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Re: Barney Lake and False Canyon Creek Fire Salvage Projects

Dear Robin,

Environment Canada – Canadian Wildlife Service has reviewed the project plans for the Barney Lake and False Canyon Creek fires, and we wish to provide the following information and comments to the *Yukon Environmental Assessment Act* screenings.

MIGRATORY BIRDS CONVENTION

The Canada – US *Migratory Bird Convention* (MBC) was signed in 1916. In 1999 a protocol was signed between Canada and the US to amend the 1916 Convention and bring in stronger references to conservation; changing the focus of the Convention from the protection of individual birds and their nests, to the conservation of populations of migratory birds, and protection of the lands and waters upon which they depend.

The *Migratory Bird Convention Act* (MBCA) and the *Migratory Bird Regulations* (MBR) were established to implement Canada's obligations under the Convention.

Section 6(a) of the MBR prohibits the disturbance, destruction or taking of a nest of a migratory bird (as defined by the MBC). This includes the incidental take of migratory bird nests through destruction during forestry activities, construction, haying etc.

Bill C-15 was passed by Parliament in December, 2004 and became law on May 19, 2005. Bill C-15 lays the legislative foundation for the Minister of Environment to issue permit to allow for the legal disturbance, or destruction of migratory bird nests through incidental take. Bill C-15 brings the focus of conservation of populations of birds into the Act, in addition to the existing protection of individual birds and their nests. Now that Bill C-15 is law, Environment Canada will begin to develop the necessary changes to the MBR. Until the necessary changes to the MBR are completed, and a permit system is implemented, the best method for proponents to address their responsibilities under the MBCA and MBR is to ensure that they practice due diligence.

It remains the proponent's responsibility to meet the requirements of the MBRs. Should a project or activity associated with it result in the contravention of the MBRs, prosecution under the Migratory Birds Convention Act may be initiated.

CWS-Yukon region is a proponent of proper land use, and conservation planning as being the most effective means to currently meet Canada's commitments under the *Migratory Birds Convention* and the *International Convention on Biological Diversity*. As a participant in this environmental assessment review, CWS will assess and provide comments on the project proposal as it relates to potential environmental impacts to migratory bird populations. CWS cannot, however, provide a written opinion that this project will not result in contravention of the *Migratory Birds Regulations* (MBR). A favorable decision under this environmental assessment review does not exempt the proponent from the MBR.

With regards to the legal uncertainty surrounding a proponents responsibilities under the MBCA, and MBR it is critical that proponents are able to exhibit that they have met due diligence with regards to the incidental take of migratory birds or their nests. Though not limited to the following; some of the considerations in forestry planning that CWS views as key to the maintenance of sustainable populations of migratory birds are:

- Scheduling of activities to avoid the breeding season (May 1 to July 31);
- Conducting pre-clearing surveys for migratory bird use;
- Identification of priority species;
- Protection of key habitats.

BIODIVERSITY CONVENTION AND STRATEGY

The Biodiversity Convention, as it is commonly known, is a legally binding international treaty. The Convention obliges signatory countries to assess the adequacy of current efforts to conserve biodiversity and to use biological resources in a sustainable manner. Canada was the Convention's first signatory. The federal Cabinet approved the Strategy in May 1995 and all Canadian jurisdictions, including Yukon, are now committed to its implementation to the extent that their resources allow through signing of the National Statement of Commitment in the spring of 1996.

Environmental Assessment (EA) has been recognized as a key element in meeting the obligations of the Biodiversity Convention and Strategy. Article 14 of the Convention recognizes EA as an important decision-making process toward the protection of biological diversity.

The 1996 Guide on Biodiversity and Environmental Assessment [10], notes that the following guiding principles should be considered:

- Minimum impact on biological diversity;
- No "net loss" of ecosystem, species populations or genetic diversity;
- Application of the precautionary principle', which is employed to avoid irreversible losses;
- No effect on the sustainable use of biological resources;
- Maintenance of natural processes and adequate areas of different landscapes for wild flora and fauna and other wild organisms;
- Use inferential information, e.g., identify species that are rare or at the limit of their range and therefore a possible early warning of critical ecological change;
- Where possible, use indicator species or valued ecosystem component to focus the assessment;
- Define the spatial parameters that characterize ecological processes and components in order to provide a regional context for an impact analysis of the proposed project;
- Identify the best practicable option (mitigation) for maintaining biological diversity;
- Examine the cumulative effects of other activities in the area/region to date and evaluate the added "effect" that this project, and others are likely to follow, will have on biological diversity.

The Guide on Biodiversity and Environmental [10], notes that some questions for practitioners to consider when analyzing effects on biodiversity are:

- What impact will the project have on the genetic composition of each species?
- Are different genotypes of the same species likely to be isolated from each other?
- To what extent will habitat or populations be fragmented?
- How will the proposal affect ecosystem processes?
- Is this proposal likely to make the ecosystem more vulnerable or susceptible to change?
- What abiotic effects will devolve – change in seasonal flows, temperature regime, soil loss, turbidity, nutrients, oxygen balance, etc.?
- Does the proposal contribute to or undermine the sustainable use of biological resources?
- Does it set a precedent for conversion to a more intensive level of use of the area?
- Is diversity measured at the species, community and ecosystem level?
- Is the biological resource in question at the limit of its range?
- Does the species demonstrate adaptability?
- Have sustainable yield calculations, including population dynamic parameters, been determined (e.g., lake capacities, population thresholds)?

In the foreward to the 2004 Convention on Biological Diversity's "Expanded Programme of Work on Forest Biological Diversity", it is noted that, "forest biological diversity provides a wide array of goods and services, from timber and non-timber forest resources to playing an important role in purifying, recycling, and storing water, and mitigating climate change. At the same time, it provides livelihoods and jobs for hundreds of millions of people worldwide. Forest biological diversity plays a particularly important economic, social and cultural role in the lives of many indigenous and local communities. To ensure the conservation and sustainable use of forest biodiversity is therefore a global obligation".

The Government of Yukon is a member of the National Forest Strategy Coalition, and through it membership committed to the elements of the 2003-2008 National Forest Strategy. Action items contained in the Strategy include:

- "Develop guidelines for integrating watershed-based management and wildlife habitat conservation into forest management policies across Canada and measures for evaluating implementation."
- "Fulfill existing commitments to complete the network of representative protected areas in each province and territory."
- "Manage to avoid or mitigate the adverse impact of invasive species on our forest ecosystems."

NATURALLY DISTURBED FORESTS

The CWS Yukon Region, views burned or insect damaged forests as intact and functioning natural forest ecosystems. It is known that the assemblage of bird species is altered after a natural disturbance to a forest; and recognized that naturally disturbed forests continue to exist as functional ecosystems that support varied populations of migratory birds. Each step in the ecological succession of naturally disturbed forests provides unique habitat and ecological values important for the long term maintenance of sustainable migratory bird populations. CWS Yukon Region maintains and supports the position that in order to meet long term conservation goals of migratory birds and maintenance of biodiversity, naturally disturbed forests should be managed in a manner consistent with any other type of forest ecosystem.

EFFECTS ON FIRE ON FORESTS

Dale et al. (2001) state that "Fire effects on forests include acceleration of nutrient cycling, mortality of individual trees, shifts in successional direction, induced seed germination, loss of soil seed bank, increased landscape heterogeneity, changes in surface-soil organic layers and underground plant root and reproductive tissues, and volatization of soil nutrients. Erosion can occur where soil disturbance accompanies fire (e.g., during fire fighting or timber salvage operations). Fire affects forest value for wildlife habitat, timber, recreation, and through smoke, human health" [14].

