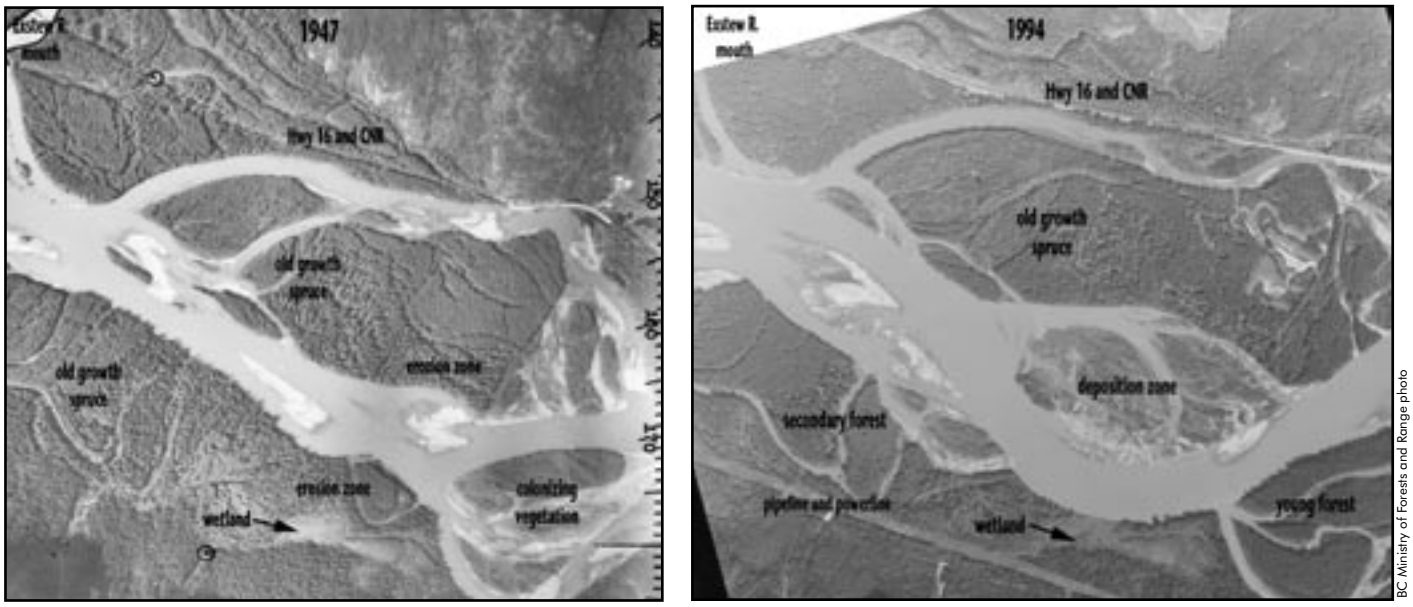
Research Brief

Knowledge of the past helps p



BC Ministry of Forests and Range photo

Skeena River floodplain dynamics showing changes in channel morphology and vegetation over 47 years.

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Conventional wisdom suggests that planning for the future is often aided by knowledge of what occurred in the past. The floodplain of the lower Skeena River in northwest British Columbia between Terrace and Prince Rupert—where a history of extensive harvesting has greatly changed the forest landscape—is a testament to this wisdom. As with many coastal floodplains in the Pacific Northwest, the relatively easy access to stands of very large conifer trees resulted in the early harvesting of these stands. Consequently, the Sitka spruce–Salmonberry high-bench floodplain ecological community is now on the BC Conservation Data Centre's (CDC) Red list (i.e., communities that are provincially extirpated, endangered, or threatened). In addition, the Cottonwood–Red-osier dogwood middle-bench floodplain ecological community is now Blue-listed, or vulnerable.

Unlike adjacent upland sites, which typically regenerate quickly to western hemlock, amabilis fir, and western redcedar after logging, stand dynamics on the Skeena River floodplain produced stands dominated by cottonwood. These high-bench deciduous stands are very similar to cottonwood stands on middle benches. The end result is a large-scale shift from coniferous to deciduous-leading stands. With these cottonwood stands now reaching harvestable age, this is an appropriate time for detailed research and management planning. Having an ecosystem-based plan in place was essential in determining the conservation needs on the floodplain, as well as identifying economic harvesting opportunities that were compatible with these conservation needs.

