ALBERTA'S SPECIES AT RISK PROGRAM

Alberta Ferruginous Hawk Recovery Plan

Alberta Species at Risk Recovery Plan No. #41

FEBRUARY 2024

Alberta

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Recovery Planning in Alberta

Albertans are fortunate to share their province with an impressive diversity of wild species. Populations of most species of plants and animals are healthy and secure. However, a small number of species are either naturally rare or are now imperiled because of human activities. Alberta Species at Risk recovery plans establish a basis for cooperation among government, Indigenous communities, industry, conservation groups, landowners and other stakeholders to ensure these species and populations are restored or maintained for future generations of Albertans.

Alberta has a robust provincial recovery program to support its commitment to the federal/provincial *Accord for the Protection of Species at Risk* and the *National Framework for the Conservation of Species at Risk*, and its requirements established under Alberta's *Wildlife Act* and the federal *Species at Risk Act*. An overall goal of the recovery program is to restore species identified as Threatened or Endangered to viable, naturally self-sustaining populations within Alberta.

Environment and Protected Areas is committed to providing opportunities for Indigenous communities, stakeholders, and the Alberta public to provide their perspectives and influence plan content during the recovery planning process. The process for how Albertan's are engaged can vary based on the socio-economic and conservation issues and the level of interest expressed. Draft recovery plans undergo a review by the Fish and Wildlife Stewardship Branch and are then posted online for public comment for at least 30 days. Following public review, Alberta's Endangered Species Conservation Committee reviews draft plans and provides recommendations on their acceptability to the Minister of Environment and Protected Areas. Plans accepted and approved for implementation by the Minister are published as a provincial government recovery plan. Approved plans are a summary of the Ministry of Environment and Protected Area's commitment to work with involved stakeholders to coordinate and implement conservation actions necessary to restore or maintain vulnerable species.

Recovery plans include two main sections: (1) a situational analysis that highlights the species' distribution and population trends, threats, and conservation actions to date; and (2) a recovery section that outlines goals, objectives, associated broader strategies, and specific priority actions required to maintain or recover Threatened or Endangered species. Each approved recovery plan undergoes regular review and at that time progress on implementation is evaluated. Implementation of each recovery plan is subject to the resource availability from both inside and outside of government.

Recovery plans will be systematically reviewed every five years. Where there are large changes in the goals, objectives, or strategy sections due to a new understanding or circumstance, a plan may need to be redrafted, consulted on, reviewed by the Endangered Species Conservation Committee, and the changes approved by the Minister.

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Melanie Redman provided secretariat assistance to the team, and also assisted in writing and editing this plan.

The current ferruginous hawk recovery plan is a progression upon the previous version, the development of which was critical to the progress of our management of the ferruginous hawk in Alberta. Key individuals should be recognized for their contribution to the development of the previous plan.

Past team members include Dr. Josef Schmutz, Francois Blouin, Dale Paton, Tom Burton, Scott Wagner, Ursula Banasch, Barry Adams, Rennie Cauchie, Richard Williams and Richard Quinlan.

Executive Summary

The ferruginous hawk in Canada occurs exclusively within the Great Plains, and within Alberta the species' range is primarily within the Grassland Natural Region. Ferruginous hawk surveys have been conducted in Alberta since the early 1980s. Survey results showed an increase in the estimated number of breeding pairs from 1982 to 1987, a slight decrease from 1987 to 1992, and a dramatic decline between 1992 and 2000. While the population has an overall long-term declining trend, it has slowly started increasing in recent years. The overall population declines formed the basis for listing the species as Endangered as designated in Alberta's *Wildlife Act*. Threats to the species include habitat loss, habitat disturbance, reduced nesting opportunities and prey populations, increased numbers of predators and competitors, indirect human-caused mortality, and climate change.

The Alberta Ferruginous Hawk Recovery Plan 2009-2014 outlined recovery strategies and actions necessary for the recovery and conservation of ferruginous hawk in Alberta. Progress occurred on many recovery actions outlined in the plan, either through project-specific initiatives for the ferruginous hawk or as part of larger provincial initiatives. The updated Alberta Ferruginous Hawk Recovery Plan refines the long-term recovery goal for the species and identifies indicators of success. Additionally, the Alberta Ferruginous Hawk Recovery Team (also referred to as "the team" or "the recovery team" in this document) defined short-term objectives to measure the success of the current recovery plan.

Seven recovery strategies were identified to recover the ferruginous hawk in Alberta: reduce human disturbance at nest sites, maintain existing native grasslands and pasture lands on both public and private land, ensure adequate number of nest structures are available in suitable habitat, maintain and enhance prey populations for ferruginous hawks, reduce human-caused mortality of ferruginous hawks in Alberta, limit the impacts of predators and competing bird species, and conservation of ferruginous hawks during migration and on their wintering grounds. Actions for each of the strategies are outlined in the plan.

Recovery actions will be implemented in priority areas as defined in the Habitat Needed to Support Recovery section of the plan. Habitat Needed to Support Recovery is defined as areas with the highest suitability or the potential to support the highest densities of ferruginous hawks. Recovery actions will be implemented through funding from a variety of sources, including in-kind and dedicated project funds from within government, industry, academia and non-government conservation organizations. Budget needs from Environment and Protected Areas (EPA) – Species at Risk budget have been estimated for each year of the five-year life of this plan.

1.0 Process for Revising the Plan

The plan was prepared by a recovery team composed of individuals knowledgeable about the species, organizations influential in the management and recovery of the species, and stakeholders who may be affected by recovery actions for the species. The Ferruginous Hawk Recovery Team was selected to provide informed and diverse input to preparation of the recovery plan. The planning process comprised six meetings or conference calls between October 2014 and September 2017. The meetings were chaired by the EPA wildlife biologist with provincial responsibility for the ferruginous hawk. The team also corresponded through email and phone calls throughout the development of the plan.

Following internal engagement, a draft of the plan was posted online for public review in early 2019, soliciting feedback through a questionnaire. The draft plan was also sent to Indigenous communities that have territories that overlap with ferruginous hawk range. Feedback was reviewed and incorporated into the plan as appropriate.

Approval for the original plan was attained in 2009 following an internal review for content and format and a review by Alberta's Endangered Species Conservation Committee in spring 2008.

This plan represents the Ministerial-approved recovery plan for ferruginous hawk in Alberta until a revised plan replaces it. Following the initial five-year period, the plan will be revisited and revised as needed. Annual meetings of the recovery team will be held to monitor implementation of the actions.

The Alberta Ferruginous Hawk Recovery Plan is designed to provide direction on conservation and recovery of the species. EPA and several other government and non-government organizations will lead implementation of the actions identified in the recovery plan. If major changes are needed, the team may be reconvened to revise the plan.

Many of the actions identified in this plan will be delivered through "in-kind" activities of government and industry. These include revisions to policy and approval processes. They also include actions such as pre-development wildlife surveys that are part of the pre-development planning costs of industry.

Costs that must be budgeted for within the EPA-Fish and Wildlife Species at Risk Program include the annual team meetings, population and monitoring surveys and participation in the research projects identified.

2.0 Conservation Actions to Date

The Alberta Ferruginous Hawk Recovery Plan 2009-2014 outlined recovery strategies and actions necessary for the recovery and conservation of ferruginous hawks in Alberta. Progress occurred on many recovery actions outlined in the plan, either through project-specific initiatives for the ferruginous hawk or as part of larger provincial initiatives. Ferruginous hawk related actions and initiatives included are listed in the table below:

TABLE 1: Ferruginous Hawk Implementation and Action Table–Current Action Status.

Action	2022-2023	Current Status
Information and education encouraging management of habitat: documents and presentation to increase Albertan landholders', industrial developers', and the general public's knowledge of the ferruginous hawk and its habitat requirements including nesting and foraging.	Ongoing through MULTISAR, OGC and other conservation groups	In Progress
Initiating positive stewardship actions: relations with Albertan landholders and lease holders in the assistance of establishing ranching and farming methods that complement ferruginous hawk needs. This includes such activities as managing grassland grazing in a favourable way.	Ongoing through MULTISAR, OGC and other conservation groups	In Progress
Establishment of pre-development survey protocol and pre-planning consultation with EPA and AER and pre-development surveys in ferruginous hawk habitat.	Standards established through approval processes related to development	Completed
Implementation of standards requiring pre-development surveys in ferruginous hawk habitat and adoption of the setback distances and timing conditions established by Alberta Fish and Wildlife Division in 1998, as required standards for all upstream oil and gas developments within the Grassland Natural Region of Alberta under the Enhanced Approvals Process (EAP). Pre-application survey requirements, setback distances and timing restrictions are found within the Pre-Application Requirements for Formal Dispositions and EAP's Master Schedule of Standards and Conditions.	Ongoing through approval processes related to development	In Progress
Use of Prairie Sensitive Species Guidelines–Implementation of the Alberta Wildlife and Wind Energy Guidelines, which require developers to complete pre-development wildlife surveys, avoid nests by appropriate setbacks and monitor after the development is complete to assess success of mitigation tools including access management and structural design in electrical systems, wind energy projects collision mortality, use of Avian Protection Plans (APPs) to reduce electrocution and collision with power lines, retrofit electrocution-hazardous structures in high priority areas.	Ongoing use of guidelines through EAP, AUC, and other related GOA processes. Work is still needed in development of industry-specific guidelines.	In Progress
Population monitoring and inventories–provincial inventory every five years, annual monitoring of 30 ferruginous hawk survey blocks to monitor population health and trends.	2022 provincial inventory completed; prep for 2023 annual surveys	Completed/ Ongoing
Research projects for the ferruginous hawk led by REACT team–projects include directly or indirectly: industrial and human disturbance; home-range habitat selection; re-occupancy surveys; determining reproductive success; impacts of climate and weather phenomena; post-fledging habitat selection and survival; causes of mortality during migration and winter; inter- specific competition with other raptors	Continued through REACT (University of Alberta)	In Progress
Place public land reservations, Crown Land Reservations (CLRs) on historical and regularly used ferruginous hawk nest sites and their surrounding habitat–to assist industry, the AER and EPA in managing development in proximity to ferruginous hawk nests and maintaining habitat quality necessary for re-occupancy and recruitment success.	CLRs have been placed on high value nests (14 nests). Continued work is required (ongoing).	In Progress

