

Inspection of Gravel Bars in the Lower Fraser Gravel Reach and Commentary on Recent Past Mining Impacts - December 17, 2010

Fraser River Gravel Stewardship Committee (FRGSC)

by **Otto E. Langer - Fish Biologist and Aquatic Ecologist.**

In response to past gravel bar mining operations undertaken in the Chilliwack gravel reach of the Lower Fraser River since 2004 (e.g. Hamilton and Spring Bars) and the mining application submitted by BC Emergency Measures Branch that is currently under review (i.e. Tranmar Bar), the FRGSC arranged for an inspection of several gravel mining sites/gravel bars in that section of the river on Dec 17, 2010 (0830-1600 hours). Bob's Adventures Unlimited (owner and pilot -Bob St. Germaine) made an air boat available for the inspection and those on the inspection were Frank Kwak, Marvin Rosenau and Otto Langer. DFO was invited to be part of the inspection but their representative could not make the trip. The trip's goal was to conduct a visual inspection of several mining sites and do selective beach seining at sites of concern related to the protection of fish habitat.

The inspection trip began at Island 22 boat launch and proceeded upstream through the river's islands and gravel bars for a distance of 30km i.e. up to Spring Bar. The initial 20km of the river contained the most significant populations of bald eagles, waterfowl and blue herons. Hundreds of ducks, especially fish eating ducks (e.g. common mergansers) were evident. The Gill Bar area was covered with a large flock of swans and eagles and blue herons were evident along the river and overhead in this and upstream areas. Most of this bird life was resting or fishing on or off most of the gravel bars from Island 22 to Tranmar Bar.

In that most fish caught by seine netting were returned to the river alive, and considering the small size of the fish, positive identifications at the family level of very young fish were not possible on site. Also large numbers of small fish were not fully enumerated or measured for fork length.

Calamity Bar:

The initial beach seine set was made in a small 10-13m wide side channel at Calamity Bar (3m stick seine - Photo 1). A 10m drag resulted in the capture of four cyprinids – possibly leopard dace. This relatively undisturbed area did have signs of chum redds and the backwater provided good rearing habitat and a wildlife foraging area. Mergansers and blue heron were evident at the site.

Harrison, Hamilton and Gill Bar areas:

The next visual inspection was then along shoreline of Harrison, Hamilton and Gill Bars. A 4X4 pickup truck was stuck in a gravel channel at the upper end of Harrison Bar (Photo 2). These clean gravel areas are soft and are a hazard to such vehicle's fording attempts. Due to the flow and good gravel quality, these riffle sites provide excellent spawning habitat for pink (odd year) and chum salmon.



Photo 1. Calamity Bar back channel showing the 10m stick seine haul site.



Photo 2. Truck stuck in riffle area upstream of Harrison Bar.

As noted at Gill Bar and Slough in 2009, travel over these sensitive fish habitats by off road vehicles will be harming the eggs that are deposited in those areas. Its is truly unfortunate that DFO seems to have done nothing effective to discourage people with such recreational or off road capable vehicles to better respect such sensitive fish spawning habitats. In the distant past, Fisheries Act charges have been laid against such vehicle operators for crossing or traveling in such habitats and a number of guilty verdicts or guilty pleas can be found in the court records. Here the use of these habitat areas for recreation is needless and the will of DFO to address this problem seems to be non-existent. Over the past few years, not a single sign has been noted to advise ‘off roaders’ to not cross such channels or wetted areas that are characterized by good clean gravel that provide essential fish spawning habitat.

We checked the upstream side of Gill Bar. What was an area of a significant channel and flow a few years ago is now more or less a still water lagoon characterized by significant fine sediment deposits in the bottom gravels (Photo 3).



Photo 3. Channel \lagoon at upstream end of Gill Bar. This recently active channel is now a still water area at low winter flows and large amounts of fine sediments can be found in the gravels.

We then inspected the Hamilton Bar site. Although the 2010 flood had occurred since it was mined in early 2010, it was obvious that little naturalized bar recovery had taken place. There was very little (if any) recruitment of gravel onto the mined site. Also the design of the mining in 2010 has resulted in a shallow water entrapment area for fish (Photo 4).

