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By
Becky Cadsand, Michael Gillingham, Doug Heard,
Katherine Parker, and Garth Mowat

Becky Cadsand completed a MSc. in the Natural Resources and Environmental Studies Graduate Program, University of Northern British Columbia, Prince George, B.C., Canada. Michael Gillingham and Katherine Parker are faculty in the Ecosystem Science and Management Program and members of the Natural Resources and Environmental Studies Institute, University of Northern British Columbia, Prince George, B.C., Canada. Doug Heard is with BC Fish, Wildlife and Habitat Division, BC Ministry of Forests, Lands and Natural Resource Operations, Prince George, B.C., Canada. Garth Mowat is with Natural Resource Science Section, B.C. Ministry of Forests, Lands and Natural Resource Operations, Nelson, B.C., Canada.

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University of Northern British Columbia
3333 University Way
Prince George, BC Canada
V2N 4Z9

Phone: 250-960-5288
Email: nresi@unbc.ca
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Abstract

Heliskiing activity has increased in many areas of mountain goat (*Oreamnos americanus*) range, particularly in British Columbia (B.C.). Current B.C. guidelines recommend that heliskiing activity remains ≥1500 m from mountain goat winter range when the helicopter is visible to animals, and ≥500 m when the helicopter is masked by topography. Whether these guidelines effectively prevent disturbance of mountain goats, however, is unknown. In 2007 – 2010, we examined locations and movements of 11 female mountain goats relative to heliskiing activity. We determined the proximity and frequency of heliskiing activity that animals were exposed to given current guidelines, and through examination of disturbance responses, determined how guidelines could be revised to better mitigate impacts of heliskiing activity. Although adherence to current guidelines eliminated most heliskiing activity that could result in disturbance, incidental helicopter approaches occurred within 1500 m of collared mountain goats with frequencies of exposure up to 1 h • month^{-1} • animal^{-1}. Animals reacted to helicopters ≤2 km away, and responded equally to visible and non-visible helicopters. Seasonal effects on movement behaviour, however, were not evident, potentially because of the low frequency of helicopter exposure. We recommend that the B.C. guidelines be revised to: 1) establish no-fly areas within 1500 m of goat habitat regardless of visibility; 2) require pre-planning of heliskiing activities to ensure that no-fly areas are effectively avoided; and 3) extend no-fly areas to 2 km where heliskiing frequencies exceed 1 h • month^{-1} to minimize the cumulative effect of incidental encounters. These guidelines should apply consistently to all helicopter activity.

Introduction

Mountain goats (*Oreamnos americanus*) are alpine-dwelling ungulates that occupy the mountains of western North America, with over half of the species' population occurring in British Columbia (B.C). Within B.C., mountain goats are currently ranked as "apparently secure"; however, there are several herds in the south of the province that have experienced significant decline, and others that have been recently extirpated (Mountain Goat Management Team 2010). The growth rate of mountain goat populations is typically lower than in other ungulate species, because of low survival of kids and yearlings and conservative female reproduction strategies (including the late onset of reproduction and reduced frequency of breeding; Festa-Bianchet and Côté 2008). Concerns regarding recent population declines, and a limited ability to recover from them, have led to mountain goats being assigned the highest priority under B.C.'s Conservation Framework and has necessitated a cautious management approach that aims to mitigate threats to survival and reproduction, including human disturbance (Mountain Goat Management Team 2010).

Human disturbance within mountain goat range is often associated with helicopter-based activities. In contrast to other forms of disturbance, helicopter activity is of specific concern because of their large area of influence and the often unpredictable flight paths and high-decibel noise, which increase the likelihood of startling wildlife (Larkin 1996). Mountain goats often respond to helicopters by increasing vigilance, fleeing to escape terrain, and hiding (Foster and Rahs 1983, Côté 1996, Goldstein et al. 2005). Although it is not known whether these immediate behavioural responses translate to demographic effects, mountain goats repeatedly exposed to helicopter activity may be displaced from critical habitat or experience significant energetic costs because of avoidance behaviours (Festa Bianchet and Côté 2008). Chronic stress from repeated disturbance could also affect individuals physiologically, reducing rates of reproduction and increasing vulnerability to disease (Millspaugh et al. 2001).

