HABITAT IMPROVEMENT AND OUTPLANTING POSSIBILITIES

- UPPER BULKLEY / MORICE SYSTEMS

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The NCD Habitat Unit, along with coho biologists from the Science Branch, have conducted a juvenile coho sampling program on the Upper Bulkley/Morice River systems during the month of August annually since 1987. During this time, we have gained some further understanding of coho distribution and habitat utilization in this area, and some feeling as to possible limiting factors for freshwater coho production. I thought it would be useful to first present some background information on which to base discussion of enhancement of these stocks.

BACKGROUND

The Upper Bulkley River system above Houston has about 50 km of very low gradient habitat below an obstruction known as Bulkley Falls. In addition, there is further habitat available in the lower ends of numerous tributaries including Buck Creek, Aitken Creek, McQuarrie Creek, Byman Creek, Richfield Creek, and Ailport Creek. There are also quite extensive backchannel areas in old relic channels and oxbows - many of which have been cut off by highway and railway construction. Historically, coho were also recorded above Bulkley Falls and up into the Maxan system where they have been observed spawning above Maxan Lake. This area has an additional 25 km of low gradient mainstem habitat (below Maxan Lake), several accessible tributaries, and two fairly sizable lakes - Maxan and Bulkley.

Historical escapement estimates for the entire system (including Buck and Maxan Creeks) have ranged as high as 7500 in the 1950's (average ~2850 for 1950's and 1960's). Coho were first recorded in Maxan Creek in 1965 (the first year of record) and were recorded fairly consistently (maximum escapement estimate - 500) until 1972. No adult coho have been recorded in Maxan since 1972. During our sampling program, we have directed some sampling effort each year to the area above the falls - particularly in Maxan Creek - but have not captured any coho juveniles. Coho no longer seem to get above the falls. Chinook, however, which migrate into the stream earlier in the summer when water levels are usually high, do seem to ascend the falls in good numbers, and juveniles have been found in Maxan Creek each year of our sampling program.

Both adult and juvenile coho distribution seems to be a function of streamflow levels and the presence of beaverdams within the system. Extensive beaverdams are common on both the mainstem Bulkley River and on the tributaries and streamflows are often very low during the late summer and early fall (late August/September) when coho adults are entering the system. Usually, rains in September and October bring water levels up somewhat and enable adults to pass upstream at least as far as the falls. However, in years when beaverdams are

particularly extensive and/or the water levels remain low until late October or November (eg. 1989), coho distribution may be restricted to the lower portion of the river - thereby drastically reducing the potential production of the system. The best distributions (and juvenile rearing conditions) occur during unusually wet, cool summers.

Coho rearing area is also negatively affected by low streamflows. In years when summer streamflows are relatively high, the tributaries of the Upper Bulkley appear to be very heavily utilized by juvenile coho, with rearing densities much higher than the mainstem. However, in many years these tributaries flow intermittently (also resulting in low DO problems) or dry altogether. Low flows also affect the rearing quality in the mainstem, by dropping the water to a point where cutbank and rootwad habitat - which provide cover for rearing juveniles - is no longer functional. In low flows, cover for rearing juveniles is actually very scarce throughout much of the Upper Bulkley mainstem. During our sampling, the best coho densities in the mainstem have been found at rip-rap sites (ie. those with artificial cover). In general, however, at recent (ie. low) escapement levels, the amount of rearing habitat is not a limiting factor unless streamflows are extremely low and distribution of fish is restricted.

In summary, it appears that the extent of adult coho distribution and the level of juvenile coho survival is likely directly related to late summer / fall streamflow levels (and probably to a lesser extent winter streamflows). A large portion of the watershed which was utilized historically (ie. the entire area above Bulkley Falls) appears to no longer be utilized by coho.

The situation in the Morice River system is similar - the main difference being that the Morice is a much larger river with a very large, cold lake which greatly moderates streamflow and temperature fluctuations. The mainstem and the extensive network of sidechannels in the middle reaches of the Morice provide diverse rearing habitat during almost all flow levels. Mainstem coho production is therefore probably relatively stable (when compared to total production from the system).

