Threatened and Sensitive Plant Species

Introduction

The ESA requires that the Forest Service conserve endangered and threatened species of plants, as well as animals. In accordance with Section 7(c) of the Act, the USFWS has determined that the following threatened or endangered listed species may be present on the Flathead National Forest:

- Water howellia (*Howellia aquatilis*) and
- Spalding's catchfly (*Silene spaldingii*) (USDI Fish and Wildlife Service 2008).

A December 4, 2001, letter received from R. Mark Wilson, Field Supervisor, USFWS, identified these threatened, endangered, and proposed species that may occur on the Flathead National Forest. The letter states that the range of Spalding's catchfly includes the upper Flathead River System and that areas below 5000 feet are considered within the range of water howellia.

In addition to plants protected under the ESA, the Forest Service identifies species for which population viability is a concern as "sensitive species" designated by the Regional Forester (FSM 2670.44). Currently, 52 plant species are designated as sensitive on the Flathead National Forest (Project File Exhibit H-7). Forest Service policy requires that activities conducted on NFS lands be reviewed for possible impacts to TES species (FSM 2670.32). The Forest Service has no jurisdiction to protect habitat of sensitive plant species on private lands.

Analysis Area

Spatial Bounds

The analysis area for the Mid Swan Blowdown Salvage Project is based on the area of the project's influence/impacts on known occurrences or potential habitat for Federally threatened and endangered and Regional Forester's sensitive plants.

Water Howellia

There are five known occurrences within close proximity to proposed units or haul routes (Exhibit H-1). Water howellia occurs in glaciated ponds and old oxbows, so the analysis area is limited to the direct, indirect, and cumulative effects from project activities to these habitats. The analysis area for the direct and indirect effects to water howellia includes the pond habitat and the surrounding catch basin of the pond. Because the Swan Valley meta-population is the only location for water howellia in Montana and is the largest known meta-population, the cumulative effects analysis area includes the entire meta-population for water howellia in the Swan Valley. Potential effects to a single pond occurrence or potential habitat may have cumulative effects on the total population numbers for the entire meta-population and potentially affecting species viability.

Spalding's Catchfly

Because there are no known occurrences or potential habitat for Spalding's catchfly within or near the proposed project area, the analysis area is confined to the project area and includes all treatment units and road systems with activities related to this proposed project (Project File Exhibit H-1).

Regional Forester's Sensitive Plants

The analysis area is confined to the project area and includes all treatment units and road systems with activities related to this proposed project (Project File Exhibit H-7).

Temporal Bounds

The temporal bounds are up to 50 years after the decision is signed. Following project implementation, vegetation conditions would take approximately 10 to 50 years to return to closed overstory. Then native overstory and understory tree and shrub canopy cover conditions would exist to shade out and compete with potentially occurring shade-intolerant noxious weeds establishing after the proposed activities. During this time, opening of the canopy and increased soil disturbance from ground activities may increase the potential for weed establishment possibly resulting in competition with known or potentially occurring sensitive plant species. Shade tolerant weeds, such as hawkweed, may persist indefinitely even after the canopy closes.

Data Sources, Methods, and Assumptions Used

Data Sources

Data sources used for this analysis include the Montana Natural Heritage Program's (MNHP) Element Occurrence Database; the Flathead National Forest's TES Survey Atlas, the Flathead National Forest's TES Plant Location Database, and USFWS' threatened, endangered, and candidate species list for the Flathead National Forest (USFWS 2008). These databases include data collected from field surveys conducted by the Forest Botanist, trained technicians, and other botanists contributing surveys and element occurrences to the MNHP. All other sources of information are cited in the text.

Methods

A habitat suitability analysis was conducted to evaluate the potential for sensitive plants occurrences within the project area. Sensitive plants species are grouped in 13 habitat guilds (Project File Exhibit H-2). For each proposed unit surveyed, known vegetation types, aerial photos, elevation ranges, and field surveys of the action area were considered in evaluating potential habitat for sensitive plants. Aerial photos (2005) were used to assist in targeting potential sensitive plant areas that could be discerned from the photos (e.g., wetlands and rock outcrops). Surveys are conducted by walking through units using intuitive searches based on knowledge of potential habitat for sensitive plants and aerial photo interpretation. Surveys attempt to visit the varying habitat types and aspects for each unit. Where the surveyor considers habitat potential high, more time is spent searching for sensitive plants for that area. Whereas, less time is spent in other areas considered having less potential for sensitive plants. A complete species list of plants encountered is assembled for each area surveyed (some smaller units were combined into one survey area). All surveyors are trained and tested in the identification and habitat associations of the Flathead National Forest sensitive plants.

All of the 690 proposed treatment acres were evaluated for sensitive species habitat and surveyed for TES species in 2008 by a Botanist and Biological Technicians. If sensitive or threatened plant species are discovered during activities, contractual requirements provide for modification of the contract to avoid impacts and protect their habitat.

Special habitats were mapped (wetlands, seeps, meadows, etc.) during surveys (Project File Exhibit H-1). Design Criteria, used for action alternatives, would avoid wetlands with all ground-disturbing activities, including lakes, ponds, marshes, fens, and streams by establishing buffers around wetlands (See Design Criteria in Chapter 2, Table 2-14).