Heliskiing is unique among helicopter-based activities because it occurs in times of peak snow accumulation, and takes place in the steep alpine areas that are often in close proximity to wintering areas used by mountain goats. During winter the consequences of disturbance are particularly high because of the increased energetic costs of movement through deep snow, and the limited forage available to animals to help compensate for energetic losses caused by fleeing. Winter severity, indexed by snow depth, is a significant factor contributing to both kid production and natural mortality of mountain goats (Adams and Bailey 1982, Holroyd 1967, Swenson 1985). Additional stress and energetic costs that result from heliskiing disturbance during this period could, therefore, be critical to survival and reproduction, and ultimately, population size.

To mitigate for the potentially detrimental effects of heliskiing activity, the B.C. Government established the Wildlife Guidelines for Backcountry and Commercial Tourism (Government of British Columbia 2006). According to those guidelines, heliskiing activity is recommended to remain ≥1500 m from mountain goat winter range when the helicopter is visible to animals, and ≥500 m when the helicopter is masked by topography. Adherence to those minimum separation distances, in addition to a ban on landing in winter range and seasonal closures of critical areas, is thought to minimize disturbance to mountain goats and ensure continued occupancy of their current range (Government of British Columbia 2006). Ideally, best-management practices are achieved through the co-operative efforts of the heliskiing operator and wildlife biologists to identify areas of mountain goat winter range within tenure areas and pre-plan flight routes and ski-runs to ensure that no activities occur within the winter range no-fly areas. Compliance is demonstrated by incorporating the recommended wildlife-avoidance measures into tenure management plans. Both tenure holders and biologists, however, have recognized that a more thorough understanding of mountain goat responses to heliskiing activities is needed to ensure that mitigation strategies are both necessary and effective.

To better understand the response of mountain goats to heliskiing and to determine whether the current guidelines are adequate to minimize disturbance, we undertook a 3-year study to examine the movements and resource use of a sample of GPS-collared female mountain goats inhabiting a heliskiing tenure area. By acquiring a detailed simultaneous record of mountain goat movements and heliskiing activity, we determined the proximity and frequency of heliskiing activity that mountain goats were exposed to and quantified changes in movement and resource use that could be attributed to helicopter activity. Here, we review the main findings of that work as it applies to recommending changes to the B.C. Wildlife Guidelines. Because the tenure operator (Last Frontier Heliskiing, hereafter LFH) had incorporated the best practices of the B.C. Wildlife Guidelines this study provided an opportunity to evaluate how effective the current guidelines are in preventing disturbance, and make recommendations on how they might be improved in the future.

Methods

Study Area

Our research took place within the LFH tenure area in the Coast Mountains of Northwest B.C. (~240 km south of Dease Lake on Highway 37; Figure 1). The area was an ideal location to examine helicopter-mountain goat interactions because: 1) it supported a high density of mountain goats (~0.45 goats • km^{-2}); 2) interactions between mountain goats and helicopters were largely restricted to heliskiing activities, thereby preventing confounding sources of disturbance; and 3) the heliskiing tenure operator was interested in the study and willing to record all heliskiing activity over the 3-year study period.

Data Collection

Over the course of the study, 19 adult female mountain goats were captured and equipped with GPS collars (GPS2000; Applied Telemetry Systems, Insanta, MN), which acquired locations every 1 – 6 h during the heliskiing season. To capture animals we used a ground-trapping technique (Figure 2; see Cadsand et al. 2011) rather than conventional

