

# MEMORANDUM

## State of Alaska DEPARTMENT OF FISH AND GAME

TO: Jackie Timothy DNR  
THRU: Scott Kelley/Brian Frenette  
Regional Supervisors for Comm.  
Fish/Sport Fish  
FROM: Commercial/Sport Fish Staff

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SUBJECT Tulsequah Chief Mine Air Cushion Barge Transportation System

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Staff of the Department of Fish and Game, Region-1 have completed a review of the documents provided by Redfern Resources Ltd. for the Tulsequah Chief Mine project entitled:

- *Tulsequah Chief Mine Air Cushion Barge Transportation System Volume 1 – Project Description,*
- *Tulsequah Chief Mine Air Cushion Barge Transportation System Volume 2 – Supporting Information for the BC Project Approval Certificate Amendment and the Alaska Coastal Zone Consistency Review*
- *Tulsequah Chief Mine Air Cushion Barge Transportation System: Operations Plan.*

The purposes of the following comments are to identify information gaps in the aforementioned documents, and to identify if comments submitted previously on the project were addressed adequately and incorporated into the Operations Plan. The department comments also identify additional information requirements needed to adequately determine the significance of potential adverse effects of this proposal on fish and fish habitat.

Taku River Fisheries information: The Taku River is the single largest producer of salmon in southeast Alaska. In the past 10 years the average total run size for Chinook salmon is approximately 69,000 adults, coho salmon is 164,000 adults, and sockeye salmon is 246,000 adults. The pink salmon index obtained from the Canyon Island fish wheels indicate that pink salmon returns vary from 0.5-1 million fish annually. The Taku River has one of the most extensive salmon stock assessment projects on the Pacific coast and is managed by Canada and the U.S. under the terms of the Pacific Salmon Treaty. There are dozens of biologists and field technicians from both countries employed year round to assess, manage, and ensure the sustainability of the fishery resources of the Taku River drainage. Three of the five species of salmon have formal escapement goals recognized by both countries. One result of these efforts has been the ability to provide the first directed fishery on Taku River Chinook salmon in roughly 30 years. The budget for salmon stock assessment work is approximately \$250,000 per year; and consists of several million dollars over the past twenty years.

The McDowell Group report (September 2004) entitled “The Taku River Economy: An economic profile of the Taku River Area” estimates the total annual economic impact from all activities on the Taku River to be \$26.7 million; commercial fishing generates \$6 million, sport fishing generates \$2 million, and commercial air activity generates \$18 million (\$13 million directly related to tourism).

The recent 10-yr average total return, harvest, and ex-vessel value of Taku River salmon harvested in U.S. fisheries is estimated in the table below. The Taku River produces the largest runs of Chinook and coho salmon in Southeast Alaska.

	Average Total Return 1996-2005	Average Harvest	2006 Price/lb	Ex-Vessel Value (millions)
Chinook <sup>a</sup>	69,000	25,500 <sup>b</sup>	\$3.37	\$1.3
Sockeye	246,000	141,000	\$1.09	\$0.88
Coho	164,000	69,000	\$1.41	\$0.66
Pink & Chum	NA	NA	NA	NA
Annual Value for all salmon				\$2.84

a –Does not include escapement below U.S./ Canada border

b – Includes U.S. and Canada commercial harvest averaged over the last two years that there has been a fishery (2005 & 2006).

General Comments pertaining to the proposed project:

**Sufficiency of Information:** The documents reviewed do not provide sufficient information to appropriately analyze the impacts on fishery resources. Department concerns have not been adequately addressed in the supporting information or the operations plan. The applicant’s analysis of potential impacts relies on a broad range of assumptions, which as currently presented are not supported by actual “field experience” in conditions similar to those that will be encountered in the project area. There has been insufficient work in identifying areas within the proposed transportation corridor that are important to both adult and juvenile fish (i.e. salmon, trout, eulachon, and sturgeon). Bathymetric information about the river along the proposed route is limited to a short reach in the lower sand flats. It is noted that Redfern intends to develop management and monitoring plans for many specific issues after permitting and operations begin. Adequate assessment of this project requires management and monitoring plans to be part of the final Operations Plan and subject to review prior to commencement of operations.

**Shallow draft vessels and amphitrac:** One of our primary concerns continues to be evaluating impacts from vehicles or vessels that are conceptual in design (e.g. amphitrac), and not field tested, nor have been operated in the environments similar to those of the project area. This issue was initially raised by the department in preliminary comments submitted after review of the Volume 1 Project Description. Subsequent documents provided by the applicant have only provided information on the intended design of the amphitrac and how it is expected to operate in the Taku River in conjunction with the air cushion barge (ACB). Similarly, how these vessels and vehicle will perform in close proximity to the fish resources and habitats of the Taku River is not known. It is worth noting that the use of shallow draft vessels is intended for the purpose of greater access to shallow water areas, and that activity in these types of areas is expected to occur. Adequate assessment of this project requires that the amphitrac and air cushion barge be field tested and comprehensively evaluated in similar conditions to the proposed project area.