Spalding's Catchfly

In 2000, the Flathead National Forest reviewed aerial photos of the entire Forest to locate large expanses of grassland with potential habitat for Spalding's catchfly. Grassland openings were delineated from aerial photos. Potential habitat was identified in small isolated grasslands in the Swan Valley, as well as other areas on the Flathead National Forest. These areas of potential grasslands are not located within the project area.

Water howellia

Aerial photo interpretation and surveys for water howellia in the Swan Valley have been conducted since 1987. In addition, a 10-year monitoring plan was conducted from 1998 through 2007 to detect changes in species distribution and abundance. Project specific surveys within the project area were conducted in August 2008. Aerial photos were used to help locate ponds, and old oxbows, and other wet areas (potential habitat).

Measurement Indicators

Measurement indicators used in this document include the effects to sensitive and threatened plants and their habitat and effects on known populations. Sensitive and threatened plant population trends are the ultimate measure for this analysis.

Affected Environment

Historic and Existing Conditions

Vegetation and Landform

The Mid Swan Blowdown Salvage Project is located along the valley floor and foothills of the Swan Valley, bordered to the west by the Mission Mountains and the Swan Mountain Range to the east. The valley runs north/south and is approximately 50 miles long.

Within a matrix of coniferous forest, there are thousands of small isolated pothole wetlands and old river oxbows along the valley floor and foothills. It is theorized that these basins were formed from outwash and tilling by glacial ice, which later melted to create an undulating topography. These swales (low marshy land) with clay sediment formed thousands of poorly drained basins that fill annually with spring precipitation and melting snow, and dry out during summer months.

A cool and moist pacific maritime climate, in combination with continental air masses, has the largest influence on the growth of vegetation in the analysis area. The south and west facing aspects are warm, dry habitats supporting Douglas-fir and ponderosa pine. The north and east aspects are cool, moist habitats commonly supporting Douglas-fir, western larch, lodgepole pine, Engelmann spruce, grand fir, and subalpine fir; and less commonly, western hemlock, western red cedar, and western white pine. The higher elevations are cold, moist habitats supporting lodgepole pine, subalpine fir, whitebark pine, and alpine larch. Deciduous trees such as black cottonwood, paper birch, and quaking aspen are primarily found in moist areas.

Federally Threatened Plants:

Spalding's Catchfly (*Silene spaldingii*): No grasslands with potential for Spalding's catchfly were located within the project area on aerial photos or during 2008 project specific surveys. There are no known occurrences of Spalding's catchfly within the Mid-Swan Blowdown Salvage Project Area boundaries or within the Flathead National Forest, based on the information sources and surveys described above. Spalding's catchfly is excluded from further discussion in this document due to the lack of occurrences and potential habitat within or near the project area.

Water howellia *(Howellia aquatilis)*: No known occurrences or potential habitat occur within the proposed treatment units of all alternatives. However, 5 ponds with known occurrences of water howellia (occupied ponds) occur in close proximity to proposed units or within 300 feet of haul routes (Project File Exhibit H-1).

TABLE 3-31.

WATER HOWELLIA OCCUPIED PONDS IN CLOSE PROXIMITY TO UNITS AND HAUL ROUTES WITHIN THE MID SWAN BLOWDOWN SALVAGE PROJECT AREA

Element Occurrence #	Unit/Haul Road
058	Unit 16
090	Rd 966
091	Rd 966
095	Unit 26
152	Rd 966

Associated Plant Community: Water howellia is an aquatic plant restricted to small pothole ponds, or oxbows, long since isolated from the flowing surface waters of the adjacent river. These wetland habitats are generally shallow [~3.3 feet (1 meter) deep], but the species has occasionally been observed in water up to approximately 6.6 feet (2 meters) deep. The ponds typically occur in a matrix of dense forest vegetation and are nearly always surrounded in part by a small ring of deciduous vegetation. The bottom surfaces of the wetlands usually consist of firm consolidated silts and clays overlain by 0 to 24 inches of organic sediments. These ponds are generally filled by snowmelt run-off and spring rains, later drying out to varying degrees by the end of the growing season, depending on annual patterns of temperature and precipitation. Water howellia occurs between elevations of 19 feet (3 meters) in Washington to 4500 feet (1372 meters) in Montana. All Montana occurrences lie between 3100 feet (945 meters) and 4500 feet (1372 meters), and are found only in the Swan River Valley from just south of the community of Swan Lake, south to the Clearwater/Swan Divide.

In Montana, most water howellia occurrences are in glacially-formed ponds surrounded by diverse coniferous forests. These forests are of mixed composition with a range of coverages of the following tree species:

- Grand fir *(Abies grandis)*,
- Subalpine fir *(Abies lasiocarpa)*,
- Western larch *(Larix occidentalis)*,
- (Engelmann spruce *(Picea engelmannii)*,
- Lodgepole pine *(Pinus contorta)*,

- Western white pine *(Pinus monticola)*,
- Ponderosa pine *(Pinus ponderosa)*, and
- Douglar-fir *(Pseudotsuga menziesii)*.

