Species Status Report

American White Pelican

Pelecanus erythrorhynchos

ʔOrānchāy (Chipewyan)
Tǫcháa (South Slavey)
Cahcahow (Cree)

IN THE NORTHWEST TERRITORIES

NORTHWEST TERRITORIES SPECIES AT RISK COMMITTEE

ASSESSMENT – SPECIAL CONCERN

April 2023

Species at Risk Committee status reports are working documents used in assigning the status of species suspected of being at risk in the Northwest Territories (NWT).

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ABOUT THE SPECIES AT RISK COMMITTEE

The Species at Risk Committee was established under the *Species at Risk (NWT) Act*. It is an independent committee of experts responsible for assessing the biological status of species at risk in the NWT. The Committee uses the assessments to make recommendations on the listing of species at risk. The Committee uses objective biological criteria in its assessments and does not consider socio-economic factors. Assessments are based on species status reports that include the best available Indigenous knowledge, community knowledge, and scientific knowledge of the species. The status report is approved by the Committee before a species is assessed.

ABOUT THIS REPORT

This species status report is a comprehensive report that compiles and analyzes the best available information on the biological status of American White Pelican in the NWT, as well as existing and potential threats and positive influences. Full guidelines for the preparation of species status reports, including a description of the review process, may be found at www.nwtspeciesatrisk.ca.

Environment and Climate Change, Government of the Northwest Territories, provides full administrative and financial support to the Species at Risk Committee.

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ASSESSMENT OF AMERICAN WHITE PELICAN

The Northwest Territories Species at Risk met on April 18-21, 2023 and assessed the biological status of American White Pelican in the Northwest Territories. The assessment was based on this approved status report. The Species at Risk Committee (SARC) determined that there was not enough available documented Indigenous and Community Knowledge (ICK) to prepare an ICK component of the status report. Therefore, the status report is based almost exclusively on Scientific Knowledge (SK). The assessment process and objective biological criteria used by the Species at Risk Committee are based on SK and are available at: www.nwtspeciesatrisk.ca.

Assessment: Special Concern in the Northwest Territories

Special Concern - The species that may become Threatened or Endangered in the NWT because of a combination of biological characteristics and identified threats.

Reason for the assessment: American White Pelican fits criterion SK(d) for Special Concern The species qualifies for Threatened status but there is clear indication of rescue effect from extra-limital subpopulations.

Status Category	**Criterion**	
Special Concern	SK(d)	The species qualifies for Threatened status but there is clear indication of rescue effect from extra-limital subpopulations.

Main factors:

- American White Pelican qualifies for Threatened under SK(D2) because the area of occupancy is less than 20 km² (the nesting colony is 8 km²), and it has only one known nesting location, such that it is prone to the effects of diseases within a very short period of time in an uncertain future.
- However, in the NWT and elsewhere, populations of American White Pelican have been increasing in numbers and there is clear indication of rescue effect (immigration) from southern populations.

Additional factors:

- American White Pelicans are susceptible to a variety of diseases and parasites that have the potential of wiping out entire colonies because of their colonial breeding behaviour.

Diseases include avian botulism, West Nile virus, H5N1 highly pathogenic avian influenza (HPAI or avian flu), and Newcastle disease. Disease outbreaks appear to be increasing in many parts of the White Pelican range.

Positive influences on American White Pelican and their habitat:

- White Pelicans are highly mobile birds with significant gene flow throughout the North American population. White Pelicans can change where they breed and/or forage if local conditions are no longer suitable. Further, they are likely able to colonize new areas and recolonize an area following local extirpation. They have been reported nesting in the Oracha Falls area on the Taltson River, NWT in the past, but current information is not available.
- Some climate change modeling suggests an expansion of White Pelicans at the northern edge of their range which represent breeding areas. This may result in population increases over time. High genetic diversity in White Pelicans, largely due to constant movement and mixing of individuals from different parts of the range, suggest they may be adaptable to a changing climate.
- White Pelicans are protected through various laws and regulations. In Alberta, the Slave River nesting islands are designated as a seasonal wildlife sanctuary in the *Alberta Wildlife Act* and Wildlife Regulations. In the NWT, the *Wildlife Act* prevents destroying or disturbing or taking an egg of a bird, the nest of a bird when the nest is occupied by a bird or its eggs, and the nest of a prescribed bird.
- The Pelican Advisory Circle provides educational resources and recommendations on safely viewing the Slave River Rapids colony.

Recommendations:

- Increased public education on the sensitivity of White Pelicans to disturbance has and will continue to help protect nesting colonies.
- Collection of Indigenous and community knowledge of White Pelican in the NWT and Alberta.
- Research to fill knowledge gaps identified in the status report on diseases and parasites, possible additional nesting area locations, feeding areas and diet, dispersal, migration, and immigration in the NWT.
- Further research on the effect of climate change on White Pelican and its habitat including modelling.
- Further research on the downstream effects of oil extraction operations on water, fish, and White Pelican.

Executive Summary

Scientific Knowledge

About the Species

Taxonomy

The American White Pelican (*Pelecanus erythrorhynchos*, hereafter White Pelican or pelican) is one of two species of the genus *Pelecanus* found in North America along with the Brown Pelican (*P. occidentalis*). Only the White Pelican is present in the NWT and surrounding region.

Description

The White Pelican is one of the largest birds in North America with a wingspan approaching 3 meters and weighing up to 9 kg. Males are larger than females but are largely indistinguishable by plumage. As the name would suggest, the White Pelican is almost entirely white in colour, except for black primary and outer secondary flight feathers. The breast and covert feathers turn a yellowish hue during the breeding season. White Pelicans have large legs and webbed feet; both are yellow. They have a large, yellow-orange pouched bill and breeding individuals develop a "horn" which is shed after the breeding season. During the breeding season, the bill and pouch become more vivid in colour.

Lifecycle and Reproduction

White Pelicans are colonial birds where groups of individuals associate closely primarily for nesting purposes (hereafter a colony). They lay eggs in May with an incubation period of about one month. The clutch size is typically two eggs; however, often only one chick is fledged. After a few weeks, chicks from multiple nests group together forming crèches or "pods" while the adults are out feeding. The age of maturity (begin breeding) of White Pelican is approximately three years. Generation time (average age of breeding individuals) is approximately 7-8 years. The life span of White Pelican is likely over 15 years with the oldest known wild White Pelican living over 26 years.

Diet and Feeding Behaviour

White Pelicans are largely opportunistic foragers. The diet consists mainly of small fish such as carp and minnows, crayfish, and salamanders. More information is required to understand the diet of White Pelicans in the NWT; however they have been photographed consuming Arctic Lamprey near the Slave River colony.

Physiology and Adaptability

White Pelicans are excellent swimmers but not good at walking on land. They are surface feeders that catch and strain food on the surface of shallow water bodies using their large bills.

White Pelicans are excellent flyers and usually travel in groups of dozens to several hundred. They often make long daily flights from the colony to foraging grounds. White Pelicans do not always return to breed and nest where they were born.

Interactions

White Pelicans are colonial breeders, meaning pairs of adult birds nest together on colonies ranging from dozens to thousands of individuals. Groups of birds from these colonies often travel together to and from foraging and loafing (i.e., resting, preening) sites as well as migrate together. Often, other species of birds nest on these colonies.

White Pelicans are sensitive breeders and any disturbance to the colony may cause adults to flee their nests. This can then lead to nest depredation, even from co-nesting species such as gulls who will take Pelican eggs if the adult Pelicans have fled. Other potential nest predators include foxes, ravens, and eagles. Although predation does occur on adult Pelicans, predation rates are highest on eggs and chicks. The level of predation on Pelicans in the NWT is unknown. Predation is often higher when water levels are low providing predators increased access to normally isolated nesting islands. However, the Slave River nesting islands remain isolated from shore and protected by rapids even at low water levels.

Human-caused disturbance on colonies can result in a reduction in breeding success or in complete breeding failures. Human disturbances include passing too close with motorized watercraft and low flying aircraft. Single isolated disturbances on colonies will likely not result in colony failures, but repeated disturbances can result in significant reductions in reproduction or even colony abandonment. When adults flee nests, this also leaves the eggs and chicks vulnerable to environmental exposure.

Place

White Pelicans use a variety of aquatic habitats for foraging and nesting. They forage in shallow wetlands, rivers, lakes, below rapids, and occasionally in open water if schools of fish are present. White Pelicans are considered highly sensitive to disturbance and require isolated nesting habitats usually on islands within proximity to foraging habitats. The Slave River colony is unique in its location on a fast-moving river with turbulent water. White Pelicans in this colony feed in the turbulent waters of the river as well as in shallow relatively calm waters more typical of White Pelicans in other parts of their range. More research is

needed to understand the habitats used by White Pelicans in the NWT.

There is a high level of genetic mixing across the entire White Pelican range suggesting high levels of immigration, emigration, and movement between colonies is possible.

White Pelicans have seasonal home ranges ranging from several hundred to several thousand square kilometers. Seasonal home range size varies by age and sex. Adults typically have larger seasonal home ranges than immature individuals (under three years old). Habitat composition and availability of forage may also influence seasonal home range size.

White Pelicans are found throughout North America mainly west of the Mississippi River; they make seasonal migrations to the Gulf Coast states, Mexico, and Central America.

The Slave River colony is the only known colony of birds with breeding season habitat within the NWT and it is at the northern extent of its range. The colony is located on the Slave River approximately 8 km southeast of Fort Smith, NWT near Mountain Portage Peninsula, and feeds and loafs daily near the Rapids of the Drowned adjacent to Fort Smith, NWT. It is unknown where the Pelicans seen in the NWT migrate to during winter months.

Historically, White Pelican in the NWT have been recorded nesting on a small rocky islet in the Desmarais group of islands on Great Slave Lake, at Oracha Falls, Taltson River, and on islands near Mountain Portage Peninsula, Slave River. There are also regular sightings of White Pelicans throughout much of the lower half of the Territory.

Population

As of 2016, there are an estimated 180,000 White Pelicans across their entire range and numbers are increasing in most areas. Only one known colony of White Pelicans includes the NWT in its summer range, nesting just 3 km south of the NWT border. Available survey data (1907-2022) for the population of the Slave River colony indicates that the population of White Pelicans increased in the early 1900s and began to stabilize in the 2000s. Over the last three generations (approximately 24 years), the number of nests each year range between 419-810, suggesting a breeding adult population of 838-1,620 mature individuals. Additionally, approximately 500 additional non-breeding birds are thought to be traveling with the breeding birds each year.

Threats and Limiting Factors

White Pelicans are highly sensitive breeders and vulnerable to a variety of disturbances which can negatively impact an already low reproductive output. As colonial breeders, they are also highly vulnerable to disease transmission which can quickly decimate a population.

The Slave River colony near the NWT is the most northern known population of White Pelican in North America.

Disturbance

The Slave River colony has been exposed to human induced disturbances including watercraft, low-flying aircraft, dam releases, and transmission line installation. Single disturbance events may result in reduced or failed nesting success for that year, however if disturbance of nesting sites persists, permanent colony abandonment may occur.

Predation

Predators of White Pelicans in the NWT may include foxes, coyotes, wolves, eagles, ravens, and gulls, although it is not known what levels of predation occur. Chicks may become vulnerable to opportunistic predation when disturbances temporarily cause adults to abandon eggs and chicks. Co-nesting gulls are a common example of this opportunistic predation on White Pelicans.

Disease and Parasites

White Pelicans are susceptible to a variety of diseases and parasites. Diseases include avian botulism, West Nile virus, H_5N_1 highly pathogenic avian influenza (HPAI or avian flu), and Newcastle disease.

Disease outbreaks appear to be increasing in many parts of the White Pelican range – however, these diseases have not been detected in White Pelicans at the Slave River colony. White Pelicans also are known to harbor parasites include lice, mites, and worms, although mortality from them is thought to be minimal. In the NWT, necropsies of two White Pelicans recorded the presence of lice and nematodes. The impacts of disease and parasites on White Pelicans in the NWT is unknown. The extent to which diseases and parasites impact a population depends on many factors including the type of disease, number of birds in the colony, and proximity of birds.

Climate Change

Climate change has the potential to pose a significant threat to White Pelicans through increased water level fluctuations, higher spring precipitation, flooding, and exposure to extreme weather. The changes expose eggs and chicks, increasing mortality, reducing survivability, and ultimately lowering breeding success. Shifts in migration and breeding timing also impacts the frequency and length of time that chicks are exposed to extreme weather when they are most vulnerable.

Persecution

White Pelicans have been historically persecuted by humans largely due to perceived

competition for fish resources. Adults, eggs, and chicks have been intentionally killed or destroyed because of misunderstandings about Pelican diet. These human-wildlife conflicts still occur, but mainly on wintering grounds where fish farms exist. White Pelicans have also been killed for sport and consumption, but this practice is thought to have largely ceased. It is unknown what impacts past or present persecution by humans have caused on the Slave River colony.

Pollutants and Contaminants

Pollutants and contaminants throughout the White Pelican range have been significantly reduced since many pesticides were banned. However, due to their colonial breeding behaviour and sensitivities to disturbance, even single exposure events to pollutants or contaminants could result in the loss of entire colonies. While local exposure and risks may be low in the NWT, migrating birds are at risk to pollutants and chemicals on wintering grounds and during migration. This exposure could have detrimental effects on survival and reproduction to local populations. Therefore, it is important to monitor local populations for signs of exposure even if local sources of pollution and contaminant exposure appears low.

Positive Influences

Mobility and Genetic Diversity

White Pelicans are highly mobile birds capable of migrating long distances on an annual basis. Based on genetic analysis, there are high levels of genetic mixing occurring throughout the White Pelican range suggesting they do not always return to where they were born. This makes recolonization of failed colonies possible and suggests the potential for range expansion if the right habitat and environmental conditions exist. Similarly, the high mobility of White Pelicans may allow them to colonize elsewhere if exposed to temporary disturbances. It is important to note that the sensitivity of White Pelicans to disturbances can cause temporary reductions in reproductive success. If the disturbances continue and the colony does not recolonize, populations will decrease due to repeated reproductive failures. The high mobility of White Pelicans allows them to change foraging locations if their current source does not meet their requirements, and alternative locations exist. Like disturbance on colonies, if the disruption to their foraging locations continues, negative impacts to survival and reproduction could occur.

Climate Change

Climate Change represents a challenge to many wildlife species. Current modeling of the effects of climate change on White Pelicans suggests a northward expansion of populations which could potentially increase populations in the NWT. Surveys on the Slave River colony

near Fort Smith show a slow increase in the population over time. In recent years (since about 2015), White Pelicans have been reported farther north than previous observations (e.g., Norman Wells, Tsiigehtchic, Kugluktuk). However, climate change projections also show a decrease in wintering range for White Pelicans. It is unknown how this shift in range will affect both local and overall populations of White Pelicans in North America. High genetic diversity in White Pelicans, largely due to constant movement and mixing of individuals from different parts of the range, suggest they may be adaptable to a changing climate. Studies are needed to determine the true effects of climate change on White Pelicans.

Legal Protection and Public Education

The Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), the International Union for Conservation of Nature (IUCN), and the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) do not consider White Pelicans as an at-risk species. White Pelicans are not covered by the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES).

White Pelicans are protected through a variety of conservation efforts and regulations. In the United States, they are protected by the *Migratory Bird Treaty Act of 1918* (MBTA), but in Canada they are not protected by the *Migratory Birds Convention Act* (MBCA). In Canada, they are not included in Article I of the *Migratory Bird Convention Act, 1994*. The Committee on the Status of Endangered Wildlife in Canada (COSEWIC) previously assessed White Pelican as Threatened in 1978 but reassessed the species in 1987 and designated White Pelican as not at risk. In Alberta, seven breeding areas, including the Slave River and Namur Lake nesting islands, have been designated seasonal wildlife sanctuaries in the Alberta *Wildlife Act* and *Wildlife Regulations* since 1977. It is illegal to enter or approach within 800 metres of seasonal wildlife sanctuaries between April 15 and September 15 (Alberta *Wildlife Act* and *Wildlife Regulations*). In the NWT, the *Wildlife Act* prevents destroying or disturbing or taking an egg of a bird, the nest of a bird when the nest is occupied by a bird or its eggs, and the nest of a prescribed bird.

The Pelican Advisory Circle also works with the Town of Fort Smith, the Government of the Northwest Territories, and the Government of Alberta to provide resources to community members, tourists, and the public to educate and provide recommendations on safely viewing the Slave River Rapids colony. Increased public education on the sensitivity of White Pelicans to disturbance has and will continue to help protect nesting colonies.