Action	2022-2023	Current Status
Inventory existing artificial nest platforms (ANP) in Alberta and assess their effectiveness.	Completed	Completed
New Hawk Nest Platform Guidelines–Based on the results of an ANP inventory, a new ANP Protocol was developed that outlines when ANPs should be used, ANP designs, pre-development surveys and requirements, construction guidelines and evaluation and reporting standards (Migaj *et al.*, 2011).	23 have been installed (9 by Operation Grassland Community and 14 by MULITSAR)	In Progress
BMPs–Beneficial Management Practices (BMPs) were developed as part of MULTISAR in 2005. These BMPs have been implemented throughout the ferruginous hawk range by such programs as MULTISAR and Operation Grassland Community.	Completed	Completed
Implementation of BMPs–conservation of ferruginous hawk habitat and use of landholder incentive programs, have been initiated by MULTISAR and Operation Grassland Community.	In Progress; Continued through MULTISAR	In Progress
Public awareness through information and education programs, create general knowledge and encourage habitat conservation of species at risk; primarily targeting landholders in the Grassland Natural Region; developed by EPA, MULTISAR and Operation Grassland Community.	In Progress; Continued through MULTISAR	In Progress
National Status Review (COSEWIC).	Completed	Completed
Prey monitoring and research–In 2003 a prey monitoring survey was developed as part of the ferruginous hawk monitoring program. Prey surveys are important in predicting the health and trends within the ferruginous hawk population in Alberta (including annual ground squirrel trend surveys).	On hold due to funding shortages and staff availability	On hold
Research on collision and electrocution–The focus of this project will be on the survival and productivity of ferruginous hawks nesting on existing transmission towers.	In progress through the University of Alberta REACT group.	In Progress
Research on range management and ferruginous hawks.	On hold due to funding and staff availability	On hold
Promote maintenance of hawk populations for regulation of ground squirrels (MULTISAR, OGC).	In progress, as part of outreach activities	In Progress
Reintroductions	Not initiated–not currently required	Not Initiated
The following actions, although important to the ferruginous hawk, are not implemented by the Ferruginous Hawk Recovery Plan. There is potential for these actions to affect the success of the population; therefore, the progress of these activities is tracked.		
Policy for native grassland retention on Alberta public lands: Through the establishment of the South Saskatchewan Regional Plan. Additional policy requirements will be necessary to fully address the impacts of selling or trading publically owned native grasslands on the ferruginous hawks.	Completed	Completed
Establish native grassland referral process with municipalities: To ensure the development planning for urban and rural residences on native grassland to consider the habitat needs of the ferruginous hawk and other prairie species at risk.	Not initiated	Not Initiated
Financial incentives for producers to provide SAR habitat–development of market incentives to reward landholders who have maintained native grasslands and habitat for species at risk, like the ferruginous hawk, is key to the long term success and recovery of these species; Canadian Cattleman's Association–Round Table for Sustainable Beef	In Progress	In Progress

3.0 Situational Analysis

The biology of the ferruginous hawk is described in detail by Bechard and Schmutz (1995) and in the provincial status report titled Status of Ferruginous Hawk (*Buteo regalis*) in Alberta: Update 2006 (ASRD & ACA 2006). While the scope of this plan is to identify recovery strategies and actions, an understanding of some key aspects of the species' biology is a necessary prerequisite to knowledgeable and wise decisions.

3.1 Biology of the Ferruginous Hawk

3.1.1 Distribution

The ferruginous hawk occurs exclusively within the Great Plains of North America, and within Alberta the species' range is primarily within the Grassland Natural Region (Bechard & Schmutz 1995).

Migratory Distribution

Ferruginous hawks are migratory, arriving in Alberta in late March to early April to pair and then nest. Following fledging (mid-July), the young and adults remain near the nest for about one month, with young beginning their southward migration to the southern United States and Northern Mexico in August and adults leaving as late as mid-October (Schmutz & Fyfe 1987; Bechard & Schmutz 1995). Ferruginous hawks from Alberta occupy wintering areas (e.g., west Texas) along with other populations from North Dakota (Gilmer *et al.* 1985) and Saskatchewan (Houston et. al 1998), but over 90% appear to be faithful to their natal areas and both sexes return annually to Alberta (Schmutz *et al*. 2008). Adult hawks appear to occupy the same winter territories year after year (REACT unpublished data).

Mortality factors are diverse during migration. Survival is reduced, especially for juvenile hawks (55%), during their first migration and subsequent search for uncontested suitable wintering areas; even among adults, survival was somewhat low (71%), as compared to an average of 80% for a raptor of this size (e.g. Schmutz & Fyfe 1987; Cully 1991). More importantly, however, a survival study for over 7 000 ferruginous hawks banded in Alberta and Saskatchewan over more than three decades showed that the calculated rate of survival did not change over time. This suggests that the species' decline may be attributed to local effects. Thus, conservation strategies implemented on the breeding grounds could be promising for a recovery of this species (Schmutz *et al.* 2008).

Breeding Distribution

Ferruginous hawks nest in lone trees, large shrubs, abandoned shelterbelts, ledges on cliffs and (rarely) on level ground. They also nest on elevated man-made platforms. In Alberta, ferruginous hawk breeding density and success is linked to the distribution and abundance of Richardson's ground squirrels, which are their main prey (Schmutz *et al.*1980; Schmutz 1989; Downey *et al.* 2006). The breeding distribution of ferruginous hawks in Alberta has been reduced by about 40% since pre-settlement (ASRD & ACA 2006). Currently, a line through Waterton Lakes National Park, Pincher Creek, Calgary, Drumheller, Hanna, Consort, and Altario represents the western and northern limit of their range, with isolated pairs to the north and west (Figure 1).

Nest site availability has been shown to limit this hawk's breeding distribution and possibly also its overall abundance in the wider region (Schmutz *et al.* 1988). As the nest site is of critical importance to the species, the Alberta Ferruginous Hawk Recovery Team defined "active nest" in 2009. This definition (see section 5.1) has been adopted into all existing Government of Alberta processes and policy, including the *EPA Master Schedule of Conditions*, and *Wildlife Directive for Alberta Wind Energy Projects*. These nests receive protection from destruction and disturbance under the *Alberta Wildlife Act*.

FIGURE 1: Distribution of the ferruginous hawk in Alberta based on observational records from 1958 to 2005. The grey line indicates the ferruginous hawk's historical range (Schmutz, Schmutz, & Boag, 1980; Downey B. L., 2005)

3.1.2 Habitat

Ferruginous hawks occur in higher densities in areas dominated by native grassland. Several studies have shown that in Alberta, ferruginous hawk nest density decreases as the area of cultivation increases beyond 50% (Schmutz & Hungle 1989; Stepinksy *et al.* 2002; Downey 2005). Landscapes with sufficient natural grasslands for ferruginous hawks exist where livestock grazing is the main land use (Schmutz 1989; Schmutz 1993a). On a local level, ferruginous hawk density may increase with cultivation, but density declines when the area of cultivation surpasses 50% of the landscape (Schmutz 1989; Schmutz 1993a).

The home range of a pair of ferruginous hawks is centred on the nest site. Based on recent research the average home range for a ferruginous hawk in Alberta is 36 km^2, with a core area of approximately 3.54km^2 (Watson 2020). Home range size fluctuates based on resource availability.

Additional description of habitat requirements will be discussed later in section *5.0 Habitat Needed to Support Recovery*.

3.2 Provincial and Federal Status

The ferruginous hawk is an *Endangered* species as designated in Alberta's *Wildlife Act*. *Endangered* species are those "facing imminent extirpation or extinction". The *Endangered* status was recommended to the Minister of Sustainable Resource Development by Alberta's Endangered Species Conservation Committee on April 12, 2006, and the Minister endorsed that recommendation on May 17, 2006. On November 8, 2006, an amendment to the *Wildlife Act Regulations* AR 275/2006 was passed by Legislative Council which designated the ferruginous hawk as an *Endangered* species in Alberta. The ferruginous hawk qualified as *Endangered* primarily because of its small and declining population.

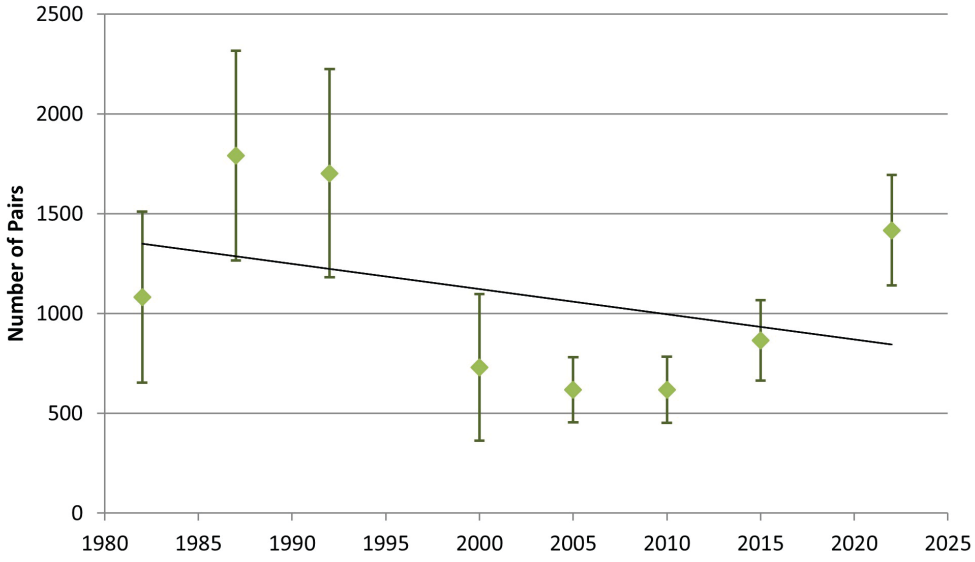
The *Endangered* designation required development of a recovery plan within twelve months of the legal listing. The Ministerial approval identified that policy and management would be implemented to protect the current population. Further, it stipulated that multiple branches within the ministry would work together to monitor regulated activities on Crown lands to ensure no resulting loss of individuals, nests, or populations. The Ministerial approval stated that interim measures to protect current populations on private and leased land would continue through ongoing grassland conservation initiatives such as multi-species conservation and stewardship programs.

