about five days, are no longer brooded at three weeks, and fledge by 35 days (Stalheim 1974). Age at independence is unknown (Bookhout 1995).

Males may breed successively with two or more females, at least in captivity (Stalheim 1974). Unlike most other rallids, captive male Yellow Rails do not tend the young and stop associating with the female once incubation begins. However, Stenzel (1982), who worked in a natural setting, observed young in the company of both parents, as well as a male with chicks. He also observed a male with his mate at hatching time. The male Yellow Rail therefore could quite probably help taking care of the young—even if he is polygynous. Detailed studies of the mating system are lacking, and since non-monogamous mating is known to occur in the wild in only five of the world's more than 130 rail species (del Hoyo *et al.,* 1996), the Yellow Rail is sometimes presumed to form only monogamous pairs (Stenzel 1982, Bookhout 1995). Yet, other studies suggest that monogamy may not be the only mating system typical of this species: for example, both Stenzel (1982) and Robert and Laporte (1996) located nests of two females in the territory of one male.

Hatching success is likely very high; in Québec for example, all the eggs (9/9) in the nest found by Terrill (1943) hatched, and of the six nests found at l' Île aux Grues three had all the eggs hatch (9/9, 9/9, 9/9), two had 8 of 9 and 7 of 8 hatch and one had 7 of 9 hatch (Robert and Laporte 1996). Survival rates and nesting success should be similar to those found in other rails. Using birds of both sexes and all ages, Conway *et al*. (1994) found survival rates (from August to April) of 0.31 ± 0.26 for Soras and 0.55 ± 0.19 for Virginia Rails (*Rallus limicola*). They also found a nesting success rate of 0.53 for both species (which is a bit lower than for other rails).

When several pairs breed in the same marsh, activity areas of nesting birds overlap somewhat (Bookhout and Stenzel 1987). The males nonetheless patrol and seem to defend territories (Stalheim 1974, Bookhout 1995). Activity areas of mated males are often large compared to those of females. In Michigan, mated males

occupied a mean area of about 8 ha (range: 5.8-10.5 ha), while females remained in a 1-2 ha area before incubation and a 0.5 ha area during incubation (Bookhout and Stenzel 1987). Densities of breeding males were one per 25 ha and one per 86 ha for Klamath Marsh National Wildlife Refuge and Seney National Wildlife Refuge, respectively (Bookhout 1995).

Migration and movements

Yellow Rails usually arrive in the northern U.S. during the last week of April or the first week of May (Bookhout 1995). In southern Canada the first individuals are usually detected as early as 15 May (Robert and Laporte 1996, McGillivray and Semenchuk 1998). Water depth and temperature at breeding sites seem to affect establishment in spring (Stenzel 1982, Kaufman 1994). Very cold temperatures are avoided, and birds become lethargic and easy to capture (Stalheim 1974, Ripley 1977). Fall migration usually does not start until the second half of September or early October (Devitt 1939, Walkinshaw 1939, Manning 1952), continuing through October and early November. The latest date of fall occurrence in southern Québec is 26 October (Robert *et al.,* 1995) and the earliest fall arrival in Louisiana is 6 October (Bookhout 1995).

Yellow Rails migrate at night, and some may migrate in groups: Pulich (1961) once recovered 13 individuals under a 500-m TV tower in Texas, and at least 28 flushed from a burning field in coastal North Carolina (Chapman 1969). They migrate in a broad front across the continent, as indicated by the distribution of published migration records (Cooke 1914, Bookhout 1995, AOU 1998). Even though they look like poor fliers, they cover impressive distances (Ripley 1977, Remsen and Parker 1990). Stalheim (1974) estimates that 2-3 weeks are required for the Yellow Rail to travel from the Gulf of Mexico to its breeding range.