Research objectives

The harvesting history and conservation concerns surrounding the Red- and Blue-listed communities on the Skeena River floodplain prompted the Kalum Forest District, the BC Ministry of Environment, and the Bulkley Valley Research Centre to initiate a research project with the following three research components:

1. Determine historical and present extent of Red- and Blue-listed ecological communities and Skeena River floodplain dynamics with landscape-scale Terrestrial Ecosystem Mapping (TEM) using historical (1947) and current (1994) aerial photography.
2. Compare forest structure at the stand scale in unlogged coniferous, unlogged deciduous, and previously logged deciduous stands.
3. Rank stands for conservation value using digital aerial photography from winter 2005.

Research results

TEM mapping indicated a 77% reduction in the area containing old and mature conifer stands on

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the Skeena River floodplain. These stands have mostly regenerated to deciduous-dominated cottonwood or red alder stands, with generally low levels of conifer regeneration. After harvesting, re-establishment of conifers on the floodplain was very difficult due to a combination of flooding, intense shrub competition, and high vole populations.

An overlay of the two (historic and current) TEM maps gave an indication of erosion rates and landform stability. Lateral erosion rates averaged 5.8 m of riverbank per year, showing the highly unstable nature of the floodplain landforms. Large differences in stability among landform types were apparent, however. For example, high benches were much more stable than middle benches and especially shrub-dominated low benches. This is partly because high-bench areas are located further away from the main stem of the river. These more stable landform areas are prime candidates for both conservation and harvesting.

Stand-scale comparisons of stand attributes included stand volume, regeneration, vegetation, coarse woody debris (CWD), gaps, and soils. The volume of CWD was uniformly low in all stand types averaging 118 m^3/ha. This was much lower than the average 554 m^3/ha on non-floodplain areas within the very wet maritime Coastal Western Hemlock subzone (CWHvm1). This CWD was essential for conifer regeneration, with 97% and 100% of conifer regeneration growing in CWD in the unlogged coniferous and previously logged deciduous stands, respectively. Therefore, managing stands to maintain CWD is needed to ensure the continuity of conifers in a managed landscape.

The unlogged coniferous stands were more diverse than the deciduous stands in both plant species richness and their structural attributes. These attributes included the number of vegetation layers, and the abundance and size of canopy gaps. Previously logged deciduous stands had higher plant species richness than unlogged deciduous stands, indicating their value for conservation purposes. Much of this additional plant richness was located on or around the base of rotting conifer stumps.

Ranking for conservation value was determined by developing specifications that followed CDC standards for ranking occurrences of rare ecological communities. The abundance of conifers was the primary feature used to rank the condition of each occurrence because the largest change on the floodplain was a 77% reduction in the area containing conifers; therefore, areas containing conifers were judged to have the highest conservation value. Late winter aerial photography was used to rank the stands because it enabled us to see conifers that would be obscured by a deciduous canopy in summer.

This ranking process showed that 15% of the forested area is dominated by mature or old conifer stands. These stands are in "excellent" condition and a high priority for conservation. Stands in "good" condition covered 78% of the forested area; these are unlogged or previously logged deciduous-dominated areas, with varying amounts of conifer regeneration. The remainder was ranked either "marginal" or "poor"; these were agricultural or residential areas, or highway, railway, or powerline rights-of-way.

Large conifer trees play critical roles in floodplain ecology and geomorphology, including the provision of nests, dens, and shelter for wildlife, and stable log jams for fish habitat, and erosion and deposition dynamics. One of the main goals for future management will include the retention of existing conifers and the recruitment of additional conifers to make up for the loss of conifer-leading stands. This can be done by focussing riparian reserves and wildlife tree patches on existing conifers, and by ensuring that sufficient CWD is available for recruitment sites. Flexible and dynamic management plans are needed that will be adjusted based on the erosion and deposition processes that constantly change the floodplain.

Using the research results

These research results are currently helping to locate Old Growth Management Areas in the Sustainable Resource Management Plan for the Kalum Forest District. **Anne Hetherington** (BC Ministry of Environment, Skeena Region) and **Kevin Kilpatrick** (BC Ministry of Forests and Range, Kalum Forest District) have also used the results of the ranking procedure in the development of a risk matrix approach to improve decisions about conservation and harvesting priorities on the floodplain. Two field trips and a seminar were held in the last year to inform local forest managers of the work.

More Information

The full reports are available on the Bulkley Valley Research Centre Web site at: ***http://www.bvcentre.ca/html/documents.html***

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