Sto: lo Tribal Council Food Security Study

An Atlas Identifying sensitive spawning and rearing habitat for Chum and Pink salmon on the Fraser River from Mission to Hope

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Background

The Sto: lo Tribal Council is concerned that food resources (in this case salmon) in their territory (and passing through their territory) are diminishing. The cultural attributes associated with salmon are varied and extensive within aboriginal communities and Sto: lo members have expressed concerns that these food sources needs to be safe and secure for current and future generations.

An immediate concern relates to scientific worries that if global warming is upon us, then sockeye salmon will suffer first and to the greatest extent of all the salmon. This is largely due to the fact sockeye salmon are very sensitive to increased water temperatures and low flow regimes during their upstream spawning migration. Both these situations may be the result of increased global temperatures.

If sockeye salmon are to be diminished in number or extirpated from the Fraser River then what are the Sto:lo to eat for salmon? While some of the traditional territory of the Sto: lo people stretches from tide water to the Fraser Canyon, the focus of this work is the area from the Mission, BC bridge to the Hope, BC bridge; both of which cross the Fraser. This area is also know to some as the "gravel reach". Within this area the most abundant salmon, by far, are chum and pink salmon; both of which use the main stem as well as tributaries to spawn.

The greatest threat to these stocks is that of habitat degradation or alienation. Urban development, flood protection, agriculture and other activities associated with the modern economy have all had negative impacts on salmon habitat. If these stocks are to remain productive and provide the food security the Sto: lo seek, then their habitats need to be identified, evaluated, protected and restored. This paper attempts to bring these habitats into focus and to present a list of important streams that need to be front of mind for the Sto: lo when governments and developers exercise their "duty to consult". The goal of this subcomponent of the larger Sto: lo Tribal Council work is to provide advice on what important spawning areas for pink and chum salmon (in the tributaries as well as the main stem) need to be protected to ensure that as much diversity as possible is maintained for these stocks.

This work has been made possible, in part, by contributions from the Fraser Salmon and Watershed Program which in turn is sponsored by the provincial and federal governments.

Introduction

The chum salmon stocks (*Oncorhynchus keta (*Wabaum)) of the Fraser River in British Columbia have supported major fisheries for decades. While current stocks levels show signs of decline, variability in stock strength is not uncommon.

The majority of spawning takes place in tributaries and side channels below Hope, BC. These stocks are amalgamated into one conservation unit (CU) while the remainder of stocks, above Hope, are amalgamated into a separate CU. This work will address the larger, lower river CU.

The spawning habitats in this CU have been subjected to a variety of developments which include but are not limited to logging, agriculture, industrial development, urban development and flood control measures. Information regarding the abundance and use of chum and pink salmon prior to European

contact is being assembled in a separate work which is intended to elucidate information from the Sto: lo people and their cultural history.

The maintenance of diversity is a major concern of the Sto: lo Tribal council. While chum stocks and fisheries have been strong over the last number of decades, there is growing concern that stocks are being concentrated in a few strong producers. Fears associated with such a trend include the erosion of important life history traits (i.e. later run timing) and habitat unitization (i.e. groundwater spawners) that support localized traditional fishing practices in order to preserve the most productive populations. The larger concern is that such a strategy could potentially lead to a complete stock collapse if survival conditions change. It is hoped that the loss of important population diversity can be avoided if strategies are developed to diversify the component life history characteristics within the CU and to utilize the entire available habitat in both space and time.

While the same concerns relate to pink salmon populations, the focus is slightly different. The distribution of pink stocks in place and time is less extensive than it is for chum stocks. Run timing for pink salmon is more compressed and they are less dependent on small ground water fed side channel. However the same concerns about the maintenance of diversity apply.

Spawning Distributions and Escapements[1]

On the basis of tagging operations carried out between 1960-69, the estimated chum salmon escapements to the Fraser River system have ranged from 172,700 to 822,200 fish. More recent estimates (1996-2005) have averaged 1,984,000.

Average escapements for pink salmon for the years 1975-2001 averaged 6.5 Million fish.

The distribution of pink salmon within the Fraser watershed can be divided into two sections although both components are managed as a single aggregate with some variation in run timing. The early run group includes stocks that spawn in the Fraser River main stem between Hope and Chilliwack, Fraser Canyon tributaries, Thompson River, Seton Creek and upper main stem Fraser and tributaries. The late run group includes stocks that spawn primarily in the Fraser tributaries below Hope, with the Harrison and Chilliwack/Vedder rivers supporting the largest populations in this group.

The distribution of chum spawners and the habitat available for spawning has been studied in more refined detail. As a result we are able to discuss these elements system by system.

Vedder-Chilliwack River

This river drains a watershed of approximately 1300 square kilometres and is the only large tributary on the south bank of the Fraser River below Hope. Much of the lower river (so named the Vedder River) has been channelized for flood protection. The dykes have cut off a large number of side channels that chum normally used for spawning thus reducing significantly the productive capability of this section of river.

[1] Historical information related to chum salmon has been taken from Palmer, R 1972 which the author gratefully acknowledges.

This lower section of river was historically the major area utilized by chum salmon in the Vedder-Chilliwack River. The upper section of river (so named Chilliwack River) has not been channelized to such an extent and most spawning occurs in the main stem. In the late 60's this area was heavily utilized in years of low discharge when the side channels of the Vedder River are inaccessible to fish.

Estimated escapements to the Vedder-Chilliwack River in the late 60's have averaged 70,000 fish. Based on the measured gravel area in the Vedder River system a capacity of approximately 100,000 chum salmon is indicated (Fraser, pers. comm. in Palmer, 1972). Palmer emphasizes that spawning area, particularly in the lower river, has been considerably reduced from the systems former capacity which was well in excess of 100,000 fish.

Harrison River System

This river enters the Fraser River on the north bank approximately 113 kilometres from the sea and constitutes the major chum salmon producing tributary of the Fraser River. The river drains a watershed of over 7800 square kilometres and chum salmon spawning is primarily restricted to areas below the outlet of Harrison Lake. The distance from the outlet of the lake to the Fraser River is approximately 18 kilometres.

Stave River

The Stave River, which disgorges into the Fraser River approximately 56 kilometres from the sea, is one of the major chum salmon producing tributaries of the Fraser River system. This river is large with a drainage area of approximately 1166 square kilometres. The system was developed many years ago for hydro-electric power and is now affected by water diversion from the adjacent Alouette River, plus two hydro-electric plants and storage dams on the Stave River. Ruskin Dam, the lower-most on the river, acts as a complete barrier to salmon migration. Since construction of this dam in 1930, salmon spawning has been restricted to less than one kilometre of river between the dam and the area of tidal influence from the Fraser River. When the plants were originally constructed they were operated according to power demand which caused considerable fluctuations in daily discharges. During periods of "no load", usually at night, reported discharges below Ruskin Dam were reduced to about 11 cubic meters per second. Since the time of Palmer's report (1972), BC Hydro and DFO have established a flow regime that is more consistent and able to support chum spawners throughout most of the available area. In addition BC Hydro constructed a chum spawning channel as compensation for lost habitat.

Despite the severe limitations of spawning area imposed as a result of the Ruskin Dam and the daily water fluctuations, a relatively large population of chum salmon currently utilizes the Stave River. From observed spawning distribution and hydraulic red sampling, it is estimated that at least 62,710 square meters of good spawning gravel is available at all times to chum salmon in the Stave River. An additional 25,084 square meters of gravel which is used mainly in years when the spawning population is large, is considered poor since the area is subjected to periodic exposure when the power plant is operating at low output. The exposure becomes particularly severe when periods of low flow coincide with low tides in the Fraser River. The chum salmon spawning capacity of the Stave River is estimated to be about 70,000 fish. The average escapement for the years 1961-69 has been approximately 50,000 fish.