Technical Summary

Question	Scientific Knowledge
Population Trends	
Generation time (average age of parents in the population) (indicate years, months, days, etc.).	Estimated at 7-8 years based on an average adult mortality of 21% and an age of first reproduction of 3 years.
Number of mature individuals in the NWT (or give a range of estimates).	Varies between 419-810 nesting pairs (838-1,620 individuals) annually.
Percent change in total number of mature individuals over the **last** 10 years or 3 generations, whichever is longer.	Over the last 10 years, populations have remained relatively constant or slightly increasing fluctuating between 419-810 nesting pairs (838-1,620 individuals) annually.
Percent change in total number of mature individuals over the **next** 10 years or 3 generations, whichever is longer.	Unknown, but expected to stay stable or slowly increase.
Percent change in total number of mature individuals over any 10 year or 3 generation period that includes **both the past and the future**.	The greatest change in population over a 10-year period occurred from 1991 to 2001 when populations increased from 205 nesting pairs to 756 nesting pairs (410-1,512 mature individuals).
If there is a decline in the number of mature individuals, is the decline likely to continue if nothing is done?	No, but there is annual variation.

If there is a decline, are the causes of the decline reversible?	Not applicable.
If there is a decline, are the causes of decline clearly understood?	Not applicable.
If there is a decline, have the causes of the decline been removed?	Not applicable.
If there are fluctuations or declines, are they within, or outside of, natural cycles?	Fluctuations appear to be normal year-to-year variation.
Are there 'extreme fluctuations' (>1 order of magnitude) in the number of mature individuals?	No.
Distribution	
Estimated extent of occurrence in the NWT (in km^2).	Approximately 373,173 km^2, but 117,108 km^2 without incidental observations in the Sahtú, Inuvialuit Settlement Region or Gwich'in Settlement Area.
Index of area of occupancy (IAO) in the NWT (in km^2; based on 2 x 2 grid).	8 km^2 (represents the currently known Slave River breeding colony).

Number of extant locations[1] in the NWT.	The most serious plausible threats to White Pelican in the NWT are flooding, predation, diseases and parasites, and disturbance by humans. These threats primarily relate to the Slave River breeding colony. Therefore, using the breeding colony as a minimum, there is at least one location for White Pelicans in the NWT.
Is there a **continuing decline** in area, extent, and/or quality of habitat?	No.
Is there a **continuing decline** in number of locations, number of populations, extent of occupancy, and/or IAO?	No.
Are there 'extreme fluctuations' (>1 order of magnitude) in number of locations, extent of occupancy, and/or IAO?	No.
Is the total population 'severely fragmented' (most individuals found within small and isolated populations)?	Yes. The nearest colony (Slave River colony) feeds and loafs (daily) north of the NWT border and nests about 8 km southeast of Fort Smith. The next closest colony is less than 300 km away at Namur Lake in northeastern Alberta.

[1] Extant location - The term 'location' defines a geographically or ecologically distinct area in which a single threatening event can rapidly affect all individuals of the species present. The size of the location depends on the area covered by the threatening event and may include part of one or many subpopulations. Where a species is affected by more than one threatening event, location should be defined by considering the most serious plausible threat.

Immigration from Populations Elsewhere	
Does the species exist elsewhere?	Yes. Breeding colonies of White Pelicans within Canada are found in British Columbia, Alberta, Saskatchewan, Manitoba, and Ontario. They are also found in central and western United States, Mexico, and central America.
Status of the outside population(s)?	Overall, populations are slowly increasing throughout most of the range. In Canada, White Pelicans are not at risk and in Alberta they are Secure. However, White Pelicans are listed as Threatened in Ontario and Endangered under the *British Columbia Wildlife Act*.
Is immigration known or possible?	Yes. White Pelicans are highly mobile and genetic analysis suggests high levels of immigration.
Would immigrants be adapted to survive and reproduce in the NWT?	Yes.
Is there enough good habitat for immigrants in the NWT?	Likely. White Pelicans use a variety of aquatic habitats for foraging and breeding including shallow wetlands, rivers, lakes, below rapids and isolated islands near foraging habitat. This type of habitat is found throughout the NWT. Further, historic evidence of other breeding sites within the NWT suggests that there are areas with suitable habitat in the NWT which may support immigrants to establish new breeding colonies.
Is the NWT population self-sustaining or does it depend on immigration for long-term survival?	Likely self-sustaining. Current population size, historical increases, and assumed high levels of immigration support a sustainable population. However, due to fragmented breeding colonies and sensitivities to disturbances, significant exposure to contaminants or repetitive disturbance could result in the permanent abandonment of the Slave River colony. It is unknown whether individuals from other colonies would immigrate to the area or whether birds from the Slave River colony would emigrate to other

	areas of suitable habitat.
Threats and Limiting Factors	
Briefly summarize the threats and limiting factors and indicate the magnitude and imminence for each.	White Pelicans are highly sensitive to both natural and human disturbance including watercraft, low-flying aircraft, dam releases, and transmission line installation. Single disturbance events may result in reduced or failed nesting success for that year. If continued disturbance of nesting sites occurs, permanent colony abandonment may occur. There are a variety of diseases and parasites which have the potential of wiping out entire White Pelican colonies because of their colonial breeding behaviour. However, there has been no documentation of White Pelicans in the Slave River colony carrying these diseases. Although, parasites have been found on dead White Pelicans in the NWT. White Pelicans are vulnerable to predation by a variety of species including foxes, coyotes, wolves, eagles, ravens, and gulls. Opportunistic predation on eggs and chicks by gulls and ravens also occurs following disturbances. White Pelicans have previously been persecuted by humans. However, the misperception of White Pelicans competing with commercial fisheries has significantly decreased in recent times. Climate change has the potential to pose a significant threat to White Pelicans through increased water level fluctuations, higher spring precipitation, flooding, and exposure to extreme weather. The changes expose eggs and chicks, increasing mortality, reducing survivability, and ultimately lowering breeding success. Shifts in migration and breeding timing also impacts the frequency and length of time that chicks are exposed to extreme weather when they are most vulnerable. Although pollutants and contaminants (including from

	industrial development) have been significantly reduced, they still pose a threat to White Pelicans. Due to their colonial breeding behaviour and sensitivities to disturbance, even single exposure events could result in the loss of entire colonies, and there is only one known current nesting location near the NWT.
Positive Influences	
Briefly summarize positive influences and indicate the magnitude and imminence for each.	White Pelicans are highly mobile birds with significant gene flow throughout the North American population. White Pelicans can change where they breed and/or forage if local conditions are no longer suitable. Further, they are likely able to colonize new areas and recolonize an area following local extirpation. Some climate change modeling suggests an expansion of White Pelicans at the northern edge of their range which represent breeding areas. This may result in population increases over time. White Pelicans are protected through various laws and regulations. Continued support for these protections as well as increased public awareness of their sensitivities to disturbance represent a positive influence for the future of this species.

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PLACE NAMES

The maps below (Figure 1, 2 and 3) are intended to help provide context to readers who may be unfamiliar with the NWT geographic features and place names referred to in this status report.

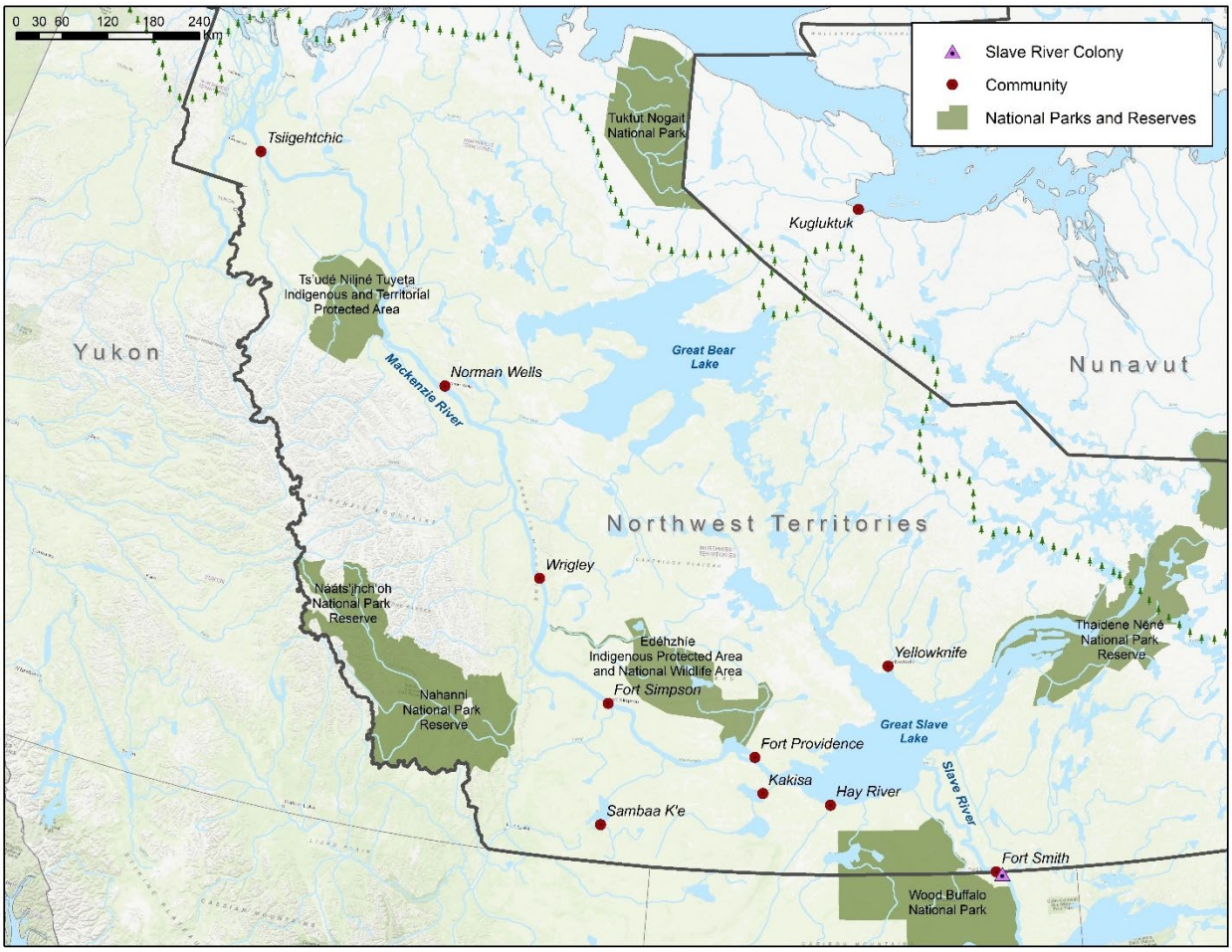

Figure 1. Map of the Northwest Territories showing communities and locations mentioned in this report. Map courtesy of Mélanie Routh, GNWT-ECC.

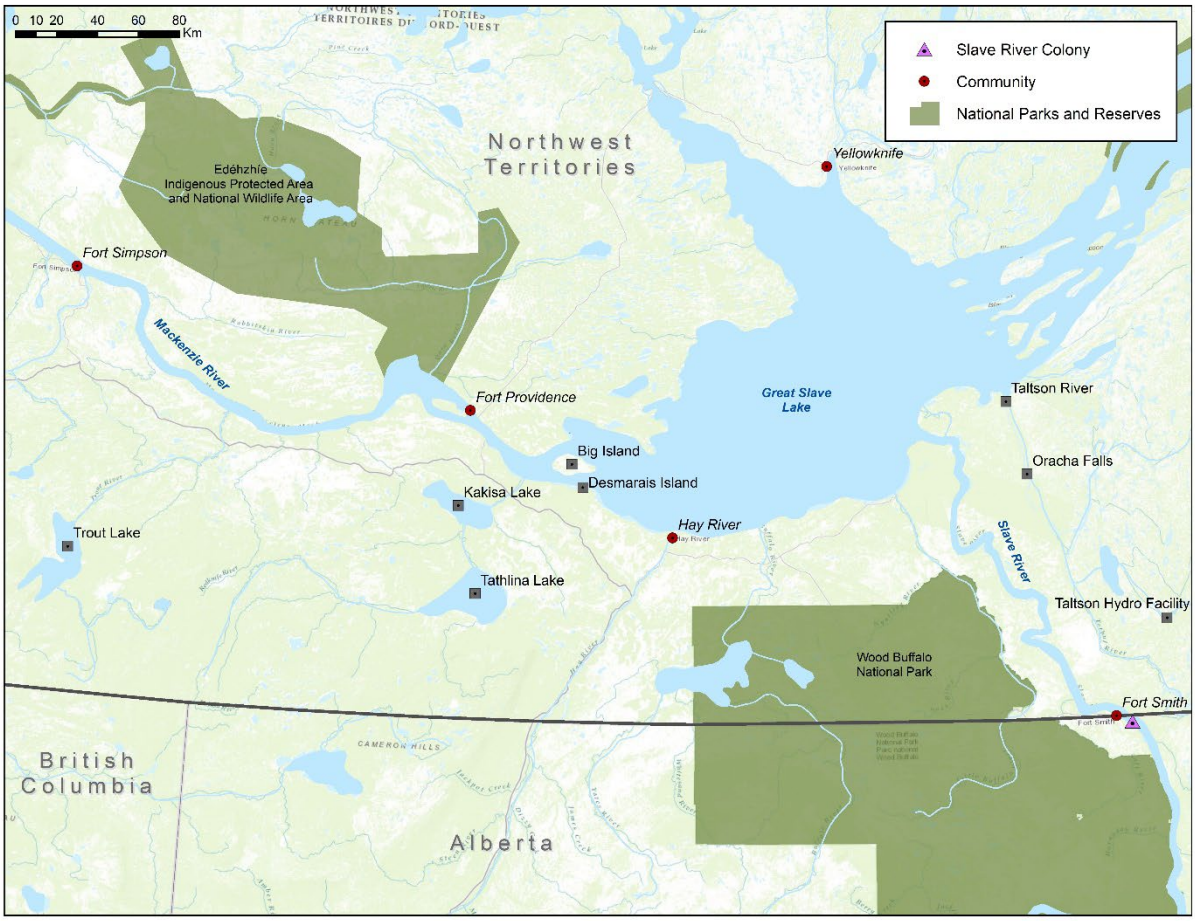

Figure 2. Map of the southern Northwest Territories showing communities and locations mentioned in this report. Map courtesy of Mélanie Routh, GNWT-ECC.

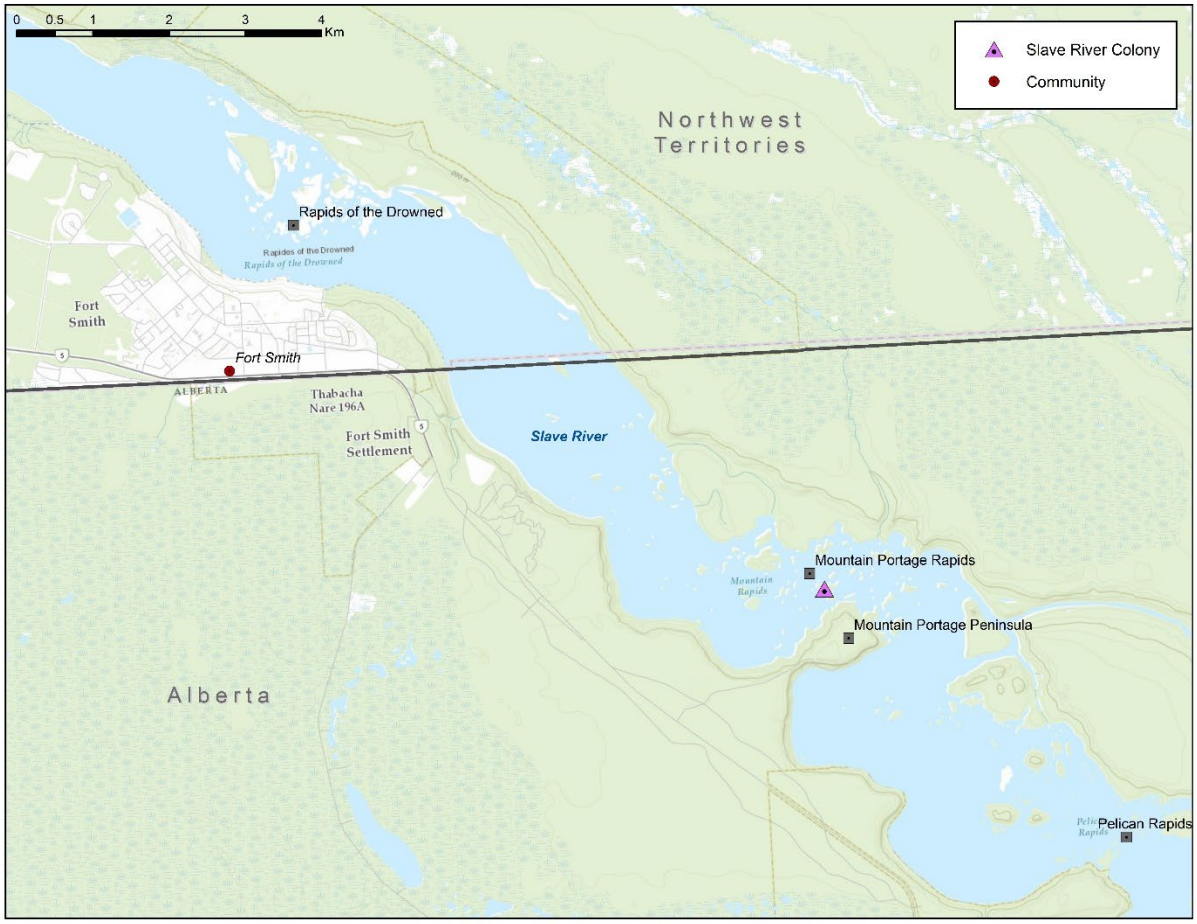

Figure 3. Map of the Slave River area where American White Pelicans are observed frequently showing communities and locations mentioned in this report. Map courtesy of Mélanie Routh, GNWT-ECC.