Nationally, prior to 2009, the ferruginous hawk was a "species of special concern". The Committee on the Status of Endangered Wildlife in Canada (COSEWIC) commissioned a status report in 2007 to enable a national status review of the species. COSEWIC recommended that the species be listed as *Threatened* under Canada's *Species at Risk Act* (SARA) in 2007. Canada's Environment Minister accepted this recommendation, and the species was listed as *Threatened* under *SARA* in March 2009. The Canadian Wildlife Service is currently drafting a recovery strategy for the ferruginous hawk. To ensure that the recovery process between the federal and provincial governments is cooperative, Alberta has been assisting the Government of Canada in the development of their ferruginous hawk recovery strategy. In turn, the federal government is a member of the Alberta Ferruginous Hawk Recovery Team.

3.3 Population Trends

Although quantitative data do not exist, it is believed that a much larger ferruginous hawk population existed in Alberta prior to European settlement. Ferruginous hawk surveys have been done since the early 1980s. When comparing inventory data since 1982 using a linear regression analysis, we see a gradually declining long-term trend (Figure 2). The slope of the trend line is now -12.49, whereas in 2015 the slope was -27.48 and in 2010 it was -35.74 (Redman 2016). The recent increase of the slope towards zero (i.e., no trend) reflects the reversal of long-term declines and the recovery towards the population sizes in the 1990's (Figure 2). This is believed to be a recoverable population if actions of this recovery plan are carried out.

FIGURE 2: The estimated number of ferruginous hawk pairs and 95% confidence intervals in Alberta between 1982 and 2022.



3.4 Threats

A threats assessment was carried out by the team in 2009 and updated in 2015. This involved determining the relative significance of each threat to the recovery and conservation of ferruginous hawks and identifying the degree to which each threat is likely to occur in present and future contexts.

During this assessment, the Alberta Ferruginous Hawk Recovery Team found that the threats to the species varied geographically. To assist in the recovery planning for the species, the recovery team has sub-divided the ferruginous hawk range by river basins. This resulted in the creation of five distinct regions within the ferruginous hawk's range: Milk River/Pakowki Basin, North Saskatchewan Basin, Red Deer River Basin, Upper South Saskatchewan Basin, and the Lower South Saskatchewan Basin (Figure 3).

FIGURE 3: Ferruginous hawk range districts of Alberta, for the purpose of the threats assessment exercise.

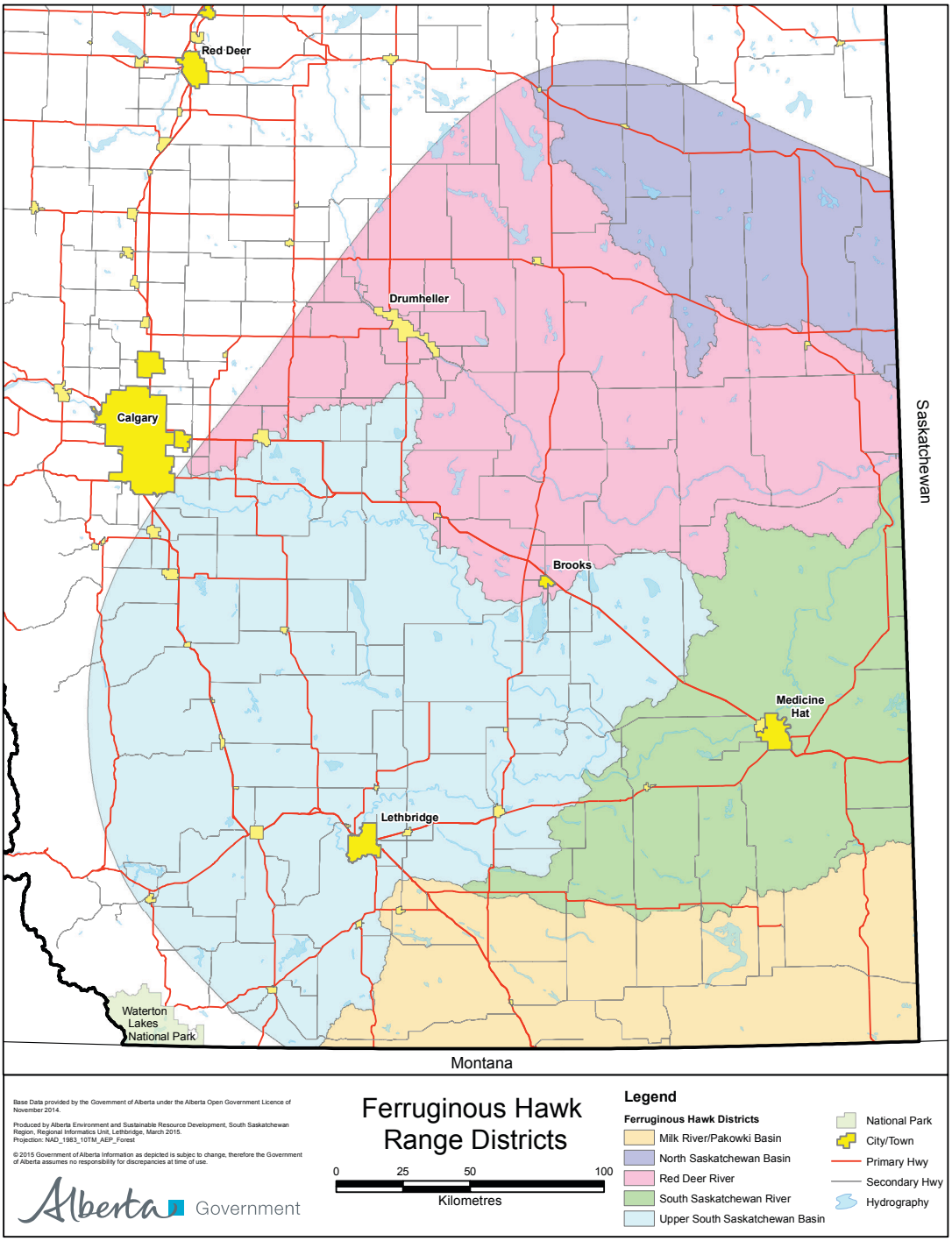


Table 2 provides the threat information as part of a matrix illustrating the progression of the team's decision-making process. It includes identification of limiting factors and threats, evaluation of the degree to which the threat is affecting or will affect ferruginous hawks, and the development of objectives and strategies. This threat assessment table will be continually updated as the Alberta Ferruginous Hawk Recovery Team moves forward with recovery efforts and as new threats are recognized.

TABLE 2: Ferruginous Hawk Threat Assessment Table.

Threat Category	Threat	Scope (regions)	Occurrence[1]	Reversibility[2]	Severity[3]	Level of concern[4]	Comments
Habitat Loss/ Alteration	Cultivation	All	Current	Low	Moderate	Red	Historically widespread; currently localized; still occurs but less common
Habitat Loss/ Alteration	Urban, Country Residential	Upper South Saskatchewan, Lower South Saskatchewan	Current	Low	Slight	Yellow	
Habitat Loss/ Alteration	Roads: increased vehicle access and potential collisions	All	Current	Medium	Moderate	Orange	Type of vehicles and volume of traffic; reversibility depends on type of road
Habitat Loss/ Alteration	Anthropogenic features (old houses, barns, abandoned features on the landscapes), Predators	All	Current	Medium	Slight	Yellow	Irreversibility rated medium due to cost, localized issue within all regions.
Habitat Loss/ Alteration	Expansion of woody vegetation, loss of foraging habitat and potentially nesting habitat	North Saskatchewan, Upper South Saskatchewan, Red Deer River	Current	Medium	Slight	Yellow	Near mountains in SW and Pincher Creek
Industrial Development	Wind turbine collisions	All	Current	Medium	Moderate	Orange	Area expanding in the next five years to all areas of the range. Local issue depending on how they develop and where and how many turbines.

[1] Occurrence is defined as: **Historical** if contributed to the declines but no longer affecting the species; **Current** if affecting the species now; **Imminent** if research suggests this is expected to affect the species soon; **Anticipated** if research suggests this may affect the species in the future; **Unknown** if the occurrence of this event requires further research.

[2] Reversibility is defined as: **High** if the threat is easy to reverse or reclaim and/or a process to reverse the threat exists; **Medium** if the threat can be reverse or corrected for but will not likely to happen in the near future (e.g.,. 20-year process); **Low** if the threat is difficult to reverse or not likely to be reversed due to other factors (i.e. socioeconomic).

[3] Severity is defined as: **Severe** if the threat is likely to cause a large population effect; **Moderate** if the threat is likely to cause a moderate population effect; **Slight** if the threat is likely to have limited impact or only has a local population effect; **Unknown** if the severity of this event requires further research.