Concerns

While the previous sections suggest chum populations have been relatively healthy on average, it does not address the concern that strong stocks may be the only ones contributing to this success. If so then the fear that decreased diversity may increase the risk of collapse needs to be assessed.

Several indications make this assessment worrisome. Ryall et al, 1999 summarized changes that have occurred in the proportion of escapement contributed by each system to the total escapement. There has been a steady decrease in the number of stocks required to achieve 85% of the total escapement. Fifty stocks accounted for 85% of the total escapement in the 1950's, 34 in the 60's, 33 in the 70's, 28 in the 80's and 16 in the 90's. In the 1990's the Harrison, Chilliwack and Stave rivers accounted for 46% of the total escapement to the Inner South Coast.

There are 121 streams in the Fraser River that support chum salmon, although 10 stocks support 90% of the total spawning escapement. Total escapement to the Fraser averaged 99,000 in the 50's, increased to 250,000 in the 60's and to 339,000 in the 70's. The number of chum returns increased to 518,000 in the 1980's and to 1,003,000 in the 1990's. The Harrison, Chilliwack and Stave systems account for 56%, 18% and 9%, of the total escapement respectively. For emphasis; at the beginning of the 90's these three systems accounted for 46% of the total escapement to the Inner South Coast but by the end of the decade they were contributing 83% of the total escapement. This is in large part due to the large escapements evident in the Harrison. These points represent the central theme of this report.

In the modern era sockeye salmon have been harvested from the lower Fraser River in large numbers by the Sto: lo people. The modern era has also been subject to threats of global warming that may threaten the very existence of sockeye salmon in the Fraser River. Finally it cannot be overemphasized that sockeye salmon, by and large, are passing stocks for the Sto: lo people. That is to say their spawning grounds are many kilometres upstream and the care and protection of these grounds rest with others. As a result it may be opportune for the Sto: lo people to turn their attention, once again, to the species and stocks (pink and chum salmon) within their traditional territory and to ensure that any declines in their productivity be arrested and then increased. With these facts in mind the approach taken here is to identify those tributaries important to chum and pink salmon populations for spawning and rearing and the same for pink salmon (mostly) in the main stem Fraser River.

Maps were taken from Google Earth and side channels that need to be protected were identified. To be sure all spawning habitat need protection but side channels, important to pink and chum spawning, are too easily alienated in the name of progress. Thus the focus has been to mark those parts of the drainages for additional attention. It is hoped that this report will assist the Tribal Council and other First Nation governing institutions to quickly cross reference development proposals that get referred to them with sensitive habitats that require attention to ensure productivity is maintained.

If future supplies of harvestable surpluses for Fraser River pink and chum salmon are to be available, then the persistent alienation of spawning habitat (beginning with the back and side channels evident

throughout this area) needs to be stopped and much of the already alienated habitat brought back into production.

Approach

Maps have been generated that focus on sensitive tributary side channel, back channel and main stem channels. These have been highlighted to draw attention to particular areas that should be on every Sto:lo governing agencies' short list of areas to protect. It is hoped that a new referral could be easily checked against these maps to identify specific concerns and the need for further work to assess potential impacts.

The system developed begins with the Chilliwack/Vedder River and works downstream to its confluence with the Fraser River. The maps then begin to address other tributaries on the south shore of the Fraser to Hope and then tributaries on the north shore to Mission. Finally potentially sensitive areas in the main stem Fraser from Mission to Hope are identified.

Each map has been highlighted and labelled for ease of use. Once a development referral is submitted to the Sto:lo Tribal Council or other Sto:lo institutions, the proposal can be quickly checked to see if any of these sensitive areas look to be impacted by the development. It must be emphasised that this atlas will not replace the need to ground truth potential impacts before the referral is complete. This atlas is only meant to provide a quick and easy reference to identify if potential impacts might threaten the future productivity of pink and chum stocks in the lower Fraser river. Field studies will still be required to determine the magnitude of potential impacts, options available to minimize impacts and the remedial work that may be need to developed if the project is to proceed.

Maps

Figure 1

Chilliwack River, BC. (Chilliwack Lake and Edwards roads)

Figure 2

Chilliwack River, BC (between Chilliwack Lake and Sleepy Hollow roads)

Figure 3

Vedder River, BC (north end of Giesbrecht Road)

Figure 4

Vedder River, BC (south side between rail bridge and north end of Browne road)

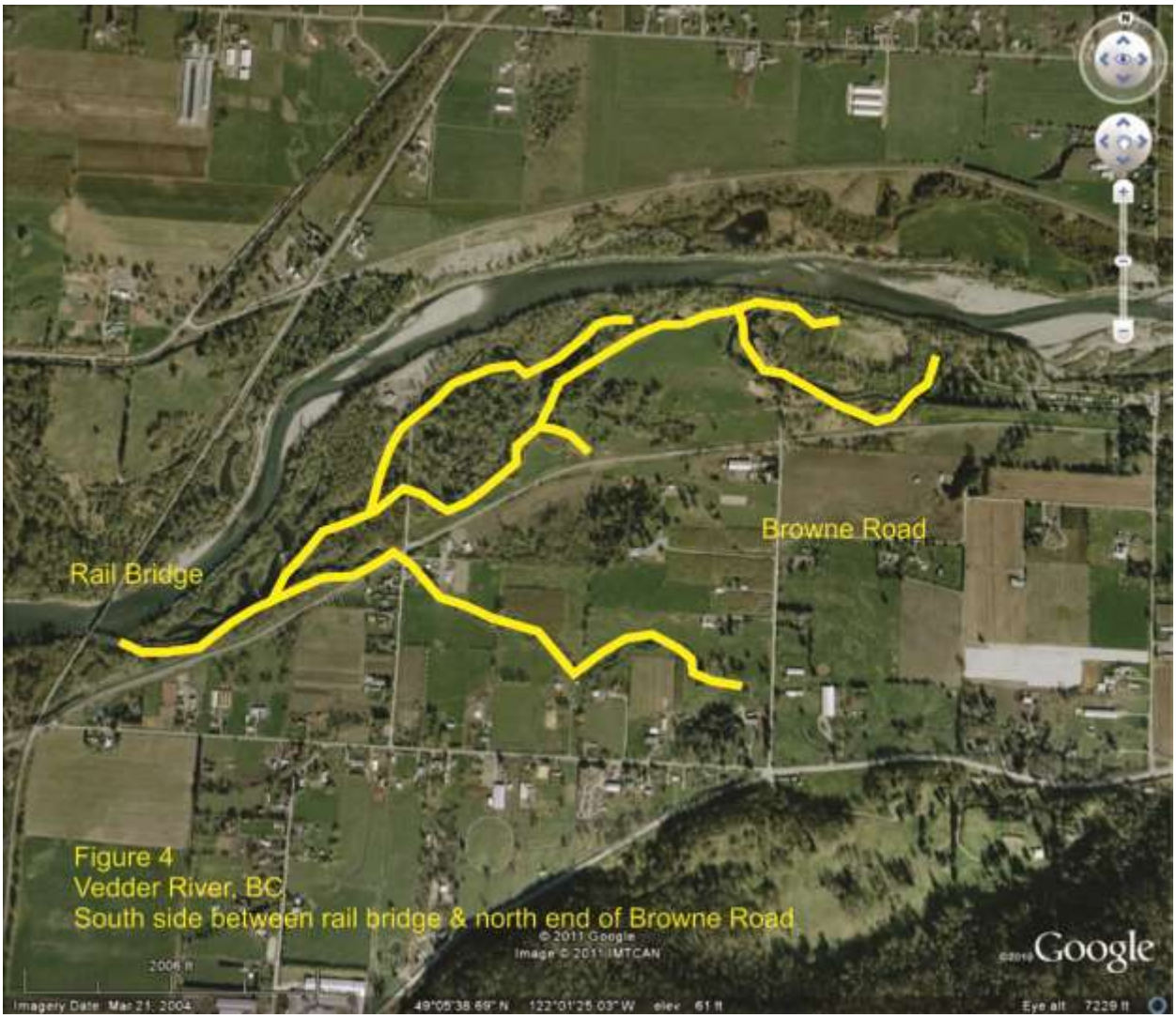

Figure 5

Vedder River, BC (south end of Lickman Road)