In 15 years of banding Yellow Rails at Seney National Wildlife Refuge, Michigan, R. Urbanek observed that males lacked strong fidelity to breeding territories; each year the same territories were occupied by different males, and of 134 breeding males banded there, only two were recaptured, both the year after being banded (Bookhout 1995). Similar results were obtained on Ile aux Grues (Québec), which had nesting areas and non-nesting areas. Of 21 birds banded in the nesting areas from 1993-1995, only 2 (9.5%) were recaptured on the island during the nesting period the year after they were banded. This was despite the fact that all males calling on the island each year were banded (75 were banded over the years).

In a recent study, a few Yellow Rails moved along the St. Lawrence River corridor from their nesting area to Ile aux Grues in order to molt, seemingly because the island harbours the largest high-marshes (ca. 530 ha) along the St. Lawrence corridor and is apparently free of terrestrial predators (Robert and Laporte 1999). Although these movements may not have been indicative of a genuine molt migration, they suggest a molt migration similar in some ways to that of many waterfowl. Among rallids, Eurasian Coots (*Fulica atra*) and American Coots (*F. americana*) are the only species known to have developed true molt migrations (del Hoyo *et al.,* 1996).

Food habits

The most important food of Yellow Rails has traditionally been considered to be snails (Walkinshaw 1939, Stalheim 1974, Ripley 1977), but this has been based largely on anecdotal information. Yellow Rails definitely eat snails, but they also eat a variety of other invertebrates as well as seeds (Robert *et al.,* 1997). For example, in Québec during summer, invertebrates and seeds had relative frequencies of 68% and 32%, respectively, with beetles (Coleoptera) representing almost two-thirds of the invertebrates taken. Spiders (Araneae) were second while other taxa (e.g. snails (Gastropoda) and flies (Diptera)) ranked much lower. Of the seeds identified, Cyperaceae and Juncaceae, particularly genera such as *Carex*, *Juncus*, and *Eleocharis*, were the most important food items. Winter, fall and spring food habits are probably similar to the summer diet, but the proportion of seeds could be higher (see Robert *et al.,* 1997). In summary, the Yellow Rail is mostly an arthropod-feeder that complements its diet with seeds.

The Yellow Rail is probably a daytime feeder, like most other rails, foraging in areas of shallow water concealed by dense vegetation. It picks its food from ground, from the surface of, and sometimes from below (3-4 cm) the water surface. It drinks by dipping its bill in water while opening and closing it, then lifting it out horizontally (Stalheim 1974, Bookhout 1995).

Behaviour

The Yellow Rail's "mouse-habits" are well-known by contemporary bird watchers and ornithologists. During daylight hours, it usually walks or runs, but almost never flies unless disturbed (for example if pursued by a dog)(Bookhout 1995, Robert 1997). It is particularly difficult to see upon approach, because, like other rails of its genus it usually remains stationary in the vegetation rather than fleeing as do other rails (Ripley 1977). It expertly slips through and hides in the dense marsh vegetation, aided by its buffy-and-black camouflage.

Its call is of particular interest, not only because it is often the only link between the bird and man, but also because it is quite peculiar. It is a rapid series of usually five monotonous and metallic *ticks* (or *clicks*) sounding like two pebbles tapped together: *tick-tick, tick-tick-tick*. In good atmospheric conditions, the clicking can be heard a kilometer away (Robert and Laporte 1996). Males click their "nuptial castanets" (Peabody 1922) much more often and regularly at night than during daytime.

Yellow Rail behaviour changes at night. Birds can be heard for hours, almost incessantly, often continuing until first light. They are much easier to flush or approach at night (Robert and Laporte 1996, Robert 1997). Many bird species living in dense vegetation are heard more regularly at night than by day, probably because their communication system is not dependent on vision, acoustic conditions are better, and the chances of attracting predators are reduced (Stalheim 1974). For example, three species that often nest in the same habitat as Yellow Rails— Sedge Wren, Le Conte's Sparrow, and Nelson's Sharp-tailed Sparrow—also sing persistently at night, sometimes more than

by day. This does not mean, as some have concluded, that the Yellow Rail is nocturnal. In many respects, it is much more active during the day than at night. For example, it does not feed at night, and its sexual and agonistic behaviours are much more frequent by day (Stalheim 1974). Moreover, it usually does not move about at night (unless disturbed), but calls from a stationary point (Stenzel 1982, Robert and Laporte 1996).