[4] Level of concern is defined as: **Red** if it is having a great or considerable negative impact on the population; **Orange** if it is intermediate in nature or degree of impact on the population; **Yellow** if of limited concern or minor negative impact on the population

Threat Category	Threat	Scope (regions)	Occurrence[1]	Reversibility[2]	Severity[3]	Level of concern[4]	Comments
Industrial Development	Power lines/ transmission line collisions	All	Current	Medium	Moderate	Orange	The impact is considered high for the individual as it could be absolute (mortality); small number of documented cases, but this is believed to be related to incidents not being properly reported or discovered.
Industrial Development	Construction (impacts of disturbance during active construction at a site)	All	Current	Medium	Moderate	Orange	Can be significantly lowered if following current recommended actions, such as avoiding critical time periods.
Industrial Development	Distribution power Line electrocution	All	Current	Medium	Moderate	Orange	Can retrofit high-risk poles (limited occurrence data due to reporting standards)
Industrial Development	High operational disturbance (wind, oil and gas, sand and gravel, etc.), high disturbance (see MSSC definitions of High)	All	Current	Medium	Moderate	Orange	
Industrial Development	Low operational disturbance (e.g., gas wells)	All	Current	Medium	Slight	Yellow	If following existing rules and BMPs
Competition/ Survivability	Migration/Winter Mortality	All	Current	Low	Moderate	Orange	Not well understood but likely that migration habitat is being degraded and lost.
Competition/ Survivability	Nest Site Availability	All	Current	High	Moderate	Red	
Competition/ Survivability	Predator population increase	All	Current	Low	Moderate	Orange	Predators considered by the team: great horned owls, coyotes and raccoons.
Competition/ Survivability	Range expansion of competing species	North Saskatchewan, Upper South Saskatchewan and Red Deer River	Current	Low	Slight	Yellow	Pincher Creek area mostly.

Threat Category	Threat	Scope (regions)	Occurrence[1]	Reversibility[2]	Severity[3]	Level of concern[4]	Comments
Food Availability	Pest control	All	Current	High	Moderate	Orange	Primarily against Richardson's ground squirrels, the primary prey item for the species.
Food Availability	Range management	All	Current	High	slight	Yellow	Depends on the type of range management.
Direct mortality	Persecution	All	Current	Medium	Moderate	Yellow	Social issue. More of an issue historically.
Climate Change	Storms variety of causes (wind, rain, snow)	All	Current	Low	High	Orange	More extreme storms as climate changes.
Climate Change	Climate change caused habitat loss	All	Anticipated	Low	Unknown	Unknown	Shift in where trees and grassland trails occur.
Climate Change	Changes in migratory behavior and prey availability	All	Anticipated	Low	Unknown	Unknown	Changes in climate and weather affect prey populations.

Some threats are of unknown significance requiring research and monitoring to discern their importance. Climate change was the most significant of these with the potential to change migratory behavior of the species, and to create changes in hibernation behavior of their prey. On balance climate change may benefit this species.

3.5 Knowledge Gaps and Research Priorities

Several areas of research needs were identified by the team in the ferruginous hawk 2009-2014 recovery plan. A number of research projects were completed between 2010-2014 which are being evaluated for implementation as part of the recovery process for the ferruginous hawk in Alberta (*refer to section 3.0 Conservation Actions to Date*). The research priorities identified below will improve understanding of population ecology and threats and will assist in the development of appropriate management tools for the ferruginous hawk in the future.

This section summarizes the team's recommendations for research topics.

3.5.1 Industrial and Human Disturbance

- Complete the University of Alberta REACT's research to determine appropriate mitigation for various industrial and human disturbance scenarios.
- Determine the level of cumulative disturbance from multiple land uses at which local ferruginous hawk populations are significantly affected through increased mortality, reduced breeding success, decreased recruitment and/or increased emigration.

3.5.2 Prey

- Study bioenergetics of ground squirrels, likely impacts of climate change on them, and how these could affect ferruginous hawk populations and those of other ground squirrel predators.
- Investigate improved, environmentally compatible "gopher" control methods, as well as the economic

Photo: Gordon Court

impacts of various levels of ground squirrel populations in grasslands and croplands.

- Monitor toxicological impacts on resident ferruginous hawks in areas where toxic rodent control continues.
- Monitor Richardson's ground squirrel population cycles and evaluate the effects on ferruginous hawk populations.

3.5.3 Collision and Electrocution

- Complete the University of Alberta REACT's research on monitoring the movement behaviour of juvenile and adult ferruginous hawks to:
  - Help quantify risk of collision with power lines
  - Help determine the impact of power line electrocutions on ferruginous hawks within Alberta
  - Help determine the incidence of vehicle-caused collision mortality on recently fledged ferruginous hawks.

3.5.4 Inter-Specific Competition

- Explore inter-specific competition with other raptors, as well as with Canada geese, and how this is influenced by factors such as nest substrate, habitat, and food availability.

3.5.5 Population Health

- Monitor the health of the hawk population through nesting and fledging success.

3.5.6 Ecological Goods and Services

- Assess and quantify the natural, ecological, and other value of the ferruginous hawk and grassland habitat.

4.0 Recovery Goal and Objectives

There have been six population estimates completed over the past 30 years. These data show that the Alberta ferruginous hawk population reached a low level of approximately 600-700 pairs during the mid to late 1990s, and had remained at that level until 2015, when the numbers began to slowly increase.

There is potential for recovery of the ferruginous hawk in Alberta. While the proximate and ultimate causes of the ferruginous hawk declines are not conclusively known, the declines appear to be linked to a number of contributing factors. Based on analysis and knowledge of the species, the Alberta Ferruginous Hawk Recovery Team has determined that the ferruginous hawk population can be recovered through appropriate management to reduce the threats to the species.

The recovery of the ferruginous hawk in Alberta will be achieved when the recovery goal (*section 4.1*) is attained. This is a long-term goal, which will continue to be worked on through successive recovery plans. To achieve this long-term recovery goal, two short-term objectives (*section 4.2.1 and 4.2.2*) have been set by the recovery team to ensure that the recovery process remains on track over the life of this recovery plan.

4.1 Recovery Goal

To achieve a stable long-term average population of 1,300 pairs of ferruginous hawks distributed across the species' (2007) range in Alberta.

4.2 Objectives

4.2.1 Objective 1

To achieve an average population of 800 pairs of ferruginous hawks by the 2020 provincial inventory.

The short-term population objective is intended to support the overall recovery goal, by incrementally increasing the population of ferruginous hawks over the life of the current and future recovery plans. The short-term population objective will capitalize on the existing indicators used to evaluate the overall recovery goal but sets short-term achievable population objectives that will be used to evaluate the success of the previous five years of recovery actions (*refer to indicator 5.3.1 and 5.3.2*).

Note, this population objective was successfully met in 2022. This objective was identified as a measure of success for the long-term recovery of the ferruginous hawk. Future objectives to measure the successful progression to meet the Recovery Goal (section 4.1) will be developed in consultation with stakeholders and the public.

4.2.2 Objective 2

Maintain the current (2007) range of the ferruginous hawk in Alberta (Figure 4)

The range of the ferruginous hawk in Alberta is influenced by the distribution of native grasslands. Land-use threats, such as cultivation, industrial development, urban/rural residential development, as well as encroachment of trees and shrubs and competition with other raptors, place constraints on the distribution of the species in Alberta. It has been noted that range shifts may occur due to unmanaged threats, such as climate change. However, range shifts are not anticipated within the timeframe of this recovery plan.

Ongoing human footprint expansion in Alberta, and the difficulties and high costs associated with large-scale grassland restoration reduce the likelihood that the presently reduced range could be increased in the province. The current range can support the increased population of ferruginous hawk identified in the recovery goal; therefore, maintaining the existing range size will assist in achieving the overall recovery goal.

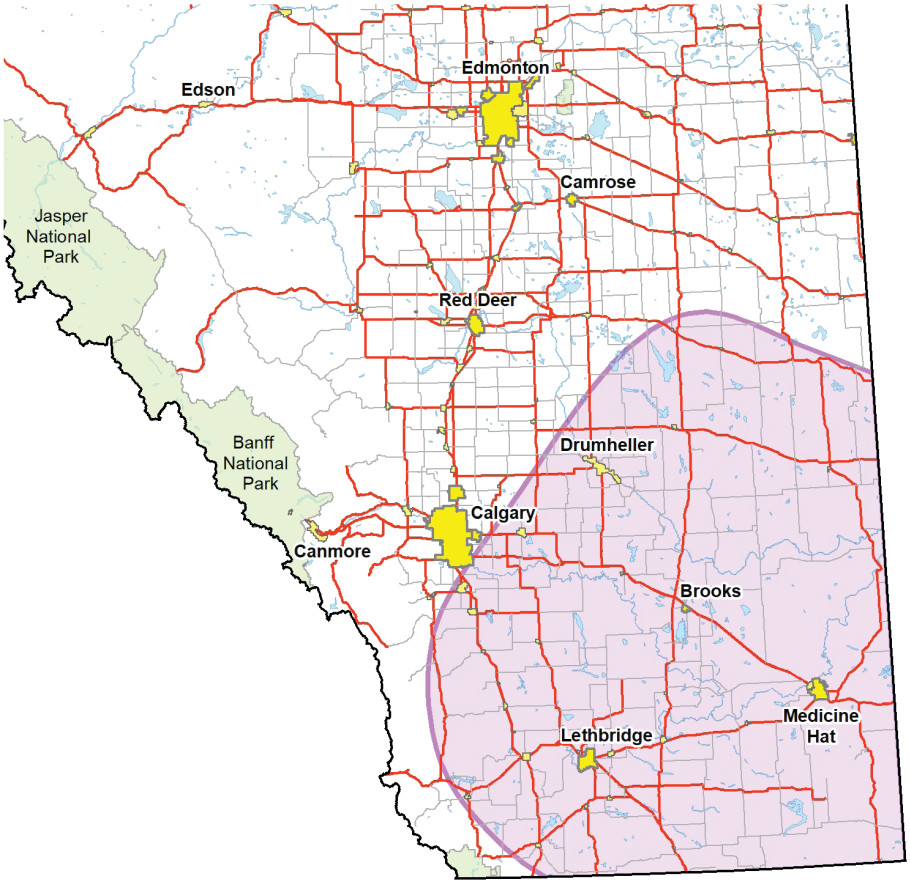


FIGURE 4: 2007 Ferruginous hawk Alberta range.

4.3 Indicators

4.3.1 Population Size

The population size will be calculated as a moving average, using the last three Alberta ferruginous hawk population inventories on a moving average basis (Appendix A). The population inventory will be conducted by EPA every five years, following the methods outlined in Downey (2005).

4.3.2 Population Trends

To monitor the stability of the ferruginous hawk population, the annual survey of a subsample of ferruginous hawk inventory blocks will continue following the methods described in Taylor (2003). Although year-to-year population fluctuations may occur, a positive population trend should be achieved over the next 20 years if the strategies in this plan are followed.