BURNED FORESTS AND AVIAN COMMUNITIES

Fire affects avian nesting and foraging activities by generating snags, altering insect communities, eliminating foliage, and altering the size, abundance, and distribution of tree species across the landscape [2]. Kotliar et al., note that although there are relatively few studies that address the effects of fire on avian communities, the consistent presence of many woodpeckers and aerial insectivores in early post-fire forests, and the near absence of many foliage-gleaning species associated with closed canopy forests, appear to be robust patterns.

Kotiliar et al (2002) summarized the results of 11 studies investigating the avian abundance in recently burned and unburned forests. The studies found that species such as Black-backed Woodpecker, Three-toed Woodpecker, Olive-sided Flycatcher and Mountain Bluebird commonly occurred in burns but were uncommon or absent in unburned forests. In addition other species that were found to typically be more abundant in burns included Western Wood-Pewee, Hairy Woodpecker, Tree Swallow and Northern Flicker. These species are all expected to be found within the project areas. Most of these species were more commonly observed in recently burned forests than all other mature forest types.

Generally, wood drillers and aerial insectivores were more abundant in early post-fire forests, whereas foliage and bark gleaners were usually more abundant in unburned forests. Numerous species showed more varied, or apparently neutral responses to burns, for example Townsend's solitaire, American Robin, Dark-eyed Junco and Chipping Sparrow were common in both burned and unburned forests, indicating that both types of forests often may provide suitable habitat for these species. The authors noted that many species, including Red-breasted Nuthatch, Yellow-rumped Warbler and Western Tanager were frequently observed in burns, but typically reached their highest abundance levels in unburned forests. It was noted that the use of burned forests by White-crowned Sparrow should be further investigated. Species that used unburned forests, but rarely occurred in early post-fire forests included Golden-crowned Kinglet, Hermit Thrush, Varied Thrush and Townsend's Warbler.[2]

Kotliar et al (2002) noted that a 1988 comparison of bird abundances in 30 fires that burned in northern Rocky Mountain conifer forests (Hutto 1995) generally corresponded to the results of their review.

There is a minimum of research or studies that have followed bird communities from early through late successional stages after fire. Research has been published however that compares changes in bird communities of stands that vary in time since the occurrence of fire. Kotliar et al. (2002) note that in general forest structure and avian communities change rapidly after fire, although the rates of change depend on burn severity as well as pre and post-fire cover type. The structure of burned snags typically changes within the first few years. Smaller snags typically decay faster than larger snags. Early post-fire forests and associated insect outbreaks attract cavity-nesting birds due to increases in nest sites and food supplies.

ENVIRONMENTAL EFFECTS OF SALVAGE LOGGING

Lindenmayer et al. (2004), note that "To many ecologists, natural disturbances are key ecosystem processes rather than ecological disasters that require human repair"[12]. The authors also state that salvage harvesting activities undermine many of the ecosystem benefits of major disturbances. That removal of large quantities of biological legacies can have negative impacts on many taxa; and that salvage logging removes critical habitat for species, such as cavity nesting mammals, woodpeckers, invertebrates like highly specialized beetle taxa that depend on burned wood, and bryoflora closely associated with recently charred logs. The authors continue, noting that salvage logging can impair ecosystem recovery; and that some taxa may be maladapted to the interactive effects of two disturbance events in rapid succession [12].

Beschta et al. (1995) note that "there is considerable evidence that persistent, significant adverse environmental impacts are likely to result from salvage logging, based on many past cases of salvage projects, plus our growing knowledge of ecosystem functions and land-aquatic linkages. These impacts include soil compaction and erosion, loss of habitat for cavity nesting species, loss of structurally and functionally important large woody debris" [11].

Beschta et al. (1995) state that "salvage logging may decrease plant regeneration, by mechanical damage and change in microclimate"; and that "(salvage) logging is likely to have unanticipated consequences concerning micro-habitat for species that are associated with recovery, e.g., soil microbes". The authors recommend that, "salvage logging by any method must be prohibited on sensitive sites, including:

- In severely burned areas (areas with litter destruction),
- On erosive sites,
- On fragile soils,
- In roadless areas,
- In riparian areas,
- On steep slopes,
- Or any site where accelerated erosion is possible." [11]

The recommendations proposed by Beschta et al (1995) note that "On portions of the post-fire landscape determined to be suitable for salvage logging, limitations aimed at maintaining species and natural recovery should apply. Dead trees (particularly large dead trees) generally have multiple ecological roles in the recovering landscape including providing habitat for a variety of species, and functioning as an important element in biological and physical processes. In view of these roles, salvage logging must:

- Leave at least 50% of standing dead trees in each diameter class.
- Leave all trees greater than 20 inches dbh or older than 150 years.
- Generally leave all live trees." [11]

Beschta et al. (1995) in regards to reseeding and replanting note that, "active reseeding and replanting should be conducted only under limited conditions. In general, active planting and seeding has not been shown to advance regeneration and most often creates an entirely new, exotic flora. Therefore such practices should be employed only where there are several years of evidence that natural regeneration **is** not occurring. Seeding grasses into burned forests has been shown to disrupt recovery of native plants and is likely to create more problems than it solves." [11]

EFFECTS OF SALVAGE LOGGING ON AQUATIC ECOSYSTEMS

"By themselves, the effects of fire create few problems for aquatic populations that have access to high-quality stream environments; fire even provides benefits, such as pulsed additions of spawning gravel and wood" (Karr et al. 2004).

Karr et al., state that "postfire salvage logging generally damages soils by compacting them, by removing vital organic material, and by increasing the amount and duration of topsoil erosion and runoff, which in turn harms aquatic ecosystems. The potential for damage to soil and water resources is especially severe when ground-based machinery is used". The authors continue, "Increased runoff and erosion alter river hydrology by increasing the frequency and magnitude of erosive flows and raising sediment loads. These changes alter the character of river channels and harm aquatic species ranging from invertebrates to fishes" [13].

"The effects of postfire salvage logging are especially significant on steep slopes, in erosion-prone soils, on severely burned sites, and in riparian and roadless areas. Riparian areas effect aquatic environments more than remoter uplands do; they influence water quality, physical habitat, and the abundance of aquatic species. Logging, landings, and roads in riparian zones degrade aquatic environments by lessening the amount of large wood in streams, elevating water temperature, altering near-stream hydrology, and increased sedimentation." (Karr et al. 2004).

Some of the suggestion made by the authors to protect streams, wetlands, and associated watersheds during salvage logging are:

- Retain old or large trees. Dead or alive, burned or unburned, large trees are vital for postfire recovery; they provide habitat for many species, reduce soil erosion, aid soil formation, and nourish streams as their trunks decay.
- Protect soils. Fire-affected soils are especially vulnerable to additional disturbance (e.g., compaction or increased erosion).
- Protect ecologically sensitive areas. Riparian and roadless areas, regions with steep slopes, and watersheds with sensitive or imperiled aquatic species should not be salvage logged.
- Limit reseeding and replanting.

- Continue research, monitoring, and assessment. Carefully planned research, monitoring, and assessment should be routine components of programs on the effects of postfire forest treatment [13].

EFFECTS OF SALVAGE LOGGING ON AVIAN COMMUNITIES

Many cavity nesting birds are associated with recently burned forests. Burned forests have been described as ephemeral source habitats for some species of cavity-nesting birds because early postfire habitats provide an increase in nesting and foraging opportunities, and a reduced risk of nest predation compared to unburned forests.
Retention of a diversity of snag species, sizes and spatial distributions, as well as snags in various stages of decay, in burned forests is essential to the conservation of avian diversity. Post-fire forests can be altered significantly by salvage logging. Although bird species will vary in their responses to different management options, few cavity-nesting species, if any, will benefit from severe salvaging (i.e., clearcut, or removal of most medium and large snags).[2]

Black-backed and Three-toed Woodpeckers are the species most likely to benefit from unsalvaged burns, or salvaging delayed five years or greater post-fire. Some species of birds may tolerate partial or light salvage logging provided the large snags and tree species are left uncut. Some species may inhabit partially salvaged burns because they resemble later successional stages of burns (when snags begin to thin out naturally) or open forest [2].