Preface

In the preparation of this report, an effort was made to find sources of Indigenous knowledge, community knowledge, and scientific knowledge. Unfortunately, there is little available documented Indigenous or community knowledge for American White Pelican. Therefore, this report is based almost exclusively on scientific knowledge.

Preamble

This report is intended to review the status of American White Pelican in the NWT and provide the information necessary for SARC to evaluate the species' risk status in the NWT. However, detailed research on behaviour and ecology of pelicans in the NWT is limited. Biological information in this report is primarily from studies of pelicans in other parts of their range, and local knowledge on the Slave River colony was included to the extent possible. There is likely significant Indigenous and community knowledge on pelicans, but it has not been compiled or recorded therefore was not available for this report.

ABOUT THE SPECIES

Names and Classification

Scientific Name:	*Pelecanus erythrorhynchos* (Gmelin 1789)
Common Name (English):	American White Pelican, White Pelican
Common Name (French):	Pélican d'Amérique
Local Names:	
Chipewyan:	ʔOrānchāy (Fort Smith White Pelican Brochure)
South Slavey:	Tǫcháa (Fort Smith White Pelican Brochure)
Cree:	Cahcahow (Fort Smith White Pelican Brochure)
Populations/subpopulations:	Single large population with high gene flow
Class:	Aves
Order:	Pelecaniformes
Family:	Pelecanidae (pelicans)
Life Form:	Large water bird, Pelican

Systematic/Taxonomic Clarifications

The American White Pelican (*Pelecanus erythrorhynchos*, hereafter White Pelican) was originally described by the German Naturalist Johann Friedrich Gmelin in 1789. The genus *Pelecanus* is the Latin word for Pelican while *erythrorhynchos* come from the Greek words erythros ("red") and rhynchos ("bill") collectively meaning "red-billed Pelican". The White Pelican is one of two species of the genus *Pelecanus* found in North America along with the Brown Pelican (*P. occidentalis*). Based on genetic analysis, these Pelicans are part of clade of new world Pelicans along with the Peruvian Pelican (*P. thagus*) found in South America (Kennedy *et al.* 2013). Based on the Kennedy *et al.* (2013) analysis, there are only eight species of this genus recognized worldwide. The new world Pelicans are genetically divergent from an old-world clade of Pelicans which include the Dalmatian (*P. crispus*), Spot-billed (*P. philippensis*), Pink-backed (*P. rufescens*) and Australian Pelicans (*P. conspicillatus*) along with a closely related Great White Pelican (*P. onocrotalus*) (Kennedy *et al.* 2013). Pelicans are most closely related to the New World Vultures and Storks although more studies are needed to accurately place them systematically (Sibley and Ahlquist 1990). There are no known subspecies of White Pelican. The White Pelican is much larger and nearly all white with a yellow bill and legs whereas the plumage of the Brown Pelican is gray and brown. The two

species only overlap in range during the winter months in the Gulf Coast, Mexico, and Central America. Only the White Pelican is present in the NWT and surrounding region.

Description

White Pelicans are a distinguishable large white and black bird with a large pouched yellow bill, yellow legs with webbed feet, and bluish gray eyes (Figures 4 and 5). White Pelicans were described in detail by Behle (1958), Knopf (1975) and Palmer (1962). Adults are mainly white apart from black primary feathers, outer secondary feathers, alula (first digit feathers), and primary coverts (first layer of feathers covering primaries). In the breeding season, the bill and legs become more vivid and orange in colour and white plumes are displayed on the back of the head (Figure 4). A laterally flattened epidermal plate (often called a "horn") develops on the top of the bill (Figure 4) which is shed after the breeding season along with the plumes (Figure 5). The horn ranges from 40-80 mm in height; and males have larger horns than females. Although the specific function of the horn is unknown, it is likely used for courtship or territoriality (Knopf and Evans 2020).

Figure 4. Adult American White Pelicans from the Slave River colony in breeding plumage. Photographer credit: John McKinnon.

Figure 5. Adult American White Pelican, non-breeding plumage, on Slave River near colony approximately 8 km southeast of Fort Smith, NT. Photographer credit: John Blyth.

White Pelicans are one of the largest of birds that are native to North America. The total length of an adult White Pelican is 127-165 cm (Knopf and Evans 2020) and their wingspan ranges from 244-290 cm. White Pelicans have been reported to weigh up to 13.6 kg (Behle 1958) however, on average they weigh between 4.5 and 9 kg with males being slightly larger than females (Knopf and Evans 2020, Palmer 1962). Other than the difference in size, sex can be determined using the culmen (upper mandible) length (Dorr *et al.* 2005). White Pelicans are known for their long bills with males averaging 342 mm and females 288 mm in length.

White Pelicans are not good at walking but are capable of slow, awkward waddling to moderately fast movements on land when necessary. They are much better at swimming and flying. Pelicans are very capable swimmers with large air sacs located around the breasts which increase buoyancy up to 61.5% (Richardson 1943). Unlike Brown Pelicans, White Pelicans do not dive to feed, but rather swim along the surface gathering food with their bills. They usually swim in groups cooperatively feeding using their large, webbed feet for propulsion. Their webbed feet also aid in flight by pushing off for take off as well as acting like skis upon landing (Behle 1958). In the air, White Pelicans often fly in flocks forming vees or irregular shapes. They are commonly found soaring in thermals to gain altitude on sunny days and flying at low level and close to the water on windy days.

Life Cycle and Reproduction

Migration and Courting

Migration of White Pelicans from the wintering grounds to their breeding grounds occurs in March and April up to three weeks before pairing occurs (Knopf and Evans 2020). Upon arrival at a colony, courting and pairing quickly occurs. Pelicans are thought to begin mating at approximately three years of age (Knopf and Evans 2020, Sloan 1982). The timing that White Pelicans arrive at a colony depends on spring temperatures and ice-off dates. In northern colonies, such as the colony near Fort Smith and northern Alberta colonies, this occurs from the end of April to early May (Beaver and Lewin 1981). Local knowledge suggests that the arrival of White Pelicans to the Slave River colony occurs in late April (Fort Smith Attractions 2021). While understudied, fidelity to natal (where an individual was born) nesting sites is thought to be low due to homogeneous genetic data across the range of White Pelicans (Reudink *et al.* 2010). Similarly, breeding individuals may not return to the same nesting colony year after year based on the high level of genetic mixing across White Pelican range (Reudink *et al.* 2010). Leg bands on White Pelicans have been seen on birds at the Slave River colony even though banding has never occurred here suggesting these breeding individuals were born elsewhere (McKinnon pers. comm. 2021).

Nesting

During courtship, nests are built in 3-5 days nearly synchronously with nearby co-nesting White Pelicans (Knopf 1979). Nests are generally formed by the adults sitting and scraping nearby soil and vegetation with their bill into a shallow depression (Evans 1989). Both adults participate in nest building using materials immediately adjacent to the nest (Knopf 1979). Nests from previous years are not reused (Knopf and Evans 2020). The nest is usually poorly developed with little rim to keep eggs and chicks contained within the nest. Nests are 61 cm (maximum 89 cm) in diameter and 20 cm in height (maximum 30 cm) (Behle 1958). Depth of the nest cup is usually less than five centimeters (Schaller 1964). Nests provide minimal protection from the local environment; thus the incubating parent provides this protection (Knopf and Evans 2020).

Egg Laying

White Pelicans begin laying eggs 5-8 days after courtship (Evans and Cash 1985) and 4-5 days after selection of the nest site (Knopf 1979). In the NWT, egg laying occurs in May. Generally, a total of two eggs are laid separated by 1-2 days with hatching occurring approximately 30 days later (Knopf 1979). Eggs hatch during the month of June in the Slave River colony. The male adult guards the nest and female until the second egg is laid upon which the male may leave to forage (Knopf 1979). If the first eggs are lost, additional eggs are not laid and the nest and reproduction for that year is usually abandoned (Knopf and Evans 2020). The eggs are initially dull white with a rough surface that becomes smooth and discoloured over time. The eggs are

approximately 90 mm in length and 57 mm in width (Bent 1922, O'Malley and Evans 1980). Eggs weigh 154 g on average (Evans 1969) which is 2-3% of adult body weight (Behle 1958). The specific gravity of the eggs declines linearly over time making it a useful predictor of hatch date (O'Malley and Evans 1980). The thickness of the eggshells is approximately 0.65 mm (Anderson *et al.* 1969, Knopf and Street 1974) and is directly related to levels of environmental contaminants like dichlorodiphenyldichloroethylene (DDE).

Incubation

For approximately 30 days, both adults incubate one at a time while the other forages (Knopf 1979). The adults sit on the nest with the eggs under their feet to protect the eggs from the environment and from falling out of the nest (Evans 1989). Eggs are rotated throughout the day due to movements by the incubating adults (Evans 1989, Schaller 1964). The adults switch incubating the eggs usually every second day (range 1-3 days; Schaller 1964). The change-over usually occurs midday with the adult returning from foraging taking over following vocalizations and body gestures from both adults lasting approximately 8 minutes with the relieved bird departing after another 4 minutes on average (Schaller 1964). Egg abandonment is not uncommon, especially for the second egg once the first hatches. Partial neglect of the second egg is common and lowers the temperature of the egg (Evans 1989, Evans 1990b). Excessively lowered egg temperature delays hatching and can be fatal (Evans 1990c).

Hatching and Development

The unhatched chick begins making vocalizations 1-2 days before hatching (Evans 1990c, O'Malley and Evans 1980). The incubating parents respond to these vocalizations with increasing attentiveness (Evans 1988, Evans 1990a, Evans 1992, Nelson 1978). It takes one day on average for the chick to hatch (Evans 1990c) with the second egg hatching up to 4 days later (Cash and Evans 1986, Knopf and Kennedy 1980). Chicks are hatched without plumage with whitish down appearing within a day or two of hatching. Chicks are fully covered with down within a week. This down thickens and grays the following weeks with primary feathers emerging by the end of the first month (Behle 1958, Evans 1984a, Lingle and Sloan 1979). The chicks are guarded by parents for 2-3 weeks until the parents begin leaving the nest for foraging (Evans 1984b). This coincides with the complete covering of down and therefore ability of the chick to self-regulate body temperature (Abraham and Evans 1999, Evans 1984a).

The first hatched chick typically harasses the younger chick which can cause injuries, fewer feeding opportunities from the adults, and eventually death from exposure, starvation, or predation (Cash and Evans 1986, Evans 1984b, Evans and McMahon 1987, Knopf 1975, 1979). The chicks can crawl within the first week, walk within three weeks, and run and swim by the fourth week (Evans 1984b, Lingle and Sloan 1979, Schaller 1964). Once the chicks leave the nest after three to four weeks, they start forming groups called crèches or pods which may

serve as a thermoregulatory response to cold temperatures as well as protection from predators (Evans 1984b , Schaller 1964). First flights begin at about 9 weeks of age and most chicks are fully fledged by the 10th week (Hall 1925, O'Malley and Evans 1982). Parents alternate brooding (sitting on the nest) and foraging. Feeding chicks is accomplished by regurgitating forage up to four times a day in the first couple weeks (Schaller 1964) which slows to just over once a day when the chicks are in crèches (Cash and Evans 1986). This feeding continues until the chicks leave the colony.

Survival and Mortality

The American white pelican is a species with a k-selected life history (i.e., characterized by larger body size, smaller clutches, lower productivity, and longer life spans) (Sovada *et al.* 2014). Life history traits for White Pelicans in the Slave River colony have not been studied and are not known. However, a number of studies have been conducted on White Pelican populations in Utah and the northern plains including colonies at Gunnison Lake, Utah, Bitter Lake, South Dakota, and Chase Lake, North Dakota (Knopf 1979, Sidle *et al.* 1984, Sovada *et al.* 2013, 2014).

The productivity and mortality of chicks vary widely for White Pelican due to weather-related mortality of chicks, nest initiation timing, and siblicide.

For the Great Salt Lake population on Gunnison Island in Utah, productivity ranged from 0.85-0.89 young fledged per nest from 1973-1974 (Knopf 1979). Productivity was higher for eggs laid earlier in the nesting season and the mean nest productivity declined linearly from April to June (Knopf 1979). Estimates of productivity from the White Pelican colony at Chase Lake in North Dakota in the early 1980s ranged from 0.34-0.68 young fledged per nest through the month of August or approximately 10 weeks (Sidle *et al.* 1984; Sovada *et al.* 2013, 2014). In 2006, weather at Chase Lake was relatively mild with only five days categorized as severe – during this year nest success was 60-70% (or 0.60-0.70 young fledged per nest) (Sovada *et al.* 2014). However, in 2004 of 6,000-8,000 nests initiated at the end of May, less than 50 chicks remained by mid-June. The high mortality of 2004 at Chase Lake was attributed to an extended period of wet (precipitation, 78 mm), and windy (sustained maximum ~40 km/hr with gusts to 65 km/hr) weather (Sovada *et al. 2013,* 2014).

Pelicans are considered an obligate brood-reducing species and siblicide is a major source of chick mortality (Cash and Evans 1986, Johnson and Sloan 1978, Sovada *et al.* 2013). White Pelicans have a high mortality rate among second-hatched chicks and Johnson and Sloan (1978) report that in nests where two chicks hatch, only 3% of second chicks survive to two weeks of age. A similar survival rate for second-hatched chicks has also been observed in the northern plains colonies (2004-2008) (Sovada *et al.* 2013).

In Manitoba none of the second-hatched chicks were alive at 12 days (n = 50 nests); and survival was for an average of 3.7 ± 2.4 days (n = 13) and 4.9 ± 2.8 days (n = 32) (Cash and Evans 1986). In Utah only 9.4% (n= 374 nests) and 9.7% (n = 195 nests) of nests had both young fledge (Knopf 1979), in North Dakota 3.15% (n = 127 nests) of nests had both young fledge (Johnson and Sloan 1978) and in Manitoba none of 70 nests had both young fledge (Cash and Evans 1986). The second egg has been shown experimentally to function as "insurance," replacing older sibling if it fails to hatch or died early (Cash and Evans 1986, Evans 1996, Evans 1997).

Based on band recovery data from 1928-1973, the mortality of White Pelicans was 41% from fledging through first year, 16% in second year, and subsequently 21.3% (mean) for the third through thirteenth year at Chase Lake, North Dakota (Knopf and Evans 2020, Strait and Sloan 1975). Similar mortality rates are found in Colorado and Wyoming (Diem and Pugesek 1994, Ryder 1981). However, due to band loss, estimates of adult mortality are demonstrably too high (Knopf and Evans 2020, Ryder 1981, Strait and Sloan 1975).

With an age of maturity of approximately three years and an average adult mortality of 21%, the generation time of White Pelicans is approximately seven to eight years using the IUCN formula of 1/(adult mortality) + age of first reproduction (IUCN 2019). The oldest known wild White Pelican was over 26.4 years old, from 4,344 band returns (Clapp *et al.* 1982).

Diet and Feeding Behaviour

White Pelicans are largely opportunistic foragers (Knopf and Kennedy 1981). The diet of White Pelicans mainly consists of small fish such as carp and minnows, crayfish, and salamanders (Findholt and Anderson 1995a, Knopf and Evans 2020). More information is required to understand the diet of White Pelicans in the NWT although they have been photographed consuming Arctic Lamprey near the Slave River colony (Figure 7; McKinnon pers. comm. 2021). The estimated rate of prey consumption for adult White Pelicans is 1.8 kg per day (Hall 1925).

White Pelicans do not dive to forage but swim in shallow waters (0.3-2.5m; Anderson 1991) along edges of water bodies, below rapids, and occasionally in open deeper water if fish are found near the surface (Findholt and Anderson 1995a, b). Foraging occurs during the day as well as night (McMahon and Evans 1992b). Prey is likely located by sight during the day as the Pelicans swim along scooping fish with their large bills. The rate of dipping increases at night likely due to lower visibility (McMahon and Evans 1992b). Dipping rates also increase with flock size likely due to greater prey density during cooperative feeding (McMahon and Evans 1992a, McMahon and Evans 1992b).

Figure 6. Adult American White Pelicans feeding on Slave River, near Fort Smith, NT. Prey being consumed appears to be an Arctic Lamprey. Photographer credit: John McKinnon.