4.3.3 Population Distribution

During each provincial inventory an assessment of change will be conducted to determine if the population of ferruginous hawks has altered its distribution within the province. If no change is detected then the distribution will be assumed to be maintained. The Alberta ferruginous hawk population should be part of a continuous population extending into Saskatchewan and Montana.

5.0 Habitat Needed to Support Recovery

Adequate habitat is considered necessary for the recovery or survival of this species. Habitat Needed to Support Recovery (HNSR) is not "Critical Habitat" as defined in Canada's *Species at Risk Act,* nor is it a legally defined term under the Alberta *Wildlife Act*. Habitat Needed to Support Recovery instead prioritizes the landscape for the implementation of recovery actions and management of the species. For the ferruginous hawk, nesting and foraging habitat are necessary for survival of the species, and ongoing and potential threats exist to both.

5.1 Ferruginous Hawk Nest Site

The nest site is of critical importance to the ferruginous hawk. Nest-site availability has been shown to limit this species' breeding distribution and possibly its overall abundance in the wider region (Schmutz *et al*. 1988). In 2009, the Alberta Ferruginous Hawk Recovery Team defined "active nest." This definition has been adopted into all existing Government of Alberta processes and policy, including the *Master Schedule of Standards and Conditions*, and *Wildlife Directive for Alberta Wind Energy Projects*. The recovery team has reviewed this definition and has endorsed the continued use of the definition. A ferruginous hawk nest will continue to be identified as "active" by the Government of Alberta if:

a. The nest is currently being used by a ferruginous hawk;

And

b. During the winter if there was nesting activity the previous summer;

And

c. Years following a season in which the nest was being used;

Until

d. June 10 of the second consecutive year of no use of that nest or a reconstruction of that nest.

For example:
A nest used in 2023 would be considered active in 2024 if no ferruginous hawks were to nest there. In 2025 it would initially still be considered active until June 10. If no nesting activity has occurred by June 10 the designation of that nest would then be changed to "inactive" and after June 10 it would no longer be managed as an active nest.

Active nests receive protection from destruction and disturbance under Alberta's *Wildlife Act.* Once a nest no longer meets the criteria as an "active" nest, any identified timing constraints and setbacks would cease to be applied. Exception to this might occur at the discretion of EPA, which may result in maintaining the site as an "active" nest, through Protective Notations.

All ferruginous hawk "active" nests in Alberta are necessary to enable and support the recovery of the species and meet the recovery goals and objectives outlined in this plan.

5.2 Ferruginous Hawk Foraging and Nesting Habitat

The current range of the ferruginous hawk is relatively large, covering a large portion of the Grassland Natural Region (Figure 4); however, not all areas within the range provide suitable habitat for the species. To facilitate the identification of Habitat Needed to Support Recovery (HNSR), habitat suitability and relative abundance models were developed by the University of Alberta's REACT team (Ng *et al.* 2018).

HNSR was developed by using habitat models developed to predict current ferruginous hawk home-range habitat-selection, based on the combination of 1) probability of finding ≥1 nests within township-sized areas and 2) location of known historical nests.

A hierarchical approach was used to select potentially suitable habitat for hawks by i) selecting township-sized areas with high abundance of ferruginous hawk nests and subsequently ii) selecting areas within the township-sized areas where home range habitat selection is likely to be relatively higher.

i. A habitat model predicting nest abundance in township-sized landscapes was developed. Data were collected by REACT through systematic nest surveys in 2012 and 2013 throughout southern Alberta and Saskatchewan. Surveys were conducted across gradients of landscapes, from areas dominated by cropland to areas dominated by native grassland. Modellers developed a statistical model to evaluate the relative influence of different landscape variables on nest abundance in township-sized landscapes. Variables included land cover composition and configuration, densities of different types of industrial and human developments, climate, and soil characteristics. Heterogeneous landscapes with moderate amounts of cropland and grassland and moderate edge density were predictors of ferruginous hawk habitat selection. Climate and seasonal weather variables were also important predictors of habitat selection. A detailed list of variables used in this analysis and their impacts on ferruginous hawk habitat selection is available (Ng 2019). The results were used to develop a map showing the probability of finding ≥1 ferruginous hawk nests within the surrounding township-sized landscape. Areas that had high probability (≥45%) of finding at least one hawk nest in the surrounding township-sized landscape were selected as important landscapes for ferruginous hawks.
ii. Within these important landscapes (i.e., high probability areas of detecting ≥1 ferruginous hawk nests), the modellers identified areas where home range habitat selection was likely to be relatively high. This was done using a predictive habitat selection model developed by REACT using historical ferruginous hawk nest locations between 2005 and 2010. The model evaluated the influence of land cover composition and configuration, densities of different types of industrial and human developments, climate, and soil characteristics on home range selection. A predictive map was generated using the model coefficients and was validated against an external dataset. Predictive performance was good, and 88% of the external dataset's nests were located in areas with >70% relative selection probability. This selection criterion was used to identify areas within the abundance model where hawks are most likely to select for home ranges. Cropland and urban land covers were removed from these identified areas as stewardship or conservation actions are unlikely to improve their habitat suitability for ferruginous hawks.

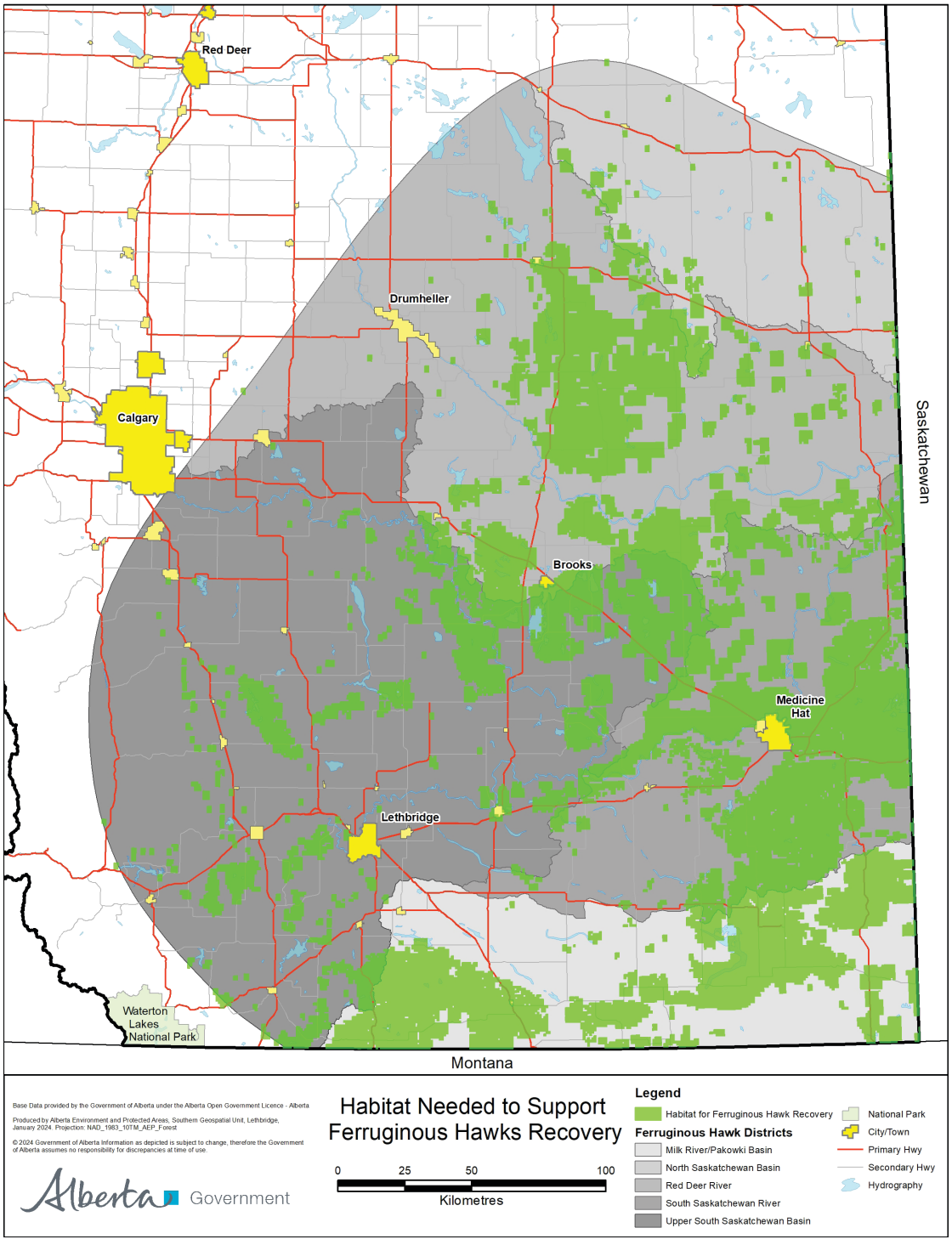
This approach, where habitat models are combined, identifies areas where ferruginous hawks are most likely to be found based on nest locations in recent years. However, it does not limit hawk habitat use exclusively within these areas, but rather predicts lower likelihood of use outside the identified areas. These models also reflect ferruginous hawk habitat use since 2005 and may not capture habitat use in more historical contexts.

Known historical nest locations identified in the Fish and Wildlife Management Information System (FWMIS), from 1980 to 2015, were included if their locations were not already included in the areas selected by the above procedure. Including these nests will complement HNSR by identifying areas that were historically important to ferruginous hawks, potentially current habitat, and potential habitat for recovering populations.

Nest locations were generalized to the quarter-section where they were located. In order to propose landscapes suitable for the home ranges of hawks and not only the nest location, any quarter-sections that bordered the section where the nest was located were also included. Cropland and urban land covers were removed as in (ii) above.

The final map was then restricted to the distribution of ferruginous hawk nests found between 1980 and 2015 (Figure 5).

FIGURE 5: Ferruginous hawk habitat needed to support recovery in Alberta.