The air boat was very effective at frightening wildlife off of the gravel bars. Upon approaching the Gill Bar area, large number of swans were frightened off the bars where they had been resting. Approximately 100-150 were seen taking to flight from that resting

site (Photo 5). Small flocks of swans were also seen flying along the river in other areas during the day.



Photo 4. Hamilton Bar looking upstream. Note the lack of natural bar deposits and the development of a ponded area (on the left) that will act as a fish trap.



Photo 5. Large numbers of swans taking off from the gravel bars in the Gill Bar area.

Little Big Bar:

A detailed visual inspection was then made of Little Big Bar. In addition two seine sets (30m seine) were taken in the isolated lagoon created by the mining project earlier in 2010 (Diagram 1)..

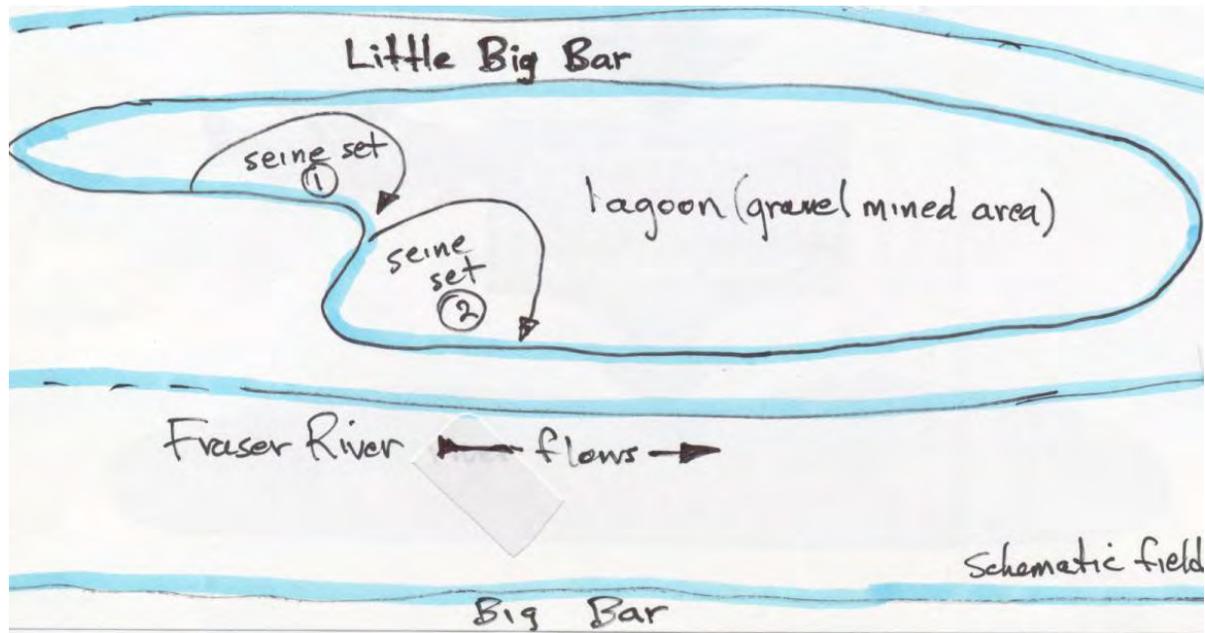


Diagram 1. A field note schematic drawing of the middle part of the Little Big Bar gravel area. The lagoon was caused by gravel mining in early 2010. The sites of the two 30 m. seine sets are shown. South is to the top of the drawing.

When the site was being mined in 2010 DFO was advised on site and in writing that this type of mining would create a “bathtub effect”. The design of the mining project created a large hole in the gravel bar and this would fill with water during the biologically active summer season and with receding flows in the late summer and fall, the hole would form a fish entrapment lagoon. New DFO staff was advised that in the 1970 to 2000 time period, DFO had been careful to not allow this to happen. In past gravel scalping / flood control projects it was specified that no holes were to be left after the mining was complete and all gravel mined areas had to be sloped towards the flowing water channel so as to drain off all water and fish from the site as flows recede over the late summer / fall seasons.