**Channelization:** It is not clear to us that the project is consistent with ACMP standards (11 AAC 112.300 Habitats). The east channel around Canyon Island is exposed much of the year and currently receives only a small portion of the mainstem flow during high water because of upstream gravel deposits that direct the majority of the river into the west channel. The potential for channelization is high on the east side of Canyon Island where the amphitrac will be transitioning from water to exposed river bar (or traveling through shallow water during high flow periods) two times a day for the majority of any given year and

over a period of roughly ten years. The applicant claims that channelization will be avoided here because the large low pressure tires on the amphitrac will produce very low ground pressure. This is a broad assumption not supported by any study or data from the project area or from any submitted supporting information. It is not uncommon for unconsolidated substrates in this type of environment to be saturated, unstable and subject to further erosion. It is not known how these substrates will respond to the physical weight of the equipment, to the action of metal wheels, low pressure tires, or Archimedes screws used to propel the amphitrac and stabilize the air cushion barge while traversing sloped grades, or to the air pressure gradient below the air cushion barge. All of these factors have high potential for scouring and channelization. In addition, the shallow draft tug operating in low water conditions along the transportation corridor has high potential for scouring if the propeller is in close proximity of the streambed. Low water profiles of the entire transportation corridor and an analysis of potential scouring, channelization would help to confirm that no adverse impacts will result from vehicle operations.

**Woody Debris:** It is well documented that the presence of woody debris in rivers and streams allows for important salmon rearing habitat formation across varying flow regimes; and provides habitat and substrate for invertebrate forage. The proposed operations plan includes removal of large woody debris that may interfere with navigation. The applicant also states that large woody debris is a danger for all river users. This statement is not supported with evidence of past accidents or complaints from other river users. It is well understood by all users navigating on inland rivers that there are inherent risks associated with these activities. These risks are accepted and prepared for accordingly. The amount and location of existing large woody debris that the applicant deems to be problematic for navigation has not been identified. It was initially stated that mitigation for loss of habitat would consist of relocation in an adjacent area. However the current proposal states that LWD would not be placed back in the river; and mitigation for this activity was not provided. We firmly believe that it is extremely important that all large wood (single pieces or accumulations) remain in the river in existing locations and undisturbed to ensure natural flow conditions, adequate sediment storage and point bar formation, and to ensure the sustainability of important habitats to juvenile salmon rearing in the mainstem and channel margins.

**Disturbance of substrates:** The supporting documents make no reference to potential implications of amphitrac, ACB, or shallow draft tug, to generate conditions which would cause substrates to shift and or settle. Disruption of sediments can result in settling due to compaction and or vibration which in turn may render spawning and rearing habitats unusable during key life stages. Potential effects to the substrate and fish habitat are discussed in the supporting documents; however the applicant assumes that impacts will be avoided because of the depth of the thalweg and the shallow draft designs of the barging equipment. Although bathymetry information has been provided, it relates only to the most downstream portion of the project area. Furthermore, it may not be relevant for low flow periods (fall - spring) when the thalweg may be much shallower and narrower along the entire proposed transportation route. Redfern states that studies on other rivers have indicated that re-suspension of sediment is a concern associated with barging; and, it is noted that in shallow water the propeller wash (shallow draft tug) may displace substrate. However it is assumed that disturbance of the substrate will be short term and that freshets and jokulhlaups will naturally redistribute gravels. There is no data provided comparing prop wash disturbances, particularly during low flow periods, to normal river actions. Bathymetric surveys of the entire transportation corridor would help to substantiate or refute these assumptions. This data will identify locations where substrate disturbance may be more likely to occur during low flow periods. Further, the department requests data be provided documenting the actual effects from water pressure under the ACB in all areas of the river so that some assessment can be made of potential adverse impacts to salmon eggs, alevin, fry, pre-smolt, and smolt, as well as to other important fish species such as eulachon.

Low flow periods do not seem to be accurately identified in that the data presented is average monthly lows across the entire hydrologic record rather than minimum monthly flows, which would be when the greatest chance for making ground contact would occur.

**Wake effects:** The applicant assumes wakes from the vessels will be insignificant in contributing to erosion effects or to stranding juvenile fish. It is noted that wake studies from other rivers with conventional vessels were cited (Mississippi and Mackenzie Rivers). The department requests data (vessel wake modeling) be provided for the environment that will be effected and by the equipment that will be used. The modeling should take into consideration different payloads of the barge, displacement of transport vessels, direction of travel and varying depths in the river. Wake effect is determined by a combination of river flow, displacement, and speed of the vessel, depth of the river and the proportion of the channel that is displaced. It is noted that the applicant cites wake observations from conventional tug and barge operations that took place in July of 2007: “The wake did not appear to exceed 1 ft (0.3m) and the wake had all but dissipated by the time it reached the river bank...No wake issues were identified during conventional barging operations during the summer of 2007”. These are subjective observations that are not substantiated by physical measurements. Contrary to the stated lack of “wake issues”, damage repeatedly occurred to the department fish wheels at Canyon Island. The applicant states “uncertainty will be addressed through the development of a management plan for the barging operation”. For the department to adequately assess wake effects, we request that the applicant take proactive measures through collecting and incorporating wake modeling data, including potential cumulative effects, into a well developed management plan as part of the Operations Plan subject to review.