Cooperative feeding is very common throughout the White Pelican range, but more information is needed to determine whether White Pelicans in the NWT exhibit this behaviour. During cooperative feeding, multiple birds move and dip bills in a synchronized fashion often driving fish towards shore, towards other feeding birds, and even encircling them (Cottam *et al.* 1942, Anderson 1991). Prey capture rates are higher for cooperatively feeding flocks (Anderson 1991) with the leading edge of the flocks having the highest capture rates (McMahon and Evans 1992a, b). Cooperative feeding also occurs with other species such as Double-crested Cormorants where Pelicans will even steal food from the other species (Anderson 1991, O'Malley and Evans 1983). Stealing food from other Pelicans also happens. Double-crested Cormorants only occur in the NWT as a vagrant species.

Physiology and Adaptability

Colonial Birds

White Pelicans are colonial birds where groups of individuals associate closely primarily for nesting purposes (hereafter a colony). Groups of newly paired birds at the same stage of the reproductive cycle then begin to form dense, synchronized nesting clusters or sub-colonies, often sub-colonies occur on separate nesting islands (Behle 1958, Knopf 1979, Knopf and Evans

2020, O'Malley and Evans 1980). Groups often migrate, nest, forage, and loaf (i.e., rest, preen) together and vary in size from a few individuals to several thousand (Knopf and Evans 2020).

Crèching and Thermoregulation

Crèching is a common survival strategy observed in the young of many colonial-nesting bird species including White Pelican (Sovada *et al.* 2013, 2014). Although the proximate cause of this behavior remains unknown, crèching offers thermal protection, protection from predators, and protection from aggression by unrelated adults (Le Bohec *et al.* 2005, Sovada *et al.* 2013, Toureno *et al.* 1995). The period between brooding and crèching is a vulnerable transition with a higher frequency of chick deaths caused by severe weather (Sovada *et al.* 2014). In American White Pelicans, Evans (Evans 1984a, b) showed that adequately sized crèches of chicks save energy and afford thermal protection compared to isolated chicks; thus, crèching appears to function as a substitute for constant parental care and brooding for older chicks.

Interactions

Co-nesting Species

Interactions between courting individuals consists of courtship flights, walking with bills pointed down, and bowing and swaying of the head (Beaver 1980, Evans and Cash 1985, Schaller 1964, Van Tets 1965). White Pelicans show aggressive behaviors towards other Pelicans, usually on the nesting colony. Such aggression usually consists of jabbing or biting with the bill between rival males or for protection while brooding or incubating young (Knopf 1979, Schaller 1964). Threatening displays consist of opening the bill, snapping it shut, and waving the head (Schaller 1964, Schreiber 1977, Van Tets 1965). White Pelicans are often territorial with other species nesting nearby, such as Double-crested Cormorants (vagrant in the NWT) and various gulls, and use similar aggressive behaviors towards them (Knopf and Evans 2020). During nesting and without major disturbance, adult Pelicans will jab at co-nesting gulls if they get too close (Knopf and Evans 2020).

Co-feeding Species

White Pelicans are often seen feeding cooperatively with other species, most commonly Double-crested Cormorants. Double-crested Cormorants are considered vagrant in the NWT (Sirois *et al.* 1995) therefore it is unknown if co-feeding occurs in the NWT. This feeding strategy is not usually associated with competitive or antagonistic behavior as Cormorants and Pelicans often forage at different depths (Knopf and Kennedy 1981). Pelicans are also known for kleptoparasitism, where they steal prey from co-feeding neighbors. Success rates range from 25-50% of attempts for kleptoparasitism on other species of co-feeding birds and 38% on co-feeding White Pelicans (Anderson 1991, O'Malley and Evans 1983).

Predators

Adult White Pelicans in the northern plains of the United States are vulnerable to a variety of predators including red fox, wolves and coyotes, especially when water levels are low which increases access by predators (Blokpoel 1971, Dunbar 1987, Evans 1972, Findholt and Diem 1988, Roney 1987, USFWS 1984). Eggs and chicks are also predated by foxes, wolves, and coyotes. The initial response of adults to predation is similar to the aggressive postures previously described. If the predation event continues, adults will generally take flight, circle above, and land nearby (Knopf and Evans 2020). It is during this type of disturbance when the eggs and chicks are very vulnerable to opportunistic predation by gulls, ravens, and eagles (Knopf and Evans 2020).

Humans

White Pelicans are very sensitive to disturbance by humans on breeding colonies. Disturbance by close passing watercraft and low flying aircraft causes the adults to flee the colony. With no adults guarding eggs and chicks, they become exposed to potentially extreme temperatures and predators, including co-nesting gulls. White Pelicans were previously hunted for sport (Koontz 1987, Thompson 1933) but it is unknown if this occurred in the NWT. They are often destroyed for perceived threats to commercial aquaculture opportunities, mainly in overwintering range near the Gulf of Mexico, but the number of birds taken is unknown (Knopf and Evans 2020). There is also a misconception that White Pelicans compete for a variety of game fish important to humans. The only quantified evidence supporting this comes from Yellowstone Lake where Pelicans consumed 3.5% of spawning trout (Stapp and Hawyard 2002). Because of this misconception, White Pelicans have been persecuted and destroyed. However, this has largely been proven as a misunderstanding after studies on the diet of White Pelicans indicated that White Pelicans forage on species that are not considered important fisheries resources (Findholt and Anderson 1995, Knopf and Kennedy 1980). However, Pelicans foraging and loafing near aquaculture facilities may be subject to lethal measures to control pelican depredation (Hendricks and Johnson 2002). In the Gulf Coast states, some Pelicans have inadvertently died due to disturbance on colonies by attempts to destroy Double-crested Cormorants for a similar perceived threat to fisheries resources, although this is largely not the case anymore (McMahon and Koonz 1991).

In the NWT, the Town of Fort Smith collaborates with the Pelican Advisory Circle and the Government of the Northwest Territories to provide resources to community members, tourists, and the public to educate and provide recommendations on safely viewing the Slave River Rapids colony. In addition, aircraft pilots and canoe/raft/kayak paddlers are provided directives on use of the seasonal sanctuary. The directives include avoiding travel closer than 2,000 AGL and 100 m by surface from the seasonal sanctuary and nesting islands located on the Slave River, Mountain Rapids.

PLACE

Distribution

World, Continental, or Canadian Distribution

White Pelicans are only found in North and Central America. Breeding range includes central to northern North America mainly west of the Mississippi River, USA and Ontario, Canada (Findholt and Diem 1988, Fink *et al.* 2021, Sidle *et al.* 1985, Stepney 1987) (Figure 7). The North American continental divide was thought to serve as a split between two main groups of White Pelicans based on their breeding and migrating habits (Anderson and King 2005, Behle 1958, Houston 1970, Houston 1972, Ryder 1981, Stepney 1987, Strait and Sloan 1975, USFWS 1984, Vermeer 1970). However, DNA analysis suggests that this divide is not creating genetically distinct subpopulations and high mixing occurs (Reudink *et al.* 2010). White Pelicans migrate and breed in the northern parts of their overall range, which includes southern NWT, British Columbia, Alberta, Saskatchewan, Manitoba, and Ontario (Figures 7 and 8) (Chapman 1988, Knoder *et al.* 1980). Wintering range includes Central California, Mexico, Central America, and the Gulf Coast states (Figure 7; Clapp *et al.* 1982, Howell and Webb 1988, Knoder *et al.* 1980, Palmer 1962).

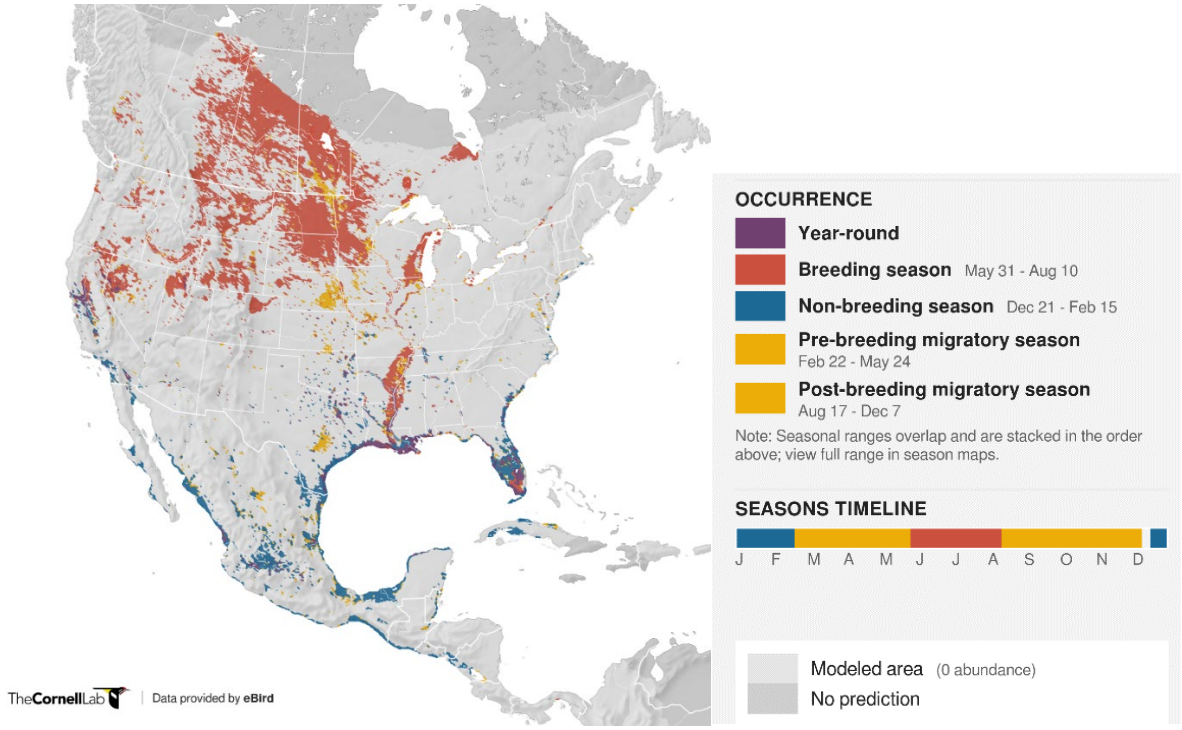

Figure 7. Distribution of breeding, non-breeding, year-round, and migration areas for American White Pelicans in North America based on data provided by eBird (2006-2020) (eBird 2021, Fink *et al.* 2021). Map courtesy of the Cornell Lab of Ornithology.

Figure 8. Location of the Slave River, Namur Lake, and Pelican Lake colonies of American White Pelican found in northeastern Alberta, Canada. Map courtesy of Mélanie Routh, GNWT-ECC.

NWT Distribution

The Slave River colony is the only known colony of American White Pelican with breeding season habitat within the NWT (Figure 8). This colony nests approximately 8 km southeast of Fort Smith, NWT near Mountain Portage Peninsula, and feeds and loafs daily near the Rapids of the Drowned adjacent to Fort Smith, NWT. This breeding colony is referred to as the Slave River colony; the nesting area consists of several islands (Figure 9). The use of these islands is discussed in the Trends and Fluctuations section later in this report. This represents the farthest north known colony of White Pelicans. The closest known colonies to the Slave River colony are located at Namur Lake and Pelican Lake in northeastern Alberta just under 300 km and 475 km south of Fort Smith, NWT, respectively (Figure 8; King and Anderson 2005).

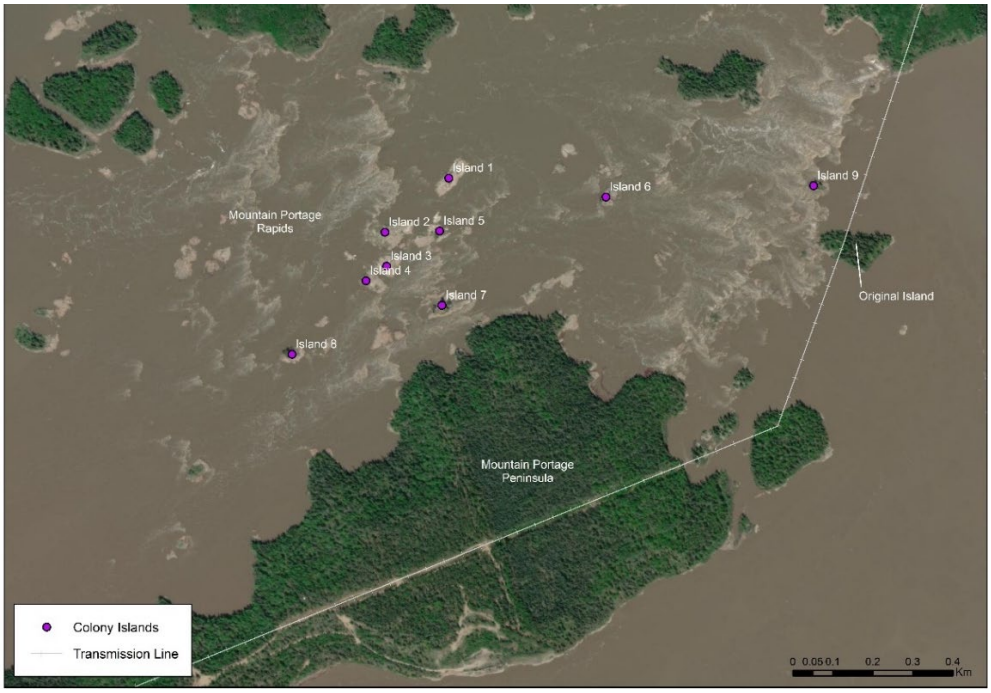

Figure 9. Locations of the original nesting island and the nine islands that have been used for nesting by American White Pelicans from the Slave River Colony near Mountain Portage Peninsula along the Slave River in Alberta approximately 8 km Northeast of Fort Smith

White Pelicans are commonly seen throughout the southern portion of the NWT and many of these birds are likely breeding individuals from the Slave River colony out foraging (Figure 10). White Pelicans are commonly noted on the Slave River (around Fort Smith), Big Island (Great Slave Lake), Hay River, Kakisa Lake, Trout Lake, and the Mackenzie River (South Slave Wildlife Workshop 2013). Recently, White Pelicans were observed as far north as Tsiigehtchic, NWT (CBC 2016) and Kugluktuk, Nunavut near the Arctic Ocean (CBC 2020). A large number of White Pelican sightings in atypical NWT areas in 2020 coincided with very high water levels in the Slave River that reduced nesting sites to a new island with higher elevation than previously used nesting islands (Kelly pers. comm. 2023).

The Species at Risk Committee (SARC) defines the 'extent of occurrence' (EO) as 'the area included in a polygon without concave angles that encompasses the geographic distribution of all known populations of a species (SARC 2020). The extent of occurrence for White Pelican is approximately 373,173 km², but 117,108 km² without incidental observations in the Sahtú, Inuvialuit Settlement Region or Gwich'in Settlement Area.

The "index of area of occupancy" (IAO) is a measure that aims to provide an estimate of area of occupancy that is not dependent on scale. The IAO is measured as the surface area of 2 x 2 km grid cells that intersect the actual area occupied by the wildlife species (i.e., the biological area of occupancy). The IAO for White Pelican is about 8 km² which only represents the Slave River breeding colony.

Figure 10. Locations of American White Pelican sightings in the Northwest Territories, Canada, from 1789 to 2022. Recent sightings are as far north as Liverpool Bay, Beaufort Sea, NWT and Kugluktuk, Nunavut. Data extracted from GBIF, which included observations from eBird, iNaturalist, and museum records (eBird 2021, GBIF 2021). Additional observations are included from the Camsell 1916, Harper 1914, Pelican Advisory Circle 2023, Preble 1908, Sirois *et al.* 1995, Soper 1942, as well as public records on Facebook in 2020 and 2021. Map courtesy of Mélanie Routh, GNWT-ECC.

Locations

SARC defines 'location' as "a geographically or ecologically distinct area in which a single threatening event can rapidly affect all individuals of the species present. The size of the location depends on the area covered by the threatening event and may include part of one or many subpopulations. Where a species is affected by more than one threatening event, location should be defined by considering the most serious plausible threat" (SARC 2015).

White Pelicans are highly mobile species that migrate annually and congregate during the breeding season in colonies. White Pelicans have been seen throughout much of the NWT. The only known location containing breeding White Pelicans is the Slave River colony southeast of Fort Smith, NWT. The breeding individuals in this colony use areas in southern NWT for foraging.

The most serious plausible threats to White Pelican in the NWT are flooding, predation, diseases and parasites, and disturbance by humans. These threats primarily relate to the breeding colony. If all White Pelicans in the NWT originate from the Slave River colony, then this colony can be considered as the only location for White Pelicans in the NWT. Further studies are required to determine if White Pelicans nest in other locations in the NWT.