Despite the advice, the exact opposite was created (Photo 6). It appears that the proponents could not have done a better job of creating a shallow water lagoon which would serve as a fish trap. The Little Big Bar lagoon was about 2h. in area and was shallow (i.e. was no deeper than 20 cm) in sections that were checked. The lagoon was ideally designed to feed great blue herons. In fact the largest number of blue herons was

noted at this site. As we approached the site the air boat frightened off a flock of 23 great blue herons from the site area. Such a large gathering of these birds at a non nesting site is very unusual. The still water shallow lagoon probably afforded them an opportunity to more easily catch fish.



Photo 6 (looking downstream). Large shallow lagoon created by the mining of Little Big Bar in early 2010. This lagoon, after the freshet, would serve as a significant fish trap and allow predation of those fish by bird life.



Photo 7 (looking downstream). Set number 2 of the 30m seine in the isolated lagoon on Little Big Bar. The lagoon was caused by gravel mining on the bar in early 2010.

The upstream end of the lagoon showed that minor sub gravel flows were entering the lagoon and the upper part of the lagoon had good growths of filamentous algae growing in it. Two seine sets were made in the lagoon (Photo 7). The depth of the water in the middle of the lagoon where the seine sites took place was about 20cm. The bottom of the lagoon was covered with a large amount of fine sediment (i.e. silt and sand). High quality salmon spawning gravel was evident outside of the lagoon area (i.e. between the lagoon and the Fraser River flow channel). At the time of the inspection the air temperature was 6.5 and the lagoon water temperature was 2.5° C.

Catch Data:

Seine Haul 1 (Depth 0-20cm / 25X50m haul).

-8 catostomids or cyprinids (lengths - 25, 28, 29, 35, 47, 47, 48, 48mm)

-1 stickleback - 55mm

Seine Haul 2. (Dept 0-20cm / 25X70m haul)

-2 suckers (38 and 43mm).

On Dec. 22, 2010 the FRGSC was notified that a backhoe was doing work on Little Big Bar. If that work was to re-connect the isolated lagoon to the river, it is largely a waste of time because it's too late in the year to remediate the problem effectively. Most fish caught in the lagoon would have been preyed upon by wildlife by that time of the year. Any such work had to be done in the August to early October time period i.e. as the river flows declined and before predation took place in the isolated lagoons.

Tranmar Bar:

Visual inspection then took place along Powerline Bar and on to Tranmer Bar were a more detailed assessment took place.

In this area we did spot a number of bald eagles and blue herons and water fowl. Also a large flock of Canada geese were frightened off of one of the bars. In the soft sediments on Tranmar Bar it was obvious from tracks that swans had recently used the bar extensively as a resting area (Photo 8).

In that Tranmar Bar is under application for mining in 2011, we walked much of the bar to be mined. Much of the downstream section of the bar flagged for mining is very flat (Photo 9) and is filled with a high amount of finer sediments and overall was not more than 30-60cm above observed river flows. The upper end of the bar (north and west) did have a higher elevation. If much of the flagged area is to be mined to a dept of 100cm or more, it would be into the wetted elevation of the river as observed on December 17, 2010 and again the issue of creating fish entrapment lagoons is a concern.



Photo 8. Swan tracks indicating the use of Tranmar Bar as a resting site.



Photo 9 (looking north). Downstream section of the south part of Tranmar Bar showing the very flat nature of that part of the bar.

This flat bar area was very diverse in habitat back channels as served by obvious sub gravel flows into three significant channels (Diagram 2). Most of these channel areas had a fine sediment bottom with some rubble evident in some areas. The complex nature of the bar was also evident in a 1998 photo of Tranmar Bar that we examined onsite (Lower Fraser River Stream Inventory Atlas DFO-MELP 1999). The more westerly part of the bar also exhibits this back channel diversity of habitat (i.e. the area that is slated for an industrial transportation corridor for the 2011 mining of Tranmar Bar).