5.3 Process for Implementing Actions in Areas Identified as Habitat Needed to Support Recovery

HNSR identifies areas of the province that are most likely to support habitat for ferruginous hawks. HNSR has been designated to support the Government of Alberta, conservation groups, landholders, and industry in identifying priority areas to implement recovery actions for ferruginous hawks. This habitat is necessary to ensure success in meeting the recovery goal and objectives outlined in this plan (section 4.0). The following outlines the process that will be followed to implement these actions in areas identified as HNSR.

1. **Prioritization of Areas:** Areas identified as HNSR for ferruginous hawks will be priority one for implementation of recovery actions. Other areas within the species' range have the potential to support individual ferruginous hawk nests. The individual ferruginous hawk nesting pairs are a vital part of the recovery process. Existing ferruginous hawk nests will continue to be conserved and protected, as per the Alberta *Wildlife Act* and Government of Alberta policy; however, recovery actions will also be implemented in areas outside of HNSR in an opportunistic manner.
2. **Identification of Recovery Actions:** Areas identified as HNSR will be assessed to determine priority actions for the area. This assessment may include a desktop review, field surveys, communication with local residents, or a combination of any of these. Recovery actions will be based on specific threats present in the local area.
3. **Implementation of Recovery Actions:** Recovery actions will be implemented based on results of the above assessment. These may include actions focused on maintaining the current population of ferruginous hawks in certain areas or more aggressive actions focused on increasing the number of ferruginous hawks in other areas.

6.0 Recovery Strategies and Actions

The Alberta Ferruginous Hawk Recovery Team identified strategies to achieve the recovery goal and objectives outlined in this plan. These strategies are linked directly with the associated threats to the ferruginous hawk.

There are seven strategies identified for the recovery of the Alberta Ferruginous Hawk population:

1. Reduce human disturbance at nest sites.
2. Maintain existing native grasslands and pasture lands on both public and private land.
3. Ensure there is an adequate quantity of nest sites available in suitable habitat.
4. Maintain and enhance prey populations for ferruginous hawks.
5. Reduce human-caused mortality of ferruginous hawks in Alberta.
6. Limit the impacts of predators and competing bird species.
7. Conservation of ferruginous hawk during migration and on their wintering grounds.

For each of these strategies a desired outcome, progress measure, and associated recovery actions are detailed. The effectiveness of the strategies and actions for the ferruginous hawk will be assessed through the progress measures identified within each individual strategy and through the general indicators identified for the recovery goal (*refer to section 4.0 Recovery Goals and Objectives*).

The recovery strategies and actions identified in this plan are achievable with focused efforts and resources from government, private industry, conservation groups, agricultural organizations and producers, and local stewardship groups.

6.1 Strategy 1: Reduce human disturbance at nest sites

Ferruginous hawks are sensitive to human disturbance in and around their nest sites. Managing human disturbance in proximity of ferruginous hawk nesting sites directly supports the conservation of identified Habitat Needed to Support Recovery (refer to section 5.1). Actions will focus on the implementation of policies, best management practices, avoidance strategies, and mitigation of threats.

6.1.1 Desired Outcome

Using best management practices developed by the government (in consultation with industry), minimize the impacts of human disturbance, including industrial development, on ferruginous hawk nesting and rearing sites. In circumstances where developments may be proceeding and a chance exists of long- or short-term impacts on ferruginous hawks, proponents must apply acceptable mitigation measures, as per the direction of EPA.

6.1.2 Progress Measures

- Number of compliance files under the AER/AUC related to ferruginous hawks.
- Percent of projects following the “non-routine application” stream related to ferruginous hawks.
- Number of Protective Notations implemented or maintained on public land.
- Nest productivity on annual ferruginous hawk monitoring blocks.

6.1.3 Recovery Actions

6.1.3.1 Pre-Development Consultation with EPA

Provide information on current and historical locations of ferruginous hawk nests and other species at risk, as well as MULTISAR and other habitat suitability information that may exist for certain areas, mapping information, and local professional knowledge as part of industrial pre-planning consultation procedures.

6.1.3.2 Pre-development Wildlife Surveys

Conduct pre-development surveys using appropriate protocols outlined by the Government of Alberta in the *Sensitive Species Inventory Guidelines* for all industrial facilities within the ferruginous hawk range (wind energy, oil and gas, transmission, solar, etc.).

6.1.3.3 Application of Recommended Mitigation Strategies

Apply Government of Alberta-recommended standards, guidelines and directives to industrial developments on both private and public land. These will be updated regularly based on new research, when available.

6.1.3.4 Development of new Standards and Guidelines

Many standards, guidelines, or directives, such as the *Alberta Wildlife Directives for Wind Energy Projects*, are available for industry with clear mitigation measures identified; where mitigation guidelines/standards do not exist for an industry, they should be developed.

6.2 Strategy 2: Maintain existing habitat

Ferruginous hawks require a diversity of habitats for both nesting and foraging. Maintaining and enhancing habitat for ferruginous hawks directly supports the identified Habitat Needed to Support Recovery (refer to section 5.0). Management techniques differ based on land ownership with regulation and policy as primary tools on public land and voluntary stewardship utilized on private land.

6.2.1 Desired Outcome

Maintain nesting and foraging opportunities in native grasslands and pasture lands on both public and private lands in Alberta.

6.2.2 Progress Measures

Number of acres of ferruginous hawk habitat conserved under voluntary stewardship agreements (MULTISAR, OGC, other voluntary stewardship organizations, easements, land purchases or other).

6.2.3 Recovery Actions

6.2.3.1 Grassland Retention Policy

Adhere to and implement the grassland retention objectives outlined in the *South Saskatchewan Regional Plan 2014-2024 (*Government of Alberta 2017*)*. Through a collaborative effort between the Department of EPA and Alberta's Prairie Conservation Forum, ensure similar objectives are outlined in the North Saskatchewan Regional Plan.

6.2.3.2 Grazing Beneficial Management Practices (BMPs)

Implement the MULTISAR Beneficial Management Practices (BMPs) for ferruginous hawks (RCS, 2004). This can be accomplished through government policy on public land; on private land, implement BMPs through MULTISAR, OGC, agricultural programs and other voluntary stewardship or through easements and land purchase programs.

6.2.3.3 Education and Awareness

Provide key ferruginous hawk conservation and recovery messages through extension programs including the Prairie Conservation Forum, MULTISAR, Operation Grassland Community, Nature Conservancy of Canada, Alberta Beef Producers, Ducks Unlimited Canada, and Cows and Fish.

6.2.3.4 Financial Incentives to Agricultural Producers

Much of the habitat for species at risk in the province is managed by ranchers who are retaining native prairie habitats and grazing it in a manner compatible with wildlife. Although this is widely understood by wildlife managers, the vast majority of urban Albertans are unaware. The following actions are recommended to support sustainable ranching:

- Encourage urban consumers to purchase open range-raised beef.
- Promote market demand for labeling to identify beef produced by "Endangered Species Friendly" producers, leading to a system of market-based incentives that encourage producers to maintain species at risk habitat.
- Encourage ecological goods and services analysis that quantifies the economic benefits of native grassland.

6.3 Strategy 3: Ensure adequate number of nest sites

The number of available nest sites has been identified as a key limiting factor for ferruginous hawks. Installation of ANPs has proven to be a beneficial recovery action in Alberta to date. Continued action to address the loss of nesting structures is required. This strategy directly supports the identified Habitat Needed to Support Recovery (refer to section 5.1) for the ferruginous hawk.

6.3.1 Desired Outcome

Sufficient nest sites are available to support the ferruginous hawk recovery population goal within suitable habitat.

6.3.2 Progress Measures

- Number of installed ANPs relative to the known number of existing sites lost/removed.
- Number of installed ANPs that have had an active ferruginous hawk nest in the current and/or past two seasons.

6.3.3 Recovery Actions

6.3.3.1 Conservation of Ground/Cliff Nest Sites

Through aerial and ground surveys, identify areas where ferruginous hawks nest on sloped ground, on cliff ledges, or atop hoodoos, and protect these areas through protective notations (if public lands) or through landowner consultation, education, and awareness activities of stewardship programs.

6.3.3.2 Installation of Artificial Nest Platforms (ANPs)

Install ANPs in suitable habitat[5] and at suitable density following the GOA ANP construction protocols (Migaj *et al.* 2011). Installation of ANPs will be focused in areas of lost nesting opportunities or in areas identified as Habitat Needed to Support Recovery where nesting sites are limited. The process will involve the regional Government of Alberta species at risk biologist, landholders, industry partners, local government and conservation agencies.

6.3.3.3 Conservation of Lone Trees

Manage naturally occurring trees and shrubs as important components of the prairie ecosystem, and encourage their protection and management through stewardship programs and referral processes.

6.3.3.4 Conservation of Shelterbelts

Encourage keeping shelterbelts and woody vegetation surrounding abandoned farmsteads in place through stewardship programs and awareness activities, where there are limited risks of competition from other raptors (refer to Strategy 6).

6.4 Strategy 4: Maintain and enhance prey populations

Prey availability will directly impact the selection of nesting sites, productivity, and the overall ferruginous hawk population. Ferruginous hawk primarily prey upon Richardson's ground squirrels, a species widely viewed as a pest by some land managers. Education and awareness is required to ensure proper management and control of prey species to support the long term recovery of the species.

6.4.1 Desired Outcome

Sufficient prey is available to support ferruginous hawk recovery population goals.

6.4.2 Progress Measures

- Track Richardson's ground squirrel trends within the ferruginous hawk population monitoring blocks (Downey 2003).

6.4.3 Recovery Actions

6.4.3.1 Pest Control

Encourage maintenance of ferruginous hawk populations for help in regulating ground squirrel populations. This will be supported through the implementation of *action 6.3.3.2*.

6.4.3.2 Rangeland Management

Encourage use of BMPs for the ferruginous hawk in stewardship programs. This will be accomplished through the implementation of *actions 6.2.3.2 and 6.2.3.4.*

6.4.3.3 Critical Ground Squirrel Density

Encourage research to quantify the ground squirrel density required to support successful ferruginous hawk breeding.