In Michigan (and probably in many other nesting localities across Canada and the U.S.), males usually cease calling in July (Stenzel 1982). The situation is similar in most localities where the species was recently found in Québec (Robert and Laporte 1996), except at Île aux Grues, where they usually stopped calling gradually from the first days of August until the last week of August. This difference is probably due to some individuals moving to Île aux Grues after nesting, apparently to molt. Although calling there ceases in late August, birds remain on the island for a few weeks afterwards and undergo a complete prebasic molt (Robert and Laporte 1996, Robert and Laporte 1999); as in other rallids, adult Yellow Rails lose all of their remiges and rectrices at once, as well as many body feathers, at the end of each summer before migrating south. They remain flightless for about two weeks (Stalheim 1974, Robert and Laporte 1996).

B. Eddleman (pers. comm.) suggests that Yellow Rails likely call very little or not at all on their wintering grounds. Very little is known about the species' distribution and ecology in winter, and the fact that there has been no substantive survey and/or study of the Yellow Rail on the wintering grounds is probably due to this species remaining largely silent in winter. As part of the first such study, K. Mizell (pers. comm.) has found after two years of field work in Texas that the birds do not call, nor do they respond to playbacks.

Adaptability

The Yellow Rail is one of the most seldom seen nesting birds in the U.S. and Canada. However, during the nesting season, a calling male can be captured by slowly approaching it within about 15 m, then imitating the call by tapping two small stones persistently until it approaches, after which it can be captured with a hand net (Bookhout 1995, Robert and Laporte 1997). Males are usually easily manipulated and seem fairly resistant to handling. In one study, all 71 males that regurgitated after having tartar emetic injected down the esophagus showed no sign of illness when released and no significant differences were found in the weights of pre-treatment and post-treatment birds that were recaptured (Robert *et al.,* 1997). However, females seem quite sensitive to handling during the nesting season (Stenzel 1982, M. Robert pers. obs.).

Stalheim (1974) maintained Yellow Rails in captivity, and some even reproduced. A major problem was inducing them to take prepared food; this had to be done gradually and the recipe had to be prepared with care. Probably the best way to ensure reproduction is to keep the birds in a natural setting that can provide natural live food and concealing vegetation (Stalheim 1974).

The dispersal capabilities of rallids in general are considered very good and this is probably also the case for Yellow Rails (Remsen and Parker 1990). Recent banding

recoveries indicate that many individuals apparently move (sometimes many hundreds kilometers) along the St. Lawrence River corridor (Québec) from one site to another during their calling period (Robert and Laporte 1999). The ephemeral nature of marshes and wet grasslands habitats dictates that most rallids must be good dispersers. Most freshwater marshes proceed through various droughts, floods, and/or successional stages (Remsen and Parker 1990), which explains why Yellow Rails, like other rallids, may occur at unpredictable times and places. For example, in 1994, Yellow Rails were found in unusual numbers in the northern prairies, as in Saskatchewan and around North Dakota, while they were apparently absent from Churchill that year (Kaufman 1994). The population at the Seney National Wildlife Refuge also varied from 1 to 85 singing males from 1995 to 1998 (R. Urbanek, pers. comm.). In the Rainy River region of Ontario in 1995, which was a late, wet spring, an area 6 km southeast of the Big Marsh had numerous small meadows in which Yellow Rails could be heard; that same area in 1994, a dry year, had none singing (D. Elder, pers. comm.).

Yellow Rails are sometimes found in croplands, especially during migration. Mature rice fields seem to provide an appropriate "artificial" habitat for migrating (and probably wintering), and seem to be used extensively by Yellow Rails (Lowery 1974, Cardiff and Smalley 1989). This is not surprising because habitat selection may be influenced primarily by plant physiognomy and maximum water levels (Robert and Laporte, in prep.), and rice fields are very similar to sedge marshes in that they have dense, fairly low herbaceous vegetation where there is very little or almost no standing water but where the substrate usually remains saturated.

