Observational Spot Monitoring:
Tamihi Logging Limited's Harvest Operations
in Airplane Creek, Block 1023 & Mountain Goat Responses

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Summary:

Observational spot monitoring was undertaken by Ministry of Environment (MOE) staff during January and February 2007 in an attempt to gather information on mountain goat responses to winter helicopter-harvesting and cable-yarding activities in a cutblock that overlapped confirmed goat winter range habitat (GWR). Harvesting and yarding was directly adjacent to core bedding/thermal and foraging habitats used by nanny & kid groups during winter. Observations[1] made during four inspections showed that both helicopter and cable-yarding activities caused goats to abandon core areas of the GWR polygon while operations were ongoing. Observations also showed a strong flight response associated with yarder whistles when goats were within 900m. Some noise buffering as a result of slope topographic characteristics and alternate areas being used by goats appeared to occur. Goats quickly re-colonized the abandoned core portions of their winter habitat once operations had ceased. In this situation, MOE observations confirm the need to restrict winter industrial operations within 1,000m of GWR habitat. In addition, the potential for site specific mitigation strategies should be explored in cases where topographic complexity can buffer the noise/disturbance to goats using core winter range areas.

Photo 1: Example of goats exhibiting an overt flight response (GWR-CL6) which significantly increases risk of injury and death, particularly in younger animals.

[1] Note: All photos taken by the author.

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Photo 2: Young Billy in GWR-CL6, October 2005.

Background:

MOE staff completed winter aerial ungulate inventories in the Chilliwack Forest District between 1996 and 2001; all work was funded by Forest Renewal BC. Following this, ungulate winter range polygons (UWRs) were delineated for both mountain goats and mule/black-tailed deer. These polygons were used to form UWR areas in the forest district, for designation and protection under the *Forest Practices Code* (FPC) and the *Forest and Range Practices Act* (FRPA). MOE goat winter range (GWR) boundaries have remained constant since 2001 but are still not established under FRPA. As well, Ministry of Forests and Range (MOFR) and licensees have known of candidate UWR locations since approximately 2001.

In a further attempt to minimize disturbance to mountain goats on their winter range, MOE established a Mountain Goat Winter Range Timing Policy in 1997[2]. This specific GWR polygon (GWR-CL6) has been of particular interest to MOE because of its proximity to town, ease of monitoring and viewing, and relatively high value for nanny and kid groups. For those reasons, MOE has spot-monitored goat use in this winter range since winter 2000/01. The goat winter range also overlaps with deer winter range (DWR-CL13).

During 2002 Forest Development Plan review, MOE entered into an 'informal agreement' with Tamihi Logging staff to recognize the high UWR values in this specific area. In short, MOE staff agreed to withdraw concerns over logging of adjacent, lower value UWR habitat in this valley, in exchange for Tamihi's support for establishing GWR-CL6 and DWR-CL13 as UWR for the district. In 2005, Tamihi submitted a Forest Development Plan amendment which included harvest plans for Block 1023; the block overlapped both UWRs. The District Manager MOFR approved this amendment despite:

1) MOE's objection to harvest given the area's status as a candidate UWR;
2) the provision of previous information which outlined the 'informal agreement'; and
3) the risk to ungulates that would result from loss of critical winter habitat.

Although MOE was not notified of the harvest start date, MOE believes that logging activities began in early January 2007 and those activities continued through to completion on March 5, 2007. MOE requested information with respect to: the start date of falling, road building, helicopter yarding and cable yarding activities; the completion date of helicopter and cable yarding; and the type of helicopter used from Tamihi for the purposes of this monitoring report, but Tamihi did not provide that information. Heli-yarding and other industrial activity was conducted without regard for MOE's Goat Winter Range Timing Policy.

[2] In 1997 MOE released a GWR Timing Window Policy for the Lower Mainland Region to MOFR and industry which was focused on mitigating negative disturbance impacts to goats using critical seasonal habitats. This policy required no operations be undertaken within 500m of GWR during the winter months. A copy of this policy is included in Appendix 2.

Monitoring Approach:

Because MOE was not notified of the start date, a formal monitoring project could not be designed and implemented for this operation. As a result, observational spot monitoring was undertaken by the author in an attempt to gather information on mountain goat responses to winter helicopter-harvesting and cable-yarding activities in a cutblock that overlapped confirmed GWR habitat and which was in very close proximity to core winter bedding/thermal and foraging habitats. Helicopter activity occurred at contour, within 200m of this core habitat, through January 2007.

This monitoring approach provides qualitative insight into the degree of disturbance and impacts to goats associated with logging operations in close proximity to GWR habitats. It also offers information which should help guide the development of mitigation and best management practices, including an updated Regional Mountain Goat Winter Range Timing Policy. This information should also be important during future considerations regarding professional accountability, FRPA plan approvals and in the development of practice standards.

Observations of helicopter yarding and cable yarding activities occurred during mornings, on four occasions between January 26 and February 27, 2007. A final post-harvest inspection occurred on March 6, 2007. Observations were made via an 8x50 spotting scope and 10x42 binoculars, from a straight-line-distance of approximately 950m (observer to yarder location: refer to Image 1, below).

