TOBOGGAN CREEK FAN
SENSITIVE AREA
MANAGEMENT PLAN

Prepared for:

Ministry of Sustainable Resource Management
Bag 5000
Smithers, BC
V0J 2N0

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Order to Establish a Sensitive Area and Objectives

Pursuant to Section 5 of the Forest Practices Code of British Columbia Act, 98 ha of Crown Land in the Glacier Gulch Creek and Toboggan Creek watersheds are established as a Sensitive Area effective , 2003

Objectives:

The boundaries of the Toboggan Creek Fan Sensitive Area are shown on the attached 1:20,000 scale map dated , 2003, (described as Map 2 in the Toboggan Creek Fan Sensitive Area Plan).

(Original signed by)

_____ _____

Kevin Kriese, Regional Director, Date

Ministry of Sustainable Resource Management

Prince Rupert Region

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1 Introduction

Biodiversity maintenance is one of the core concepts upon which the Bulkley Land and Resource Management Plan (LRMP) is founded on. Biodiversity includes all living organisms at all levels of organization, and the evolutionary and functional processes that link them. The priority of biodiversity is reflected throughout the LRMP, with "the maintenance of biodiversity being an underlying objective of land and resource management at all levels" (Bulkley LRMP). Biodiversity is to be managed at the landscape level over the entire district. The Bulkley LRMP identifies sensitive area designation as one method to manage biodiversity within landscape units.

The vegetation of the northern portion of the Glacier Gulch/Toboggan fan has been recognized as being rare within the Bulkley TSA, and will be protected through the establishment of a sensitive area. The purpose of the sensitive area is to maintain the hydrogeomorphic processes on the fan, and the mosaic of plant communities that are a product of these processes. The objectives and strategies of this plan will be consistent with direction in the Bulkley LRMP and the Trout Creek/Kitseguecla Landscape Unit Plan (LUP). The rationale for designating this portion of the Glacier Gulch/Toboggan Creek fan as a sensitive area, a more detailed description of the area, and the history and consultation of the proposal are included in Appendix 1.

2 Site Description

This section will briefly describe the Toboggan Creek Sensitive Area, a more detailed description can be found in Appendix 1.

2.1 Location

The Toboggan Creek Fan Sensitive Area covers 98 ha, and is located 10 km northwest of Smithers, at the base of Hudson Bay Mountain (Map 1). The Toboggan Creek Fan Sensitive Area can be accessed by trail from the end of Horlings Road and from Toboggan Creek Road. The trail from Horlings Road uses a road right-of-way that continues on from the end of the Horlings Road to Crown Land beyond. The Toboggan Creek Road starts at Glacier Gulch Road and crosses private land; the Southwest 1/4 Section of Section 21. The owner of that property has voiced his opposition to the sensitive area, but not for reasons of access across his property. As the Toboggan Creek Road is outside of the Toboggan Creek Fan Sensitive Area, establishment of the sensitive area will not restrict access along this road.

2.2 Physical Characteristics

The Toboggan Creek Fan Sensitive Area is entirely on a fluvial fan, formed by the combined action of Glacier Gulch and Toboggan creeks. Toboggan Creek is responsible for depositing most of the material in the area covered by the sensitive area; however, both of these creeks flow through the sensitive area.

The Glacier Gulch/Toboggan Creek fan is still geomorphically active, especially the Toboggan Creek portion where deposition and channel movement events have occurred within the last 4 years. Numerous wetlands and ponds have formed, with the assistance of beavers, where the fan meets constraining landscape features at its toe.

2.3 Ecological Characteristics

Fans are distinctly different from other landforms because of the coarse fluvial material that forms them, and the constant supply of seepage water through this coarse material. In addition, the disturbance history of fans can produce a mosaic of vegetation types and successional stages related to different disturbance events.

The core area contains a stand of very large old cottonwood trees. The other vegetation types on the fan are closely tied to this core area, and are key to maintaining the integrity of the core area, and to ensuring that a diversity of vegetation types are maintained in the area.

As many pioneer tree species are deciduous, a high proportion of the forest on the fan in deciduous leading. Deciduous trees often establish after disturbance events and then persist for some time in forest openings after conifers establish. Riparian areas are often dominated by deciduous shrubs such as alder, willow and dogwood.

