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Front cover:

HEROES ON THE GROUND

The Goldman Foundation of California has become, in effect, the Nobel Prize organization for persons demonstrating unusual courage in the defense of nature. Since 1990, the Goldman Prize of \$125,000. is awarded to each of six persons representing the inhabited regions of the planet. In 2006, the recipients of this environmental prize were Silas Kpanan (a young Siakor of Liberia), Yu Xiaogang of China, Olya Melen of Ukraine, Anne Kajir of Papua New Guinea, Craig E. Williams of the United States, and Tarcisio Feitosa da Silva of Brazil. With the exception of the American who spent close to 20 years fighting Pentagon plans to incinerate chemical warfare weapons right next to urban communities, the other winners of the Goldman prize dedicated their lives to slowing down the violent destruction of forests, wetlands and rivers in Africa, Asia, and Europe.

On April 26 and 28, 2006, I heard the stories of these exceptional individuals and talked to most of them in Washington D.C. Kpanan played with fire while documenting the timber violence of Liberian president Charles Taylor who paid for his 14-year war with timber. Because of Siakor's data the UN Security Council ultimately banned the export of timber from Liberia. Xiaogang collected data on the bad effects of damming rivers on the environment and communities with the result that China is now slowing down its dam development. Melen and Kajir have been fighting legal battles to bring government and international attention to illegal and dangerous development projects, their actions delaying the almost certain destruction of wetlands and forests in Ukraine and Papua New Guinea. Forest destruction in Papua New Guinea, exceptionally rich in biodiversity, is particularly tragic. Kajir's litigation against Rimbunan Hijau, a Malaysian timber company, turned out to be hazardous for her. Rimbunan Hijau, linked to the Indonesian military, is razing Papua's forests with the complicity of the government of Papua. Now Kajir fears for her life, and bodyguards protect her day and night.

But the most dangerous work is that of 35 year old Tarcisio Feitosa da Silva of Brazil. For 10 years he has been following the footsteps of Chico Mendes who, in 1998, was cut down by the assassins of the landowners because he resisted their criminal destruction of the Amazon. Feitosa is working with the National Conference of Bishops in the northern state of Para, trying to lessen illegal logging and the landlord violence against indigenous people and others dependent on the forest for their livelihood and survival.

The courage of these environmentalists and the admirable decision of the Goldman Foundation in rewarding them ought to spur us to stop the global criminal attacks on nature by corporations, governments and reckless individuals.

Just like Charles Taylor of Liberia, the warlords of Angola and Mozambique financed their battles with the slaughter of thousands of elephants and rare rhinos. Corrupt officials of the Philippines, Indonesia, Burma, the Democratic Republic of Congo, Central African Republic, and Nigeria wrecked tropical forests. Japanese companies wiped out the forests of the Philippines. Other Japanese companies and the fishing fleet of Norway are killing whales. Brazil has been leveling the Amazon for minerals, timber, beef and soybeans. And Brazilian officials

look the other way while traffickers export rare birds, reptiles, and other wild animals and plants. Argentina is suing Uruguay at the International court in the Hague over two huge pulp mills Uruguay is building on its side of the shared Uruguay River. Argentina fears the pulp mills, costing Uruguay \$ 1.7 billion, will pollute and wreck the environment and damage the health of the people of both countries. However, Argentina is destroying its family farmers and is spreading hunger by converting its prosperous land into plantations of bioengineered soybeans for the animal farms of Europe and North America.

The tropics, treasuries of biodiversity, continue to suffer the crimes of colonialism, still feeding their former masters cash crops of cocoa beans, tea, coffee and bananas. The seas and oceans are open fields for the dumping of wastes, especially petroleum, and for warfare against fish and wildlife. Factory fishing boats literally farm the waters, decimating both the fish and other animals like dolphins, turtles and whales.