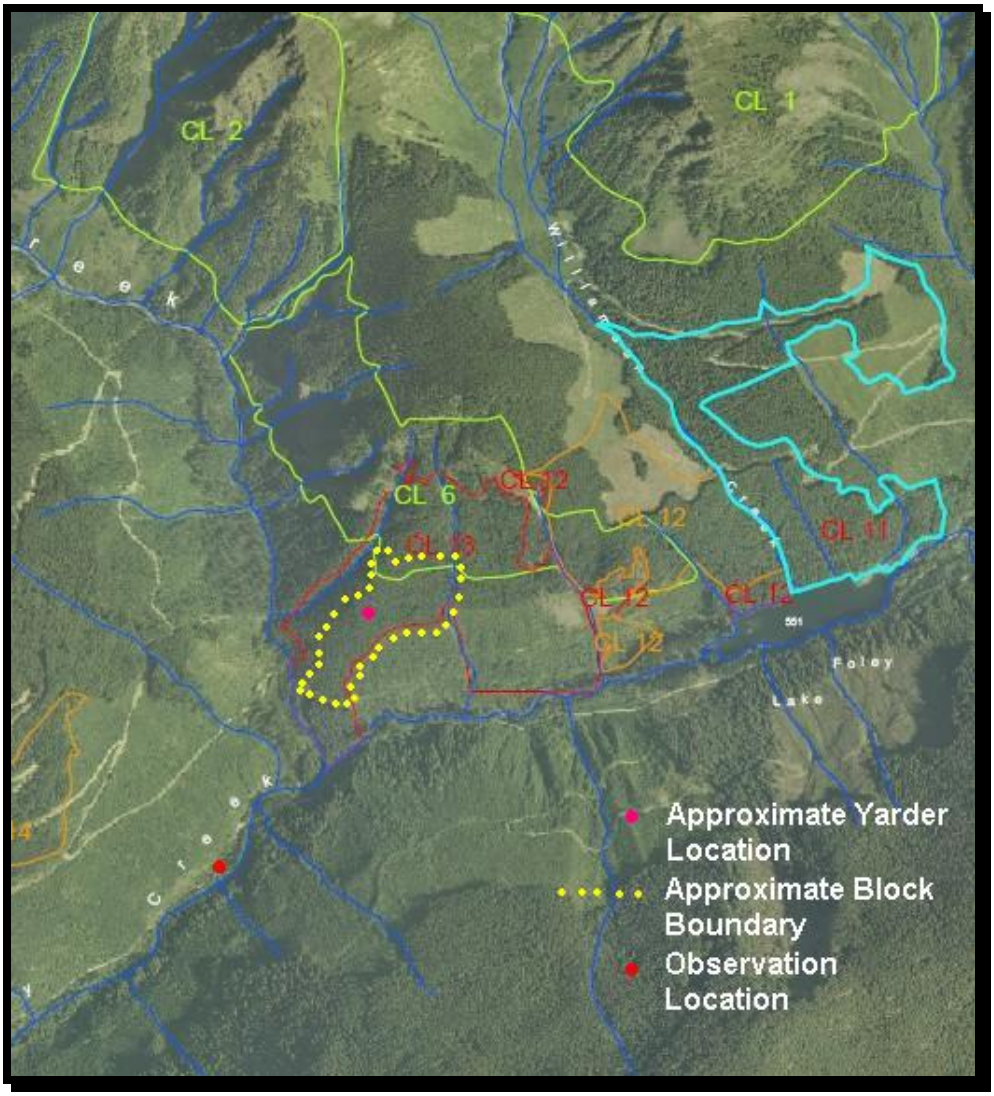

Image 1: Ortho-photo showing monitoring observation location, UWR boundaries (green and red outlines) and the approximate location of the in-block landing/cable-yarder location.

Observations:

Field observation notes are summarized as follows:

1. January 26, 2007: attended Tamihi's logging show at confluence of Airplane and Foley Creeks (timber harvesting in DWR & GWR) in the morning, and observed heli-logging within the UWRs and within 200m of the main bedding bluff on the GWR (the block appeared to be completely felled). No goats were observed during the 30 minute observation period:
   - Heli-logging is ongoing in Tamihi's block 1023. The helicopter is operating within a couple hundred meters of the bedding/feeding bluffs, where MOE has typically found nannies and kids occupying this habitat at this time of year just above the cutblock (Note: the author has conducted surveys over the past

several years; see Appendix 1). This preferred habitat appears to have been alienated from goat use by the heli-logging activity; this response by goats has been observed in other studies. It is likely that this will have some negative implications to this herd since the preferred habitats are not available for feeding, thermal and bedding use. Note: goats are occupying their anticipated, preferred winter range habitats in the other GWRs in this area (e.g., Chipmunk Creek GWR-CL3 had 7 goats using the traditional bedding bluffs, consistent with the author's observations each year to date). The absence of goats from this winter range core area is not typical of behaviour and habitat selection in previous winters where snow conditions have been even less severe.

