

PROVINCE OF BRITISH COLUMBIA BC PARKS

Wildlife/Dangerous Tree Assessment Report

For

Tribune Bay Campground Expansion



Assessments completed August 17, 2023

Assessment and Report Prepared by
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Wildlife Dangerous Tree Risk Assessment of Tribune Bay Campground Expansion

Assessment Dates: Dec. 14-16, 2022; Jan. 3-5, 2023; August 17, 2023.

Field Assessment by: Dean McGeough, RPF (Wildlife/Dangerous Tree Parks Assessor #P004)

Assignment: At the request of Jessica Lines and Gina Bugslag of BC Parks, Integra was commissioned to assess the overall condition and hazard potential of trees in proximity to version 2 of the planned campground developments within the Shields Road property (Property) and a portion of the Tribune Bay Park (Park) which I will call the Area of Interest (figure 1). Following the assessment, Integra was asked to make recommendations for hazard reduction that would enable BC Parks to reduce tree hazard risks to workers developing the planned campground. In addition, Integra was requested to recommend strategies that will promote a thriving and diverse forest.

Site Description: The area of assessment is the Area of Interest bounded by Shields Road on Hornby Island, British Columbia. A revision to the original plan for the Area of Interest was proposed to create a campground within a part of the Property and within a portion of the existing Park south of the walking trail which runs parallel to road into the day-use area. The plan is conceptual at this time but could have 20 walk-in campsites in the Park, and 32 walk-in campsites in the Property, as well as 4 service stations and a group parking area.

The Area of Interest has a second-growth stand (estimated 70 years) primarily composed of grand fir (Bg), Douglas-fir (Fd), western redcedar (Cw), red alder (Dr), and a varying presence of bigleaf maple (Mb), cottonwood (Ac), bitter cherry (Vb), willow (W), western hemlock (Hw) and sitka spruce (Ss). Additionally, within this area are scattered veteran Fd and Cw trees.

DANGEROUS TREE ASSESSMENT

A Dangerous Tree, according to Worker's Compensation Board Occupational Health and Safety regulations section 26.1 is any tree that is hazardous to people or facilities because of:

- Location or lean,
- Physical damage,
- Overhead hazards,
- Deterioration of limbs, stem or root system, and
- A combination of the above.

There are **5 steps** required to determine tree danger rating:

1. **Determine the level of ground disturbance (LOD)** (refer to Tables 1, 1A)
2. **Conduct a site assessment overview** (refer to Table 2)
3. **Conduct tree assessments** (refer to Tables 3, 4, 4A and 5)
4. **Make the appropriate safety decision** (Safe or Dangerous)
5. **Provide documentation and communicate safety procedures.**

LEVEL OF DISTURBANCE

According to the Wildlife Dangerous Tree Assessment Course (WDTAC) for Parks and Recreation sites, the hazard criterion of a dangerous tree depends upon the type of activity and recreation activity and is called the Level of Disturbance (LOD). For site developments (felling and clearing) and eventual campsite use, assessments were performed to LOD3 and using the tree hazard table 4a (appended for reference) to

inspect the forest for suspect trees if they could impact the anticipated area of development or adjacent private lands to the west of the Property. The hazard criteria within table 4a are applicable to managing trees to sustained windspeeds of up to 65km/hour, above which there is a risk of tree failure, and a work shutdown would need to be implemented.

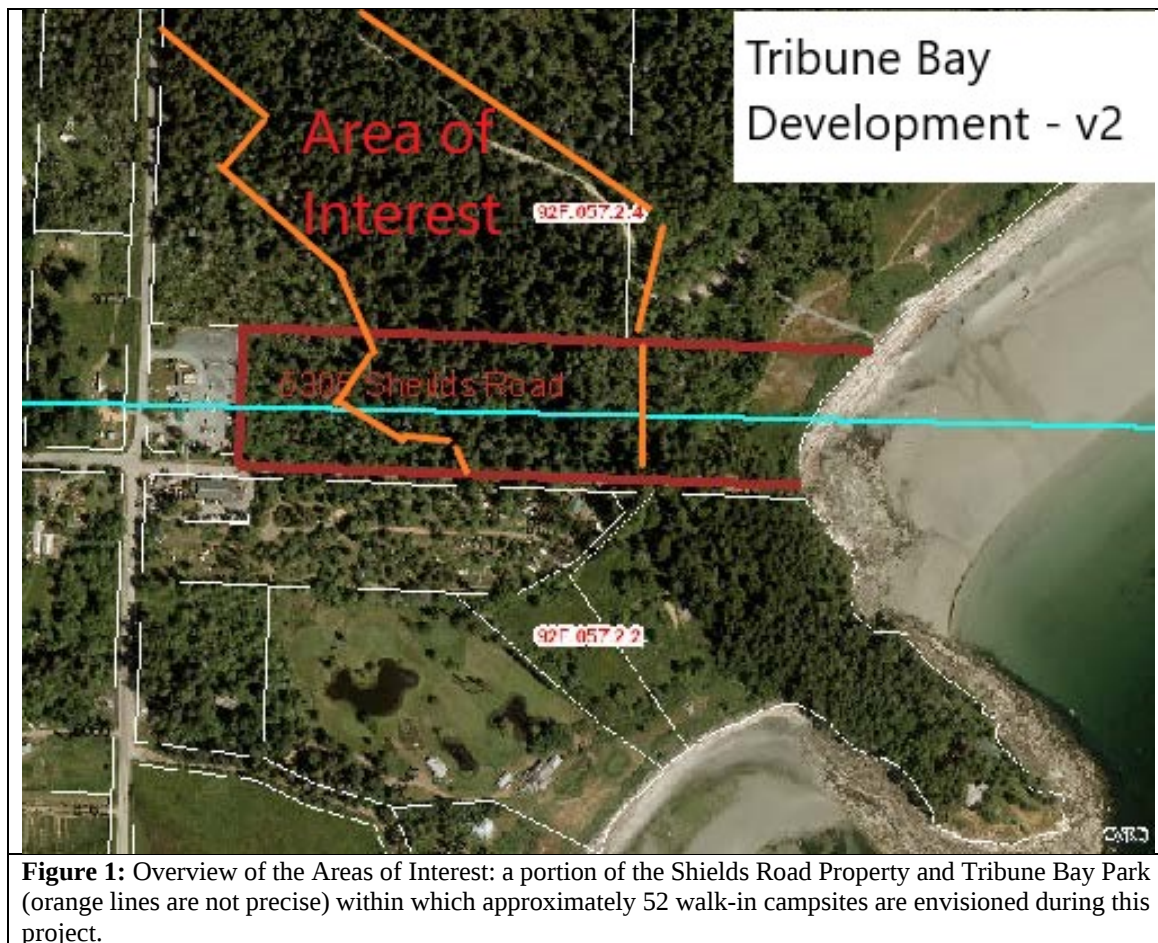


Figure 1: Overview of the Areas of Interest: a portion of the Shields Road Property and Tribune Bay Park (orange lines are not precise) within which approximately 52 walk-in campsites are envisioned during this project.

SITE ASSESSMENT OBSERVATIONS

Tree Risk Assessor Dean McGeough walked the revised Area of Interest to identify the nature of tree health, wildlife habitat values and to review recent failures of trees. Active wildlife use is evident, with deer trails throughout the Area of Interest, and signs of primary cavity excavators (woodpeckers and sapsuckers) nesting, roosting and foraging.

The prominent concerns were the overall decadence of most Dr trees, the deterioration of several Bg trees and the high-water table creating a risk for future tree failures during windstorms in the wet seasons. The following observations and discoveries were made during this step of the tree assessment process:

- Restricted rooting depths (40cm) and a ditch line traversing the Property are critical site factors that will pose risks during high-water table and seasonal flooding periods. The Area of Interest is exposed to winter storms from the East to Southeast and recent whole and partial tree failures of Bg, Fd and Dr trees have occurred in subdued and flooded microsites. There are numerous Cw trees that have been partially uprooted in the past (they have self-corrected or are lodged onto support trees).
- Primary cavity excavator (PCE) woodpeckers are foraging on the dead and dying Bg and Dr trees, and cavity nests of varying sizes were primarily found on Bg trees >40cm, but also on a few Dr trees. One Ac tree (#134) and a few Bg trees (e.g., #110, #337) have cavities that show signs of

previous use. Pileated woodpeckers are foraging on Cw, Bg and Dr trees, and suspected nest or roosting sites were found on Bg trees.