Atrocities against nature continue because the dominant corporate ideology fuelling the global system considers nature a resource for privatization and development, which means plunder. Even scientists are not beyond reproach as nature is often treated primarily as a resource: wetlands and forests are useful because they provide us with biological services. Imagine mighty nature serving the insignificant human? This hubris is apparently true in "natural resource" departments and agricultural colleges. The result of this disdain for nature fuels the war against nature and also nature's revenge.

The alarming warming of the earth, a result of the industrialization of the planet, has not made any impact on humans' suicidal behavior against nature, the nursery of life, including human life. America has a phantom protector of nature and human health in the Environmental Protection Agency. Other industrialized countries have similar paper organizations to protect their corporations from public wrath. And the Third World and the United Nations have wonderful-sounding but toothless agencies pretending to work with issues of health, environment, agriculture and development. There is no institution in the world empowered to protect nature.

The time has come to take nature seriously. The Goldman Foundation does. The warming of the earth, the collapse of fisheries, the high rate of extinction of species, and the violent tsunamis and storms are the result of a protracted war against nature. We need a Planetary Nature Organization with teeth to override any and all development projects that are inimical to nature and human health. We must finally realize that humanity suffers from all blows against nature. Like the ancient Greeks and other traditional people, we ought to respect and even venerate the natural world.

Dr. E.G. Vallianatos, a former analyst with the US Environmental Protection Agency, is the author of 4 books, 3 of which deal with the planetary impacts of giant agriculture. His most recent title is "This Land is Their Land: How Corporate Farms Threaten the World" (Common Courage Press). Dr. Vallianatos has taught at various universities, and presented seminars on global environmental and agricultural issues as well as environmental policy.
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Conservation of Grizzly Bear populations and habitat in the northern Great Bear Rainforest

Brian L. Horejsi and Barrie K. Gilbert

Abstract. There are now at least eleven “threatened” Grizzly population “units” in British Columbia and one quarter of the province is now either without Grizzlies (8%) or occupied by threatened populations (16%). B.C. Grizzly populations are moving toward extinction in more than 25% of the province, an increase in area of more than 200% since 1965. This paper evaluates the Protected Areas (PAs) proposed for the North Coast Plan in the context of published understanding of Grizzly Bear ecology, behavior and movements, population densities, and effective population size. It also investigates the relationship between commercially productive forest and the designation of PAs as well as compares conservation strategies in Alaska’s Tongass National Forest (Habitat Conservation Areas, HCAs) and BC’s North Coast Plan area PAs. The conservation biology analysis reveals that this North Coast plan is dangerously inadequate and recommendations are made for an additional 3 large and 19 medium-sized PAs.

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INTRODUCTION

Analysis of the survival of North American Grizzly Bears since 1900 reveals that populations exposed to intense human, industrial and agricultural pressure have survived and remain potentially viable only because they are found in large public land ecosystems of which 50% or more is roadless and managed as Wilderness or National Park (Mattson *et al.* 1995; Horejsi 2004). In the western United States Grizzly Bear populations were isolated in 44 population centers by 1920. Today only six of those populations remain; three (North Cascades, less than 15 bears; Selkirk, less than 40 bears; and Cabinet-Yaak, less than 15 bears) are legally recognized populations that may no longer be viable and of these the latter two are imperiled by an inadequate roadless habitat base. All three are listed as endangered under U.S. federal endangered species legislation. One population (Kettle) is not officially acknowledged. The remaining two (Yellowstone and Northern Continental Divide) are categorized as threatened under that legislation and each occupies an ecosystem at least 50% of which is unroaded and protected landscape.

Bear populations in British Columbia have fared no better than those to the south. There are now at least eleven “threatened” Grizzly Bear (hereafter referred to as Grizzly or Grizzlies) population “units” in British Columbia and one quarter of this vast province is now either without Grizzlies (8%) or occupied by threatened populations (16%). British Columbia Grizzly populations are moving toward extinction in more than 25% of the province, an increase in area of more than 200% since 1965. Bears in an additional 16% of the province, representing an entirely different set of threatened population units to those that exist now, are predicted to be threatened by the year 2065 (B.C. MELP 1995; Horejsi *et al.* 1998).