2. February 1, 2007: attended the block again between 7:30 and 8:30AM. Heli-logging operations had ceased but cable-yarding and truck loading activities were still ongoing from the end of the main/upper landing. The last loaded truck (of the early-morning loading-cycle) left the landing at approx. 7:45AM[3]. No goats were observed in their traditional core habitat and no goats were observed at all to this point. No significant noise generating activity occurred on the landing (i.e., no trucks, no whistles, limited machinery working) between 7:45 and 8:05AM:
   - At approx. 8:05AM a single billy walked into view at the upper-most, lee-face of the polygon from the block (blue outline in Image 2, below). A yarding whistle was sounded and the billy immediately moved away from the block face, back to the leeward side and disappeared into the forest. The author considers this an overt response to the whistle noise.
   - At approx. 8:10 a nanny and kid appeared at the uppermost bluff area in the traditional habitat, directly above the block (red outline in Image 2, below) and were observed feeding across the bluff. At approx. 8:15AM another yarding whistle sounded and the nanny and kid moved quickly (i.e., almost a run) back into the forest, moving toward the leeward side of the slope, away from the disturbance. This degree of overt response is expected to negatively impact goat condition, as animals during winter are already in a nutritionally deprived state. Any additional burden on stored fat reserves generally decreases overall body fitness.
   - Remained onsite until 8:30AM and the goats did not reappear. No other goats were observed.

   The author suspects that the goats are bedding on the lee-side of the hill through the night because this core habitat is critical to them and site fidelity to this preferred habitat is strong, especially in this high-snow winter. In the early morning goats attempt to travel to the core habitat, when the machine noise is potentially hidden by the river noise and early-morning out-flow winds, and yarding whistles are not being used. They are attempting to move to the core habitat at dawn/during daylight, to exploit the thermal benefits and to forage on preferred slopes. Once the yarder whistles begin and the morning conditions and topographic buffering that diffused the industrial noises no longer provide this function, goats get disturbed and are displaced from this core habitat.

[3] MOE has been provided information that suggests that the first log trucks are being loaded on the landing as early as 5:30AM; at minimum, 1 hour prior to sunrise.

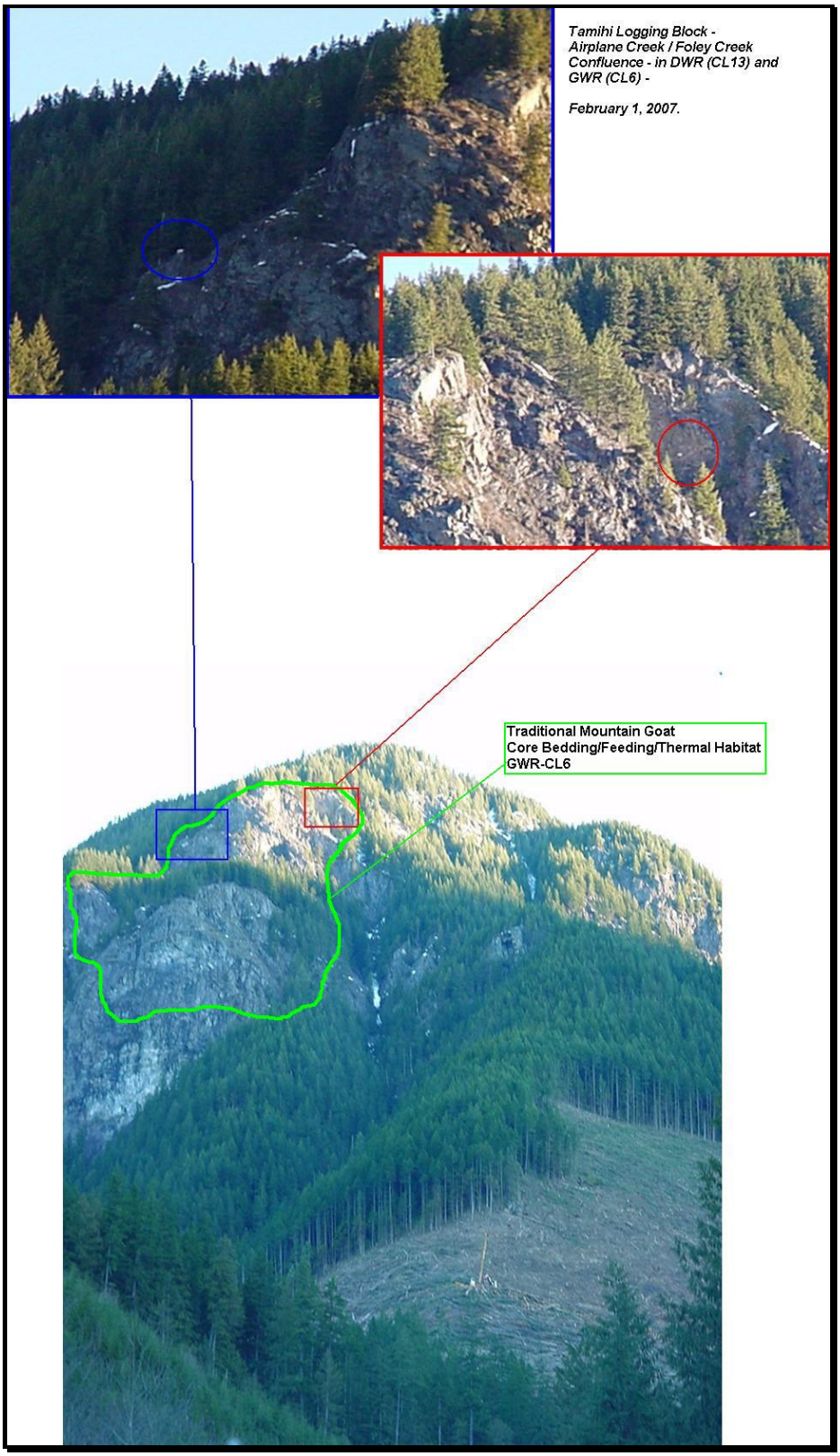

Image 2: Locations of goats observed on February 1, 2007 in relation to their traditionally used core winter habitat, GWR-CL6.