The broadleaf deciduous tree most frequently associated with the pond margins is blackwood cottonwood *(Populus trichocarpa)*, but quaking aspen *(Populus tremuloides)* is also often present. In the northern end of the Swan Valley, paper birch *(Betula papyrifera)* is found near some pond margins. Shrub species bordering the ponds include:

- Gray alder *(Alnus incana)*,
- Edosier dogwood *(Cornus stolonifera)*,
- Common juniper *(Juniperus communis)*,
- Alderleaf buckthorn *(Rhamnus alnifolia)*, but most commonly,
- Bebb willow *(Salix bebbiana)*.

Aquatic herbaceous species commonly associated with water howellia are:

- Blister sedge *(Carex vesicaria)*,
- Twoheaded water-starwort *(Callitriche heterophylla)*,
- Water horsetail *(Equisetum fluviatile),*
- Variableleaf pondweed *(Potamogeton gramineus)*,
- White water buttercup *(Ranunculus aquatilis)*,
- Water parsnip *(Sium suave)*, and
- Small bur-reed *(Sparganium minimum)*.

Status and Threats: Water howellia occurrences are distributed throughout the Pacific Northwest in scattered clumps across Montana, Idaho, Washington, and California. There are 154 occurrences known to Montana, all in the Swan Valley. This is over two thirds of the total 217 known global occurrences. Water howellia habitat has been subject to various management activities including dredging, draining, road construction, logging, and grazing (Shelly 1988, USDA 1997). Reed canarygrass, an introduced species, also threatens populations across its range (Lesica 1997b). The National Heritage Program Network has ranked this species as G2, meaning that it is globally imperiled because of rarity, or because of other factors contributing to its vulnerability to extinction throughout its range. The MNHP has ranked the species similarly for the state (MNHP 2006).

Baseline conditions were prepared only for the Swan Valley metapopulation. Because water howellia ponds are located in the valley floor in gentle rolling terrain, past activities, such as road construction, timber extraction, and other development, has occurred frequently in areas where ponds occur. A summary of these human-influenced conditions, within a 300-foot buffer surrounding water howellia ponds, is displayed in Table 3-32.

TABLE 3-32.
EXISTING CONDITION OF 184 KNOWN OCCURRENCES IN THE SWAN VALLEY
(INTERPRETED FROM 1997 and 2005 AERIAL PHOTOS)

Location	Number
Timber Management (within 25 years) **	
Adjacent to pond (to the edge of pond)	63
Within 300 feet of pond (not to edge of pond)	55
No activity within 300 feet of pond	66
Roads	
Open road within 300 feet of pond	43
Closed road within 300 feet	63
No activity within 300 feet of pond	78
Reed canarygrass *(Phalaris arundinacea)*	
Present within ponds*	27 of 62 ponds monitored annually; 37 of 184 total known ponds***
Livestock Use in Ponds	
Observed within ponds**	0 detected since 1998 annual monitoring 6 detected prior to 1998

*Harvest is only noted as occurring if it is evident from an aerial photo. A light or partial cut that is undetectable from the photo was not recorded as recent harvest. If the area was previously harvested but the canopy has recovered enough to where harvest activity is undetectable on the photo, then it is not considered recently harvested.
** Surveyed in 2007
*** Not all ponds have reed canarygrass data

These current day conditions show a significant departure from the range of conditions that historically surrounded ponds. Aerial photo interpretation (1934 photos) of 78 ponds indicated that 25 of the 78 ponds (30 percent) had harvesting or road activities within 300 feet of the ponds. In contrast, 60 of the same 78 ponds (85 percent) now show harvesting or road activities within 300 feet as interpreted from 1997 aerial photos.

In 1998, a 10-year monitoring plan was implemented to detect changes in species distribution and abundance. This study will assist in evaluating if current management prescriptions for water howellia are sufficient for continued viability of the Swan Valley metapopulation. The 10-year monitoring plan was completed in 2007.

Regional Forester's Sensitive Plants

Little is known about the historical condition for TES plants in the Swan Valley Drainage. Botanical surveys that may have detected rare plants were not initiated in the area before the onset of the Flathead National Forest's Botany Program in 1991.

Based on the information sources and surveys listed above, there are two sensitive plants known in the project area (Project File Exhibit H-2). There are no sensitive plants located within or immediately adjacent to proposed treatment units. Refer to Table 3-33 below.

TABLE 3-33.
REGIONAL FORESTER'S SENSITIVE PLANTS AND OTHER RARE PLANTS IN THE MID SWAN BLOWDOWN SALVAGE PROJECT AREA

		Habitat Guilds												
Species	**EO#**	**AV**	**F**	**W**	**R**	**MCT**	**MC**	**MMC**	**GO**	**MS**	**CRS**	**S**	**A**	**D**
short-spored jelly lichen (*Collema curtisporum*)	8				X			X						
crested shield fern (Dryopteris cristata)	11		X	X	X			X						

EO# = Element Occurrence number in the Montana Natural Heritage Program Database
AV=Aquatic and vernal pools; F=Fens and fen margins; W=Marshes, seeps, springs, and wet meadows; R=Riparian; MCT= Vernally moist cliffs or mossy talus; MC= Mid-elevation moist coniferous forests; MMC=Margins of moist coniferous forests; GO=Dry grasslands & openings in ponderosa pine and dry Douglas-fir forests; MS=Mid-montane/Subalpine grass/forb; CRS=Canyon walls, crevices, rock outcrops and slides S=Subalpine forests; A=Alpine; D= Disturbed areas
*Rare Plant

Potential Occurrences: Based on the information sources and surveys listed above, the project area contains habitat types for sensitive plant species associated with five of the thirteen habitat guilds (mid-elevation moist coniferous forests; margins of moist coniferous forests; marshes seeps, springs and wet meadows; riparian; and disturbed areas) listed in Project File Exhibit H-1.