(Author’s note: British Columbia government management agencies do not use the term “endangered”. Many of the biologically threatened populations (<100 animals) in the province would be considered endangered by the courts, the public and scientists in other jurisdictions. The Selkirk Grizzly Bear population, whose ecosystem is shared by Canada and the United States, is an example; U.S. management agencies

and courts consider it endangered but in B.C. it is classified as a “threatened unit”. British Columbia has artificially defined “populations” on the basis of administrative boundaries instead of biological boundaries based on ecological, behavioral or genetic criteria).

The distribution and viability of Grizzly Bear populations in coastal British Columbia appears to be following the same pattern as that experienced by Grizzlies across western North America. Grizzlies have been extirpated from the southern B.C. coast. The status of central and north Coast populations however, remains largely uncharted. Warnings of unsustainable mortality implying population decline have existed for over a decade (Bianci, V., 1991; Trites and Thommasen 1992; Horejsi *et al.* 1998) and recent acceleration of clearcut logging in the Coastal watersheds (Marchak *et al.* 1999; World Resources Institute 2000; Horejsi *et al.* 1998) have elicited public and scientific alarm about habitat degradation.

In the last two decades B.C. government ministries and the public have been attempting to grapple with intensifying demands by the timber industry to implement industrial scale clearcut logging in North Coast watersheds, many of which are still pristine. The government of B.C. launched the North Coast Land and Resource Management planning process in 1991 as part of their resource allocation plans.

The North Coast Plan area was initially defined by government and the timber industry to identify timber supply areas and their management. It encompasses about 16,175 km² of coastal influence landscape, of which about 66% (10,795 km²) is presently considered by the British Columbia Wildlife Branch to be occupied by Grizzly Bears (Figure 1). The analysis in this paper is confined to the area defined by the province’s wildlife staff as occupied by Grizzlies, however, Grizzlies may be found outside the recognized occupied area and historically, they are likely to have been common outside today’s shrunken range.

Approximately 56% (6050 km²) of the area occupied by Grizzly Bears is considered habitat suitable for use by Grizzlies (see Figure 2); the remainder (4745 km²) is considered largely unsuitable (Table 1) for use by Grizzlies. Because the North Coast LRMP process excluded participation by all

but a selected group of British Columbians and progressed without science-based environmental impact assessment (see Boyd 2003 for more on the B.C. regulatory environment), we examined the proposed allocation of public land to protected areas and industrial use.

METHODS

All GIS data were processed with ESRI Arc/Info 7.2 and ArcView 3.2 with Spatial Analyst extensions. All raster processing was accomplished at a resolution of 50 x 50 m. The area occupied by grizzly bears was taken from a draft map, entitled Grizzly Bear, North Coast LRMP Ranked Watersheds, July 31, 2003, prepared by Ministry of Sustainable Resource Management. It is no longer on the government website, but is essentially the same as Map 6, Grizzly bear Occupied Area (December 15, 2004), North Coast LRMP, posted on February 2, 2005 at http://srmwww.gov.bc.ca/ske/lrmp/ncoast/docs/maps/Map_6_Grizzly_Bear_Occupied_Area.pdf.

Protected areas used in this analysis were those existing and proposed by the North Coast LRMP as of March 2005. They are taken from Map 3, Recommended Land Use Designations (December 15, 2004), North Coast LRMP, at http://srmwww.gov.bc.ca/ske/lrmp/ncoast/final_landuse_recommend.htm, posted by the Ministry of Sustainable Resource

Management, Skeena Region, dated February 2, 2005.

Suitable and unsuitable habitat was identified by defining unsuitable habitat as being greater than 45 degrees steepness and/or consisting of the following classes of land as defined in the B.C. Ministry of Forests forest cover data base and refined by the Small Scale Predictive Ecosystem Mapping Project (ssPEM), B.C. Ministry of Sustainable Resource management, 2002: not classified, lakes, ice field, alpine, rock, gravel pit, sand, clay bank, roads, and urban and other lands occupied by human infrastructure. Roads were designated as part of the land base occupied by human infrastructure. Paved and unimproved roads are included. It should be noted that the database is not

considered comprehensive.