2.4 Other Identified Uses and Concerns

2.4.1 Forestry Development

The Toboggan Creek Fan Sensitive Area is not presently included in any operational forestry plans. Forest harvesting on fans can appear to be quite easy because of the low gradient and easy valley bottom access (Wilford et al. 2002). Road building and harvesting on fans, however, can be problematic because of episodic floods, debris flows, and debris floods (Hungr et al. 2001, Wilford et al. 2002).

The sensitive area is unlikely to be targeted for traditional forest harvesting as the area mostly contains deciduous species. The two main forest cover polygons over the area have cottonwood as the leading species. If markets change however, and the demand for deciduous species increases there may be pressure to harvest in this area. The establishment of this sensitive area is intended to preclude forest harvesting because of the high biodiversity values.

2.4.2 Recreational Uses

There are two trails within the Toboggan Creek Fan Sensitive Area. The main trail goes between Horlings Road and Toboggan Creek Road and crosses the southern portion of the sensitive area. There is a branch of this trail that goes northwards, traversing the sensitive area and carrying on beyond the fan. Parts of these trails have been improved with bridges and short boardwalks. The trails are frequently used for walking, skiing, snowmobiling and ATV's.

While access to sensitive areas may be restricted, this restriction is intended for road access and forest harvesting. No recreational use restrictions are proposed for the sensitive area. Recreational activities to date have not had an impact on the functioning of the fan ecosystem. If major trail building efforts are proposed in the future the effects on the fan ecosystem may have to be considered during construction.

2.4.3 Range Tenures

The proposed sensitive area is within a high range potential area (LUP), and is covered by a range tenure held by Mr. Bob Storey of Coyote Cattle Co. A Range Use Plan is in effect for the tenured area, and qualifies as an Operational Plan. The relationship between this higher-level plan and Operational Plans is detailed in the *Forest Practices Code of BC Act*. The act states "An operational plan in effect at the time that a sensitive area and objectives are established in not affected by the establishment of the higher level plan, the operational plan continues to guide operations on the ground and does not have to be amended because

the higher level plan was established. However, after the higher level plan is established, the next operational plan or amendment prepared must be consistent with the higher level plan before the new operational plan can be approved". The guidelines on sensitive areas also give direction as to the phase-in, timing, operations affected by phase-in, and the involvement of agreement holders. Mr. Storey has indicated he is opposed to the establishment of a sensitive area over part of his grazing tenure area. The considerations for range management are detailed in Section 4.

2.4.4 Access

Concerns has been voiced by residents of the Glacier Gulch Road area that the establishment of a sensitive area could lead to improvements to or changes in the legal status of Toboggan Creek Road; a result they would not be in favour of. Direction in the Bulkley LRMP regarding this road states that the road remain in it's present state, subject to subsurface exploration and development. The Trout Creek/Kitseguecla LUP does not mention this road. As sensitive area objectives have to be consistent with higher-level plans, it is not possible for the sensitive area plan to change the direction given in the Bulkley LRMP regarding Toboggan Creek Road.

3 Relevance to Existing Management Plans

In the Bulkley LRMP, the Toboggan Creek Fan Sensitive Area is in the Hudson Bay Mountain planning unit, Glacier Gulch sub-unit 10.1, it is now in the Trout Creek/Kitseguecla Landscape Unit, due to boundary changes during the landscape unit planning process.

This establishment of this area as a sensitive area would be consistent with both the Bulkley LRMP and the Trout Creek/Kitseguecla Landscape Unit Plan (LUP). Management direction from the Bulkley LRMP that is relevant to this sensitive area designation is in Table 1.

Table 1: Management direction in the Hudson bay Mountain planning unit, Glacier Gulch sub-unit of the Bulkley LRMP relevant to the sensitive area.

Management Category	Specific Direction
Biodiversity	Rare ecosystems known to exist in this unit will be incorporated in the Ecosystem Network
Fish and Wildlife Habitat	Protect water source for fish hatcheries and Lake Kathlyn
Water Quality	Maintain water quality

There is also management direction in the more detailed Trout Creek/Kitseguecla LUP that is relevant to this proposal (Table 2). This table also shows how the designation of the Toboggan Creek Fan Sensitive Area will assist in meeting the direction given in that plan.

Table 2: Management direction in the Trout Creek/Kitseguecla Landscape Unit Plan relevant to the sensitive area, and how this proposal meets this direction.

