

**Subject:** FW: Updated: Follow-up Science Meeting on Factors Affecting 2009 Fraser Sockeye Return  
**Location:** Nanaimo - Coast Bastion - Ladysmith Room - Documentation Attached

**Start:** 9/30/2009 8:30 AM  
**End:** 9/30/2009 4:00 PM  
**Show Time As:** Tentative

**Recurrence:** (none)

**Meeting Status:** Not yet responded

**Required Attendees:** Sloan, Lara  
**Resources:** Nanaimo - Coast Bastion - Ladysmith Room - Documentation Attached

**When:** Wednesday, September 30, 2009 8:30 AM-4:00 PM (GMT-08:00) Pacific Time (US & Canada).  
**Where:** Nanaimo - Coast Bastion - Ladysmith Room - Documentation Attached

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-----Original Appointment-----

**From:** Saunders, Mark  
**Sent:** Tuesday, September 29, 2009 10:03 AM  
**To:** Richards, Laura; Cass, Alan; Miller-Saunders, Kristi; Beamish, Richard; Trudel, Marc; Crawford, Bill; Johnson, Stewart; Hyatt, Kim; Chamberlain, Michael; Hargreaves, Brent; Tompkins, Arlene; Parken, Chuck; Whitehouse, Timber; Beacham, Terry; Irvine, James; Gillespie, Graham; Grant, Sue; Jones, Simon; Ryall, Paul; Rosenberger, Barry; Gillis, Dave; Grout, Jeff; XPAC SC MEAD Section Heads; XPAC SC STAD Area Chiefs; XPAC SC SAFE Section Heads; XPAC Science Executive Committee; Patterson, David; Ross, Peter (Pacific); Macdonald, Robie; Pena, Angelica; Thomson, Andrew; Saunders, Mark  
**Cc:** Schweigert, Jake; Brown, Robin; Brown, Laura (Pacific); Curtis, Janelle; Holt, Carrie; MacDonald, Steve; Cooke, Ken; Schubert, Neil; Hume, Jeremy; Farlinger, Susan; D'Amours, Denis; Perry, Ian; Tucker, Strahan; Benner, Keri; Holtby, Blair; Sweeting, Ruston; Johnston, Sandy  
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<<Science Meeting Agenda.doc>> <<Fraser Sockeye Meeting\_Hypotheses.xls>>  
Apologies for the late distribution of documentation. Please find attached the Agenda and a Spreadsheet with some initial observations by life history stage and some preliminary thinking on potential hypotheses. Thanks to Arlene and Robin for work on this.  
Looking forward to seeing everyone tomorrow.  
Mark

Mark W. Saunders  
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Good morning:

The location for this meeting, Wednesday September 30th, has been established. It will be held at the Coast Bastion, 11 Bastion Street, Nanaimo, in the Ladysmith Room starting at 8:30am. The agenda for this meeting will follow prior to the meeting.

Thank you  
Cheryl  
On behalf of Mark Saunders

Hi folks,

Thanks to all who provided their thoughts on the factors affecting the 2009 sockeye return. Arlene has summarized the information received in the attached rough DRAFT. It does not include fish health information that is being reviewed separately.

In all likelihood there will be a public workshop to examine the question later in the fall. In preparation for this I would like to examine the information we have in further detail at a one day internal DFO meeting in Nanaimo - Seminar Room. If it is impossible for you to make it to Nanaimo please let me know and we could set up a conference call although that is not my preferred method.

Can you please let me know if you are available for October 1st. Cheryl checked Outlook schedules and while not everyone appeared to be available it was the best option.

I would ask that you please keep the document internal to DFO at this point. It is for our discussion purposes and is incomplete and speculative.  
<<2009 Fraser SX Science Response.doc>>

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From: Saunders, Mark  
Sent: August 14, 2009 3:50 PM  
To: Saunders, Mark; XPAC SC SAFE Section Heads; XPAC SC STAD Area Chiefs; XPAC SC Executive; Hargreaves, Brent; Cass, Alan; Parken, Chuck; Hyatt, Kim; Beamish, Richard; Beacham, Terry; Crawford, Bill; Irvine, James; Holt, Carrie  
Cc: Ross, Cheryl; Rosenberger, Barry  
Subject: RE: Explanation for poor sockeye return to the Fraser

Should read AUG 18 not July.

