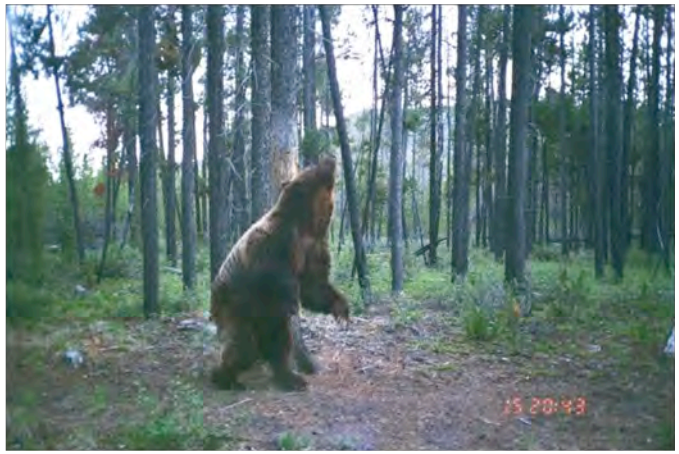
AN INDEPENDENT REVIEW OF THE ENVIRONMENTAL IMPACT DOCUMENTS FOR THE PROSPERITY MINE [TERRESTRIAL/WILDLIFE COMPONENT]

April 26, 2010 Draft



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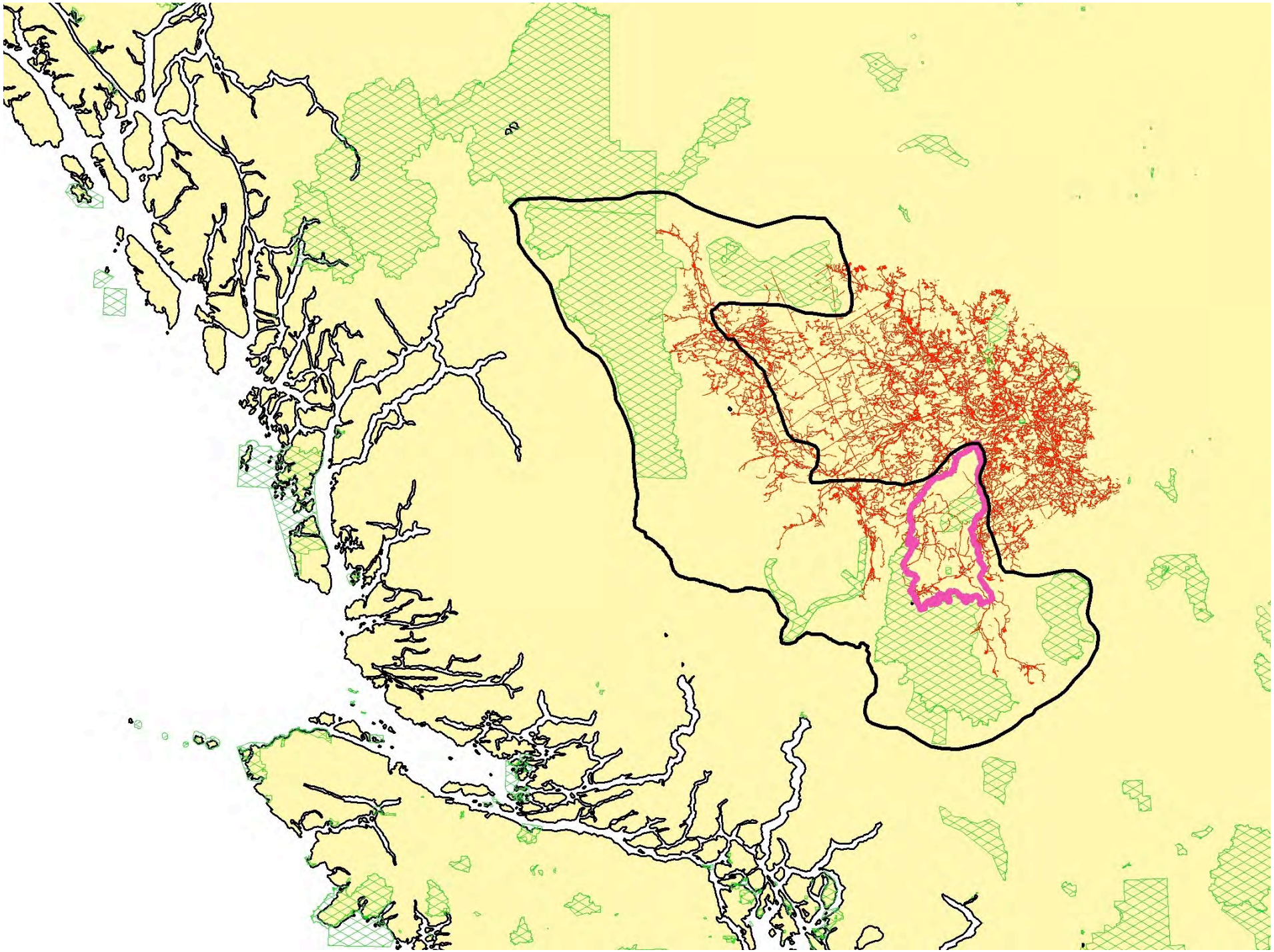


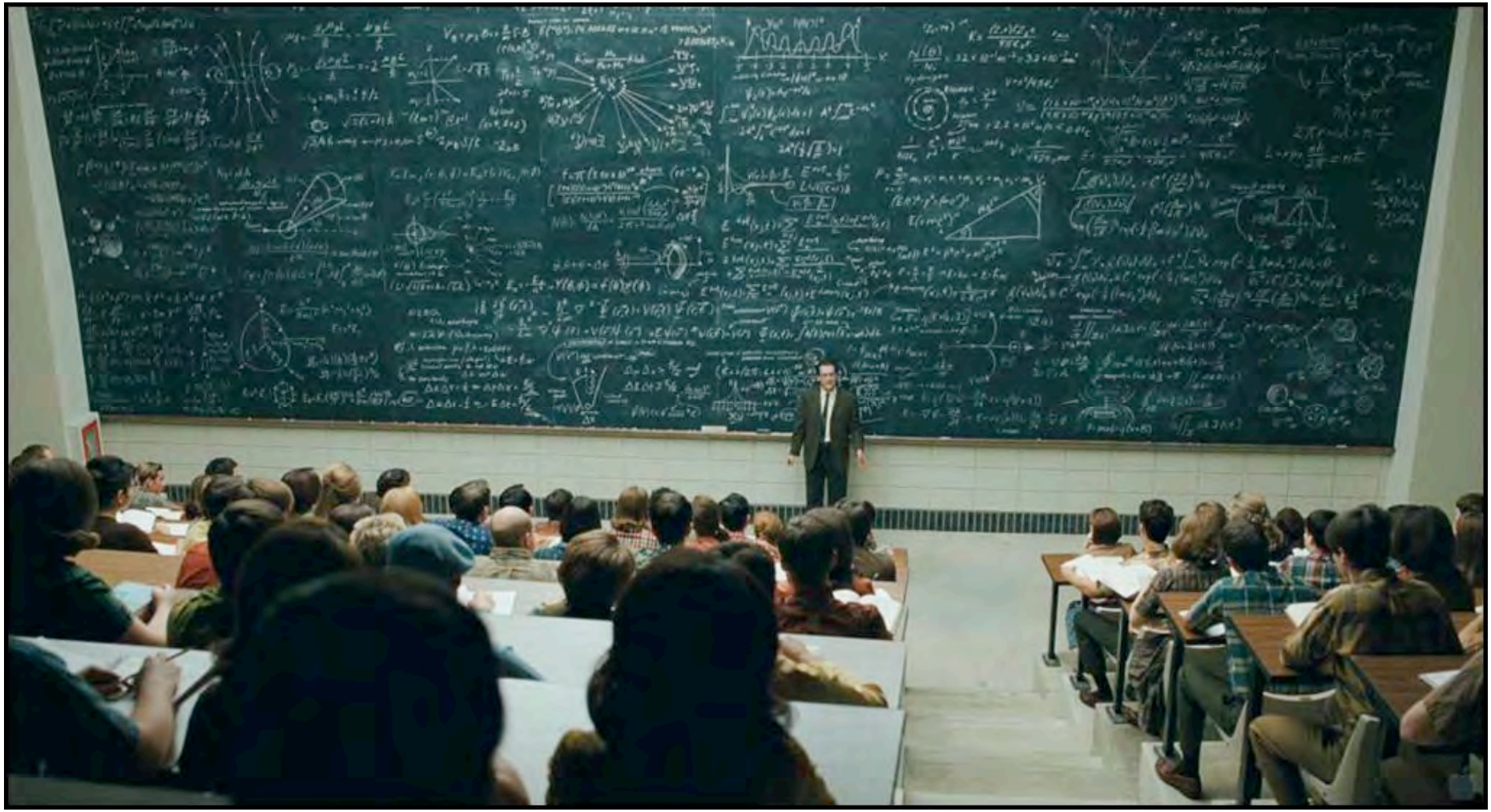
Technical review using cumulative effects/conservation biology approach

- My expertise includes 40 years of research and conservation programs related to wildlife and bears. 80 technical reports including waterfowl, mammal inventory, etc.
- BC govt. Grizzly Bear Scientific Advisory Committee for 4 years.
- EIAs: Syncrude tar sands, Gas Arctic pipeline(Yukon), Mackenzie Valley Pipeline, coastal logging & bears, etc.
- Local Cariboo-Chilcotin wildlife studies include bufflehead duck surveys for CWS, proposed Moran dam EIA, EIA for Toosey Band on Chilcotin military block, various studies in XGCA, etc.

