

# Age and Species Composition of Forests, Grizzly and Other Species Densities, Wilderness Watersheds, and Threats to Yellowstone to Yukon in British Columbia

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*"In the Pacific Northwest...there are species and processes that depend upon old-growth forest as habitat...existing old-growth forests are our only source of reserves...we must see the larger task—stewardship of all of the species on all of the landscape." (J. Franklin 1993).*

## Forest Age and Species Diversity of British Columbia Forests

Half of the forested land in British Columbia has been clearcut, burned, or settled. This has happened to a lesser degree in the Y2Y planning area, however, than in other parts of B.C. (Fig. 1; MacKinnon 1996). Forests over 140 years old are found on 25% of the British Columbia landbase (15% coastal and 10% interior). Fifty percent of these forests are at high elevations (Fig. 1; MacKinnon 1996; MacKinnon and Vold 1997). Only 3% of British Columbia's forests over 140 years old are presently protected. The Y2Y area contains over 75% of the unprotected forests over 140 years old left in the British Columbia interior (Fig. 1).

Forests over 250 years old are usually termed "ancient forests." Most of these forests are rainforests (over 1 metre of precipitation per year). Eight percent of the British Columbia landbase is forested with ancient forests over 250 years old (Fig. 1; MacKinnon 1996; MacKinnon and Vold 1997). This 8% exists in four major areas: (1) Mid-coast of the British Columbia mainland, (2) Vancouver Island, (3) Robson and Parsnip valleys, (4) Upper Nass Valley. The latter two contain most of the remaining larger tracts (>2000 ha) of ancient forest left in the British Columbia interior and are contained in the Y2Y. Smaller patches (<500 ha) of ancient forest exist throughout the Y2Y, especially in southeastern British Columbia (Fig. 1).

Ancient rainforests of the British Columbia interior that have been in climax for thousands of years have been recognized as distinct ecotypes among ancient forests. Recently they have been termed "antique forests," or, more technically, oroboreal (Goward 1994, 1995, 1996a). The Y2Y contains almost all of the interior ancient forests over 400 years old and almost all of the known antique forests left in the British Columbia interior (Fig.1; MacKinnon 1996).

The oldest, wettest, and least fragmented old-growth forests contain more lichen species (British Columbia's most diverse primary producer), more rare lichen species, and more endemic lichen species than younger, drier, or more fragmented forests (Goward 1994, 1995, 1996a, b). Preliminary studies suggest trees, insects, birds, and mammals are also more diverse in the oldest, wettest, and least fragmented old-growth forests, especially at low elevations (Fig. 2; Bunnell and Kremsater 1990; Ketcheson et al. 1991; Lattin 1993; Zammuto and Howard 1994; Zammuto 1993; Zammuto unpubl. data).

Small patches (<500 ha) of old growth forest display interesting island effects in British Columbia. These patches allow old-growth-dependent vertebrate species to exist because species disproportionately overuse each patch. Many species travel long distances to use these patches for food, shelter, rearing, and movement (Zammuto 1993, unpubl. data). For example, marten, wolverine, lynx, grizzly, cougar, and wolf tend to travel from one old-growth patch to the next, especially in riparian habitat, many times noticeably avoiding openings (see also Weaver et al. 1996; Weaver unpubl. data). All data indicate that British Columbia's high biodiversity can be

maintained only by protecting almost all the remaining old-growth forest of interior British Columbia, including the smaller patches, especially at lower elevations and in riparian areas.

## **Fragmentation, Edge Effects, and Undeveloped Wilderness Watersheds**

Many wildlife, plant, lichen, and other species need unfragmented old-growth structures and functions for their survival. For example, 30–65% of the bird and mammal species of British Columbia need old dead trees inside unfragmented forests for breeding (Bunnell and Kremsater 1990, Zammuto unpubl. data). Much of the old-growth in British Columbia is fragmented or discontinuous enough to display edge effects that degrade habitat quality for most old-growth-dependent species. Many of these species are disappearing from British Columbia and have been listed on government red/blue lists (BCMOE 1991; Zammuto unpubl. data).

When a forest patch is less than 30 ha (550 x 550 m) in size it contains little unfragmented interior forest unaffected by edge effects (Morrison 1988). Using this criterion, only 6.3 million ha of interior forests over 140 years old in British Columbia can be considered unfragmented by roads (Fig. 1; MacKinnon 1996).