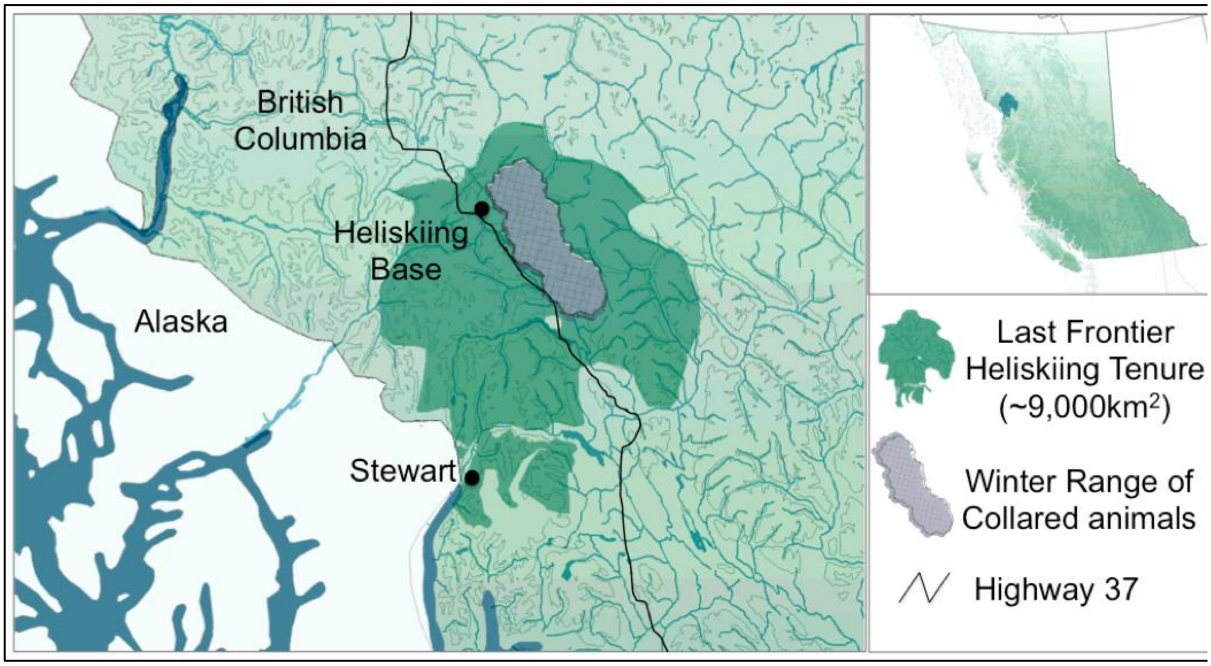

Figure 1. The Northern Skeena Mountains study area where interactions between mountain goats and helicopters were examined in 2007 **–** 2010. The darker green shaded area is the Last Frontier Heliskiing tenure area, the lighter polygon within it represents the winter range of collared mountain goats in the study.

helicopter-based net gunning to avoid potential sensitization of study animals to helicopters that could affect subsequent reactions to heliskiing activity. Animals were captured at 4 capture sites located along a gradient of heliskiing use (Figure 3).

Heliskiing activity was measured by placing GPS receivers (Garmin GPSMAP 76CSx, Olathe, KS) onboard all helicopters (A-Star B2 and Bell 407) that operated during the 3-heliskiing seasons of the study period (2007 – 2008, 2008 – 2009, and 2009 – 2010). GPS receivers were pre-programmed to record the location, elevation, and speed of the helicopter every 100 m of flight. Following each day of helicopter activity, LFH guides downloaded the GPS helicopter data to an onsite computer.

Analyses

For each mountain goat location, we used several Geographic Information System (GIS) tools to determine whether any heliskiing activity had occurred within 2 km of the animal in the previous 6 h (see Cadsand [2012] for details). Based on prior research (Foster and Rahs 1983, Côté 1996, Goldstein et al. 2005), we assumed mountain goats only responded to helicopters that were within 2 km, and for this reason, did not examine disturbance responses beyond the 2-km distance. For animal locations where helicopter activity had occurred within the 2-km distance threshold, we determined the: 1) duration of helicopter activity; 2) proximity of the helicopter relative to the animal; 3) visibility of the helicopter to the animal;

Figure 2. Female mountain goat captured in Clover trap during 2009 mountain goat capture session.