Environmental Consequences

Alternative A – No Action
Direct Effects

This alternative proposes no ground-disturbing activity. Therefore, there would be no direct effects on any listed threatened or sensitive plant species or their habitats. The response of each of the sensitive plant species to management activity varies by species, and in some cases, is not fully known. Local native vegetation has evolved with and is adapted to the climate, soils, and natural processes such as fire, insect and disease infestations, and windthrow. Any management or lack of management that causes these natural processes to be altered may have impacts on native vegetation, including threatened and sensitive plants. Indirect effects would depend on further natural disturbances.

Alternative A – No Action
Indirect Effects

With Alternative A, natural forest succession and recovery would not be disrupted. Patterns of ecosystem recovery, together with the recovery of flora within ecosystems, are influenced by the types, numbers, and spatial arrangements of biological legacies remaining following natural disturbance (Lindenmayer & Franklin 2002). Biological legacies are organisms, organically derived structures, and organically produced patterns that survive from the pre-disturbance system. Biological legacies can be critical for biodiversity and influence the rate and pathway of post-disturbance recovery (Franklin et al. 2000). Among the factors that make recently disturbed forests biologically diverse are a combination of surviving and pioneering plant species, high availability of light and

moisture, and a variety of microclimates (Noss et al. 2006). Conditions following stand-replacing disturbances in many regions are among the most biologically diverse of all forest conditions (Franklin & Agee 2003). Major disturbances can enhance ecological processes and aid ecosystem restoration by creating some of the structural complexity and landscape heterogeneity lost through past human management. Disturbance regime sensitive plants are often rare due to the lack of the habitats they occupy and represent.

New establishment and spread of new noxious weeds occurrences would occur with Alternative A, the No Action Alternative. However, Alternative A would not increase this existing potential. Increased weed establishment and spread, facilitated by project activities of the action alternatives (ground disturbance and vehicle traffic in and out of the analysis area), would not occur in Alternative A. In addition, the potential for weed invasion and competition for nutrients and light with sensitive plant populations and native vegetation is reduced in Alternative A as compared to the action alternatives.

Alternative A – No Action
Cumulative Effects

Past, present, and reasonably foreseeable actions within the Mid Swan Blowdown Salvage Project Area (Federal and nonfederal) include timber harvesting, noxious weed control, road construction and maintenance, recreation, and fire suppression. These actions may have historically affected Federally-threatened plants and the Regional Forester's Sensitive Plants and may continue to have effects (See the Cumulative Effects Section under the Action Alternatives).

Cumulative effects from Alternative A may include a potential for stand replacing fire. Stand replacing fire may occur due to increased understory fuel; wind affected trees would not be removed, and seedlings and saplings would continue the processes of natural forest succession. Native species have evolved and adapted to natural disturbance, such as fire on the landscape. Fires primarily occur in the mid to late summer season, when annual plants have flowered and set seed. Perennial root-stocks would remain underground and would emerge following the fires. It is unlikely that Alternative A would cumulatively contribute to a marked decrease in Federally-threatened or sensitive plant populations or habitat.

Alternatives B, C, and D
Direct and Indirect Effects

Water Howellia

Direct Effects: Five water howellia element occurrences are located within close proximity to treatment units or haul routes (Table 3-31). Treatment units do not overlap with occupied ponds and no direct effects are expected for these ponds. All occupied ponds have over a 300-foot buffer from the edge of wetland type plants associated with the pond's perimeter. No project related activities would occur within the buffered areas.

Indirect Effects: The indirect effects from salvage activities would vary depending on the amount of ground disturbance occurring and amount of dead, dying, or damaged trees removed from salvage areas. Salvage in the surrounding uplands of water howellia ponds may impair natural vegetation recovery and alter the hydrologic processes (Lindenmayer and Noss 2006) of howellia ponds for occupied ponds within proximity to the treatment units. Changes to the hydrologic processes of ponds could result in both a decrease and increase in pond inundation levels. Additional disturbance of surrounding upland trees may decrease evapotranspiration of the surrounding upland trees and could result in increased inundation of ponds from runoff. Also, increased canopy openings near ponds could increase evaporation of ponds, effectively reducing water levels earlier in the growing season. Some impacts may be different from or additional to the effects of traditional logging that is not preceded by a large natural disturbance because the conditions before, during, and after salvage

logging may differ from those that characterize traditional timber harvesting (Lindenmayer and Noss 2006). In particular, the salvage harvest as proposed under all alternatives would not target living trees, so hydrologic affects normally associated with green tree harvest would be limited to trees incidentally removed primarily on skid trails. Changes in hydrology due to changes in evapotransporation would largely be very similar to the effects of the no action alternative as the trees targeted to be removed are those already affected by the windstorms. Reproductive success of water howellia is directly linked with the fluctuation of water levels both annually and from year to year (Lesica 1990). Water howellia produce seeds underwater early in the growing season when ponds fill up and also produce seeds later in the season via above-water flowers. Water howellia requires annual drying of ponds for fall germination on exposed pond substrate. However, repeated annual premature drying of ponds may reduce the ability for water howellia to replenish the seed bank from year to year. In addition, prolonged inundation of ponds in a given year may reduce fall germination and result in reduced seed bank replenishment. The longevity of seed bank viability is not well understood. Some studies indicate that seed can retain viability for up to 2 years (M. Mantas, The Nature Conservancy, and J.S. Shelley, US Forest Service, unpub. data).

