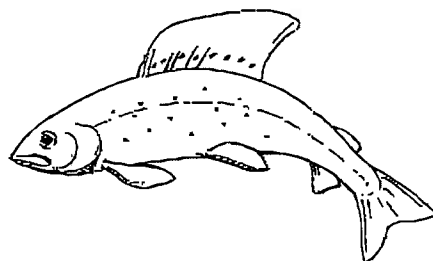




Fisheries
and Oceans

Pêches
et Océans



Western Arctic Area
Fish Habitat Management
Box 1871, Inuvik, Northwest Territories, X0E 0T0

May 30, 2002

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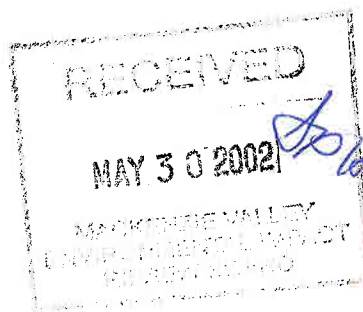
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DFO File No. SC02019

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MESSAGE

**RE: WesternGeco, Mackenzie River 2D Seismic Program 2002
DFO Comments for CEAA Screening**

FROM/DE:

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X0E 0T0Your file *Votre référence*Our file *Notre référence*
SC02019

May 30, 2002

Laura Van Ham
National Energy Board
444 Seventh Avenue SW
Calgary, Alberta
T2P 0X8**RE: WesternGeco, Mackenzie River 2D Seismic Program 2002 -**
DFO Comments for Screening Purposes

Dear Ms. Van Ham

The Department of Fisheries and Oceans, Western Arctic Area (DFO) has reviewed the above mentioned project proposal (referred to as "Project" below) and is providing the following comments. These comments (including questions) are compiled from and raised by the Fish Habitat Management, Oceans Management, Environmental Science and Fisheries Management programs within DFO. Comments focus primarily on fish and fish habitat concerns but also speak to the Project proposal in general and are intended to fulfil DFO's responsibilities under the Canadian Environmental Assessment Act (CEAA).

DFO should be considered a responsible authority for this Project under CEAA. However, it is unlikely that DFO will issue an Authorization under section 32 or section 35(2) of the *Fisheries Act* for this Project. A section 32 Authorization allows for the destruction of fish by any means other than fishing and a section 35(2) Authorization allows for the alteration, disruption or destruction of fish habitat. It is DFO's position that WesternGeco should mitigate impacts.

Although this portion of the river survey is being dealt with as a separate project from the Delta portion for environmental assessment purposes DFO considers both projects to be one and the same; therefore, we are including interested parties in the Inuvialuit Settlement Region (ISR) on the distribution list.

As there was a limited review period, DFO considers the following comments preliminary and may provide more comments at a later date.

Canada

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SC02019

Specific Comments

- 1) **Page 5, 3rd Paragraph:** It states that airguns are typically towed 4 to 6 m below the surface, Yet the airguns in this Project will be towed 2.5 m below the surface. Why this depth? How much water is required between the airguns and the substrate in order for them to operate properly?
- 2) **Page 9:** In the Wadden Sea seismic survey referenced in the proposal the airgun array was 480 cubic inches in comparison to 1500 cubic inches. Even at this reduced size the range of disturbance using the lowest avoidance threshold was reported to be (by Subacoustech) to be greater than 1 km. With an airgun array that is 3 times as large will the range of disturbance increase proportionally (to somewhere around 3km)?
- 3) **Page 12, Table 1.1:** This table indicates that fish and cetacean avoidance occurs at a sound intensity of 162dB. Is it possible for the Project to be conducted maintaining sound pressures of 150 dB or lower? If so, then DFO recommends that the Project be carried out as such as it would eliminate the majority of concerns DFO has related to negative impacts to fish health and behaviour. If the Project cannot be conducted in this manner WesternGeco should provide an explanation to DFO as to why not.
- 4) **Page 18:** It states in the projected time schedule that the Liard River section would be shot from June 15th-June 22nd. However, on page 21 in the community consultation documentation, the first response states that Western Geco expects to be on the Liard River in August. Which is correct?
- 5) **Page 21, Community Issues:** It is stated that the Arctic Star needs about 5.5 ft to operate in. The airgun array is to be towed at 2.5 m below the surface which is much greater than 5.5ft yet the Arctic Star was replaced due to concerns with vessel draft. Can you offer clarification on this point?
- 6) **Page 21, Community Issues:** It states that this type of seismic has been done in the Mackenzie Delta in the 1960's. Please provide any information related to this activity.
- 7) **Page 24, Community Issues:** In the last response it states that ramping up has been proven as a successful method of temporarily scaring fish away. This is mentioned again on Page 87. Please provide a copy of the Gausland, 2000 reference to DFO
- 8) **Page 27, Community Issues:** It is stated that the river is wide enough to give fish lots of room to escape. Is it wide enough when compared with a 200m zone of influence on either side of the barges? In addition, the route shown traverses narrow sections of the river and is often close to the banks.