Over 75% of British Columbia's undeveloped, unprotected, wilderness watersheds over 5000 ha are in the Y2Y bioregion (Figs. 3a, 3b, 3c, 3d; BCMOF 1992). Northern British Columbia contains significantly more large wilderness watersheds (one group is 5 million ha) than southern British Columbia, where the largest one left is 100,000 ha (Figs. 3a, 3b, 3c, 3d; BCMOF 1992).

## **Grizzly Bear Habitat**

Prime grizzly habitat (one bear:15km<sup>2</sup>, 6mi<sup>2</sup>) is roughly n-shaped in British Columbia, being in the extreme west, the extreme east, and arcing across the north of the province (Fig. 4; BCMOELP 1995). Figures for old-growth (Fig. 1), roadless areas, and undeveloped watersheds (Figs.3a, 3b, 3c, 3d) display almost the same configuration. The Y2Y contains over 60% of the prime and good density grizzly bear habitat (one bear:45km<sup>2</sup>, 18mi<sup>2</sup>) in British Columbia (Fig 4). Historic prime and good grizzly habitat has been reduced by 40–60% throughout British Columbia due to almost uncontrolled development, habitat fragmentation, hunting, and poaching pressures (compare Figs. 4 and 5; BCMOELP 1995; Fuhr and Demarchi 1990).

In human-settled, logged, or roaded areas, especially at low elevations along rivers, many prime sites have been degraded to good or low density grizzly bear habitat (one bear:135km<sup>2</sup>, 55mi<sup>2</sup>), or extirpation has occurred (Figs. 4 and 5). This habitat degradation trend is likely to continue without the intervention of successful conservation measures. The current government strategy consists of designating "Grizzly Bear Management Areas" (GBMAs), which are theoretical zones where only hunting would be restricted. No habitat protection whatsoever is afforded. Not a single GBMA (which can be designated only by legislation) has been considered to date, and it is extremely doubtful the GBMA program will stabilize the population decline of grizzly bears in British Columbia.

## **Caribou**

Northern caribou, which are found throughout much of the northern British Columbia portion of the Y2Y planning area, number over 10,000 individuals. They feed on ground lichens and ground cover and are hunted. Mountain caribou, which are found only in southeastern British Columbia, number less than 2000 individuals (Stevenson and Hatler 1985). They feed on arboreal lichens and are protected from hunting. Because mountain caribou feed only in old growth over 150 years old, their habitat is completely eliminated by clearcutting and agriculture. Y2Y contains the entire range of the mountain caribou, whose populations are highest where the largest areas of old growth are found (Fig. 1).

## Conclusions

One approach to identifying core areas in the British Columbia portion of Y2Y is to overlay maps of British Columbia's old forests (Fig. 1), diverse tree species composition (Fig. 2), high grizzly density (Fig. 4), and undeveloped roadless areas (Figs. 3a, 3b, 3c, 3d). Significant overlapping suggests possible core areas (see Shaffer 1992 and Noss et al. 1996 for discussion).

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**Figure 1. Age class groups in British Columbia's forests.**