In addition, to the extent salvage activities incidentally remove any living trees, such activities may increase groundwater and sediment flow in some of the microcatchments containing water Howellia. This may have effects on seed germination if enough sediment were to accumulate and deeply bury the existing seed bank. Increased siltation may also result in shifts in the pond's vegetation composition, supporting emergent vegetation in place of submergent vegetation types (USDI 1996).

> *Unit 26:* A portion of this unit is located within the microcatchment area for EO 95. Salvage activities, in addition to natural disturbance from the blowdown event, have the potential for indirect effects through increased ground water and sediment flow to this water howellia occupied pond.

Treatment operations within the vicinity of water howellia ponds have the potential for depositing or dispersing weed seeds. Noxious weeds within water howellia ponds may affect plants by competition for light nutrients, and vegetative structural changes within ponds. Reed canarygrass is known to occur in two (EO 58 and EO 152) of the five water howellia ponds in close proximity to units or haul routes within the project area. This grass is highly competitive in moist and aquatic habitats and can form monocultures, displacing other plants (Apfelbaum and Sams 1987). Reed canarygrass has been shown to have detrimental effects to a howellia population in the Swan Valley (Lesica 1997a). Human-induced activities, including logging, are potential dispersal vectors for reed canarygrass seed and other noxious weeds. However, reed canarygrass seeds are not typically wind blown and spread would most likely occur with a vector source (such as water, recreationists, ungulates, bears, or birds) spreading seeds from pond to pond or through water courses, connecting ponds. The potential effects of noxious weeds are reduced by the 300-foot buffering of occupied ponds and the washing of equipment prior to entry into the project area, (See Design Criteria, Table 2-14).

To mitigate these potential effects and in accordance with the Flathead National Forest Plan Amendment 20, all occupied ponds would be avoided with a 300-foot buffer around the ponds. The buffer zones would extend out 300 feet starting at the edge of the concentration of plants that are directly associated with the wetland and are influenced by the hydrology of the wetland (e.g., Gray alder (*Alnus incana),* Edosier dogwood *(Cornus stolonifera),* Common juniper *(Juniperus communis),* Alderleaf buckthorn *(Rhamnus alnifolia),* Bebb willow *(Salix bebbiana*). Buffer zones would reduce indirect effects of potential hydrologic alternations and/or siltation within the microcatchment basin of ponds.

Three occupied ponds are located less than 300 feet from proposed haul route on FDR #966.

TABLE 3-34.
POND'S PROXIMITY TO ROADS

EO #	Distance to Road (feet)	FDR #	Road Status
152	70	966	Open year round
091	240	966	Open year round
090	230	966	Open year round

Forest Development Road #966 would be bladed and may need additional BMP maintenance before or after project activities. This road is open year round. The increased traffic past occupied howellia ponds associated with hauling from Unit 26 is unlikely to increase measurable impacts to these ponds. However, associated road maintenance on FDR #966 may contribute to potential siltation into ponds associated with EO 152, EO 091, and EO 090. Increased siltation into ponds may result in the burying of water howellia seeds too deep for germination or shifting the pond's vegetation composition, supporting emergent vegetation in place of submergent vegetation types (USDI 1996). If ground-disturbing BMP-related activities occur within 300 feet to the north and south of these ponds, then mitigation measures would be applied to ensure limited sediment deposition into these ponds (See Design Criteria, Table 2-14).

Regional Forester's Sensitive Plants

Currently, there are no known sensitive plants located within or adjacent to the proposed salvage units; therefore, no direct or indirect effects are expected for known populations.

The project area contains habitat types for sensitive plant species associated with 5 of the 13 habitat guilds (mid-elevation moist coniferous forests; margins of moist coniferous forests; marshes seeps, springs and wet meadows; riparian; and disturbed areas) listed in Project File Exhibit H-2. The extent of direct and indirect effects for undetected occurrences is speculative due to lack of known locations.

Post-disturbance salvage harvesting may lead to altered composition of plant species and abundance of plant life forms (Stuart et al. 1993). Post-disturbance blowdown areas contain early and late successional species. Salvage-logged areas exhibit a shift towards graminoid dominance and early successional plant species (del Rio 2006). For non-wetland associated sensitive plants, salvage harvesting would increase the light level to the understory. This may be a beneficial effect for some rare or sensitive plants, but may have adverse effects for other rare plants requiring greater canopy cover (e.g., clustered lady's-slipper). As well, further fragmentation of habitat and alteration of plant community composition associated with salvage harvesting could limit recruitment of new populations into disturbed areas, and may alter patterns of seed dispersal, seed predation, germination rates, and survivorship of young plants (Jules 1998).