Koitlar et al (2002) note that given our limited understanding of the cumulative effects of fire suppression and post-fire salvage logging, and their effects on post-fire habitat availability across the landscape, allowing succession to proceed naturally in unsalvaged burns may benefit the most species.

Salvage logging in burned forests can have pronounced effects on cavity-nesting species that use post-fire habitats. Salvage logging reduces the number of available snags which impacts populations of Black-backed and Three-toed Woodpeckers, which rarely use even partially-logged post-fire forests[2].

Koitlar et al. (2002) state that severely salvaged burns may decrease the suitability of post-fire forests for most cavity-nesting species. Black-backed and Three-toed woodpeckers were most abundant in unsalvaged burns and rarely nested in salvaged areas of burns. Mountain Bluebird and Hairy Woodpecker nested in both unsalvaged and salvaged portions of burns but tended to nest more often in unsalvaged portions[2].

Salvage-logging practices often call for the harvest of larger, more economically valuable tree species. By altering species composition, sizes, and densities of snags, salvaging may alter resource availability for birds[2].

Kotliar et al (2002) note that the extent of snag decay influences which snags woodpeckers select for nesting. For example, strong excavators such as Black-backed and Three-toed Woodpeckers nested in snags with intact tops. Weak excavators such as Northern Flicker nested more frequently in broken-topped snags (many broken pre-fire) that were presumably more decayed than intact snags. Because the extent of decay influences nest-tree selection, selective salvaging of less decayed snags likely affects bird species differentially[2].

The authors also state that cavity nesters also respond to differences in the sizes and spatial distribution of snags, which in turn, could be affected by different salvage prescriptions. In both coniferous and mixed burns, most cavity nesters selected large-diameter trees more often than expected. Black-backed and Three-toed Woodpeckers nested in medium-sized snags. In general cavity nesters selected dense patches of snags more often than dispersed or isolated snags[2].

CLIMATE CHANGE

Dale et al. (2001) note that, "Local, regional and global changes in temperature and precipitation can influence the occurrence, timing, frequency, duration, extent, and intensity of disturbances. Because trees can survive from decades to centuries and take years to become established, climate-change impacts are expressed in forests, in part, through alterations in disturbance regimes. Disturbances, both human-induced and natural, shape forest systems by influencing their composition, structure, and functional processes." [14].

The Canadian Climate Center General Circulation Model (CGCM1) produces a seasonal severity rating (SSR) of fire hazard increase of 30% for Alaska and Yukon, between the current level and that predicted in 2060 [14].

In regards to insect and pathogen outbreaks, Dale et al. (2001) comment that "Climate influences the survival and spread of insects and pathogens directly, as well as the susceptibility of their forest ecosystems. Changes in temperature and precipitation affect herbivore (insect) and pathogen survival, reproduction, dispersal, and distribution. Indirect consequences of disturbance from herbivores and pathogens include elimination of nesting trees for birds and negative effects on mycorrhizal fungi. Other indirect effects include the impacts of climate on competitors and natural enemies that regulate the abundance of potential pests and pathogens. Because climate change can both directly and indirectly affect herbivores and pathogens through various processes, the ultimate effects on patterns of disturbance include increased disturbance in some areas and decreased disturbance in others. Increased warming would most likely increase the diversity of insects at higher latitudes. Because insects typically migrate much faster than trees, many temperate species are likely to encounter nonnative insect herbivores that previously were restricted to subtropical forests" [14].

Introduced species can affect forests through herbivory, predation, habitat change, competition, alteration of gene pools via hybridization with natives, and disease (as either pathogens or vectors). Introduced species can alter the diversity, nutrient cycles, forest succession, and fire frequency and intensity of some ecosystems. The impact of introduced species on ecosystems is influenced by such climatic factors as temperature, drought, and cloud cover. The ultimate ranges of introduced species are largely determined by climate and human activities. Climate change will modify the distributions of many introduced species.[14]

In their discussion of strategies for dealing with forest disturbances in light of predicted climate change impacts, Dale et al (2001) state that "Coping strategies for forests are influenced by the value of the forest, the naturalness of the disturbance, and the range of acceptable management options. Often the least ecologically disruptive response after a disturbance is no action at all". "Recovery efforts need careful consideration of the long-term impacts because such actions can damage soils and residual trees. Stands can recover naturally without any removal of the dead or damaged trees" [14].

In regards to research and management needs associated with forest disturbance/climate change interactions, Dale et al (2001) note that our ability to manage forests now as well as under climate change rests on our understanding of how forests respond to multiple disturbance events; and recommend that "a monitoring program should be used to determine how disturbances affect forests and to continually update our understanding of how climate change is potentially influencing the disturbance regimes". Suggested research questions about how disturbances affect forests in the face of climate are:

1. Improved understanding of climatological conditions that initiate disturbance
    a. What are the average and range of climate-change predictions?
    b. What information about climate and weather forecasts are needed to improve both short and long-term predictions of disturbance effects on forests?
    c. How do interactions between forest structure and function and climate affect disturbances?
    d. How does climate variability interact with the temporal and spatial variability of forest disturbances?
2. Better information on how disturbances and land-use changes affect climate
    a. How do changes in forest structure caused by disturbance influence weather and climate?
3. Quantifying the impacts of disturbances on forests
    a. What are the average and range of the frequency, intensity, and spatial extent of forest disturbances?
    b. What are the major environmental factors affecting forest disturbance regimes?
    c. What are the major impacts of disturbance on forests?
    d. What patterns of species composition and yield are altered by disturbances (especially at the margin of species ranges)?

    e. What are the long term effects of a disturbance, and how can they be quantified?
4. Interactions among forest disturbances and management
    a. What information is needed to understand the response of a forest to multiple disturbances?
    b. How do forest disturbances interact?
    c. What options exist for managing forests in the face of climate change?
    d. How should forests be monitored to best inform management of impending changes? [14]

The 2004 Arctic Climate Impact Assessment states that "forest fires, insect infestations, and other disturbances are projected to continue to increase in frequency and intensity in a warming climate".

The Government of Yukon is a member of the National Forest Strategy Coalition, and through it membership committed to the elements of the 2003-2008 National Forest Strategy. Action items contained in the Strategy include:

- "Develop a better understanding of the effects of climate change and the Kyoto Protocol commitments on the forest ecosystem and incorporate these into forest policy and forest management planning".

Climate Change and Birds

There is a growing body of scientific evidence that some birds are already responding to climate change. For example, many songbird species are shifting their ranges and migrating earlier, often making it more difficult for them to find food such as insects, flowers, and berries when they need it; as many birds play a critical role in ecosystems by eating insects, pollinating plants, and dispersing seed, such changes may play a role in throwing ecosystems off balance. Models predict that these shifts are likely to increase, as climate change impacts increase [16].

Price and Glick (2002) in their review of climate change impacts on birds, state that "studies indicate that the ranges of a number of bird species have been changing, consistent with the 20th century trend of rising average temperatures. One study of 35 North American warbler species, for example, has found that the range of occurrence of seven of the species … has shifted significantly farther north in the past 24 years, by an average of more than 65 miles (100 km). By comparison, none of the species in the study were found to be farther south" [16].