3. February 13, 2007 - 9:35AM-10:05AM - no goats observed on traditonal bluffs, these bluffs are mostly snow-free yet remain unoccupied. Expected goat use of this traditional bluff area would be high at this time of the year. No goats were observed during this inspection and this would be considered atypical given the current weather/snow conditions. Snow is deep at slightly higher elevations. Heavy equipment continues to operate in very close proximity to the best GWR habitat and is using whistles for yarding communication. Temporary abandonment of the core winter range in GWR-CL6 appears to have occurred. The adjacent GWR-CL2 is snow-covered well above normal depths, as a result of recent snowfall.

   Chipmunk Creek GWR-CL3 – Observations at 9:20AM - 3 goats were observed using typical habitat for this time of year and snow conditions. Goats were foraging on lichen & deciduous rooted forage at the bottom of the main rock polygon, located in SE corner of the upper lobe of the GWR.

4. February 27, 2007 - Snow accumulations on the slope are significant when compared to the February 1st inspection. Three goats observed using locations of the polygon on the periphery of the core habitat, when considering the present snow levels. These goats are likely the same animals observed during the February 1st inspection. Tamihi's cable-yarding operations continue, using whistles-based-communications, in block 1023. The first truck loading cycle had just been completed, with the last truck leaving the landing just prior to observations starting.
   - 1 Adult Billy was observed at the very height of land on CL6 (see image 3, next page). This billy was bedded on the bluff. A yarding whistle sounded and the billy immediately stood up and faced downslope toward the disturbance. He remained standing in this position for approximately 10 minutes, at which point he turned and his hind was now facing downslope. Another whistle sounded shortly after he turned and he immediately reacted and turned back to face the disturbance again. From his location there is very little topographic buffering of the sound, although the level of sound would be reduced over this distance. Regardless, he still reacted immediately to the whistle noises and remained in alert posture for more than 10 minutes. This response is considered significant even though he was approximately 1km from the yarder location.
   - 1 Adult nanny and 1 kid were observed in the mid-portion of the polygon. They did not react overtly to the yarder noises, likely because their location was buffered topographically from the source and the sound would never reach them (see Image 3, below).
   - No goats or tracks were observed in the traditional bedding/foraging terrain area of this polygon. Consistently over several winters MOE staff and the author have observed goats using these bluff areas and foraging slopes (shown on Image 3). This portion of the GWR is not topographically buffered from the yarding disturbance and this is expected to have caused abandonment of the core habitat.
   - Chipmunk Creek GWR-CL3 – This GWR was surveyed again for comparative purposes. 12 goats were observed using the core habitat areas in the GWR. This GWR is not disturbed by the logging adjacent GWR-CL6 and also has high snow

levels. Goat use in relation to habitat function in this GWR has been consistent with goat use observed in GWR-CL6, through the years. In contrast to other areas of the GWR, these core areas have significantly less snow (i.e., observed tracks and trails appear to indicate that goats are moving around the winter range toward critical bedding/thermal and foraging locations in snow that is belly deep or more).