- 9) **Page 27, Community Issues:** It states in the response column that "We have done other river seismic work with airguns for years, with fish monitors on board and have not seen stunned fish, and have never had fish kills". Based on this comment it seems that there should be a wealth of background material that isn't currently showing up in the proposal. Please provide documentation to substantiate the above comment (if available).
- 10) **Page 27, Community Issues:** It is stated that the seismic vessels "will likely operate as long as there is daylight." Please clarify what the scheduling will be for the seismic program (how many hours per day will the seismic vessels be operating, etc)
- 11) **Page 50-51, Tables 6.5 and 6.6 Potential Fish Species in the Mackenzie River/ Liard River:** Note that this list is far from complete, omitting several species, many of which have sensitive hearing. For instance, bull trout (*Salvelinus confluentus*) is a species of special concern in the Northwest Territories and occurs throughout the project area, not just in the Liard River.
- 12) **Page 77, Section 7 Proposed Mitigation and Environmental Impacts:** It is stated in this section that: "It is predicted that no significant residual impacts will occur as a result of the project due to the use of proven technology; the ship-based seismic exploration experience of WesternGeco; and appropriate mitigation measures." DFO would like copies of any studies that demonstrate that this technology has been proven in riverine systems including information on impacts and what mitigation measures were successful in eliminating these impacts.
- 13) **Page 82, Section 7.3, Mitigation and Monitoring:** It is difficult to assess the impacts of this Project without a monitoring plan proposed. A comprehensive and effective mitigation and monitoring plan, with contingencies (that has been approved by DFO) should be in place prior to implementation of the Project. As always, DFO invites WesternGeco to discuss mitigation and monitoring options with us.
- 14) **Page 84, Section 7.3.4, Airgun Ramp-up:** How long is the duration of the ramp-up? What volume (in dB) is emitted at the commencement of the ramp-up?
- 15) **Page 84, Section 7.3.5, On-board Observations:** DFO agrees that the use of monitors on the seismic vessels and on scout boats is a good idea, as they will both be looking for signs of fish stress or mortality. If adverse impacts are identified by the monitors or crew as a result of the Project, what will be done? Will the scout boats look close to shore for stressed fish in addition to in front of and behind the seismic vessels? How and when will DFO be notified if impacts to fish are observed? DFO appreciates the offer by WesternGeco to observe the Project aboard the seismic vessels.

- 16) **Page 85, Section 7.3.6:** It is stated that "dB and PSI will be less in the river system owing to signal attenuation, especially as regards a shallow soft riverbed." For this program however, Western Geco is staying in the deepest portions of the riverbed therefore the sound/pressure will travel further in all directions. In areas with steep banks, fish can't move into shallow water and out of the way.
- 17) **Page 85, Section 7.3.6, Acoustic and Overpressure Measurements:** DFO agrees that testing of the sound pressure and attenuation should be conducted prior to the initiation of the Project. What will be done if the measurements prove to be higher than anticipated? DFO recommends that testing be done in different areas throughout the project since subtle differences in the receiving environment (e.g. channel width, channel depth, substrates, current, turbidity) may alter the pressure and attenuation, as was clearly demonstrated with the pressure monitoring of explosives in waterbodies this past winter.
- 18) **Page 86, Section 7.4.3, Water Quality:** It should be noted that the combined volume of airgun arrays used in the North Saskatchewan River survey described in this section are only 2% of the combined airgun array volume proposed for the use in this Project. The comparatively miniature size of the airguns in the North Saskatchewan River survey and the lack of pressure or volume presented make comparison to the Project difficult.
- 19) **Page 93, 2nd paragraph:** It states that injuries due to airguns may not result in immediate mortality, but if a fish cannot regulate its buoyancy, or has damage to vital organs it is likely to eventually die. Will the monitoring for stressed fish and mortality take this delay factor into account? How long after and for what duration will the monitoring vessels be looking for stunned or dead fish? How far behind the seismic vessels will the monitoring vessels be? How will fish that may be dead or stunned but not floating be monitored? The poor clarity of the Mackenzie River will make such observations challenging.
- 20) **Page 94, Impacts to Eggs and Larval/Juvenile Fish:** The assumptions posed in this section have little meaning, as there is no pressure data available to do comparison analysis.
- 21) **Page 94-96:** General statements are made about small fish being more susceptible to effects from airguns than larger fish. This has negative implications for the many small fish that actually spawn in June and July. Further, although the seismic vessels will be operating in the main channel, many of these small fish may be near the mouth of tributaries to the Mackenzie. These fish may be greatly affected even by transitory programs such as this. Will the sound/pressure travel right into these small streams and cause negative impacts?
- 22) **Page 96, 1st Paragraph, Last Line:** The statement that "...fish will move away from the peak intensity noises caused by the Project" is too