The authors also note that "studies in the United States and Europe have found that some songbirds are migrating earlier in the spring months, corresponding with warmer temperatures. For example, research of migratory birds in North America shows that the arrival dates of 20 species were up to 21 days earlier in 1994 than in 1965, while just a few species were later. This includes long distance migrants like Rose-breasted

Grosbeak, Black-throated Blue Warbler, and Barn Swallow. Similarly, North American Tree Swallows are now nesting up to nine days earlier than 30 years ago, corresponding with an increase in average spring temperatures. Because this shift is occurring throughout the species' broad habitat range, scientists believe that the birds are responding to larger trends than just localized climate variations. These changes may be occurring regardless of whether the birds' arrival is synchronized with the availability of food sources such as insects, flowers, and berries at their destination habitat. Global warming may cause migration and nesting to get out of step with food supplies [16].

A 2002 report by the American Bird Conservancy states that, "bird communities as we currently know them, may look quite different in the future. As regional temperatures rise, the climatic ranges of a number of bird species in the Northern Hemisphere could shift north as they seek habitat, food availability, and other factors to which they are adapted. In turn in the ranges they leave behind, the birds may be replaced by species from farther south" [16]. As ecological conditions continue to change, the authors suggest that optimal habitats for many bird species may no longer exist. "This is particularly true for birds relying on specific plants for food or nesting. While most birds can respond quickly to a changing climate, the ranges of some plants may take centuries to move, if they move at all. Studies of past changes in climate suggest that many slow-maturing plants such as trees will have trouble responding to the future rate and magnitude of change that we could expect in the coming century, leading to changes in wildlife communities and possibly the extinction of some species". The authors then state that "as the landscape becomes more and more fragmented due to development of roads, buildings, and farms, the ability of forest species to migrate is that much harder" [16].

Price and Root (2004) note that birds are limited in their distributions not only by habitat and food availability, but also by their physiology. Logistic regression models have been developed looking at the association between climate and how the climatic ranges of birds might change with climatic changes. For example, the Great Lakes region could see a potential gross loss of 53% of the neotropical migrants currently found in the region. Thus bird communities, as we currently know them, may look quite different in the future [17].

In regards to management issues related to climate change, the authors state "conservation planners need to be encouraged to consider climate change as they develop future management plans. This includes assessing key species vulnerability as well as monitoring for climate change related impacts. Site based conservation needs to become more flexible, and non-site based conservation needs to be woven into other land use policies taking climate change into account". In conclusion that authors state "projected rapid climate change is a major concern, especially when viewed in concert with other already well-established population stresses such as habitat conversion, pollution, and invasive species. Research and conservation attention thus needs to be focused not only on individual stressors, but collectively on the effects of all stressors. These synergistic effects may prove to be the greatest challenge to wildlife conservation in the 21st century" [17].

IMPORTANCE OF BOREAL FOREST TO BIRDS

Blancher and Wells (2005) state that "the vastness of the Boreal Forest Region makes it one of the few remaining places on earth where entire ecosystems function. These ecosystems support some of the greatest abundance of wildlife on the continent, including massive caribou herds, intact predator-prey systems with healthy populations of top predators like wolves, and large numbers of birds. In fact the Boreal Forest Region represents 26% of the land area of the U.S. and Canada – yet this report shows that it supports nearly 50% of North America's bird species"[15].

94% of individual birds migrate out of the Boreal Forest Region after breeding, highlighting the importance of the Boreal to international populations of birds whose entire ranges encompass the Boreal, contiguous U.S, Mexico, and Central and South America [15].

In a 2003 article, Fiona Schmiegelow notes that the Boreal Forest is "subject to a variety of resource development activities, the cumulative effects of which are largely unknown. The pervasive influence of global climate change will also re-shape future forests. While the fragmentation of temperate forests and loss of tropical forests have received much public attention, the remote nature of most of the boreal forest make these threats less tangible." Schmiegelow continues. "the direct effects of many development activities are significant reductions in the quantity of certain habitat types such as older forests of commercial value. These have predictable consequences for bird populations: a reduction in the habitat quantity translates into reduced number of species associated with that habitat. There are also indirect effects associated with landscape context and habitat quality that can exert subtle influences on bird populations at several scales" [18].

SPECIES AT RISK

The federal Minister of Environment is responsible for the administration of the *Species at Risk Act* (2002) (SARA) and overall coordination of the federal species at risk strategy, including the implementation of federal activities in support of the Accord for the Protection of Species at Risk in Canada.

Non-aquatic, Yukon species currently listed in SARA Schedule 1 are: Eskimo Curlew (Endangered, May 2000); Peregrine Falcon anatum subspecies (Threatened, May 2000); Wood Bison (Threatened, May 2000); Woodland Caribou - Northern Mountain Population (Special Concern, May 2002); and Western Toad (Special Concern, November 2002).

SARA Schedule 1 species that may be expected to be found in the project region are Wood Bison (Barney Lake area only), Woodland Caribou and Western Toad.

COMMITTEE ON THE STATUS OF ENDANGERED WILDLIFE IN CANADA

The Committee on the Status of Endangered Wildlife in Canada (COSEWIC) determines the national status of wild Canadian species, subspecies, and varieties that are suspected of being at risk of extinction or extirpation. COSEWIC uses a process based on science and Aboriginal or community knowledge to assess species at risk. All native mammals, birds, reptiles, amphibians, fish, arthropods, molluscs, vascular plants, mosses and lichens are included in COSEWIC's current mandate. In doing its work, COSEWIC develops prioritized candidate lists of species needing assessment, manages the production of species status reports, and holds meetings at which species are assessed and assigned to risk categories.

After completing a species assessment, COSEWIC sends its assessment the federal Minister of the Environment. The assessment and the reasons for it are also posted in the SARA Public Registry. The Minister of the Environment has 90 days to publish, in the Public Registry, a report on how the Minister intends to respond to the COEWIC assessment and, to the extent possible, provide time lines for action. Within nine months of receiving the COSEWIC assessment, the Governor in Council must decide whether or not to add the species to the List of Wildlife at Risk. Or, it can ask COSEWIC for more information. If the Governor in Council does not make a decision within nine months of receiving the COSEWIC assessment, the species is added by order to the List of Wildlife Species at Risk, according to the COSEWIC assessment.

COSEWIC candidate species are species not yet assessed by COSEWIC that have been identified by COSEWIC as potentially being at risk. As such, they are candidates for detailed status assessment. Species on the candidate list have been ranked into three priority groups by the Species Specialist Subcommittees (SSCs) to reflect the relative urgency with which each species should receive a COSEWIC assessment. Group 1 contains species of highest priority for assessment by COSEWIC, and includes species that are suspected to be at high risk of extirpation from Canada. Groups 2 and 3 contain species that are of intermediate and lower priority for COSEWIC assessment respectively.

Group 1 – High priority candidates contains three migratory birds found in Yukon: Common Nighthawk (*Chordeiles minor*); Olive-sided Flycatcher (*Contopus cooperi*); and Canada Warbler (*Wilsonia canadensis*). Group 3- Low priority species contains two migratory birds found in Yukon: Blackpoll Warbler (*Dendroica striata*); and Thick-billed Murre (*Uria lomvia*).

Common Nighthawk; Olive-sided Flycatcher; and Blackpoll Warbler are expected to be found in the project areas. Common Nighthawk and Olive-sided Flycatcher are species that are known to be associated with naturally disturbed/burned forests.

COSEWIC status reports are currently being prepared for Common Nighthawk and Olive-sided Flycatcher.

SUMMARY OF AREA BIRD USE

According to the *Birds of the Yukon*[1] it is anticipated that 161 species of birds utilize the False Canyon Creek / Barney Lake region. 137 of these species are "migratory birds" as defined by the 1994 *Migratory Birds Convention* (MBC).

It is expected that approximately 147 species of birds breed in the area; with 94 of those being defined as migratory birds by the MBC.

Yukon has been identified as having a high conservation stewardship responsibility for 12 of the species, 11 of which are migratory birds as per the MBC.

Of the species that are anticipated to nest in the area: 40 species are ground nesters; 17 species are cavity nesters (7 primary cavity nesters, 10 secondary cavity nesters); 4 species use abandoned nests; and one species is a nest parasite.