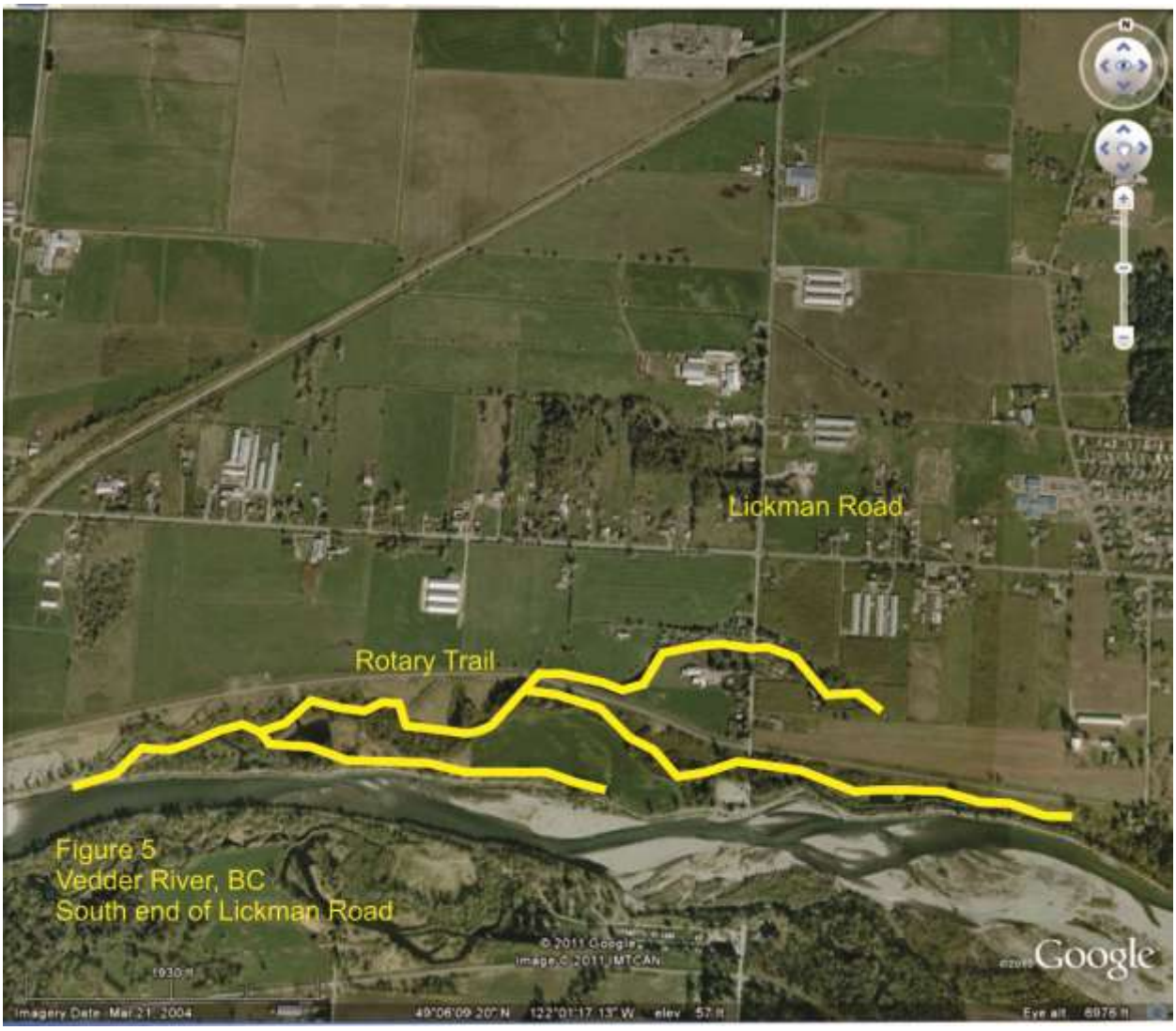

Figure 6

Vedder River, BC (Great Blue Heron Reserve, south end of Sumas Prairie Road)