LIMITING FACTORS

Habitat loss

A detailed analysis of habitat loss for Yellow Rails was presented above in "Trend in quality and quantity of critical habitat". The salient points are summarized below.

Wetland loss unquestionably is the greatest threat to the Yellow Rail (Eddleman *et al.,* 1988, Bookhout 1995), both in Canada and in the U.S., and there is no doubt that the population has been affected by habitat loss and degradation (Robert 1997). Loss of habitat known to have been used in the breeding season by Yellow Rails has been documented in Oregon, northwestern Ontario, southern Ontario, and southern Québec. We have not been able to find similar documentation in the prairies, but the landscape changes that have occurred there are very well documented. Hence, from a largely pristine environment at the turn of the century, the prairie-parkland region now comprises the largest expanse of agricultural land in Canada (Turner *et al*. 1987), and as of 1986, about 40% of the original wetlands in Prairie Canada had been lost (Canada/United States Steering Committee 1986). There is little doubt that considerable amounts of Yellow Rail habitat have been lost in this region. Specific documentation is lacking only because litte work has been done there on the species.

Habitat loss is occurring even in the last pristine stronghold, the west coast of Hudson/James Bay. However, it is unclear how much of a problem this currently poses to Yellow Rails, and there is uncertainty regarding the future dynamics of the enormous Snow Goose population.

Habitat loss is also a concern regarding the smaller U.S. breeding population. The status of habitat in the U.S. is also important because the entire global population migrates through that country. However, the most important limiting factor for Yellow Rails, regardless of where they breed, is habitat loss on the wintering grounds, which has been so extensive that the wintering range may no longer be contiguous (T. Bookout, pers. comm.). In Texas and elsewhere in the U.S. wintering grounds, the species seems to be largely restricted to a narrow band of coastline, and coastal marshes throughout the Gulf states are threatened. The size of the known wintering range is no more than 7% the size of the breeding range (277,800 km^2 compared to 3,787,000 km^2).

Other limiting factors

Harvest of wild and planted rice results in nest destruction and excessive disturbance to rails (Fannucchi *et al.,* 1986, Eddleman *et al.,* 1988, del Hoyo *et al.,* 1996). Many Yellow Rails are apparently attracted to Louisiana rice fields (in fall and probably during winter also) and the potential for Yellow Rail casualities during harvesting is important. In fact, most specimens at the Louisiana State University Museum of Natural Science were found killed or mutilated by hay mowers near Baton Rouge (Cardiff and Smalley 1989). Evidence of this sort of injury has also been reported by Lowery (1974). A large portion of the Ile aux Grues (Québec) wet meadows is mowed annually from late-June to September, and farmers there have accidentlly killed some (Robert and Laporte 1996). Others have had their legs cut off during harvesting in the Abitibi region (Cyr and Larivée 1995).

Other less important limiting factors include lead contamination, hunting, disturbance by birders and collisions during migration. Lead shot is a major contaminant that can potentially affect rails (Eddleman *et al.,* 1988). Some have been found in the gizzards of many Soras in the U.S. (Artmann and Martin 1975, Stendell *et al.,* 1980); the highest incidences occured in marshes with tidal action, on waterfowl refuges, and on areas that have long been used for hunting. This threat has likely diminished with the decrease in the use of lead shot in favour of steel shot for waterfowl hunting. The effects of contaminants on rails are poorly known (Eddleman *et al.,* 1988), and there is no indication one way or the other that Yellow Rails have been affected by the widespread use of pesticides in marshes (Ripley 1977).

