REVIEW OF GAHCHO KUÉ SAMPLING PLAN FOR PEAMOUTH (*Mylocheilus caurinus*)

Context

Gahcho Kué is a diamond mine project being proposed by De Beers Canada for the Kennady Lake area north of Great Slave Lake in the Northwest Territories. Fisheries studies were initiated beginning in 1996 as part of this project. The overall objective of the summer study program is to collect additional information from the local study area for use in the environmental assessment of De Beers Canada's proposed Gahcho Kué Project.

In 2007, one of the main tasks is to confirm the presence or absence of peamouth (*Mylocheilus caurinus*) from Kennady Lake and the greater Lake 410 watershed. Peamouth were reported in the watershed in 1999, however, they have not been captured in subsequent studies and the original voucher specimens are not available. In Canada, peamouth are common in British Columbia and the Yukon Territory and are present in the upper Peace River drainage. Peamouth have been found in only two locations previously in the N.W.T., Poplar Creek (Liard River tributary) and Smith Creek near Wrigley. Presence of peamouth in the Gahcho Kué project area would be a significant range extension for the species. Confirmation of the presence or absence of peamouth at Kennady Lake is important for the environmental impact review and the no-net-loss compensation plan for the Gahcho Kué project.

Fish Habitat Management (FHM) submitted a request for information and advice for the sampling plan on July 10, 2007. In particular, FHM are asking if the sampling plan, "Detailed Gahcho Kué Fisheries Sampling Plan – summer 2007" (Appendix 1) provides the necessary direction to ensure defensible/adequate assessment of peamouth (*Mylocheilus caurinus*) presence or absence in Kennady Lake and the Lake 410 watershed? Comments were also requested on the choice of sampling locations.

As the sampling program was planned to begin on July 18, 2007, the time-frame with which to review the sampling plan was limited. Unfortunately with the timing of this project and the limited notice, it is not possible for someone from Science in Winnipeg to participate. FHM might consider providing support from the Area Office. There will be a Regional Science Peer review of a fish sampling protocol for Species at Risk in July/August 2007, the results of which would apply to this request, however the results will not be available until after the sampling program is completed.

Analysis and responses

Identification

McPhail and Lindsey (1970) indicate that small barbel at the corner of the mouth, the well-developed pelvic axillary process, the forward position of the dorsal fin, the deeply forked tail and the small mouth that never extends back as far as the front of the eye are the distinguishing characters for this species.

J. Reist will provide an initial confirmation of any suspected specimens of peamouth sent to him for identification. He will also arrange for re-confirmation of identity by another fish taxonomist, and deposit specimens formally in a reference collection. Fish can be either preserved by freezing or in 10% formaldehyde (10% concentration of the 37% formaldehyde solution) formalin as soon after capture as possible. Include a waterproof label in the container with the specimens with location (coordinates), date and collector's name. If samples are frozen, they must be well frozen and the well packed in an insulated container with ice. They should be shipped by air with "Keep Frozen" clearly marked on the waybill and the container. Most airlines have freezer facilities. Any samples should be shipped by Air to FWI, 501 University Crescent, Winnipeg, MB R3T 2N6 Attention J. Reist. The shipper should contact J. Reist (204-983-5000) and provide advance notice of the waybill number and carrier and expected arrival time.

Suspected peamouth should be photographed in the field as indicated in the methods proposed. These photographs should a) characterize each key character (see cyprinid keys provided by Scott and Crossman 1973) used to differentiate the various species, and, b) be of sufficient resolution to permit reasonable identifications. The photographs should capture as much as possible the key identifying features used to differentiate the various species up to and including the couplet at which peamouth are identified in this key. A scale bar should be included in any photos.

Sampling Locations

Sampling locations where peamouth were first caught, SA1 and SN17 are located in two watersheds, Kennady Lake and N watersheds. The proponents indicate they will specifically target the particular locations where peamouth were reportedly previously captured. This, and the indication that they will also specifically search for peamouth in all sites to be sampled within the drainage basin and particularly target appropriate habitats indicates that the geographic coverage should be sufficient to capture this species. Additional areas outside the specific locations indicated (i.e., in different drainage sub-basins) would widen the confidence in whatever results are obtained.

Waterbodies which will be impacted (altered or destroyed) by the planned mining activities should receive priority treatment (LA1, SA1, LA3, LA2, D1, D2, D3, etc.).

Peamouth are a member of the minnow and carp family. They form schools in lakes and slow-flowing areas of small and medium rivers and are commonly associated with vegetated habitats (Scott and Crossman 1973). McPhail and Lindsey (1970) indicate that spawning takes place either in inlet or outlet streams close to a lake, or over gravel in the shallows of lakes. Fry school near the shore, moving into deeper water in the summer (Scott and Crossman 1973). In southern British Columbia lakes, young peamouth occupy shallower water whereas adults remain close to the bottom in deeper water during daylight (except when spawning), and move into the shallows at night (Northcote *et al.* 1964). For species with known habitat preferences, sampling should target those areas where the species is most likely to be present.

Capture Methods

The proponent has indicated that fish will be sampled using an electrofisher. Low conductivity water and electrofishing success for small-bodied fishes may be quite limited and biased against capture. The addition of small-mesh (1/4") seining as a capture method is strongly recommended. The addition of this active capture technique would increase confidence in whatever results are obtained from each site sampled. Richardson *et al.* (2001) was successful

using a beach seine to capture peamouth. The further addition of passive sampling such as traps (i.e., hoop nets, trap nets, minnow traps) would also strengthen confidence in results if deployed for sufficient duration in suitable habitat where peamouth might be expected to occur.