Search Effort

Data used in this report is from eBird, iNaturalist, museum records, local sources, and dedicated surveys at the Slave River colony completed by the Pelican Advisory Circle; the protocols for these surveys are detailed in the Population Abundance section of this report. The Pelican Advisory Circle is a citizen-led group dedicated to monitoring the Slave River White Pelican colony that has monitored nesting on the Slave River islands since 1975 (McKinnon pers. comm. 2023). Data from eBird is based on data gathered by a community of bird watchers and stored in an online database (Sullivan *et al.* 2009). Formal surveys have been completed by the Government of Northwest Territories and Parks Canada staff as well as local partners from the Pelican Advisory Circle. Except for the formal surveys, all other location data are mainly incidental observations and therefore may not accurately represent the true range of White Pelicans in the NWT (Figure 10). Further, the formal surveys completed by the Pelican Advisory Circle and collaborators are limited in search area to the Slave River colony and rapids on the Slave River in the vicinity of the colony based on time and funds available for surveys (McKinnon pers. comm. 2021). Therefore, it is possible other colonies, including those in former nesting sites, exist.

Distribution Trends

The current distribution of White Pelican colonies in Canada appears to be expanding, mainly to the east with more recent new colonies in Lake Nipigon, Ontario (Bryan 1991), Lake

Superior (Pekarik *et al.* 2009) and Lake Michigan (Ratcliff 2005). Although reports of White Pelican observations in the NWT seem to be increasing in the north, including as far north as the Arctic Ocean, these reports may not necessarily represent a northward expansion of breeding range. However, it is certainly possible that a colony may be established farther north than the Slave River colony near Fort Smith in the future.

White Pelicans were recorded in literature in the NWT as early as 1789 when Alexander Mackenzie referred to 'Pelicans' at a portage when he descended the river (Preble 1908). In the late 1800s, Ross (1862) called them "common" as far north as Big Island, NWT (see Place Names; Figures 1, 2, and 3; Appendix A). They were seen along the south shore of Great Slave Lake on Big Island, and near Fort Providence (McFarlane 1908). In June or July 1900, Fleming recorded a White Pelican in Liverpool Bay, Beaufort Sea, NWT; local Indigenous people were not familiar with the species therefore it was likely a vagrant (Preble 1908). In the spring of 1903, it was reported that several pairs of White Pelicans nest annually on a small rocky islet, one of the Desmarais group of islands on Great Slave Lake (Preble 1908). By 1932 only a few White Pelicans were observed on the small rocky islet in the Demarais Islands (Soper 1942).

There is also a history of White Pelicans being observed at Oracha[2] Falls (also referred as Pelican Chutes or Pelican Falls), Taltson River by hunters from Fort Resolution (Sirois *et al.* 1995). And in 1983, White Pelican nests were observed and photographed in the Oracha Falls area and up to 1,200 White Pelicans occurred near the south shore of the Oracha Falls area, Taltson River from 1989 to 1994 (Camsell 1916, Harper 1914, Sirois *et al.* 1995). More recently, White Pelicans have been seen at Oracha Falls fishing, but not nesting (Beck pers. comm. 2023). In the 1990s, White Pelicans were seen in a variety of locations along the south shore of Great Slave Lake from the Big Island area to the mouth of the Taltson River (Sirois *et al.* 1995). In 1993, up to 75 White Pelicans spent a month at Mackenzie Rocks near Hay River in August (Sirois *et al.* 1995). In 1994, there were as many as 200 pelicans at the mouth of the Taltson River on 28 June, at Hay River on 14 July, and in the Desmarais Islands - Big Island area between June and August (Sirois *et al.* 1995). The current status of breeding colonies, foraging groups, and other locations with regular occurring White Pelicans in the NWT, is unknown.

Movements

White Pelicans make annual migrations from their breeding grounds to the Gulf Coast states, Mexico and Central America. Migratory flock sizes of over 180 birds are often seen with birds

[2] Note that the Chipewyan word for 'Pelican' is ʔOrānchāy.

generally migrating during the day, likely to make use of thermals and soaring to conserve energy (Knopf and Evans 2020). Unlike many migrating birds, White Pelicans do not necessarily return to the location they were born to reproduce, as suggested by DNA analysis (Reudink *et al.* 2010). Generally, White Pelicans nesting east of the Rocky Mountains migrate south and east to the Gulf of Mexico (Houston 1970, Houston 1972, Ryder 1981) while those nesting west of the Rocky Mountains migrate to southern California and western Mexico (Behle 1958, USFWS 1984) with some exceptions (Diem and Condon 1967, Hendricks and Johnson 2002). It is unknown where the White Pelicans from the Slave River colony overwinter or which migratory routes they use.

Seasonal home range size for White Pelicans varies greatly, from several hundred to several thousand square kilometers (km^2) based on age and sex (King *et al.* 2016). Seasonal home range size may be influenced by habitat and food availability (McNab 1963, Weimerskirch *et al.* 1994). King *et al.* (2016) found that adults have larger seasonal home ranges than immature individuals (under three years old). Adult summer ranges were larger than winter ranges; contrastingly, immature Pelicans had larger winter than summer ranges.

Pelicans breeding east of the Rocky Mountains generally migrate to the coastal regions of the Gulf of Mexico (Houston 1970, Houston 1972, Ryder 1981). No Pelicans in the NWT have been tagged and tracked. Therefore, it is unknown where Pelicans from the NWT migrate to during the winter months. Northern breeding Pelicans often return to their breeding grounds as frozen waters open for foraging opportunities (Vermeer 1970). In the NWT, this generally occurs in late April to early May. Breeding White Pelicans commonly use islands that are 50-100 km away from foraging areas (Knopf and Evans 2020). Non-breeding White Pelicans can be found summering or moving throughout the migratory range and occasionally well outside their normal distribution (Knopf and Evans 2020). White Pelicans breeding on the Slave River colony are often seen foraging in nearby wetlands, lakes, and rivers (McKinnon pers. comm. 2021).

Habitat Requirements

White Pelican breeding colonies require isolated locations for nesting close to aquatic foraging areas; these ideal locations are typically islands on large lakes (Behle 1958, Findholt and Diem 1988, Hall 1925, Schaller 1964), or periodically flooded islands in shallow lakes, wetlands, and rivers (Chapman 1988, Evans 1972). It is believed that periodic flooding reduces vegetation on these islands making them an ideal site for a colony and White Pelicans will even change islands to cope with the changing water levels (Evans 1972, Findholt and Trost 1981, Paullin *et al.* 1988). While breeding individuals may fly over 100 km to feed, most colonies are located within 50 km of foraging areas (Knopf and Evans 2020). White Pelicans forage in shallow waters (0.3-2.5 m, Anderson 1991) along edges of water bodies, below rapids, and occasionally

in open deeper water if fish are found near the surface (Findholt and Anderson 1995a, b). Similar foraging habitats are used at stop-over points to feed during migration (Alcorn 1943, Behle 1958, Sidle *et al.* 1990). In wintering range, White Pelicans use similar habitats found on shorelines of bays, inlets, and estuaries with foraging opportunities and suitable loafing areas (Chapman 1988, King and Michot 2002).

Figure 11. Adult American White Pelicans on Island 3 at the Slave River Pelican Colony's Nesting Islands at Mountain Portage Rapids on Slave River, Alberta approximately 8 km southeast of Fort Smith, NT. Photographer credit: John McKinnon.

The location of the Slave River colony is unique relative to the rest of White Pelican range because they nest near a fast-flowing waterbody (Dagg 2016). Instead of islands on relatively calm lakes and wetlands, the Slave River colony is on a large, fast flowing river with turbulent water near Mountain Portage Peninsula (Figure 9 and 11). The spring break up of the ice on the river scours and floods the islands and reduces vegetation making them suitable for nesting habitat. The rapids act as a barrier to fish movement resulting in increased abundance and diversity of fish (Boag 1993, Tripp *et al.*1981). This may create ideal foraging opportunities for White Pelicans, but more research is needed to understand the selection of this location. White Pelicans are frequently seen foraging around the Rapids of the Drowned near Fort Smith, NT, (Figure 3), another turbulent water site just downstream of the nesting islands at Mountain Portage rapids. White Pelicans have also been seen foraging in shallow swampy lakes in the vicinity of the Slave River colony (McKinnon pers. comm. 2021) which are likely similar habitats to those seen in other parts of their range, as previously described. However, more research is

needed to identify the habitat types of these foraging locations and other areas used by White Pelicans in the NWT.

Habitat Availability

Throughout most of their range, White Pelicans use isolated islands for breeding, as well as shallow waters and areas below rapids for foraging, both of which appear to be in abundance in the NWT. White Pelicans are known to travel 50 - 100 km between breeding and foraging habitats (Knopf and Evans 2020). In the NWT, these two habitats are generally within this proximity. However, there have been no studies of White Pelican habitat use in the NWT making it difficult to assess availability of habitat.

The northern range for White Pelican is limited by temperature relating to ice out dates for breeding and foraging. Vermeer (1970) noted the northern extent of White Pelican range coincides with the 0°C isotherm in April. White Pelicans arrive at breeding grounds as the ice breaks up in the spring, and individuals are observed on or near available open water (Beaver and Ballantyne 1979). During April and May, open water is limited to fast flowing water and rapids for foraging and most of the large lakes are still covered with ice preventing access to fish (Vermeer 1970). In one study, White Pelicans require approximately 150 ice-free days from the time the adult birds begin courtship until all young mature sufficiently before migration (Beaver and Ballantyne 1979). If this is the case, habitat availability may not be a limiting factor for White Pelicans in the NWT, but rather spring temperature and its corresponding ice out dates. However, it is unknown what is truly limiting the northern extent of White Pelican range, and therefore the potential expansion of White Pelicans in the NWT.

Habitat Trends

Isolated islands for nesting and shallow aquatic areas for foraging have likely been in constant abundance in the NWT. If spring temperatures are what limit the northern extent of their range (Vermeer 1970), these areas have the potential to shift due to climate change. Climate projections for the NWT suggest a general warming as well as an increase in spring precipitation (Prairie Climate Centre 2021). Warming of the region could be beneficial to White Pelicans if the northern extent of their range is limited by temperature (Vermeer 1970).

There have been significant changes in flow in the Slave River over the past 40-50 years, as noted by both western science and from observations by residents (Dagg 2016). Observations include a decrease in summer flow, an increase in winter flow, and earlier peak flow creating a less variable annual regime (Dagg 2016). The mean peak spring flows of the Slave River has decreased 20% and the average mean winter low flow has increased by 75% (Sanderson *et al.* 2012 *in* Dagg 2016), thus reducing the variability between high and low flow (Dagg 2016). The

variation in flow that still occurs is mostly due to inputs of water downstream of the Bennett Dam (Prowse *et al.* 2002a *in* Dagg 2016).

Increased spring precipitation or ice jams have the potential to cause high water levels or flooding, which could be detrimental to nesting Pelicans. In 1996 and 1997, ice jams on the Peace and Athabasca Rivers caused very high water levels (Wolfe *et al.* 2008, Dagg 2016). Other flood events in 1974, 2005, and 2020 were noted as significant by community members (Dagg 2016, NNSL Media 2020). High water levels and floods have the potential to disrupt or even wipe out nesting colonies of White Pelicans and can be a factor in site abandonment as well (Beaver and Ballantyne 1979, NNSL Media 2020). Similarly, falling water levels may facilitate accessibility of islands to predators (Beaver and Ballantyne 1979, Vermeer 1970). In 2010, record low water levels were experienced on the Slave River (Dagg 2016).

Warming temperature and increased spring precipitation may also impact prey species important to White Pelicans. More research is needed to understand these potential changes to habitats used by White Pelicans.

Habitat Fragmentation

White Pelicans are highly mobile birds which migrate long distances annually. They also travel long distances to and from foraging areas daily. The NWT population of White Pelican is naturally fragmented from other colonies of White Pelican, and the nearest colony from Slave River is at Namur Lake, Alberta. The northern extent of White Pelicans is limited by spring temperatures, ice out dates, and access to prey (Vermeer 1970). In the NWT, individual White Pelicans have been observed across the territory including near Dettah and Yellowknife on Great Slave Lake, up the Mackenzie River in Fort Providence, Fort Simpson, Wrigley, Norman Wells and Tsiigehtchic, as well as in Nahanni Butte, Sambaa K'e and as far north as Liverpool Bay, NWT and Kugluktuk, NU. Therefore, the dispersal of individual White Pelicans does not appear to be fragmented as long as suitable foraging habitat is accessible (ice free). Colonies of foraging White Pelicans are commonly observed near Fort Smith, Hay River, and Kakisa.

Nesting habitat for White Pelicans in the NWT does appear to be naturally fragmented based on habitat suitability and nest site selection. Historically, White Pelican in the NWT have been recorded nesting on a small rocky islet in the Desmarais group of islands on Great Slave Lake (Preble 1908), at Oracha Falls, Taltson River (Camsell 1916, Harper 1914, Sirois e*t al.* 1995), and on islands near Mountain Portage Peninsula, Slave River (Pelican Advisory Circle 2023; King and Anderson 2005). These locations presumably satisfy the requirements for the minimum number of ice-free days, islands suitable for nesting habitat, and access to nearby foraging sites. However, more information is required to understand whether and why nesting on Desmarais Island and Oracha Falls has been abandoned, and whether White Pelicans are

nesting elsewhere in the NWT. Studies are also needed to understand habitat availability to White Pelicans in the NWT, other potential limitations (e.g., land use by people), and how habitat may have influenced populations in the past as well as how it may change in the future.

POPULATION

Abundance

Nest counts at colonies were the traditional way to estimate populations of White Pelicans. In the United States, an estimated nest count of 17,872 in the early 1960s increased to 22,299 in the early 1980s (Lies and Behle 1966, Sidle et al 1985). In Canada, nest counts were 14,103 in the late 1960s, 32,256 in the late 1970s, and 53,345 in the late 1980s (Koonz 1987, Sidle *et al.* 1985, Vermeer 1970). These data suggest an overall population increase from the 1960s to 1980s. The most recent analysis of White Pelican populations across their entire range was done by King and Anderson (2005). Using breeding bird survey data from 1979-1981, 55 colonies and over 109,000 breeding individuals were estimated. For data available from 1998-2001, 42 colonies were estimated and approximately 134,000 breeding individuals. These limited data make analyses difficult to interpret. In fact, a subset of the colonies was surveyed between both timeframes and suggests a doubling of the population. A more comprehensive survey is needed to accurately assess populations (King and Anderson 2005). The latest assessment of White Pelicans by the International Union for Conservation of Nature (IUCN) in 2016 estimates the total population at up to 180,000 individuals (Birdlife International 2016).

The earliest surveys conducted at the Slave River colony began in 1907 by Ernest Thompson Seton (Seton 1908). On June 22, 1907, Seton counted 77 nests and 163 eggs and noted gull and raven predation on the eggs (Seton 1908). Vermeer (1970) surveyed White Pelican nesting sites across much of Canada which included the Slave River colony in 1967. During this survey, 50 nests were counted on one island (Vermeer 1970). There were major disturbances subjected to the colony in the 1960s and early 1970s (Pelican Advisory Circle 2023). A power transmission line was installed directly across the islands used by Pelicans (Figure 9) and there were also low-level sightseeing flights with aircraft over the colony (Pelican Advisory Circle 2023). In response to declining White Pelican numbers resulting from these disturbances, the Pelican-Portage Group was formed and later became known as the Pelican Advisory Circle (Pelican Advisory Circle 2023). The Pelican Advisory Circle is a partnership between the Government of the Northwest Territories and local Pelican enthusiasts.

The Pelican Advisory Circle began the first formal White Pelican surveys on the Slave River colony in 1974 when 27 nests were counted in June and 21 chicks seen in August. These surveys consist of a series of aerial photographs taken of the colony islands from aircraft through the

nesting season. Photographs consist of high-level overview images taken from 3,000 feet above ground level of the entire series of islands near Mountain Portage (Figure 12). Photographs are also taken at 2,000 feet above ground level which are ultimately used to count the number of nests and birds on each island. The first series of images are taken in June to count the number of active nests. Starting in 2002, pod count surveys were conducted, which includes taking photographs in July to count the number of chicks as they are forming crèches or pods. This pod count is intended to track survival of chicks between the initial nest count in July and a final chick count flight occurring in August. These aerial photograph surveys are conducted annually. In 2019, to reduce disturbing the colony and to reduce survey costs, the Pelican Advisory Circle began using drones for some surveys (McKinnon pers. comm. 2021).

Figure 12. White Pelicans on Island 9 from the August Chick Survey at the Slave River Pelican Colony's Nesting Islands at Mountain Portage Rapids on Slave River, Alberta approximately 8 km southeast of Fort Smith, NT. Photographer credit: John McKinnon.

Data must be interpreted understanding that the survey methods have changed over the duration of the data set including the addition of a July chick count in 2002 and changes to the methods used to count nests and chicks (on the ground, aerial by fixed wing aircraft, aerial by drone). Data from these surveys indicate that the population of White Pelicans in the Slave River colony increased in the early 1900s and began to stabilize in the 2000s (Figure 13); the number of nests surpassed 100 in the early 1980s, 250 in the early 1990s and 500 in the early 2000s (Figure 13). Over the last three generations (24 years from 1997 to 2022), the number of

nests has been relatively stable fluctuating from 419 to 810 nests (Figure 13). Over the last three generations, chick counts in August fluctuated from 45 to 491 chicks (Figure 13).