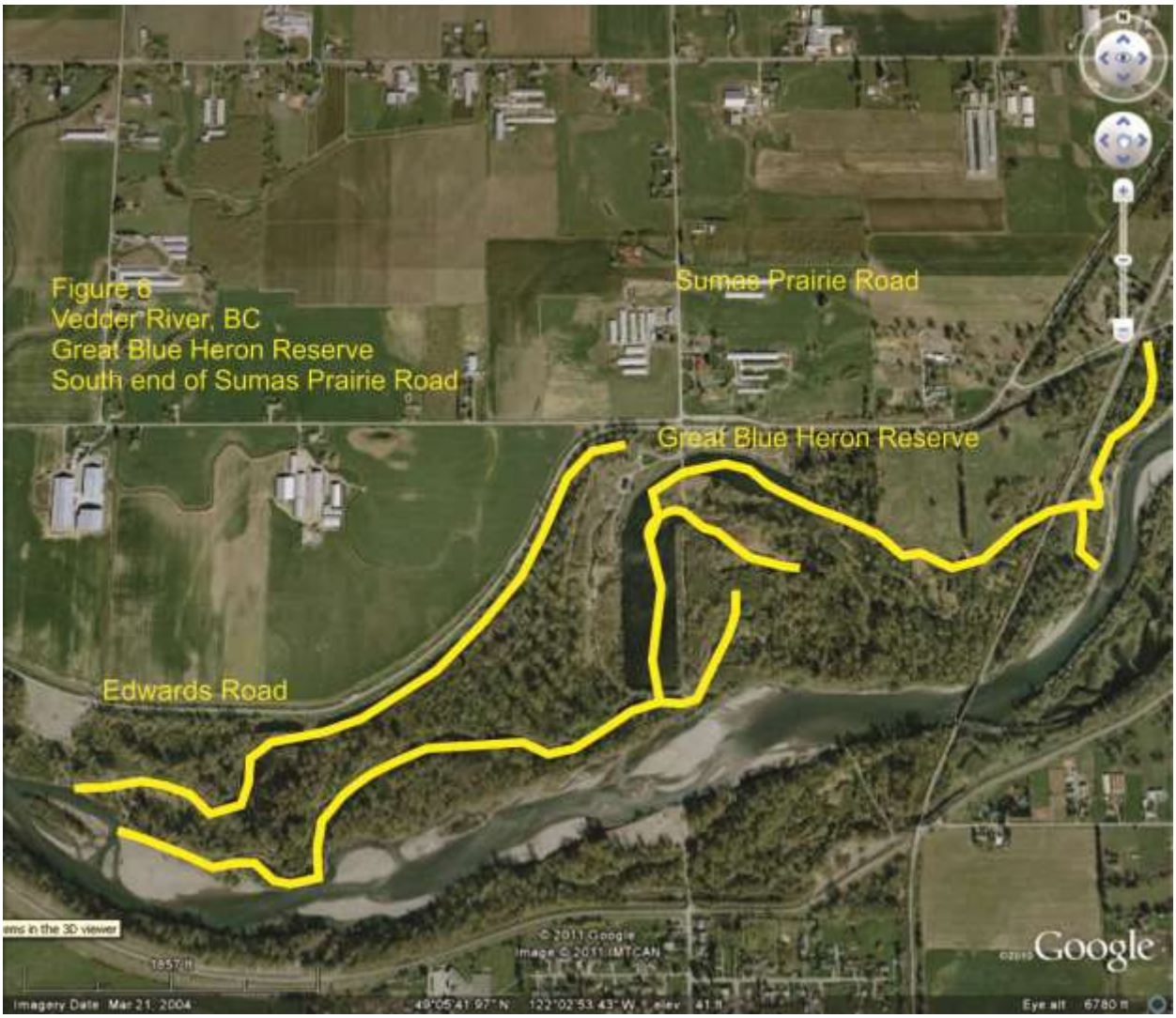

Figure 7

Atchelitz-Little Chilliwack drainage

Figure 8

Hope and Camp drainage

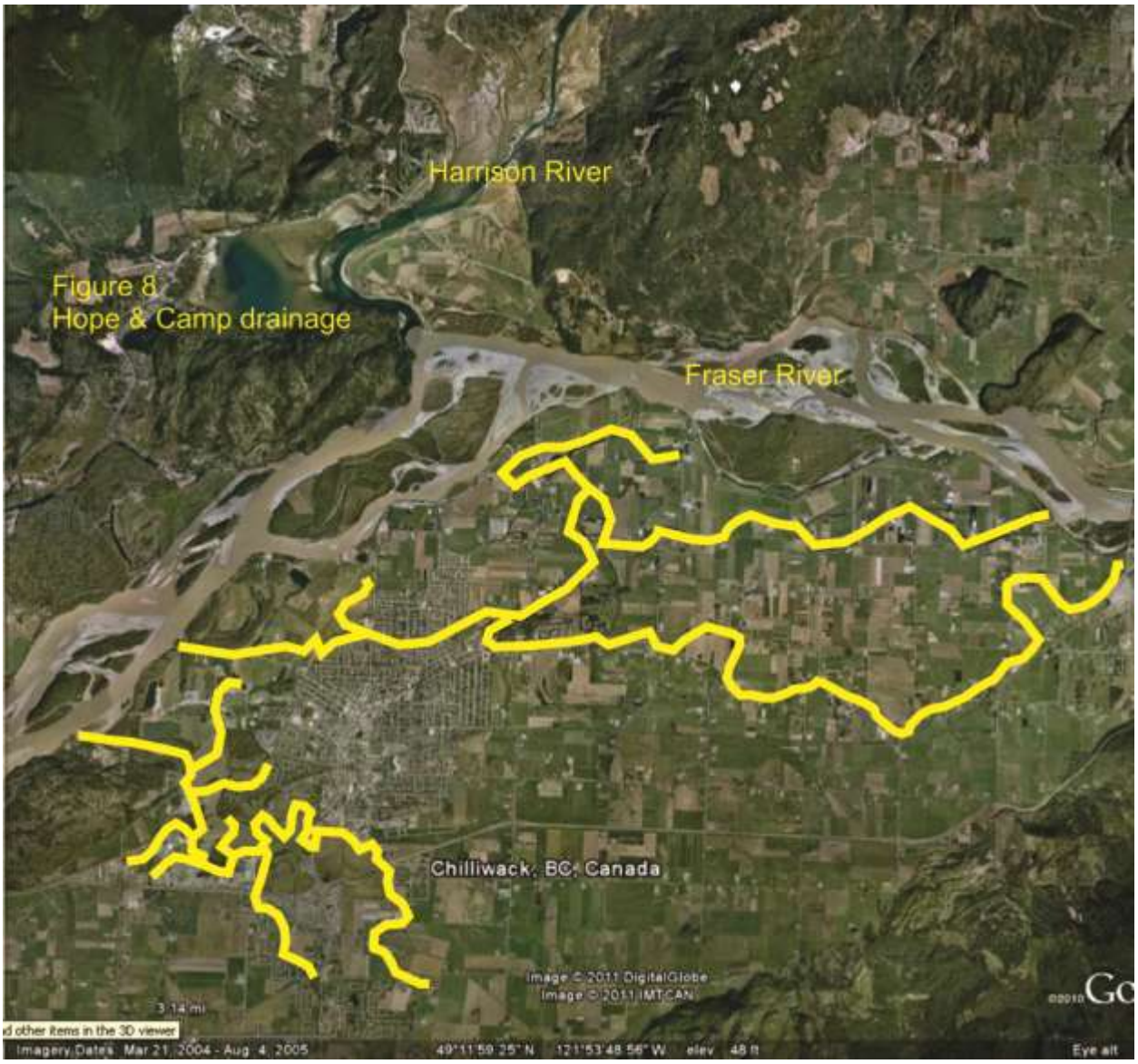

Figure 9

Fraser River island (south bank north of Jess Road)