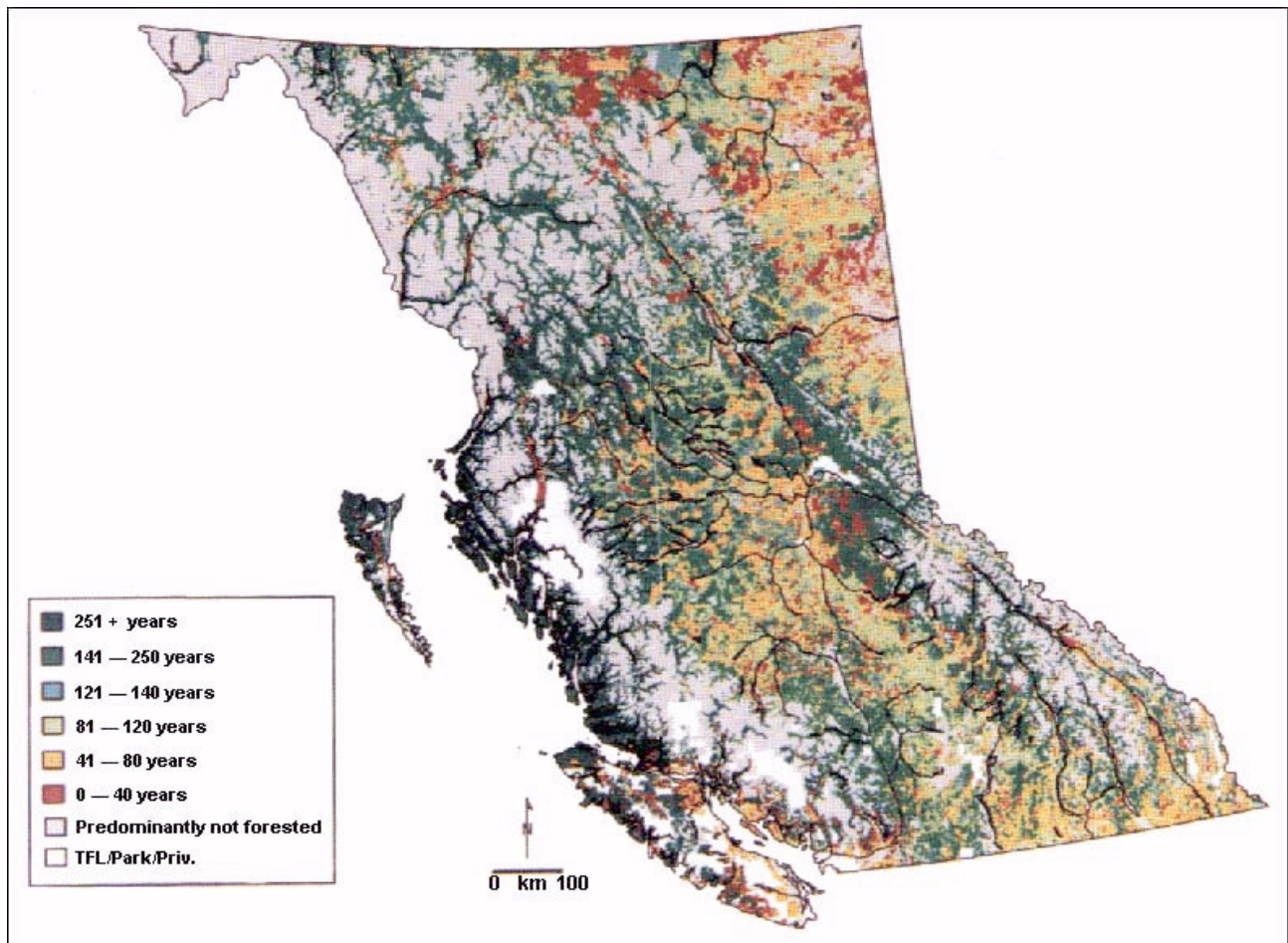


Figure 2. Leading tree species groups in British Columbia

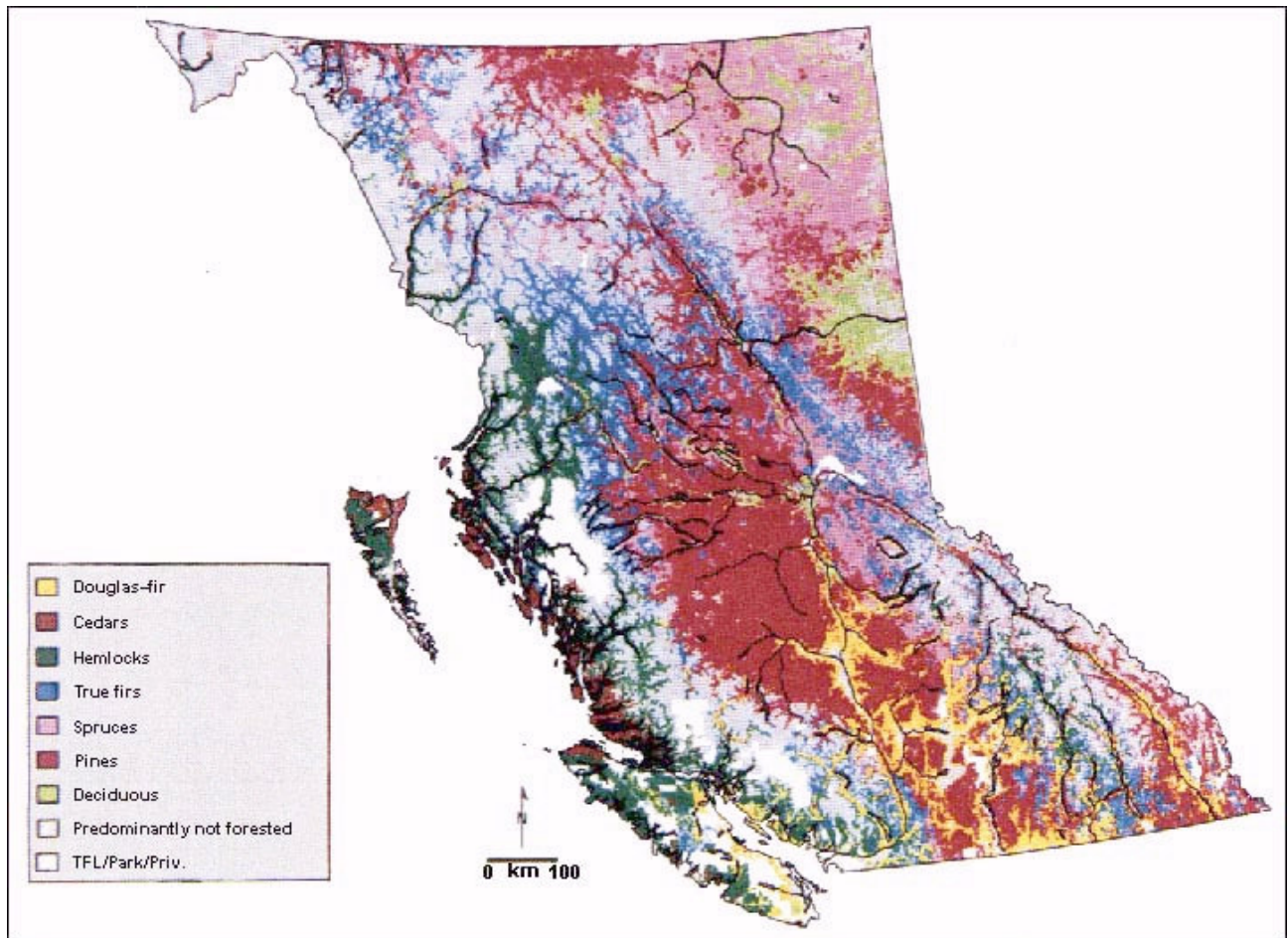


Figure 3a.  
Undeveloped watersheds over 5000 ha in the Columbia/Kootenay  
watersheds of British Columbia (numbers refer to BCOMF 1992).