Assuming two breeding adults per nest and using the approximate number of nests over the last three generations (419-810 nests), the breeding population of the Slave River Colony is approximately 838-1,620 mature individuals. The Pelican Advisory Circle notes there is an additional group of non-breeding White Pelicans which travel and feed with the breeding Pelicans. Estimates for this group of birds are approximately 500 individuals (McKinnon pers. comm. 2021).

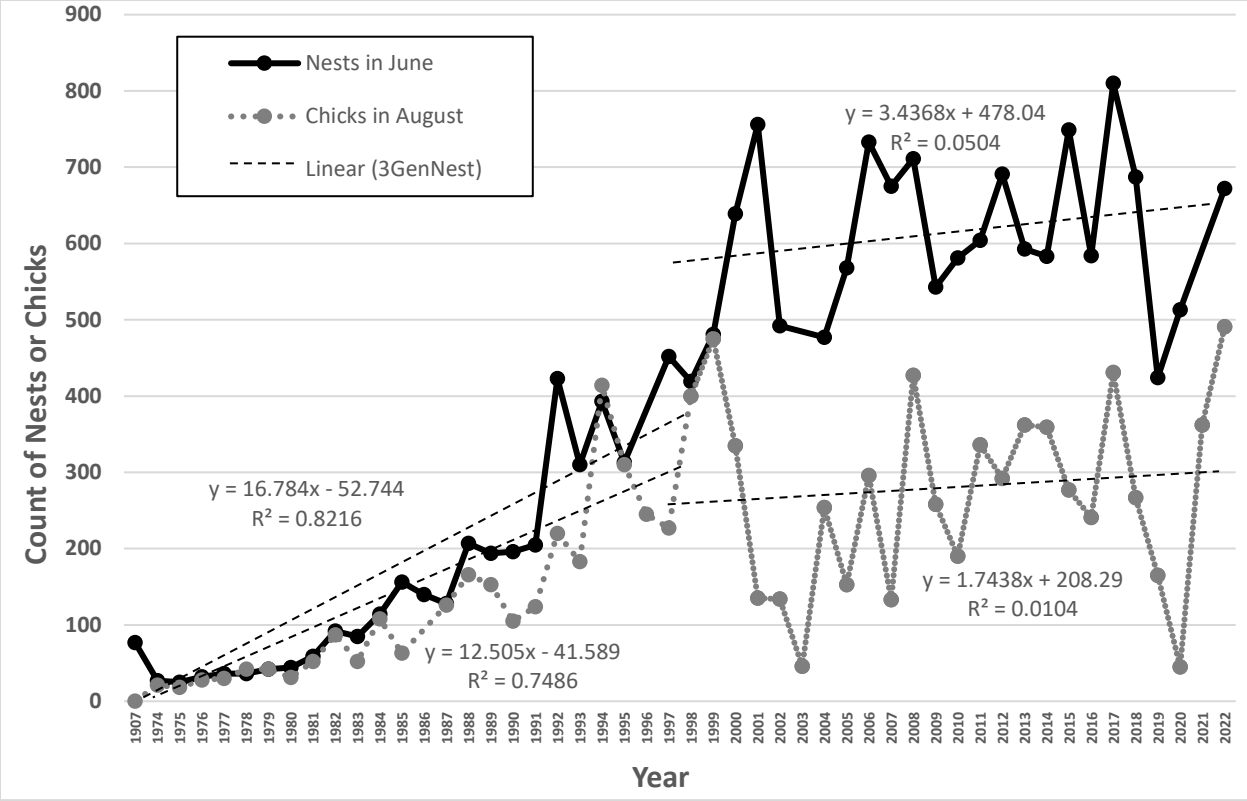

Figure 13. Survey results of American White Pelican nests in June and chicks in August from the Slave River colony near Fort Smith, NT from 1974 through 2022. Linear trend lines are shown for the last three generations (approximately 24 years). Data courtesy of GNWT and the Pelican Advisory Circle.

Population Dynamics

White Pelicans begin breeding in approximately their third year and normally lay two eggs, only one of which typically survives to fledge (Knopf and Evans 2020, Sloan 1982). Estimates of productivity determined from nest and chick counts from aerial surveys from other White Pelican colonies ranged widely from 0.34-0.89 young per nest through their first 10 weeks (Knopf 1979, Knopf and Evans 2020, Sidle et al. 1984, Sovada *et al.* 2013). White Pelicans have a mortality rate of 41% from fledging through to their first year, 16% from the first to second

year, and 21.3% (mean) for the third through thirteenth year (Strait and Sloan 1975). Productivity, defined as the number of August chicks divided by the number of June nests, has the tendency to be highly variable from year-to-year resulting in population dynamics sometimes described as boom and bust (Diem and Pugesek 1994, Knopf and Evans 2020).

The population dynamics of the Slave River colony generally has followed a similar pattern as seen elsewhere across the range with productivity fluctuating quite dramatically from year to year (Figure 14). During the years of rapid population growth up to the year 2000, estimates of productivity on the Slave River colony averaged 0.79 (range 0.40-1.17). During the last three generations (approximately 24 years), productivity has shown a declining trend (Figure 14). During this time, productivity has dropped to an average of 0.47 (range 0.09-0.98).

It is not known what causes changes in productivity and more studies are needed to fully understand White Pelican population dynamics at the Slave River colony. However, in years of low chick counts, the Pelican Advisory Circle has noted flooding (1997), low water in the spring (2000), mid-summer floods washing out nests (2001), observations of low (~50 feet above ground) flying aircraft buzzing the nesting islands (2007), and very high water levels and floods in July/August (2020).

As discussed in *Abundance*, in 2002 a July survey of chicks was added to track chick survival between the June nest count and the August chick count (Pelican Advisory Circle 2023). These counts track comparatively to the August chick counts most years suggesting July to August survival is high (Figure 15). Therefore, productivity of the Slave River Pelicans is negatively influenced by loss of eggs (potentially predation from Gulls), siblicide, and exposure during the vulnerable period when chicks transition between being brooded by parents in nests to forming thermally protective crèches; this is typical of White Pelicans across their range (Knopf and Evans 2020). Measures of population dynamics are not available beyond the August chick counts for the Slave River colony.

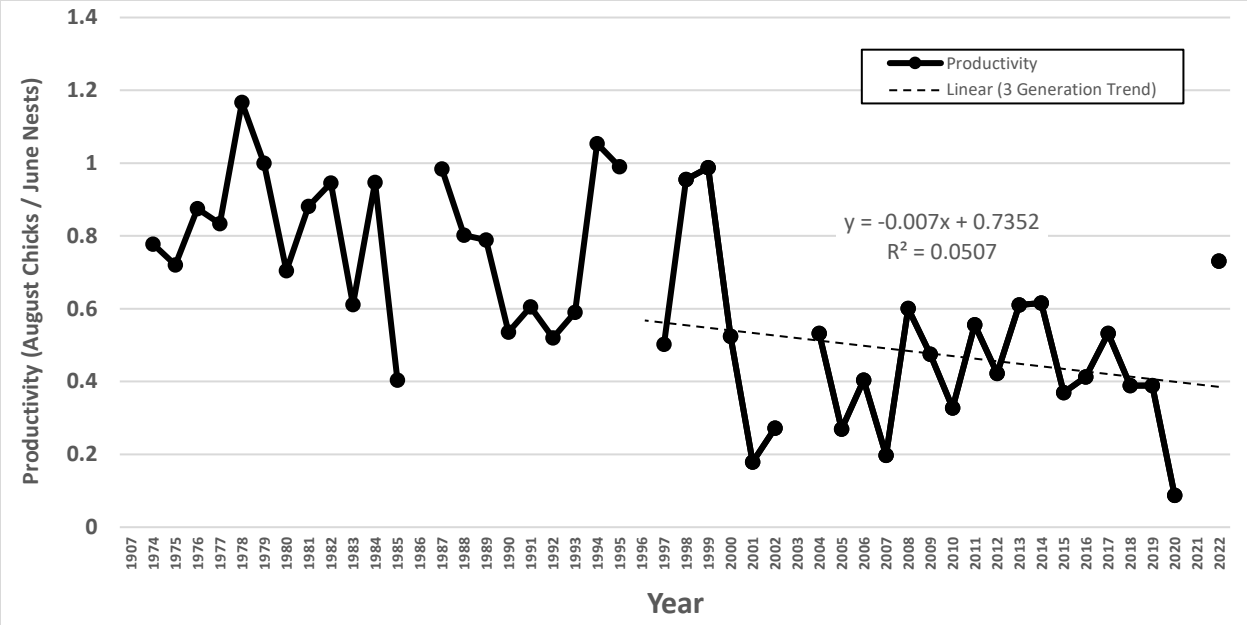

Figure 14. Estimates of reproductive productivity from the Slave River colony near Fort Smith, NT from 1974 through 2022. Estimates are based on the number of chicks counted during the August survey divided by the number of nests counted during the June survey. A linear trend line is included for the last three generations (approximately 24 years). Data courtesy of GNWT and the Pelican Advisory Circle.

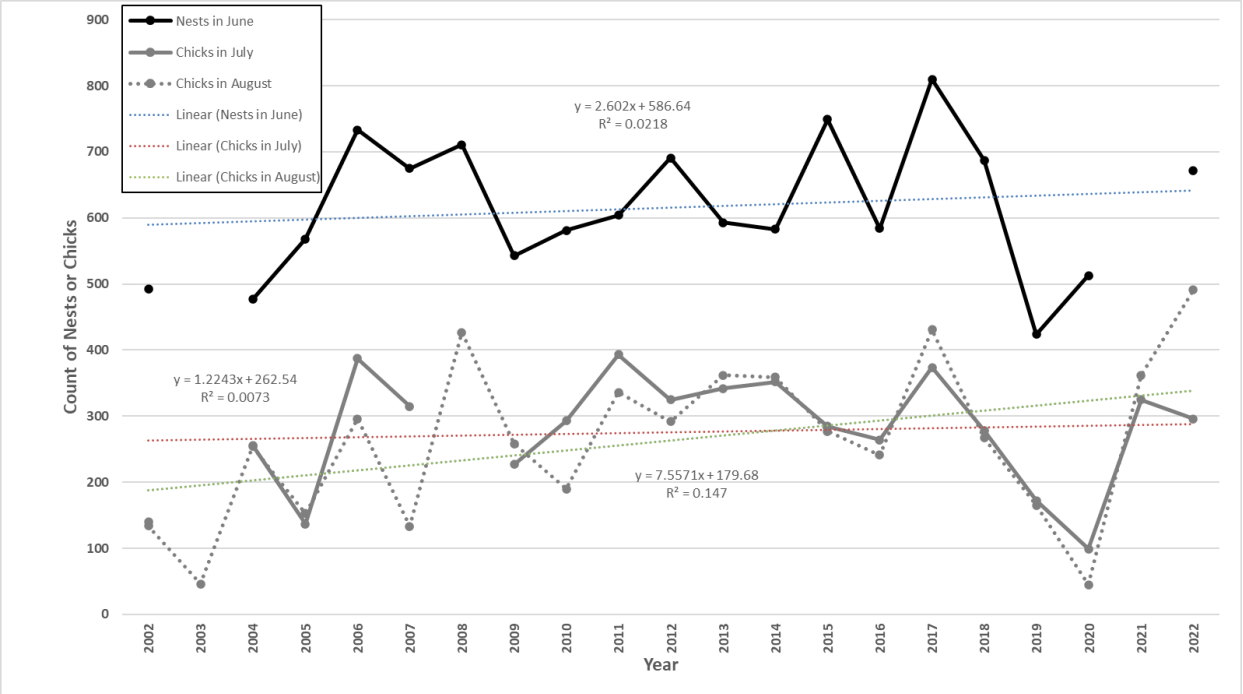

Figure 15. Counts of nests with linear trend lines during June survey and chicks from July and August surveys from the Slave River colony near Fort Smith, NT from 2002 through 2022. Data courtesy of GNWT and the Pelican Advisory Circle.

Although no White Pelicans have ever been banded on the Slave River colony, leg bands have been seen on birds in the colony (McKinnon pers. comm. 2021) suggesting some level of immigration from other colonies. It is unknown where these leg bands were applied, and therefore where the birds immigrated from. Immigration and emigration of White Pelicans is not uncommon as suggested by high levels of genetic mixing across their range (Reudink *et al.* 2010).

Trends and Fluctuations

White Pelican population data across their range is available from breeding bird surveys which show a steady increase in the population of White Pelicans. From 1980 through 2003, an overall increase of 3.9% per year was found with an increase of 5.6% per year in the United State and 1.5% in Canada (Sauer *et al.* 2003). In northern Alberta, the Pelican Lake colony (approximately 475 km south of the Slave River colony) increased five-fold from 216 nests in the early 1980s to 1,050 nests in the late 1990s (King and Anderson 2005).

During the early 1980s to late 1990s, the number of nests on the Slave River colony increased approximately 10-fold from 59 nests in 1981 to 639 nests in 2000 (Figure 13). Since then, the Slave River colony has continued to trend up but with the number of nests fluctuating between 419 and 810 (Figure 13). The last three generations (approximately 24 years) indicate that nest and chick counts have been relatively stable (Figures 13 and 15, respectively) and an average productivity of 0.47 (range 0.09-0.98) (Figure 14).

Locally, populations fluctuate annually largely based on water levels and forage availability (Behle 1958, Johnson and Sloan 1978). Population fluctuations are common for White Pelican populations which generally recover quite quickly the following year, largely due to the adaptability to switch to nearby alternate nesting sites as needed (Knopf and Evans 2020).

The survey results from the Slave River colony show annual fluctuations for both nests and chicks counted in August (Figure 13). As in other parts of White Pelican range, fluctuations are generally attributed to water level fluctuations, forage availability, and environmental conditions (Behle 1958, Johnson and Sloan 1978, Knopf and Evans 2020). Significant flooding occurred in 1997 and 2020 on the Slave River and nesting success was lower during those years (Figure 13, Pelican Advisory Circle 2023). It is unknown which other factors contribute to population fluctuations seen on the Slave River colony because only population surveys are conducted.

An interesting aspect of the Slave River colony is that island use by nesting White Pelicans changes throughout survey years. Including the original island Seton (1908) surveyed in 1907, at least nine different islands have been used for nesting (Figure 16). As populations have

increased, additional islands have been used for nesting, likely due to limited space (Figure 16). Island 1 had been the primary island used for nesting until significant population increases in the late 1980s and early 1990s when the use of Islands 2, 3, and 5 began and has continued since (Figure 16). Islands 6 and 7 were mainly used in 1997 and 2020, the years with significant flooding (Pelican Advisory Circle 2023). In 2022, use of a new nesting island (Island 9, Figures 9 and 12) was observed (Pelican Advisory Circle 2023). More research is required to understand the dynamics of island use on the Slave River over the years.