The downstream portions of Tranmar Bar appears to be a bar that provides a complex habitat area from backwater channels to higher gravel bar habitat and from fine sediments to gravel habitats. This complexity is not that common on many such bars areas and this diversity is creates highly desirable habitat. Also the filamentous green algal growth in the back channel areas was very high for this time of the year i.e. cold water and reduced lighting (Photo 11). It was in this area that the swan tracks were very evident. The bar was unfortunately the site for the deposition of numerous discarded vehicle tires.

Four 30m seine hauls were made in one of the three significant open backwater channels and another seine haul was done in an adjacent isolated shallow lagoon.

In the back water channel closest to the main river channel, a large number of small fish were evident. This channel had a larger proportion of gravel as a bottom and had large amounts of algal growth in it. Due to time it was determined that another seine set in this channel, although looking more productive than another of the other sites seen over the day, would provide little more fish information for our purposes. This is the only channel where fish could be seen freely swimming around in the water column.

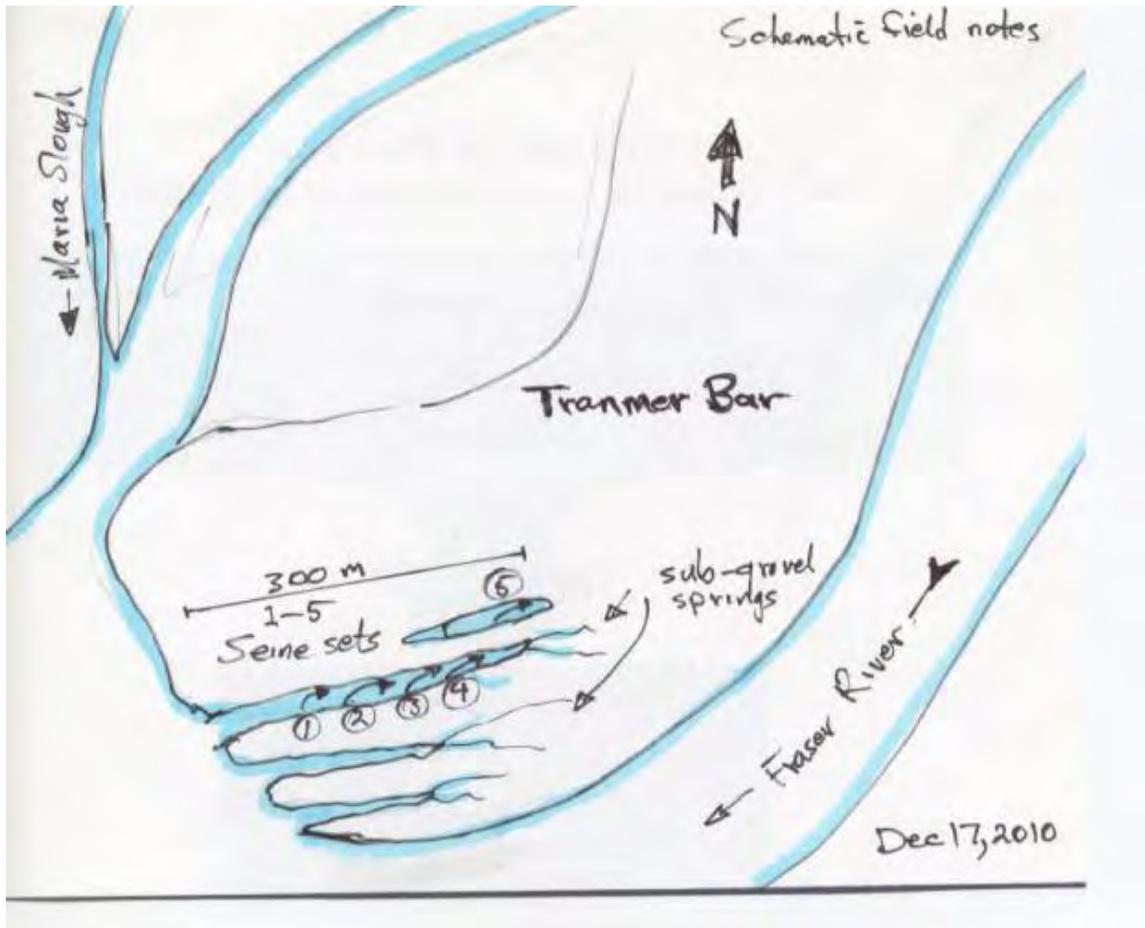


Diagram 2. Schematic field notes drawing of the downstream south west part of Tranmer Bar. The drawing shows the sites of the five seine sets made on Dec. 17, 2010. The isolated lagoon is also shown in the diagram (Seine set 5).