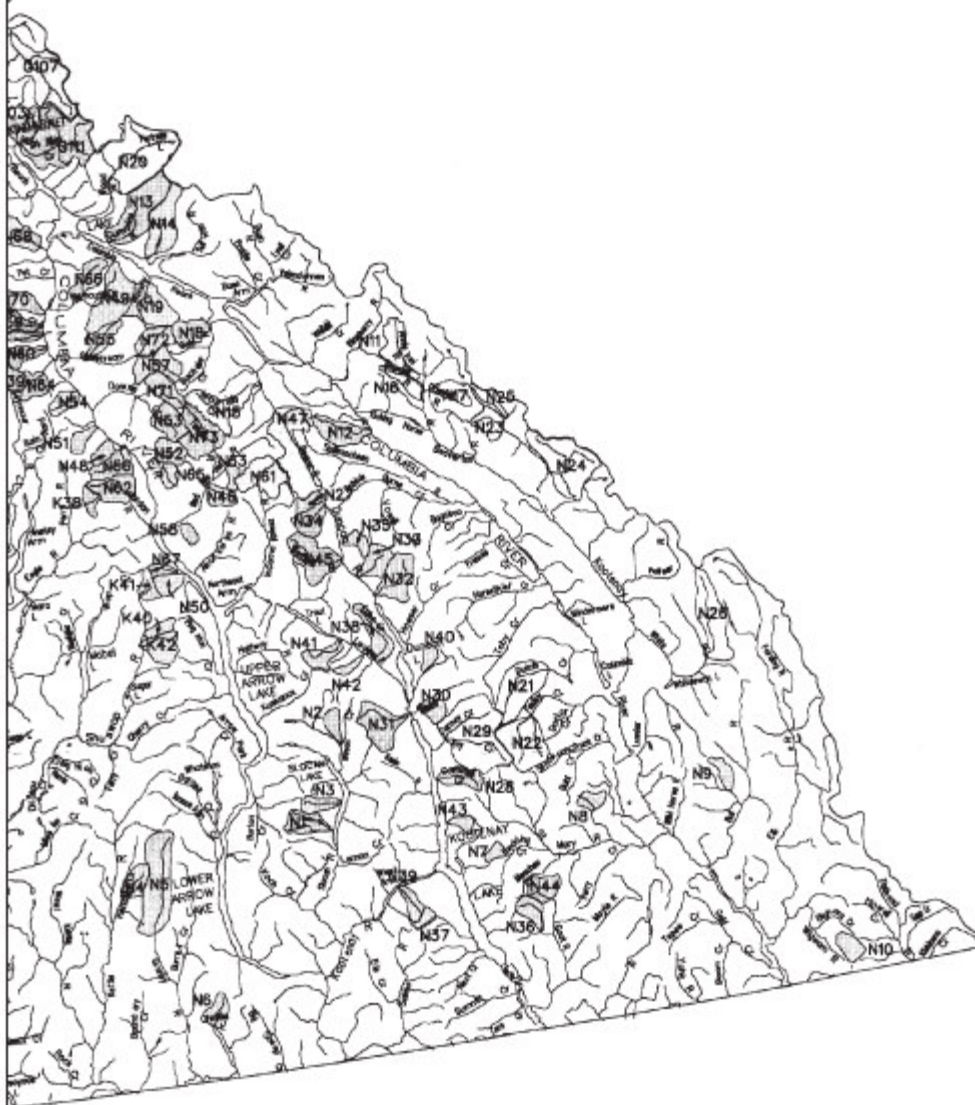


Figure 3b.  
Undeveloped watersheds over 5000 ha in the Peace/Fraser/Thompson  
watersheds of British Columbia (numbers refer to BCMOF 1992).



Figure 3c.  
Undeveloped watersheds over 5000 ha in the Ft. Nelson/Muskwa  
watersheds of British Columbia (numbers refer to BCMOF 1992).