Salvage logging and temporary road construction may alter the hydrologic processes for sensitive plants of wetland-associated habitat groups (Project File Exhibit H-2) including mid-elevation moist coniferous forests; margins of moist coniferous forests; marshes seeps, springs and wet meadows; and riparian areas. Changes to the hydrologic processes in wetlands may result in both a decrease and increase of wetland water levels. To the extent any live trees not already killed by the windstorm are removed, salvage logging and road construction would decrease canopy cover proportionately and, in consequence, could decrease evapotranspiration rates proportionately. The extent to which this is anticipated to actually occur is very limited, but such an affect could be theorized, if not measured. This could result in increased inundation of wetlands from runoff. In addition, increased canopy openings (to the extent that canopy openings are increased by any incidental removal of green trees) near wetlands may increase evaporation of the wetlands, potentially reducing water levels earlier in the growing season.

Units 3, 6, 8, 17 and 18 contain wetland or riparian inclusions. Potential impacts to wetland-associated habitat groups (Project File Exhibit H-2) within these units are the same as the potential impacts for non-wetland sensitive plants and habitat discussed in the following paragraph for proposed Alternatives B and C.

Salvage logging may affect non-wetland sensitive plants and habitat by creating unfavorable conditions for establishment and persistence, at least in the short term. Soil compaction may occur, which can alter current and future success of understory plants due to mortality, reduction in future recruitment, changes in soil moisture, and changes in mycorrhizal associations. Physical disturbance of the understory community may eliminate species from the stand that are disturbance intolerant, particularly plants that have shown little tolerance for logging disturbance. The temporal recovery of individual plants after disturbance is species specific and may depend on factors of the disturbance and effects to the microsite, tolerance of the species to disturbance, and presence of regenerative methods of survival (i.e., rhizomes, taproots, bulbs, and corymbs). Frequent and intense disturbance may favor ruderal species, and cause a decline of forest understory species that have low dispersal rates (Halpern and Spies 1995). Conversely, stands allowed to mature with no additional disturbance may favor recovery of all but the most disturbance intolerant species.

Removal of downed trees and incidental removal of shrubs would open up the canopy and potentially create new substrate for noxious weed colonization where propagules are present. Noxious weeds can have detrimental effects to the plant community altering its composition and function (Thorpe et al. 2006; Yurkonis et al. 2005). Spread of noxious weeds has the greatest potential for indirect effects on potentially occurring sensitive plant populations within the project area. Equipment associated with this project would be washed prior to entering NFS lands to reduce the introduction of weeds into the disturbed area. In addition, Design Criteria to minimize spread of noxious weeds could mitigate this potential impact (See Design Criteria, Table 2-14).

Alternatives B, C, and D
Cumulative Effects

Water Howellia

Past, current and reasonably foreseeable actions that may have affected water howellia and may continue to have effects include noxious weed control, land sales, recreation, wildfire, and road and timber management.

Noxious Weed Control: Water howellia adjacent to areas of chemical weed control may be at risk of exposure to chemicals used in weed control. However, on the Flathead National Forest, threatened and sensitive plant surveys are conducted for each site (not previously treated) before any chemical control treatments, as required by the NIWC Decision Notice (Project File Exhibit R-4).

Land Sales*:* Past, present, and future lands sales from PCTC to private ownership may have had effects and may continue to affect habitat and occurrences of water howellia. Water howellia occurring on private land is afforded no protection, and private ownership may lead to destruction of the population or degradation of habitat. Conversely, potential sales of PCTC land to the Forest Service could have the effect of providing additional habitat protection to ponds currently on PCTC lands.

Recreation: Trails and other areas frequented by recreationists may contribute to the cumulative effects to water howellia. Trail maintenance near wetlands could affect water howellia by increased siltation into wetlands or the dispersal of noxious weed seeds from human vectors. However, most recreationists are reluctant to tread in the mucky waters of wetlands.

Wildfire: The potential effects of fire to water howellia are discussed above. As it is likely, the metapopulation has been surviving lethal fires through the century into present day; the cumulative contribution of wildfire would be expected to be minimal.

Road and Timber Management: It is possible that past and future road construction, maintenance, and timber management could have increased groundwater and sediment flow in some wetlands. This could have effects on seed germination as discussed above. Increased siltation could result in shifts in the wetland vegetation composition, supporting emergent vegetation in place of submergent vegetation types (USDI 1996). Timber management and other development activities could also contribute to these same effects to water howellia.

Reed canarygrass is known in approximately 37 of the 184 elemental occurrences of howellia in the Swan Valley. Past, present, and reasonably foreseeable activities associated with the Proposed Action could have contributed to the spread of reed canarygrass to these ponds. Areas within the project area would be actively monitored for invasive weeds and active management of weeds would occur in compliance with the NIWC Decision Notice (Project File Exhibit R-4).

