

Salmon Resilience in the Face of Natural and Human-caused Catastrophes

Part I of III

Ecosystem



Natural Disturbance Regime



Photo credit: J. O'Brien

Disturbance

In ecological terms, disturbance is a relatively discrete event in time coming from the outside, that disrupts ecosystems, communities, or populations, changes substrates and resource availability, and creates opportunities for new individuals or colonies to become established (Smith 1990).

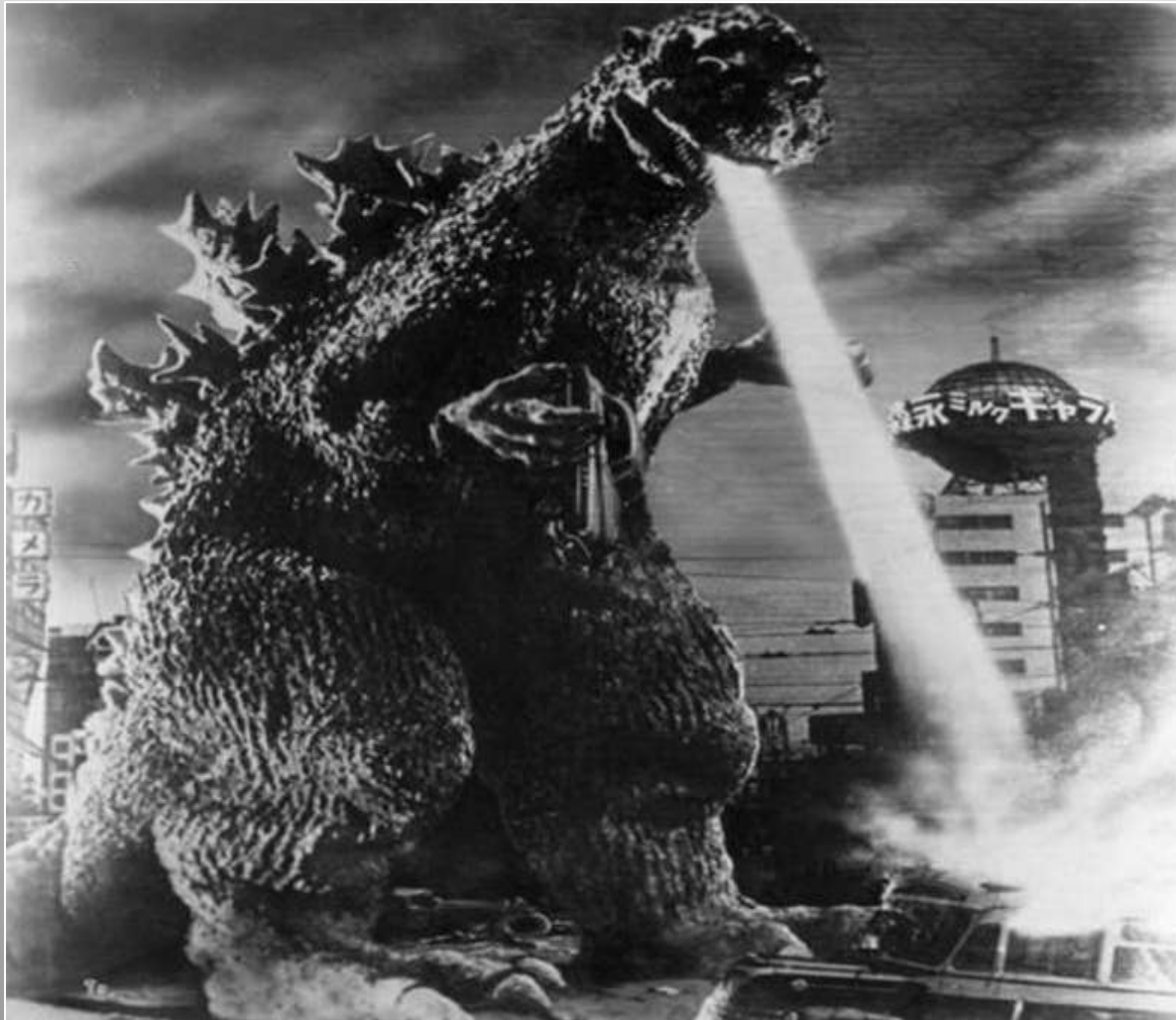
Resilience

The capacity of a system to absorb disturbance and reorganize while undergoing change so as to still retain essentially the same function, structure, identity, and feedbacks (Walker et al. 2004).