Management Category	Specific Direction	Relevance to this Sensitive Area
Biodiversity - general	New initiatives such as sensitive areas will be accommodated by the Ecosystem Network to assist in maintaining biodiversity	This sensitive area is a new initiative that will complement the Ecosystem Network in maintaining biodiversity in the Landscape Unit. (see paragraph following table)

Table 2: Management direction in the Trout Creek/Kitseguecla Landscape Unit Plan relevant to the sensitive area, and how this proposal meets this direction.		
Management Category	**Specific Direction**	**Relevance to this Sensitive Area**
Biodiversity, objective 1.6: the maintenance of coniferous and deciduous diversity	Strategy 6: Do not assist conversion of natural deciduous stand to coniferous species	This initiative will assist in the maintenance of deciduous species in the area by restricting the harvesting of deciduous species in this area; the sensitive area has a large deciduous component.
Moose winter range, objective 2.3	Ensure forage is retained and available in identified moose winter range.	Area is within moose winter range and has a large deciduous component; this sensitive area will assist in retaining the deciduous species important for moose forage.
Moose winter range, objective 2.4	Provide for security, visual, thermal and snow interception cover within identified moose winter range	This sensitive area will assist in providing security and cover for moose in the area by retaining the present tree and shrub cover.
Fish habitat, objective 3.1	Retain structure within the riparian management zone to reduce the risk of windthrow to the reserve zone. Retain structure within the riparian management zone to provide shade and maintain natural channel and bank stability	This proposal would assist in meeting the fish habitat objectives by ensuring riparian areas in the sensitive area are not harvested, thus maintaining tree windfirmness, and natural channel and bank stability.
Special Management Zones (SMZ)	The area is within the Glacier Gulch SMZ2, because of the visual and water qualities in the area. Low impact harvesting is recommended.	By protecting the vegetation and hydrological processes on the fan, water quality in Toboggan and Glacier Gulch creeks will be maintained. (The area in not visible from Highway 37)
Landscape Riparian Corridor	Toboggan Creek has been designated a Landscape Riparian Corridor to maintain connectivity between the Bulkley Valley and Hudson Bay Mountain, and because of the high fisheries values of the creek.	The sensitive area is partially within this riparian corridor and its designation would strengthen this corridor. It is especially important to maintain the integrity of this fan because of the high fisheries values within and downstream of the sensitive area.

Although the area is partially within the Landscape Riparian Corridor portion of the Ecosystem Network established by the Bulkley LRMP, the boundaries of the Ecosystem Network are intended to be fluid and can be modified as new information becomes available (LRMP pg 44; Trout Creek/Kitseguecla LUP pg 3). Thus a specific area that warrants special protection cannot be guaranteed protection by inclusion in the present boundaries of the Ecosystem Network. The Sensitive Area designation is available to fulfill this role.

4 Objectives and Strategies

The objectives of the sensitive area are statements of desired future conditions of the area. As a higher level plan, they provide legally-binding direction for forest management and must be reflected in operational plans. The associated strategies describe recommended approaches to achieving the objectives.

Table 4: Objectives and strategies to achieve desired future conditions of the Toboggan Creek Fan Sensitive Area.	
Objectives	**Strategies**
Maintain the hydrological processes operating on the fan by both Toboggan and Glacier Gulch creeks.	• Avoid road building and forest harvesting within sensitive area • Allow improvements to existing recreational trails, provided they do no impact hydrological or successional processes. • Allow recreational activities to occur, provided they do not impact hydrological or successional processes.
Protect the large old cottonwood trees within the area from windthrow	• Avoid forest harvesting within the sensitive area
Protect the full range of natural plant communities in sensitive area and allow natural successional process to proceed	• Manage cattle grazing in the sensitive area to minimize long-term impacts to plant communities and successional processes, and prevent the establishment of exotic plant species. • Avoid forest harvesting within the sensitive area • Allow natural processes to occur including pests and diseases as long as they do not threaten adjacent commercial forests. If intervention is required, conduct operations to retain the structural diversity of the stand and the stands interior forest conditions. • As the sensitive area is near residential areas, forest fires will need to be controlled.

The sensitive area is covered by a range tenure as described in Section 2.4.3. These objectives and strategies will have little affect on the status quo of range management in the area, as tenure holder primarily grazes his cattle in the northeast portion of his tenure area and not in the sensitive area portion of his tenure (Range Use Plan 1998). However, he has indicated that he wishes to increase the number of cattle he grazes, and thus use the sensitive area for grazing. This plan does not exclude cattle from the sensitive area, but is intended to protect the natural plant communities and maintain successional processes. This could be done by restricting the clearing of native vegetation and the planting of exotic plant species. The Range Use Plan states that the present plant communities are desired in riparian areas and cattle use is discouraged in riparian areas. With two creeks running through the sensitive area, much of it would be considered riparian and see little cattle use. The next range use plan will need to reflect the objectives of this higher-level plan.