See appendix 1.

Black-backed Woodpecker

In the *Birds of North* America, the Black-backed Woodpecker is described as an irruptive species that forages opportunistically on outbreaks of wood-boring beetles in recently burned habitats; and that this restricted diet renders the species vulnerable to local and regional extinction as fire-suppression programs and postfire salvage logging increase. The authors note that this species' dependence on fire landscapes and other large-scale forest disturbances is well known and exemplified by studies in Montana, Michigan, Boundary Waters Canoe Area (Minnesota), Northern Rockies, Alaska, and Alberta [9].

Dixon et al (2000) state that in Alaska, Black-backed Woodpeckers occupy burned white-spruce (*Picea glauca*) forests within 3 mo of a fire and remain for 2–3 yr; and that in burned spruce forest of interior Alaska, these birds foraged primarily on charred portions of moderately to heavily burned spruces [9].

Fire suppression and postfire salvage logging are detrimental to this species. Since the early 1900s, these activities have reduced habitat for the Black-backed Woodpecker throughout its range. Where postfire salvage logging is planned, it is recommended to retain snags in clumps rather than evenly spaced distributions and retain >104–123 snags/ha, of dbh size >23 cm; allow wildfires to burn in some forests with high fire risk to produce stand-replacing conditions and subsequent beetle outbreaks; and avoid postfire salvage logging in portions of large burned forests for 5 yr after fire [9].

In *Birds of North America* it is recommended closing roads and enforcing fuelwood regulations to minimize removal of snags for firewood, particularly after postfire salvage logging. Snag reduction and edge effects were identified as road-associated factors having negative impacts on habitats and populations of Black-backed Woodpecker. The authors note as well that burn edges are as important as the burn interior for wood-borer outbreaks and thus Black-backed Woodpeckers [9].

Three-toed Woodpecker

The only woodpecker common to the Old and New Worlds, the Three-toed Woodpecker (formerly known as the Northern Three-toed Woodpecker and the American Three-toed Woodpecker) breeds farther north than any other woodpecker. Like the Black-backed Woodpecker, and to a lesser degree the Hairy Woodpecker (*P. villosus*), the Three-toed is associated with locally abundant insect outbreaks resulting from disturbances (for example, fire). The Three-toed, however, specializes on bark beetles (Scolytidae), while the Black-backed specializes on wood-boring beetles (Cerambycidae). In North America, however, data suggest that its populations may be declining, while long-term data from northern Europe leave little doubt that populations in Finland and Sweden are indeed declining [8].

The tracking and use of forests damaged by fire, insects, or storms make the Three-toed Woodpecker vulnerable in fragmented forests or those managed for timber. Fire suppression and salvage logging of trees damaged by fire or insects reduces the abundance of the species' favored prey. Increased awareness of the importance of natural disturbances in forest ecosystems and economic pressure to increase logging has created interest in this woodpecker. This species' association with spatially unpredictable disturbance and its large home range make it sensitive to timber harvesting (removal of habitat) and forest fragmentation; both ultimately reduce food availability. Given these habitat requirements, timber harvesting, especially of old-growth coniferous forests, has undoubtedly contributed to population declines in North America. In black spruce-dominated forests of Québec, habitat loss due to timber harvesting may often be permanent as Three-toed Woodpeckers are restricted to forests older than scheduled cutting rotations. In Finland, Three-toed Woodpecker density was significantly correlated with the proportion of forest in nature reserves >100 yr old; in large old-growth tracts (about 1,000 km^2) the species had not declined, but in smaller old-growth forests (1–140 km^2), isolated as a result of logging, the species had declined or disappeared [8].

Modern forestry practices use fire suppression, salvage logging (cutting of burned trees), and suppression logging (cutting of insect infested trees), all of which reduce or remove the dead and dying trees on which this species depends. In addition to fire suppression, alteration of natural fire intensity (i.e., from intense stand replacement to "cool" understory fires) has likely resulted in population declines of this species. Although not considered at risk in British Columbia, it is noted that given the widespread practice of salvage logging of stands infested with bark beetles and suppression logging of susceptible stands, there is an urgent need to protect Three-toed Woodpecker habitat [8].

The *Birds of the Yukon* (2003) states that the Three-toed Woodpecker is the Yukon's most widely distributed resident woodpecker, and is found in coniferous or mixed forests dominated by White Spruce. It is most common in southern Yukon, with highest numbers in White Spruce forests in the southeast and southwest, in the vicinity of high spruce beetle populations [1].

In southwestern Yukon, the number of Three-toed Woodpeckers increased in response to the spruce bark beetle outbreak. The Three-toed Woodpecker has been identified as the most important predator of the spruce bark beetle in western United States; they reduce forest insect populations directly, by consuming them, as well as indirectly, by exposing beetle larvae to parasites and desiccation through the removal of tree bark [1].

This species' association with spatially unpredictable disturbance and its large home range make it sensitive to logging and forest fragmentation, and these activities have undoubtedly resulted in population declines. In many cases, this species is restricted to forests older than planned cutting rotations. Management that provides for leaving stands of standing or fallen dead wood in boreal forests will be beneficial. Also, leaving downed wood after fire or disease outbreaks may benefit this species. Because Three-toed woodpecker densities increase following fires, they are probably detrimentally affected by fire suppression.

Kotliar et al (2002) note in their summary of available research that Black-backed and Three-toed Woodpecker commonly occurred in burns, but were uncommon in unburned forests. They also state that these two species also appear to use stand-replacement burns more readily than low and moderate-severity burns [2].

<u>Black-backed and Three-toed Woodpecker Responses to Burns/Salvage Logging</u>

Black-backed and Three-toed woodpeckers rapidly colonize stand-replacement burns within one to two years of a fire; within five years however, they become rare, presumably due to declines in bark and wood-boring beetles [2]. Kotliar et al (2002), noted that in the studies that they reviewed that several cavity nesters showed consistent patterns of abundance in logged or unlogged conditions across studies; and that Black-backed and Three-toed Woodpeckers were most abundant in unsalvaged burns and rarely nested in salvaged areas of burns[2].

Salvage logging in burned forests can have pronounced effects on cavity-nesting species that use post-fire habitats. Salvage logging reduces the number of available snags which impacts populations of Black-backed and Three-toed Woodpeckers, which rarely use even partially-logged post-fire forests[2].

Kotliar et al (2002) note that Black-backed and Three-toed Woodpeckers nested in snags with intact tops and nested in medium-sized snags[2]. The authors also state that because these two species appear to depend on the short-lived availability of prey resources that quickly invade post-fire habitats, a delay in salvage logging may be warranted.

Olive-sided Flycatcher

This species has been listed as High-priority by COSEWIC for preparation of a status report, for the following reasons:

> “Olive-sided Flycatcher has suffered an annual decline of 3.5% over the last 30 years (65% overall). Annual decline rate has increased to 6% in the last 10 years (46% overall decline in the last decade). Most of the world’s population (>90%) breeds in Canada.”

Nesting territories are relatively large for a passerine bird; 1 pair may defend up to 40-50 ha. Olive-sided Flycatcher is one of 13 species of boreal landbirds that winter primarily in South America; undergoing one of the longest and most protracted migrations of all Nearctic migrants, wintering primarily in Panama and the Andes Mountains of South America.

The mean size of 16 territories in central Alaska was 18.4 ha. (Wright 1997). Wright also noted that territory configuration and proximity to other Olive-sided Flycatchers are associated with landscape features. Pairs did not saturate forest with common territorial borders, but used drainages where territories were not in direct contact, or abutted another territory on 1 side. Only 2 of 16 territories abutted another territory; in which cases nests were 720 and 1,050m apart [4].