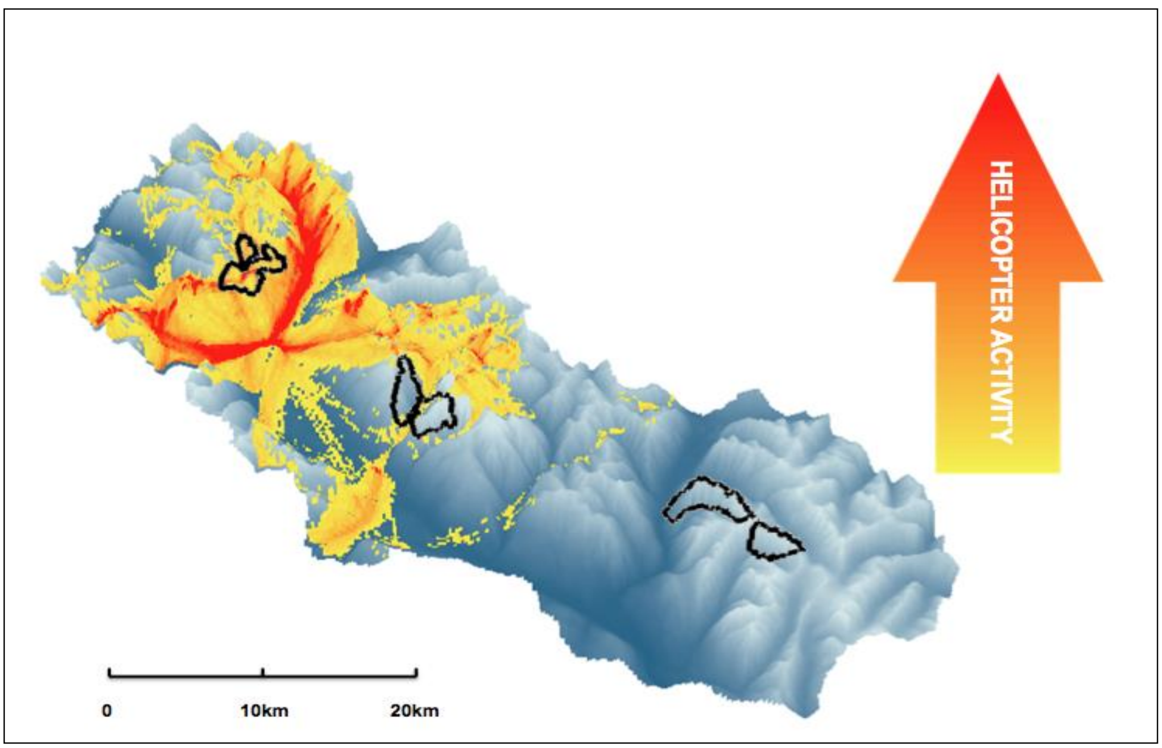

Figure 3. Study area showing the gradient of heliskiing activity within study area. Black outlines represent the winter range of collared animals.

4) position of the helicopter relative to animals (i.e., above or below); and 5) presence or absence of landing activity. We also used GIS to query the elevation, slope, ruggedness, aspect, and distance to escape terrain for each mountain goat location.

Using those data, we determined how often mountain goats were exposed to helicopter activity both daily and seasonally. Following exposure to helicopter activity, we examined the movement behaviour of collared animals for the following 72 h to determine whether a disturbance response occurred. We defined a disturbance response as when the animal either made an anomalous movement or was displaced from the area where the disturbance occurred. We then examined specific helicopter exposure events using an information-theoretic approach to identify what factors related to helicopter activity (i.e., visibility, proximity, position, and duration) or the environment (i.e., terrain and land-cover) increased the likelihood of a disturbance response occurring, and should be accounted for in prescriptive measures.

At a seasonal scale, we examined for changes in seasonal movement and resource-use associated with heliskiing activity. We examined relationships between seasonal-movement metrics and heliskiing exposure of collared animals using Spearman's rank correlation test. We determined whether animals avoided areas of heliskiing or exhibited other changes in seasonal resource use in areas of increased heliskiing activity using resource selection function analyses within an information-theoretic framework (see Cadsand [2012] for details).

Results and Discussion

Over the 3 heliskiing seasons examined, 2% of heliskiing activity (214 helicopter exposure events) occurred within 2 km of collared animals. The remaining 98% of heliskiing activity occurred in areas >2 km away from any collared mountain goats, and was not likely to negatively influence animals. Of the 214 helicopter exposure events, 37 approaches were within 500 m, 139 approaches were between 500 m – 1500 m, and 38 approaches were between 1500 m – 2 km.

Collared animals showed low movement rates typical of mountain goats during the winter season, ranging from 5 – 15 m • h^{-1}. Following helicopter approaches within 2 km, however, collared animals often exhibited anomalous, long-distance movements ranging from 97 m – 3.4 km. The proportion of anomalous movements exhibited by individuals appeared to be unrelated to their cumulative heliskiing exposure, but indicated that some animals were more likely to respond to disturbance with movements than others (Figure 4). The variation in responsiveness to disturbance could be attributed to differences in wariness among individuals, perhaps due to reproductive status, or differences in environments inhabited by animals.

Disturbance was more likely when helicopters were closer to mountain goats, with anomalous movement responses occurring 68% of the time when the helicopter approach was within 500 m, and 42% of the time when the helicopter approaches was between 500 m and 2 km. Approximately 62% of the movement responses occurred within 6 h of