- English ivy is an invasive plant that is spreading and climbing onto trees within the Property.
- Windstorms will continue to cause branch loss, especially to Fd, Bg, Mb and Dr trees, creating the risk of overhead hazards in the aftermath of storms that could occur during the campground construction and development.
- Basal resinosis is an important indicator of pending health deterioration. Veteran live Fd trees exhibiting resinosis and exhibiting a swollen (buttressed) stem were found to have basal decay associated with *Phaeolus schweinitzii* when probed.
- Sickly Bg trees (top dieback) are likely to develop weak tops over the next 1-2 years. These symptoms are likely a combination of the unseasonal droughts and excessively wet winters experienced over the past decade, exacerbated by a minor incidence of armillaria root disease.
- Stem fungi infection observed on dead conifers was by *Fomitopsis pinicola*, *Ganoderma oregonense*, *Gleophyllum separium*, or *Cryptoporus volvatus*. Smaller diameter trees (<50cm) show a rapid deterioration of the sapwood, making such trees at risk of early top and limb shedding soon after the appearance of these fruiting bodies.
- Brittle cinder conk (*Kretzschmaria deusta*) was found on large, mature Mb trees that are in advanced stages of decline and/or had failure of twinned stems.
- Cw trees with historic top dieback have dead spike tops. However, several trees with old stem wounds have varying levels of internal stem decay. Cw trees growing on old, downed logs are also at risk of windthrow. At least two (2) Cw trees were found with foraging damage by pileated woodpeckers.
- Mature Dr trees are being attacked by alder bark beetle (*Alniphagus aspericollis*) and many show signs of a bleeding canker (*Phytophthora siskiyousensis*) and are dying consequently and failing soon after death. Several Dr stems have been damaged over their years and show advanced internal decay at these wound sites and have been collapsing or having mid-stem breakage. A few of the previously painted Dr trees failed since the previous assessment in January 2023, further supporting the need to remove the dead and dying Dr stems prior to developments.

TREE ASSESSMENT RESULTS

Trees within the Area of Interest were assessed from the perspective of ‘total chance’ development within the assessment area because the ‘plan’ is still in its conceptual phase and could change. Trees were viewed from the perspective that developments were likely to occur and if a tree was dangerous, it was marked for removal, or if the tree had high wildlife habitat value, it was assessed for retention and a mitigation strategy was recommended. Trees previously assessed but outside the Area of Interest were left field marked and retained in the tally in case of future changes to the design.

Tree assessment was conducted using the principles of tree risk assessment, namely visual inspection of hazards, the use of binoculars to review upper stem defects and a hammer to acoustically check basal wood soundness. Where these checks were inconclusive and the tree is of high retention value, an increment borer and/or drill were used to probe the internal condition of base or roots.

There were numerous trees which were obviously dangerous to campground development because of advanced stem and/or root deterioration issues and these were simply field identified at chest level with at least one (1) blue paint dot. These marked trees were tallied by species and size class to guide future contractors during the procurement of services process. Trees which were deemed to have high retention value were field identified with a numbered aluminum tag nailed to the tree at chest height, and a yellow/black striped flag tied to the tag. Information about the trees and the recommended mitigation strategies were documented (appended) and the approximate location of tagged trees shown on the site map. It is important to note that trees previously assessed in the first version of the plan had been painted with orange dots and if believed to be part of the new plan (version 2), then these trees were over-painted with blue paint dots.

Pre-construction Tree Mitigation

At this planning stage for this Area of Interest there was one tree (343A) which was snapped and insecurely lodged beside the trail within the Park. A hazard alert was sent to BC Parks to have this tree removed. Otherwise, there are fifty-one (51) trees tagged for mitigation (table 1, figure 2), including the priority mitigation of tree #343A noted above. Fifteen (15) safe trees were tagged for mitigation treatment because of their eventual deterioration, and thirty-six (36) trees are dangerous because of hazardous defects. Five (5) tagged trees (#114, 116, 138, 139 and 1122) have No Work Zone flagging established on-site to ensure site workers stay out of the hazard area for these trees because of their loose limbs or weak top.

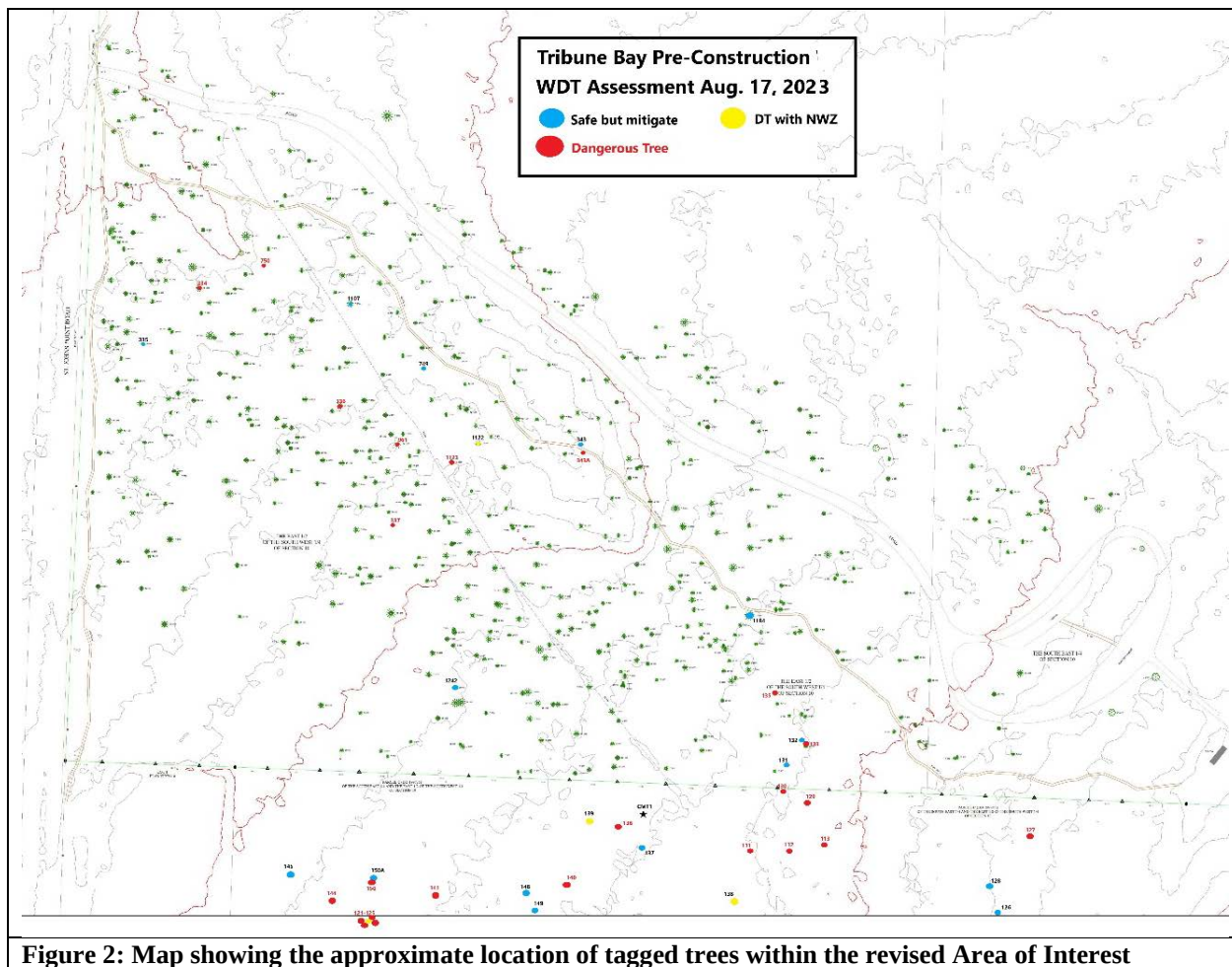
Species	# Dangerous	# Safe	Total #
Fd	8	2	10
Bg	23	11	34
Dr	0	1	1
Cw	4	1	5
Ac	1	0	1
Subtotal	36	15	51

Table 2: Species summary of tagged trees where mitigation action is recommended.