5 Implementation Strategy

All provisions of the higher-level plan take effect as of the date specified in the attached order. A statement of higher-level plan transition is therefore not required.

The sensitive area and its objectives will be reviewed in 10 years, as outlined in the Higher Level Plans: Policy and Procedures.

If changes are made to the Bulkley LRMP, while the sensitive area is still in effect, the objectives for the sensitive area will be reviewed to ensure they remain consistent with the revised LRMP.

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Appendix 1: Rationale for Establishing the Toboggan Creek Fan Sensitive Area

Background on Sensitive Areas

A sensitive area is defined by the Forest Practices Code as "small areas of land and water that have unique or locally significant forest resources that are frequently sensitive to resource development activities"

A rare ecosystem is defined in the Biodiversity Guidebook as "making up less than 2% of a landscape unit and is not common in adjacent landscape units"

Under the *Forest Practices Code of BC Act*, a regional director of the Ministry of Sustainable Resource Management (MSRM) is authorized to establish a sensitive area and objectives if he or she believes that the area should be treated differently from adjacent areas in order to manage or conserve the forest resources.

According to the Chief Forester's policy, a proposed sensitive area must also meet the following criteria in order to be established:

1) Maximum size of 1000 ha;
2) The circumstances associated with the management and conservation of the area must be special and not broadly present in the district; and
3) The resource must be unique or locally significant.

The sensitive area designation has not been previously used in the Bulkley TSA, but has been used once in the Kispiox TSA for biodiversity maintenance purposes, with a second proposal pending (Platz and Marsland 1998, Williston 2002). Sensitive areas are legally different than environmentally sensitive areas.

Bulkley LRMP, Biodiversity and Rarity

The Bulkley Land and Resource Management Plan (LRMP), states that: "the maintenance of biodiversity is an underlying objective of land and resource management at all levels". The designation of sensitive areas is one of the methods mentioned in the LRMP that could be used to maintain biodiversity within the LRMP area. Sensitive areas are intended to manage or conserve small areas of unique or locally significant forest resources. Development, such as timber harvesting and access may be restricted, but sensitive areas are not generally intended to preclude harvesting and other activities that are compatible with the values for which the sensitive area has been established.

Three factors should be considered in defining rare ecosystems: physical environment, biota, and site history. Distinctive characteristics in any of these factors can produce a rare ecosystem unit. In this case, the soil and hydrological characteristics of fans make them different from other landforms, and more likely to support vegetation types different from that on other landforms. Fans occur relatively frequently on the landscape in the Bulkley TSA, but never cover a large area. The combination of a landform with a different physical environment from surrounding areas that covers little area and the biota that grows on fans because of this physical environment make them likely candidates for supporting rare ecosystems.

Precisely because of their rarity, rare ecosystems are often not included in ecosystem classifications, and hence do not make it onto regional rare ecosystem lists. This problem

arises precisely because of the rarity of the ecosystem, necessitating flexibility when designing designation protocols.

The proposed Toboggan Creek Fan Sensitive Area covers 98 ha. The entire fan, which covers a much larger area, could not be included in the sensitive area because part of it is privately owned and a BC Hydro right-of-way dissects the area. The proposed sensitive area, however, does cover the most active and biologically important portion of the fan.

Area Description

Landform and Geology

The Toboggan Creek Fan Sensitive Area is located 10 km northwest of Smithers, at the base of Hudson Bay Mountain. The proposed Toboggan Creek Fan Sensitive Area is located on a portion of the fluvial fan formed by the combined action of Glacier Gulch and Toboggan creeks. Fans are conical deposits of sediments formed where streams emerge from the confines of a mountain (Bull 1977). Deposition of fans material can be the result of historic or active process, with active fans still having material deposited on them.

Much of the fan within the proposed sensitive area is still geomorphically active. A high-power stand-level event as defined by (Wilford et al. 2002), with material deposition and channel movement, occurred within the last 4 years on Toboggan Creek. The historical movements of the creeks across the fan can readily be discerned on aerial photographs by the numerous abandoned channels on the fan, and by the pattern of vegetation. The toe of the fan is constrained by morainal material and several knolls. Where the fan meets these drainage constraining features there are numerous beaver ponds and swampy areas fed by seepage through the coarse fluvial material of the fan.

