

From: Olesiuk, Peter <olesiukp@dfo.mpo.com>
Sent: Monday, August 9, 2010 8:16 AM
To: Thiess, Mary <Mary.Thiess@dfo-mpo.gc.ca>
Subject: RE: Fraser River Sockeye - Future Research Workshop Follow-up
Attach: Fraser River Sockeye Proposal - Pinniped Predation.doc

Mary, sorry wasn't quite able to finish this on Friday, but here it is.

Cheers,

Peter O.

<<...>>

From: Thiess, Mary
Sent: Friday, July 30, 2010 3:51 PM
To: Beacham, Terry; Beamish, Richard; Benner, Keri; Boutillier, James; Bradford, Mike; Bravender, Bev; Brown, Laura (Pacific); Brown, Robin; Cass, Alan; Cooke, Ken; Cox-Rogers, Steven; Crawford, Bill; Cross, Carol; Ewart, David; Ford, John (Pacific); Garver, Kyle; Gillespie, Graham; Grant, Sue; Grout, Jeff; Hargreaves, Brent; 'Holtby, Blair'; Hume, Jeremy; Hyatt, Kim; Irvine, James; Johannessen, Sophia; Johnson, Stewart; Jones, Simon; Joyce, Marilyn; Lange, Krista; Macdonald, Robie; MacIsaac, Erland; Mackas, Dave; Miller-Saunders, Kristi; Neville, Chrys; Olesiuk, Peter; Parken, Chuck; Patterson, David; Peacock, David; Pena, Angelica; Perry, Ian; Preikshot, Dave; Richards, Laura; Ross, Peter (Pacific); Ryall, Paul; Saunders, Mark; Schubert, Neil; Schweigert, Jake; Selbie, Daniel; Sweeting, Ruston; Thiess, Mary; Thomson, Richard; Tompkins, Arlene; Trudel, Marc; Van Will, Pieter; Whitehouse, Timber; Wood, Chris; Workman, Greg; Cronkite, George; Vagle, Svein; Hague, Merran
Cc: D'Amours, Denis
Subject: Fraser River Sockeye - Future Research Workshop Follow-up

Hi everyone

Please find attached the notes from this week's Fraser River sockeye workshop, held at PBS on July 27th.

For those who have been identified as lead contacts for providing the research proposal briefs, there is a

second attachment outlining this request. Note that this submission is due by 4pm on Friday, August 6th.

If you have any questions, please let me know.

Best wishes,

Mary

<< File: Cohen_ResearchWorkshop_FINAL_30JUL10.doc >> << File: CohenResearchWorkshop-Request_for_ResearchProjects.doc >>

Fraser River Sockeye Research - Pinniped Predation (Olesiuk)

Harbour Seals: Previous studies indicated that harbour seals in the Strait of Georgia preyed mainly on hake and herring. Salmon comprised 4% of the overall diet, and seals took mainly pre-spawning adult salmon as they concentrated in estuaries and rivers. Except in special circumstances (seals foraging on outmigrating smolts using bridge lights in the Puntledge River), juvenile salmon were rarely consumed. The diet studies were conducted during 1982-88 when the seal population was still recovering and increasing exponentially. Recent surveys indicate that the seal population has since stabilized at historic levels, suggesting it is now at carrying capacity and probably food limited. Bioenergetic models indicate that seal predation levels on hake and herring stocks have increased since the 1980s. Telemetry studies currently underway indicate that foraging behaviour has also changed in recent years, with seals spending a greater proportion of time diving and utilizing larger areas than they did in the early 1990s. It might be expected that the diet of seals has become more diversified as competition for prey resources increased, but there are no recent diet data to assess this hypothesis.

Minimum Research Effort: A narrowly focused study could be conducted specifically to address whether seals in the Strait of Georgia are preying on Fraser River sockeye. Scat collections would be made at select haulout sites where and when seals have greatest access to sockeye during the smolt outmigration (as determined from the Beamish et al. surveys) and returning pre-spawning adults (Fraser River estuary during peak sockeye returns). The study would require a modest budget for small boat fieldwork, and 4 months of salary for a technician and student assistant to collect and process scat samples. Several hundred scat samples would be collected, and undigested bone fragments analyzed to determine prey species (\$40 per sample) and genetics analysis conducted on a subsample to determine salmon species (single prey, \$24 per sample). Approximate cost: \$70K for a one-year study (optionally could be repeated a second year to contrast years of high and low sockeye abundance).