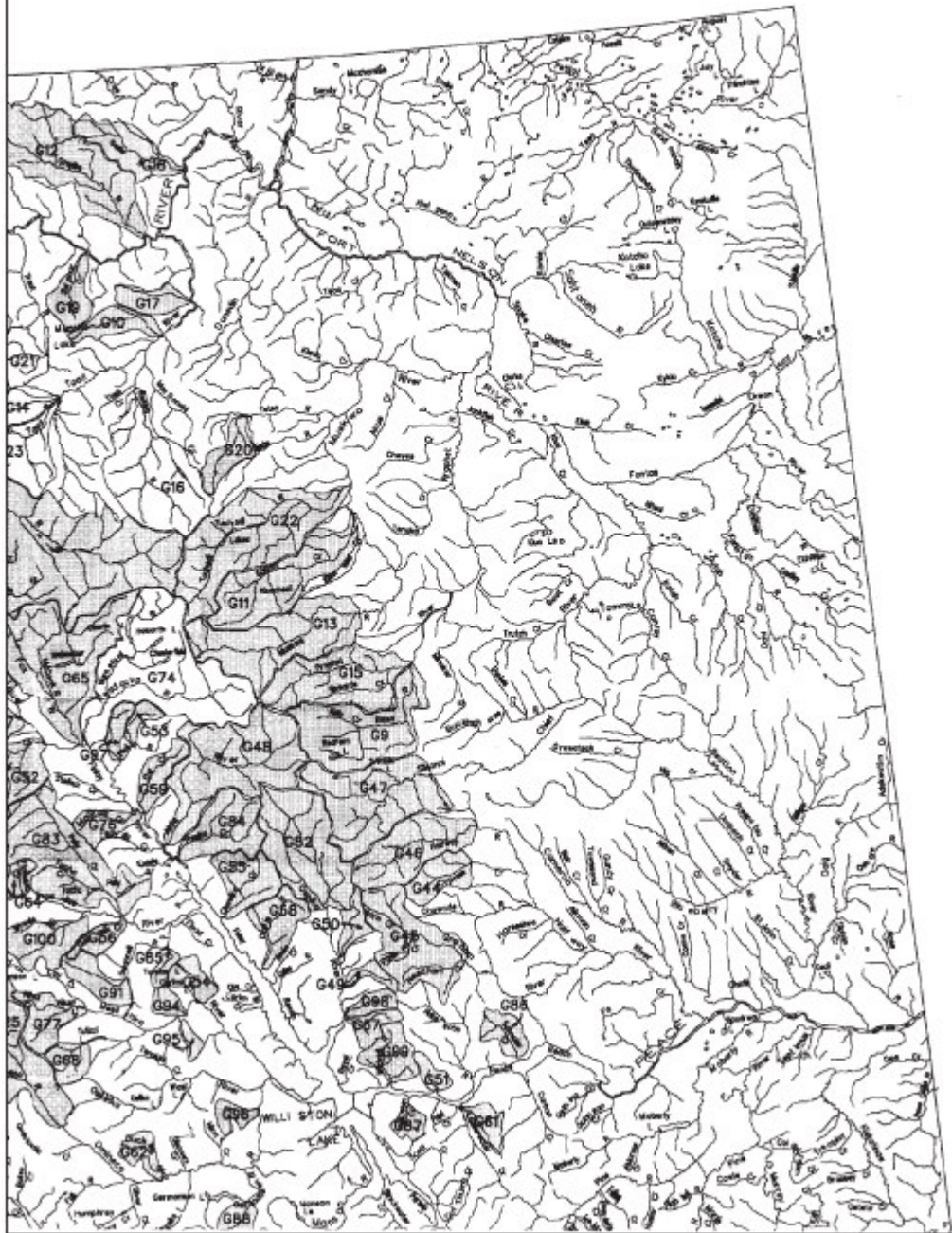
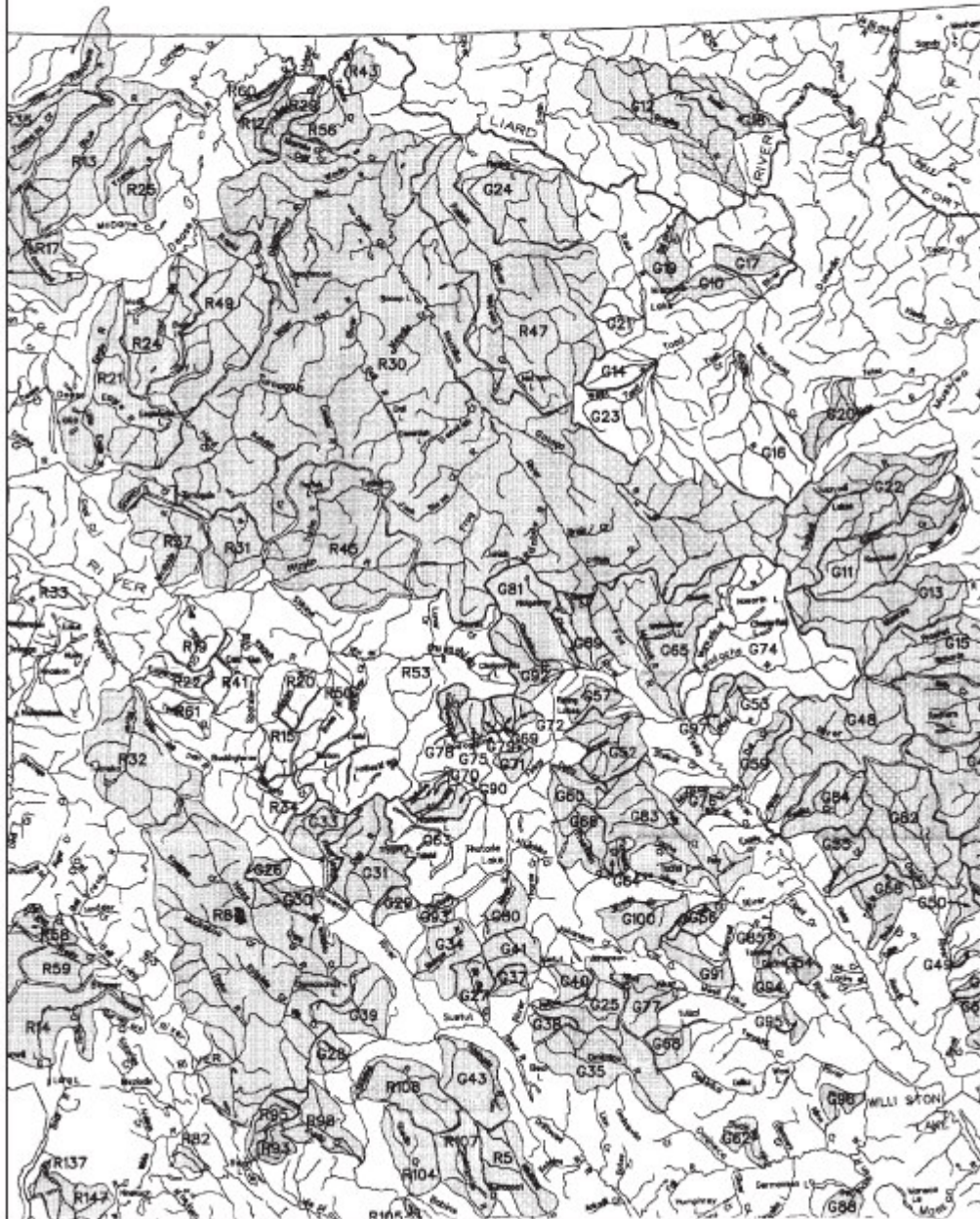
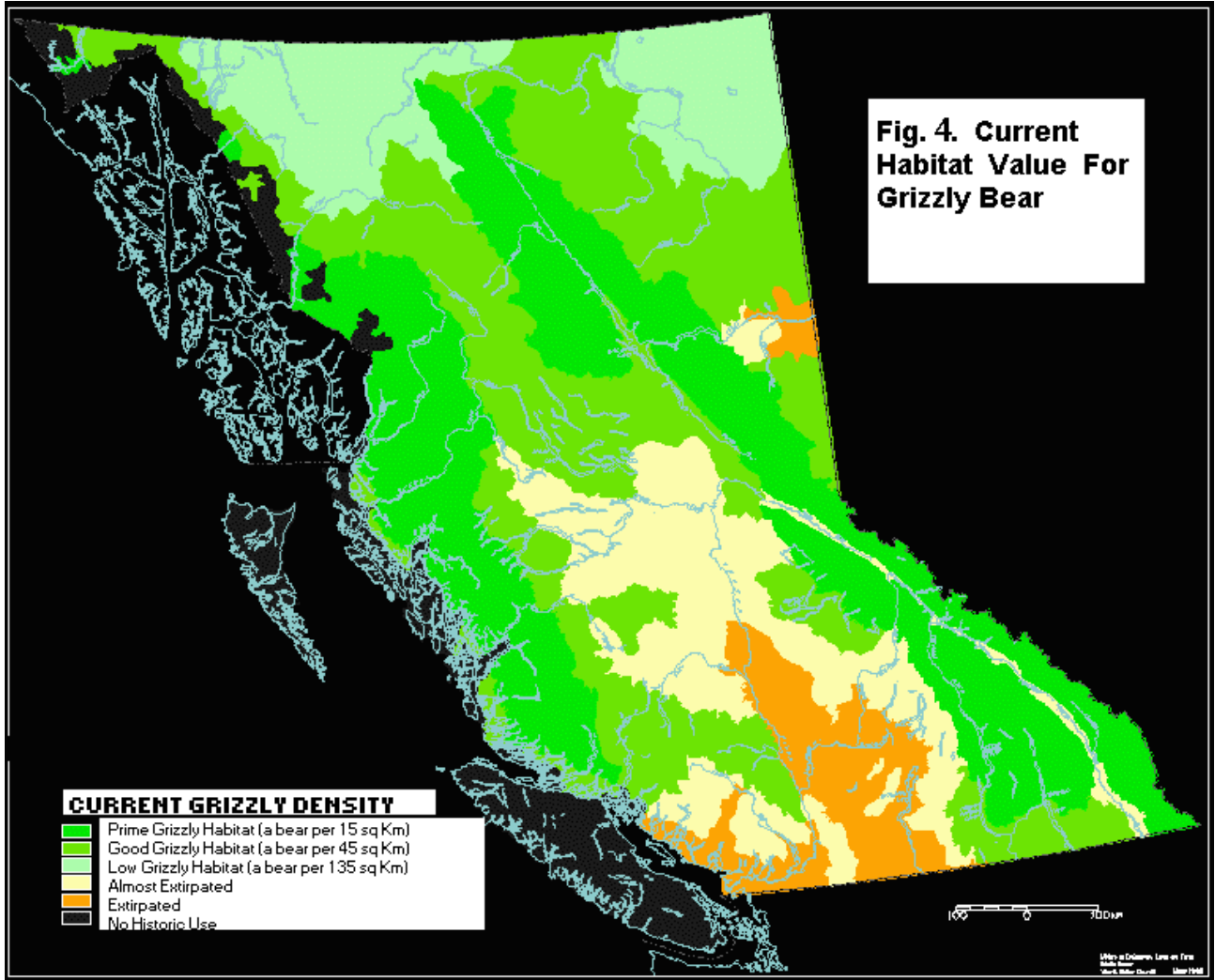