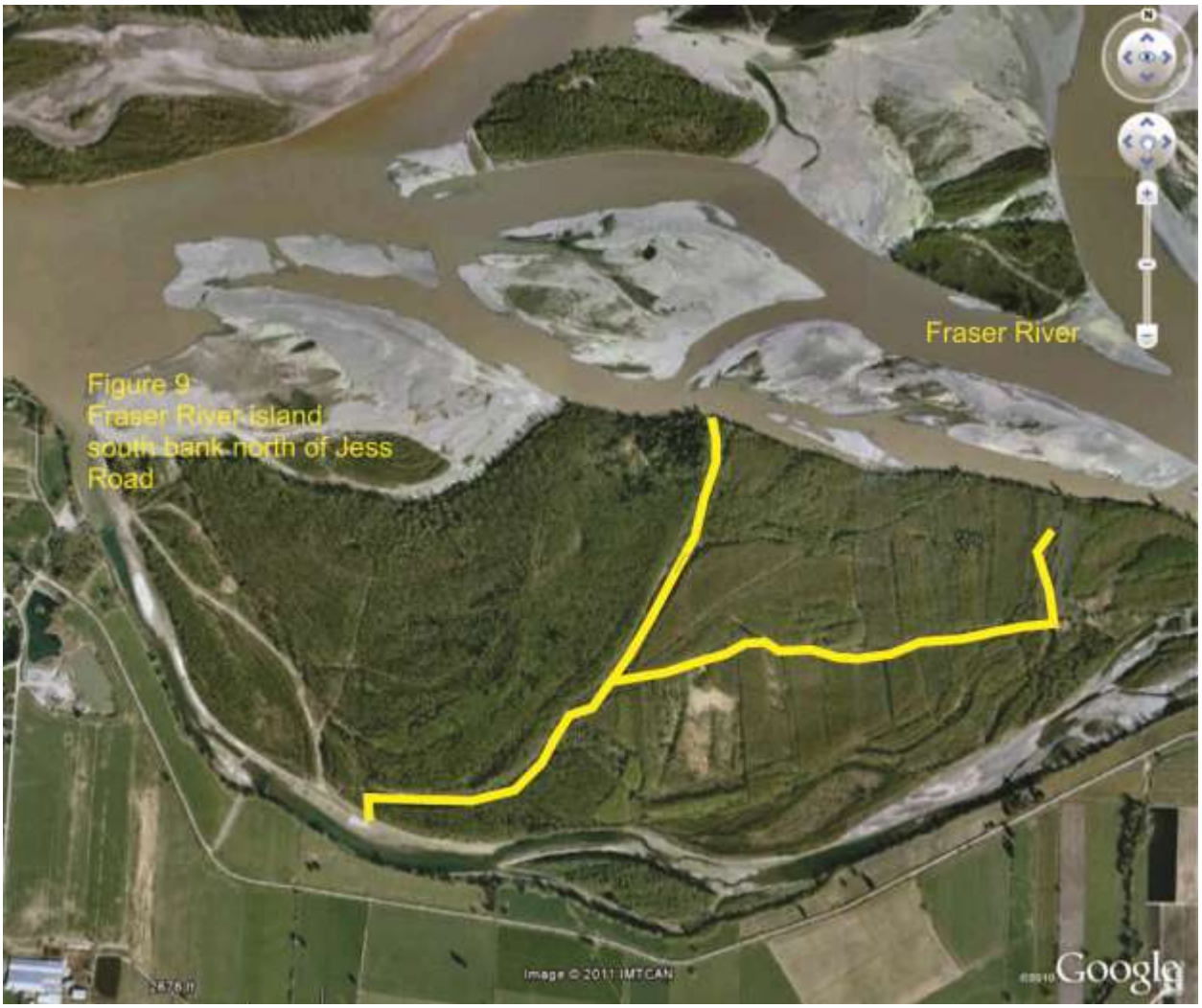

Figure 10

North of Old Yale Road and Highway #1 junction

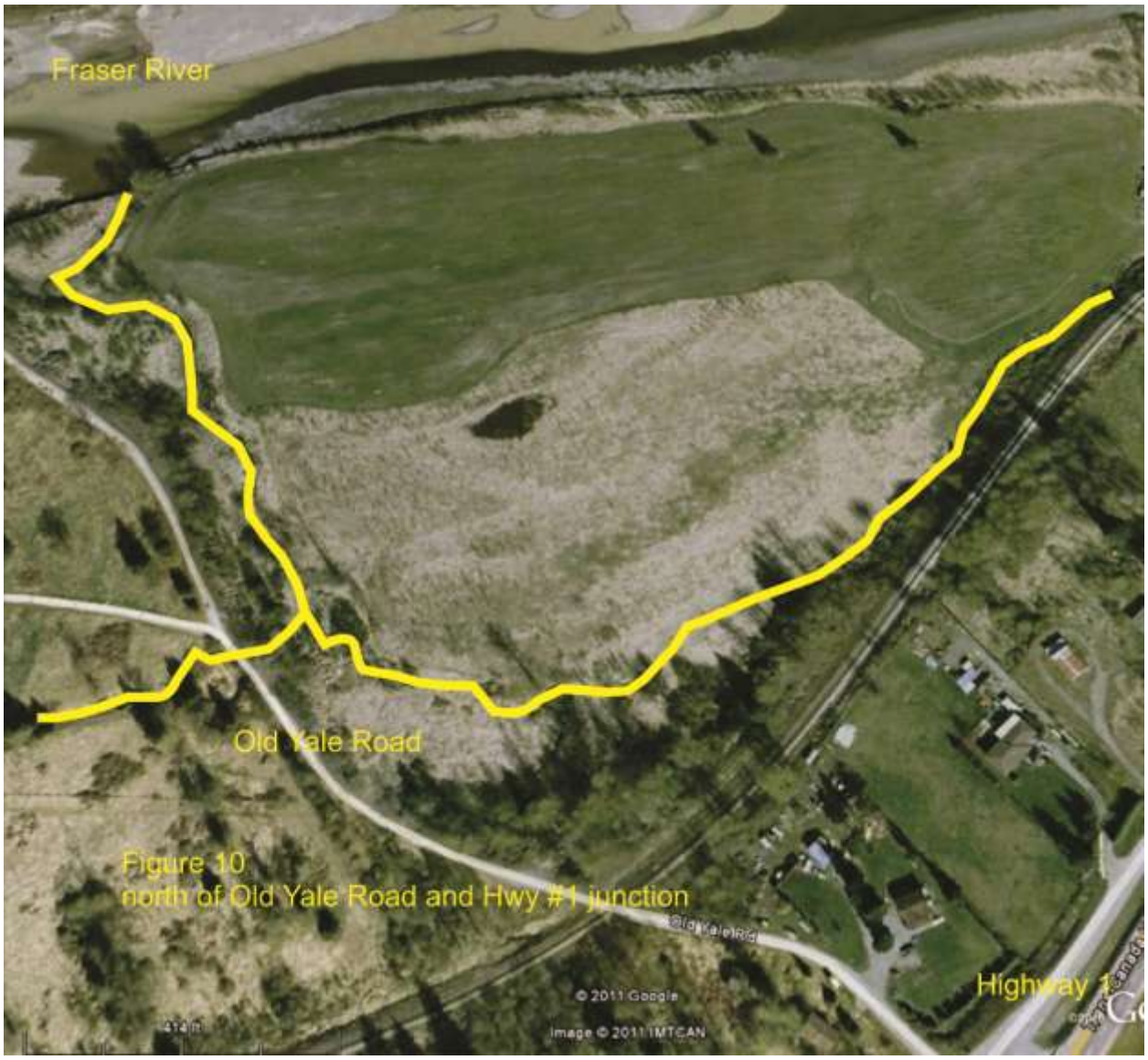

Figure 11

Jones Creek

Figure 12

Laidlaw Road and Highway #1 junction

Figure 13

Hunter Creek

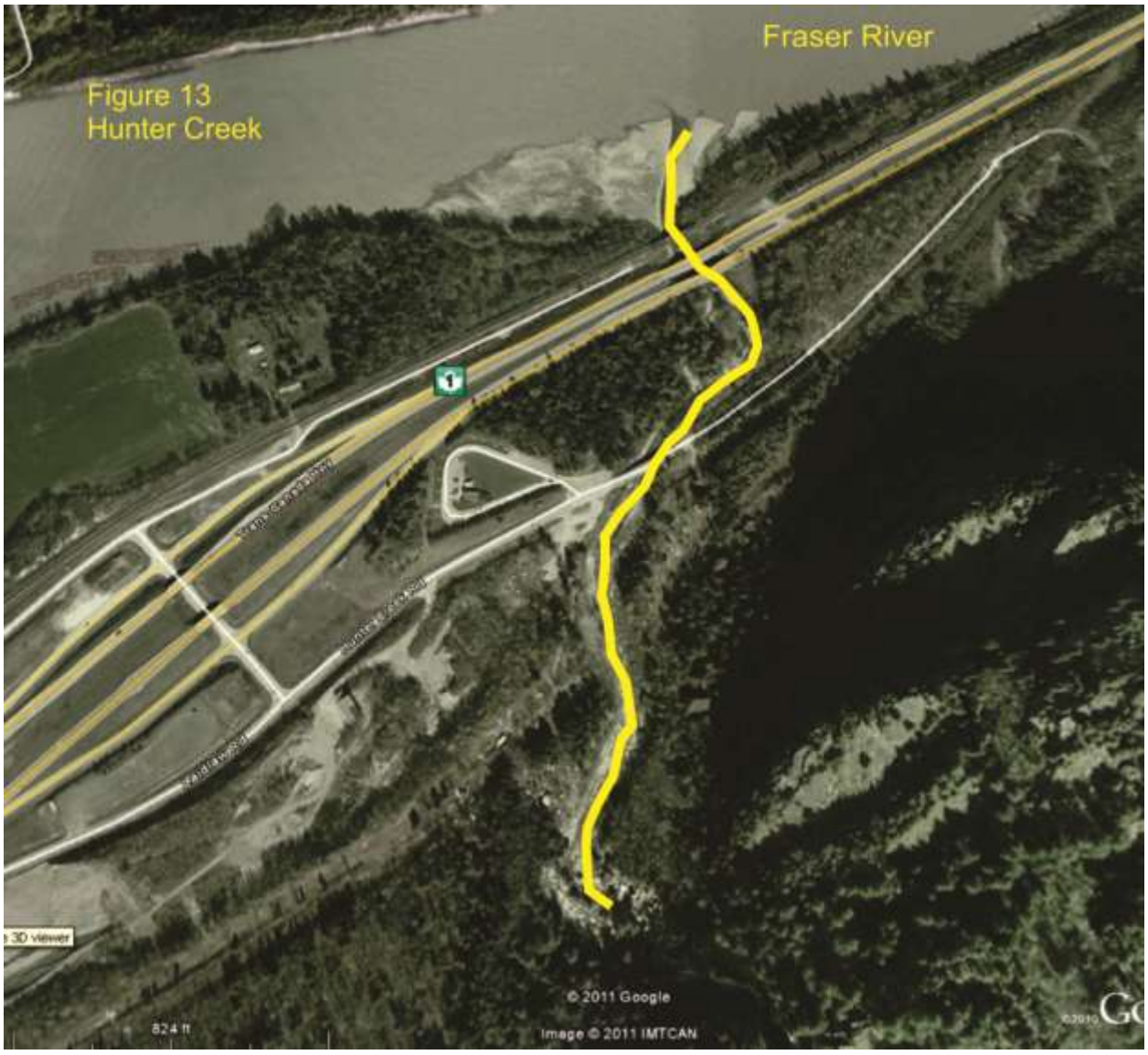

Figure 14

Flood Hope Road

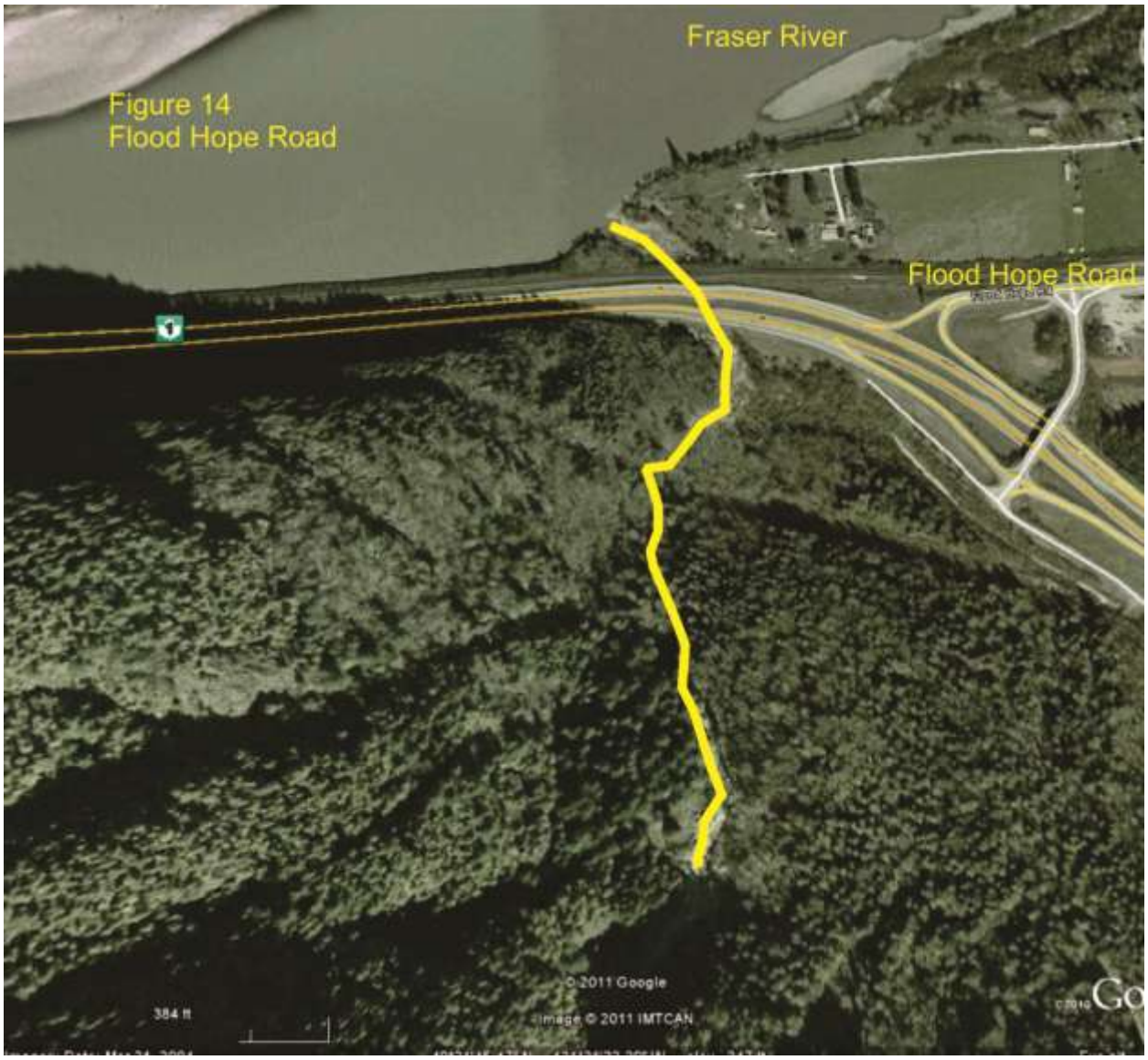

Figure 15

Hope, BC flood plain