Study approach for wildlife review of Prosperity EIS

- Web search & technical scoping of wildlife materials in Taseko's documents provided by biologist Maggie Paquet.
- Background review of cumulative effects (roads, etc.) on grizzly bears, info. Provided by conservation biologists Dr. L. Craighead and Dr. B. Horejsi. Input from wildlife ecologist Tony Pearse.
- Case history studies of effects of mines on grizzly bears.
- GIS map/road & protected area analysis & grizzly bear suitability map (based on ground-truthing values) by Applied Conservation GIS
- Conservation grizzly overview by Craighead-McCrory (2010) and Apps et al. (2009) DNA study for South Coastal Ranges
- Used "threatened" Chilcotin grizzly bear as ecosystem indicator. If maintain grizzlies, maintain hundreds of other species (Dr. P. Paquet pers. comm.)
- Local knowledge and studies

Attempting to understand grizzly bears, connectivity and environmental impact assessments



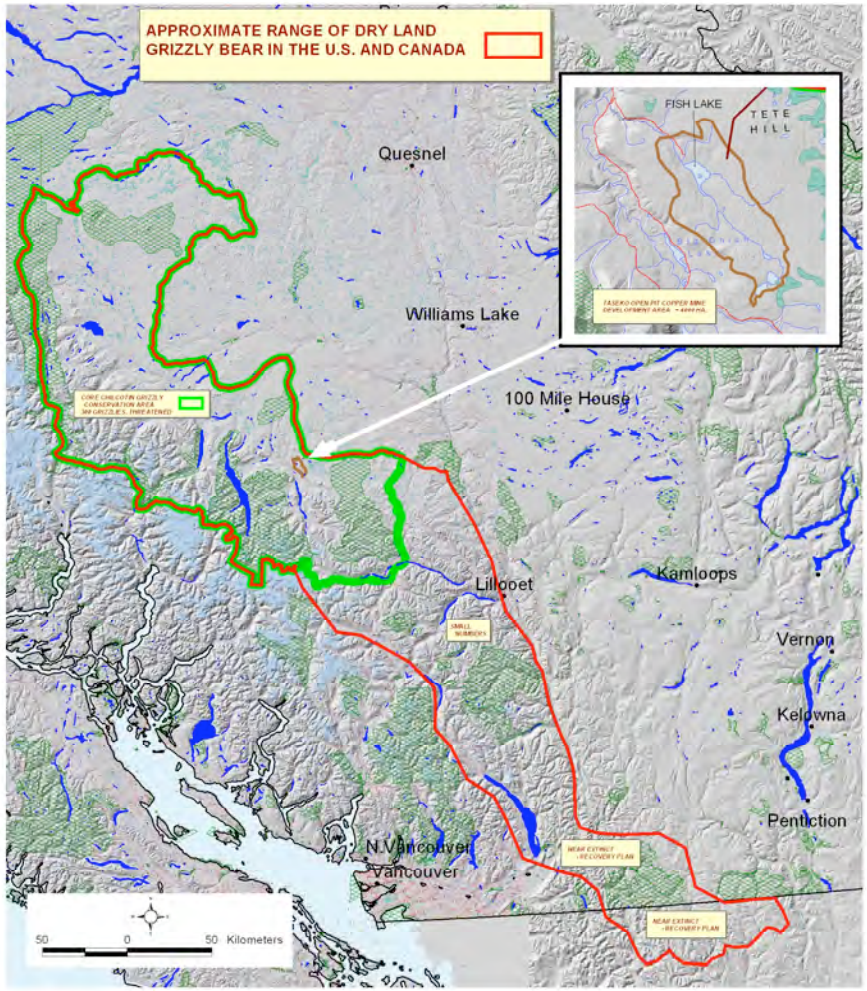
My conclusion: Strongly disagree with Taseko EIS that no significant effects on wildlife, incl. grizzly bears. There will be adverse effects on grizzly bears in an already stressed ecosystem - with limited ability for mitigation

- Taseko's EIS was based largely on species habitat assessments that were used in a limited area-type assessment, comparing amount of habitats lost by the mine development versus availability in regional study area.This does not take into account degree of concentrated use of some habitats such as wetlands by grizzly bears.
- Did not adequately address conservation status and cumulative threats of species at risk such as the grizzly bear or other indicator species.

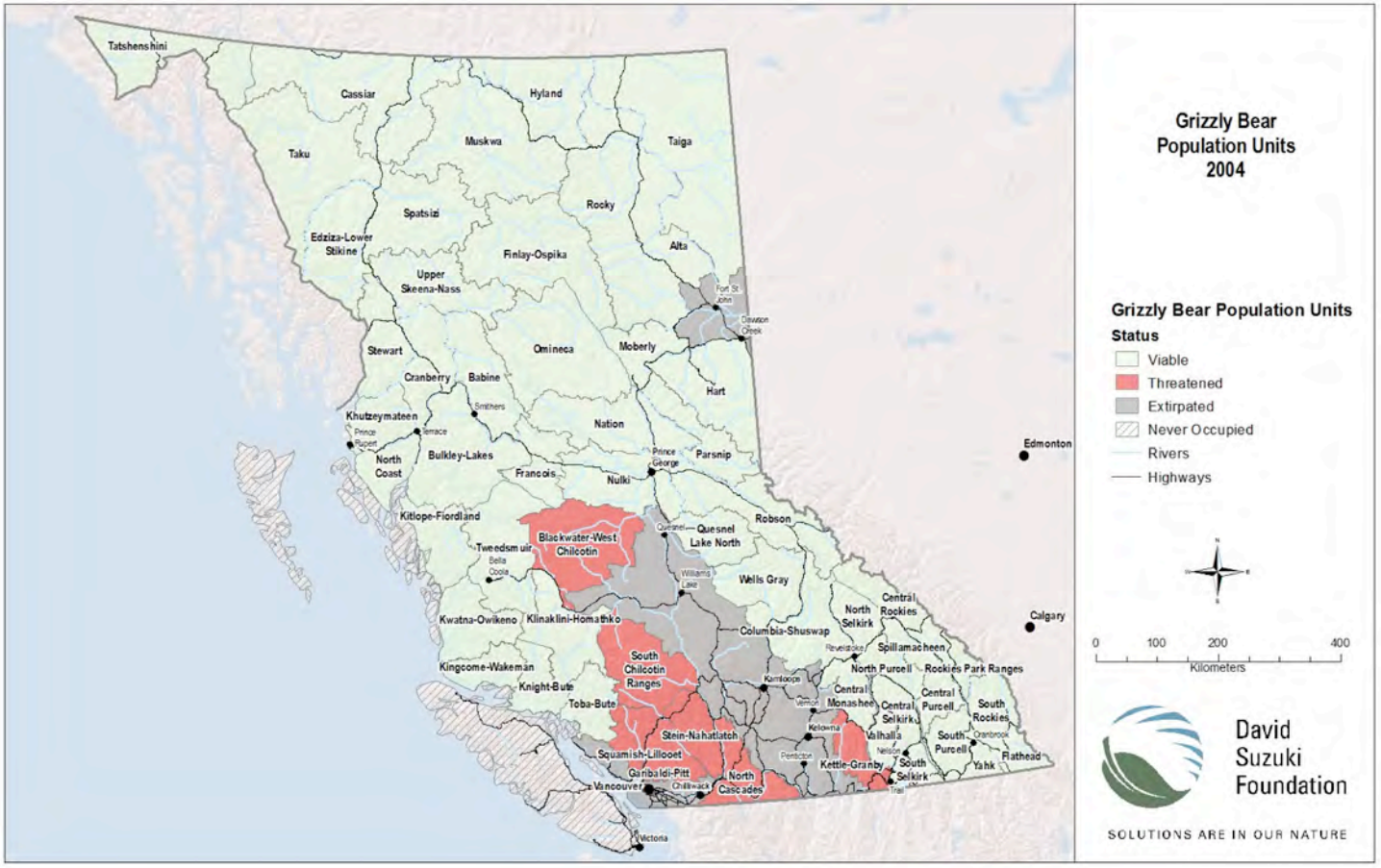
Recent DNA study of South Coastal Ranges (Apps et al. 2009) identified 9 genetically discrete population clusters. North Cascades (23 bears) is isolated

- "*Ancestral landscapes with little human access now separated by human activity and physiographic features that are likely to inhibit grizzly bear survival and movement*".