Mark

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From: Saunders, Mark  
Sent: August 14, 2009 3:46 PM  
To: XPAC SC SAFE Section Heads; XPAC SC STAD Area Chiefs; XPAC SC Executive; Hargreaves, Brent; Cass, Alan; Parken, Chuck; Hyatt, Kim; Beamish, Richard; Beacham, Terry; Crawford, Bill; Irvine, James; Holt, Carrie  
Cc: Ross, Cheryl; Rosenberger, Barry

Subject: Explanation for poor sockeye return to the Fraser

Hi folks,

As all of you are aware the return to date of Fraser sockeye is an order of magnitude below the forecast of 8.7M fish. We are being called on for explanations both internally and externally about the reasons for this unprecedented mortality. The numerous discussions that I have had to date with staff demonstrate that while we don't have an easy single answer, we collectively have an outstanding body of research and knowledge to develop some well informed hypothesis about what is happening. I would like to quickly pull these ideas together to inform the development of responses that will be needed in both the short and long term. Can you and your staff please forward to Arlene Tompkins (Head, Salmon Stock Assessment) any thoughts you may have on the possible factors responsible for this mortality. For those folks in Ocean Science or MEAD, any observations you are aware of that are coincident with the migration and feeding of these sockeye from the time they entered the Strait of Georgia in the summer of 2007 till they returned this summer would be very welcome. For the Area Chief's, comparison with other species and sockeye stocks in this time period would be very helpful as well.

If you can get your initial thoughts back to Arlene by COB on Tuesday July 18 it would be appreciated. Once we have the ideas collated I will get back to you regarding next steps.

Have a good weekend!

Mark

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Science Meeting  
Factors Affecting 2009 Fraser Sockeye Return

Coast Bastion Hotel, Nanaimo, Ladysmith Room  
Sept 30, 2009 (08:30 – 16:30)

Facilitator: Denis D'Amours

Objectives:

- Review information regarding the 2009 Fraser Sockeye return
- Develop potential hypotheses to explain the poor return, and
- Determine next steps to investigate likely hypotheses

Agenda

0830 - 0845	Mark Saunders	Opening Remarks
0845 - 0915	Sue Grant	Review of Fraser sockeye life history and performance in 2009
0915 - 0930	Peter Ross	Potential contaminant issues
0930 - 0945	Kristie Miller	Potential disease issues
0945- 1000	Dick Beamish	Strait of Georgia observations on juvenile salmonids
1000 - 1030	Coffee Break	
1030 - 1045	Strahan Tucker	WCVI observations on juvenile salmonids
1045 - 1100	Bill Crawford	Queen Charlotte Sound chlorophyll & seabird observations
1100 - 1115	Jim Irvine	State of Oceans indicators
1115 - 1130		Other observations
1130 - 1145		Review Potential Hypotheses
1145- 1230	Lunch (not provided)	
1230-1300		Plenary: confirmation of hypotheses
1300 - 1400	Breakout session	Next Steps: actions to investigate likely hypotheses
1400 - 1600	Reconvene & summarize breakout discussions	

2009 Fraser Sockeye Summary of Hypotheses/ Issues

		Hypothesis	Where?	Life stage	When? (calendar)	Evidence for/supporting	Evidence against	Likelihood?	Next steps/ comments
FW	H1	growth/survival failure in nursery lakes	interior lakes	fry / smolt	2006 / 2007	Quesnel fall fry size smaller than usual	Chilko Lake shows massive outmigration and 2005 BY smolts size in range expected for escapement	NO - inconsistent with direct measurements	Robie warns of lake exposure that manifests itself later - c.f Fairchild et al
	H2	Exposure to pollutants in freshwater / downstream migration	Fraser River - PG - Steveston	smolt(?)	Spring 2007	1) other sockeye population with long FW migrations (Skeena; possibly Nass) have done poorly  2) Fraser early & summer stream type chinook have performed poorly in recent years (2006 & 2007 sea entry)	Okanagan lake sockeye did fine,		Peter Ross looking at some contaminants issues in the Fraser basin
SoG	H3	High mortality in SoG - SoG disease		early juvenile	June / July 2007	1)Very low abundance in Beamish survey	1) Harrison Lake sockeye that entered SoG one month later did great		
	H4	high Mortality in SoG - SoG HAB		early juvenile	June / July 2007	1) Very low abundance in Beamish survey  2) High phytoplankton biomass in June 2007 SoG cruise (Pena)  3) "red -water" reported May - June 2007 4) Rensel and Tynan hypothesized that heterosigma (and others) blooms could kill wild fish	1) Harrison Lake entered SoG later, large catches in juvenile surveys in Sept		species - Noctiluca, Heterosigma, Chaetoceros?  look at sediment trap data?