Catch:

Seine Haul 1 (1230PM / Rubble bottom / Heavy green algal growth / Depth 0-50cm. / Haul area 25X40m) (haul greatly compromised by submerged tire and algal growth)

-17 suckers and or cyprinids (18, 18, 24, 25, 25, 27, 27, 30, 32, 34, 34, 36mm)
-1 sculpin (70mm)
-1 sockeye parr (74mm).

Seine Haul 2. (Heavy green algal growth / Depth 0-70cm deep/ Haul area 25X65m)
(haul effectiveness compromised by submerged tire and filamentous algae)

- about 50 cyprinids and suckers (under 35mm length).
-25 Mountain whitefish (132, 120, 118, 118, 124, 114, 150, 136, 110, 130, 127, 122, 120,
125, 123, 113, 122, 107, 121, 115, 110, 127, 112, 113, 115mm)
-4 sockeye parr (67, 75, 97, 98mm). These salmonids collected and retained by Dr.
Rosenau (Photos 11 and 12).

Seine Haul 3. (1330hrs / fine sediment and some gravel bottom / Heavy green algal
growth / Depth 0-40cm /haul 25X63m)

-54 cyprinids and /or suckers (all under 30mm long).

Seine Haul 4. (Heavy green algal growth / Fine sediment bottom / Depth 0-30cm / haul
area 18X40m).

-30 cyprinids and suckers (lengths under 30mm).

Seine Haul 5 (Isolated shallow lagoon –muddy bottom – Depth 0-15cm / haul
25X100m).

-2 cyprinids/suckers <30mm in length).



Photo 10 (looking upstream). The middle back water channel on Tranmar Bar (see Diagram 2). Several small spring channels fed the larger backwater channels. The bar offered more complex habitat areas for rearing fish than most other inspected bars. The bar offered more complex habitat areas for rearing fish than most other inspected bars.



Photo 11. Picking catch out of seine net on larger Tranmar north backwater channel (see Diagram 2). Note large algal collection in the net.

Spring Bar:

From 1500 to 1530 hours we examined the piling structures installed at Spring Bar and conducted a tour of the mined northern part of Spring Bar (pilings installed and mining done in the winter-spring of 2008). This site required a significant inspection and some fish sampling however; the shortness of daylight unfortunately made this impossible.

The four dolphins installed in 2008 seem to be stable and they stretch across the narrow main navigation channel of the Fraser River where flow velocities are very high, they are still an obvious navigation hazard as previously documented by several DFO staff and First Nation's fishermen. In 2008 a fishing boat was destroyed when the currents swept it onto the pilings and that nearly caused the loss of lives of the fishermen. The bridge support structures are also not easy to see from upstream or downstream areas until you have navigated into their immediate vicinity (Photo 13). The downstream marking buoy is not brightly colored and is directly downstream of the centre of the channel and serves next to no warning of the piling's hazard in the navigation channel. Although dusk was approaching, it was not possible to see if lights were functioning on any of the four structures.



Photo 12. Rich catch of salmonids in backwaters on Tranmar Bar. The large fish are sockeye parr and mountain whitefish.

The Spring Bar giant excavation site was more than an eyeful to behold. In that the acting DFO Lower Fraser River Director in 2008 said that such mined sites would recover within two years, they did not need compensatory habitat to replace what the excavation had disrupted or harmed. Ironically it was also the understanding that the ‘temporary’ bridge piling structures that were to be removed after the 2008 mining season were then deemed permanent structures and permitted to remain in place for another 50 years (as permitted by Transport Canada with an NWPA permit). This was to allow a more cost effective re-mining of the area once it filled in with newly recruited gravel (i.e. rehabilitated) within a few years.