Chilcotin Ranges last viable enclave of the threatened & endangered coastal foothills-dryland grizzly bear left in North America

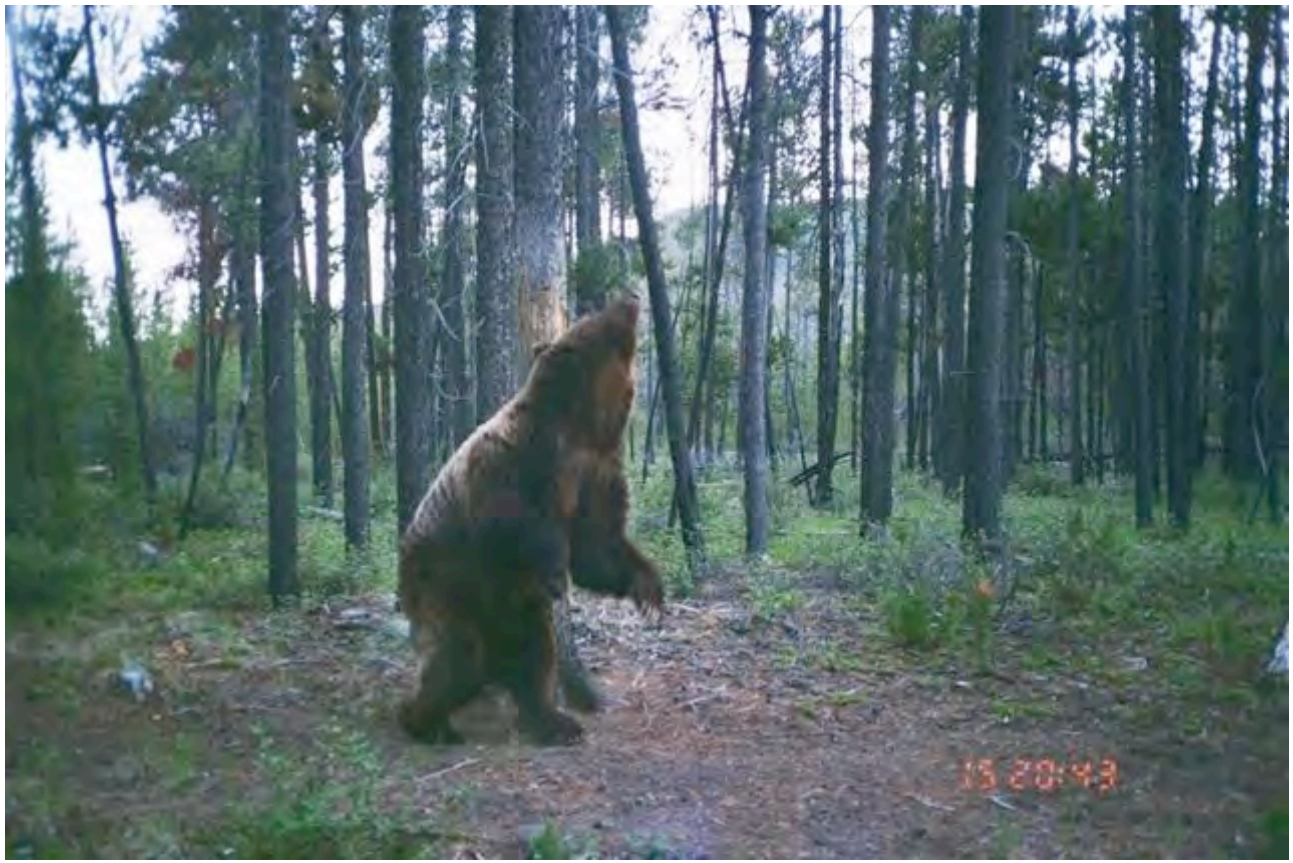


Pink/orange areas show units where grizzly bears are considered threatened in BC, including the Chilcotin Ranges. Population down to about 300, but Xeni have a core, protected area



2010 grizzly bear conservation study by Dr. L. Craighead and W. McCrory

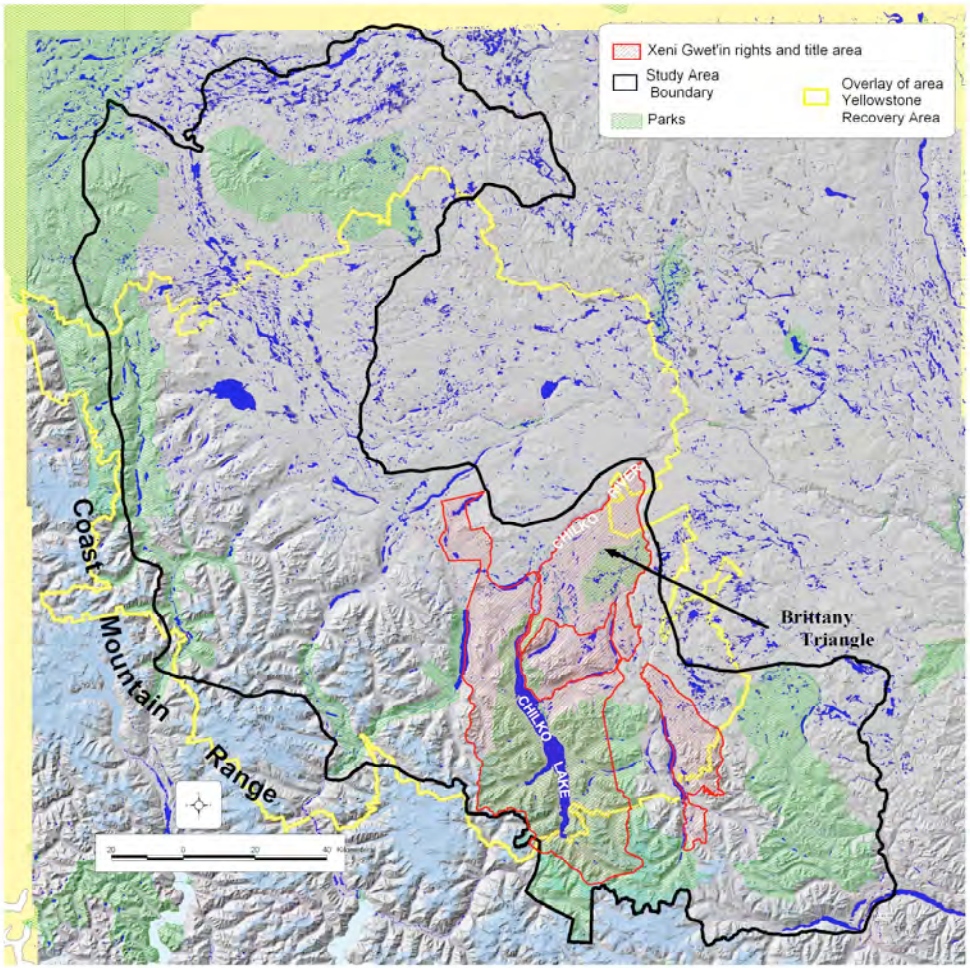
Found West Chilcotin mountains & foothills core grizzly refugium larger that Greater Yellowstone



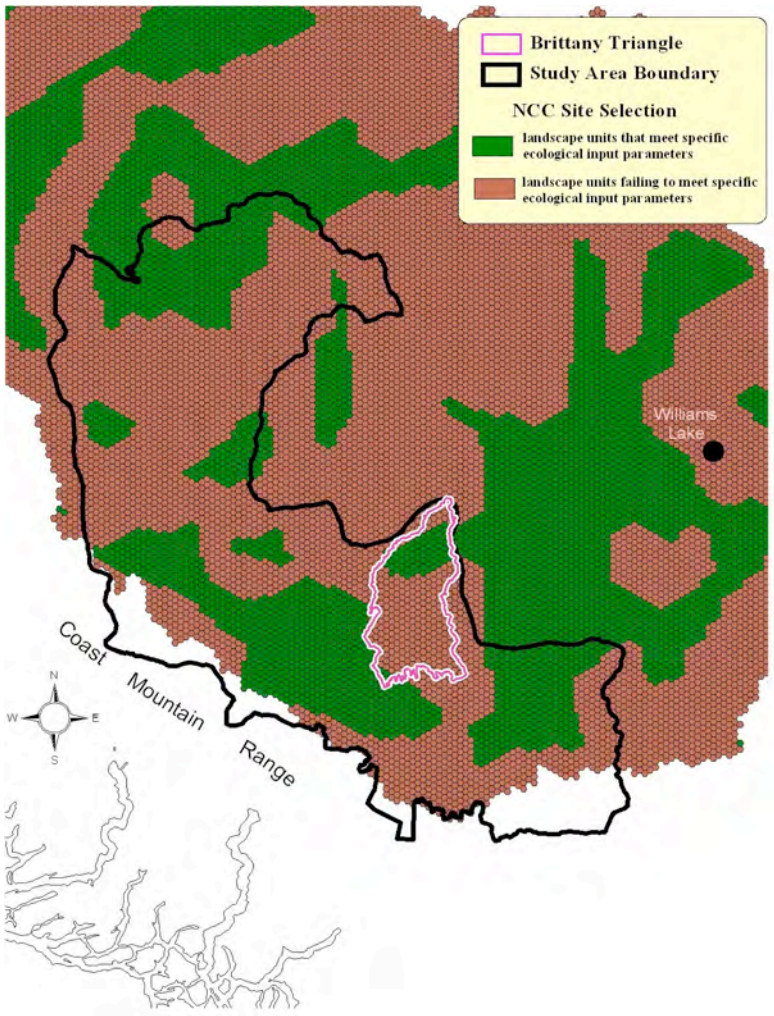
Study recommends a grizzly recovery plan and to retain remaining grizzly habitat intact. Salmon an important value

- Some 1,239,761 hectares or 46% of the total proposed Chilcotin grizzly bear conservation area is protected
- Xeni aboriginal/wild horse preserve provide greatest protected area of 777,290 hectares, includes within it 4 provincial protected areas

Some 46 % protected. Large amount of moderate habitat. Panel of independent bear scientists (Gilbert et al. 2004) recommend 68% habitat protected for long term population viability of BC grizzly bears.