In addition to the tagged trees, there are three hundred and forty-three (343) trees which were painted for mitigation prior to the campground development. Of these, 288 are dead trees and 44 are living trees; but all trees have hazardous conditions making them dangerous for planned site works. These tallies are appended for more information by size classes but are briefly summarized in table 3, revealing that in total, 63.8% of these trees are alder (Dr) and 23% are grand fir (Bg).

Species	Dead	Live	Total	% of Total
Dr	191	28	219	63.8%
Bg	71	8	79	23.0%
Fd	14	3	17	5.0%
Mb	3	3	6	1.7%
Hw	1	1	2	0.7%
Cw	19	1	20	5.8%
Subtotal	299	44	343	100%

Table 3: Summary of paint-marked trees to be removed prior to site construction.



Site and Tree Mitigation Strategies

The subdued topography, shallow rooting depths and soil saturation conditions make this Area of Interest prone to wind-induced failures during wet seasons. Therefore, if a storm warning advisory is issued by Environment Canada or storms occur at this site with sustained wind speeds above 65km/hour, it is a prudent action to conduct a site visit following a significant storm event to ascertain and document the nature of tree disturbance and failures (if there was damage). If a tree partially fails (e.g., tipped into a support tree, or leaning with root plate shift), then the worksites in proximity of the affected campsite(s) would be closed until a mitigation plan can be completed and the hazards were controlled.

Trees which show a significant decline need to be managed in a manner that balances habitat management while ensuring the safety to workers and visitors. Interventions should be planned in accordance with the historic rates of deterioration and wildlife habitat use. For example, larger diameter (>50cm) dead trees generally deteriorate slower than small trees, and they have higher wildlife habitat value (there are always exceptions to this generalization) so full removal upon discovery is an acceptable management strategy for the smaller trees (<50cm). Large trees (>70cm) and veteran Fd trees are less common at this site and will generally persist longer than smaller trees, thereby making these trees good candidates for promoting wildlife habitat. At this site, trees <50cm should be felled if targeted for hazard mitigation, trees 50-70cm will make good interim habitat trees if topped because topping will lessen the visual impact compared to full tree removals, and trees larger than 70cm should be prioritized for upper stem modification for wildlife habitat if safe to undertake. The ideal candidates to modify for habitat are those trees with little or no lean and are located more than 5m from a planned camping site. Trees too close to a campsite may get disturbed by the visitors (chopped or roped) and require premature removal before wildlife use occurs. Candidate trees to modify to create wildlife habitat were tagged and documented.

Veteran Fd trees should be prioritized for protection and hazard modifications because of their minimal presence within the Area of Interest. When hazards need to be managed, the ideal treatment would be crown reduction pruning to manage crown height and weight. Temporary No Work Zones (NWZ) have been flagged in yellow around trees #114, #116, #138, #139 and #1122 because of hazardous hanging, large limbs or weak top. Once these hazards are managed, these NWZ's can be dismantled.

Maple trees will coppice when cut, so leaving a high stump that coppice will provide the benefit of on-going visual screening amongst the Campground and offer a brilliant display of colour in the autumn. Alder trees are impacted by the bark beetle and bleeding canker and have a rapid rate of deterioration once infected or die, and thus full tree removal is a priority mitigation strategy for this species. A cottonwood tree (#134) has high wildlife habitat value and leans away from the planned campsite developments. If this remains the plan, then this tree can be retained as long as there are no trails or vegetation removals that would bring the public within proximity to this tree.

Ground excavations should be kept out of the canopy drip-line of residual trees to avoid damage to the root plate. For veteran trees and trees growing on nurse log/stumps, it is increasingly important to avoid root plate disturbances and avoid disturbing the nurse log. If needed, flag out the "no excavation" areas prior to the construction works.

Soil compaction prevention measures are needed during site development, especially where there is standing water as evidenced by the presence of sedges and rushes. Using felled trees for puncheon and weight displacement is advisable. Drainage measures are recommended once the trails and campsite pads are constructed to maintain or improve drainage flows and to avoid microsite ponding. Minimize brush removal between pads to afford visual screening cover, promote song-bird habitat and deer forage, and to deter visitors from venturing "offsite" and trampling the flora and disturbing amphibian habitat.

Site development works should be undertaken outside the nesting season. Identified or discovered pileated woodpecker nest trees are federally protected year-round under the Migratory Birds Regulations (2022). These nest trees will need to be protected and campsite development excluded from their associated hazard zone, which would be the length of top above the lowest nest cavity +1metre times 1.5, in a 360° circle around the tree. A nest tree reconnaissance survey should be conducted prior to the site construction works in the autumn 2023, and any pileated nesting trees will need to be protected using the WDTAC process.

For each tagged tree, there are recommended mitigation strategy codes with recommended management actions. The following guidance should be implemented in mitigating the hazards:

- BT Bucket truck accessible tree. Reduce the tree to a designated residual height (e.g., 3m); or where pruning is prescribed, then prune out dead or broken limbs.
- CT Climb and top the tree to remove the identified hazard, or to reduce the tree's residual height to achieve a smaller hazard zone. Reduce in segments or make a single cut are acceptable strategies. Longer length logs are a preference for promoting coarse woody debris function. Flat topping as a finishing cut is acceptable.
- CTW Climb and create a wildlife tree stub at the suggested height, if safe to do so. This can be achieved by reduction cuts or single cut. Once cut, then create a jagged top and bore twice into the stem's centre within 3m of the top to encourage heart rot, and blaze cut to remove bark at the boring hole to attract the attention of cavity excavators.
- CTR Climb and top reduce, with the goal to keep the tree alive. The target height for topping is a recommended goal and the top cut finished as a flat cut with no live limbs within 20cm of the cut top. It is acceptable to remove dead limbs during the climb through the crown but minimize live limb cutting to <10% removal to maximize the chance the tree remains alive following treatment.
- NWZ A No Work Zone was flagged to protect workers from overhead hazards. Where a tree was recommended for 'modification' and 'remove target', then the tree needs a NWZ established (remove target) as a temporary measure until the modification treatment is completed.

- **Avoid Devel** This is for two (2) trees (#144, #134) which can be protected if development is kept away from these trees. Otherwise, the trees would need alternative mitigation. Cw culturally modified trees (CMT) will also need avoidance measures.

Promote Stand Resilience

The Area of Interest has a significantly large number of decadent Dr and Bg trees. In part, a result of mature age and intense soil moisture stresses, but also from stem damages inflicted to trees during windthrow or following dead tree fall-down. There are numerous tree species which are better adapted to these site conditions. During the development of the campground, BC Parks should consider planting Cw, Ss, Ac, Mb and Willow in cleared wet areas (areas with sedges and rushes) to replenish the removal of dead or decadent trees and to build a windfirm forested stand which would also be aesthetically appealing to visitors and provide shade during the hot summers. In drier microsites (salal and salmonberry ground cover), plant a mix of Fd, Cw and Bg seedlings on raised microsites.

Ideally, planting should be conducted in the early spring (March) or in the late summer (September) at 5m spacing from one another and 3m from the dripline of established trees and within 2m of the constructed campsites. The seedlings should be large container stock 2-3 years old, grown in 1-gallon pots to provide a robust and tall seedling that can outgrow competition from salmonberry and other ground vegetation species. These tall seedlings (>50cm height) should be supported by 1-2 wooden stakes with twine to reduce the chance that visitors might unknowingly trample the seedlings (remove the stakes after the trees are well established). Additionally, consider installing deer browse protectors on Fd and Cw seedlings. Note that Willow and Ac can be regenerated using cuttings (minimum 50cm length and 2cm diam) taken during the dormant season from healthy trees and inserted vertically and approximately 50% of their length into the ground.