This species is a passive sit-and-wait predator, remaining perched until prey is sighted then actively pursued prey, including insects that are often difficult to capture. Restricted almost entirely to sallying for prey [3].

Olive-sided Flycatcher may appear immediately after fires and can persist as long as snags are available and canopy cover remains low [2].

Altman notes that Olive-sided Flycatchers may have evolved to depend on natural disturbances, particularly forest fires that create forest openings and naturally patchy habitat with abundant edge. Limiting factors on breeding grounds likely are exacerbated by the fact that genus *Contopus* has lowest reproductive rate of all passerine genera in North America [3].

Hutto (1995) reported that on breeding grounds Olive-sided Flycatchers were most numerous in and perhaps historically dependent on postfire habitat, and expressed concern that the dichotomy of increased habitat use of harvested forest and declining populations may indicate that the occurrence of Olive-sided Flycatcher in harvested forest types represented an “ecological trap”. That is, harvested forest with suitable residual structure may appear to be suitable breeding habitat, having a superficial resemblance to an early postfire situation, but in reality may function quite differently [5].

The Olive-sided Flycatcher breeds in habitat along forest edges and openings, including burns; natural edges of bogs, marshes and open water; semi open forest; and harvested forest with some structure retained. Tall prominent trees and snags, which serve as singing and foraging perches, and unobstructed air space for foraging, are common features of all nesting habitats. Presence in early successional forest appears dependant on availability of snags or residual live trees for foraging and singing perches [3].

Frequently reported as a species associated with burned forest; likely because of creation of forest openings, increased edge at interface of live and dead forest, and availability of snags. Because aerial-feeding insectivorous bird species often respond positively to fire, it has been suggested that aerial insects increase in number after fires, thus providing foraging opportunities for this flycatcher.

Altman (2000) notes that preliminary indications of the importance of postfire habitat to nest success indicate the need to avoid or minimize the salvage of burned trees in forest burns and suggests that forest harvest practices that retain snags and live trees (potential nest trees) help provide suitable habitat [3].

Partners in Flight suggests allowing stand-replacing fires to burn; leaving the tallest trees and snags when implementing salvage cuts after fires, insect outbreaks or blowdowns; excluding some affected areas entirely from salvage cutting; and including the creation of forest openings with tall trees or snags around the margins when developing timber harvest prescriptions.

Common Nighthawk

COSEWIC notes that Common Nighthawk was formerly common across Canada and that this species has completely disappeared from parts of its range (particularly urban centers) and declined in others. Breeding Bird Survey data show a 3.9% annual decline of 30 years steepening to a 9.5% annual decline in the last decade. This would translate into an overall population decline of 70% over 30 years, and 63% over 10 years. About 25% of the world population nests in Canada.

Nine subspecies of Common Nighthawk have been described, with *C. m. minor* occurring in Yukon. Poulin et al. (1996) note that nesting habitat includes coastal sand dunes and beaches, logged or slashburned areas of forest sites, woodland clearings, prairies and plains … and flat gravel rooftops of city buildings.

Poulin et al (1996) state that the decrease in Common Nighthawk population coincides with non-selective pesticide spraying programs for control of mosquitoes; and that the change from flat, gravel roofs to smooth rubberized roofs may account for decrease in urban populations [6].

Campbell et al. (1990) note that burned and clear cut areas reduce vegetation and create bare patches that may attract nesting Common Nighthawks; and that Common Nighthawk has been found nesting in clearcuts and recently burned areas with reduced vegetation [7].

SUMMARY

Bill C-15 became law on May 19, 2005 brings the conservation of populations of birds into the *Migratory Birds* Act, in addition to the existing protection of individual birds and their nests. The federal government and all Canadian jurisdictions including Yukon, have committed to implementation of the Canadian Biodiversity Strategy to the extent that their resources allow. Environmental Assessment (EA) has been recognized as a key element in meeting the obligations of the Biodiversity Convention and Strategy.

The CWS Yukon Region, views burned or insect damaged forests as intact and functioning natural forest ecosystems. Fire affects avian nesting and foraging activities by generating snags, altering insect communities, eliminating foliage, and altering the size, abundance, and distribution of tree species across the landscape. Black-backed Woodpecker, Three-toed Woodpecker, Olive-sided Flycatcher and Mountain Bluebird commonly occur in burns. Western Wood-Pewee, Hairy Woodpecker, Tree Swallow and Northern Flicker are other species found to typically be more abundant in burns.

Early post-fire forests and associated insect outbreaks attract cavity-nesting birds due to increases in nest sites and food supplies. Removal of large quantities of biological legacies can have negative impacts on many taxa; salvage logging removes critical habitat for species, such as cavity nesting mammals, woodpeckers, invertebrates like highly specialized beetle taxa that depend on burned wood, and bryoflora closely associated with recently charred logs. Some taxa may be maladapted to the interactive effects of two disturbance events in rapid succession. Salvage logging is likely to have unanticipated consequences concerning micro-habitat for species that are associated with recovery.

Retention of a diversity of snag species, sizes and spatial distributions, as well as snags in various stages of decay, in burned forests is essential to the conservation of avian diversity. Few cavity-nesting species, if any, will benefit from severe salvaging. Some species of birds may tolerate partial or light salvage logging provided the large snags and tree species are left uncut. Some species may inhabit partially salvaged burns because they resemble later successional stages of burns.

There is limited understanding of the cumulative effects of fire suppression and post-fire salvage logging. Allowing succession to proceed naturally in unsalvaged burns may benefit the most species. By altering species composition, sizes, and densities of snags, salvaging may alter resource availability for birds. In both coniferous and mixed burns, most cavity nesters often select large-diameter trees.

The CGCM1 produces a SSR of fire hazard increase of 30% for Alaska and Yukon, between the current level and that predicted in 2060. Climate-change impacts are expressed in forests, in part, through alterations in disturbance regimes. Increased warming will most likely increase the diversity of insects at higher latitudes. Climate change will modify the distributions of many introduced species.

There is a growing body of scientific evidence that some birds are already responding to climate change; for example, many songbird species are shifting their ranges and migrating earlier. Climate change may cause migration and nesting to get out of step with food supplies. As regional temperatures rise, the climatic ranges of a number of bird species in the Northern Hemisphere could shift north as they seek habitat, food availability, and other factors to which they are adapted. Planners need to be encouraged to consider climate change as they develop future management plans; this includes assessing key species vulnerability as well as monitoring for climate change related impacts.

Black-backed Woodpeckers occupy burned white-spruce forests within 3 mo of a fire and remain for 2–3 yr; in burned spruce forest of interior Alaska these birds foraged primarily on charred portions of moderately to heavily burned spruces. The Three-toed woodpecker is associated with locally abundant insect outbreaks resulting from natural disturbances. The Three-toed woodpecker specializes on bark beetles, while the Black-backed woodpecker specializes on wood-boring beetles. Salvage logging of trees damaged by fire reduces the abundance of the Three-toed woodpeckers favored prey.

Common Nighthawk and Olive-sided Flycatcher are species that are known to be associated with naturally disturbed/burned forests. Olive-sided Flycatcher and Common Nighthawk have been listed as High-priority species by COSEWIC. Olive-sided Flycatcher may appear immediately after fires and can persist as long as snags are available and canopy cover remains low. Olive-sided Flycatchers may have evolved to depend on natural disturbances, particularly forest fires. The mean size of 16 Olive-sided Flycatcher territories in central Alaska was 18.4 ha. Burned and clear cut areas reduce vegetation and create bare patches that may attract nesting Common Nighthawks. Common Nighthawk has been found nesting in clearcuts and recently burned areas with reduced vegetation.