Effort

Although the presence of a species can be proven, the absence of a species never can. The best approach is to provide sufficient capture effort in the habitat where the species would be expected to be found. If the sampling program is designed so that, if the species was present, the probability of its capture would be high, then if the species is not caught we would expect that its occurrence there would be improbable.

There is no indication in the proposal of how the proponents will measure effort for any of the capture techniques to be employed. This is critical in order to assess confidence in the results obtained. Peamouth may be relatively rare in the area; they may be very episodic or unlikely even if they are present. Positive findings (i.e., confirmed capture of peamouth is not an issue for interpreting results and impacts). However, in order to reasonably differentiate negative findings (i.e., sampled but not captured) into either 'most likely not there' or 'may not be present', some indication of effort is required. For electrofishing standard measures include time electrofished and/or distance electrofished, both of which must be associated with particular habitat types and conductivity measures in order to assess false negative results (there but not found) from true negative results (not there); distance and area covered for seining can also be combined to yield some measure of effort; number and duration of trap sets is also a measure of effort. In the event that no peamouth are captured, it must be demonstrated that sufficient effort was expended in order to properly interpret the negative results. By increasing effort, recording effort, and sampling additional possible locations as suggested above, the confidence in negative results may increase but will never be absolute.

Conclusions

Fish Habitat Management (FHM) submitted a request for a review of the study protocol – Detailed Gahcho Kué Fisheries Sampling Plan – summer 2007 to ensure defensible/adequate assessment of peamouth (*Mylocheilus caurinus*) presence or absence in Kennady Lake and the Lake 410 watershed. Absence of peamouth cannot be proven. In order to demonstrate probable absence of the species sufficient effort must be employed and documented. Sampling should target the preferred habitat of peamouth including stream and lake locations. Multiple sampling methods should be employed and information recorded to demonstrate sampling effort. Voucher specimens of suspected peamouth should be photographed and preserved for confirmation of identification by DFO-Wpg. A sampling protocol for Species at Risk has been drafted and will be peer reviewed in the near future which has information relevant to this study however a response was required prior to the completion of the formal peer review.

Authors or Editor and other Contributors

K. Martin (author), Science, Coordinator, Centre for Science Advice-Central & Arctic Region

J. Reist, Science, Research Scientist and Program Lead Climate Change and Fisheries

Approved by

M. Wheatley, Director of Science, Central and Arctic Region

D. Cobb, A/Division Manager, Arctic Aquatic Research

Sources of information

McPhail, J.D. and C.C. Lindsey. 1970. Freshwater fishes of northwestern Canada and Alaska. Fisheries Research Board of Canada, Bulletin 173. 381 pp.

Northcote, T.G., H.W. Lorz, and J.C. MacLeod. 1964. Studies on diel vertical movement of fishes in a British Columbia lake. Verh. Intern. Verein. Limnol. 15: 940-946.

Richardson, J.S., T.J. LIssimore, M.C. Healey and T.G. Northcote. 2000. Fish communities of the lower Fraser River (Canada) and a 21-year contrast. Environmental Biology of Fishes 59:125-140.

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Appendix 1

Section 2.1 of the Gahcho Kué Fisheries Sampling Plan – summer 2007 relating to the peamouth sampling plan.

2.1 Peamouth Presence/Absence

Five 'peamouth' were captured in summer of 1999 by EBA Consultants. Three individuals were captured in Stream A1, which flows from Lake A1 to Kennady Lake. Two individuals were captured in Stream N17, the inlet to Control Lake (Lake N16) in the adjacent 'N' watershed. Initial sampling will be focused in Stream A1 and N17. Discrete habitat types in these two streams will be electrofished and high effort will be used to determine if peamouth inhabit these streams. Intensive sampling will also be conducted in several lakes in the Kennady Lake watershed (Lakes A1, A3, D2, D3, and E1) as part of other investigations but these lakes also contain habitat preferred by peamouth. Peamouth is a cyprinid species commonly found in rivers and lakes in northwestern North America (Scott and Crossman 1973). Peamouth inhabit slow stretches of rivers and lakes and juveniles prefer nearshore areas over rubble and gravel substrates in areas of submerged vegetation (Richardson et al. 2001). Adults prefer areas of abundant aquatic vegetation.

Habitat maps produced from the 2005 field studies will be used to select shoreline sample sites that have preferred peamouth habitat types. Sampling in lakes will consist of shoreline electrofishing and overnight minnow trap sets.

The streams and lakes downstream from the Kennady Lake outlet (L and M drainages) and in the N drainage will also be sampled for peamouth in conjunction with the young-of-the-year Arctic grayling outmigration investigations. These sites will be sampled using three-pass depletions using backpack electrofishing. Where present, any sites that contain preferred peamouth habitat will also be sampled.

If peamouth are not found in any of the planned sample sites, additional sample sites will be chosen from the Lake 410 watershed in areas that have not been sampled before. Sample sites would be selected based on preferred peamouth habitat criteria.

All captured fish will be identified, enumerated, and measured for length and weight. If any suspected peamouth are captured, photographs will be taken and voucher specimens will be collected and preserved for identification. Field staff will carry a colour identification guide with pictures of adult and juvenile peamouth to aid in on-site identification. Habitat information for the sample sites will also be collected. This will include temperature, conductivity, pH, dominant and sub-dominant substrate types, and habitat information including channel characteristics. GPS waypoints will also be taken, along with site photographs.

THIS REPORT IS AVAILABLE FROM THE:

Center for Science Advice (CSA)
Central and Arctic Region
Fisheries and Oceans Canada
501 University Crescent,
Winnipeg, Manitoba, Canada
R3T 2N6

Telephone: (204) 983-5131
Fax: (204) 984-2403
E-Mail: xcna-csa-cas @dfo-mpo.gc.ca
Internet address: www.dfo-mpo.gc.ca/csas

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