Moderate Research Effort: The above study could be expanded to include seals in the Fraser River. Seals have never been systematically surveyed in the Fraser River, and existing survey methods (low-tide surveys at tidal haulout sites) are not applicable in a riverine habitat. Anecdotal reports and historic records indicate that seals occur, albeit in relatively small numbers, as far up as Harrison, Hatzic and Pitt Lakes and probably range as far as the major rapids at Alexandria on the Fraser River. A pair of students would be hired to interview fishers, boaters, marina and lodge operators and shoreline residents and industries to compile local knowledge on seal behaviour and sightings, and to conduct shore-based observations to validate seal reports. A series of aerial reconnaissance flights would be conducted to count swimming animals and search for haulout sites. Scat samples would be collected opportunistically from any significant haulout sites discovered. Approximate cost: this would add approximately \$50K per year to the cost of the minimum research effort, for a total of \$120K per year.

Major Research Effort: The broad-based scat studies conducted in the 1980s could be repeated to provide updated information on the overall diet of harbour seals in the Strait

of Georgia, and test the hypothesis that the overall diet has become more diversified in recent years as seal populations have attained carrying capacity. The harbour seal is a predominant apex predator in the Strait of Georgia, and a broad-based study would facilitate ecosystem modeling as well as impact assessments on a wide array of prey including salmonids, herring, rockfish and lingcod. The study would require a 3-year effort involving year-round scat collections throughout the Strait of Georgia. A technician or biologist would need to be staffed to oversee the program, and a series of students hired to assist with field work and processing samples. Several thousand scat samples would be collected and bone fragments analyzed (\$40 per sample), and genetic analysis conducted on a subsample to refine prey identifications and assess potential biases (multiple prey, \$55 per sample). Approximate cost: roughly \$500K over a 3-year period.

Steller sea lions: Steller sea lion populations in BC were reduced by predator control programs between 1912-68. As local populations were depleted, the species established a new rookery 20 nm north of the Alaska border that has grown into the largest breeding site for the species, making it difficult to separate populations in BC and SE Alaska. Abundance of Steller sea lions in BC and SE Alaska has been gradually increasing since the last major kills in the mid-1960s. Abundance has now surpassed known peak historic levels that occurred in the early 1900s prior to any major kills, but the population continues to increase. The breeding population of Steller sea lions on the west coast has also shifted northward and is now centered off central BC, and the species has recently established several new breeding sites in BC and SE Alaska. The reasons for the continued growth and redistribution of Steller sea lions are not understood, but they are now the predominant pinniped predator in BC, consuming about twice as much prey annually as harbour seals.

In 2008, a study was initiated to estimate the prey requirements and assess the importance of salmon in the diet of Steller sea lions. PSC provided funding to initiate the study, which was expanded with supplementary funding from SARA, A-Base and Parks Canada. Surveys were conducted throughout the year to determine abundance and seasonal distribution, a bioenergetics model was developed based on captive studies and telemetry data to estimate prey requirements, and scat samples collected to determine diet. Researchers from NMFS, WDF&W, ODF&W and UBC have collaborated on the study and provided access to scat samples that had previously been collected but never published, allowing the PSC funding to be directed to filling seasonal and geographic gaps in sample coverage. Preliminary results indicate that salmon is a fairly important prey of Steller sea lions, occurring in about 24% of scat samples. The amount of salmon taken by Steller sea lions in BC may now be of the same order of magnitude as landed in commercial fisheries. The study is scheduled to be peer-reviewed at the next National Marine Mammal Review Committee Meeting in November, 2010, with a final report available by the end of 2010.

Minimal Research Effort: The original goal of the PSC study was to collect about 60 scat samples from 8-10 sites in each of 4 seasons (i.e. 480-600 samples per season or 1,920-2,400 samples in total) for diet analysis. With the contributions of data from other agencies, 6,413 scat samples have been compiled, or about 3 times the original target. This will allow for a more comprehensive assessment of sea lion predation on salmonids. However, the species of salmon can rarely be determined from visual examination of undigested bone fragments recovered in scats. Recently, specialized genetic techniques have been developed at the PBS Molecular Genetics Laboratory to extract DNA from bone fragments, allowing species of salmon to be identified. The remaining PSC funding is sufficient to analyze about one-third of the scat samples with salmon, and additional funding is required to complete the analysis. Doing so will allow us to partition salmon consumption by species, and identify where and when sea lions are feeding on each species of salmon. Approximate cost: \$22K is required to cover technician salary and laboratory supplies, and samples would need to be analyzed by early October 2010.

Moderate and Major Research Efforts: It is recommended that plans for further research initiatives on the feeding habits of Steller sea lions and impact on salmon stocks be deferred until the results of the PSC study are available. The PSC study will provide estimates of the total prey requirements of Steller sea lions in BC and adjacent waters, and assess the importance of salmon in the diet in the Southern Endowment Area (Cape Caution to the Columbia River). The study will also identify when and where salmonids are being consumed by sea lions, and attempt to quantify sources of uncertainty in the salmon consumption estimates. These results will be useful for evaluating the need for and planning future research.