Catastrophe



Human-caused disturbance



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Disturbance, good



Disturbance, bad



Thursday, August 7, 2014

NEWS

Mine spill threatens salmon in Canada

By Liezel Hill and
Christopher Donville
BLOOMBERG NEWS

VANCOUVER, BRITISH COLUMBIA — A spill that dumped billions of gallons of mining wastewater into creeks and lakes this week has led local officials in British Columbia to declare a state of emergency and raised concern for migrating sockeye salmon.

The Cariboo Regional District said the declaration will help it get access to needed resources to protect private property and government infrastructure in the nearby town of Likely, about 248 miles northeast of Vancouver, according to a notice posted Wednesday on its emergency operations center Facebook page. It didn't provide further details.

The spill comes as the annual sockeye salmon migration is expected to peak within about two weeks, potentially exposing fish to any chemicals or silt from the spill, according to Craig

Orr, executive director of Coquitlam, British Columbia-based Watershed Watch Salmon Society. Effects of the spill on the salmon were still unknown, the department of Fisheries and Oceans Canada said in a statement posted Tuesday on Twitter.

"There are a lot of concerns about how all this might affect the life cycle of returning sockeye," Orr said Wednesday by telephone. "The timing is particularly bad."

An estimated 10 million cubic meters of water and 4.5 million cubic meters of fine sand were released after an Aug. 4 breach of the waste-storage pond at the Mount Polley copper and gold mine, owned by Vancouver-based Imperial Metals. The district is warning people not to drink or use water from lakes and river systems while samples are tested by the provincial Ministry of Environment.

Imperial, which Tuesday had its biggest one-day plunge in Toronto trading,

said in a statement it didn't know what had caused the breach.

Officials from the British Columbia Ministry of Energy and Mines were at the site probing the cause of the failure, the Canadian Press said, citing Minister Bill Bennett.

Water from the storage pond was "very close to drinking water quality," Imperial President Brian Kynoch told Likely residents at a meeting Tuesday, according to the Canadian Press. "The quality, once the solids fall out, should be good. I would drink the water once the solids come out."

Kynoch didn't immediately respond to a request Wednesday from Bloomberg for comment.

Imperial fell 0.5 percent to C\$10.14 at the close in Toronto. The shares have plunged 40 percent since the spill.

Imperial had to "continuously" raise the height of the storage dam walls to contain rising water from rain and surface drainage, according

to Brian Olding, who produced a technical report in 2011 on Mount Polley.

Olding, whose company was hired by two aboriginal groups and Imperial after the company applied for a permit to discharge waste water, said he recommended steps to monitor water coming out of the storage pond, which measures about 16 square kilometers. He said he asked at the outset to include a structural review of the dam, but that request was denied.

Imperial was given a discharge permit in 2012, and had applied for a second one before the breach this week, Olding said.

"Obviously there's water pressure on the dam and it's rising," he said. "Common sense just tells you that that is a contributing factor."

The results of water-quality testing by an independent laboratory in Vancouver will probably be available late this evening, Cariboo Regional District Chairman Al Richmond said Wednesday.