Toboggan Creek is responsible for depositing most of the material in the area covered by the sensitive area; however, both of these creeks flow through it. Glacier Gulch Creek enters the sensitive area as a low gradient multi-channelled stream through a narrow neck of the fan that connects the Glacier Gulch Creek and Toboggan Creek portions of the fan. Toboggan Creek enters the sensitive area as a higher gradient creek at the apex of the Toboggan Creek portion of the fan. The creeks though close to each other do not meet in the sensitive area; Glacier Gulch Creek first enters Toboggan Lake before joining Toboggan Creek just downstream of the Toboggan Lake outlet.

Although fans are relatively common in the Bulkley TSA, they only cover about 2% of the landbase. Of the total fan area in the TSA approximately 50% has been impacted in some way by development (M. Sakals *pers. comm*.). These developments include forest harvesting, land clearance, road building, gravel quarries and cattle grazing. These impacts are already evident on the Glacier Gulch/Toboggan fan. A BC Hydro right-of-way and the Toboggan Creek Road cross the fan, a large portion of the fan that is privately owned was logged in the early 1990's, and a grazing lease covers part of the fan. This proposal would cover about 1% of the total fan area in the Bulkley TSA (M. Sakals *pers. comm*.).

Ecological Characteristics

The vegetation of the fan is obviously distinct from that on the surrounding morainal material. These differences are caused by differences in soil and hydrology between the two sites. The fluvial soils of the fan are coarse and allow relatively free movement of water through them. Having two creeks flowing through the fan supplies much water to the soils. This combination of coarse fluvial soils and an abundance of seepage water produce rich growing conditions. These conditions are reflected in the vegetation, which has many

indicators of rich conditions, including devil's club, cottonwood, cow parsnip, and lady fern (Beaudry *et al*. 1990).

The history of deposition events on fans often results in a diverse mosaic of plant communities and forest types. These communities will at various stages of succession depending on a number of factors, including: the time since the event that started the successional process, substrate type, site hydrology and the plant community present before the disturbance event. This diversity of successional stages is not usually found in such a small area dominated by other disturbance types such as fire.

Vegetation

The proposed sensitive area is in the SBSdk (Dry Cool subzone, of the Sub-Boreal Spruce zone) biogeoclimatic zone (Banner et al. 1993). The area immediately west (uphill) of the fan is in the ICHmc1 (Moist Cold subzone, Nass variant, of the Interior-Cedar-Hemlock zone). The proposed sensitive area contains a mix of ecological communities related to the fluvial landform (Table 1). Like Trowbridge (2006), I found it difficult to find appropriate ecological communities descriptions for all sites within the site series described SBSdk subzone by Banner *et al.* (1993) and the wetlands described by MacKenzie and Moran (2004). Thus the Spruce – Devil's club – Lady fern was used from the ICHmc2/05. Also, I describe a Thimbleberry – Cow parsnip community that is found on a gently sloping fluvial fan landform similar to that which Haeussler (1998) describes, that contain what she called fluvial meadow and wetlands complexes.

Table 1. Ecological communities on the Toboggan Creek Fan

Map Code	Site Association	Ecological Community Name	Site Description	Moisture Regime	Nutrient Regime	Area (ha)
CS	Fm03	Cottonwood – Subalpine fir – Devil's club	This is a cottonwood-dominated community covers a large portion of the fan. Differing densities of conifers present in the canopy or understory. Usually has a dense shrub layer dominated by devil's club, with red-osier dogwood, and highbush cranberry. These stands are regionally unique and rare, and have been recommended for Blue-listing (S. Haeussler in Trowbridge 2006)	5 to 6+	D to E	39.0
MP	Ws02	Mountain alder – Pink spirea – Sitka sedge	This is a swamp wetland community that occurs at the toe of the fan where there is abundant surface seepage. There is a mountain alder canopy over a spirea sedge understory. Beaver dams are frequent in parts of this ecosystem.	6+ to 7	C to D	12.3
SD	ICHmc2/05	Spruce – Devil's club – Lady fern	This community occurs along a braided portion of Glacier Gulch Creek. Stands have complex structure, are spruce dominated but also contain sub-alpine fir and cottonwood. Devil's club, lady fern, oak fern and horsetail are present.	6- to 6+	D to E-	6.8
SH	SBSdk/07	Spruce – Horsetail	This community occurs near the toe of the fan and has significant near surface seepage. There is abundant horsetail, under a spruce dominated canopy. Well developed stands have been recommended for Red-listing (Haeussler 1998).	5 to 7	B to C	8.7