Cumulative effects only would occur if water howellia habitats were to be impacted resulting from activities identified in the Proposed Action. Occupied ponds would be buffered 300 feet. No ground-disturbing activities would occur within the buffered zones. Design Criteria for hauling and associated road maintenance on roads with nearby ponds would be implemented to prevent or reduce sediment from reaching the ponds close to haul routes (Table 2-14). Treatment activities outside the 300-foot buffers and hauling near the three occupied ponds may have potential indirect effects as described in the indirect effects sections. However, potential indirect effects resulting from this project are expected to contribute minimally towards the cumulative degradation of the environmental baseline described in the Affected Environment Section for water howellia. The total of these effects would not likely reach thresholds where water howellia could not maintain its ability to survive within the Swan Valley.

Regional Forester's Sensitive Plants

Because little is known about the condition of sensitive plants in the Swan Lake Ranger District before the initiation of the Flathead National Forest's Botany Program in 1991, cumulative effects from past activities are described in general and are speculative for potentially occurring plants within the project area. Therefore, the cumulative effects analysis below describes the potential impacts of past, present, and future activities for all potentially occurring plants, undetected in the past, present, and future.

Past, current, and reasonably foreseeable actions (Federal and nonfederal) that may have affected sensitive plants and may continue to have effects include noxious weed control, land sales, land acquisition, special use permits, wildfire and fire suppression, underburning and prescribed fire, recreation, and road and timber management. Please refer to Project File Exhibit H-3 for the Cumulative Effects Worksheet describing the relationship of sensitive plants to all past, present, and reasonably foreseeable activities in the project area.

Road Management: Past, present, and future management of the roads have both adverse and positive cumulative effects on documented and potentially occurring roadside sensitive plant populations. Disturbance of roadsides may benefit those sensitive species with a competitive edge in disturbed environments and temporarily adversely affect these populations until new seedlings establish in the openings. Maintenance of roads may increase traffic along these roads and, thus, increase potential for disturbance of plant populations adjacent to roads. Road construction and maintenance could also affect wetland habitats. Past (and future) road construction could have affected groundwater and sediment flow in some wetlands. Increased siltation may result in shifts in the wetland vegetation composition, supporting emergent vegetation in place of submergent

vegetation types (USDI 1996). Timber harvesting and development may also contribute to these same effects to wetland plants.

Past and future closures and reclamations of roads would potentially have short-term effects to known and potentially occurring sensitive plants growing near and on these roads. However, closure and reclamation of roads would reduce impacts overall.

Timber Management: The direct and indirect effects of timber management on sensitive plants and habitat are discussed in detail above. Potential effects include mechanical compaction, noxious weed competition/displacement, roadside dusting, hydrologic alteration due to treatment activities, and degradation of habitat. It is likely that this extensive timber management has affected the habitat or occurrences of sensitive plants, although the extent is unknown and can only be speculative. The Mid Swan Blowdown Salvage Project, as well as past and future timber management projects on Federal and non-federal lands, contributes cumulatively to the effects on sensitive plants and habitat.

Recreation: Trails and other areas frequented by recreationists could contribute to the cumulative effects to sensitive plants. Trail construction/maintenance near wetlands could affect sensitive wetland plants by increased siltation into wetlands or the dispersal of noxious weed seeds from human vectors. However, most recreationists are reluctant to tread in the mucky waters of wetlands. Non-wetland plants may experience cumulative effects of trampling, weed introduction, and collecting from dispersed recreation.

Noxious Weed Control: Sensitive plants adjacent to areas of chemical weed control could be at risk of exposure to chemicals used in weed control. However, on the Flathead National Forest, sensitive plant surveys are conducted for each site (not previously treated) before any chemical control treatments, as required by the NIWC Decision Notice (Project File Exhibit R-4). With the exception of some sensitive plants that occur in “disturbed” environments, rare plants do not persist with noxious weeds due to differing habitat requirements. Weed control on State and private lands could have adverse effects to plant viability for plants occupying disturbed habitats that may favor weed establishment.

Wildland Fire and Fire Suppression: Fire suppression has created a denser understory condition in many unharvested stands where historically, low-intensity understory fires occurred regularly. The fires that have been eliminated from the understory played a role in reducing fuels and encroaching vegetation (USDA Forest Service 1998). Fire suppression resulting in closed-canopy could have effects of reduced light levels to sensitive plants in the understory.

Fire creates conditions favorable for noxious weed establishment where propagules exist for colonization. In addition, suppression activities disturbed soils (dozer lines and other staging areas) could create additional areas for weed establishment.

Underburning and Prescribed Fire: Typically, prescribed fire and underburning could have short-term direct effects to potentially occurring sensitive plants from direct burn over. Undetected annual plants disturbed prior to seed set could experience decreased population viability in subsequent years, due to a reduction of the seed bank. Perennial plants could experience ground disturbance to rootstocks (rhizomes, taproots, and bulbs), potentially inhibiting the plant’s ability to resprout from rootstock.

Land Sales: Past, present, and future lands sales from PCTC to private development could have had effects and may continue to affect habitat and occurrences of Regional Forester’s Sensitive Plants. Effects to sensitive plant resources because of past development and land clearing on private lands have been significant. Much of the available habitat for plants associated with wetlands has been lost or degraded on private lands. These areas have been used for grazing or building sites and were often cleared of trees or drained. Continued development of lands could reduce potential habitat, alter hydrologic regimes, and increase the likelihood for new weed establishment.