Photo 13. Looking upstream to the series of dolphins across the navigation channel at Spring Bar. The downstream marker buoy can be seen adjacent to the third dolphin structure from the left.

The giant lagoon that had been created and had extended at least two meters below the Fraser River flow elevation at time of mining in 2008 looked like a small lake. It was indeed almost fully intact and almost fully cut off from the Fraser River (Photos 14 and 15). A trickle of flow (mainly subsurface) was flowing into the lagoon at the upstream end in that the lagoon was cut off from the Fraser by a narrow berm of gravel and the lagoon water level was about one meter lower than the than the prevailing Fraser River water levels at time of inspection. A few chum salmon redds were noted in the channel where flows did enter the lagoon at higher Fraser River flow levels. A flow connection was evident at the lower end of the lagoon but it could be cut off at lower river flows causing a large fish trap that was once a large gravel bar.

It was evident that freshet high flows had entered the lagoon in 2010 but it did not erode a permanent channel into the lagoon. At the northern end of the excavation, the lagoon water level was about three meters below that of the old stable gravel bar (photo 15). The depth of water in the lagoon was not measured. Most experts including DFO consultants (Chillbeck et al) , Dr. Church and even the BC flood control / dyking engineer R.Henry noted that mining this site would do nothing to alleviate flood risk or erosion concern along the North Bank of the Fraser River i.e. to protect Seabird Island. The BC dyking engineer noted that it was only being mined because DFO had promoted the project to give the Seabird Band a supply of commercial gravel to build better relationships between the band and DFO.



Photo 14. Looking south across what was Spring Bar (prior to mining in 2008) and is now a small lake. The mining excavation has left a large almost totally cut off from the Fraser Rivers flows and this can and will act as a trap for any fish isolated in it.



Photo 15 (looking to the south). Photo indicates that the bar mining in early 2008 had created a large hole (lake) in that part of Spring Bar and it was still fully evident after three years of freshet flows. The top of bar to the water level was about three meters in elevation difference.

The Spring Bar lagoon has now survived three Fraser River flood flows and shows very little rehabilitation to a more natural state. Either DFO and other 'experts' were very wrong in their claims that it would rehabilitate within two years or they misled the public on the issue. Other experts that said the mining of this bar would do little to reduce a flood threat of the Seabird Band's lands appear to have been accurate in their assessment. In that the Fraser River did not direct significant flow into the mined out area, obviously it took little flood threat away from the north side of the river.

One can only conclude that the mining of Spring Bar, the largest in river mining project in BC history, did not have any scientific or engineering basis in that it was more or less driven by a political agenda and has served no purpose but to cause a long term disruption to fish habitat. Also, the pilings structures remain a significant hazard to navigation and fishing in this section of the river and should now be removed. In that the Spring Bar lagoon will take many years to fill and the mining of the bar has not alleviated any apparent concern for flood risk reduction, the need to maintain the footings for a 'temporary bridge' to this site will remain in doubt for many years to come.

Conclusions:

1. The 2010 mining project at Little Big Bar resulted in the development of most of the excavation site into a large shallow water lagoon which will and has trapped fish i.e. isolated them from the river.
2. Little Big Bar is a remnant of what it was in 2009. Fishery biologists felt this bar may be important for the spawning of sturgeon. If this was high bar habitat for such spawning, little of it is now remaining. The bar is now little more than a low elevation ring of gravel around an isolated lagoon.

