From: Richards, Laura
Sent: Tuesday, October 6, 2009 12:42 PM
To: Saunders, Mark <Mark.Saunders@dfo-mpo.gc.ca>
Subject: RE: Draft BN
Attach: Sockeye2009_bn_min_e_MS1 (5).doc

<<...>>

Dr. Laura Richards
Regional Director Science | Directrice régionale des sciences
Fisheries and Oceans Canada | Pêches et Océans Canada
Pacific Biological Station | Station biologique du Pacifique
3190 Hammond Bay Rd, Nanaimo, BC, Canada V9T 6N7

Laura.Richards@dfo-mpo.gc.ca
Telephone | Téléphone 250-756-7177
Facsimile | Télécopieur 250-729-8360
Government of Canada | Gouvernement du Canada

From: Saunders, Mark
Sent: October 6, 2009 10:50 AM
To: Richards, Laura
Subject: Draft BN

Hi Laura,

Still needs summary bullets. Hopefully this is closer. Could easily move the hypotheses to an attachment if need be. << File: Sockeye2009_bn_min_e_MS1 (5).doc >>

Mark

Mark W. Saunders
Division Manager, Salmon and Freshwater Ecosystems
Directeur de secteur, Saumons et Ecosystèmes d'eau Douce
Fisheries and Oceans Canada / Pêches et Océans Canada
Pacific Biological Station / Station Biologique du Pacifique
3190 Hammond Bay Rd, Nanaimo, BC V9T 6N7

tel/tél: 250-756-7145
FAX: 250-756-7053
Mobile/tél cell: 250-713-3786
e-mail/courriel: Mark.Saunders@dfo-mpo.gc.ca

(No Letterhead)

CLASSIFICATION

200X-XXX-XXXXX
EKME # XXXXXX

BRIEFING NOTE FOR THE MINISTER

FACTORS AFFECTING
THE 2009 FRASER SOCKEYE RETURN

(Information Only)

SUMMARY

•

Background

- Sockeye salmon returns to the Fraser River in 2009 are significantly below the pre-season forecast. The actual return is now estimated to be on the order of 1.4 million fish, whereas more than 6 million fish were expected. One exception is Harrison sockeye, which returned to the Fraser system significantly above expectation.

- Unlike other years where returns to the Fraser were poor, sockeye returns were above expectations for Barkley Sound and the Columbia system. However, returns to the Skeena were also poor.
- While the explanation for the poor 2009 Fraser return is not known, staff have now considered factors which could have impacted sockeye at different stages of their life history as they migrate from their lake-rearing habits (2 years) to the Strait of Georgia (spring/early summer), on to the Gulf of Alaska and the Bering Sea and back again to spawn in their fourth year.

Analysis / DFO Comment

- The leading hypotheses and their probable likelihood is as follows:
- **Pollution in lake/watersheds – 2009 unlikely impact: Long term decline possible impact** – Given the high smolt production from Chilco Lake in 2007, this is considered unlikely. and that all sockeye populations were impacted, it is unlikely that a basin-wide environmental event (ie pesticide application or chemical spill) could have been responsible. Concerns related to the long term impact of pesticides and pollutants released from glaciers and pest control programs, and chemicals in run-off such as copper.
- **Fishery effects – 2009- possible impact: Long term decline –possible impact.** In 2009 the Canadian fishery was minimal and did not contribute to the poor return. There is some evidence that Canadian sockeye are intercepted in U.S. Gulf of Alaska fisheries and Bering Sea fisheries. The level is not well documented but appears it would only explain a small proportion of the 2009 mortality.
- **Viral disease coastwide effects – 2009 possible impact: Long term decline – possible impact.** There has been growing evidence based on genomic work since 2006 that Fraser sockeye are infected with a virus that could be a major contributor to mortality occurring throughout their life history. Recent discovery of a high incidence of tumour-like growths in the brain of sockeye sampled both as smolts and returning adults has raised the level of concern. While this could provide an explanation for the long and short term declines for sockeye it is important that histology be completed to confirm the presence of tumours and that their presence is linked to the virus and that that the virus be identified. Signatures of this virus are present in Chinook and coho heightening the importance of this work. DFO Science is developing a workplan to resolve these questions.
- **Predation offshore by Humboldt squid -2009 possible impact: Long term decline no impact.** Humboldt squid has increased dramatically in abundance in Canadian waters beginning in 2007. Salmon have not been identified in the diet. A possible contributor to mortality but the fact that Harrison stock resides of the west coast of Vancouver Island where the squid is most abundant suggests it is not a key factor. Gut content analyses from 2009 surveys will be examined.
- **Predation in Strait of Georgia – 2009 unlikely impact: Long term decline possible impact.** There are no known shifts in predator abundance that could be responsible for increased predation in 2007.
- **Mortality attributed to sea lice from fish farms in Discovery Passage – 2009 possible impact: Long term decline possible impact.** While it is possible that sea lice from farms contributed to the mortality the degree of impact is difficult to assess. To investigate this a request to the Province of BC for data on farm lice loads and treatments during 2007 in the Discovery Passage area has been sent. It will be important to confirm which species of sea lice is present as at least one of the species

present is carried by other marine fish.

- **Mortality attributed to toxic algal blooms in the Strait of Georgia -2009 possible impact: Long term decline unlikely impact** – Very extensive blooms of toxic marine algae were identified in the Strait of Georgia during the period of sockeye residency in the Strait in 2007. These blooms could have caused mortality of the scale in question although the lack of anectodal evidence (no reports of fish kills) suggests it is unlikely. We will be working with the Vancouver Island University (VIU) and the aquaculture industry to confirm to the extent possible the nature of these blooms in 2007.
- **Krill fishery impact on food supply for sockeye** in **Strait of Georgia -2009 unlikely impact: Long term decline unlikely impact -** Sockeye feed on krill and it has been suggested that the small fishery in one of the mainland inlets (Jervis) is contributing to sockeye mortality. Again possible but unlikely given the small amount of krill removed relative to the biomass present. We will analyse sockeye stomach data from Strait of Georgia to see if there is any indication the fish are food deprived.
- **Mortality due to low prey abundance in Queen Charlotte Sound** – there is a correlation with low ocean productivity that suggests that sockeye entering Queen Charlotte Sound in 2007 would have encountered low quantities of prey.
- It may not ultimately be possible to fully understand what led to the poor return in 2009. This work however, indicates that a number of hypotheses are plausible and require follow up and further analysis.
- This work also suggests that there is potential for a modest monitoring program in the Strait of Georgia to improve the understanding of the area where the majority of impacts appear to be taking place.

…/2

Recommendations / Next Steps

- Staff are continuing to assemble data and analyze the key hypotheses.
- The disease work as it is examined will be of extreme interest and may be quite controversial. A communication strategy should be developed to accompany the workplan
- This work can be used to inform annual post season reviews or a science symposium/workshop if a decision to proceed with one is made.

Attachment (1)
- Speaking points for the Minister – *(Please add the title here)*

Officers / DGs / ADMs / initials of the admin clerk or typist

SPEAKING POINTS – *(Please add a title here)*

- **Speaking points should accompany each briefing note.**

- **Speaking points must also be written with size 16 font and with bold typeface.**