presumptuous with the current lack of understanding of fish behaviour in response to airgun noise. What if the fish are attracted to the noise? What if the fish can't get away due to exhaustion, lack of speed, and/or channel narrowness to allow for escape opportunities?

- 23) **Page 97:** The proposal focuses mainly on migrating salmonids and coregonids. However, the minnows and other forage fish should be considered as well.
- 24) **Page 98, Disruption of Fish Migrations, 1st Paragraph, Last Line.** It is stated that the vessel will be moving through and out of a fish's environment in a given day and that they will be able to resume normal migrations. The river is the fish's immediate environment and, particularly the case with fish migrating upstream or fish being herded by the sound, the vessel could be moving with the fish rather than away from the fish.
- 25) **Page 98, Herding Fish:** While DFO agrees that there are some similarities that can be drawn between marine seismic surveys and river surveys, herding fish is not one of them. Marine fish, if they are motile enough, can theoretically escape seismic generated noise in any lateral direction. In contrast river fish are confined to channels.
- 26) **Page 98:** Reference is made to WesternGeco stopping every 2 – 4 hours or at a minimum of 1 hour in every 6 hours, and that fish will then resume their regular routines. While DFO agrees that regular shutdowns should mitigate impacts to some extent, the behaviour that fish exhibit to noise and how long it will take them to re-distribute themselves is poorly understood. It is possible that fish pursued by noise for several hours will become exhausted and may simply rest when the seismic activity shuts down, only to find themselves in the same situation an hour later.
- 27) **Page 99:** The differences in marine and river systems should be taken into account when reading these examples as they can easily mislead the reader. It is stated that: "Most of the studies have found that catch rates return to normal within hours." This is a strong statement considering that only 2 out of the 3 examples presented illustrated catch rates resuming to normal. This may not be the case at all with river fish as they are confined to lateral borders. It is possible that the marine seismic operations could have pushed fish out of a fishing area and could have also pushed them back into it as the seismic vessel moved through it's project area.
- 28) **Page 105, Section 8.1 Spatial and Temporal Boundaries:** The spatial and temporal boundaries identified are too narrow. Several species of fish are known to migrate up and down the river through the Project area and beyond. This migration also occurs before and after the timing of the Project. The effects of this program cannot be confined to the Project area identified.

- 29) **Page 109, Section 8.5.1, Spatial Effects:** It should be noted that while scout boats moving ahead to talk to other boats may reduce disturbance to other boaters, it does not reduce any environmental effects of the Project.
- 30) **Page 110, 8.5.4:** Western Geco is proposing to have a minimum of 4km (or 8km according to the preceding paragraph) separation between their project and the Northern River Survey project to ensure overall consequences to fish are kept to a minimum in the Liard River. However, there will only be a 2km separation between the two source vessels during Western Geco's project. How does Western Geco intend to keep fish from being trapped between their own seismic vessels?
- 31) **Page 111, Section 8.5.7 Induced Development:** DFO disagrees with the presumption expressed in this section that this Project will obviate the need for additional river surveys. From the experiences of the past two winters it is known that 2D seismic is a precursor to 3D seismic if the findings of the former are positive. If this 2D survey does provide promising data then 3D surveys will surely follow to further delineate deposits (barring a drop in oil and gas prices). This would certainly require more river work as stretches of the Mackenzie River are in excess of 2 km wide, well beyond the 400m gap tolerated in shot spacing by oil companies (as our experiences using explosives within waterbodies has demonstrated). And, if there is subsequent development of reserves yet to be discovered, what about the extraction of the hydrocarbons? Or the 4D seismic to delineate the movement of reserves over time? If there weren't the potential of induced development as a result of this Project what would be the point of it? These possibilities should be identified clearly in this section.