Nature Conservancy conservation study & “best solutions” shows high values in Fish Lake mine area



Projected cumulative impacts of mine access & development-roads

- **Many studies show that access & roads have a negative impact on grizzly bears including loss of habitat, displacement from quality habitats within a Zone of Influence up to 3 or more km, blockage of movements. Most human-caused grizzly bear mortality occurs near roads (Horejsi 1999).**
- **In a Montana ecosystem somewhat similar to the West Chilcotin, grizzly bears showed strong avoidance of roads with 11-60 vehicle per day [vpd] (Mace et al. 1996). 60 vpd appeared to be a possible threshold for high avoidance, which we used to analyze the impacts of the Prosperity Mine.**
- **Less dominant bears (adult females, subadults) will also habituate to road sides, even with high traffic volumes, as "security" from male bears and become more susceptible to collisions with traffic and illegal killing.**
- **Roads cause habitat fragmentation and decreased habitat values from avoidance can caused population declines once the amount of roading and impacts passes a certain ecological threshold.**

Taseko's mine will triple the vehicle traffic on the Taseko/Whitewater Road from about 100 vpd to about 300 vpd.Where did the numbers come from for current use? Seem far too high.

	current traffic	construction	operations	closure	post-closure
	AADT	Yr-1AADT	typical year	Yr 20, AADT	Vehicles per wk
4500 Haul Road	5<	48	100	46	2
Taseko Lake/Whitewater roads	50	48	100	46	2
Hwy 20 Rural (Lee's Corner to Wms Lk)	1,600 to 1,800	48	100	46	2
Hwy 20 (Williams Lake to Hwy 97)	About 16,000	48	100	46	2
Hwy 97 (Wms Lk to Macalister load-out	2,900	-	32		
Note: * indicates will be upgraded					
Source: Taseko Mines, see Table 3-36 for annual values					

Impacts on grizzly bears - Taseko/Whitewater Road & "4500 road"

- **If current use of Taseko/Whitewater road is >60 vpd then much of grizzly habitat within 0.5 + km of the road already reduced in value from traffic for about 40 km across the plateau.**
- **However, core grizzly habitat mapping shows some smaller core roadless areas on the plateau, despite logging & fragmentation.**
- **Significant increase in traffic from mine will still have an impact on habitats along the Taseko/Whitewater Road by closing off reduced movements of warier grizzlies across the plateau and causing mortality to subdominants that habituate to roadsides.**
- **4500 road is 10<vpd, therefore having much less impact on grizzlies than the main access road. Mine road & mine development will cause significant changes including direct habitat loss, habitat displacement and movement blockages for about 10 - 15 km south of the Taseko/Whitewater road.**

Home ranges of two female grizzlies on coast showing avoidance areas of logging road

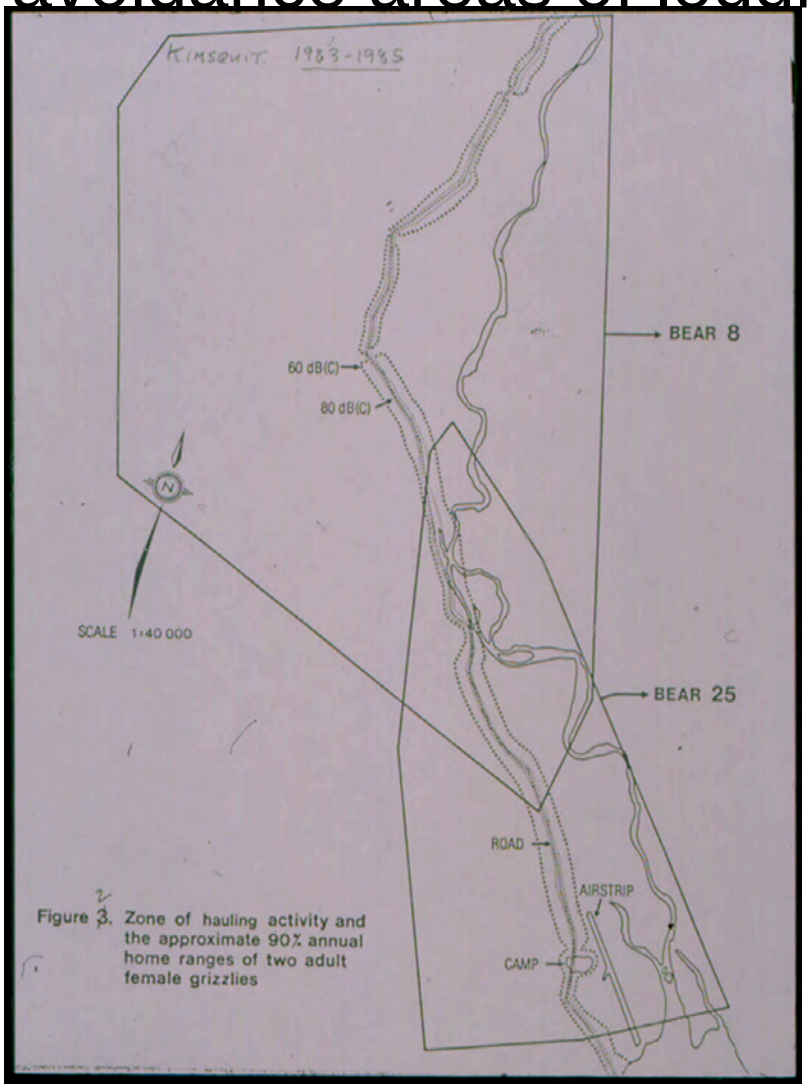


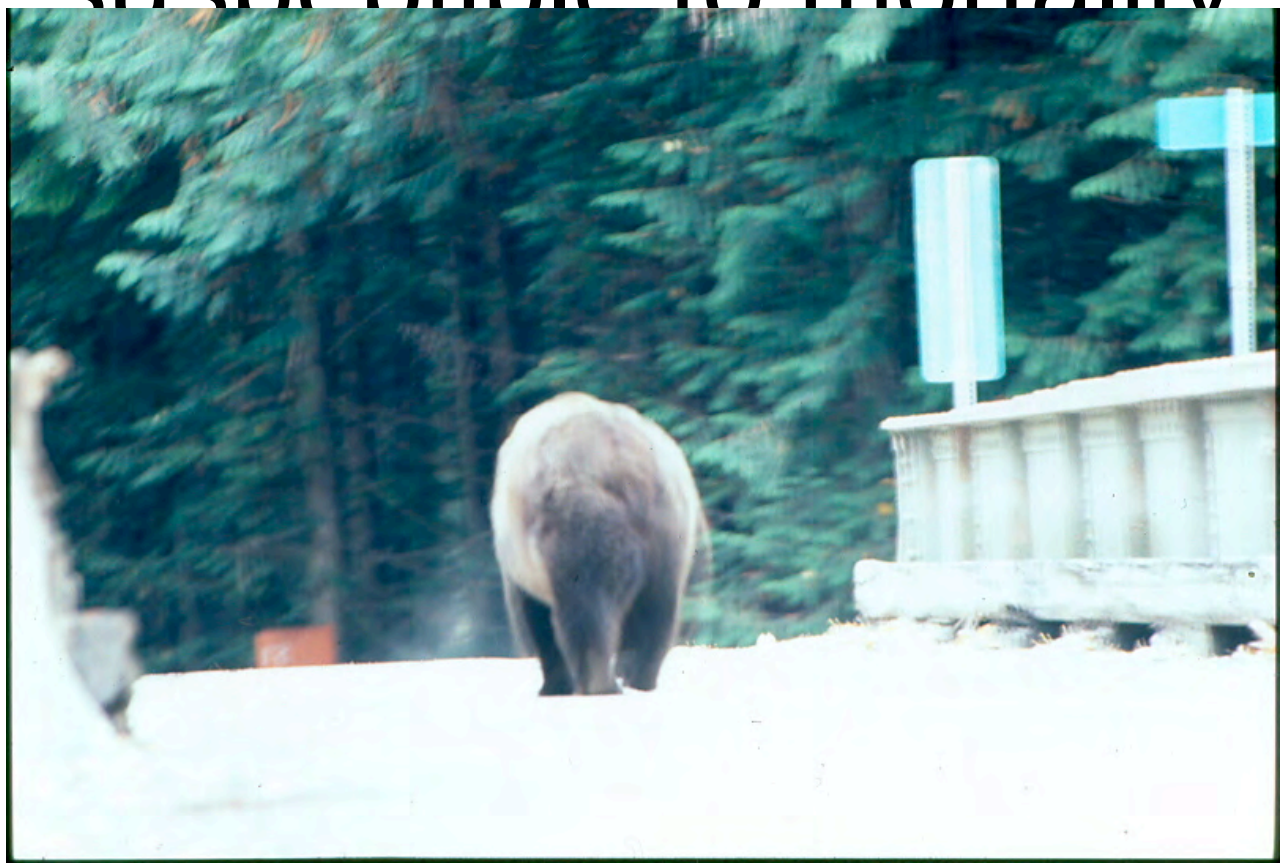
Figure 3. Zone of hauling activity and the approximate 90% annual home ranges of two adult female grizzlies