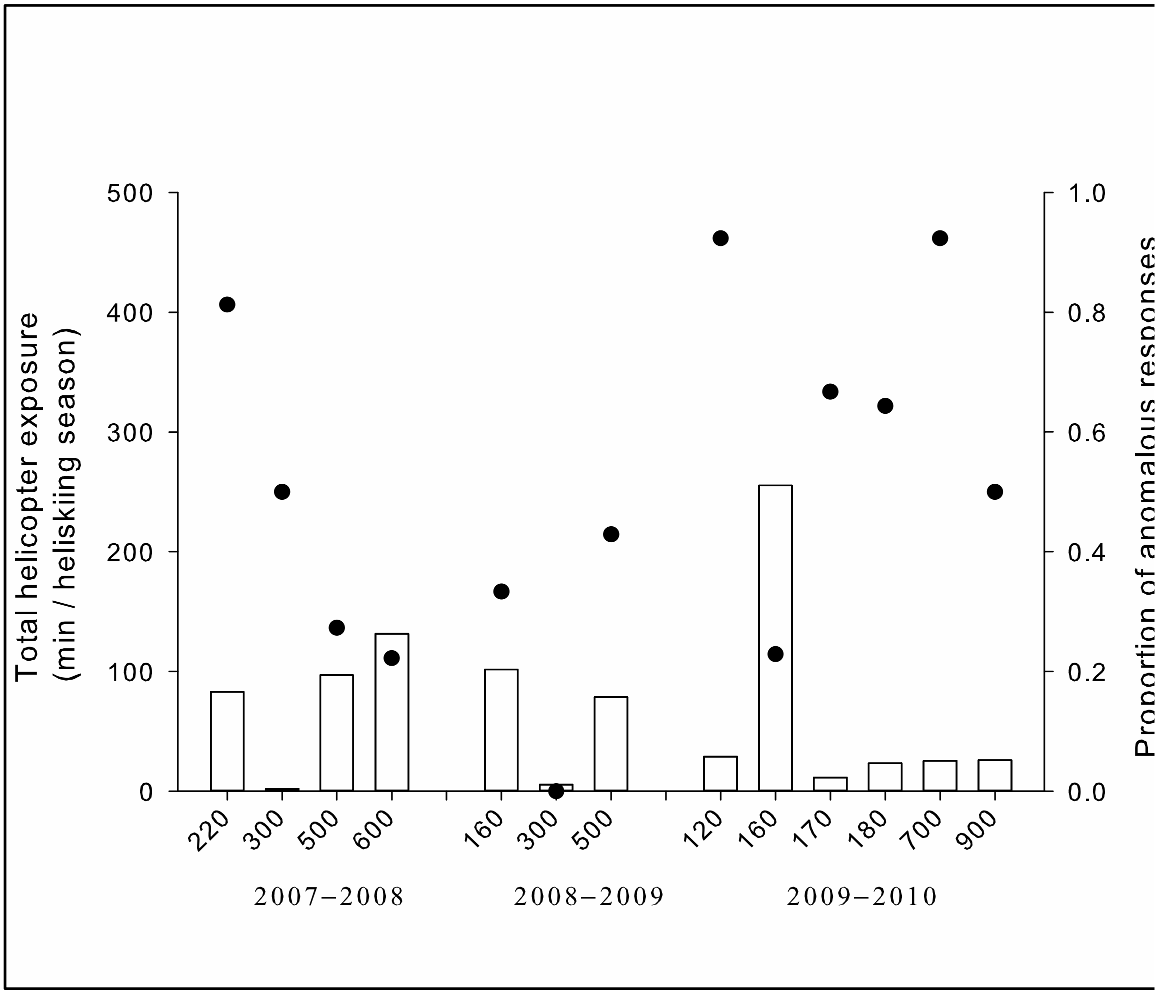

Figure 4. The observed proportion of anomalous movements made by female collared mountain goats in response to helicopter approaches within 2 km (●) on the right axis and the cumulative seasonal helicopter activity that mountain goats were exposed to that year (open bar) on the left axis. Values on the x-axis represent individual animals, some of which were collared during multiple heliskiing seasons (2007 – 2010).

the disturbance event, and the remaining 38% of responses were lagged, occurring 6 h – 48 h after the disturbance event. Being able to detect these lagged responses to disturbance prevented us from underestimating both the frequency and intensity of the disturbance responses to heliskiing activity.