North Coast logging data was derived from British Columbia Ministry of Sustainable Resource Management TRIM (Terrain Resource Information Management) data and provincial forest cover data. Road and elevation data were derived from the provincial government TRIM database and input data for ssPEM. Elevation was employed to identify logging activity by elevation zone. We evaluated the Protected Areas proposed for the North Coast Plan in the context of published understanding of Grizzly Bear ecology, behavior and movements, population densities, and effective population size. The British Columbia government has very carefully chosen the name “protected areas” to define public lands that have some form of protection from some kinds of industrial and non-industrial human activity. They have specifically avoided the use of designations such as wilderness or refuge. Core habitat was defined as any area outside the zone of influence (0.62 km) of any open road, gated road, motorized trail, or high use non-motorized trail (Wakkinen and Kasworm 1997).

CONTEXT

B.C. is not the only North American jurisdiction faced with the task of protecting coastal Grizzly populations and their habitat. Immediately adjacent to and north of the North Coast Plan area is the Tongass National Forest in Alaska. There are 7.9 million acres (31,970 km²) of occupied and suitable brown bear habitat in the Tongass National Forest, of which 7.5 million acres (94%) (30,352 km²) are classified roadless (U.S. Forest Service 1997). This vast, largely intact ecosystem exists because there is a national constituency and a legal process-driven approach, with a mandate to incorporate conservation biology, supporting land and wildlife planning and management actions. Alaska’s coastal ecosystems maintain the largest, most dense brown bear populations (Miller *et al.* 1997) in the western world. The Tongass provides a stark land and bear management contrast to the North Coast of B.C. and prompted us to compare the two approaches.

The average adult female annual home range size in the North Coast landscape can only be approximated. Limited evidence from the Khutzeymateen study suggests it is at least 53 km² (n=13) (MacHutchon *et al.* 1993), a size almost surely several times too small. In coastal Alaska, a less topographically fragmented landscape than the North Coast, female annual home ranges averaged 522 km² (n=8) (Arthur & Schwartz 1999). Female home range size on the North Coast is likely somewhere in between these two estimates. Multi annual home ranges can be several times as large as annual ranges; their large size reflects considerable mobility as bears try to move through the landscape to find security and exploit foraging opportunities like salmon runs and berry abundance. Home range size and use appears to be a combination of localized use, occasional long-range excursions, and long-range movements within a drainage or to adjacent drainages. For example, 13 of 17 Grizzly Bears, including four of five adult females, moved between the Khutzeymateen watershed and adjacent watersheds



Figure 1. Watersheds occupied by Grizzly Bears (shown in light grey) as of March 30th, 2006. (All figures and photos in this article were provided by the authors)

Figure 2. Suitable and unsuitable Grizzly Bear habitat.

(MacHutchon *et al.* 1993).

In spite of these large annual home ranges, on a daily basis undisturbed Grizzlies make relatively localized movements that range from an average of 4-5 km/day (Farley *et al.* 2001) down to about one km/day when bears are able to exploit concentrated and rich food sources (usually salmon spawning areas but also berry fields and avalanche chutes). Mattson (1991, 1993) initially proposed small scale Security Areas (SAs) as a means of providing Grizzly Bears, particularly females, with safe haven when human activity occurs in their vicinity or within their home range. Size alone distinguishes Security Areas from Core Wildlife Habitat designations such as large Protected Areas, which ideally consist of large blocks of permanently protected habitat. Mattson (1991, 1993) suggested a minimum area of 28 km² for SAs based on demonstrated displacement and disruption of feeding by bears within two (2) km of major roads and four (4) km of developments and the provision of security that would encompass a 24 - 48 hour foraging distance of about 1.8 km.