Figure 16

Chawathil Road

Figure 17

East of Ruby Creek

Figure 18

Ruby Creek

Figure 19

West of Ruby Creek

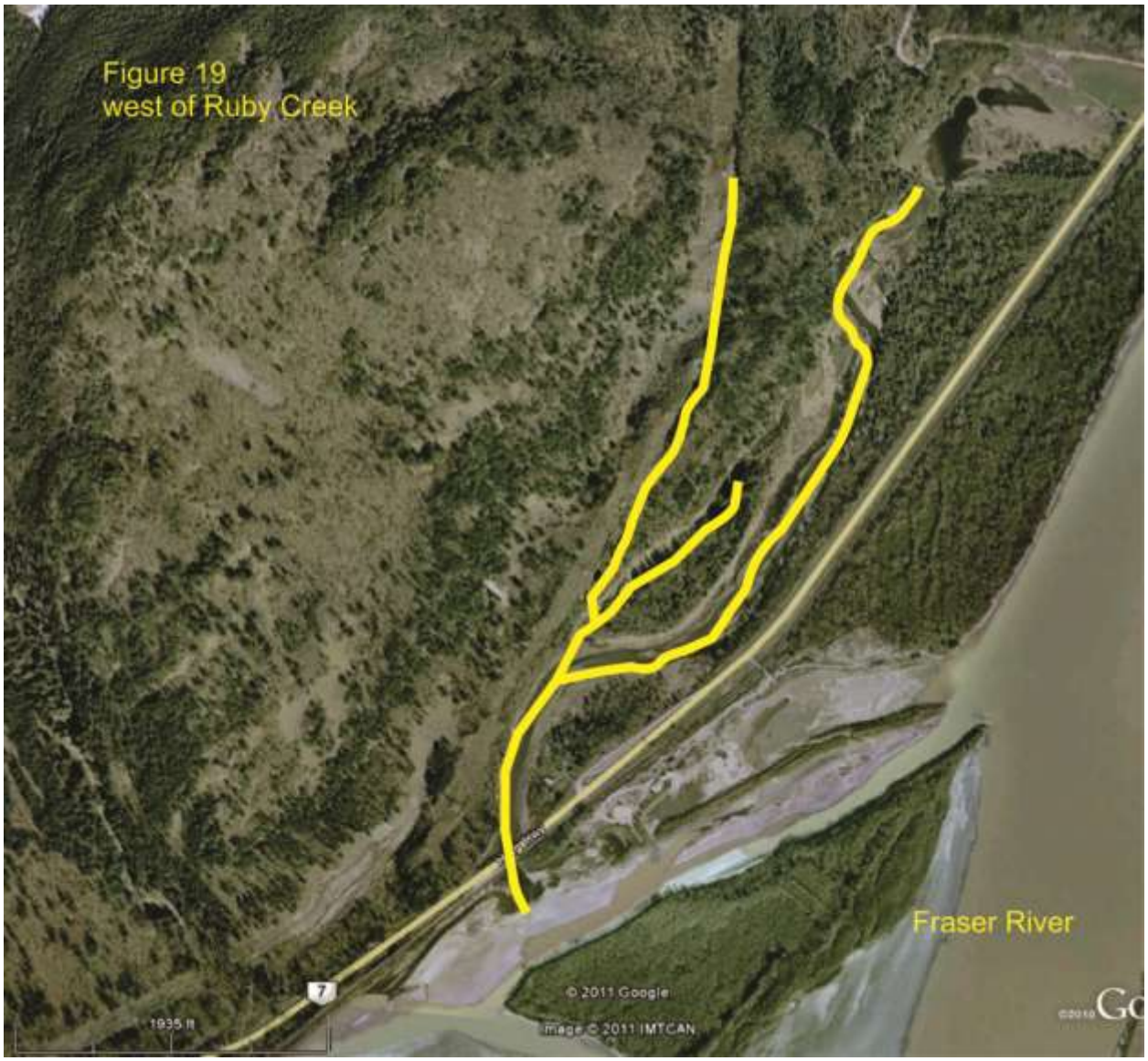

Figure 20

Maria Slough

Figure 21

Aggasiz

Figure 22

West of Aggasiz

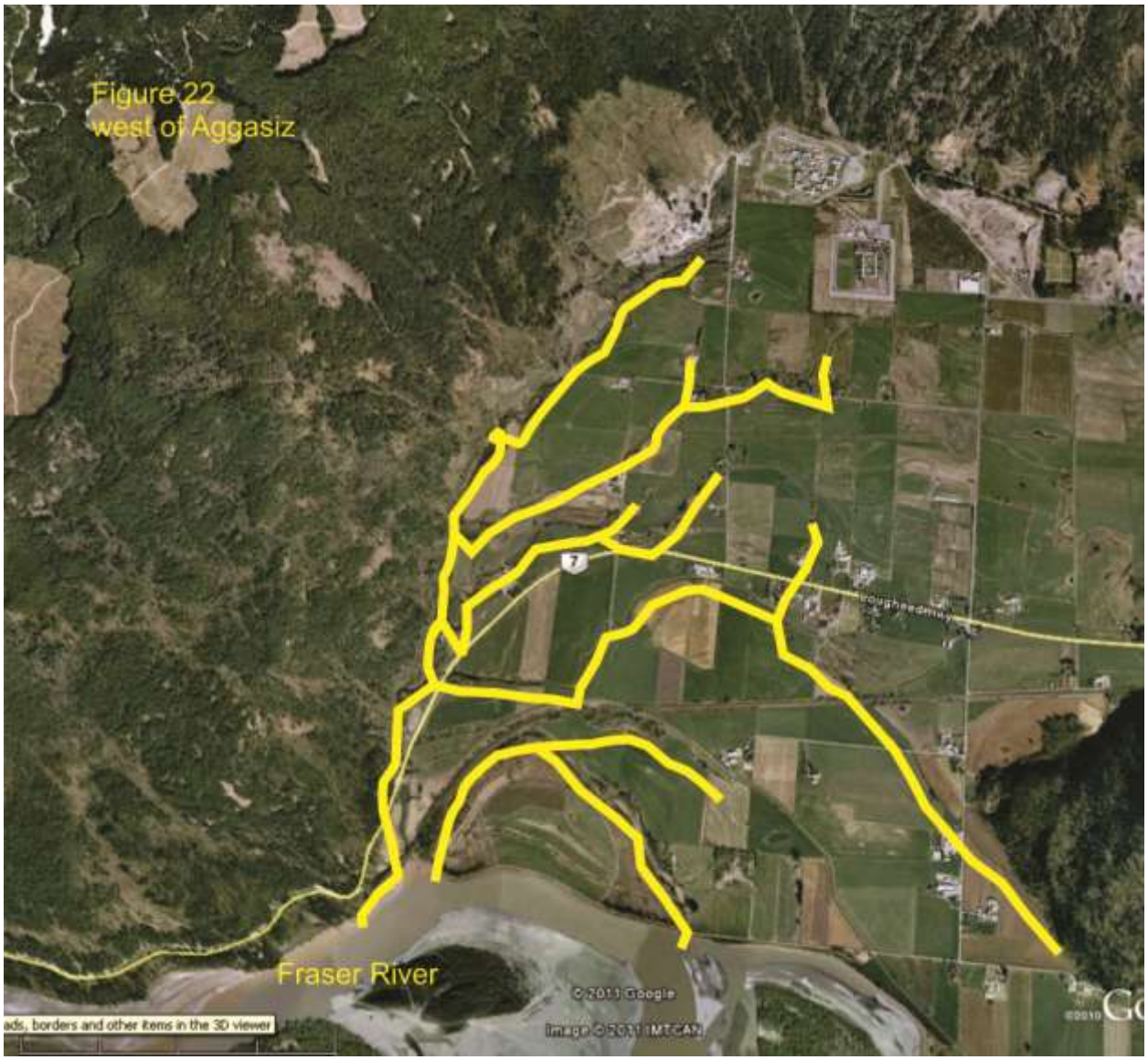

Figure 23

Harrison River mouth

Figure 24

Squakum Creek

Figure 25

Inch creek of Nicomen Slough