Trees infected by root disease pose a risk of infection to nearby host trees. To promote stand health, assessors should continue to monitor trees showing visual symptoms of infection and then target tree removal during the hazard abatement process. Fortunately, the root diseases identified are presently affecting only a small cluster of host trees. For now, the strategy recommended is to yearly assess trees with early onset of infection symptoms. If there is a noticeable acceleration to tree decline and risk of failure, then interventions can be planned at that time.

Manage Invasive Plants

An invasive plant is any non-native plant species that has the potential to pose undesirable or detrimental impacts on humans, animals or ecosystems. Invasive plants have the capacity to establish quickly and easily, especially on disturbed sites, and can cause widespread negative social and environmental impacts¹. Invasive plant species often threaten biological diversity, and some present health risks to the public. For these reasons, efforts need to be taken to monitor this site for unwanted species² so that they can be eradicated as early and effectively as possible. Presently, English holly (*Ilex aquifolium*) and English ivy (*Hedera helix*) are the most prevalent invasive plants found within the treed areas. Along roadsides there is scattered Himalayan blackberry (*Rubus armeniacus*), Canada thistle (*Cirsium arvense*) and bull thistle (*Cirsium vulgare*). Mechanical control is labour intensive and may require several years to eradicate. Staff should be trained on how to identify and eradicate invasive species if discovered. Preventing their establishment and spread is key to maintaining a healthy forested environment at this site.

Mitigation Implementation

Tree mitigation should be undertaken prior to trees becoming too hazardous to treat. Additionally, plan mitigations with sufficient time to complete the work and clear debris before the site is developed for camping. Trees which are accessible by a bucket truck can be top reduced to provide vertical structure for future wildlife habitat. If a tree needs to be climbed, remember that safety considerations may preclude any treatment if the tree has advanced stem and/or root deterioration or hazardous lean. For trees with cavity

¹ Best practices - a pocket guide for British Columbia's forest workers; Invasive Species Council of BC. 2013 edition

² <https://www2.gov.bc.ca/gov/content/environment/plants-animals-ecosystems/invasive-species/priority-species/documents>

nesting habitat, treatment is best planned outside the breeding and nesting season (e.g., between September and March) to avoid contravention of habitat protection laws (e.g., Wildlife Act), regulations (Migratory Birds Regulations) and policies. Stems suited for cavity nesting (nest hole or natural cavities) should be cut 30cm above the cavity/nest hole to retain these habitat features for secondary cavity dwellers (birds and small mammals) while mitigating the hazards to the public. However, for pileated woodpecker nests, treatments to the tree will need to be approved under provisions in the Migratory Birds Regulations.

Small diameter (<30cm) live trees which are overcrowded can be targeted for thinning removals, especially where there is an opportunity to encourage growth in more desirable trees and/or if such a tree is damaged or weak. Ideally, spacing to prevent canopy closure (inter-woven crown) will develop windfirm trees which become less dependent upon neighbouring trees for support during wind and snow loading. Taking this proactive action will increase the overall vigour and form of the remaining trees, which in turn makes them more resilient. Additionally, if the stand has density controls there is more sunlight reaching the forest floor to promote and sustain understory shrubs and ground cover grasses, herbs, wildflowers and moss for biodiversity and visual screening between campsites.

Midsized (50-100cm) and larger trees which are dead or living but hazardous, and which have minimal lean and solid rooting can be topped to promote future wildlife habitat. Reducing the tree to a height that has minimal exposure to campsites will reduce the risks while providing opportunity for wildlife use to the enjoyment of the visiting public. The trees within reach of a bucket truck can be left taller than the distance to the nearest campsite because they can easily be revisited should the tree deteriorate to an unstable state in future years. If a tree must be climbed, then top at or below the distance to the nearest campsite or infrastructure is advised.

Larger living trees (>100cm) which require intervention should be managed to maintain vertical stand structure. Cutting large trees creates large canopy gaps that may exacerbate wind dynamics that will topple trees surrounding the new gap. Therefore, applying crown weight reduction treatments instead of full tree removal is recommended to promote a more windfirm stem for those trees tagged for treatment. By reducing the tree to a live height below the adjacent canopy the tree is less exposed to damaging winds. The top reduction also 'stiffens' the residual stem making it more windfirm and a good candidate for wildlife habitat. The top should be cut flat and at least 20cm above large, live limbs to reduce the risk of decay induced limb failure in future years.

RECOMMENDATIONS

Decisions to remove or treat a tree remain at the discretion of BC Parks and the timing and methods utilized should be planned to avoid disruptions to the site developments and future camping, timed to avoid conflicts with potential wildlife activity (i.e., nesting season). To assist with this tree management process, it is important to ensure that a tree can be treated with minimal conflict – safe for the worker(s) treating the tree, and with minimal impact to the neighbouring trees and site infrastructure. Therefore, once the campground is developed, BC Parks should consider conducting yearly assessments in the autumn (after the camping season) and then implementing any mitigation treatments while the site is closed to camping. These yearly assessments will continue to provide a timely opportunity to capture patterns of tree decline and deterioration. After the winter storm season, a site overview assessment should be taken to ensure storm damaged trees are detected, assessed and mitigated in a timely manner prior to opening the site to camping.

All treatments recommended must be performed in accordance with BC's Workers Compensation Board Health and Safety Regulations and be guided by written Safe Work Procedures. If new hazards are created in the process, then these new hazards must be evaluated and mitigated as required.

Details for managing tagged trees are appended for reference. Once these trees are treated and debris is removed as required, then the Campground can be developed. Additional trees recommended for felling removal with blue (or orange) paint dots were tabulated by species and size. These treatment actions, if implemented as recommended, should ensure a safe workplace for site development activities in

conformance with Occupational Health and Safety Regulations 26.11³ and while protecting and promoting wildlife tree habitat.

Wildlife tree creation

Wildlife trees are an integral component of a forest⁴, and when dangerous trees need to be managed, consideration should be given to habitat conservation where feasible. For example, select trees to be modified which are some distance from the planned campsites and modified to a height that will not reach high-cost infrastructure (e.g., toilet facilities) and campsites. Site managers need to remember that if a tree becomes an active nesting tree, then it cannot be disturbed or removed whilst active (section 34, Wildlife Act and the Migratory Birds Regulations).

Mitigating the hazards of suspect or dangerous trees provides an opportunity to create wildlife tree habitat by topping selected trees. Firstly, if a tree is to be topped it is important to leave a few branch stubs (10-30cm length) for birds to use for perching and roosting. Trees which are then topped should be modified further to promote heartwood decay for primary cavity excavating (PCE) birds to use for feeding and nesting. This can be done by downcutting at 45° from 4 ‘sides’, thus creating a water catchment trough at the top. Additionally, make two (2) bore cuts 1-3m beneath the top into the heart wood of the stem (ideally on the south-east) and then a superficial blaze over the boring cut to attract the interest of PCE’s. Branches in the upper 2-5m of these trees should be left as stubs or half-length for perching/roosting opportunities. If treating a Fd or Bg tree, additionally spiral rip cut through the bark for 2-5m of upper stem length to encourage the bark to loosen for bats and small brown creepers to use for refuge.

CWD management

Once trees are felled (and those which failure during recent storms), there is an opportunity to manage the Coarse Woody Debris (CWD) for multiple benefits. CWD needs to be managed to ensure the safety of the workers and visitors while aiming to nurture the ecological benefits of CWD⁵. Therefore, fallen trees which are elevated need to be bucked and brought to the ground to negate their being an overhead hazard. Debris management is necessary to ensure that bucked pieces are securely positioned and out of reach from the visitors who may wish to climb onto these pieces.

For small CWD (<30cm), this debris can pose a future fire hazard by fuel loading. Therefore, such debris (bucking and limbs) should be cleared from the edge of camping sites and trails and spread out rather than piled. Bucking logs into 2m length so they are resting on the ground will encourage water absorption, decay and reduced fire risk as a result. If debris is deemed too unsightly, then it can be chipped and hauled away.