[5] Given the objective to increase the provincial ferruginous hawk population, and the likelihood that, at least in some areas, availability of nest sites may be a limiting factor, it would be appropriate to provide additional nest platforms in suitable habitat within the range of the species. However, this should be done in areas where it is unlikely they will be used by competing species such as Swainson's hawk. Additionally, new sites should avoid areas with other species at risk such as burrowing owl and sage grouse.

6.5 Strategy 5: Reduce human-caused mortality

Human caused raptor mortality in Alberta include collisions (vehicle and other), electrocution on power lines, and persecution. Minimizing these losses through management of threats, implementation of best practices, and awareness programs will support the ferruginous hawk recovery goal.

6.5.1 Desired Outcome

Human-caused mortality does not have a significant negative impact on the population of ferruginous hawk.

6.5.2 Progress Measures

- Number of annual human-caused mortalities.
- Number of sites that have been retrofitted as described in action 6.5.3 below.

6.5.3 Recovery Actions

6.5.3.1 Collisions with Elevated Structures

Reduce mortality of ferruginous hawks due to collisions with elevated structures through industrial land planning actions described in the previous section (*actions 6.1.3.1 and 6.1.3.2*).

6.5.3.2 Avian Protection Plans

Reduce mortality of ferruginous hawks due to electrocution and collision with power lines through requiring the use of Avian Protection Plans (APLIC and USFWS, 2005).

6.5.3.3 Mitigation of Electrocution and Collision Risk

Retrofit power poles at high risk of electrocution according to the Avian Power Line Interaction Committee standards (APLIC, 2006) in high-priority areas to minimize ferruginous hawk mortalities.

6.5.3.4 Mitigation of Road Mortalities

Undertake efforts to reduce mortality arising from collisions with vehicles, through the implementation of industrial BMPs and signage.

6.5.3.5 Reduce Persecution Risk

Develop messages relating to the values of ferruginous hawks and thereby discourage persecution of the species. Incorporate these messages into information and education programs. These awareness messages should be provided to landholders, land planners (e.g., municipalities) and industrial developers.

6.5.3.6 Voluntary Reporting of Mortalities

Encourage voluntary reporting of ferruginous hawk mortalities to the Fish and Wildlife Management Information System (FWMIS) by all industry proponents in Alberta.

6.6 Strategy 6: Limit impacts of predators and competitors

Habitat change within Alberta has led to the expansion of raptor species that directly compete with ferruginous hawks for resources. These habitat changes have also resulted in predator subsidies which have increased the number and types of predators within the ferruginous hawk range. Actions will focus on reducing anthropogenic habitat, reducing tree encroachment into the species range, and research.

6.6.1 Desired Outcomes

Competition pressure from other raptor species such as red-tailed hawks and Swainson's hawks is reduced in areas of native grassland. Further, the number of predators within ferruginous hawk range is not artificially increased.

6.6.2 Progress Measures

- Amount of tree encroachment within ferruginous hawk range.

6.6.3 Recovery Actions

6.6.3.1 Tree and Shrub Encroachment into the Grassland Natural Region

Through the Grassland Vegetation Inventory (GVI), monitor incremental expansion of trees in the North Saskatchewan and western edge of the Upper South Saskatchewan regions of the ferruginous hawk range every five years. Where appropriate, encourage the removal of clumps of trees to limit nesting opportunities for competing species (red-tailed hawk and Swainson's hawk) in close proximity to existing ferruginous hawk nests.

6.6.3.2 Predator Population Expansion

Monitor populations of predators of nestling or fledglings, such as great-horned owl, common raven, and American crow, to determine if populations are expanding within ferruginous hawk range.

6.6.3.3 Mitigation of Artificial Predator Habitat

Through existing stewardship programs, remove artificial predator habitat (e.g., abandoned buildings) where increased predation has been linked to reduced ferruginous hawk nesting success. Negative impacts of predation have been shown to outweigh the benefit of additional nesting substrates.

6.6.3.4 Quantification of Predator Impacts

Encourage research into the impact of potential predators on ferruginous hawk population ecology.

6.7 Strategy 7: Contribute to conservation of ferruginous hawks across all jurisdictions

Alberta is responsible for the management of ferruginous hawks when they are within the province. However the ferruginous hawk is a migratory species, therefore management decisions made in other jurisdictions may impact the success of recovery initiatives undertaken in Alberta. Where appropriate, Alberta will encourage implementation of management actions that will benefit ferruginous hawks throughout the species' North American range.

6.7.1 Desired Outcome

Ferruginous hawks are actively managed to conserve the species along migration routes and on their wintering grounds.

6.7.2 Progress Measures

- Number of jurisdictions that have adopted actions identified in the Alberta Ferruginous Hawk Recovery Plan.

6.7.3 Recovery Actions

6.7.3.1 North American Conservation Action Plan

Include recommendations of the Alberta Ferruginous Hawk Recovery Plan into the next update of the North American Conservation Action Plan for Ferruginous Hawk (Commision for Environmental Cooperation, 2005)

6.7.3.2 Alignment with the Federal Government Recovery Strategy

Provide the Alberta Ferruginous Hawk Recovery Plan to the national recovery team and encourage adoption of it as the recovery action plan for the Alberta portion of the species' range.

6.7.3.3 Mitigate Migration Risks

Work with the federal government of Canada to encourage protective measures on infrastructure along the ferruginous hawk migration routes, similar to those identified in action 6.5.3, in the United States and Mexico.

6.7.3.4 Quantification of Sources and Level of Mortality

Encourage research into the impact of mortality during migration and on wintering grounds on ferruginous hawk population ecology.

7.0 Timetable for Implementation and Schedule of Cost

The implementation table summarizes each action, the strategy that action is delivering and the priority (Table 4).

Priority codes are:

1 = High priority for immediate species conservation, initiate as soon as possible;

2 = Medium priority for long term species conservation;

3 = Lower priority, primarily directed at potential future activities;

4 = Not needed at this time but possibly in future.

Costs to the EPA-Fish and Wildlife Species at Risk Program are estimated. The term "In-kind" is used where there are costs associated but they are absorbed within the normal operating costs of government or provided by another organization or industry.

TABLE 3: Alberta Ferruginous Hawk Implementation Table.

Action	Priority	2023	2024	2025	2026	2027	2028
Strategy 1: Reduce human disturbance at nest sites							
6.1.3.1 Pre-development consultation with EPA	1	In-kind ongoing	In-kind ongoing	In-kind ongoing	In-kind ongoing	In-kind ongoing	Evaluate
6.1.3.2 Pre-development Wildlife Surveys	1	In-kind ongoing	In-kind ongoing	In-kind ongoing	In-kind ongoing	In-kind ongoing	Evaluate
6.1.3.3 Application of Recommended Mitigation Strategies	1	In-kind ongoing	In-kind ongoing	In-kind ongoing	In-kind ongoing	In-kind ongoing	Evaluate
6.1.3.4 Development of new Standards and Guidelines	2	In-kind ongoing	In-kind ongoing	In-kind ongoing	In-kind ongoing	In-kind ongoing	Evaluate
Strategy 2: Maintain existing habitat							
6.2.3.1 Grassland Retention Policy	2	In-kind ongoing	In-kind ongoing	In-kind ongoing	In-kind ongoing	In-kind ongoing	Evaluate
6.2.3.2 Grazing Beneficial Management Practices	1	In-kind ongoing	In-kind ongoing	In-kind ongoing	In-kind ongoing	In-kind ongoing	Evaluate
6.2.3.3 Education and Awareness	1	ongoing	ongoing	ongoing	ongoing	ongoing	Evaluate
6.2.3.4 Financial Incentives to Agricultural Producers	2	ongoing	ongoing	ongoing	ongoing	ongoing	Evaluate
Strategy 3: Ensure adequate number of nest sites							
6.3.3.1 Conservation of Ground/Cliff Nest Sites	1	In-kind ongoing	In-kind ongoing	In-kind ongoing	In-kind ongoing	In-kind ongoing	Evaluate
6.3.3.2 Development of ANPs	1	In-kind ongoing	In-kind ongoing	In-kind ongoing	In-kind ongoing	In-kind ongoing	Evaluate
6.3.3.3 Conservation of Lone Trees	1	In-kind ongoing	In-kind ongoing	In-kind ongoing	In-kind ongoing	In-kind ongoing	Evaluate
6.3.3.4 Conservation of Shelterbelts	1	In-kind ongoing	In-kind ongoing	In-kind ongoing	In-kind ongoing	In-kind ongoing	Evaluate
Strategy 4: Maintain and Enhance Prey Populations							
6.4.3.1 Pest Control	2	ongoing	ongoing	ongoing	ongoing	ongoing	Evaluate
6.4.3.2 Rangeland Management	2	In-kind ongoing	In-kind ongoing	In-kind ongoing	In-kind ongoing	In-kind ongoing	Evaluate
6.4.3.3 Critical Ground Squirrel Density	3	In-kind ongoing	In-kind ongoing	In-kind ongoing	In-kind ongoing	In-kind ongoing	Evaluate
Strategy 5: Reduce human-caused mortality							
6.5.3.1 Collisions with Elevated Structures	2	In-kind ongoing	In-kind ongoing	In-kind ongoing	In-kind ongoing	In-kind ongoing	Evaluate
6.5.3.2 Avian Protection Plans	2	In-kind ongoing	In-kind ongoing	In-kind ongoing	In-kind ongoing	In-kind ongoing	Evaluate
6.5.3.3 Mitigation of Electrocution and Collision Risk	2	In-kind ongoing	In-kind ongoing	In-kind ongoing	In-kind ongoing	In-kind ongoing	Evaluate
6.5.3.4 Mitigation of Road Mortalities	2	In-kind ongoing	In-kind ongoing	In-kind ongoing	In-kind ongoing	In-kind ongoing	Evaluate
6.5.3.5 Reduce Persecution Risk	2	ongoing	ongoing	evaluate	ongoing	ongoing	Evaluate
Strategy 6: Limit impacts of predators and competition							
6.6.3.6 Voluntary Reporting of Mortalities	3	Ongoing	Ongoing	Ongoing	Ongoing	Ongoing	Evaluate
6.6.3.1 Tree and Shrub Encroachment into the Grassland Natural Region	3	In-kind ongoing	In-kind ongoing	In-kind ongoing	In-kind ongoing	In-kind ongoing	Evaluate
6.6.3.2 Predator Population Expansion	3	In-kind ongoing	In-kind ongoing	In-kind ongoing	In-kind ongoing	In-kind ongoing	Evaluate
6.6.3.3 Mitigation of Man-made Predator Habitat	3	In-kind ongoing	In-kind ongoing	In-kind ongoing	In-kind ongoing	In-kind ongoing	Evaluate
6.6.3.4 Quantification of Predator Impacts	3	In-kind ongoing	In-kind ongoing	In-kind ongoing	In-kind ongoing	In-kind ongoing	Evaluate