Although it is illegal to hunt Yellow Rails anywhere in the U.S. and in Canada (except in Ontario and in the Yukon), a few individuals are likely taken, accidentally or otherwise, especially by waterfowl and Common Snipe (*Gallinago gallinago*) hunters (see Meredith 1935). No rails have been legally hunted in Canada since 1994 (Dilworth-Christie and Dickson 1997) and the sport probably has a minimal impact on

populations. Yellow Rails may also be killed by flying into TV towers, telephone wires and lights (Barrows 1912, Roberts 1932), and some get stranded in large cities (Bull 1974, Whelan 1975). Thirteen individuals were once found at the foot of a 500 m TV tower in Texas (Pulich 1962). The impact of such accidents on populations is unknown (Bookhout 1995).

The Yellow Rail is greatly sought after by birders, and frequent visits to a site can cause considerable disturbance. For example, 70 participants in an annual *American Birding Association* meeting went to McGregor Marsh in Minnesota, surrounded, and captured a Yellow Rail (Bernstein 1988). Similar reports have emanated from elsewhere, especially Québec (Cyr and Larivée 1995). Fortunately, the famous "Rail Buggies", used for flushing wintering rails in the Anahuac National Wildlife Refuge (Texas) and other U.S. wintering areas, were discontinued about 10 years ago because many rails were killed and the habitat was greatly affected (Holt 1993, K. Mizell pers. comm.).

Predators

Walkinshaw (1939) found two dead Yellow Rails that had been killed by a raptor and observed the remains of one in an owl pellet. A radio-tracked bird in Québec (Robert and Laporte 1996) was apparently taken by a Red Fox (*Vulpes vulpes*), while another was retrieved by a House Cat (*Felis catus*) in Indiana (Kirkpatrick 1980). Herons (*Ardea herodias*, *Casmerodius albus*) may eat a large number of rails during extremely high tides if adequate upland cover is unavailable around tidal marshes (Evens and Page 1986, Eddleman *et al.,* 1994). Birders have reported having seen Yellow Rails hunted in this opportunistic fashion at Point Reyes (California), where the species is considered of exceptional occurence (P. Lehman and C. Elphick, pers. comm.). Northern Harriers (*Circus cyaneus*) and Short-eared Owls (*Asio flammeus*) frequent breeding sites in Michigan and Québec and are potential predators (Bookhout 1995, M. Robert, pers. obs.). In Texas, the Water Moccasin (*Agkistrodon piscivorus*) is a known predator, and other likely predators include Northern Harriers, Raccoons (*Procyon lotor*), Minks (*Mustela vison*), Bobcats (*Lynx rufus*), and possibly Barn Owls (*Tyto alba*) (K. Mizell, pers. comm.).

SPECIAL SIGNIFICANCE OF THE SPECIES

Public interest

The Yellow Rail is one of the most sought-after breeding birds by bird-watchers in North America (Anderson 1977, Bennett 1981, Savaloja 1981). Much information on this bird, especially details on sites where they can be found, have been published in the magazine *Birding*, which is very popular among serious North American birders. The Yellow Rail was recently featured in an article (Robert 1997) in the *Rare, Local, Little-known, and Declining North American Breeders* section. Birders seek this species to the extent that until recently it was possible to take "Rail Buggies" used for flushing

wintering rails in Anahuac National Wildlife Refuge (Texas) and other U.S. wintering areas (e.g in Louisiana)(Anderson 1977, McKee 1987). In southwestern Louisiana, especially in the Lafayette region, birders go to rice fields to watch Yellow Rails being flushed by combines (Cardiff and Smalley 1989).

Even though birders searching for this species do so in winter, a few papers discuss methods for observing it on the breeding grounds (Bennett 1981, Savaloja 1981, 1984, McKee 1987, Robert 1997). It would be feasible and useful to organize Yellow Rail observation tours during the breeding season, which could help sensitize the public to this special bird (Anderson 1977, Stenzel 1982); for example, such tours have been conducted at Seney National Wildlife Refuge (T. Bookhout, pers. comm.). In Québec, interpretation displays on the Yellow Rail will be installed in the high-marshes of Île aux Grues in spring 1999.