For larger CWD (>30cm), attempt to keep these pieces long but bucked to the ground if they are close to campsites. If larger CWD is out of sight from the campsites, then elevated CWD is desirable for slowing decomposition and adding vertical structure for habitat and small mammal movements. To hasten nurse log development outside the campsite ‘footprint’, have the sawyer bore vertically through the log at intervals of once every 2-3 metres, then along the length of the log, rip into the top 10cm to facilitate the capture of water and to hasten the loosening of the bark for amphibian and small mammal use. All these steps will hasten decay and further help to reduce fire hazard concerns. For very large (>75cm) CWD, it is beneficial to leave these pieces full length. Clear all smaller debris away from these logs.

Stumps of felled dangerous trees should be flat cut trimmed and several crosscuts made to their surface to retain water and promote decomposition. For large stumps (>75cm) additionally make a few downward boring cuts to allow water to penetrate deeper. These prepared stumps should be covered with moss collected from the forest (outside the field of view from the camping sites). This moss covering will assist with decomposing the stumps while softening the visual impacts of tree removal.

³ OHS Regulation 26.11(1) states that “If it is known or reasonably foreseeable that work will expose a worker to a dangerous tree, (a) the tree must be felled.” Furthermore, this removal work must be done before workers return as per 26.11(2).

⁴ See Wildlife Tree retention guidance provided in the Biodiversity Guidebook, Klenner 2006, FRPA General Bulletin # 8, December 2011

⁵ Chief Forester Guidance CWD management – May 2010

REASSESSMENT

Annual assessments of the campground (once built) is warranted because of the anticipated high level of public use, the detection of root disease, and the presence of dead and dying trees associated with wet soils. Additionally, a site and tree assessment should be completed if there is evidence of new tree failures or site altering events (e.g., fire, widespread windthrow), or if planned construction activities extend beyond December 31, of 2023. Additionally, if the final campground plan is revised from what was proposed as version 2, then a return visit will need to be made. A certified WDTAC assessor should make these reassessments.



PHOTO 1: View of a red alder tree with bark beetle attack; note the pitch holes from beetle attack. Such trees are likely to fail within 1-2 years of death because of accelerated stem decay.



PHOTO 2: View of brittle cinder conk (*Kretzschmaria deusta*) on a bigleaf maple with basal damage. This is a dangerous tree and full tree removal is recommended. Cut with a high stump to remove the hazard while promoting coppice shoots for visual screening.



PHOTO 3: View of the stand conditions where wind is an important site factor leading to the marking of stem defective and wind prone trees for mitigation treatments.



PHOTO 4: View of a remnant Fd class 7 tree with a highly unstable top. This tree is marked for removal because it is unsafe to climb for reduction treatments.



PHOTO 5: View of several tipped Cw trees which have been marked (blue dots) which are hazards to campground development and are thus recommended for removal.



PHOTO 6: View of Fd veteran #334 that has infection by *Phaeolus schweinitzii* and *Porodaedalea pini*. Therefore, it poses a risk to the planned developments and to the public road and hydro lines. Reducing the tree to a 15m stub is recommended to eliminate the hazards and retain the tree for wildlife habitat.



PHOTO 9: Bg tree #110 has a pronounced stem scar. This live tree has a cavity nest (red arrow) and topping above the nest is recommended.



PHOTO 10: Examples of highly decayed Alder stems recommended for removal.



PHOTO 11: View of Fd veteran tree #114 with a large hanging limb – NWZ was flagged out until tree can be treated.



PHOTO 12: Cottonwood #134 has a large natural cavity dwelling (red arrow). Retention is possible if this area is excluded from development.

LIMITATIONS

Conclusions and recommendations contained in this report are based on ground assessments and visual reviews of trees within the Areas of Interest proposed as version 2 of campground developments as shown in figure 1 between December 14-16, 2022, January 3-5, 2023 and August 17, 2023. To the extent that any information provided or made available to Integra Forest Consulting Ltd. forms the basis of this report, such information has not been verified by Integra Forest Consulting Ltd. and Integra Forest Consulting Ltd. makes no representations as to the accuracy or completeness of, and disclaims all liability with respect to, such information.

Tree assessments were carried out in accordance with generally accepted procedures presented in the Wildlife/Danger Tree Assessor's Course: Parks and Recreation Sites for the purposes of guiding BC Parks and other stakeholders in its tree care management responsibilities. However, the hazard tree criteria used from the above cited standard are only applicable to defective trees exposed to wind speeds of up to 65km/hour.

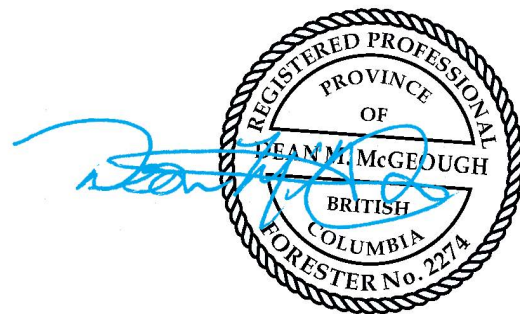
This visit and the resulting tree assessment guidance do not eliminate the possibility for tree failures in the future. Trees are living organisms that fail in response to a complex range of interactions that are not always known, visible, predictable or under our control. Due to the nature of the work and the fact that assessments are only made of trees with symptomatic visual signs of decline, damage or visible hazards, trees may exist with hidden defects that were not evaluated during the assessment. Such hidden defects combined with other factors, including but not limited to weather patterns, traffic patterns, and worker or visitor interactions, could materially affect the conclusions and recommendations contained herein. Consequently, Integra Forest Consulting Ltd. does not guarantee that a tree will remain healthy or safe. Periodic monitoring, re-assessment, consultation with adjacent landowners and managers, and the timely scheduling of preventative treatments may reduce the level of risk to public and to workers to generally accepted standards of care; however, such activities are the responsibility of BC Parks, and Integra Forest Consulting Ltd. accepts no liability for the actions of persons or entities carrying out such activities. In no event will Integra Forest Consulting Ltd. be liable to any recipient of this report for any damages, loss, cost, expense, injury or other liability that arises out of or in connection with this report, including, without limitation, any indirect, special, incidental, punitive or consequential loss, liability or damage of any kind.

For the above reasons and for the safety of workers and public, the proposed campground areas should be re-assessed once the site plans are finalized and before construction works commence in 2023 for the presence of trees that may require intervention or removal. Should there be site or tree altering events (e.g., new construction or property developments, tsunami, fire, severe windstorm, acts of vandalism) subsequent to the date of this assessment, this assessment is rendered void and areas affected should be revisited promptly to ascertain the scope of changes to trees and the safety implications.

This report, in its entirety, has been prepared at the request of BC Parks, which includes distribution as required for the purposes for which this assessment was commissioned.

Prepared and respectfully submitted by,
Integra Forest Consulting Ltd.

