

A Review of “Science and Sea Lice: What do we know?” BC Pacific Salmon Forum (PSF) Report prepared by Brian Harvey, February 22, 2008.

Reviewed by Dr. Craig Orr for the Coastal Alliance of Aquaculture Reform, March 2008.

The most useful contribution of this “independent overview of recent research on the interaction between sea lice and juvenile Pacific salmon” is the annotated bibliography of recent scientific research. Unfortunately, the report itself does not effectively evaluate or synthesize the science, and instead of resolving the “sea lice question,” the review muddies the waters of what is clearly a relevant ecological and sociological topic.

Some of this confusion might have been avoided had the author defined the areas of (dis)agreement (scientific and political), and the outstanding questions themselves. Readers will struggle sorting out what scientific issues the author is trying to reconcile. In the Introduction, for instance, the author suggests the “question of where the sea lice on juvenile wild salmon come from...is a tantalizing scientific one.”

The ‘question’ on the source of lice is no longer considered a question by most scientists studying the issue, and is hardly tantalizing, except to folks who wish it so, and who don’t/won’t clearly articulate the evidence. Had the author categorized the research he reports, he could list four types of evidence that point squarely at farmed salmon as the overwhelming source of lice infesting wild juvenile salmon: (1) lice are common on juvenile salmon *only* in areas with farms, (2) louse abundance and prevalence next to farms ‘tracks’ louse production on farms (numbers, development patterns), (3) comparative estimates of louse production point to farmed salmon as the main source of lice in the spring (as compared to sticklebacks, which have never been seen to carry egg-bearing lice), and (4) louse prevalence on wild fish can be lowered by fallowing farms (removing farmed salmon).

The only real debate (or question)—and one not assessed persuasively in the review—is how much harm lice are causing wild salmon. The debate is not helped by the author extolling the “science process” (page 6), then trivializing much of the evidence as “circumstantial” and “correlational?” The scientific process is rarely about cause and effect relationships. As true for our evolving understanding of climate change, scientific views are reached/refined mainly by the weight of evidence approach. The PSF review does not rate the weight of evidence on lice impacts (also true for the source of lice, above). Claiming that the lack of clarity (page 12) is due to “little overall agreement between different papers” is disingenuous and misleading. This claim must be weighed against the merits of the science (e.g. where it is published), authorship (e.g. academics, industry or agency scientists), how science is normally advanced (as above), and how our understanding of science is routinely and deliberately impeded by vested interests.

The review also obfuscates by asking why scientists are arguing so much, or, ‘acting normally.’ This ‘debate is healthy’ implication is belied by the politics around this issue—a subject the report largely avoids. There is no mention that much of the ‘anti-

impact science’ is done by industry consultants and agency scientists—or stimulated and prolonged by agency media branches (e.g., Fisheries and Oceans’ attempt to blame lice outbreaks on sticklebacks). A review of the federal sea lice communications plan would have been quite valuable, for instance, in revealing how the complexity of ecosystems is routinely used as an excuse to conduct yet more research before any ‘inconvenient’ management action is reluctantly taken. (For a review of how communications control of agency science may have contributed to the collapse of Atlantic cod stocks, see: Hutchings, Walters and Haedrich. 1997. Is scientific inquiry incompatible with government information control? *Can. J. of Fish. Aquatic Sci.* 54: 1198-1210.)

The report also misses or ignores important evidence, including two recent workshops on lice-wild fish interactions. This is troubling as it purports to assess “unpublished work where it seemed to bring important new insights.” It would have been prudent had the author (who admits to not being an expert in this field) at least mentioned expert agreements from international workshops, perhaps even starting with the following, unambiguous consensus statement issued by scientists barely a year ago in BC:

European governments (Ireland, Scotland, Iceland, and Norway and the European Union) have recognized that salmon farming can be hazardous to the environment, including the proliferation of sea lice on salmon farms posing significant risk to wild salmonids. There was general agreement at the meeting on the following and that the situation on the British Columbia coast has many parallels, but that the risks to pink and chum salmon are exacerbated by their small size at emergence into the marine environment.¹

Finally, the PSF review suggests that the burden of proof—showing that sea lice from farmed salmon don’t cause population decline in wild salmon—is with the salmon farming industry. If only that were true (because that is exactly where the burden belongs). Unfortunately, the facts, and the scientific literature on resource management (not cited in the PSF review), suggest something very different is happening. The burden of proof in most resource management cases from around the world—that is, the burden of showing that activities such as farming are harming wild fish—is routinely shifted onto the public, and perhaps nowhere is this more apparent than the BC sea lice debate. That burden is shifted, so say scientists like BC’s own C.S. Holling, thanks to agency bias, inaction, and manipulation.² This burden-shifting is documented by Holling and others in numerous examinations of what these scientists glumly term, “resource management pathology.” This pathology is now a well-known, damaging, and hard to break pattern. The science on it is crystal clear, but no where does such clarity appear in the review of “what do we know” about science and sea lice. Sadly, the latest PSF tome only shifts yet more of the burden of saving our wild salmon onto people who care about those fish.

¹ Routledge, Gallagher and Orr. 2007. Summit of scientists on aquaculture and the protection of wild salmon. Convener’s Report. Continuing Studies in Science and Centre for Coastal Studies. SFU.

² Gunderson and Holling. 2002. *Panarchy: Understanding transformations in human and natural systems.* Island Press.