Spawner escapements to the mainstem river have been estimated as high as 15000, with an average in the 50's and 60's of about 4800. Alcan tower counts ranged from 700 - 6000 from 1956 -1970 and averaged ~3000. Coho spawners have also been recorded from a number of tributaries including Gosnell/Thautil Creeks, Owen Creek, McBride Creek, Lamprey Creek, and Houston Tommy Creek. Escapement records exist for Gosnell (50's and 60's average - ~2000), Thautil (~275), and Owen (~250).

The survey work done during the Alcan studies (in the 1970's) indicated that tributaries such as Gosnell Creek, McBride Creek, Houston Tommy Creek, and Owen Creek were very important coho rearing areas - in some years at least, accounting for much of the coho production from the system. This work also indicated that during low flow years adult access to some of the tributaries could be restricted, thus leading to a greatly reduced distribution of rearing fish. The Alcan work documented high densities of rearing coho throughout McBride Creek and into McBride Lake and also documented juvenile coho presence in Owen Creek as far upstream as Owen Lake. During our sampling program, we have found only very low numbers of juveniles in upper McBride Creek and have

found no coho juveniles in Owen Creek, except in the lower 1 - 2 km. We feel that spawning has likely not occurred in these systems in the past few years and that most (if not all) of the juveniles found in these systems have originated in the mainstem (or in other tribs to Morice Lake) and migrated upstream to the rearing areas. It appears that these tributaries are now only utilized for spawning during years with high fall streamflows (and perhaps only when coupled with good escapements) and therefore in most years the available rearing habitat is either poorly utilized or not utilized at all.

Another characteristic of juvenile coho life history along the Morice River mainstem is the movement of fish from the mainstem into small tributaries, and particularly ponds and sloughs, during the spring. This migration seems to be in response to high flows during spring freshet and the attraction of warmer water in the offchannel areas. If the water levels in these areas are stable, coho juveniles appear to remain in these very productive areas over the rest of the year to emerge as smolts in the spring. In low-water years, however, many of these off-channel areas dry up or lose their connection to the main channel, stranding fish in summer and fall and likely causing winter kills. Access to ponds is also frequently blocked by beaver dams.

Low flows are therefore also an important limiting factor for coho production in the Morice system - tending to restrict the distribution of adults to the mainstem and larger tribs and also to reduce the survival of juveniles. It is not hard to imagine that this area could be prone to very great fluctuations in coho production - with `boom' years resulting from good escapements coupled with ideal fall streamflows (ie. high water), allowing access to all the tributaries and enabling full utilization of the rearing habitat. Similarly, if very low escapements coincided with low fall streamflows and poor rearing conditions the following year, extremely poor production would result.

HABITAT ENHANCEMENT/RESTORATION POSSIBILITIES

Several fairly small habitat projects have been suggested for the Upper Bulkley and Morice systems, some of which we anticipate will be undertaken next F/Y. These include the following:-

1) **Improvement of passage at Bulkley Falls.** Passage could be improved with some relatively minor work to divert a larger portion of the flow around the falls. If escapements to the Upper Bulkley improve, coho may push up past the falls by themselves - at least in years with high water. There are also some coho fry now outplanted above the falls. This work will also improve the passage for chinook. It is proposed for the RRU to undertake next fiscal year.

2) **Improvement of existing off-channel rearing areas along the Morice River.** Several ponds and slough areas which currently dry up during low water are being investigated for possible excavation to capture groundwater and create more stable pond areas. This work has been proposed for the RRU to undertake next year, pending further feasibility study.

3) **Improvement of passage at a bridge/culvert at mouth of Owen Creek.** While not a complete barrier, this structure inhibits passage - particularly at low flows.

This has also been proposed for next year.

4) **Inclusion of a coho rearing/spawning structure in conjunction with the proposed Nanika Sockeye channel.** Stable rearing areas are at a premium in this area, some sort of rearing pond structure could be incorporated into the design of the channel - perhaps with input from the RRU. This has been suggested to J. Wild who has promised to follow this up. Surveys are planned for this channel this fall, with work to begin next F/Y.