RECOMMENDATIONS

General Comments

The EAA screenings of the fire salvage projects for False Canyon Creek, and Barney Lake should include discussion of how the environmental assessments of the projects address conservation of, and impacts on biodiversity and species at risk. This is important in recognition that:

- **Biodiversity**. Government of Yukon is a signatory (1996) to the Canadian Biodiversity Strategy. By signing a National Statement of Commitment to conserve biodiversity and use biological resources in a sustainable manner, all governments, territorial, provincial, and federal demonstrated their commitment to the goals of the Strategy and committed to using the Strategy as a guide for their actions.

The EA should include a discussion of how the proposed salvage logging projects exist within the Canadian Biodiversity Strategy. The CBS is available at: http://www.cbin.ec.gc.ca/documents/national_reports/cbs_e.pdf

Article 14 of the Convention on Biological Diversity identifies Environmental Assessment as an appropriate mechanism for identifying and mitigating project impacts on biodiversity.

The Government of Yukon is a member of the National Forest Strategy Coalition, and through it membership is committed to the elements of the 2003-2008 National Forest Strategy. The project proposal should include information on how action items 1.4 and 1.8 of the National Forest Strategy 2003-2008 are being addressed.

- **Species at Risk**. Government of Yukon is a signatory to the Accord for the Protection of Species at Risk. The signatories to the Accord agree to develop legislation and programs that will, among other items:
    - Consider the needs of species at risk as part of environmental assess processes;
    - Emphasize preventative measures to keep species from becoming at risk;
    - Address all native wild species;
    - Provide protection for the habitat of threatened or endangered species;
    - Recognize, foster, and support effective and long term stewardship by resource users and managers…

With the exception of Red and White-winged Crossbills; the expected breeding season for the majority of migratory birds in the region is May 1 to July 31. CWS requests that no planned harvesting be allowed to occur during the period of May1 to July 31 in order to allow for the successful breeding of migratory birds in the planning area.

It is unclear in the project descriptions, how the proposed salvage logging volumes relate to the proposed 128,000 m^3 that have been allocated through the KFRSC-IWS process. Action item 1.10 of the National Forest Strategy 2003-2008 states “Redirect, where appropriate, harvesting into forest areas affected by fire, pests and disease damage to mitigate loss”. Is the proposed volume to be cut through salvage logging a portion of the total 128,000 m^3 contained in the IWS? This would seem an appropriate response to item 1.10 of the National Forest Strategy 2003-2008. If the proposed volume to be harvested through salvage logging is in addition to the 128,000 m^3 of the IWS, Environment Canada would be concerned that this volume is being allocated outside of a regional planning process. Environment Canada is not necessarily opposed to a portion of the IWS AAC being obtained through salvage logging (as per the National Forest Strategy); however we would be concerned if it was in addition to the IWS, and outside of a regional planning process. Please provide clarification as to the relation between the IWS AAC, and the proposed volumes contained in the two salvage logging proposals.

Section 1.0 - Introduction

Section 1.0 states that "Harvesting from fires requires planning to ensure that the products can be economically extracted without unreasonable environmental or social impacts." The term "unreasonable" is not a term defined by either CEAA, EAA or YESAA and creates confusion as to what significant impacts are, and how they will be assessed. Please clarify the term "unreasonable" or switch to terminology contained in the applicable environmental legislation.

Section 5.0.8

"The amount and pattern of logging activity will generally increase with the severity of burn. For example … less retention in the full burn areas with a higher percentage of the operating area harvested."

Beschta et al. (1995) recommended that "salvage logging by any method must be prohibited on sensitive sites, including: in severely burned areas (areas with litter destruction)" The author's reasons for this recommendation are that "Logging of sensitive areas is often associated with accelerated erosion and soil compaction, and inherently involves the removal of large wood which in itself has multiple roles in recovery. Salvage logging may decrease plant regeneration, by mechanical damage and change in microclimate. Finally logging is likely to have unanticipated consequences concerning micro-habitat for species that are associated with recovery e.g., soil microbes."

Karr et al. (2004) state that "Increased runoff and erosion alter river hydrology by increasing the frequency and magnitude of erosive flows and raising sediment loads." "The effects of postfire salvage logging are especially significant on steep slopes, in erosion-prone soils, on severely burned sites, an in riparian and roadless areas."

Kotliar et al (2002) note in their summary of available research that Black-backed and Three-toed Woodpecker commonly occurred in burns, but were uncommon in unburned forests. They also state that these two species also appear to use stand-replacement burns more readily than low and moderate-severity burns [2].

Section 2.2 – Criteria of the project descriptions includes "soil conservation strategies" as one of the nine criteria.

Environment Canada is concerned that increasing the amount and pattern of logging activity with the severity of the burn will result in significant impacts on:

- Black-backed and Three-toed woodpeckers;

- aquatic ecosystems, through increased frequency and magnitude of erosive flows and raising sediment loads;
- Plant regeneration through decreased regeneration through changes in microclimates and soil microbes. This is particularly a concern in regards to the climate change predictions for Yukon generated by the CGCM1.

In regards to Black-backed and Three-toed woodpeckers, the project proposals note that the False Canyon Creek, and Barney Lake fires represent only 1.3% of the 2004 burned area in KTT. Regional planning for migratory birds within Bird Conservation Region #4 is underway, and once completed a more detailed account of the impacts on Black-backed and Three-toed woodpeckers will be possible. However in respect of the concerns raised by Beschta et al., Karr et al., and Kotliar et al., the significance of salvage logging in severely burned areas should be sufficiently addressed in the EIA.

Section 6.0

TTWO Landscape scale: maintain a minimum of 40% of original existing mature and old-growth coniferous and mixed forests dominated by White Spruce.

Section 6.1 General Development Plan Guidelines

Connectivity corridor

"Operating units will be subject to THPOG practices". It is not possible, from the project description or associated maps, to determine the stream classes of the various drainages within the project areas. The criteria in section 2.2 of the project descriptions do state however, that best growing sites will be harvested first; in addition to protection of wetlands and riparian areas; and soil conservation strategies.

In addition to the almost immediate use of burned areas by species such as Black-backed and Three-toed woodpecker, Olive-sided Flycatcher, and Mountain Bluebird; other species which are known to utilize burned forests, and occur in the project areas are: Western Wood-Pewee, Hairy Woodpecker, Tree Swallow, and Northern Flicker. Kotliar et al. (2002) also list the following species as typically exhibiting mixed or neutral response to burns: Mourning Dove, Common Nighthawk, Pine Siskin, Chipping Sparrow, Dark-eyed Junco, American Robin, Townsend's Solitaire, Hammond's Flycatcher, Western Tanager, Yellow-rumped Warbler, and Red Crossbill.

The Olive-sided Flycatcher breeds in habitat along forest edges and openings, including burns; natural edges of bogs, marshes and open water; semi open forest; and harvested forest with some structure retained. Tall prominent trees and snags, which serve as singing and foraging perches, and unobstructed air space for foraging, are common features of all nesting habitats. Presence in early successional forest appears dependant on availability of snags or residual live trees for foraging and singing perches [3].

Due to factors such as related site conditions such as soil moisture it may be anticipated that riparian areas will experience regeneration of vegetation at a greater rate than will more upland areas. Karr et al. (2004) and Beschta et al. (1995) discuss the impacts of post-burn erosion on aquatic systems, and the role that salvage logging can play in magnifying those processes and effects. Karr et al. (2004) state that "Riparian areas affect aquatic environments more than remoter uplands do".
The project descriptions state that **"when operational planning occurs, deviation from THPOG and harvest zones may occur if stand and site characteristics allow. In other words it may be that some of the RMZ can be salvage logged."**

Environment Canada requests that all stream riparian areas, with the exception of ephemeral draws, receive a minimum riparian management area width of 100m, including a reserve zone width of a minimum of 40m based upon concerns for impacts from sediment on stream quality, and to maintain the regeneration capacity of stream riparian areas for creation of successional habitat for migratory birds which exhibit mixed or neutral responses to burns and are anticipated to recolonize the areas. As per the THPGO, Environment Canada requests although logging may occur in the Riparian Management Zone, "forest practices shall retain important wildlife attributes including wildlife trees, larger trees, hiding and resting cover, nest sites, structural diversity, coarse woody debris, and food source requirements of the natural riparian ecosystem".