Dean McGeough, R.P.F.
Certified Wildlife/Danger Tree Assessor
Certified Tree Risk Assessor



Dangerous Tree Assessment Report

Appended Information:

- Tree Assessment Field Data and Map

**Tribune Bay PreConstruction WDT Assessment
(Jan. 2023)**

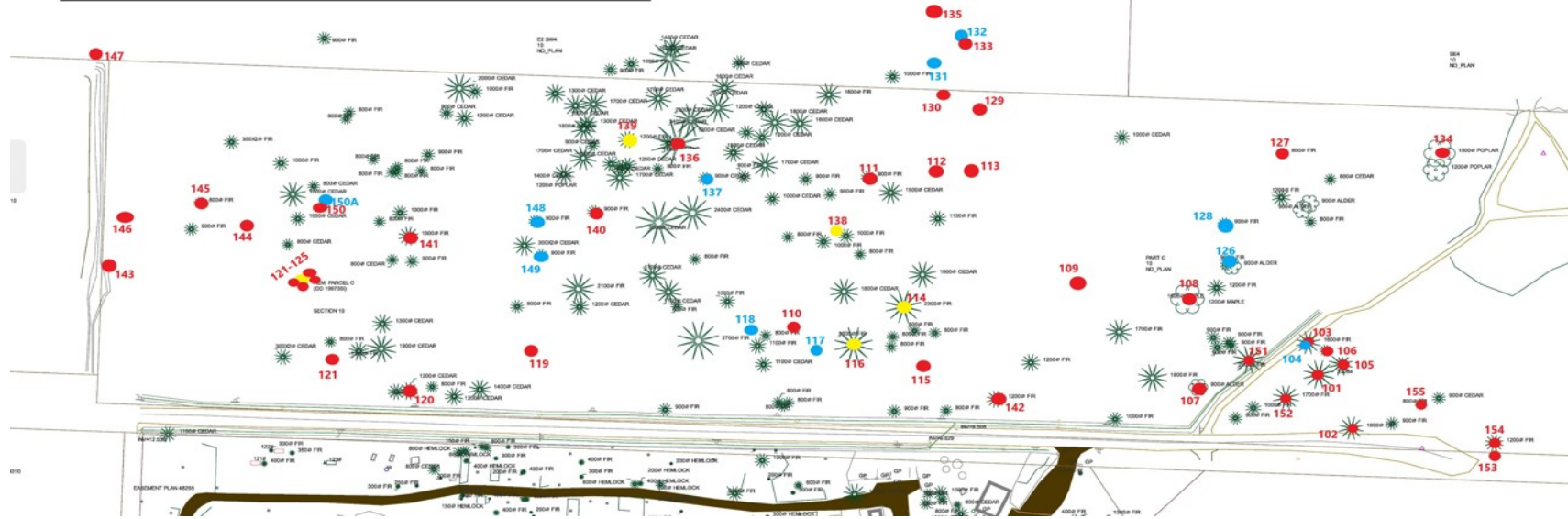
Dangerous Tree		#	DT + NWZ		#
Safe but Mitigate		#			

**Tribune Bay PreConstruction WDT Assessment
(Jan. 2023)**

Dangerous Tree		#	DT + NWZ		#
Safe but Mitigate		#			

**Tribune Bay PreConstruction WDT Assessment
(Jan. 2023)**

Dangerous Tree		#	DT + NWZ		#
Safe but Mitigate		#			

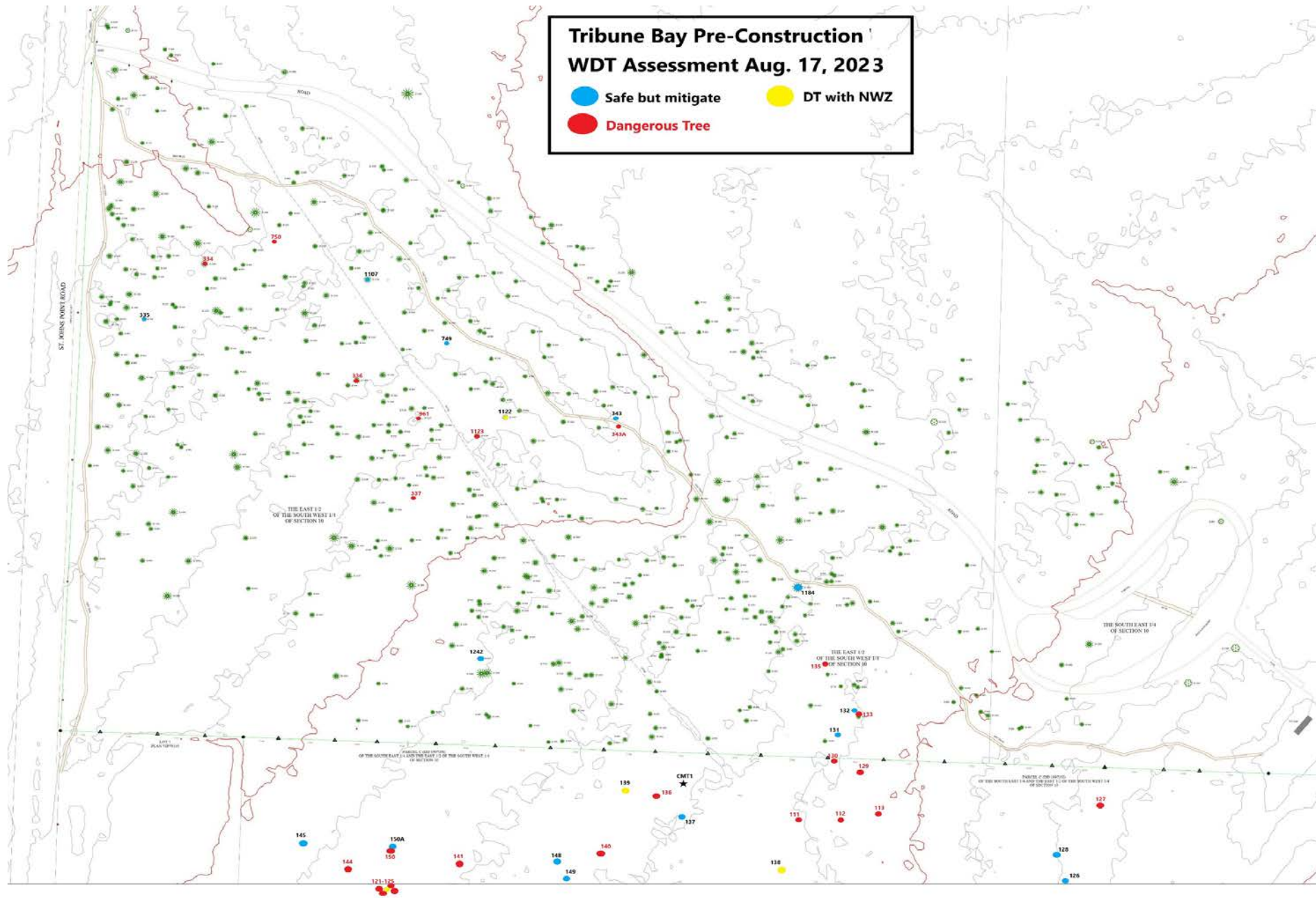


**Tribune Bay Pre-Construction
WDT Assessment Aug. 17, 2023**

 Safe but mitigate DT with NWZ

 Dangerous Tree

 **Dangerous Tree**



Trees Marked for Removal (blue paint dots)

Aug. 17, 2023

DEAD TREES						LIVE TREES					
Species	<20cm	<50cm	<75cm	>75cm	Total	Species	<20cm	<50cm	<75cm	>75cm	Total
Dr	34	124	33	0	191	Dr	2	20	6	0	28
Bg	43	20	8	0	71	Bg	2	3	3	0	8
Fd	10	1	2	1	14	Fd	2	0	1	0	3
Mb	3	0	0	0	3	Mb	1	0	1	1	3
Hw	0	1	0	0	1	Hw	0	1	0	0	1
Cw	5	11	1	2	19	Cw	1	0	0	0	1
Totals:	95	157	44	3	299	Totals:	8	24	11		44

Dr main issues: bark beetle stem decay/near death; blood canker; SD with advanced decay; tipped rooting issues; weak tops

Bg main issues: deteriorated roots or stem decay; live trees with stem deformity, tipped, poor rooting

Fd main issues: root diseased, weak roots or unstable tops

Mb main issues: cinder conk, weak stem unions, weak tops

Hw: advanced decay, armillaria root disease

Cw main issues: tipped with root pull; advanced state of decay; deteriorating shell; dislodged into other trees