5) **Water storage at Maxan and Bulkley Lakes.** It has been suggested that it might be possible to store water in Maxan and/or Bulkley Lakes for release to the Upper Bulkley during low flows. Preliminary assessment indicates that the amount of water which could be stored would likely be fairly limited, but might be sufficient to provide short-term releases during the coho adult migration period. These flow supplements might be sufficient to allow coho to distribute more completely throughout the system. Further feasibilty work is required. [NB. Distribution of adults might also be accomplished by simply trucking fish from the counting fence upstream to spawning areas during extreme low water periods.]

6) **Development of the McQuarrie Creek groundwater area.** The only obvious groundwater area in the Upper Bulkley is near the mouth of McQuarrie Creek. Groundwater issues from a series of springs and ponds in the area and flows along the edge of the highway for approx 2 km. This area stays ice-free all winter. Unfortunately, preliminary investigations show low DO's in the groundwater, making the area questionable for development of spawning sites. The area may still have value as an outplanting site and overwintering area.

7) **Reconnection of pond and slough habitat cut off by highway and rail construction along the Upper Bulkley.** There are probably some areas where this would be possible, but it is considered that rearing area is not currently limiting. These may be investigated further when coho numbers have improved.

Other larger-scale projects such as groundwater channel development may be possible along the Morice, and further investigations are warranted to identify whether potential sites exist.

OUTPLANTING STRATEGIES

The Upper Bulkley and Morice systems both have extensive areas of excellent coho habitat which is currently either very poorly utilized or not utilized at all due to lack of adult access. Outplanting to these areas could be a very cost-effective strategy to improve production. Another argument for outplanting coho fry is that a fairly large percentage of the wild smolts from this area are 2+ fish, which means that fry from a very successful brood year when outplanted would likely produce two successive years of strong returns. An appropriate strategy might be to take a large number of coho eggs during years of strong returns, when brood stock is easy to get and do some extensive fry outplants. In years when returns are poor (and brood stock is hard to get), perhaps a smaller number should be taken and most coho hatchery-reared.

In the Upper Bulkley system, the most obvious area to look at for

outplanting is the area upstream from Bulkley Falls, which appears to be no longer utilized by coho. Within this area, Maxan Creek and the smaller tributaries such as Crow Creek and Foxy Creek are probably best suited for outplanting, due to cooler summer water temperatures. The mainstem Upper Bulkley below Bulkley Lake tends to get very warm during mid-summer (temperatures in the mid-twenties have been noted), and so is less favourable. Maxan Creek has approximately 13 km of suitable habitat below Maxan Lake, Crow Creek has at least 5 km of suitable habitat, and the lower 3 km of Foxy Creek are suitable. The inlet to Maxan Lake appears (on the map) to have a large amount of low gradient habitat and may also be suitable. The lakes themselves might also be considered for outplants, although competition with other species may be a problem. Approximately 50,000 coho fry (in total) were outplanted to Foxy Creek, Crow Creek, and the Upper Bulkley mainstem this year.

In the Morice system, Owen Creek and McBride Creek both have excellent access and abundant low gradient coho habitat. The upper ~8 km of Owen Creek have been barren of coho in recent years. There are extensive pond areas in the middle reaches of Owen Creek which should support very large numbers of rearing coho. McBride Creek has approximately 8 km of habitat below the lake and also has extensive beaver pond areas. Owen and McBride Lakes might also be used for rearing coho, although there may be problems with competition.

Some of the ponds and sloughs along the Morice mainstem seem to be utilized sporadically due to fluctuating water levels and occasional access problems. These areas might also be considered for outplanting. In all cases, a spring survey should be done of potential outplanting areas to confirm that they have not been adequately seeded by wild fish.

There are undoubtedly other outplanting possibilities in areas of poorer access in the Morice system, such as upper Gosnell Creek, Shea Creek/Shea Lake, Chisholm Lake, etc.