Animals responded equally to visible versus non-visible helicopter activity within 2 km (likelihood-ratio χ_{12} = 1.24, P = 0.27). This finding emphasizes the disruptive effect of the noise associated with helicopter activity, and lends support to previous work showing that mountain goats were disrupted primarily by auditory cues rather than visual cues (Foster and Rahs 1983). When we examined both immediate and lagged responses, animals were more likely to flee when the helicopter was at close proximity and the animal was distant from steep escape terrain. Other factors that appeared to influence anomalous movements were the occurrence of landings, when animals appeared to be less likely to

Table 1. Factors influencing probability of immediate and lagged anomalous movements of collared female mountain goats to helicopter approaches in the Northern Skeena Mountains. Results are based on models identified through an information theoretic approach (see Cadsand 2012 for details). The sign of the effect needs to interpreted relative to each measurement. For example, the farther an animal was from escape terrain, the more likely it was would show a response; the larger the distance of the approach, the less likely an animal would respond**.**

Immediate Response		**Lagged Response**	
Factor	**Effect**	**Factor**	**Effect**
Distance to escape terrain	+	Distance to escape terrain	+
Proximity of approach	–	Proximity of approach	–
Landings within 2 km	–	Landings within 2 km	–
Disturbance history	–	Ruggedness	–

move, and disturbance history, where animals that had experienced higher levels of disturbance in the past were less likely to move immediately, but still exhibited lagged movements (Table 1; see Cadsand 2012 for the detailed analyses).

At a seasonal scale, we found that neither average movement rate or range size were related to heliskiing exposure (all $P > 0.05$; Table 2), however, in 2 of the 3 years, animals inhabiting areas of higher heliskiing activity often had higher maximum movement rates during the heliskiing season ($P < 0.01$ in 2009 and 2010; Cadsand 2012). In other words, although animals disturbed by heliskiing were observed to move longer distances than animals in less disturbed areas, these movements did not occur frequently enough to affect average movement rates over the entire heliskiing season. This is not surprising given the low frequency of heliskiing activity that animals were exposed to over the duration of the study (i.e., maximum exposure of 1 h • month^{-1} • animal^{-1}; Figure 4).

When examining seasonal resource-use patterns, we found that within their range, animals did not avoid areas used for heliskiing (Cadsand 2012). There was some evidence, however, that animals in areas of higher heliskiing activity were more likely to exhibit a security based strategy, (utilizing steep slopes, rugged terrain, and areas that provided better visibility), relative to animals inhabiting areas of low levels of heliskiing activity, which typically selected for areas based on an aspect based strategy that maximized solar insolation and minimized snow accumulation (Figure 5; Cadsand 2012).

Table 2. Relationship between the amount of heliskiing exposure (in min) that collared female mountain goats in the Northern Skeena Mountains were exposed to and the average movement rate and range size over the heliskiing season. *n* is the number of animal-heliskiing seasons tested, $\bar{r}_s$ is the Spearman's rank correlation coefficient, and *P* is the associated probability value that these relationships could have occurred by chance.

Variable	*n*	$\bar{r}_s$	*P*
$\bar{x}$ movement rate	15	0.03	0.92
Range Size	15	-0.08	0.77

Although the short-term daily or seasonal responses to disturbance are most often documented in disturbance studies, it is the longer-term effects of disturbance to an individual's survival and reproductive ability that are critical to wildlife populations. Whether short-term disturbance responses, such as anomalous movements, ultimately affect an individual's survival or reproductive ability will depend on the frequency of disturbance, the energetic costs of the disturbance response, and whether the animal is able to compensate for energetic costs or habituate to the disturbance stimuli (Gill et al. 2001, Fortin et al. 2004). In winter, disturbance responses are more difficult for animals to compensate for because of the increased costs of movement through deep snow, and the lower quality and quantity of forage available.

The frequency of disturbance depends on the intensity and distribution of helicopter