Observations of radio collared Grizzlies in endangered populations in interior rainforest ecosystems like the Selkirk and Yaak, where industrial exploitation has all but eliminated large scale blocks of roadless habitat indicates disproportionate use of habitat that conform closely with this size Security Area; 88% of radio relocations of female bears in the Selkirks were in core habitats > 26 km². A further 6% were in core habitat >10

km² but < 26 km². In the Yaak ecosystem 74% of relocations were in core habitats > 26 km² and a further 15% of relocations occurred in core habitats >10 km² but < 26 km² (Wakkinen and Kasworm 1997).

PROPOSED PROTECTED AREAS

North Coast Protected Areas discussions led to recommendations for nineteen proposed and existing PAs (see Figure 4) that contained adequate suitable habitat to provide minimum daily security habitat for bears at or above the lower end of the daily range of movements. Three of these (PAs #19, 32, and 68) are on the lower end of this scale and one other (Bishop, #6) could meet security requirements (around 26 km²) for bears whose daily range is on the upper end of daily foraging movements. Seven of the nineteen areas consist of 50% or less suitable habitat. Unsuitable habitat is of little ecological value but bears do move across it in very limited and specific locations; it is therefore not entirely without value and it may provide additional security by blocking access to bears and suitable habitat by humans and industry.

To make Security Areas useful they must be readily accessible to bears in the area. Mattson (1991, 1993) suggested that Security Areas be no more than two days foraging range apart. A daily foraging radius for adult female bears of 4-5 km at the upper end would require protected areas to be within that distance of each other. To include bears with smaller foraging ranges, particularly those gathered around salmon spawning areas,

Figure 3. Coastal bears, like this 450 kg male, require protected low elevation habitat to access forage and salmon.



protected areas would have to be closer together. A network of Security Areas using a 4-5 km daily foraging range would result in approximately 50% of an area being incorporated as Protected Areas.

Designating small PAs of 10 - 40 km² of suitable habitat can be beneficial if they are contiguous with or accessible from larger areas of suitable habitat and combine to form units that may be ecologically effective. Only one (#32) of the four proposed PAs (#32, 6, 19 and 68) in this size range (shown *italicized* in Table 1) benefit from direct linkage by sharing a mutual boundary with larger areas. The other three areas fail to meet this threshold; Bishop Bay (#6), Upper Ecstall (#68) and Europa Lake (#19) have no linkage to other PAs in the North Coast Plan area. The size of Upper Ecstall (# 68) and Europa Lake (#19) is deceptive; even though each is 87 km² or greater in overall size, they are limited in effectiveness because they contain only 12% and 13%, respectively, suitable habitat and because they are largely isolated by substantial expanses of unsuitable habitat on all but one side. For example, although Upper Ecstall (#68) is geographically only a few kilometers from Khtada Lake (#26), the two are about 58 km apart if bears choose to move between them using suitable habitat. These two PAs are 20 and 38 km distant via suitable habitat from Sparkling (#57)

and bears attempting to move between these areas will have to increasingly use pathways through an industrialized landscape that will impose a growing cost (Lidicker and Koenig 1996) on bears and the population.

Seven PAs (listed south to north, # 11, 38, 26, 40, 63, 65 and 58, shown in Table 1) may contain suitable habitat sufficient to meet minimum annual home range size requirements. However, the utility for bear conservation of PA designation for two of these areas, the Stagoo South (#58) and Khtada Lake (#26), is compromised by geographic and functional isolation from other PAs. Two more areas, Union Lake (#65) and Tuck Woodworth (#63), are 16 km and 13 km distant, or about 2.5 and three days minimum foraging range, respectively, from the nearest other sizeable PA. These Protected Areas will increasingly become marginalized as the landscape surrounding them is industrialized (i.e. roaded and logged). The overall implications of these observations are that small PAs (less than annual home range size) are of marginal value in providing daily or even seasonal requirements for security of habitat and security from interactions with humans using managed forests unless they were to be so common as to provide a “stepping” stone network across the landscape (Groves 2003).