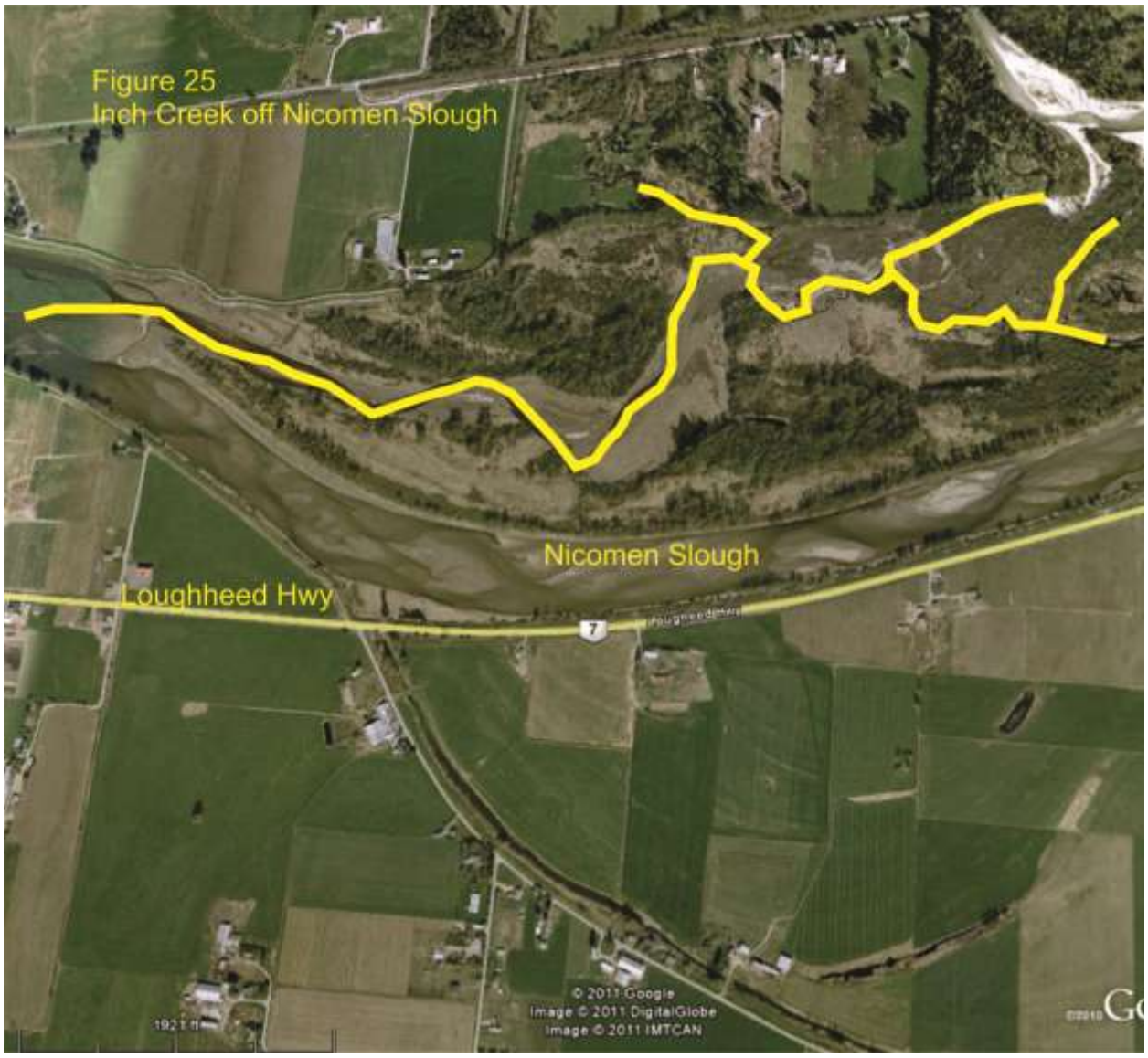

Figure 26

Upstream of Hatzik Lake

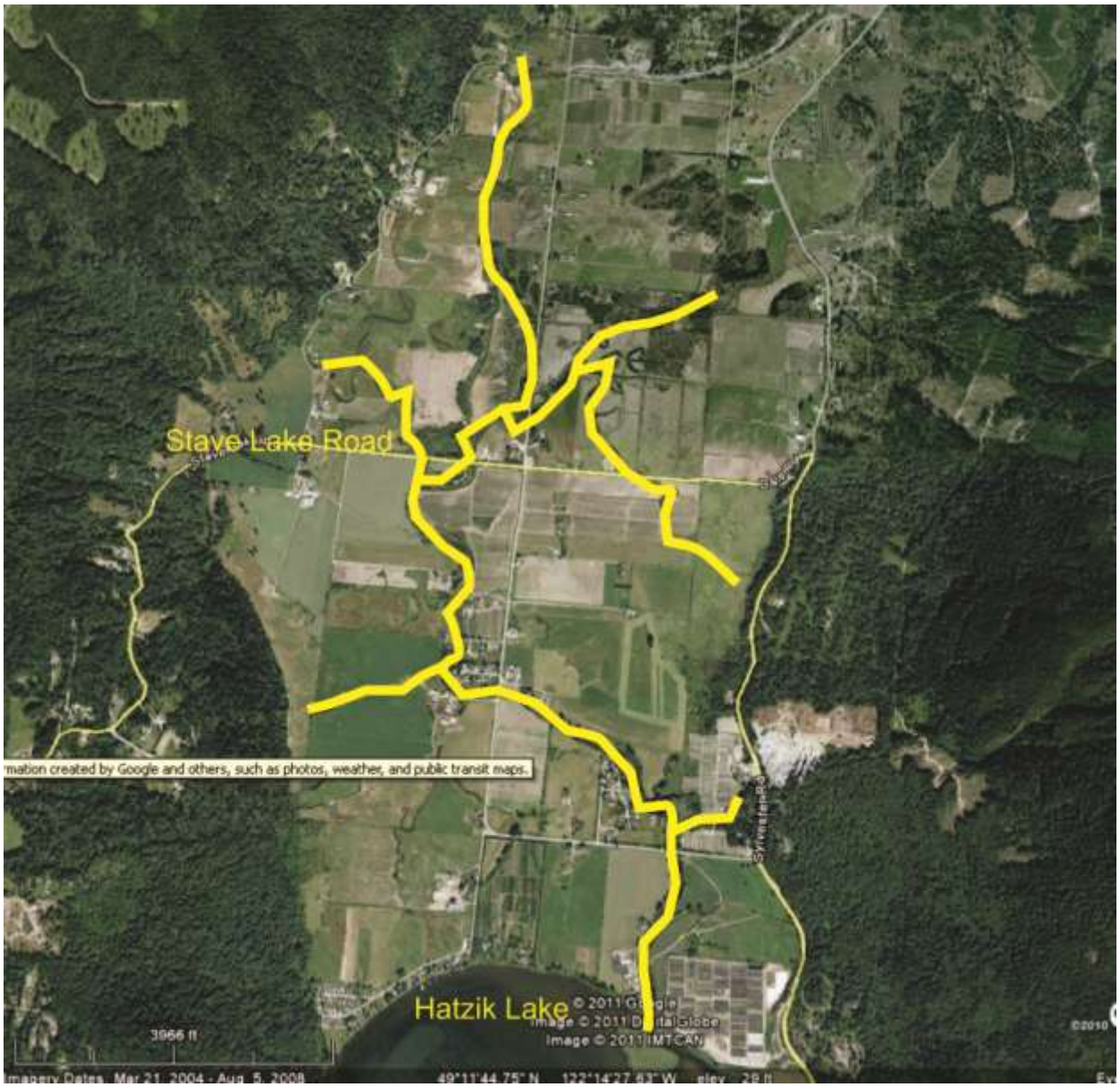

Figure 27

Fraser main stem (Chilliwack-Harrison area)

Figure 28

Fraser main stem (upstream of Harrison River)

Figure 29

Fraser main stem (Hope, BC area)

Summary

The maps presented in this atlas are intended to provide the Sto: l Tribal Council and other governing institutions of the Sto:lo people with a quick reference guide to sensitive habitat for chum and pink salmon in the Fraser River area from Mission to Hope, BC. Tributary as well as main stem spawning habitats have been identified and it is hoped this atlas will prove useful when dealing with the many development referrals that First Nations receive on an annual basis.