Grizzly bear Mortalities: According to Horejsi (1999): "***Understanding the impact of road access involves the recognition that the cumulative effects of incremental mortality and displacement events can quickly destabilize a bear population".***

- **Taseko made no attempt to analyze grizzly mortality factors in the region for their EIS and what mortality would be predictably caused by the mine development through direct and indirect effects. They propose, rather, a mortality monitoring program.**
- **My review shows that for the Chilcotin Ranges GBPU between 1991-1999, 7 grizzlies were reported killed in conflict situations. A mother and two young were also killed, but not officially reported. Total females killed were at least 3.**
- **Since unreported kills are about equal to reported kills (McLellan *et al*. 1999), about 17 grizzlies were killed over this period, which by extrapolation includes at least 6 females.**
- **Given the low population level (est. 100), any losses of females is critical. I.e. The estimated loss of six females by human factors is significant and any further losses, such as predicted from the broad cumulative effects of the Prosperity mine development, will easily push this population over the edge.**

Carnivores including wolves have increased mortality along roadways. Wolf shot within 1 km of Taseko-Whitewater Road, winter 2008. Hind leg was shot.

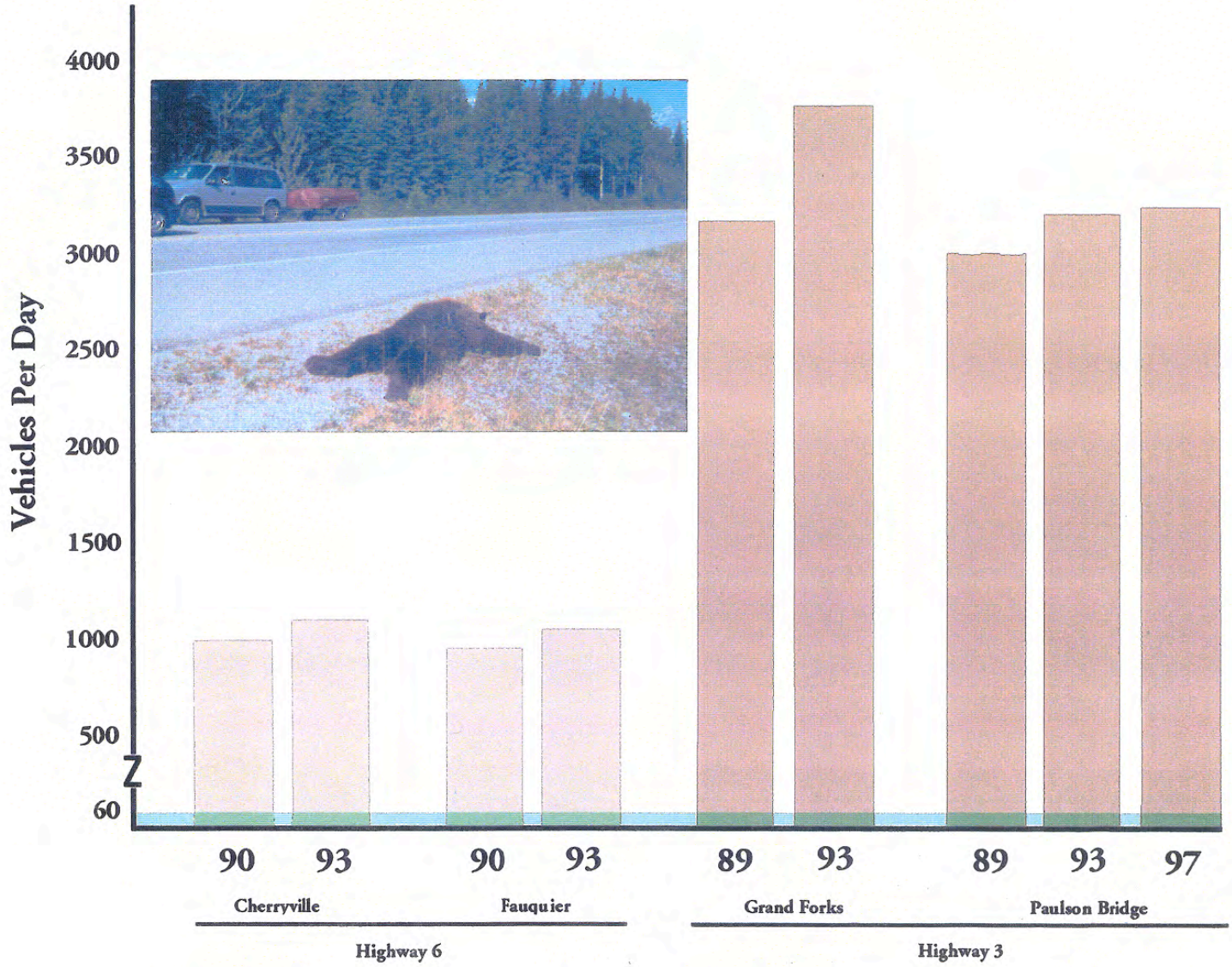
Some grizzly bears habituate to roads and are more susceptible to mortality



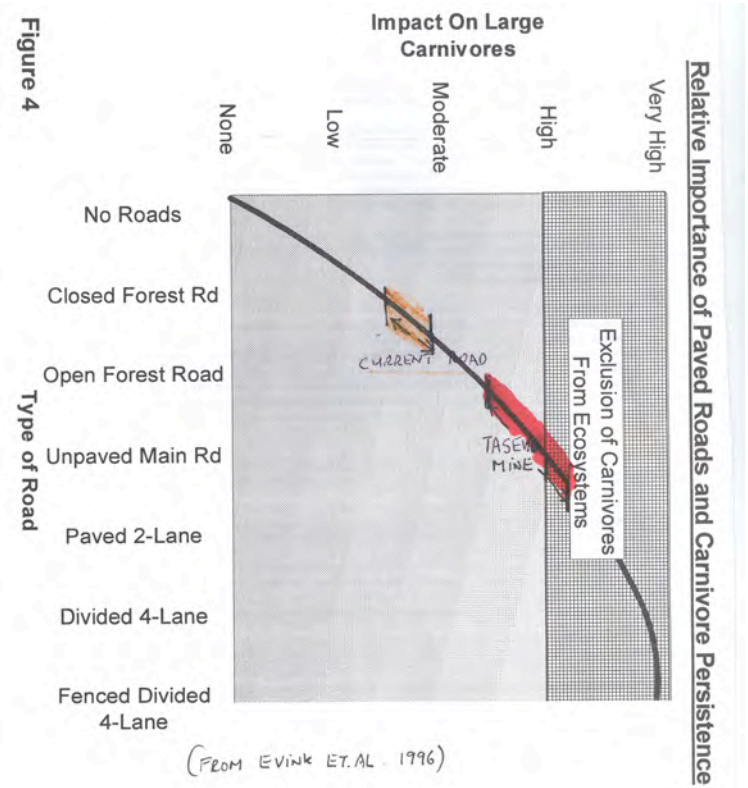
Example of unreported subadult grizzly mortality from logging traffic or shooting on coastal logging road, May 2008

E.g. Conservation biology study of endangered Granby grizzlies is s.BC (Horejsi 1999)

- Summer traffic levels of two transprovincial highways through Granby area about 90 - 100 vpd. 1989-1997, 1/3 of what Taseko road will be if mine developed.
- At least one Granby grizzly mortality on hwy.
- Population of 50 grizzlies cannot sustain one highway induced mortality per year if female
- For every bear reported killed on a highway, 5 more die but unreported (BC Wildlife Br.)
- No data for Taseko/Whitewater road but 3 bears (likely black bears) reported killed on highway between Wms. Lake and Hanceville


Vehicles Per Day
4000
3500
3000
2500
2000
1500
1000
500
60
90
93
90
93
89
93
89
93
97
Cherryville
Fauquier
Grand Forks
Paulson Bridge
Highway 6
Highway 3

Road improvements & tripling of traffic volumes from Hanceville to mine & mine development will increase impact on large carnivores from low-moderate to high-very high



Effects of 80 km Transmission line & access

- This long roaded corridor will effectively improve access for motorized access into a mosaic of intact grizzly habitats and areas already impacted by logging and roads. Nonetheless, despite gating and other restrictions, increased motorized 4-wheel drive, ATV and snowmobile use are expected to causing displacement and increased illegal mortality to grizzly bears.
- E.g. In endangered international Selkirk grizzly ecosystem with 50 bears, 4 of the 18 mortalities over a 14 year period were associated with **closed (gated)** roads (Wakkinen 1993, Wakkinen and Johnson 1996).