Wetlands provide important habitat for a wide variety of migratory birds, and the edges associated with them provide important hunting sites for insectivores, and feeding areas for seed eating birds. Environment Canada requests that the riparian areas of all wetlands within the project areas are managed as per the THPOG, regardless of stand and site characteristics.

"Stands within operating units identified as having height >17m will be targeted first for operational planning". Beschta et al. (1995) state that "On portions of the post-fire landscape determined to be suitable for salvage logging, limitations aimed at maintaining species and natural recovery should apply. Dead trees (particularly large dead trees) generally have multiple ecological roles in the recovering landscape including providing habitat for a variety of species, and functioning as an important element in biological and physical processes. In view of these roles, salvage logging must:

- Leave at least 50% of standing dead trees in each diameter class.
- Leave all trees greater than 20 inches dbh or older than 150 years.
- Generally leave all live trees." [11]

Karr et al (2004) suggest that in order to protect streams, wetlands, and associated watersheds during salvage logging managers should retain old or large trees. Dead or alive, burned or unburned, large trees are vital for postfire recovery; they provide habitat for many species, reduce soil erosion, aid soil formation, and nourish streams as their trunks decay.

Kotliar et al. (2002) note that salvage-logging practices often call for the harvest of larger, more economically valuable tree species. By altering species composition, sizes, and densities of snags, salvaging may alter resource availability for birds[2]. The authors also state that cavity nesters also respond to differences in the sizes and spatial distribution of snags, which in turn, could be affected by different salvage prescriptions. In both coniferous and mixed burns, most cavity nesters selected large-diameter trees more often than expected. Black-backed and Three-toed Woodpeckers nested in medium-sized snags. In general cavity nesters selected dense patches of snags more often than dispersed or isolated snags[2].

Dixon et al. (2000) note in the *Birds of North America* that in regards to Black-backed Woodpeckers, where postfire salvage logging is planned, it is recommended to retain snags in clumps rather than evenly spaced distributions and retain >104–123 snags/ha, of dbh size >23 cm.

Kotliar et al. (2002) note that Black-backed and Three-toed Woodpeckers nested in snags with intact tops and nested in medium-sized snags[2].

In respect to Olive-sided Flycatcher, Partners in Flight suggests leaving the tallest trees and snags when implementing salvage cuts after fires.

In respect to the comments of the above authors, Environment Canada wishes to ensure that the EA of the two projects reflects the important ecological roles that medium and large size snags have in relation to Black-backed and Three-toed Woodpecker, Olive-sided Flycatcher; aquatic and riparian systems, and post-fire recovery.

"The vegetation inventory does not identify stands smaller than 25ha." Please note that Wright (1997) determined that the mean size of 16 Olive-sided Flycatcher territories in central Alaska was 18.4 ha.

"Areas within the burn classified as 'partial 3' will be looked at for mortality." As recommended by Beschta et al. (1995) generally do not harvest live trees. Environment Canada accepts the definition of live tree at the bottom of page 9.

"Retention ranges are prescribed in section 6.3". Beschta et al. (1995) recommend when planning salvage logging, that at 50% of standing trees in each diameter class are left; and to leave all trees greater than 20 inches dbh, or older than 150 years. Karr et al. (2004) suggest that in order to protect streams, wetlands, and associated watersheds that planners retain dead or alive, old or large trees. Kotliar et al. (2002) note that Black-backed and Three-toed woodpeckers, and cavity nesters in general, selected dense patches of snags more often than dispersed or isolated snags. Dixon et al. (2000) recommend in respect to Black-backed Woodpeckers that "where postfire salvage logging is planned, it is recommended to retain snags in clumps rather than evenly spaced distributions and retain >104–123 snags/ha, of dbh size >23 cm."

Environment Canada requests that the retention of medium and larges snags, dead or alive, is maximized to provide habitat for Black-backed and Three-toed Woodpeckers. Although snags may be in clumps or dispersed, the retention of snags in clumps should be maximized. The suggested threshold of >104-123 snags/ha, of dbh >23 cm should be considered when laying out blocks and determining retention to ensure that adequate habitat is maintained for Black-backed Woodpecker.

"When Lodgepole pine, birch and aspen …" Environment Canada concurs with the approach of conducting a 5 year regeneration survey in spruce/fir sites prior to assisting with regeneration.

"Seasonal access and winter harvest is required…" This concurs with Environment Canada's request that no harvest activities occur between May 1 and July 31, when migratory birds are expected to be breeding.

RESEARCH AND MONITORING

The Canadian Climate Center General Circulation Model, and the Arctic Climate Impact Assessment predict that the frequency and magnitude of natural disturbances caused by fire and insect damage will increase in the Yukon between now and 2060.

The National Forest Strategy 2003-2008, action item 1.10 states that signatories should "redirect, where appropriate, harvesting into forest areas affected by forest fire, pests and disease damage to mitigate loss". Action item 1.1 states "develop guidelines for integrating watershed-based management and wildlife habitat conservation into forest management practices across Canada and measures for evaluating implementation".

The Accord for the Protection of Species at Risk states that the signatories agree to: establish complementary legislation and programs that provide for effective protection of species at risk throughout Canada, and that will:

- Address all native wild species;
- Monitor, assess and report regularly on the status of all wild species;
- Emphasize preventive measures to keep species from becoming at risk;
- Improve awareness of the needs of species at risk.

The 1995 Canadian Biodiversity Strategy's first two goals are:

- Conserve biodiversity and use biological resources in a sustainable manner;
- Improve our understanding of ecosystems and increase our resource management capability.

The Guiding Principles of the Canadian Biodiversity Strategy include:

- An ecological approach to resource management is central to conserving biodiversity and using our biological resources in a sustainable manner.

- Healthy, evolving ecosystems and the maintenance of natural processes are prerequisites for the in situ conservation of biodiversity and the sustainable use of biological resources.
- The knowledge, innovations and practices of indigenous and local communities should be respected, and their use and maintenance carried out with the support and involvement of these communities.
- The conservation of biodiversity and the sustainable use of biological resources should be carried out using the best knowledge available and approaches refined as new knowledge is gained.
- The conservation of biodiversity and the sustainable use of biological resources require local, regional, provincial, territorial, national, and global cooperation and a sharing of knowledge, costs and benefits.

The Strategic Directions of the Canadian Biodiversity Strategy include:

- Use ecological planning and management of approaches with more emphasis on landscape/watershed-level planning to integrate economic and social objectives with biodiversity conservation objectives.
- Through research, increase our understanding of the status, genetic diversity and ecological relationships of species and populations to improve ecological planning and management.
- Develop indicators to monitor trends and support the management of wild populations, species, habitats and ecosystems.
- Foster the participation of non-government ex situ conservation experts and institutions in in situ conservation efforts, and improve the participation of government agencies in non-government ex situ conservation efforts.

The passage of Bill C-15 into law on May 19, 2005 will require research, and progress on the understanding of management tools to ensure that the conservation of migratory bird species is achieved.

In light of the above commitments shared by territorial and federal governments, it is important that the federal, first nation and territorial governments, in cooperation with non-government conservation experts, continue to move forward on better understanding how to manage Yukon resources to conserve, and reflect the full range of ecological, cultural, and societal values. This is particularly timely and important in light of continued ecological changes resulting from global climate change; and as development pressures increase in the Canadian north.

It is important that these values and commitments be incorporated and recognized in the Environmental Assessment process.

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