ST	SBSdk/06	Spruce – Twinberry – Coltsfoot	This community covers a significant part of the better-drained portions of the fan. Occurrences are mid-seral so are dominated by deciduous species including birch, cottonwood and aspen, with some younger spruce. The stands likely developed after fire. The understory is dominated by thimbleberry, with some snowberry, black twinberry and devil's club.	4+ to 5+	C- to D+	27.4
TC	00	Thimbleberry – Cow parsnip	This undescribed community is found on moist fluvial soils that have a sandy capping over coarse gravel. It contains thickets and meadows with scattered trembling aspen. Ungrazed valley bottom meadows of this type and similar are uncommon in the Bulkley Valley.	4+ to 5+	C to D	2.4
WB	Wm01	Beaked sedge – Water sedge	This sedge marsh wetland community occurs were the fluvial deposits of Toboggan Fan abut morainal deposits.	7 to 8	C to D	0.8
OW	00	Open water	Patches of open water typically associated with mountain alder swamps and beaver ponding.			0.7

Two of the ecological communities have been recommended for listing by S. Haeussler, the Spruce – Horsetail for the Red-list and the Cottonwood – Subalpine fir – Devil's club for the Blue-list (Haeussler 1998, Trowbridge 2006). In addition, fluvial meadows such as the Thimbleberry – Cow parsnip community are uncommon in the Bulkley Valley, especially ungrazed occurrences. These meadows are often threatened by introduced non-native species, grazing and excessive recreational use (Haeussler 1998). The Toboggan Creek fan is mostly ungrazed and has seen no other major disturbances to date, so is valuable for this reason.

While some of these ecological communities are not be rare on their own, the mixture of communities found on the Toboggan Creek Fan is rare. These communities occur in an evolving complex due to the active nature of the fan. This makes it important to maintain all the parts of the system as they function as a unit.

In addition, the cottonwood trees in the core area and the coniferous trees below the cottonwood canopy have a high diversity of arboreal lichens. This can be attributed to two factors: 1) the drip zone effect with the cottonwood canopy providing leached nutrients to the epiphytes in the sub-canopy, 2) the meeting of coastal and interior floras combining to produce high local biodiversity.

Ecological Continuity

Ecological continuity has been shown to be very important in maintaining taxonomic groups such as lichens, bryophytes, fungi and arthropods with restricted dispersal capabilities and very specialized habitat requirements. Evidence for ecological continuity existing in this stand is found by the presence of old dead and down cottonwoods, the present large trees, and the young regenerating stands. The uniform carpet of devil's club, an indicator of older forests, and the exceptional development of epiphytic lichens and bryophytes provide further evidence of this continuity. In the interior generally, and in valley-bottom Sub-Boreal Spruce more specifically, sites with this degree of ecological continuity are extremely rare because of the regular occurrence of fire and other catastrophic disturbances and widespread human intervention. Stands with a high degree of

ecological continuity are very important for the maintenance of biological diversity and are much more at risk generally than old-growth stands.

There are currently no other known large cottonwood ecosystems in the Bulkley TSA with this kind of ecological continuity. All other riparian cottonwood stands in the Bulkley TSA are either young and more-or-less even-aged, or have suffered heavy anthropogenic disturbance.

Conclusion

In order to maintain the physical and ecological processes that produced the diversity of vegetation types now present, it is important to conserve the landform as a functional unit. While this will not entirely possible on this fan due to private land holdings and existing developments, the proposed boundaries protect these processes as much as possible. The boundaries should also allow for a shifting mosaic of successional stages to be present over time and help provide ecological continuity. The proposed boundaries will ensure that the main area of interest, the large cottonwood stand, is buffered to prevent disturbances caused by potential developments, such as windthrow and microclimate changes.

This area meets the conditions necessary to qualify as a sensitive area, because:

1) It covers less than 2% of the area in the landscape unit.
2) The ecosystems present in the proposed area are unique and rare in the forest district.
3) Different treatment from adjacent areas is needed conserve these forest resources.

Proposal History and Consultation

The special characteristics of this fan have been recognized by a number of biologists and ecologists in the Smithers area. The area has been used as a field trip site for botanical gatherings such as Botany BC, an annual gathering of botanists from around the province. After discussion with local ecologists, Adrian de Groot decided to propose that a sensitive area be established to protect the biological features of the fan.