Alder bark beetle: *Alniphagus aspericollis*

Bleeding Canker: *Phytophthora siskiyousensis*

DANGER TREE ASSESSMENT FIELD DATA – PARKS

Park or Rec Site: Tribune Bay																				Location: Hornby Island										Assessor's Name: Dean McGeough				Date: Aug. 17, 2023			
Type of Facility: proposed Campground										Target Description: Future walk-in camping sites, toilets, visitor parking										Certificate # P004				Map Attached: Yes													
Type of Activity: Camping, hiking, parking																				LOD: 3 (camping) 2 (parking)																	
Tree #	Species	Tree Class	Tree Height (m)	Diameter (cm)	Distance to Target (m)	LOD = 1		LOD = 2, 3 or 4														Overall Rating (S or D)	Tree Comments				Management Action										
						From Table 3		From Table 4 or 4A or 5										Detailed Assessment					Wildlife Tree Value	Wildlife Uses (CN, F, P, ON, M, R, Other)	Recreational Attraction	Veteran \ Feature (Y/N)	Safe / No action	Dangerous - Fall Tree	Dangerous - Modify	Dangerous - Move Target	Treatment Plan						
						Insecurely lodged or hung up limbs/tops = D	Highly unstable stem = D	Recent lean with unstable roots = D	HT	DL	WB	ST	SD	SB	CA	CM	TL	RI	DSH (cm)	RST (radius x 0.3)	AST (cm)											Stem (S or D)	Roots (S or D)				
						Tree Defects (S = defects rated safe; D = defects rated dangerous; / = absent; ? = needs detailed assessment)																															
1184	Fd	6	22	170	1		S														S	Hi	No	No	Y	M		R		Reduce decaying top							
343	Bg	3	36	58	2		S														S	Mod	No	No	No		X			CTW - 15m							
343A	Bg	6	18	23	1	D	D														D	Low	No	No	No												
1123	Cw	3	33	110			S		D	D											D	Mod	No	No	Y			X		CTW - 20m							
1122	Fd	1	40	100		D				D											D	Mod	No	No	No			X	X	Climb to remove DL; NWZ							
749	Bg	3	38	64			S		S	S											S	Mod	No	No	Y			R		CTW 10m							
1107	Cw	2	34	130		S	S		S	S											S	Mod	No	No	Y			R		CTR - 20m							
750	Cw	2	28	72			S		D	D											D	Mod	No	No	No			X		CTR - 15m							
334	Fd	2	44	125										D							D	Mod	No	No	No			X		CTW - 15m							
335	Bg	3	36	80									S		S						S	Mod	No	No	No			R		CWT - 15m							
336	Bg	4	39	137					D						D						D	Hi	No	No	No			X		CWT - 10m							
961	Fd	8	13	210					D			S				S					D	Mod	No	No	No		X			Fell - high stump (2m)							
337	Bg	6	11	73											D		S				D	Hi	CN	No	No		Alt	X	X	Cable or CTR - 5m							
1242	Bg	3	36	87												S					S	Mod	No	No	No			R		CTW - 15m							
Field Marking - tag + yellow/black flagging Species Codes: Dr - alder, Mb - maple, Fd - Douglas-fir, Bg - balsam, Cw - western redcedar																																					
Treatment: BT - bucket truck Top; CT - Climb & Top; CTW - climb & wildlife top; F - fell; CTR - Climb & top reduce; R = recom. mitigation; X = hazard mitigation req'd; M - monitor																																					
1184 - trailside ok to monitor or reduce; 343 group of 5 Bg to manage (fell others), but WT creation for 343; 343A - top snapped and weakly lodged - urgent removal																																					
1123 - top at a safe height above kink, remove DL's but leave stubbs 50cm for larger limbs; 1122 - suspended DL at 20m ro remove (temp NWZ); 749 - 3 tops, create WT																																					
1107 - multiple dead tops - reduce to 20m; 750 - weak seam at candelabra, reduce by 15m; 334 - Butt rot + P. pini - reduce to 15m; 335 - saprot CM and can reach road																																					
336 - twin top failed recently, butt rot CM - reduce to 1m above fork; 961 - very weak top, remove tree (maybe high stump)																																					
337 - likely a flicker nest, cable strap to supporting tree if not able to CTW 5m; 1242 - create wildlife tree while safe to climb to 15m.																																					
NOTE: NWZ established for #1122 - limbs hazards (yellow NWZ flagging)																																					

DANGER TREE ASSESSMENT FIELD DATA – PARKS

Park or Rec Site: Tribune Bay		Location: Hornby Island		Assessor's Name: Dean McGeough		Date: January 3-5, 2023																												
				Certificate # P004		Map Attached: Yes																												
Type of Facility: proposed Campground				Target Description: Future walk-in camping sites, toilets, visitor parking																														
Type of Activity: Camping, hiking, parking				LOD: 3 (camping) 2 (parking)																														
Tree #	Species	Tree Class	Tree Height (m)	Diameter (cm)	Distance to Target (m)	LOD = 1		LOD = 2, 3 or 4												Overall Rating (S or D)	Tree Comments				Management Action									
						Insecurely lodged or hung up limbs/tops = D	Highly unstable stem = D	Recent lean with unstable roots = D	From Table 4 or 4A or 5												Wildlife Tree Value	Wildlife Uses (CN, F, P, ON, M, R, Other)	Recreational Attraction	Veteran Feature (Y/N)	Safe / No action	Dangerous - Fall Tree	Dangerous - Modify	Dangerous - Move Target	Treatment Plan					
									Tree Defects (S = defects rated safe; D = defects rated dangerous; / = absent; ? = needs detailed assessment)																									
						HT	DL	WB	ST	SD	SB	CA	CM	TL	RI	DSH (cm)	RST (radius x 0.3)	AST (cm)	Stem (S or D)	Roots (S or D)														
137	Bg	3	37	86												S									S	Mod		No	No			R		CTW - 10m
138	Bg	6	10	60						D						S								D	Hi	R	No	No			X		NWZ - 8m	
139	Fd	2	43	140					S	D						S								D	Mod	CN	No	Y			X	X	Prune DL's	
140	Bg	2	38	88					S	S			D		D	-10	D							D	Mod	CN	No	No		X			Fell	
141	Bg	7	16	109									D		D		D							D	Mod	F	No	No		X			Fell	
142	Fd	2	35	113					S	S						S								S	Mod		No	No	M				mitigated spring 2023	
144	Cw	2	23	43	60										-20	D								D	Low		No	No		Alt		X	Avoid Devel.	
145	Bg	2	36	75	35				D	S						S								D	Mod		No	No			X		CTR - 20m	
148	Fd	2	33	85											S	S								S	Low		No	No		Alt	R		CTR - 22m	
149	Bg	3	39	96							S		S			S								S	Mod		No	No			R		CTW - 10m	
150	Bg	2	31	60					D	S						S								D	Mod		No	No			X		CTR - 18m	
150A	Bg	2	23	55					S	S						S								S	Mod		No	No			R		CTR - 18m	
151	Fd	2	35	210	4				S	S						S								S	Hi		No	Y	M				mitigated spring 2023	
Field Marking - tag + yellow/black flagging Species Codes: Dr - alder, Mb - maple, Fd - Douglas-fir, Bg - balsam, Cw - western redcedar																																		
Treatment: BT - bucket truck Top; CT - Climb & Top; CTW - climb & wildlife top; F - fell; CTR - Climb & top reduce; R = recom. mitigation; X = hazard mitigation req'd; M - monitor																																		
137 - candidate for WT; 138 - roost tree to protect; 139 - DL issues 10-25m to prune; 140 - basal SD+CM hazard; 141 - Butt rot; 142 - powerline exposure was pruned																																		
144 - failed but caught by c14 Dr - leave if no developments, otherwise fell; 145 - if development area top, otherwise retain as is																																		
148 - old root lift from nurse log, avoid development within 15m + adj Cw																																		
149 - saprot fungi; 150 + 150A candidates for WT; 151 - buttrot, reduce main stem and prune DL's over trail; 152 - butt rot, reduce height + prune DL's																																		
153 - butt rot and rotten top risk to parking arewa; 154 - butt rot conks; 155 - butt rot conks																																		
NOTE: NWZ established for 138 - roost/CN; temporary NWZ for 139 - limbs hazards (yellow NWZ flagging)																																		