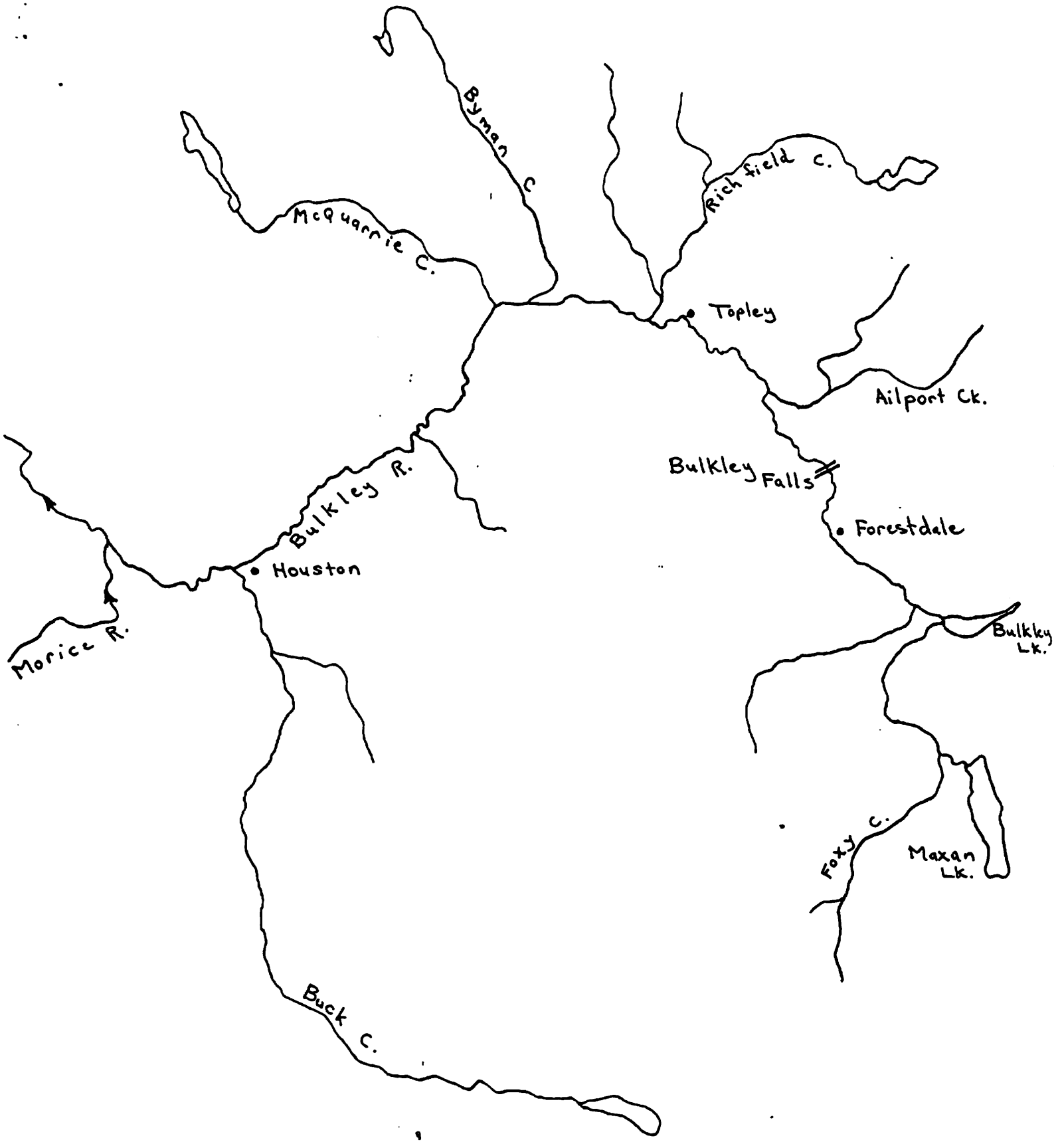

Figure 1. Upper Bulkley R. system, indicating 1987 fish sample sites.

Figure 2. Morice R. system, indicating 1987 fish sample sites.