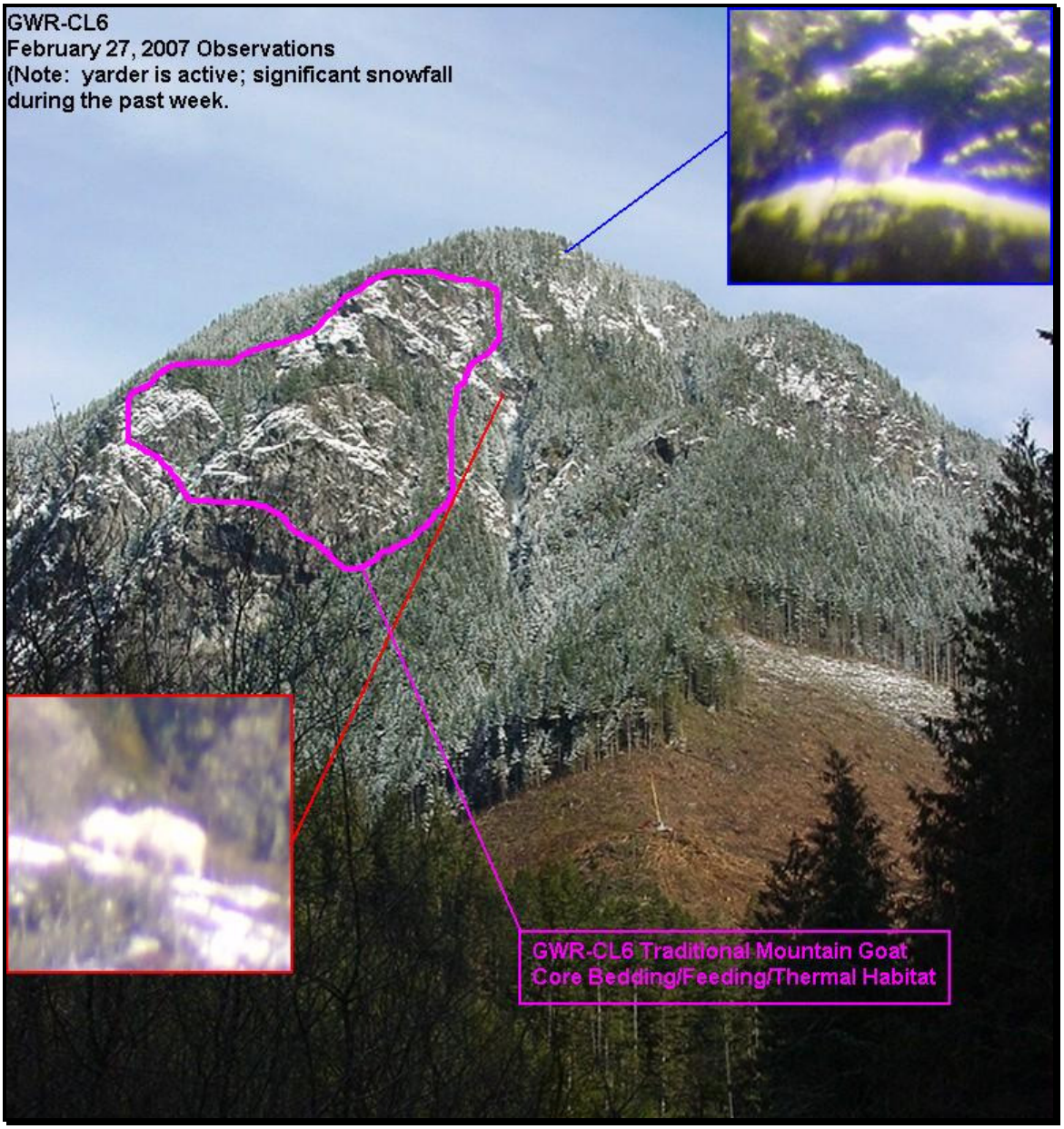

Image 3: Locations of goats observed on February 27, 2007 in relation to core habitat areas, GWR-CL6.

5. March 6, 2007: attended the GWR-CL6 again today and noted that the yarder had been removed, likely on the 5th. There was no further disturbance of the GWR. In response to this, goats were once again using the preferred habitats and in particular, the portion of the polygon known to be the core traditional bedding/feeding/thermal location. Observations are summarized below:
    - 6:50 AM - Arrived at the same viewing location, just past 4km marker on the Foley Creek Road. Observed 1 adult goat (Goat 1) bedded at the edge of the bluff, in the traditional bedding location. 2 additional adult goats (Goat 2 [bedded] & Goat 3 [standing]) were observed upslope of the first and were bedded. A 4th adult goat (Goat 4) was observed at the NW end of the GWR-CL6 polygon (refer to image 4, next page).
    - 7:20 AM - Sun began to hit the traditional bedding site, which was the first spot the sunlight reached the ground in this polygon. All goats remained in place.
    - 7:50 AM - All goats remain in the same position and location as when first observed.
    - 8:00 AM - Goat 1 stood up and stretched. When this goat was bedded it was facing to look down the Foley valley, out over the block area.
    - 8:04 AM - Goat 1 bedded back down facing in almost the opposite direction; now facing toward Foley Lake.
    - 8:15 AM - 1 additional goat (Goat 5) appeared near the NE corner of CL6 and was facing southerly. This goat was a kid (the Nanny associated with this kid would most likely be bedded out of site, typically very near the kid's location and would be the 6th goat). Goat 3 began grazing while walking approximately 20m in an easterly direction. Goat 3 bedded at the edge of the bluff facing almost directly south.
    - 8:31 AM - Goat 1 stood and began grazing along the top of the bluff, moving eastward.
    - 8:35 AM - Observations ended with all goats in the last locations noted above.
    - Nearby GWR-CL3 in Chipmunk Creek had 5 goats using expected bedding/thermal and foraging habitats.

    Given the high number of goats observed in the core winter range area immediately following Tamihi's removal of industrial equipment and completion of operations in the block, there is little doubt that Tamihi's operations alienated critical habitat portions of the GWR polygon. It is even more unfortunate that during this same period of logging activity was also the same period when snow/weather conditions were most critical for goats. The impacts associated with critical habitat alienation/abandonment during periods of inclement weather can range from simply a loss in body mass/reduction in fitness (i.e., burning fat reserves); to reduced fetus survival and significant increases in kid and yearling mortalities. Any of these impacts can affect population stability/viability over the long-term.