Four of the 19 proposed and existing North Coast Protected

Table 1. Suitable and unsuitable habitat within existing and proposed protected areas (PA > 10km² of suitable habitat), 2005, within the range of the Grizzly Bear in the North Coast LRMP area, listed from north to south. See Figure 4 for location via ID number.

ID	Protected Area Name	Description	Total Land Area	Suitable Habitat	Un-suitable Habitat (km2)	Percent Suitable Habitat (%)	Minimum Elevation of Suitable Habitat (m)	Elevation of Suitable Habitat (m)	Road
58	Stagoo South	Proposed PA	108.7	64.9	43.8	60%	23	1213	0.0
34	Kwinimass	Proposed PA	334.4		110.1	67%	0	1731	18.3
27	Khutzeyma-teen	Existing PA	442.3		251.7	43%	0	2218	0.0
35	Khyex	Proposed PA	480.3		326.9	32%	0	1182	25.7
65	Union Lake	Proposed PA	62.3	44.7	17.7	72%	52	1085	0.0
63	Tuck-Woodworth	Proposed PA	48.7	44.7	4.0	92%	12	929	0.0
40	Lower Ecstall	Proposed PA	122.8	86.9	35.9	71%	0	1085	0.0

Occupied by Bears	Proposed and Existing Protected Areas
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Table 2.
The proportion of productive forest (PF) in areas occupied by Grizzlies compared to protected areas in the North Coast Plan area.

Areas (shown in **bold** in Table 1) provide enough suitable habitat to meet the annual or multi annual home range size requirements of adult female Grizzlies. The most positive and functional Protected Area designations lie in the adjacency of Kwinimass (#34), Khytzymateen (#27) and Khyex (#35) PAs; this may represent recognition of the significance of the relationship between ecological function and landscape size. In spite of this single example of synergism, the proposed North Coast Protected Areas system will not provide life-long protected habitat for most Grizzly Bears.

We also investigated the relationship between commercially productive forest and the designation of Protected Areas (Table 2).

It appears that Protected Areas are slightly biased against the protection of productive forest, however, the disparity is small and could be corrected as indicated below.

BRITISH COLUMBIA VERSUS ALASKA

Four of the proposed and existing Protected areas (# 34, 27, 35 and 57, total 731 km² of suitable habitat) in the North Coast Plan equal or exceed the size of Large Habitat Conservation Areas (HCA; ≥ 162 km²) considered necessary to protect brown bears in the adjacent coastal Alaska Tongass National Forest (NF); two more North Coast proposed PAs (#40 and 38, total 185 km² of suitable habitat) meet the size requirement for Medium Habitat Conservation Areas (HCA; ≥ 81 km²) (Suring *et al.* 1993). In addition, there are 257 km² of suitable habitat protected in five PAs between 45 and 81 km² in size and 61 km² of suitable habitat protected in four smaller PAs (10 - 25 km²).

Ten Large HCAs and 27 Medium HCAs already exist in the Tongass National Forest and the wildlife viability strategy designed for the Tongass (Kiestler and Eckhardt 1994) proposes an additional 28 Large HCAs and 84 Medium HCAs, for a total of 38 Large areas and 111 Medium sized areas.

We calculated the number of large and medium sized Protected Areas necessary to secure Grizzly Bear habitat in the North Coast Plan area by correcting for the size of suitable occupied Grizzly habitat in the North Coast Plan (6050 km²) relative to occupied Brown bear habitat in the Tongass National Forest (31,970 km²). The North Coast Plan falls far short of the seven Large Protected Areas (HCAs) (North Coast proposed (=3) and existing (=1)) and 21 Medium sized Protected Areas (HCAs) (North Coast proposed = 2) necessary to meet minimum expectations for Grizzly habitat viability even if we allow that those 7 PAs between 45 and 162 km² might function as Medium sized protected habitats. Table 3 compares the two conservation

To provide adequate baseline protection for Grizzly populations and habitat in the North Coast Plan area, our analysis indicates that the following additional amount of suitable habitat will need to be protected;

- 1) 486 km² in about three Large Protected Areas (each about 162 km²) and 1539 km² in about 19 Medium sized Protected Areas (each about 81 km²).
- 2) Of the 2025 km² of additional habitat protection necessary, about 72 % (1458 km²) should consist of productive forest in order to maintain historical ecological proportions and functions in these Grizzly Bear landscapes.