3. The mining of the Hamilton Bar has resulted in little recovery over the past freshet and the excavation has resulted in a shallow lagoon that can and probably has trapped fish.
4. The Spring Bar mining project in 2008 has resulted in a very large lagoon that is almost totally cut off from the Fraser River and will isolate river fish from the river i.e. act as a fish trap.
5. Considering the lack of freshet flow through the Spring Bar site in 2008, 2009 and 2010, it is very doubtful if it served any flood risk reduction function that some claimed. The doubt of the value in this bar mining project was strongly stated by several engineers/scientists but ignored by the Province, the Seabird Band and DFO.
6. The gravel recruitment into such mined bars as Hamilton, Spring Bar, and Little Big Bar is much slower than what the FRGSC and the public has been led to believe by DFO. The large Spring Bar excavation site has largely survived three freshets. DFO indicated that the site would rehabilitate itself in two years. At the present rate of natural rehabilitation, the site's excavation hole will be evident for many more years to come.
7. At this time of the year young forage fish (i.e. cyprinids and catostomids) are especially evident in still backwater channels and in the isolated lagoons created in the gravel bars in the inspected sites.
8. The backwater open channels on Tranmar Bar were especially productive in terms of algal growth, the presence of large numbers of forage fish and larger mountain whitefish and over wintering sockeye salmon parr. The bottom part of the bar provides a diversity of habitat types that are fed by sub gravel flows. It is concerned that any mining of the upstream area may affect these 'spring' flows into these productive back channels.
9. The use of Lower Fraser gravel bar reach for over wintering purposes by sockeye juveniles has been proven to be important in past FRGSC work and this sampling program again showed that bars like Tranmar Bar is important sockeye par rearing and/or over wintering habitat.
10. To date the environmental screening of these gravel bar mining proposals have largely only examined fish habitat as an issue. This brief inspection shows that these gravel bars are very important resting and foraging habitat for significant populations of bird life. This observation concurs with CWS mapping of these areas some 15 years ago as sensitive wetlands for wildlife use.
11. Off road vehicular traffic in fish habitat continues to be an issue especially in areas where salmon would prefer to spawn. Each time one checks out the

sensitive gravel bar reach of the Lower Fraser River, these violations are easy to document and little is done to address the problem.

Recommendations:

1. Those that promote, review and approve such gravel bar mining practices have to more seriously consider what this practice is doing to the habitat of the various bars that have been subject to recent mining i.e. from 2004 to 2010. It is obvious that high bar habitat has been compromised greatly and that can seriously affect sturgeon spawning, salmonid over wintering habitat, has caused fish entrapment and can harm wildlife resting and foraging areas (other than lagoon development which may allow fish eating birds to more easily prey upon entrapped fish).
2. Further to the above, the cumulative impacts of large amounts of gravel mining on multiple bars over multiple years must be now addressed and not ignored indefinitely. A proper ecosystem and associated hydro-geological assessment of the gravel reach is long overdue.
3. It was recommended to DFO that the mining practices that they approved in 2010 would create bathtub effects in the Fraser River gravel bars and that would result in fish entrainment with subsequent enhanced predation by wildlife. It is again recommended that this is poorly planned gravel removal not be allowed. Any gravel mining must result in a final sloped excavation draining to the flow of the river. Mining below low river flow levels is also totally unacceptable.
4. The cumulative impacts of inspecting just three bar mining sites by our team must convince the regulatory agencies to examine the cumulative and interactive impacts of eight years of mining under the DFO-BC Gravel Removal Agreement of 2004 at several bar sites before approving any further project by project reviews and mining approvals.
5. The impacts of mining gravel on the entire complex of Lower Fraser gravel bars must be properly assessed in future programs. The present application to again mine Tranmar Bar must be seriously questioned at this time. Until it is better shown that there is a significant flood risk reduction and it is put into the context of a comprehensive environmental management plan, it must not be approved as just another stand alone bar mining project independent of the ecology and the hydraulics of the entire river reach.
6. It has again and again been recommended, gravel removal to address flood risk issues must be put into the context of a comprehensive environmental management plan for the gravel reach of the Lower Fraser River. It is strongly recommend that this common sense recommendation not be further ignored by DFO, MOE, EMBC and other regulatory agencies and land owners.

7. The MOT and DFO decision to permanently leave the 2008 dolphins (temporary bridge footings) in the river for a 'temporary' bridge is continuing to cause a great hazard to navigation and fishing. These structures must be removed as soon as possible.
8. In that the Dec 17th brief inspection shows that bar mining has caused significant habitat impacts, DFO must accept and deliver upon their responsibilities and require better impact studies and as their habitat policy dictates, require compensatory habitat works to ensure a no net loss of habitat.

This paper represents the views and opinions of
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