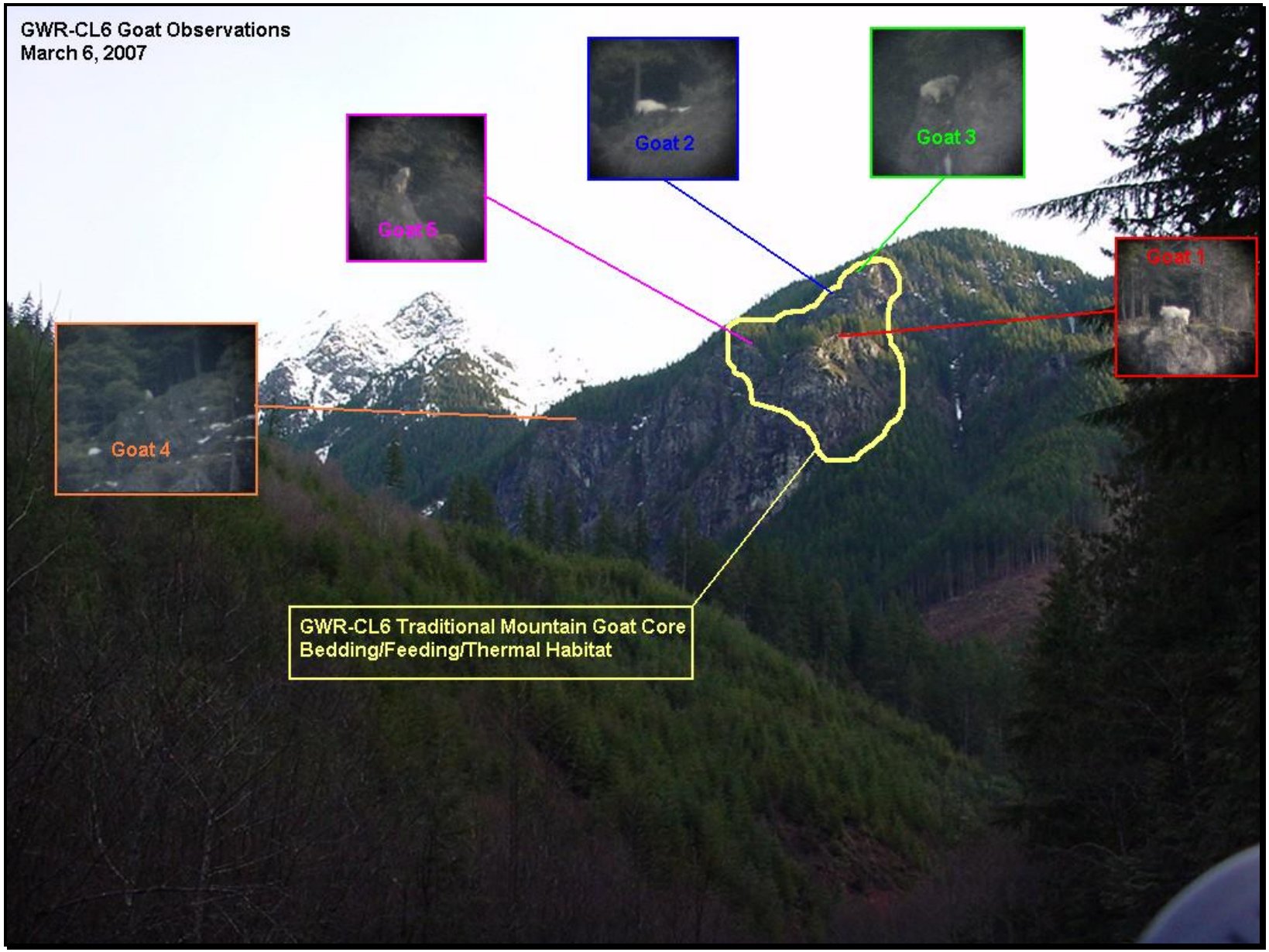

Image 4: Locations of goats observed on March 6, 2007 in relation to their core winter habitat, GWR-CL6.

Conclusions:

Disturbance impacts to mountain goats observed in this assessment, associated with the heli-logging in close proximity to GWR, are consistent with those in more formal published literature. These impacts can range from critical habitat alienation/abandonment, to reduced fitness, to reduced rates of productivity and higher rates of young-of the-year and sub-adult mortalities. For example, Foster and Rahs (1983) documented mountain goat flight responses associated with helicopters activities and noted a buffer distance of 2km from goats is required to avoid harassment. Cote (1996) recommended restriction of helicopter flights within 2km of areas that support mountain goat populations. Biologists also generally agree that mountain goats are more sensitive to aerial disturbance than sheep and other ungulates (Frid 2003); and Maier et al. (1998) found that female ungulates with young are especially sensitive to aerial disturbances. Disturbances such as helicopter activity can impact fitness-enhancing activities such as foraging, parental care and mating, and can significantly affect survival and reproduction through trade-offs between perceived risk and energy intake (Bunnell and Harestad 1989, and Frid & Dill 2002 *in* Toweill *et al*. 2004). Joslin (1986) showed an association between industrial activities and reduced rates of productivity in mountain goats, even when habitats were not abandoned. Fox *et al*. (1989 *in* Toweill *et al*. 2004) found that winter was a period of severe nutritional deprivation for mountain goats. Winter is thus of particular concern for the management of disturbance stimuli, because periods of deep snow can reduce food availability and increase locomotion costs (Dailey and Hobbs 1989 *in* Toweill *et al*. 2004). Rideout (1974), Smith (1977) and Chadwick (1977) all indicate that juvenile goat mortality will vary with winter severity.