Global range and status

The Yellow Rail's global distribution is restricted to North America. It breeds exclusively in Canada and the northern U.S, with Canada comprising about 90% of its breeding range. It is thus considered a species with a very high Canadian supervisory responsibility score; it is also considered a high concern species in Canada (Dunn 1997). The very closely related Swinhoe's Rail of Asia, sometimes considered con-specific with the Yellow Rail (Olson 1973, Ripley 1977, Bookhout 1995), is listed Vulnerable by the International Union for the Conservation of Nature and Natural Resources (IUCN 1996). The Nature Conservancy has also expressed some concern for the Yellow Rail's long-term global status by ranking it G4 (The Nature Conservancy 1998). Finally, the Yellow Rail is listed as a Migratory Nongame Bird of Special Management Concern in the U.S., which identifies migratory non-game birds that, without additional conservation action, are likely to become candidates for listing under the *Endangered Species Act*.

Status of other species found in Yellow Rail habitats

In Canada, the only other bird at risk typically found in Yellow Rail habitats is the Short-eared Owl, which was listed Vulnerable in Canada in 1994 (COSEWIC 1998). The Canadian status of two other birds that often nest in the same habitat as Yellow Rails – the Sedge Wren and the Nelson's Sharp-tailed Sparrow – were also assessed, but those two species were listed Not at Risk in 1993 and 1998, respectively (COSEWIC 1998).

EVALUATION AND PROPOSED STATUS

We estimate that there are roughly a few thousand pairs of Yellow Rails breeding in the Hudson/James Bay area, another 2,000 pairs elsewhere in Canada, and about 600-750 in the U.S. Outside of the Hudson/James Bay area, breeding sites are widely dispersed. Wetland loss is a concern throughout much of North America. Animal and

plant species associated with wetlands are often considered to be of particular concern. Among such species, the Yellow Rail is especially vulnerable because the specific wetland habitat that it uses is usually the easiest and the first portion of the wetland that is converted for human endeavours.

The population has declined and is still declining throughout its southern range, albeit more slowly now. In the remaining portion of its range, the Hudson/James Bay region, it may also be declining in certain areas; certainly the degradation of breeding habitat caused by Snow Geese cannot be helping it. The relatively small wintering range is also declining. The rate of habitat decline on the whole seems to be slow to moderate — it cannot be described as rapid, although it probably was rapid earlier this century throughout most of its range south of the Hudson/James Bay region. The causes of these habitat declines are mostly a result of human activities, whether direct (e.g. wetland drainage) or indirect (e.g. Snow Goose), and we can safely conclude that Yellow Rail habitats are still declining. The decline is probably not rapid today, and the species is clearly not facing imminent extirpation, so Endangered status is not warranted. The relatively small wintering range, combined with the considerable pressure on the habitats that the Yellow Rail is known to use, could likely become the key limiting factor if it is not already.

Information available currently does not allow us to determine whether Yellow Rail extinction would become inevitable if present trends on both the wintering grounds and breeding grounds are not reversed. Nevertheless, extinction seems to be very unlikely over the next few decades. We therefore recommend that the Yellow Rail be designated Vulnerable in Canada (although if we were to strictly apply the COSEWIC criteria, we might have to propose Threatened status because there is good evidence that the Canadian population has declined and continues to decline).

Given the current discussions regarding criteria for selecting species at risk in Canada, we felt it might be instructive to apply the IUCN criteria to the Yellow Rail at the national level. We feel it is possible that the Canadian breeding population could decline by 20% over the next 10 years (Criterion A for Vulnerable), but that under present conditions such a decline would likely take a bit longer (e.g. 15-25 years). In addition, the total breeding population in Canada may be less than 10,000 individuals (Criterion C for Vulnerable). Thus Near Threatened would clearly be justifiable under the IUCN criteria and Vulnerable might be justifiable.