Land Acquisition: Land that had been owned by PCTC and acquired by the Forest Service may be more likely to be surveyed and managed for sensitive plant populations than land owned by PCTC. Depending on priorities, surveys may occur in conjunction with the goals to protect and restore important wildlife, fish, and wetlands habitat. In one recently acquired section of land in the Swan Valley, three new occurrences of sensitive plants were found during a survey. Land acquired also could be more likely to be treated for noxious weeds, which may protect sensitive plant habitat from noxious weed infestation.

Summary of Effects for Sensitive Plants: None of the action alternatives are expected to have direct, indirect, or cumulative effects on any known occurrences of sensitive plants, due to the lack of known occurrences within treatment units. However, habitat for sensitive plants does occur within the project area. All ground-disturbing activities from the on-set of the Forest's Botany Program since 1990 have been analyzed for effects to threatened, endangered, and sensitive plants prior to project implementation. Activities would be modified to mitigate anticipated impacts to sensitive plants resulting from foreseeable action as required by Forest Service policy.

Direct, indirect, or cumulative effects on potential or undetected sensitive plant occurrences can only be speculative. However, the project area has been significantly altered from its natural condition by timber management, road construction, development, and the increase in noxious weeds. The direct and indirect effects of this project are expected to contribute minimally to the total effects from past, present, and foreseeable actions. The potential spread of noxious weeds and potential degradation of suitable habitat resulting from this project and past, present, and future projects described above have the greatest potential for cumulative effects on potentially occurring sensitive plant populations. Design Criteria (Table 2-14) to minimize the risk of noxious weeds would help reduce these potential effects. In addition, areas within the project would actively be monitored for invasive weeds and active management of weeds would occur in compliance with the NIWC Decision Notice (Project File Exhibit R-4).

Regulatory Framework and Consistency

Threatened or endangered status affords a species and its habitat special protection from adverse effects resulting from Federally-authorized or funded projects. It is the responsibility of the Forest Service to design activities that contribute to the recovery of listed species in accordance with recovery plans developed as directed by the ESA (50 CFR Part 402). The Flathead National Forest's Amendment 20 to the Forest Plan provides for conservation measures to ensure the protection of water howellia. Amendment 21 to the Forest Plan has a goal to

> "*provide sufficient habitat to promote the recovery of threatened and endangered species and conserve the ecosystems upon which they depend*."

Federal laws and direction applicable to sensitive species include the NFMA and FSM 2670. Amendment 21 to the Forest Plan has standards to conduct analyses to review programs and activities, to determine their potential effect on sensitive species, and to prepare a BE. It also states:

> *"adverse impacts to sensitive species or their habitats should be avoided. If impacts cannot be avoided, the significance of potential adverse effects on the population or its habitat within the area of concern and on the species as a whole will be analyzed. Project decisions will not result in loss of species viability or create significant trends towards federal listing."*

Future conservation strategies for each species would present direction on maintaining habitat diversity and managing for population viability, as required by the NFMA and Forest Plan Amendment 21. The Forest Service is bound by Federal statutes (ESA, NFMA), regulations (USDA 9500-4) and Agency policy (FSM 2670) to conserve biological diversity on NFS lands. A goal in Forest

Plan Amendment 21 is to "*ensure that Forest Service actions do not contribute to the loss of viability of native species*."

All action alternatives described in this EA would meet the direction of FSM 2670.3 and is consistent with the Forest Plan direction for sensitive plants. In addition, all activities are also in compliance with ESA and Forest Plan Amendments 20 and 21, with respect to Federally-listed plants.

Determinations

Sensitive Plants

The activities associated with the action alternatives "**may affect individuals, but is not likely to result in a trend toward Federal listing or loss of viability"** for potentially occurring sensitive plant species and proposed plant species listed in Project File Exhibit H-2. This is based on the, 1) presence of suitable habitat for potentially occurring sensitive plants within the project area; 2) the potential for indirect effects of noxious weed competition; and 3) the delineation of new occurrences located prior to project implementation.

Federally Threatened Plants

Water Howellia

The activities associated with the action alternatives "**may affect, but is not likely to adversely affect** water howellia (Project File Exhibit H-1). This determination is based on:

1) The occurrence of five occupied water howellia ponds within proximity to proposed treatment units or haul routes.

2) Occupied ponds would be buffered 300 feet. No salvage activities would occur within the buffered zones.

3) For ponds adjacent to haul roads, ground disturbing BMP activities occurring in the vicinity of these ponds, would apply mitigation measures (such as natural filtration zones, sediment retention structures, or straw bales) to ensure limited sediment deposition into these ponds.

4) Salvage activities outside the 300 feet buffers and hauling near the occupied ponds may have potential effects as described in the indirect effects section. However, potential indirect effects resulting from this proposed project are expected to contribute minimally towards the cumulative degradation of the environmental baseline when considering other past, present and foreseeable cumulative affects.

Spalding's catchfly

The activities associated with the action alternatives will have **"no effect"** on Spalding's catchfly, its habitat, or potential habitat for these species (Project File Exhibit H-1). This determination is based on the lack of known occurrences and suitable habitat within the proposed action area.

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