About 94% of brown bear habitat in the Tongass National Forest is currently roadless (U.S. Forest Service 1997). This represents

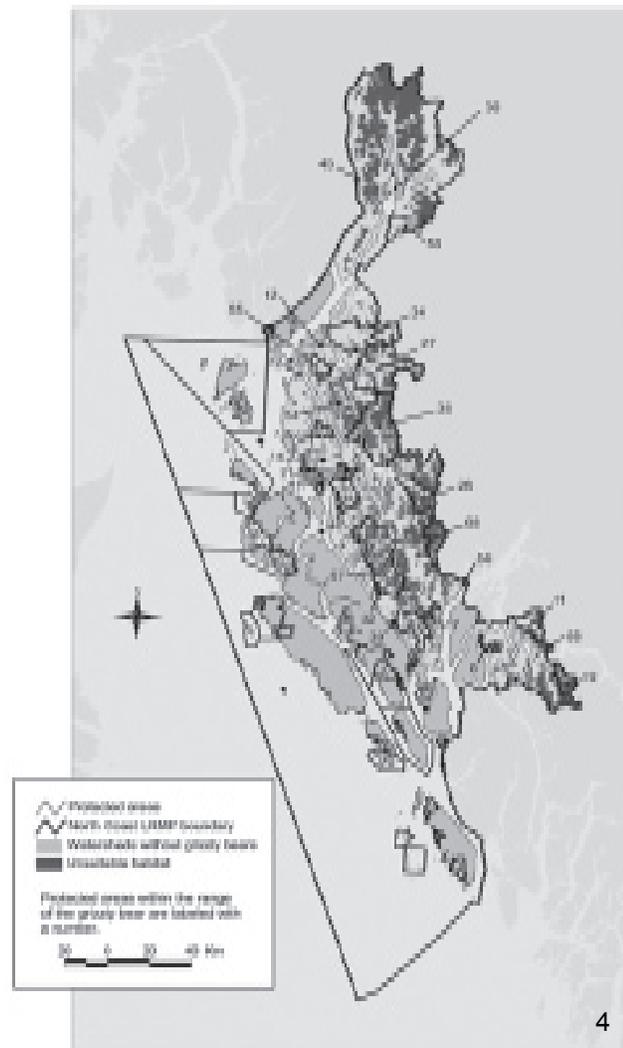


Figure 4.
Protected Areas, proposed and existing, in the North Coast Plan area.

p r o p o s a l s .

Table 3. Existing and proposed conservation strategies in Alaska's Tongass National Forest (Habitat Conservation Areas, HCAs) and British Columbia's North Coast Plan area (Protected Areas, PAs) with corrections for size of suitable habitat available.

	Large HCAs (162 km ²)			Medium HCAs (81 km ²)		
	10	28	38	27	84	111
Tongass National Forest	10	28	38	27	84	111
North Coast Plan	1	3	4	0	2	2*

* If we include all areas between 45 and 162 km² as Medium HCAs this would = 7.



the highest level of ecological protection and function possible and is currently accountable for the viable and high-density bear populations Alaska is proud of. Even so, it is arguable whether the proposed Wildlife Strategy for the Tongass (Kiestler and Echardt 1994), in which Habitat Conservation Areas would be designated for legal protection, is adequate given that the scientists involved were all government agency employees who may be under agency pressure to temper their “science” with career and political concerns (Steel *et al.* 2004). In strictly practical terms, this might suggest that habitat protection measures could be strengthened in the Tongass National Forest, as has been suggested by others (Kiestler & Eckhardt 1994), which would widen the gap between conservation measures proposed by two very disparate jurisdictions (British Columbia and Alaska) claiming to have the same goal - to protect viable Grizzly (Brown) Bear populations and their habitat.