DANGER TREE ASSESSMENT FIELD DATA – PARKS

DANGER TREE ASSESSMENT FIELD DATA – PARKS																				Assessor's Name: Dean McGeough				Date: Dec. 14-16, 2022; 5, 2023				Jan. 3-				
Park or Rec Site: Tribune Bay										Location: Hornby Island										Certificate # P004				Map Attached: Yes								
Type of Facility: proposed Campground												Target Description: Future walk-in camping sites, toilets, visitor parking																				
Type of Activity: Camping, hiking, parking																LOD: 3 (camping) 2 (parking)																
Tree #	Species	Tree Class	Tree Height (m)	Diameter (cm)	Distance to Target (m)	LOD = 1		LOD = 2, 3 or 4										Overall Rating (S or D)	Tree Comments				Management Action									
						From Table 3		From Table 4 or 4A or 5								Detailed Assessment				Wildlife Tree Value	Wildlife Uses (CN, F, P, ON, M, Other)	Recreational Attraction	Veteran / Feature (Y/N)	Safe / No action	Dangerous - Fall Tree	Dangerous - Modify	Dangerous - Move Target	Treatment Plan				
						Insecurely lodged or hung up limbs/tops = D	Highly unstable stem = D	Recent lean with unstable roots = D	Tree Defects (S = defects rated safe; D = defects rated dangerous; / = absent; ? = needs detailed assessment)								DSH (cm)		RST (radius x 0.3)										AST (cm)	Stem (S or D)	Roots (S or D)	
									HT	DL	WB	ST	SD	SB	CA	CM																TL
119	Bg	2	30	55						D										S	D	Mod		No	No				X		CTR - 15m	
121	Bg	2	21	82						D										S	D	Hi	CN	No	No				X	X	CTR - 15m	
122	Bg	4	10	63									D							S	D	Hi	CN	No	No				X	X	CT - 5m	
123	Bg	2	16	64						D										S	D	Hi	CN	No	No				X		CTR - 10m	
124	Bg	2	16	62						D										S	D	Hi	CN	No	No				X		CTR - 10m	
125	Bg	2	27	64						D										S	D	Mod	F	No	No				X		CTR - 20m	
126	Dr	3	28	80						S	S									15	S	S	Mod		No	No				R		CTW - 8m
127	Bg	2	34	94						D										10	S	D	Mod		No	No				X		CTR - 18m
128	Bg	2	36	85						S										Sw	S	S	Mod		No	No				R		CTR - 18m
129	Bg	2	38	62						D			D								S	D	Hi	CN	No	No				X		CT - 18m
130	Bg	2	39	101						D											S	D	Mod		No	No				X		CTR - 30m
131	Bg	4	38	87							S									S	S	Mod		No	No				Alt	R		CTW - 8m
132	Bg	2	38	66						S											S	S	Mod		No	No				R		CTW - 8m
133	Bg	2	40	81						D											S	D	Mod		No	No				X		CTR - 28m
134	Ac	4	21	132	24					D	D			S	S	12	D				S	D	Hi	CN	No	No				X		Avoid Devel.
135	Bg	2	36	49	20								D								S	D	Hi	CN	No	No				X		CTR-10m
136	Cw	2	32	130										S						D	S	D	Low		No	No				X		CT-5m
Field Marking - tag + yellow/black flagging Species Codes: Dr - alder, Mb - maple, Fd - Douglas-fir, Bg - balsam, Cw - western redcedar, Ac - cottonwood																																
Treatment: BT - bucket truck Top; CT - Climb & Top; CTW - climb & wildlife top; F - fell; CTR - Climb & top reduce; R = recom. mitigation; X = hazard mitigation req'd; M - monitor																																
119 - weak spike top to remove; 121 - remove 6m dead top; 122 - top broke, CN - cut above nest; 122 - top for WT																																
123 - 125 candidate for WT by removing weak tops; 126 - covered in vines; bark borer; 127 - remove 15m weak spike; 128 - remove top 25% for wind reduction																																
129 - SD with CN at 18m, 10m dead top; 130 - remove top 10m, kinked stem; 131 - candidate for WT or fell tree; 132 - forked top, almost dead																																
133 (beside #132), remove dead top (12m); 134 - No hazard exposure to beach, avoid developments; 135 - CN at 4m, reduce to 10-15m; 136 - on nurse stump																																
NOTE: temporary NWZ established for 122 to protect CN (yellow NWZ flagging)																																

DANGER TREE ASSESSMENT FIELD DATA – PARKS

Park or Rec Site: Tribune Bay															Location: Hornby Island															Assessor's Name: Dean McGeough				Date: Dec. 14-16, 2022			
Type of Facility: proposed Campground															Target Description: Future walk-in camping sites, toilets, visitor parking															Certificate # P004				Map Attached: Yes			
Type of Activity: Camping, hiking, parking																									LOD: 3 (camping) 2 (parking)												
Tree #	Species	Tree Class	Tree Height (m)	Diameter (cm)	Distance to Target (m)	LOD = 1			LOD = 2, 3 or 4															Overall Rating (S or D)	Tree Comments				Management Action								
						From Table 3			From Table 4 or 4A or 5										Detailed Assessment						Wildlife Tree Value	Wildlife Uses (CN, F, P, ON, M, Other)	Recreational Attraction	Veteran Feature (Y/N)	Safe / No action	Dangerous - Fall Tree	Dangerous - Modify	Dangerous - Move Target	Treatment Plan				
						Insecurely lodged or hung up limbs/tops = D	Highly unstable stem = D	Recent lean with unstable roots = D	HT	DL	WB	ST	SD	SB	CA	CM	TL	RI	DSH (cm)	RST (radius x 0.3)	AST (cm)	Stem (S or D)	Roots (S or D)														
Tree Defects (S = defects rated safe; D = defects rated dangerous; / = absent; ? = needs detailed assessment)																																					
101	Fd	2	18	90	10				S*	S*			S*					S					S*	Hi	CN	No	No	M				Mitigated spring 2023					
102	Fd	7	8	135	0													S*					S*	Hi		No	Y	M				Mitigated spring 2023					
103	Fd	2	33	180	3					S							S*					S*	Hi		No	Y	M				Mitigated spring 2023						
107	Dr	3	8	96	8												-16	S					S*	Hi	CN	No	No	M				Mitigated spring 2023					
108	Mb	2	25	115					S*									S					S*	Mod	No	No	No	M				Mitigated spring 2023					
109	Fd	2	28	85					S	D								S					D	Mod		No	No			X		Prune/cut					
110	Bg	2	30	57									D					S					D	Hi	CN	No	No			X		CTW - 10m					
111	Bg	2	35	61					S				D					S					D	Mod		No	No			X		CTW - 10m					
112	Bg	3	26	83					D									S					D	Mod		No	No			X		CTW - 8m					
113	Fd	2	28	180						D			D					S					D	Hi		No	Y			X		CTW - 15m					
114	Fd	2	38	220						D					D			D					D	Hi		No	Y			X	X	NWZ, CTR - 15m					
115	Bg	2	35	69					D									S					D	Mod		No	No			X		CTR - 25m					
116	Fd	2	38	175						D			D					D					D	Hi		No	Y			X	X	NWZ, CTR - 20m					
117	Bg	3	36	64														S					S	Mod		No	No			R		CTW - 8m					
118	Bg	3	40	105														S					S	Mod		No	No			R		CTW - 10m					
Field Marking - tag + yellow/black flagging Species Codes: Dr - alder, Mb - maple, Fd - Douglas-fir, Bg - balsam, Cw - western redcedar																																					
Treatment: BT - bucket truck Top; CT - Climb & Top; CTW - climb & wildlife top; F - fell; CTR - Climb & top reduce; R = recom. mitigation; X = hazard mitigation req'd; M - monitor																																					
101 - CN, twin tree; 102 - roadside previously topped; 103 - topped; 107 - topped; 108 - modified																																					
109 - hanging limb; 110 - top above CN remove dead sucker stem; 111 - top above SD knik for habitat; 112 - habitat tree; 113 - butt rot, top below live limbs																																					
114 - butt rot, shorten to 15m, stub dead limbs; 115 - remove dead top; 116 - butt rot, shorten to 20m, prune dead limbs; 117 + 118 create habitat																																					
NOTE: temporary NWZ established for 114, 116 - limbs hazards (yellow NWZ flagging). Defect rated S* means tree was managed spring 2023																																					