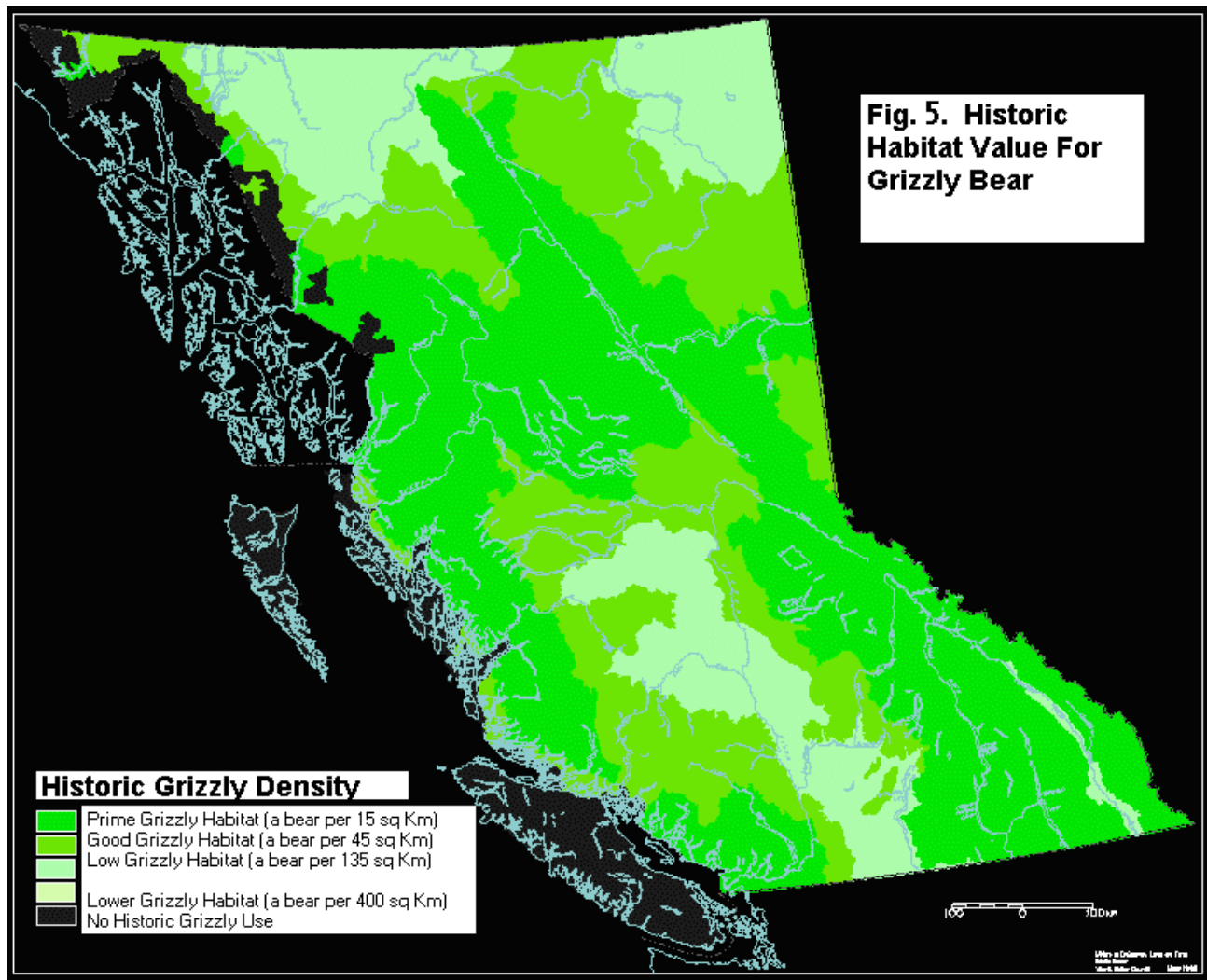


Figure 3d.  
Undeveloped watersheds over 5000 ha in the Liard/Dease/Nass  
watersheds of British Columbia (numbers refer to BCMOF 1992).









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