Improved road access increases motorized (ATV, etc.) access and not only habitat damage, but displaces grizzly bears, depending on degree of activity. Wetland damage. May 2008. 1 km west of Fish Lake

Increased backcountry motorized and non-motorized recreational/hunting/fishing use will lead to increased grizzly bear-people conflicts with increased defense-of-life kills as firearms are allowed.It only takes a few trigger-happy people to damage the population. Defence of life kills are often close to roads

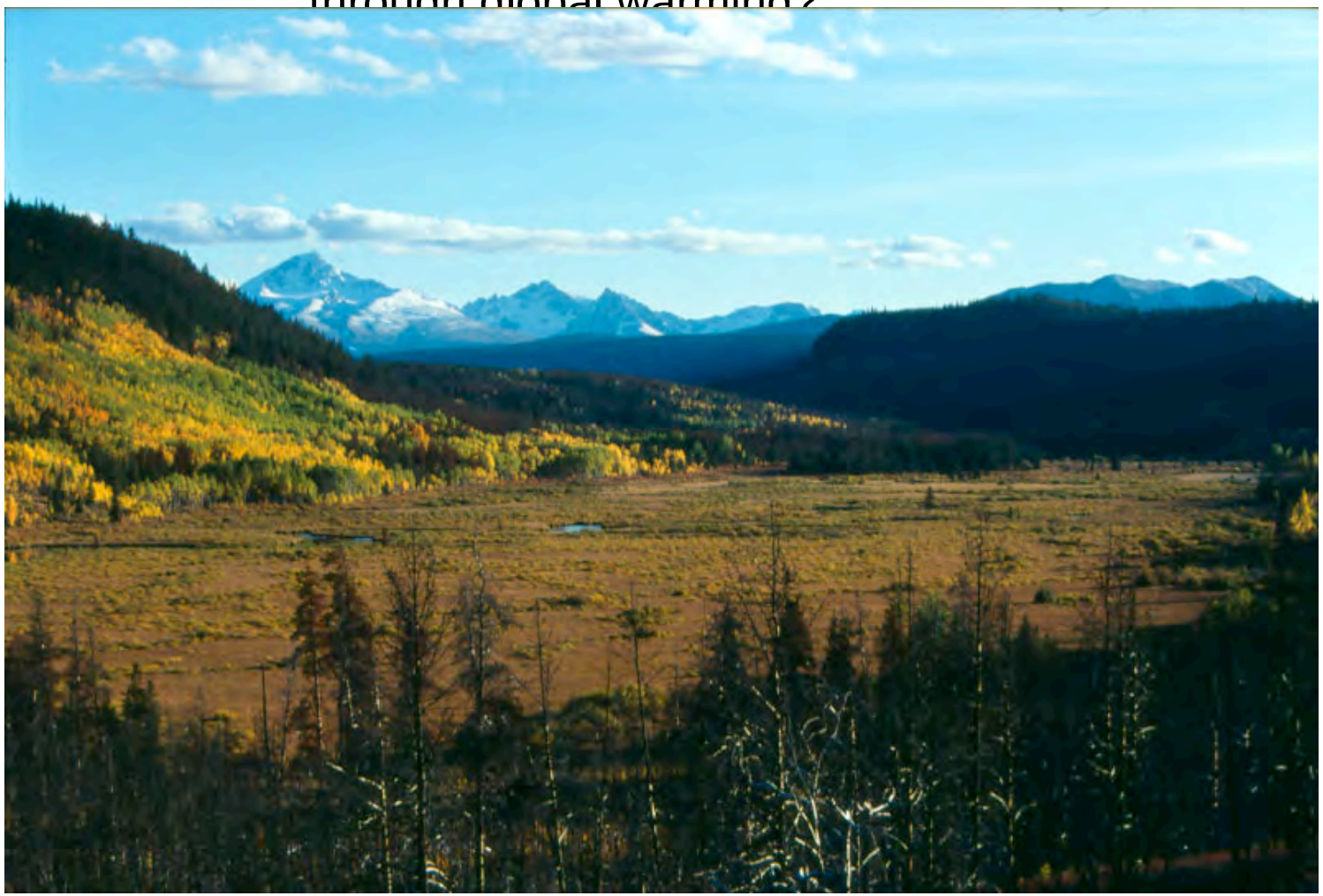
“*The practice, now common, of identifying “critical habitat” and classifying it into management situation categories is an approach that may help a few individual bears over the short-term, but, over the long-term, will surely violate the totality of resources and space necessary for population viability*” (Dr. J. Craighead 1995).

Equating area-based habitat species model losses of the mine development as only a small % of regional area is presents a highly misleading impact picture of the mine footprint & cumulative effects

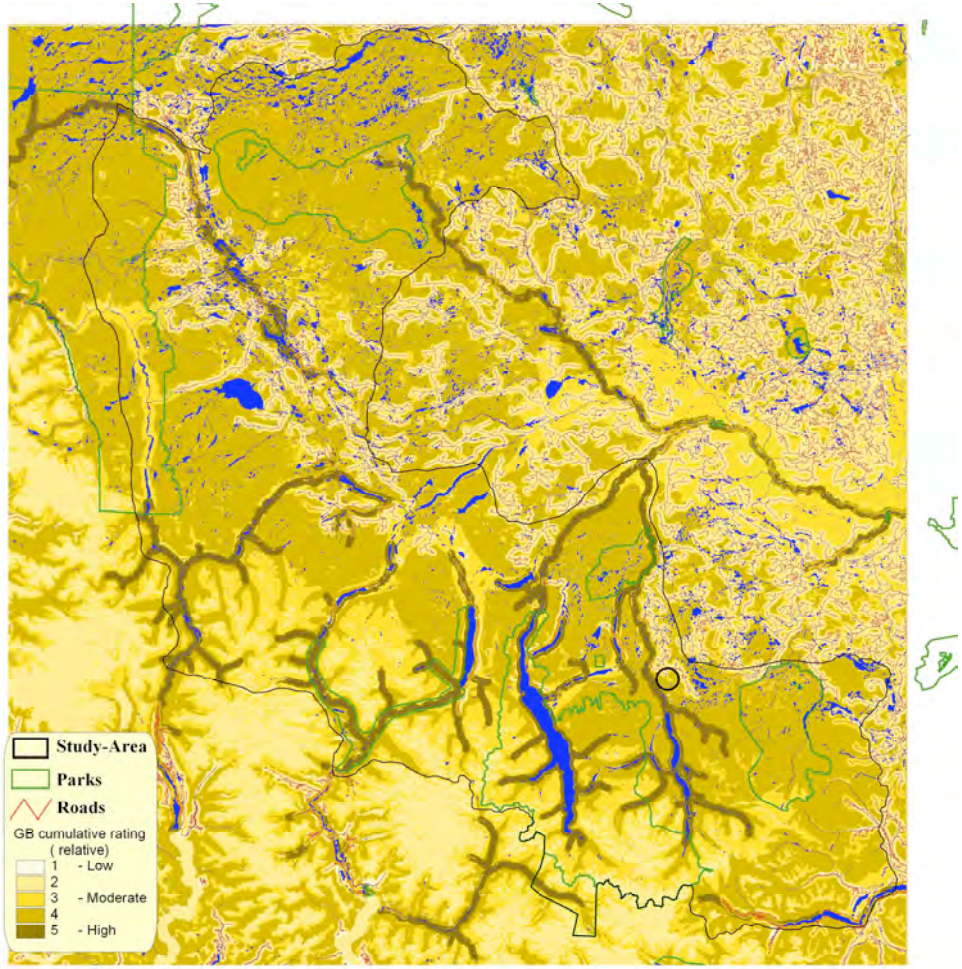
- E.g. 400 ha loss of wetlands = only 2 % loss of wetlands of the Prosperity Mines RSA (regional study area).
- A grizzly bear radio-telemetry study in southeast British Columbia (McLellan and Hovey 1993) demonstrated that grizzly bears made a much higher proportionate use of wetlands than their distribution over the landscape. Although wetland/riparian habitat comprised only 8.5% of the study area, 40% of the transmitter locations of 46 radio-collared grizzly bears between May 15 – July 22 (and located 10 or more times) were in wetland habitats. Some bears were located 85% of the time in this type of habitat during this period.
- Similarly I disagree with the approach used by the CWS on waterfowl that measured (as expected) small (402) breeding pairs in the Prosperity RSA (Breault 2008) as a small percentage of the much greater-sized Chilcotin Plateau. This does not address cumulative wetland losses in the overall region nor losses of wetlands predicted from global warming. Nor does it address total numbers of migrant waterfowl that pass through the RSA each season and might be subject to contaminants should the projected contaminant containment system fail, just as waterfowl have been subjected to at the tar sands.

Meadows - one km west of Fish Lake - Important trout & grizzly spring habitat/travel route; east end has mining damage

Taseko's 400 ha of wetland removal would cumulatively be the equivalent of removing twice the protected wetlands pictured in this valley area from the Xeni Gwet'in ecosystem-which is sparce in wetlands for wildlife. Can we afford such losses? When wetlands provide incredible biodiversity & will be diminished through global warming?