2009 Fraser Sockeye Summary of Hypotheses/ Issues

		Hypothesis	Where?	Life stage	When? (calendar)	Evidence for/supporting	Evidence against	Likelihood?	Next steps/ comments
						5) SoG coho that went to sea in spring 2007 did poorly 6) Puget Sound and coastal Stocks are below projections	These stocks primarily migrate north along WCVI		
	H5	High mortality of SoG · SoG predators		early juvenile	June / July 2007	1) Very low abundance in Beamish survey	1) Harrison lake sockeye that entered SoG one month later did great		not sure anyone has actually suggested this
	H6	High mortality (food web related) in SoG	SoG	early juvenile	June / July 2007	1)Very low abundance in Beamish survey			
Discovery Islands	H7	sea lice loads picked up in Discovery Passage caused subsequent marine moratlity	Discovery Passage - on exit from SoG	early juvenile	July / Aug?	CAA reports juvenile sockeye with sea lice in 2007 & 2008	1) Jones et al research on pinks(?) suggest lice are not particularly harmful to fish of this size  2) pink declines observed in 2008 (sea entry 2007) were coast wide to Alaska with exception Adam, Quinsam & Phillips R, (migration timing may be earlier than SX)  3) Beamish reports all juvenile salmon sampled in spring 2008 in S SoG were infected with Caligus clemensi		

2009 Fraser Sockeye Summary of Hypotheses/ Issues

		Hypothesis	Where?	Life stage	When? (calendar)	Evidence for/supporting	Evidence against	Likelihood?	Next steps/ comments
QC Sound	H8	High mortality (food web related) along marine migration route (outside of SoG)	QC Sound/Hecate Strait		month?	1) Very poor seabird survival at Triangle island- correlated with plankton/forage fish in QC sound  2) also explains failure of Fraser River sockeye returns in 2007	1) Not observed for Harrison Lake , Barkley Sound, Smith Inlet/Long Lake, Quatse, Nimpkish or Heydon. These stocks may have migrated elsewhere  2) other oceanographic conditions (biased to WCVI) appear favourable to salmon survival 3) WCVI sockeye stocks did fine  4) data from Trudel indicate that Fraser sockeye stocks are intermingled with Barkley and Smith Inlet sockeye on the North Coast by fall.		Any information on migration route of Harrison sockeye? Are Fraser sockeye in QC sound at the right time?
Alaska	H9	High mortality (food web related) along marine migration route (SEAK and GoA)				Possible competition with Bristol Bay Sockeye and Asian chum stocks, which are in very high abundance	would require differential impacts on stocks that are thought to be mixed together in this area		
	H10	interception in US (Alaska) Fisheries		returning adults		1) Fraser Sockeye ARE know to be intercepted in Ak fisheries. 2009 North Peninsula fishery was 2.24M. South Peninsula was 1.62M. 1.13M Chignik and 1.57M (?).	requires a much higher than normal percentage catch by AK(?)		

2009 Fraser Sockeye Summary of Hypotheses/ Issues

		Hypothesis	Where?	Life stage	When? (calendar)	Evidence for/supporting	Evidence against	Likelihood?	Next steps/ comments
									sockeye salmon samples from 2009 - Bering and Chukchi Seas - to be analysed by Beacham to determine Canadian component
BC	H11	caught in canadian fisheries		returning adults			no directed Canadian commercial or recreational fisheries for Fraser sockeye in 2007 or 2008. Minimal FSC harvest.	none	
FW	H12	warm river waters delays entry of returning adults to the Fraser River, exposing them to HABs	Fraser Plume	returning adults		presence and timing of Heterosigma (and other HAB species) that are known to have impacts of fish	test fisheries previously determined that very few adults were returning/getting to the mouth of the Fraser.	very low	NA in this case, mortality occurring earlier
	H13	warm river waters resulted in high en route in-river mortalities	Fraser River	returning/spawning adults		FR Environmental Watch has good tracking/measurements	test fisheries previously determined that very low marine abundance		NA in this case, mortality occurring earlier