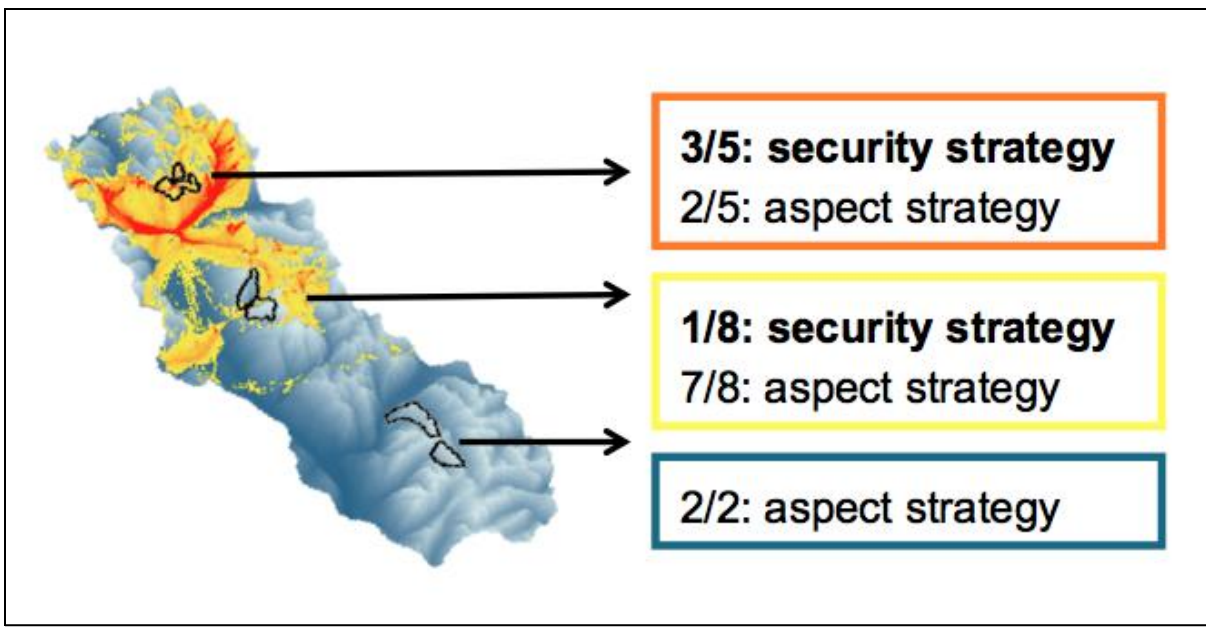

Figure 5. The number of animals exhibiting either a security based strategy or aspect based strategy across the study area. Ratio represents the number of animals showing that strategy relative to the total number of animals-seasons analyzed for that capture area. Capture areas are stratified by relative heliskiing activity with the highest activity in the northern capture site and lowest heliskiing activity in the southern site.

activity, and the management actions taken to prevent disturbance responses from occurring. In our study the low level of heliskiing disturbance was likely due to practices adopted by LFH to avoid mountain goat winter range. In 2006, LFH, regional biologists, and government agencies worked together to identify the wintering areas of mountain goats within the tenure area. The company then altered flight routes, landing areas, and ski runs to ensure its activities remained ≥1500 m from mountain goat winter range when the helicopter was visible to animals, and ≥500 m when the helicopter was masked by topography. The small amount of heliskiing activity recorded within 2 km of mountain goats (2%) is evidence of the success of these management actions in reducing potentially disruptive heliskiing activity.

In evaluating the efficacy of the guidelines, however, it is important to note that the current recommended avoidance measures did not prevent all heliskiing activity disruptive to mountain goats. In some cases, animals reacted to heliskiing activity that was permitted given the current guidelines, (i.e., visible approaches between 1500 m – 2 km, as well as non-visible approaches between 500 m – 2 km). In other cases, animals were outside of the predicted winter range areas / no-fly areas and not able to be detected and avoided, or the helicopter entered the no-fly area, potentially for reasons related to weather or safety. In the following section we discuss several revisions that could be made to the current guidelines to further minimize disturbance to mountain goats within heliskiing tenure areas.

Recommendations

If the management objective is to eliminate disturbance of mountain goats, we recommend a 2-km, no-fly area surrounding mountain goat winter range that applies regardless of helicopter visibility. This extended no-fly area would help mitigate for the disruptive effects of noise from heliskiing activity and ensure that disturbance does not compromise sensitive animals in a population. The extended buffer area would also help compensate for inherent errors in the predicted winter-range areas of mountain goats, reducing the number of disturbance events that occur because animals are outside of designated no-fly areas. Reduction in the recommended 2-km separation distances should be considered only if both visual and auditory effects could be mitigated by topography as determined through the use of viewscape and soundscape modeling when determining no-fly areas (see Andrus and Howlett 2006 for an example of soundscape modeling).

If the management objective is to maintain normal seasonal movement behaviour and range occupancy by mountain goats but accept that disturbance events will occur periodically, the current 1500-m separation distance is likely sufficient provided that mountain goats are exposed only to low frequencies of helicopter activity (i.e., <1 h • month^{-1} as observed in our study). In areas where there are multiple sources of helicopter activity, all sources of helicopter activity must be considered cumulatively in an assessment of disturbance effects. When the frequency of heliskiing activity within 1500 m – 2 km of mountain goat range is greater than 1 h • month^{-1}, separation distances should be extended to 2 km or cumulative frequency of flights reduced to threshold levels of ≤1 h • month^{-1}.