Mine in Core grizzly bear habitat, moderate - high value



Case History: Schoen and Beier (1990) - grizzly bears & mine in S.e. Alaska

- Six radio-collared grizzly bears denned significantly further from mine in the 2nd year
- Significant decrease in use of grizzly bear day-beds along new road
- One female bear was monitored from before the mine (1982) to the spring of 1989. Prior to 1986 she successfully weaned two litters of 2 cubs each. After that she lost two consecutive litters. The researchers had no direct evidence that development activities were implicated in her reproductive failure, but suggested the possibility that **displacement from her familiar feeding area along lower Zinc creek in 1987 may have reduced her reproductive effectiveness.**

Other case histories

- **Johnson et al (2005). Collared grizzly bears in arctic showed mineral exploration sites had a moderate influence in use of summer habitats up to 23 km.**
- **“habitat loss for grizzly bears was most extreme during *late summer and autumn*, where we measured 12 and 11% reduction in the total availability of high and good-quality habitats, respectively”. Note: This is a critical time for pre-denning weight gain**

Suring et al (1998)

- Cumulative effects model of Chugach National Forest in AK. Mining operations, recreation sites accessible by motorized means, recreation trails, open roads and residential / townsite areas.
- CONCLUSION: Simultaneous analysis of all known human activities resulted in a total cumulative reduction in habitat effectiveness (HE) of 71% for spring and 72% for summer.

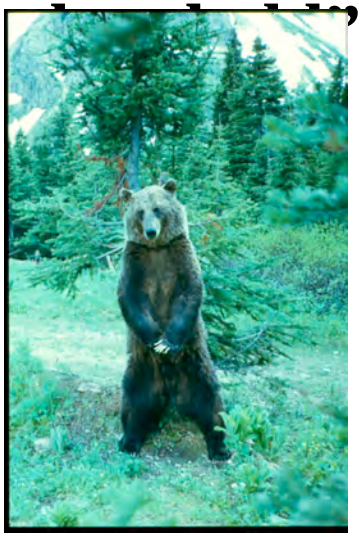
Proposed new road to Kincolith, BC (Demarchi 2001)

- **According to wildlife biologist A. Hamilton (pers. comm. 1999) concerns about potential impacts of the Greenville to Kincolith project on grizzly bear habitat were superceded by concerns about mortality risk posed by construction and operation of the road.**
- Biologists projected that of the 175-270 grizzly bears estimated to be within the Stewart Meziadin GBPU, the road could negatively affect 40-60. Most effects would be in the form of disturbance and displacement, but based on regional data, an annual mortality rate of 4-6 individuals was forecast as a result of the road.

Taseko's mitigation program will have limited results & largely be ineffective in reducing any grizzly mortality

- **Food-garbage control at mine site important but overall projected mortality to grizzlies from cumulative effects of mine development cannot be effectively mitigated.**
- **Taseko proposes as mitigation as GRIZZLY BEAR MORTALITY MONITORING PROGRAM. With highway collisions, if one reported, 4 others not, so 4 may die or be injured before problem detected.**
- **Monitoring will do little or nothing to prevent mortalities and will not address illegal kills from increased motorized use of the transmission line roads or increased backcountry use (motorized) in XGCA as a result of human population influx into area from mine development**
- **Road closures, speed limits and other administrative attempts to mitigate access problems has limited effectiveness in reducing human-induced grizzly bear mortality (Horejsi 1999).**

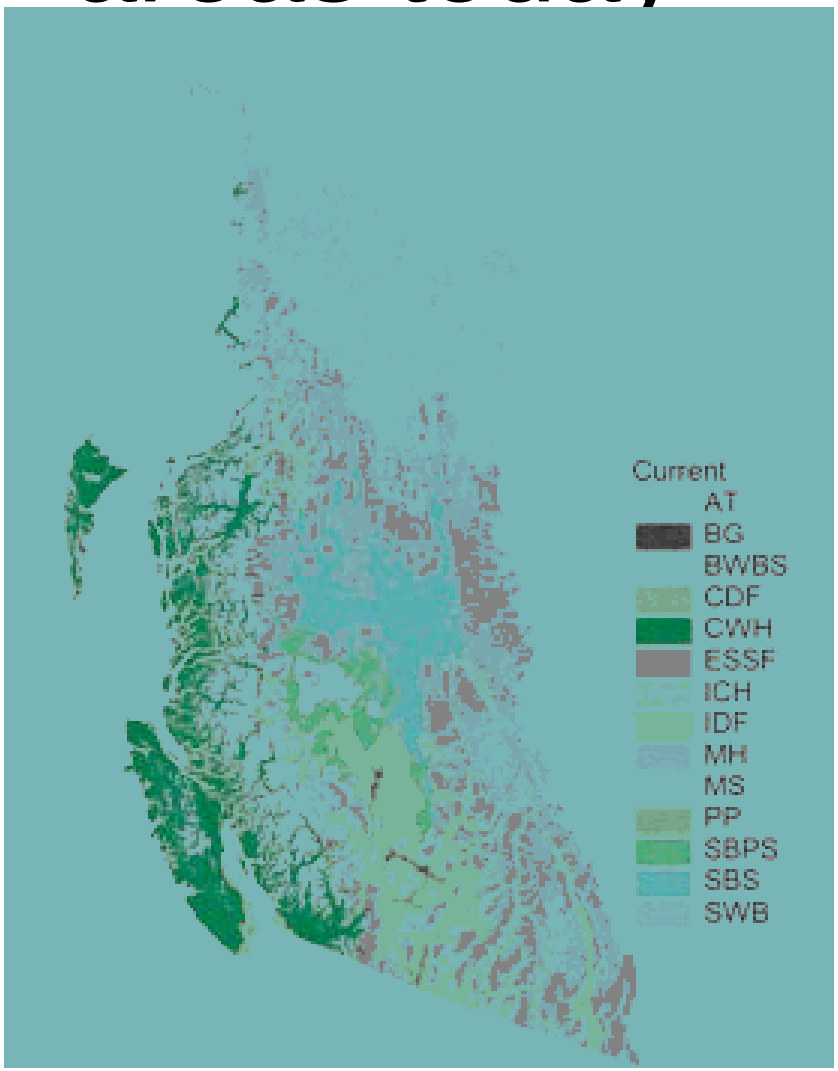
In the Journal of Animal Ecology, Bascompte and Sole (1996) refer to an "extinction [redacted]".



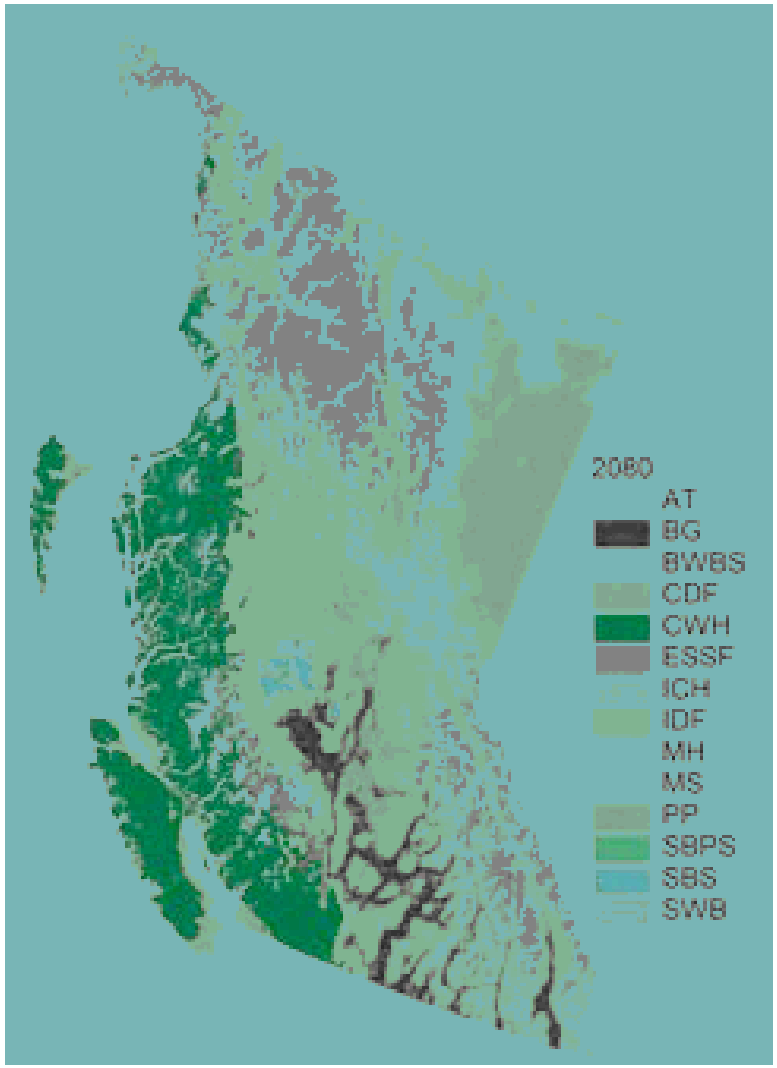
- **Because grizzly bear populations are highly sensitive to human-caused mortality, habitat losses and displacement, critical thresholds are reached that should not be exceeded if the population is to be expected to survive or recover over the long term. In the Chilcotin Ranges, we have already reached this or are close to it.**