**Mainstem spawning and rearing:** The mainstem of the Taku River accounts for 50-60% of the sockeye salmon production. Some, if not most, of the fall chum salmon production is also from mainstem spawning. It is noted that studies of sockeye salmon in the Taku River are cited by the applicant. However, many chum and sockeye salmon mainstem spawning areas are not spatially documented (using GPS), and it is probable that some degree of presently unidentified mainstem spawning occurs in the project area.

High numbers of fry and smolt pass through the lower river in the spring, and it has been shown that fry, particularly sockeye, rear near the mouth of the river into fall and winter months. Pink and chum salmon start leaving southeast Alaska streams as early as mid March. A portion of the pink and chum fry emigration coincides with the return of eulachon to the river.

A substantial annual run of **eulachon** returns every spring to spawn in the fine sand and gravel present in the lower river. The importance of eulachon to the food web is well documented. These forage fish with their high oil content are the first abundant, highly nutritious, food resource for many birds, mammals, and fish after a long winter. Distribution and densities of these fish in the shallow water areas of the sand flats is not known.

The applicant assumes that residual effects from ACB/amphitrac transiting the gravel bar on the east side of Canyon Island, adjacent to a sockeye spawning area, will be reversed by normal water flows in the river. This is not substantiated by studies or data. We do not know the extent of channelization, siltation, compacting, or other disturbances that will result from amphitrac passage along this route. It is apparent that there is an absence of data on effects of using the ACB, amphitrac and shallow draft tug along the entire transportation route. Direct or indirect effects may occur to spawning salmon, incubating salmon eggs, pre-emergent alevin, rearing or emigrating fry, pre-smolt, smolt as well as spawning eulachon. There would be particular concern during low water periods and in the areas of the east side of Canyon Island and the sand flats where ground contact and shallow water are already expected to be encountered. It was stated in the Volume 2 environmental document that a typical shallow draft tug requires continuous channel depth of 3 ½ feet, however the Project Operations document states that the shallow draft tug proposed for this project has a full draft load of 2.4 feet. It is indicated that a depth of three feet will be sufficient in protecting spawning/rearing fish and fish habitat, however there is no supporting evidence of this. When the amphitrac tug leaves the water, transits around the Island, and winches the ACB (which

will use a wheel in contact with the ground to prevent side slippage of the ACB) there is high potential to impact the bank of the river and sensitive salmon habitat associated with Fish Creek. Adequate assessment of this project should include identification of where spawning does and does not occur in the mainstem of the river and in all areas where the vehicles will be traveling. This information should be available for review in the project Operations Plan.

**Sturgeon:** The department previously expressed concerns about impacting the green sturgeon population in the Taku River. The green sturgeon has a status designation of Special Concern in Canada because it has characteristics that make it particularly sensitive to human activities. No research has been done on this species in the Taku River drainage, but they are known to exist in the drainage through encounters in existing salmon stock assessment studies and in commercial fishery catches.

**Monitoring:** Proposed mitigation cites monitoring as a measure to identify impacts post operation rather than conducting proactive assessment and development of adaptive management measures and thresholds to avoid, monitor and measure potential impacts of barge operations. Monitoring is certainly necessary but should not replace the need for information before this project can be adequately reviewed.

**Water quality:** It is noted that Redfern intends to develop and implement Spill Prevention and Contingency Plans (Redfern discusses sediment suspension and potential siltation in other sections). Reviewers should have the opportunity to comment on a Spill Prevention plan as part of the Operations Plan prior to commencing operations. It is common with any type of mechanical equipment to experience hydraulic failure and other mechanical breakdowns that can place contaminants into the environment quickly. Any contaminants that are introduced into the water will rapidly be displaced downriver. The department requests that a fully developed spill prevention and contingency plan be part of this review process. This plan would include (among other things): oil containment booms and other equipment for cleanup located at various strategic locations along the transportation route so that they may be deployed quickly if needed.

**Ice Formation and Break-up:** It is noted that ACBs have been used as icebreakers and every effort will be made to avoid using the ACB as an icebreaker to facilitate natural ice conditions. The department has reviewed no detailed information in the supporting documents that support this. Supporting documents should include operating procedures during ice formation and break-up conditions, the possible effects of icebreaking, and details of how the operating plan is designed to minimize these effects. The department requests that more detail be provided on winter routes in relation to snow depth and river profiles along the navigational route.

It is noted that Redfern asserts that **corrective actions** will be taken if there are documented problems or issues based on observations (from environmental monitors) during barging operations. No suggestions or recommendations have been provided explaining how impacts would be detected, or what type of corrective actions could be utilized. Developed action plans should be made available for review.

There is no assessment or plan for evaluating **cumulative effects** on fish and fish habitat temporally and spatially.

Environmental monitors are proposed to be aboard the vessels at all times for the life of the project, however their responsibilities have not been provided.