Additional factors that were outside the scope of this study, but that should be addressed in the management strategy include the types and number of machines used, timing of operations, and the nature of the terrain accessed. Further work could help determine whether limitations on the number of helicopters within an area, or type of machine used within mountain goat range are necessary. Also, it is important to note that the wintering strategies of mountain goats vary across their range, and this may affect how often animals are exposed to heliskiing activity, and their reactions to it. The mountain goats monitored in our study wintered at high elevations, and virtually all (98%) of the heliskiing activity occurred below them. Mountain goats that winter within lower elevation forested areas may respond differently to heliskiing activity in terms of movement responses or changes in resource use.

Lastly, to achieve meaningful mountain goat conservation goals, guidelines to minimize disturbance should be applied consistently across all helicopter-based industry. Within the heliskiing industry, the management plans of all tenure holders should be reviewed to ensure that they include adequate mountain goat avoidance measures (i.e., identification of mountain goat winter range and corresponding no-fly zones, and pre-planning of flight routes and skiing activities around these no-fly zones). Records of helicopter flight history acquired using Skytracking services already present on most helicopters, or an onboard GPS receiver programmed to record flight tracks, could be used as a condition of the tenure permit to allow for review of compliance. To minimize total disturbance, the recommendations discussed above should be applied to all helicopter activities occurring within mountain goat range throughout the year.

References

Adams, L.G. and J.A. Bailey. 1982. Population dynamics of mountain goats in the Sawatch Range, Colorado. *Journal of Wildlife Management* 46:1003–1009.

Andrus, K., and T. Howlett. 2006. Development of a heliskiing and mountain goat habitat management model. Available at: http://esri.com/mapmuseum/mapbook_gallery/volume19/environment4.html.

Cadsand, B. 2012. *Responses of mountain goats to heliskiing activity: Movements and resource use.* [MSc Thesis] University of Northern British Columbia, Prince George, British Columbia, Canada. available at: web.unbc.ca/~michael/Pubs/Cadsand_thesis_Sept_2012.pdf).

Cadsand, B., B. Jex, and M. P. Gillingham. 2011. Modified clover trap for capturing mountain goats in Northwest British Columbia. *Proceedings of the Biennial Symposium of the Northern Wild Sheep and Goat Council* 17:71–77.

Côté, S.D. 1996. Mountain goat responses to helicopter disturbance. *Wildlife Society Bulletin* 24:681–685.

Festa-Bianchet, M., and S.D. Côté. 2008. *Mountain goats: ecology, behaviour, and conservation of an alpine ungulate.* Island Press, Washington, D.C., USA.

Fortin, D., M.S. Boyce, and E.H. Merrill. 2004. Multi-tasking by mammalian herbivores: overlapping processes during foraging. *Ecology* 85:2312–2322.

Foster, B.R., and E.Y. Rahs. 1983. Mountain goat response to hydroelectric exploration in Northwestern British Columbia. *Environmental Management* 7:189–197.

Gill, J.A., K. Norris, and W.J. Sutherland. 2001. Why behavioural responses may not reflect the population consequences of human disturbance. *Biological Conservation* 97:265–269.

Goldstein, M.I., A.J. Poe, E. Cooper, D. Youkey, B.A. Brown, and T.L. McDonald. 2005. Mountain goat response to helicopter overflights in Alaska. *Wildlife Society Bulletin* 33:688–699.

Government of British Columbia. 2006. *Wildlife guidelines for backcountry tourism/ commercial recreation.* Available at: http://env.gov.B.C.ca/wld/twg/index.html.

Holroyd, J.C. 1967. Observations of Rocky Mountain goats on Mount Wardle, Kootenay National Park, British Columbia. *Canadian Field-Naturalist* 81:1–22.

Larkin, R.P. 1996. *Effects of military noise on wildlife: a literature review*. Technical Report 96/21. Centre for Wildlife Ecology, Illinois, USA.

Millspaugh, J.J., R J. Woods, K.E. Hunt, K J. Raedeke, G.C. Brundige, B.E. Washburn, and S.K. Wasser. 2001. Fecal glucocorticoid assays and the physiological stress response in elk. *Wildlife Society Bulletin* 29:899–907.

Mountain Goat Management Team. 2010. *Management plan for the mountain goat (Oreamnos americanus) in British Columbia*. British Columbia Ministry of Environment, Victoria, 87pp.

Swenson, J.E. 1985. Compensatory reproduction in an introduced mountain goat population in the Absaroka Mountains, Montana. *Journal of Wildlife Management* 49:837–843.

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