Xeni Climate change adaptation study (Ecolibro2010) shows some major concerns for global warming impacts on the XGCA

Douglas fir - bunchgrass areas today



In next 70 years, grasslands will increase & move north, & treeline will move higher up the mountains



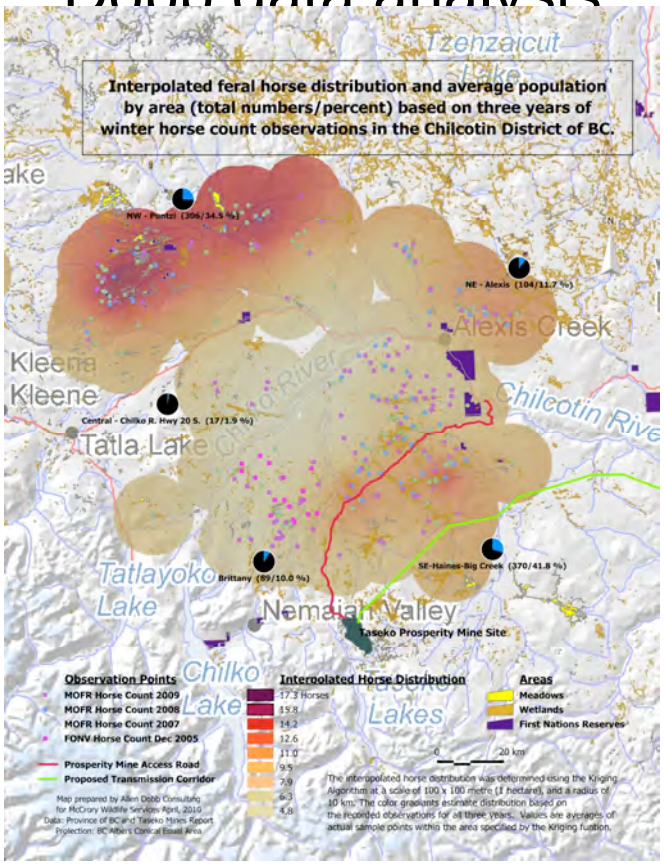
Upward shift in treeline will reduce meadow habitats for bears, less wild potatoes, whitebark pine nuts, etc.Reduced salmon & wetlands. Overall net loss for grizzlies

Concluding remarks on grizzly bears

- Taseko Mines claims their development will have no significant impact on grizzly bears and other wildlife over the life-span of their gold-copper open pit mine. However, there are a number of species within the mine area and its large Zone of Influence (ZOI) that are already in various stages of federal and provincial listings as at risk from cumulative impacts that include excess roading and clearcutting, habitat losses and mortality from human settlement, extensive mining exploration activities (Upper Taseko), over-grazing (e.g. sharptailed grouse), illegal killing, climate change and other factors. The provincial listing of the Chilcotin grizzly bear as “threatened” is by definition a sound indicator of significant impacts, meaning that the species has already undergone significant adverse effects human development and associated activities. Climate change effects on wildlife are not even considered in Taseko’s EIS. **Based on the evidence I have presented, I can only conclude that the Prosperity Mine will push vulnerable species like the dryland grizzly bear over the edge to extirpation**

OTHERWISE ONE FINAL OPTION FOR “THREATENED” CHILCOTIN GRIZZLY BEARS - LEARN FROM THEIR RUSSIAN COUSINS: “*Bears besiege Russian mine after killing guards-Terrified workers at a mining compound in one of Russia's most isolated regions are refusing to go to work after a pack of giant bears attacked and ate two of their colleagues.”* The Times: July 24, 2009

Other important concerns: Main Industrial transportation corridor will pass through sector with highest Min. of For. Wild horse counts (Avg. 370 horses, 2006-2009. 42% of total average for region. A. Dobb data analysis



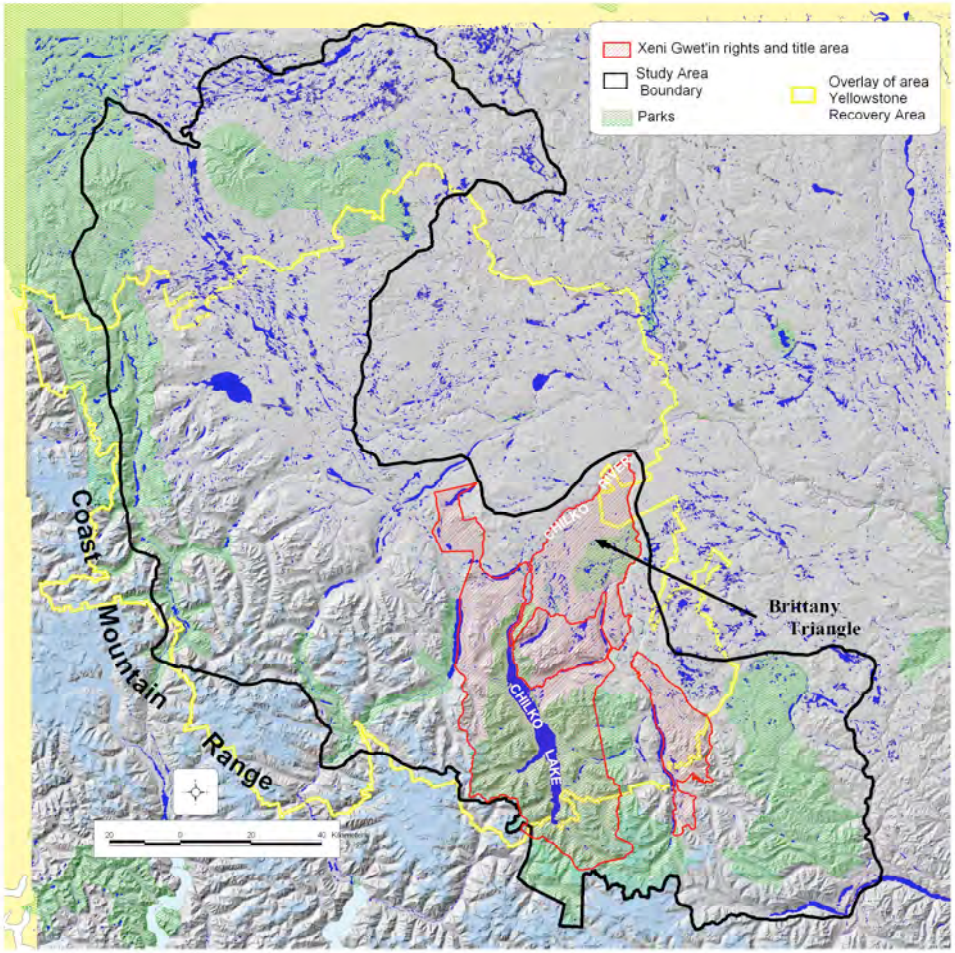
Currently little observed road impacts and horse road kills.Rough nature of road = slow traffic

- **Note on wild horse map for the region that the majority of wild horses have their territories away from the main Williams Lake-Bella Coola Highway.**
- **For the Taseko Road, some horse bands appear habituated to road traffic but will generally run off if the vehicle stops. Many other bands appear to avoid the road but will cross it. In winter, often see where a herd has crossed the road.**
- **To cross the road, wild horses sometimes suddenly make a dash right out of the forest, en masse. This makes them vulnerable to traffic collisions.**
- **Since horses generally stay in herds of up to 16 or more, I predict that with the significant improvements necessary to bring the current road up to industrial standards combined with a tripling of daily traffic volumes and speed that there is going to be a rapid escalation of wild horse-traffic collisions.**

Other important concerns: Taseko road will cross major mule deer movement corridor

- Improved road for mine will cause considerable mule deer road kills
- Whole plateau an important subsistence mule deer hunting area for First Nations.

Proposed mine will negatively impact ecological integrity of adjacent protected areas



Stating the obvious: Eastside Forest Scientific Society Panel (1994): Concluded that existing roadless regions have enormous ecological value.

- A panel of eight scientists representing the American Fisheries Society, American Ornithologists Union, Ecological Society of America, Sierra Biodiversity Institute, Society for Conservation Biology, and the Wildlife Society. They were addressing the coastal rainforests on National Forests in Oregon and Washington. These forests have experienced a long history of human impacts; the science team recognized the scale of importance relative to availability.

Huge investment by society in protecting ecosystem. Mine will jeopardize ecological integrity.

- Xeni Gwet'in aboriginal/wild horse preserve - 770,000 ha
- Tsylos Provincial Park - 233,340 ha
- Big Creek Provincial Park - 65,982
- Spruce Lake Protected Area - 71,347 ha

1989 Xeni Gwet’in Nendduwh Jid Guzit’in or Aboriginal Wilderness Declaration.
2002 ?Elegesi Qiyus Wild Horse Preserve or Eagle Lake Henry Cayuse Wild Horse Preserve

- Declared that no industrial logging, mining and hydro-electric development
- 770,000 ha, approximate size of Banff National Park

Nemiah Aboriginal Preserve