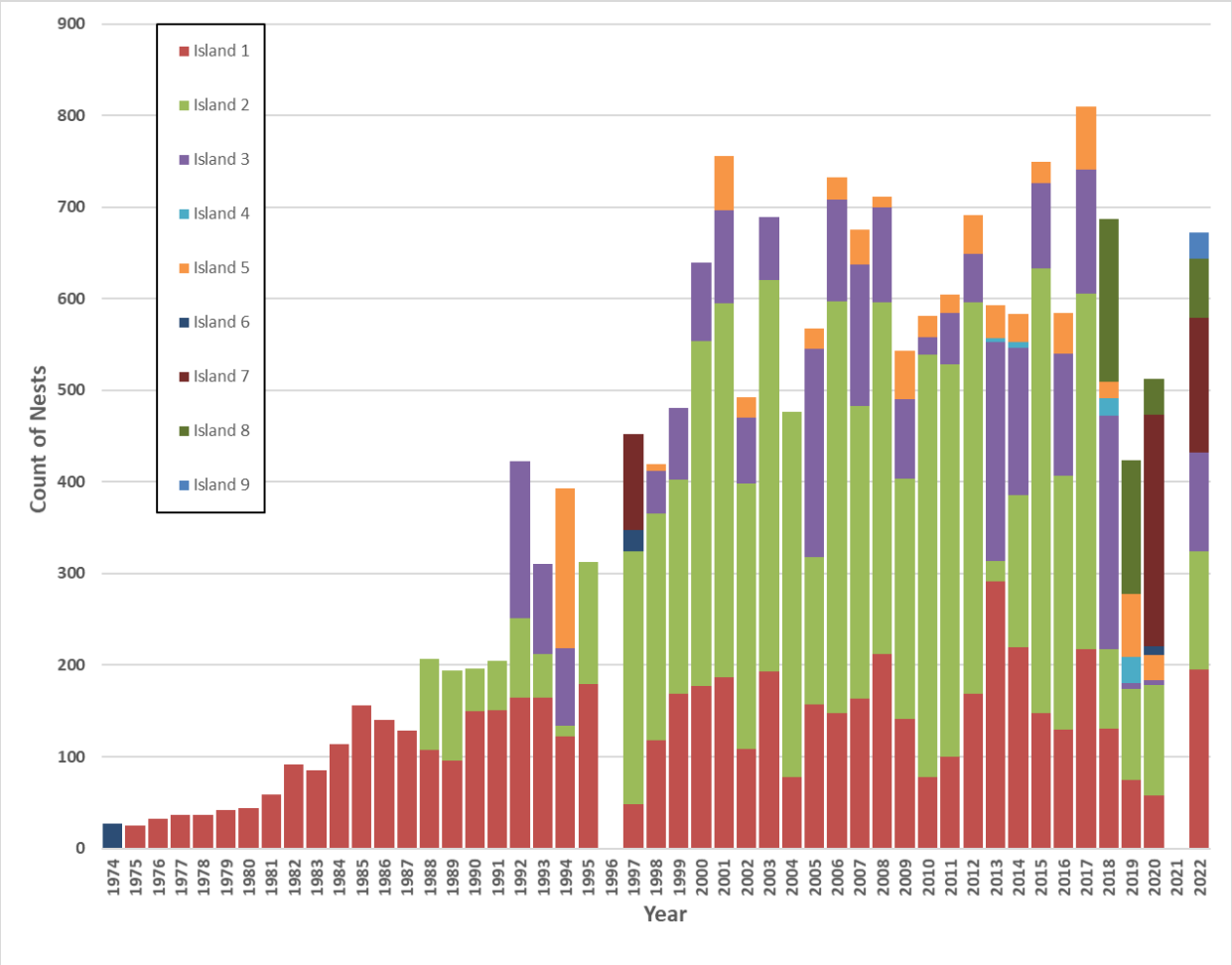

Figure 16. Count of White Pelican nests surveyed on each island for the Slave River colony from 1974 through 2022. June nest surveys were not completed in 1996 and 2021. Data courtesy of GNWT and the Pelican Advisory Circle.

Possibility of Rescue

White Pelicans are susceptible to disturbances and habitat destruction which may inhibit continued population growth (Koonz 1987, Johnson and Sloan 1978, USFWS 1984). The high genetic diversity and movement rates (Reudink *et al.* 2010) of White Pelicans indicate a potentially strong resistance to local population declines for the overall population through

immigration. Considering other parts of White Pelican range show high levels of immigration and that leg bands have been observed on the Slave River colony despite no birds ever being banded on this colony (McKinnon pers. comm. 2021), it is likely that continued immigration is occurring. Further, several colonies in central Alberta with significant population sizes may be a source for immigration (King and Anderson 2005). Populations of White Pelicans across most of their range are stable or increasing and even expanding (Birdlife International 2016, King and Anderson 2005). However, more research is needed to understand the current levels of immigration and other population metrics involved in recovery of a local population.

The Slave River colony is unique in its location on a fast-moving turbulent river compared to the more typical lake islands and relatively calm waters used by White Pelican throughout the rest of its range (Knopf and Evans 2020, Vermeer 1970). It is unknown if the local population of White Pelicans nesting on the Slave River have any local specialized adaptations to survive in this unique habitat. However, it is unknown if the survival of immigrants is different from the birds born at the Slave River colony. Additional research is needed to understand any other habitat differences, availability, and trends and how that may impact future populations of White Pelicans in the NWT.

THREATS AND LIMITING FACTORS

The American White Pelican is a species with a k-selected life history characterized by larger body size, relatively low reproductive rates (not breeding until 3 years of age), smaller clutches, fledging less than one young per pair annually, lower productivity, and longer life spans (Sovoda *et al.* 2015). The colonial nesting behaviour of pelicans makes them especially vulnerable to factors that can influence productivity, such as weather events, disease, loss of nesting habitat, and disturbance by humans or predators (Sovoda *et al.* 2014).

Disturbance

White Pelicans are sensitive to a variety of disturbances, mainly on their breeding colonies (Knopf and Evans 2020). Human induced disturbances such as watercraft and low-flying aircraft are known to cause interruptions to courtship, and may cause adults to flee their nests or abandon the entire colony temporarily (Knopf and Evans 2020). This exposes eggs and chicks to the environment and predators (Blokpoel 1971, Dunbar 1987, Evans 1972, Findholt and Diem 1988, Roney 1987, USFWS 1984). If the disturbance is continued, adults may abandon nesting for that year (Knopf and Evans 2020). In the worst case, entire colonies may be permanently abandoned (Knopf and Evans 2020).

The Slave River colony has been subjected to a variety of disturbances over the years. In the late 1960s and early 1970s, there were commercial sightseeing helicopter flights over the colony. Low-level flights may cause adults to flee the nests which could result in low egg and chick survival. On 22 June 2007, two kayakers witnessed and reported an airplane flying approximately 50 feet above the ground, 'buzzing' over the nesting islands of the Slave River colony (Pelican Advisory Circle 2023). Although the link is presumptive, the survivorship of chicks in 2007 was low (0.197 chicks in August/nests in June) indicating that the disturbance provided by the low-flying aircraft may have caused adults to flee when chicks were at their most vulnerable.

Mountain Portage Rapids and the Rapids of the Drowned on the Slave River are popular locations for visiting tourists throughout the open water season and the area hosts the annual Slave River Paddlefest during the August long weekend (Fort Smith Paddling Club 2023). Paddlefest includes events like canoeing, guided hikes, white-water kayaking, and stand-up paddleboarding (Fort Smith Paddling Club 2023). It is unknown whether and to what extent tourism impacts the Slave River colony of White Pelicans. However, the Town of Fort Smith in collaboration with the GNWT and the Pelican Advisory Circle have developed information brochures and posters to educate and to offer tips for viewing pelicans (Pelican Advisory Circle n.d.).

The Taltson Hydroelectric Facility (Taltson Hydro Plant) was built in 1965 northeast of Fort Smith to supply electricity to Pine Point Mine and has been providing power to communities in the South Slave region since 1986 (NTPC 2023). It is unknown if the installation of the hydroelectric facility and dam impacted any White Pelican nesting or foraging sites along the Taltson River including the historic nesting site documented at Oracha Falls. A transmission line was also installed as part of the Taltson Hydro Plant across the Slave River in the vicinity of the islands where the White Pelicans used to nest (Figure 9). Transmission line poles were installed on the original island that the Pelicans used in 1907 when Ernest Thompson Seton made the first recorded nest count (Figure 13; Pelican Advisory Circle 2023, Seton 1908). The Pelicans abandoned the use of the original island and shifted to nearby islands in the following years which, along with population declines, resulted in the formation of the Pelican Advisory Circle (Pelican Advisory Circle 2023). In April 2023, the Taltson unit will be taken off-line for six months while key components are being replaced (NTPC 2023).

Predators

Predators of White Pelicans in the NWT may include foxes, coyotes, wolves, eagles, ravens, and gulls, but it is not known what levels of predation occur. A colony is especially vulnerable if low water levels make the nesting area accessible to land-based predators such as foxes,

wolves, and coyotes (Blokpoel 1971, Dunbar 1987, Evans 1972, Findholt and Diem 1988, Roney 1987, USFWS 1984). However, the Slave River nesting islands remain isolated from shore and protected by rapids even at low water levels. Vulnerability to predators such as ravens and gulls is higher during disturbances from watercraft and low flying aircraft because adults leave the nest, exposing the eggs and chicks to the environment and making predation by ravens and gulls easier. With the addition of aircraft flight regulations (via NOTAM) and increased public awareness of White Pelican sensitivities, opportunistic predation by ravens and gulls may be reduced. Bald eagles have been seen on the colony among dead White Pelican chicks during surveys on the Slave River (Pelican Advisory Circle 2023). It is unknown if Bald eagles killed the White Pelican chicks or were merely scavenging. Bald eagles are known to predate and even wipe out entire colonies of Double-crested Cormorants and Herring gulls (Windels *et al.* 2016). Research is needed to determine to what extent Bald eagles pose a risk to White Pelican eggs and chicks, and to better understand which species and what levels of predation occur on White Pelicans in the NWT.

Disease and Parasites

White Pelicans are susceptible to a variety of diseases and parasites. Diseases include avian botulism (Type C), West Nile virus, H5N1 highly pathogenic avian influenza (HPAI or avian flu), and Newcastle disease (Johnson *et al.* 2010, Rocke *et al.* 2005, Sovada *et al.* 2008) and may be increasing in prevalence in some parts of their range (Rocke *et al.* 2005). Although found in a few deaths, avian cholera, an infectious bacterial disease that afflicts numerous waterbirds annually, has not been linked to outbreaks or die-offs for White Pelican in the United States (Rocke *et al.* 2005). Avian type C botulism is caused by *Clostridium botulinum* and more commonly affects fish-eating water birds (Rocke *et al.* 2005). Avian botulism has been the cause of numerous White Pelican deaths in the United States since 1980, however it was considered infrequent, and incidental compared to larger outbreaks in waterfowl (Rocke *et al.* 2005). An outbreak in southern California in 1996 caused approximately 8,500 White Pelican deaths and in 2005, avian botulism contributed to an estimated mortality of 11,588 birds in the United States (Rocke *et al.* 2005). Avian botulism has not been detected in the NWT (Jutha pers. comm. 2023).

West Nile Virus has not been detected in the Northwest Territories (CWHC 2023). However, West Nile Virus can impact populations in a short amount of time. It was first detected in the northern plains of the United States in 2002 and has since contributed significantly to chick mortality rates (Sovada *et al.* 2008). Between 2004 to 2007, White Pelicans on the Bitter, Chase, and Medicine Lake colonies in the northern plains were monitored to assess the impact of West Nile Virus (Sovada *et al.* 2008, 2013). Mortality rates were as high as 25% at Bitter

Lake, 40% at Chase Lake, and 44% at Medicine Lake in the years since West Nile Virus arrived in the region (Sovada *et al.* 2008, 2013).

HPAI or avian flu is a contagious viral infection that can affect all species of birds and is a pathogen more likely to cause large-scale epidemics of high morbidity and mortality in human populations (CWHC *et al.* 2023). There were 1,938 positive samples of birds with HPAI from across Canada in 2022 (CWHC *et al.* 2023). In the NWT, there was one confirmed HPAI positive Herring Gull in Yellowknife in June 2022, and two HPAI confirmed positive ravens in the Dehcho Region in October 2022 (GNWT 2022). There were 24 suspected or positive White Pelicans from British Columbia, Alberta, Saskatchewan, Manitoba, and Ontario (CWHC *et al.* 2023).

Newcastle disease has been suspected of causing die-offs of White Pelicans in the United States and in Canada, however, diagnosis of mortality events is problematic due to difficulties isolating the virus in White Pelican (Rocke *et al.* 2005, Wobeser *et al.* 1993). Newcastle disease has not been detected in the NWT (Jutha pers. comm. 2023). There has been no documentation of White Pelicans from the Slave River colony carrying any of these diseases and there is no information on whether these diseases have contributed to any past population declines.

Parasites impacting White Pelicans include lice, mites, nematodes, and tape worms. Lice (*Piagetiella peralis*) are common on colonial nesting birds such as White Pelicans and are found on both adults and chicks (Price 1970). Lice may enter the egg through the pip hole [first crack or hole in egg before hatching] (Behle 1958). Within 1-2 weeks, lice may be found in significant numbers on chicks clustering around the head, under wings, and in the pouch (Samuel 1982). These cause inflammation of the mouth and throat (Wobeser *et al.* 1974). While the infection rate is high, mortality rates due to the lice are low (Sidle *et al.* 1984). White Pelican mortality rates are also low from nematodes and tape worms (Behle 1958) as well as mites (Tuggle 1983). Two White Pelican necropsies were completed in August 2014 on juvenile chicks that had starved, likely by being displaced from the nesting island during a storm, and becoming separated from their parents (ENR 2014). One necropsy report included observations of thousands of lice on the skin and feathers across the entire body and many (hundreds) nematodes within the oral cavity and the ventriculus, with one end embedded in the gastric mucosa (*Contracaecum spp.*) (ENR 2014). The other necropsy did not observe lice, however the stomach contained hundreds of nematodes embedded in the mucosa (ENR 2014). Outside of these two reports, it is unknown what other parasites White Pelicans carry on the Slave River colony and what impacts they may have.

Although high mortality rates from diseases and parasites are not common, White Pelicans are susceptible to outbreaks due to their colonial nesting behaviors with large groups of birds in highly transmittable proximity.

Climate Change

Flooding

The presence of White Pelicans is negatively correlated to increased water level fluctuations in northeastern Alberta (Found *et al.* 2008). In the NWT, climate change may increase spring precipitation in the Slave River colony region by 15-20% by the end of the 21st century (Prairie Climate Centre 2021). Higher spring precipitation could increase the frequency of spring flooding during the sensitive nesting season for White Pelicans. Slave River Colony reproductive success was lower in years where high spring water levels were noted in the survey data (i.e., 1997 and 2020) and White Pelicans tended to switch nesting islands during high water years likely due to flooding (Pelican Advisory Circle 2023).

As noted earlier, the flow of the Slave River has changed in the past 40-50 years and a general decline in water levels in the Slave River between four and ten feet (1.2 to 3 m) lower in different locations has been reported by Indigenous communities (MRBB 2021). Water flow of the Slave River has also changed. Water Survey of Canada flow data for Slave River at Fitzgerald, which indicate a decline in flows from 1921 to 2017 with significant decreases recorded in months from June to October (MRBB 2021). On average, flows decreased by 20 – 30 m^3/s per year during summer months and by 11.2 m^3/s per year, or by 0.33% annually (MRBB 2021).

If nesting sites of White Pelicans are flooded, they may move to more suitable nesting sites or abandon nesting attempts that season all together. Similarly, if the timing and duration are not carefully considered, human-induced water level fluctuations such as hydroelectric dam releases (Bennett and Taltson Dam) can also have a similar effect on White Pelican nesting success. These type of water releases have occurred upstream of the Slave River colony (NNSL Media 2020), but it is unknown what impacts this has had. Bennet Dam had a non-typical large release in 1996-1997, which coincides with a year of low survivorship for White Pelicans in the Slave River (ENR 2022, Pelican Advisory Circle 2023). Pelicans may have the ability to bounce back after a single season of failed reproduction due to flooding. This was seen on the Slave River colony in 1998 and 2021 following the high spring water levels in 1997 and 2020 (Pelican Advisory Circle 2023). However, consecutive seasons of failed attempts may cause the total abandonment of a colony.

Phenological Shifts

For migrating birds, arrival timing and breeding condition at nesting locations are important factors that determine reproductive success (Cotton 2003). White Pelicans have advanced their spring migration and onset of breeding by over two weeks in four decades at the Chase Lake colony in North Dakota as well as other parts of their range (Cotton 2003, Sovada *et al.* 2013). Earlier arrival leads to earlier nesting, which exposes chicks to more days of severe weather (e.g., thunderstorms, cold and wet conditions) during their most vulnerable period (ENR 2014, Sovada *et al.* 2013, 2014). Ultimately, these factors contribute to chick mortality and poor breeding success.

Climate change may also impair food availability and foraging efficiency (e.g., increased travel distance, reduced feeding rates, degraded food quantity or quality) and ultimately breeding success (Larson 1994, Sovada *et al.* 2014).

More information is required to understand the extent of phenological shifts and the impact of arrival timing and food availability on breeding success of White Pelicans in the NWT.

Pollutants and Contaminants

Many birds are sensitive to pollutants and contaminants throughout their range and these compounds often bioaccumulate and may cause eggshell thinning. Many highly toxic pesticides were widely used in the past but have since been banned in Canada (Dagg 2016). However, these compounds persist in the environment (Dagg 2016). White Pelican eggshell thinning has been observed, but eggs were not significantly weakened structurally and ultimately there were no changes in chick survival (Knopf and Evans 2020).

Trends in mercury concentration in fish in the Slave River between 1990 and 2000 found no conclusive results (Evans *et al.* 2005 *in* Dagg 2016). Similarly, mercury along with other contaminants including pesticides have also been noted in the tissues of White Pelicans in Idaho and Utah; however, no impacts to reproductive output or population declines were measured (Anderson *et al.* 1969, Benson *et al.* 1976, Greichus *et al.* 1973, Knopf and Street 1974).