Consistent with the author's observation notes from February 1st regarding negative impacts to behavioural patterns and the potential risk to goats resulting from early morning helicopter and cable-yarding disturbances, Foster & Rahs (1983) documented that early-morning-human-induced-disturbances cut short early morning foraging patterns. These goats were therefore affected through their compensation efforts by one or more of the following: selection of less preferred forage species in rocky habitats; exertion of more energy to obtain sparse vegetation in rocky areas; and increased nocturnal foraging patterns in more gently sloping areas. All of these could result in greater chance of accident, predation and maternal-offspring separation (Foster & Rahs 1983). Similarly Geist (1978) notes impacts from harassment and disturbance which range from reduced fitness of individuals to habitat abandonment and even death. The most critical times of disturbance tend to be during cold weather, late pregnancy when the fetus is most sensitive to maternal nutrition, and whenever else animals are in a state of negative energy balance (Geist 1978).

This winter (i.e., 2006/07), snow levels are considered to be above normal to very deep in various local watersheds. According to MOE snow pillow data, the Chilliwack River snowpack was 146% of normal levels on March 1, 2007 (Boyd 2007). This is a result of the weather patterns in February which were particularly inclement, with longer periods of colder temperatures than normal, and as such, MOE biologists would expect goat use to be concentrated on the critical portions of GWR polygons. Observations in the nearby

Chipmunk Creek watershed (GWR-CL3; undisturbed) of snow levels and goat habitat selection confirmed concentrated use and exploitation of traditional core areas within the GWRs. Rapid re-colonization of the core habitats in GWR-CL6 in Airplane Creek following removal of disturbance stimuli also confirms the priority selection of core habitat areas at this time during winter, by the goats reliant on this winter range. This re-colonization does not indicate a lack of negative impact, habituation, or even tolerance of the disturbances (observations and literature indicate otherwise). It does indicate that disturbance required goats to occupy less suitable/desirable habitats within the GWR polygon, in the closest proximity and at their highest level of tolerance to the disturbances. The associated physiological stresses and long-term population impacts on the local herd can only be hypothesized at this point, although the assumption would be that negative impacts have resulted.

Management Recommendations:

Although this monitoring project was not able to be undertaken as part of a formal monitoring project, important qualitative observations regarding goat behaviour toward logging disturbances and the implications associated with those activities were made. These observations can now be used, supported by peer reviewed and published literature, to assist in the development of a locally specific set of best management or operational practice standards which industry professionals can employ. This report can also guide delegated decision makers such as the District Manager, MOFR when making determinations with respect to Forest Stewardship Plans and Cutting Permits as they relate to practice standards, performance measures and FPC & FRPA provisions.

Recommendations for best management practices related to operations near GWR are:

1. The current MOE, Region 2 GWR Timing Window Policy should be revised and include the measures listed in points 2-6, below.
2. Industrial ground-based operations within 1,000m and aerially-based operations within 2,000m of GWR habitat should be confined to a period extending from May 1 to October 31 of a calendar year. MOE staff should be involved in decision making around the approval of industrial activities that are proposed outside this period (i.e., during winter months).
3. Considerations around the application of MOE's timing window and proposed variances to it, should consider unique topographic characteristics. Complex slopes can provide noise attenuation, as such, core portions of the GWR may not be alienated by operations. This consideration has to occur on a polygon by polygon and block by block basis.
4. Snow depths and storm events must be considered. Inclement weather periods and periods of higher snow accumulations can force goats to move and concentrate in specific core habitat areas. Industrial operations that are approved outside the window must consider these events and implement measures to minimize impacts, even at the expense of shutting down operations for a short period.
5. Yarding operations within 2 km of GWR must employ the use of mitigation strategies such as radio communications between the yarder operator and the choker-men. As observed in this assessment, whistle-based communication can illicit overt flight responses and result in negative impacts to goats at great distances. Use of radio communications during cable-yarding of block 1023 would have significantly reduced disturbance impacts.
6. Truck loading and hauling activities within 1,000m of GWR should be confined to the daylight periods, perhaps 1hr after sunrise to 1hr before sunset, to allow goats to exploit critical foraging locations undisturbed, at times when goats would typically be foraging. This would also minimize the likelihood of accidental injuries/falls and deaths, resulting from a flight response by goats during the dark hours of the day.

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Appendix 1

Previous spot survey observations are as follows:

- March 30, 2000, MOE staff observed 4 goats and numerous sets of tracks in GWR-CL6, in and around the location shown by Goat 1 (Image 4, page 9 above);

- January 23, 2001, MOE staff reconfirmed use in this GWR observing several sets of tracks and 3 goats (1 nanny, 1 kid & 1 female sub-adult) during an aerial fly-over in a similar location as shown by Goat 1 (Image 4, above);

- The author observed 3 goats (nanny with last year's twins) on February 23, 2004 in the area labelled, *Traditional Bedding Area*', as identified on Image 4;

- Tamihi logging has provided information regarding observations of mountain goats in GWR-CL6 in winter. Tamihi observed 7 goats on October 27 and 28, 2004 in and around the locations of Goat 1 and Goat 3; and 14 goats on November 8, 2004 dispersed across all the same locations as identified by Goat 1 through Goat 5, on Image 4;

- The author observed 9 goats (4 Nannies, 2 kids, 2 yearlings & 1 Billy) on November 29, 2004 in the same locations as the November 8th Tamihi observations;

- On April 5, 2005, 3 goats (1 Nanny, 1 Yearling, 1 Sub-Adult Nanny) were observed in this GWR using the top of the rock bluffs at the mouth of Airplane Creek, in a similar location as Goat 1, shown on Image 4, above;

- November 14, 2005, 4 goats observed (3 bedded [1 Nanny, 1 kid, 1 unknown] and 1 foraging [sub-adult]) in and around the *Traditional Bedding Area* (Image 4, page 9).