This initial proposal to establish a sensitive area was discussed with Jane Lloyd-Smith, Operations Manager, Bulkley Forest District, by Adrian de Groot in March 2002. The authority to establish sensitive areas at that time rested with the District Manager. This authority was shifted to the Ministry of Sustainable Resource Management (MSRM) in April 2002. A draft of the proposal was then forwarded to the Kevin Kriese, Regional Director of MSRM in June 2002.

This initial contact led to James Cuell of MSRM contacting Adrian de Groot, and asking him to forward the proposal to the Bulkley Community Resources Board (CRB) for their comment. The CRB gave their support in principle, but wanted a number of issues addressed before they would fully endorse the proposal. Subsequently, a contract was let to Drosera Ecological Consulting (Adrian de Groot) to formally write up a proposal, contact stakeholders and write a management plan. The document Mr. de Groot wrote would address issues the CRB raised about the proposal.

Consultation for this plan was carried out with numerous organizations and individuals. The Community Resources Board, whose role is to monitor the implementation of the Bulkley LRMP, supports the establishment of the Sensitive Area. A residents group from Glacier Gulch Road have written a letter supporting the proposal. Numerous local

biologists and ecologists have also voiced support for the proposal. Peter Lund, a local resident has written a letter in opposition to the proposal. Bob Storey, the grazing tenure holder, has indicated that he is opposed to the proposal, as he feels there is little threat of logging occurring and he does not want further restrictions placed on his operations.

Appendix 2: Plant Species List

Toboggan Creek Sensitive Area Species List	
Latin name	English name
Trees	
Abies Lasiocarpa	Sub-alpine fir
Betula papyrifera	Paper birch
Picea glauca x engelmannii	Engelmann x white spruce
Pinus contorta	Lodgepole pine
Populus tremuloides	Trembling aspen
Populus balsamifera ssp *trichocarpa*	Cottonwood
Tsuga heterophylla	Western hemlock
Shrubs	
Acer glabrum var. *douglasii*	Douglas maple
Alnus incana	Mountain alder
Alnus viridis ssp. *crispa (A. crispa)*	Green alder
Alnus viridis ssp. *sinuata (A.sinuata)*	Sitka alder
Cornus stolonifera	Red-osier dogwood
Lonicera involucrata	Black twinberry
Oplopanax horridus	Devil's-club
Ribes lacustre	Black gooseberry
Ribes laxiflorum	Trailing black current
Rosa acicularis	Prickly rose
(Rubus idaeus)	Red raspberry
Rubus parviflorus	Thimbleberry
Rubus pubescens	Dwarf red blackberry
Salix drummondiana	Drummond's willow
Salix scouleriana	Scouler's willow
Sambucus racemosa ssp. *pubens*	Elderberry
Shepherdia canadensis	Soopolallie or soapberry
Spiraea douglasii	Hardhack
Symphoricarpos albus	Snowberry
Viburnum edule	Highbush cranberry
Herbs	
Angelica genuflexa	Kneeling angelica
Aruncus dioicus	goat's-beard
Actaea rubra	Baneberry
Aralia nudicaulis	Sarsaparilla
Aster ciliolatus	Fringed aster

Aster modestus	Great northern aster
Calamagrostis canadensis	Bluejoint
Carex canescens	White sedge
Carex utriculata (C.rostrata)	Beaked sedge
Cerastium ?vulgatum	Chickweed
Cinna latifolia	Nodding woodreed
Circaea alpina	Enchanter's-nightshade
Clintonia uniflora	Queens cup
Corallorhiza trifida	Yellow coralroot
Cornus canadensis	Bunchberry
Elymus glaucus	Blue wildrye
Epilobium ciliatum (E. watsonii)	Purple-leaved willowherb
Equisetum arvense	Common horsetail
Galium triflorum	Sweet-scented bedstraw
Geum macrophyllum	Large-leaved avens
Heracleum maximum (H. lanatum)	Cow-parsnip
Lathyrus nevadensis	Purple peavine
Maianthemum (Smilacina) racemosum	False Solomon's-seal
Maianthemum(Smilacina) stellatum	Star-flowered false Solomon's-seal
Moehringia lateriflora (Arenaria lateriflora)	Blunt-leaved sandwort
Moneses uniflora	Single delight
Orthilia secunda	One-sided wintergreen
Osmorhiza chilensis	Mountain sweet cicely
Petasites palmatus	Sweet coltsfoot
Plantago major	Common plantain
Poa palustris	Fowl bluegrass
Pyrola asarifolia	Pink wintergreen
Saxifraga ferruginea	Alaska saxifrage
Streptopus amplexifolius	Clasping twistedstalk
Taraxacum officinale	Common dandelion
Tellmia grandiflora	Tall fringecup
Thalictrum occidentale	Meadow rue
?Tiarella trifoliata var. *laciniata (T. laciniata)*	Cut-leaved foamflower
Tiarella trifoliata var. *trifoliata (T. trifoliata)*	Three-leaved foamflower
Tiarella trifoliata var. *uniflora (T. uniflora)*	One-leaved foamflower
Trifolium repens	White clover
Trisetum cernuum	Nodding trisetum
Urtica dioica	Stinging nettle