Action	Priority	2023	2024	2025	2026	2027	2028
Strategy 7: Conservation of ferruginous hawks during migration and on their wintering grounds							
6.7.3.1 North American Conservation Action Plan	3	In-kind ongoing	In-kind ongoing	In-kind ongoing	In-kind ongoing	In-kind ongoing	Evaluate
6.7.3.2 Alignment with the Federal Government Recovery Strategy	3	In-kind ongoing	In-kind ongoing	In-kind ongoing	In-kind ongoing	In-kind ongoing	Evaluate
6.7.3.3 Mitigate Migration Risks	3	In-kind ongoing	In-kind ongoing	In-kind ongoing	In-kind ongoing	In-kind ongoing	Evaluate
6.7.3.4 Quantification of Sources and Level of Mortality	3	In-kind ongoing	In-kind ongoing	In-kind ongoing	In-kind ongoing	In-kind ongoing	Evaluate
Other associated costs and actions							
5-year Provincial Population Inventory	1	-	-	-	-	-$50,000 and in-kind contributions from partners	-
Annual monitoring	1	In-kind	In-kind	In-kind	In-kind	In-kind	In-kind
Prey monitoring	1	In-kind	In-kind	In-kind	In-kind	In-kind	In-kind

Photo: Gordon Court

8.0 Social and Economic Considerations

Social and economic impacts of implementing the Alberta Ferruginous Hawk Recovery Plan are expected to be minimal. Industrial and infrastructure developments may require a longer planning lead time in areas where ferruginous hawks are known or expected to occur. Additional costs related to hiring biologists and their carrying out of pre-development surveys can be expected. In some cases, setback distances and timing constraints may result in development delays and special procedures, which will increase costs.

The retention of areas of native grassland to benefit ferruginous hawk and other grassland species will limit some potential crop development. This may be considered a financial loss but it may also be recognized as an ecological and societal gain for future generations. The loss of economic opportunities due to considerations related to conservation of nature generally lead to creation of other long-term benefits and opportunities. Given the accelerating rates of industrial, infrastructure and residential developments on the prairie landscape and the attractiveness of increasing the amount of cropland resulting from high commodity prices, an imminent need exists to develop methods of economic valuation of natural habitats and landscapes. Until such methods are refined, full-cost accounting of the socio-economic impacts of endangered species recovery cannot be done.

While satisfactory valuations of ferruginous hawk to society may not be available at this time, it is clear that Alberta society places a high value on the continued presence of natural habitats and landscapes. Habitation of those natural areas by native species, including the ferruginous hawk, is also very important to Albertans.

TABLE 4: Anticipated socio-economic considerations for implementing the ferruginous hawk recovery plan

Strategy	Action	Socio-economic impact
1. Reduce human disturbance at nest sites	Pre-development consultation and wildlife surveys	(+) maintenance of an intact prairie landscape that may lead to enhanced recreational opportunities such as nature viewing, hunting, and ecotourism (+) reduced disturbance for other wildlife species (+) increased understanding (knowledge creation) of the importance of habitat for the species and the species interaction with specific components of the ecosystem (+) increased understanding of interaction between human activities and the species (+) improved communication between industry and provincial government (+) improved access to information for industrial proponents (+) improved transparency and clarity provided by a well defined process industry needs to follow when attempting development in prairie landscape (-) opportunity cost of restrictions for industrial activity on public land that may limit potential future development (-) cost of conducting pre-development surveys (-) coordination costs
	Application of recommended mitigation strategies	(-) cost of including in development plans (e.g., setback 9-distances, timing) (+) healthy biodiversity (-) cost of implementing mitigation strategies

Strategy	Action	Socio-economic impact
2. Maintain existing habitat	Grassland retention policy	(+) improved habitat for other wildlife species (-) potential for limited conversion of native grasslands into crop land
	Grazing BMPs	(-) cost of implementing BMPs (+) improved habitat for other wildlife species (+) improved understanding and implementation of practices that promote a suitable habitat for ferruginous hawks
	Financial incentives to agricultural producers	(+) increased business to producers (+) improved knowledge of consumers regarding “endangered species friendly” producers
3. Ensure adequate number of nest sites	Installation of Artificial Nest Platforms	(+) increased nesting success (-) coordination and installation costs
	Conservation of lone trees, ground/ cliff nest sites and shelterbelts	(+) improved habitat for other wildlife species (+) improves collaborative relationships between provincial government, land owners, NGOs and counties (+) better understanding (land owners) of the habitat needs of ferruginous hawks for increased nesting success and chick survival(+) richer vegetation has positive effects on carbon retention
4. Maintain and enhance prey populations	Pest control	(+) natural pest control method would have a positive impact on other wildlife species, domestic animals, and soil health.
	Rangeland management	(-) cost of implementing BMPs (+) healthy biodiversity (+) increased nest success
	Critical ground squirrel density research	(+) creation of new knowledge that allows a better understanding of the needs of ferruginous hawks to survive
5. Reduce human-caused mortality	Avian protection plan development	(+) improved communication between industry and government (-) cost of plan development (+) improved public relations
	Retrofit power poles	(+) improved public relations (+) improved system reliability (fewer power outages) (+) decreased cost to repair damages to infrastructure or system generated by ferruginous hawk contact with power lines (-) cost of modifying poles
	Mitigate road mortalities and reduce persecution	(-) cost of producing signage and educational materials (+) improved relationships between industry, government, and landowners (+) Increased understanding of the importance of the species by industry, government, landowners and the general public
6. Limit impacts of predators and competitors	Vegetation management	(+) improved habitat for other grassland –dependent species (-) cost of removing vegetation
	Predator monitoring and research	(+) improved ability to manage impacts of predators on ferruginous hawks (-) cost of conducting research (+) creation of new knowledge that would enhance the understanding of the impact of competing predator populations to the ferruginous hawk population (+) potential of identifying better practices through knowledge creation that could translate into a more effective policy design
7. Conservation of ferruginous hawks during migration and on wintering grounds	Incorporation/ alignment of ferruginous hawk conservation needs into strategies and policies	(+) improved communication and collaboration among jurisdictions (+) improved effectiveness of conservation action plans for North America (-) cost of collaboration (staff time, meetings, etc.)
	Research into mortality during migration and wintering grounds	(+) improved ability to manage impacts of migration and overwintering mortality (-) cost of conducting research (+) creation of new knowledge that would enhance the understanding of the impact of migration on the ferruginous hawk population (+) potential of identifying better practices through knowledge creation that could translate into a more effective policy design

9.0 Effects on Other Species at Risk

The Grassland Natural Region (GNR) of Alberta includes the entire Alberta population of ferruginous hawks. The GNR has the highest number of species at risk of any natural region in the province. Because of the large number of species at risk that have overlapping habitat needs within this natural region, there is potential for various recovery actions identified in the individual species' recovery plans to be in conflict with each other. All species recovery team leads should collaborate with recovery team leads for other potentially affected species to minimize conflicts. As of September 2015, there were seven Alberta species at risk recovery plans whose actions had the potential to conflict with Ferruginous Hawk recovery actions:

- Burrowing owl
- Northern leopard frog
- Ord's kangaroo rat
- Greater sage-grouse
- Soapweed and yucca moth
- Swift fox
- Western spiderwort

The majority of the recovery actions included in each of these plans are compatible with the recovery actions identified for the ferruginous hawk. These include conservation of native prairie habitats, invasive species control or elimination, development of BMPs for various land users, and use of standards/ guidelines or BMPs for industrial developments. Based on the Ferruginous Hawk Recovery Team chair's review of the above species' recovery plans and associated actions, potential for conflicting recovery actions with other existing plans is limited to the erection of artificial nest platforms in areas in greater sage-grouse critical habitat or in close proximity to burrowing owl nests. However, the ANP construction protocol (Migaj *et al.* 2011) directly addresses these two risks. As long as this protocol is followed, the risk should be adequately addressed.

To avoid conflict at any point of the ferruginous hawk recovery process, programs that consider multiple species at risk rather than individual species (e.g. MULTISAR, OGC) should be the main delivery agents for recovery plan actions. A multiple species program can examine the land base as a whole and achieve a balance between the habitat needs and recovery actions for each of the listed species. Agencies delivering recovery actions for ferruginous hawk will consider all impacts to other species at risk before implementing the recovery actions. This is of particular importance in areas where important habitat of more than one species overlaps.

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Appendices

Appendix A: Ferruginous Hawk Population Averages

The ferruginous hawk population average will be calculated using the estimated number of pairs from the last three provincial inventories conducted by Environment and Protected Areas. The table below provides the average number of ferruginous hawk pairs estimated each of the inventory years since 1982.

Average number	Inventory Years included	Average number of Ferruginous Hawk Pairs
1	1982	only 1 inventory completed, insufficient data to calculate
2	1982, 1987	only 2 inventories completed, insufficient data to calculate
3	1982, 1987, 1992	1525
4	1987, 1992, 2000[6]	1408
5	1992, 2000[6], 2005	1017
6	2000, 2005, 2010	655
7	2005, 2010, 2015	700
8	2010, 2015, 2022[7]	967

[6] Greater than 5 years between 1992 and 2000 population inventory, data may not accurately reflect the true population average

[7] Greater than 5 years between 2015 and 2022 population inventory, data may not accurately reflect the true population average


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