The Yellow Rail has not been listed by the IUCN (at the global level), but given the new information presented in this report, application of the same criteria that were applied for Canada could be justified at the global level, thus giving a Near Threatened and possibly a Vulnerable designation using the IUCN criteria at the global level. (The U.S. breeding population adds relatively few pairs to the global population in relation to the larger Canadian population, and declines in the U.S. have been and probably continue to be more drastic than in Canada.)

TECHNICAL SUMMARY

Coturnicops noveboracensis
Yellow Rail Râle jaune
[Population name (if applicable)] none
[Range of Occurrence in Canada (by province / territory / ocean)] AB, BC, MB, NB, NT, ON, QC, SK

Extent and Area information	
• *extent of occurrence (EO)(km²)*	3 million
• *specify trend (decline, stable, increasing, unknown)*	Stable
• *are there extreme fluctuations in EO (>1 order of magnitude)?*	No
• *area of occupancy (AO) (km²)*	Several 100s
• *specify trend (decline, stable, increasing, unknown)*	Declining
• *are there extreme fluctuations in AO (>1 order magnitude)?*	No
• *number of extant locations*	500 – 1000+
• *specify trend in # locations (decline, stable, increasing, unknown)*	Declining
• *are there extreme fluctuations in # locations (>1 order of magnitude)?*	No
• *habitat trend: specify declining, stable, increasing or unknown trend in area, extent or quality of habitat*	Moderate/slow decline Decline more severe on wintering grounds
Population information	
• *generation time (average age of parents in the population) (indicate years, months, days, etc.)*	2y or more
• *number of mature individuals (capable of reproduction) in the Canadian population (or, specify a range of plausible values)*	About 10,000
• *total population trend: specify declining, stable, increasing or unknown trend in number of mature individuals*	Uncertain; possibly declining
• *if decline, % decline over the last/next 10 years or 3 generations, whichever is greater (or specify if for shorter time period)*	Unknown
• *are there extreme fluctuations in number of mature individuals (> 1 order of magnitude)?*	No
• *is the total population severely fragmented (most individuals found within small and relatively isolated (geographically or otherwise) populations between which there is little exchange, i.e., ≤1 successful migrant / year)?*	No
• *list each population and the number of mature individuals in each*	n.a.
• *specify trend in number of populations (decline, stable, increasing, unknown)*	n.a.
• *are there extreme fluctuations in number of populations (>1 order of magnitude)?*	n.a.
Threats (actual or imminent threats to populations or habitats) [add rows as needed]	
- declining habitat in area and quality, especially on wintering grounds which might be limiting to this species survival	

Rescue Effect (immigration from an outside source)	Not relevant
• *does species exist elsewhere (in Canada or outside)?*	Yes
• *status of the outside population(s)?*	1000 – 1500 inds at 100+ sites; declining
• *is immigration known or possible?*	Yes
• *would immigrants be adapted to survive here?*	Yes
• *is there sufficient habitat for immigrants here?*	Yes
Quantitative Analysis	None available

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Michel Robert completed his B.Sc. and M.Sc. at the Université de Montréal, where his thesis dealt with the night feeding habits of shorebirds wintering in Venezuela. Since then he has worked on a variety of projects as an ornithologist, first as a consultant (1986-1995), now as an employee of the Canadian Wildlife Service (since 1995). Most of his work has focused on rare and endangered birds in Québec, such as the Wild Turkey and the Loggerhead Shrike. In 1989, he produced the technical report, "The Threatened Birds of Québec", a comprehensive status determination of all the birds of Québec. From 1993 to 1996, he studied Yellow Rails in southern Québec, particularly along the St. Lawrence River corridor, and developed techniques to survey, band, and radio-track this secretive species, as well as characterize its nesting habitat. He develops and coordinates conservation and research projects for rare and endangered birds for the Canadian Wildlife Service, in Sainte-Foy. He is currently coordinating a study on the eastern population of the Barrow's Goldeneye and is collaborating in a research project on Harlequin Ducks. Michel has authored 13 technical reports, 8 scientific papers, and 15 magazine articles. He is the (volunteer) director of the ornithological quarterly "QuébecOiseaux".

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