Veronica serpyllifolia	Thyme-leaved speedwell
Viola glabella	Stream violet
Viola canadensis	Canada violet
Ferns and fern allies	
Athyrium filix-femina ssp. *cyclosorum*	Lady fern
Dryopteris expansa	Spiny wood fern
Equisetum arvense	Common horsetail
Equisetum pratense	Meadow horsetail
Equisetum sylvaticum	Wood horsetail
Gymnocarpium dryopteris	Oak fern
Lycopodium annotinum	Stiff club-moss
Thelypteris phaegopteris	Moustache fern
Mosses	
Antitrichia curtipendula	Hanging moss
Atrichum selwynii	Crane's-bill moss
Aulocomium androgynum	Lover's moss
Brachythecium asperimum	
Ceratodon purpureus	Fire moss
Dicranum fuscescens	Curly heron's bill moss
Dicranum scoparium	Broom moss
Dicranum tauricum	
Hylocomnium splendens	Step moss
Hypnum subimponens?	Curly hypnum
Orthotrichum	
Plagiomnium venustum	Magnificent moss
Pleurozium schreberi	Red-stemmed feathermoss
Pohlia cruda	
Polytrichum juniperinum	Juniper haircap moss
Ptilium crista-castrensis	Knight's plume
Rhytidiadelphus triquetrus	Electrified cat's-tail moss
Tetraphis pellucida	
Lichens (mainly epiphytes)	
Alectoria sarmentosa	
Amandinea punctata	
Bryoria spp.	
Caloplaca cerina	
Cetraria chlorophylla	
Cetraria pallidula	

Chaenotheca chrysocephala	
Chaenotheca furfuracaea	
Chaenotheca trichialis	
Cyphelium inquinans	
Evernia prunastri	
Hypogymia physodes	
Hypogymia rugosa	Rare or infrequent in BC
Hypogymnia occidentalis	
Hypogymnia tubulosa	
Leptogium saturninum	
Lobaria hallii	
Lobaria pulmonaria	
Melanelia subaurifera	
Parmelia hyperopta	
Parmelia sulcata	
Parmeliopsis ambigua	
Peltigera horizontalis	
Peltigera membranacaea	
Platismatia glauca	
Ramalina thrausta	
Sclerophora coniophaea	
Vulpicida canadense	
Vulpicida pinastri	
Liverworts	
Cephalozia lunulifolia	
Lophozia guttata	

Glossary

Alluvial/Fluvial Fan: a sloping, mass of sediment deposited by a stream where it emerges from upland area onto a plain.

Environmentally Sensitive Area: an area identified during a forest inventory that is sensitive to disturbance and/or is significantly valuable for fisheries, wildlife, water, and recreation resources.

Higher Level Plan: Defined in the *Forest Practices Code of British Columbia Act* as an objective for a:

(a) resource management zone
(b) landscape unit or sensitive area
(c) recreation site, recreation trail or interpretive forest site

Landscape Unit: A planning area established under the *Forest Practices Code of British Columbia* Act by the District Manager. A landscape unit is typically up to 100,000 ha in size, and is based on topographic or geographic features such as a watershed or a series of watersheds.

Rare Ecosystem: an ecosystem (site series or surrogate) that makes up less than 2% of a landscape unit and is not common in adjacent landscape units.

Sensitive Area: a small area of land or water established under the *Forest Practices Code of British Columbia Act* by the district manager to manage or conserve unique or locally significant forest resources.

Site Series: sites capable of producing the same late seral or climax plant communities within a biogeoclimatic subzone or variant.