Appendix 2

Regional Mountain Goat Winter Range Timing Policy, July 15, 1997.

BRITISH COLUMBIA

July 15, 1997

Environment and Lands Region 2 Mountain Goat Winter Range Timing Restriction Policy

Background:

Mountain Goats (*Oreamnos americanus*) are a species of management concern in the Lower Mainland Region and have been shown to be extremely sensitive to human-induced disturbance. Due to their sensitivity to disturbance, special measures are necessary to ensure mountain goats are not adversely affected by proposed industrial operations. Of particular concern is activities proposed in close proximity to areas utilised by mountain goat populations as winter range habitat. Such areas often provide critical escape terrain, security and thermal cover, and foraging opportunities for goats during the winter months. Disturbance during critical periods may discourage mountain goats from travelling to suitable winter range habitats, forcing them to occupy sub-optimal habitats thereby reducing their chances of survival, or displace them completely. To ensure protection of over wintering mountain goats, regional Environment and Lands requires that all activities within 500 metres of winter range habitat be restricted to the period of May 1 to October 31 in a given year. Regional Environment and Lands, Fish, Wildlife and Habitat Protection has developed the following policy regarding all proposed industrial activities adjacent to winter range habitats outside this timing window:

1. All industrial operations within 500 metres of known mountain goat winter range habitat must be undertaken between May 1 to October 31 in a given year. Deviations or extensions to this timing window will not normally be granted except as outlined below. Note: 500 metres is considered a minimum distance based on the results of reviews of existing literature and field observations of mountain goat behaviour by Fish, Wildlife and Habitat Protection staff. There may be occasions where operations greater than 500 metres from winter range habitats may require application of a timing restriction due to site specific factors such as elevation, aspect, topography, heavy snowfall, etc. An additional timing restriction may be applied after May 1 where critical natal habitats are identified by Fish, Wildlife and Habitat Protection.

2. Extension requests will not be considered after November 15 or before April 15. Any extensions granted will be on a day to day basis, dependent upon weather conditions and presence of goats. Works areas are to be kept small so operations can be stopped on short notice.

Ministry of Environment, Lands and Parks

Environment and Lands
Lower Mainland Region

Mailing/Location Address:
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3. Extensions will not be granted for activities involving significant or sustained disturbance such as helicopter yarding, road construction with heavy equipment, drilling, or blasting.

4. Each extension request will be evaluated on its own merit according to the historical intensity of mountain goat use of an area, type of work proposed, current weather conditions and short and long term weather forecasts. Note that any relaxation of operational constraints is contingent upon goats not using the area and continuation of favourable weather conditions.

5. The absence of mountain goats must be determined prior to operations outside the constrained work period. It is the proponent's responsibility to conduct a brief aerial survey (to the satisfaction of Fish, Wildlife and Habitat Protection staff) to confirm that goats are not present. If any sign of mountain goat activity is noted within 500 metres of the proposed operational area, all work must cease and no extension will be granted. Note that helicopter flights in themselves can cause excessive disturbance to wintering goats. If goats or tracks are sighted during overflights, the flight should be terminated immediately and the location and type of sign forwarded to F&W staff. **Repeated overflights of occupied habitats are not to occur.**

6. Fish and Wildlife Management staff must be informed in writing of the results of assessments prior to work occurring. Reports will then be assessed by this agency to determine if relaxation of the work window is appropriate. Works outside the timing window are not permitted until confirmed by Fish and Wildlife Management staff.

7. When an extension has been granted, work may be allowed to continue when minor snowfalls (i.e. less than 8 hours duration and less than 0.3 metres in depth) occur. However, when snowfalls exceed 0.3 metres in depth or continue for longer than 8 hours, all work is to cease and the timing restriction will be enforced.

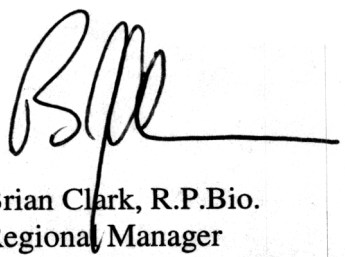
   Fish, Wildlife and Habitat Protection may revise this protocol subsequent to receipt of additional information.

8. Where the locations of known mountain goat winter ranges have been provided to the licensee, it must be shown on operational Plans (i.e. Forest Development Plans) to reflect "best known information" as per Section 11 of the Operational Planning Regulations.

9 Fish and Wildlife Management reserves the right to recommend non-approval of extension requests where proposed works present an unacceptable risk to over-wintering mountain goat populations.

Please be advised that regional Environment and Lands will be updating winter range maps once the results of the 1997/98 FRBC mountain goat winter range inventory have been collated.

Please contact the appropriate regional Fish, Wildlife and Habitat Protection District staff (Forest Ecosystem Specialists or Habitat Protection Officers) in your area if you have any questions or require further information.



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