Mount Polley Tailings Dam Breach



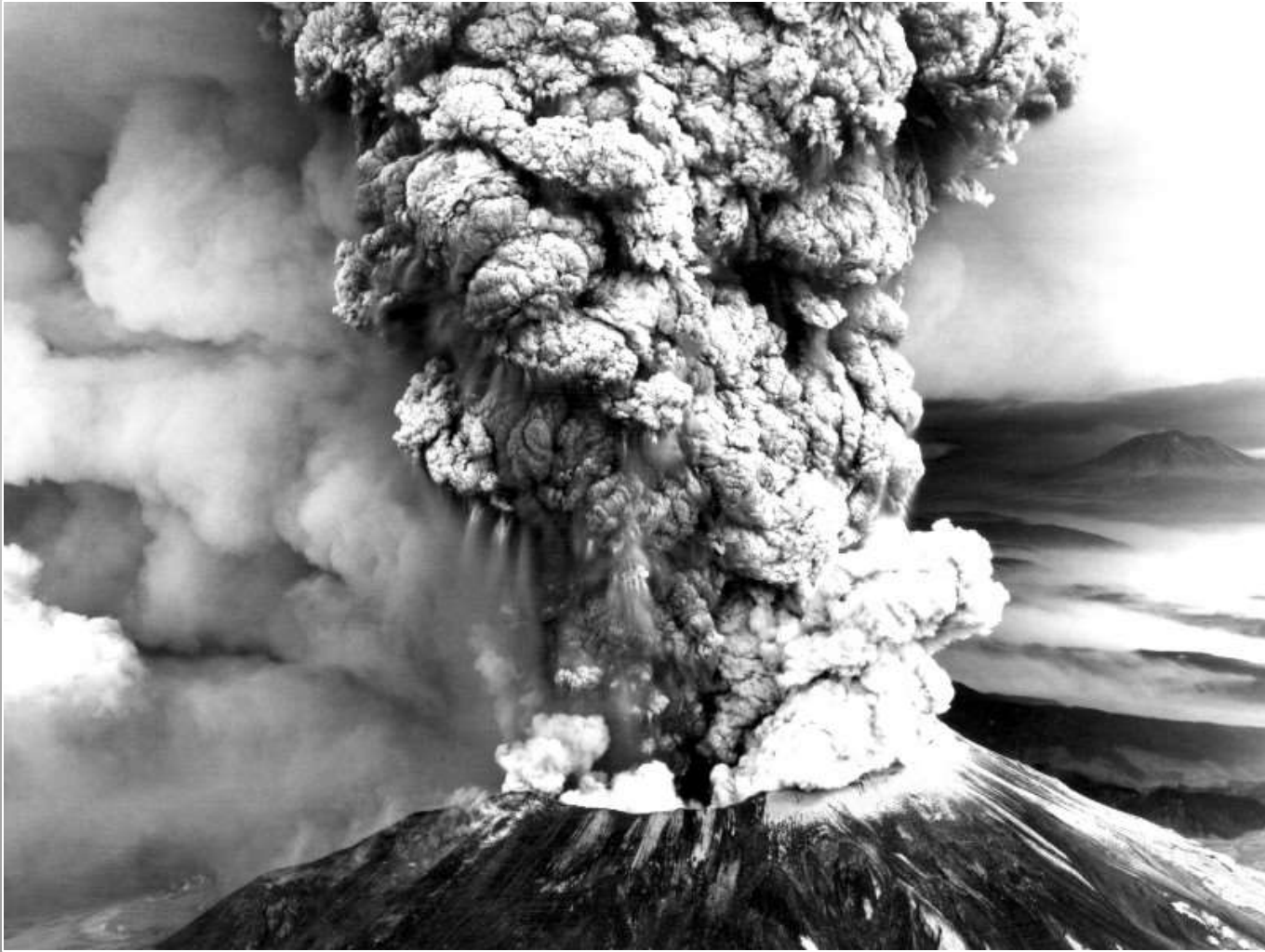
Recovery Timeline: Unknown

Oso, WA Mudslide, April 2014



Recovery Timeline: Weeks/months

Mount St Helens Eruption, May 18, 1980



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Recovery Timeline: Decades

Managing for Resilience

- Currently in Alaska salmon are managed for maximum sustainable yield.
- Focus instead should be to managing for resilience;
- By considering processes that generate and maintain natural variability in fresh water
- This idea is from Bisson, Dunham and Reeves 2009.



Photo credit: J. O'Brien

Inherent resilience of salmon (Healey 2009)

- Multiple, independent reproducing populations;
- High reproductive capacity;
- Metapopulation structure;
- High genetic diversity;
- Phenotypic plasticity;
- Variable life history tactics;
- Opportunistic use of habitat.



Restoration



Photo credits: National Park Service

Conclusions

- Ecological disturbance surrounds us and always has; it is responsible for the biological diversity which we have on the planet today.
- We are experiencing a shift in the mgmt. paradigm from managing for sustainability to managing for resilience
- We have choices about the level of human caused disturbance we allow but our choices can be undone by unforeseen natural events.



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Lienau, M. The fire below us; remembering Mount St. Helens, a dramatic documentary. All rights reserved, copyright, Global Net Productions. Hosted by Grant Goodeve, original music by Ron Erak; edited by Rick Dupea.

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Call to Action on Sustainability



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