Navigation

- 32) The Canadian Coast Guard is part of DFO and has a regulatory interest with respect to navigation under the *Navigable Waters Protection Act*.
- 33) Any vessel used in the operation must be lit in accordance with the Collision Regulations under the *Canada Shipping Act*. (applies to Delta section as well)
- 34) The vessel trailing the 2 kilometre cable to support the array being floated 2.5 metres below the surface with a marker to identify the array position should be followed by a safety vessel to warn other vessels of the activity. (applies to the Delta section as well)

General Comments

- 35) **Alternatives:** The use of marine vibrators was dismissed rather quickly in the proposal submitted for the Delta portion (ISR) while in this proposal it was not mentioned at all. In the Delta proposal the virtues of the marine vibrator being an environmentally sound and effective seismic technique are touted

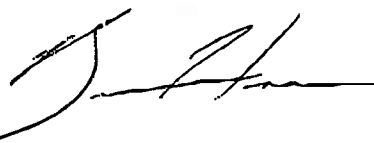
and then it is stated that "the effects of this technology on aquatic wildlife and habitat have not been not well studied...". Anyone who has read the Project proposal can see that the same is true for airguns (Refer to Page 88, 2nd Paragraph-Delta Proposal). Studies that have been done on the effects of marine vibrators on fish have shown them to be benign, not so for similar studies with airguns. The section goes on to state "...and the applicability of marine vibrators to a riverine system is not known." Wouldn't this Project be an ideal situation to test the effectiveness of a low impact technique like the marine vibrator in a riverine environment, perhaps comparing it to airguns? DFO encourages that the use of the marine vibrator be given further consideration.

- 36) It is well known that this Project is linked to another project surveying the remaining length of the Mackenzie River (Delta component) in the Inuvialuit Settlement Region and that the separation into two projects was to facilitate review under different environmental assessment regimes. Space or time does not separate these projects, they are proposed on the same river, and like the river, the proposed projects are a continuum. Not mentioning the adjoining project (Inuvik North) in the Project proposal is blatantly misleading.
- 37) Concerns are expressed over the draft of the seismic vessels. What is the respective draft of each seismic vessels proposed?
- 38) The width of the river should be delineated more clearly rather than presenting a mean width of the entire 1000+ km of the Mackenzie River. For example, sections of like-width could be identified and individual sections of mean width and depth could be obtained. This information would be useful in determining potential sensitive areas with limited fish escape possibilities.
- 39) Throughout Table 7.5 on page 104 reference is made to conclusions of impacts being made with medium confidence. There is a lack of information relating to the environmental impacts of river seismic operations and the difficulty in drawing similarities from marine seismic studies. Due to these limitations, DFO suggests that the Level of Confidence placed on the conclusions in Section 12 should more appropriately be of low confidence using the criteria of outlined in Appendix VI.
- 40) Bubble curtains have been suggested as possible mitigation for other airgun surveys. Could WesternGeco use bubble curtains on this project to help attenuate noise pressure? Explanation should be provided as to why this was not presented as a mitigation option.
- 41) According to the Sahtu maps, the Mackenzie River is in excess of 50 km in width in some sections. The scale on these maps should be corrected.

Summary:

- a) DFO realizes unknowns are inherent with this type of project as it has not been conducted in this environment before and therefore many questions will remain unanswered until they are studied first hand.
- b) A comprehensive and effective mitigation plan needs to be developed to minimize or eliminate environmental impacts. This plan needs to be in place and tested to work effectively prior to the initiation of the Project.
- c) A comprehensive and effective monitoring program (including but not limited to acoustic monitoring and monitoring for fish stress and mortality) needs to be developed to assess the effects the Program will be having on the environment with particular emphasis on fish.
- d) The use of marine vibrators should be explored as an alternative or an additional energy source. One of the sources that promotes marine vibrators as an environmentally friendly seismic source with flexibility in application is Schlumberger.
- e) DFO encourages the use of non-explosive techniques for conducting seismic programs, preferring technology that has the least environmental impacts possible.
- f) Information is lacking in the proposal, making a determination on environmental impacts difficult. The questions posed by DFO should be answered to DFO's satisfaction prior to initiation of the Project.

Thank you for providing DFO with the opportunity to comment on this interesting project. If you have any questions feel free to contact me at (867) 777-7520 or Bruce Hanna at (867) 669-4931.



For / Pete Cott

Area Habitat Biologist
Fish Habitat Management
Department of Fisheries and Oceans- Western Arctic Area

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