CONCLUSIONS

We do not consider it remarkable that the conclusion that protection of about 50% of suitable Grizzly habitat as a necessary minimum to achieve a reasonable prospect of maintaining population viability has been arrived at by two widely disparate means of analysis; 1) a more thorough analysis of habitat requirements as evidenced by the Tongass analysis and this report, and 2) an analysis of historical survival of Grizzly populations in managed and roadless ecosystems, as presented by Mattson *et al.* (1995) (and later by Horejsi 2004 and Gilbert *et al.* 2004). What stands out is the dramatic difference in strategy and vision for bears and their habitat between the scientifically and publicly driven approach in Alaska, where bear conservation is anchored by a huge protected and roadless habitat base, and the retreat toward near full industrialization proposed by the North Coast Land and Resource Management process, wherein 76 % of the land base is slated for industrialization.

For more than two decades B.C. government ministries have been attempting to grapple with intense private demands to industrialize public lands. Each proposed initiative for scientifically sound land and wildlife conservation strategy has been undercut by political deference to the Ministry of Forests and the timber industry. For example, the Protected

Figures 5A, 5B & 5C. The cumulative effects of clearcut logging and the enabling road network destroy and fragment native habitat and sharply reduce security and ecological and biological options for bears.

Areas Strategy of 1990 began with a politically imposed cap on how much public land (10%) could be maintained in a fully functional ecological state. The Grizzly Bear Conservation Strategy of 1995 (B.C. Government 1995) was neutered by categorical exclusion of ecosystem maintenance measures that would have reduced long-term timber supply by more than four percent (4%). Land and Resource Management Plans, of which the North Coast Plan is but one of many in British Columbia, were similarly restricted to a shallow box of options defined by prior initiatives.

History and science have shown that the consequences of widespread and intensive industrialization of unique and ecologically functional landscapes are sharp declines in fish and wildlife habitat effectiveness and population viability with escalating risk of threatened and endangered status. Protected Areas (PAs) proposed for and existing in the North Coast Plan area fail by a wide margin to secure suitable Grizzly habitat; based on the extirpation and extinction history of Grizzlies in North America present land use proposals provide a very low probability of maintaining Grizzly Bear population viability over a reasonable time frame (one half logging rotation, about 100 years). Our conservation biology analysis reveals that this North Coast plan is dangerously inadequate.

Our analysis of existing scientific data and management practices in North America indicates that:

1. Three additional Large (162 km²) Protected Areas (a total of 486 km² of suitable habitat) need to be added to the North Coast LRMP to maintain Grizzly and salmon habitat, and
2. Nineteen (19) additional Medium sized (81 km²) Protected Areas (a total of 1,539 km² of suitable habitat) need to be added to the North Coast LRMP.
3. The supplement of these 22 additional Protected Areas (2025 km²) will result in a total of 3,260 km² of suitable Grizzly and salmon habitat being managed for long-term sustainability in North Coast Plan area. This amounts to 54% of existing suitable habitat (total of 6050 km²) in occupied Grizzly Bear range.
4. These 22 additional Protected Areas be strategically located throughout the North Coast Plan area to provide a functional network of secure, long term protected habitats that ecologically compliment each other. Guidelines about spacing of PAs and their relationship to Grizzly Bear security, movements and access to habitat are outlined in the above text and in Gilbert *et al.* (2004).
5. Of the 2025 km² of additional protection necessary, at least 72% (1458 km²) should consist of productive forest in order to maintain historical ecological proportions and functions in these occupied Grizzly Bear landscapes.

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Figure 6.
Grizzly feeding on Salmon.

Figure 7.
Mother Grizzly and her cubs.

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