The Slave River colony is downstream of significant oil extraction operations in the oil sands area of Alberta and the potential effects of these operations are a concern of local residents with regard to water quality (Dagg 2016). A study indicated that contaminants from oil sands are carried by the Athabasca River and deposited in the Peace-Athabasca Delta and Lake Athabasca and are not carried further downstream to the Slave River Delta (Dagg 2016). However, Kelly *et al.* (2009, 2010) found that pollutants were detectable in the winter snowpack of the area to a distance of about 50 km and analyses of lake sediment showed that

airborne polycyclic aromatic compounds (PACs) could be found at distances up to 95 km away from oil sands (Schindler 2014). Although the Athabasca Oil Sands operations are approximately 300 km away from the Slave River colony nesting area, Slave River pelicans migrate through this area. While local exposure risks in the NWT may be low, migrating birds are at risk to pollutants and chemicals on wintering grounds and during migration. This exposure could have detrimental effects on survival and reproduction for local populations. Further, exposure to pollutants and contaminants can occur through atmospheric deposition and some natural processes, especially in habitats used for foraging. A study in the Lake Apopka region of Florida found an estimated 1,000 White Pelicans died in the vicinity of the lake and most individuals examined had toxic levels of organochlorine pesticides (Rocke *et al.* 2005). In this instance, pesticides were used on a vegetable farm that had flooded contaminating fish consumed by White Pelicans (Rocke *et al.* 2005). Locally, organochloride pesticides and PACs were not found at detectable levels in suspended sediment samples in the Slave River at Fort Smith (Sanderson *et al.* 1997, 2012; Dagg 2016).

Despite pollutants and contaminants not being considered a major threat to White Pelicans, it is important to monitor local populations for signs of exposure even if local sources of pollution and contaminant exposure appears low.

POSITIVE INFLUENCES

Mobility and Genetic Diversity

White Pelicans are highly mobile birds migrating significant distances on a yearly basis. Non-breeding individuals are also often seen in locations well outside their normal range, particularly during the warmer months (Osborne 1982, American Ornithologists' Union 1998). Further, White Pelicans often do not return to the location they were born (Reudink *et al.* 2010). This mobility and its associated ability to increase genetic diversity, allows White Pelicans to potentially recolonize failed colonies or expand their range given the right conditions. They also can shift foraging locations, even to sites over 100 km away (Knopf and Evans 2020). In a similar fashion, White Pelicans can quickly shift to new nesting sites if the conditions are unfavourable each year. In 2020, flooding of preferred nesting islands resulted in a much higher rate of White Pelican observations across the NWT that summer; this may have resulted partly from birds searching for other suitable nesting sites (Figure 10). This is apparent on the Slave River colony with at least nine different islands used for nesting over time. The Pelicans are likely shifting islands given the water level conditions or other factors present year-to-year.

Climate Change

While some components of climate change, such as increased flooding potential, may have negative effects, others may benefit White Pelicans. Summer temperatures are predicted to increase up to 4°C in the region including the Slave River colony by the end of the 21st century (Prairie Climate Centre 2021). Since the northern extent of White Pelican range is likely limited by temperature (Vermeer 1970), an increase in temperature may allow the northern expansion of White Pelicans farther into the NWT. The Audubon Society modeled the impacts of climate change on White Pelican range and showed under a +3.0°C scenario, a significant gain in the northern extent of their range including northern parts of Alberta and Saskatchewan and southern parts of the NWT (Figure 17; Audubon 2022). This suggests suitable habitat exists or will exist in these areas under the projected +3.0°C scenario. This modeling also shows a retraction in other parts of the range, particularly in the southern extent of their summer and winter range (Figure 17; Audubon 2022). However, the White Pelican range gained at the northern extent under this scenario is large relative to the range lost. They also note the risk of increased wildfire threatening habitats and increased spring heat waves that could impact nesting birds. More studies are needed to fully understand the overall impacts of climate change on White Pelicans in the NWT.

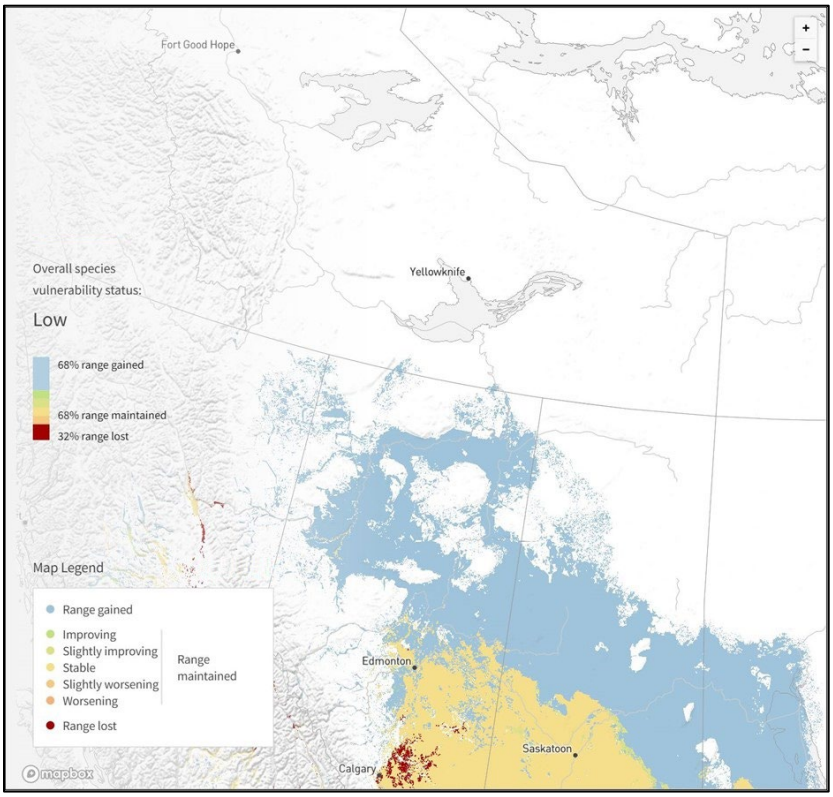

Figure 17. Projected change in White Pelican range under a +3.0°C climate change scenario (image modified from Audubon Society 2022).

Legal Protection and Public Education

The Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), the International Union for Conservation of Nature (IUCN), and the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) do not consider White Pelicans as an at-risk species. In the United States the American White Pelican is protected under the *Migratory Bird Treaty Act of 1918* (MBTA, USFWS 1984). In Canada, they are not included in Article I of the Migratory Birds Convention Act, 1994 (*Migratory Bird Convention Act 1994*). In Alberta, seven breeding areas, including the Slave River and Namur Lake nesting islands, have been designated seasonal wildlife sanctuaries in the Alberta *Wildlife Act* and *Wildlife Regulations* since 1977. It is illegal to enter or approach within 800 metres of seasonal wildlife sanctuaries between April 15 and September 15 (Alberta *Wildlife Act* and *Wildlife Regulations*). In the NWT, the *Wildlife Act* prevents destroying or disturbing or taking an egg of a bird, the nest of a bird when the nest is occupied by a bird or its eggs, and the nest of a prescribed bird.

A Notice to Airmen (NOTAM) regulation by Transport Canada prohibiting the flight of aircraft within 2,000 ft above ground level of the seasonal sanctuary (nesting islands located on the Slave River) from April 15 to September 15 is posted annually (McKinnon pers. comm. 2021). This NOTAM surrounding the colony further reduces disturbance from aircraft.

Following the formation of the Pelican Advisory Circle, awareness of the sensitivities of Pelicans has increased and disturbances have been reduced. The Pelican Advisory Circle also works with the Town of Fort Smith, the Government of the Northwest Territories, and the Government of Alberta to provide resources to community members, tourists, and the public to educate and provide recommendations on safely viewing the Slave River Rapids colony. Increased public education on the sensitivity of White Pelicans to disturbance has and will continue to help protect nesting colonies. The use of aerial photography from higher altitudes and the current and future use of drones for survey efforts by the Pelican Advisory Circle further reduces disturbance on the colony during population monitoring. Public education about their diet not competing with fishing opportunities by humans has also reduced the risk of persecution.

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STATUS AND RANKS

Region	Coarse Filter (Ranks)[1] To prioritize	Fine Filter (Status) To provide advice	Legal Listings (Status) To protect under species at risk legislation
Global	G4 – Apparently Secure (NatureServe 2016) [2]	Least Concern (IUCN Red List 2020)	
Canada	N5B, N5M (NatureServe 2016)	Not at Risk (COSEWIC 1987)	No Status
Northwest Territories	May be at Risk (NWT General Status Ranking Program 2021) S2 – Imperiled (NatureServe 2016)	To be determined	No Status
Adjacent Jurisdictions			
Alberta	S5B – Secure [breeding] (NatureServe 2016)		
British Columbia	S1B – Possibly		

[1] All NatureServe codes are as defined in Definitions of NatureServe Conservation Status Ranks: http://help.natureserve.org/biotics/Content/Record_Management/Element_Files/Element_Tracking/ETRACK_Definitions_of_Heritage_Conservation_Status_Ranks.htm#NatureSe

[2] NatureServe Explorer (nd) (last reviewed 2020) gives a global rank of G4, which means the species, is apparently secure. In Canada, N5B, N5M means the national rank for the breeding and migrant portion of the population is secure. In the NWT, the status ranks is may be at risk, with the equivalent sub-national rank of S2, or imperiled with high risk of extirpation due to restricted range, few populations or occurrences, steep declines, severe threats, or other factors.) (WGGSNS 2016, updated in 2020).

	Extirpated [breeding] (NatureServe 2016)		
Manitoba	S4B – Apparently Secure [breeding] (NatureServe 2016)		
Nunavut	S1B – Possibly Extirpated [breeding]		
Saskatchewan	S5B – Secure [breeding/migrant]		

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APPENDIX A – ADDITIONAL INFORMATION

Threats Assessment[3]

Threats have been classified for American White Pelican as a whole, insofar as those threats may be relevant to the status of the population in the NWT. The threats assessment is based on whether threats are considered to be of concern for the sustainability of the species over approximately the next 10 years.

This threats assessment was completed collaboratively by members of the NWT Species at Risk Committee, at a meeting on June 29, 2022. The threats assessment will be reviewed and revised as required when the status report is reviewed, in 10 years or at the request of a Management Authority or the Conference of Management Authorities. Parameters used to assess threats are listed in Table A1.

Table A1. Parameters used in threats assessment.

Parameter	Description	Categories
LIKELIHOOD		
Timing (i.e., immediacy)	Indicates if the threat is presently happening, expected in the short term (<10 years), expected in the long term (>10 years), or not expected to happen.	Happening now Short-term future Long-term future Not expected
Probability of event within 10 years	Indicates the likelihood of the threat to occur over the next 10 years.	High Medium Low
CAUSAL CERTAINTY		

[3] This approach to threats assessment represents a modification of the International Union for the Conservation of Nature's (IUCN) traditional threats calculator. It was originally modified for use in the Inuvialuit Settlement Region Polar Bear Joint Management Plan (Joint Secretariat 2017). This modified threats assessment approach was adopted as the standard threats assessment method by the Species at Risk Committee and Conference of Management Authorities in 2019.

Certainty	Indicates the confidence that the threat will have an impact on the population.	High Medium Low
MAGNITUDE		
Extent (scope)	Indicates the spatial extent of the threat (based on percentage of population area affected)	Widespread (>50%) Localized (<50%)
Severity of population-level effect	Indicates how severe the impact of the threat would be at a population level if it occurred.	High Medium Low Unknown
Temporality	Indicates the frequency with which the threat occurs.	Seasonal Continuous
Overall level of concern	**Indicates the overall threat to the population (considering the above).**	**High** **Medium** **Low**

Overall Level of Concern

The overall level of concern for threats to American White Pelican are noted below. Please note that combinations of individual threats could result in cumulative impacts to American White Pelican in the NWT. Details be found in the *Detailed Threats Assessment*.

Overall level of concern:

- **Threat 1 – Diseases** **High**
- **Threat 2 – Disturbance** **Medium**
- **Threat 3 – Climate Change and Flooding** **Medium**
- **Threat 4 – Predators** **Medium**
- **Threat 5 – Pollutants and Contaminants** **Low**

Detailed Threats Assessment

Threat #1. Diseases	
Specific threat	White Pelicans are susceptible to a variety of diseases including avian botulism (Type C), West Nile virus, H5N1 highly pathogenic avian influenza (HPAI or avian flu), Newcastle disease and, to a lesser extent, avian cholera.
Stress	White Pelicans die-offs have been recorded in the United States and mortalities have been attributed to avian botulism and West Nile virus. Mortality rates of avian botulism contributed to an estimated 11,588 Pelican deaths in 2005. And mortality in the northern plains of the United States ranged from 25-44% at three colonies since West Nile Virus arrived in the region. In the NWT, there was one confirmed HPAI positive Herring Gull in Yellowknife in June 2022, and two HPAI confirmed positive ravens in the Dehcho Region in October 2022. There were 24 suspected or positive White Pelicans from British Columbia, Alberta, Saskatchewan, Manitoba, and Ontario. There is no documentation of White Pelicans from the Slave River colony carrying any of these diseases and there is no information on whether these diseases have contributed to any past population declines. Although high mortality rates from diseases are not common, White Pelicans are susceptible to outbreaks due to their colonial nesting behaviors with large groups of birds in highly transmittable proximity. Further, the nearest colony to the Slave River colony is around 300 km away likely making recolonization of a colony after an outbreak slow.
Extent	Widespread (>50%)
Severity	High
Temporality	Seasonal
Timing	Short-term future
Probability	Medium
Causal certainty	High
Overall level of concern	**High**

Threat #2. Disturbance	
Specific threat	American white pelican colonies are subjected to a variety of human disturbance including watercraft and low flying aircraft. The Slave River colony has been subjected to a variety of disturbances since the late 1960s. In the past (1960s-1970s), disturbance to this colony included low-level commercial sightseeing helicopter flights. The nesting islands were also disturbed during the installation of the Taltson Hydroelectric Facility transmission lines.
Stress	Disturbance may cause individual adults to flee their nests resulting in low egg and chick survival. This exposes eggs and chicks to the environment and predators. If the disturbance is continued, adults may abandon nesting for that year. In the worst case, entire colonies may be permanently abandoned. When the Pelican Advisory Circle was formed, awareness of pelican sensitivities was increased, and disturbances decreased. The Wildlife Acts and Regulations (in Alberta and NWT) designate the Slave River nesting islands as seasonal wildlife sanctuaries from April 15 to September 15, and Notice to Airmen (NOTAM) regulations by Transport Canada prohibit the flight of aircraft within 2,000 ft above ground level surrounding the colony further reduced disturbance from aircraft. In addition, the methods used by the Pelican Advisory Circle are moving towards the use of drones to limit disturbance.
Extent	Widespread (>50%)
Severity	High
Temporality	Seasonal
Timing	Happening now
Probability	Medium
Causal certainty	High
Overall level of concern	**Medium**

Threat #3. Climate Change	
Specific threat	In the NWT, climate change may increase spring precipitation in the Slave River colony region by 15-20% by the end of the 21st century. Higher spring precipitation could increase the frequency of spring flooding during the sensitive nesting season for White Pelicans. Human-induced water level fluctuations such as hydroelectric dam releases can also affect White Pelican nesting success. Climate change can also influence the timing and conditions of migration and breeding. Advances in spring migration (over two weeks in four decades) and the onset of breeding exposes chicks to more days of severe weather including thunderstorms, and cold/wet days. Climate change may also impair food availability and foraging efficiency if the timing of food availability does not coincide with life cycle stages. Climate change may also provide advantages to White Pelicans including earlier open water and expansion of the northern range.
Stress	If nesting sites of White Pelicans are flooded, they may move to more suitable nesting sites or abandon nesting attempts that season all together. Advances in migration and breeding negatively influence breeding success. Pelicans may have the ability to bounce back after a single season of failed reproduction due to flooding. However, consecutive seasons of failed attempts may cause the total abandonment of a colony.
Extent	Widespread (>50%)
Severity	High
Temporality	Seasonal
Timing	Short-term future
Probability	Medium
Causal certainty	Medium
Overall level of concern	**Medium**

Threat #4. Predators	
Specific threat	Predators of White Pelicans adults, chicks and eggs in the NWT include foxes, wolves, coyotes, eagles, ravens, and gulls.
Stress	Colonies are vulnerable to predation when low water levels increase accessibility for land-based predators or when eggs and chicks are left unattended. Vulnerability to predators such as ravens and gulls is higher during disturbances from watercraft and low flying aircraft because adults leave the nest. These disturbances not only expose the eggs and chicks to the environment but makes predation by ravens and gulls easier.
Extent	Widespread (>50%)
Severity	High
Temporality	Seasonal
Timing	Happening now
Probability	Medium
Causal certainty	High
Overall level of concern	**Medium**

Threat #5. Pollutants and Contaminants	
Specific threat	Many birds are sensitive to pollutants and contaminants and these compounds accumulate in eggshells or in the tissues of White Pelicans.
Stress	Eggshell thinning has been seen in White Pelicans in the past although the structural integrity and ultimately any change in chick survival has not been observed. Contaminants including pesticides and mercury have also been noted in the tissues of White Pelicans; although no impacts to reproductive output or population declines were measured. The Slave River colony is downstream of significant oil extraction operations (approximately 300 km away) and White Pelicans are at risk from exposure of pollutants and chemicals from spills.
Extent	Widespread (>50%)
Severity	Unknown
Temporality	Continuous

Timing	Happening now
Probability	High
Causal certainty	Low
Overall level of concern	**Low**