

## **BACKGROUND**

### **Mitigating Salmon Farming's Environmental Impacts through Closed Containment**

Closed containment technology will address numerous serious environmental problems by imposing a physical separation of farmed salmon from the marine environment. Closed systems can be on land or floating in the ocean.

#### **Sea Lice & Disease Outbreaks**

- Salmon farms practice intensive, industrial farming, where as many as 50,000 fish are raised in a single pen, with generally 10 to 12 pens per site — that's 500,000 fish or more at a single farm site. These conditions are ideal for diseases and parasites to grow and spread.
- A recent study in a peer-reviewed scientific journal, the *Proceedings of the National Academy of Sciences of The United States of America*, found that sea lice originating from fish farms can kill up to 95% of juvenile wild pink and chum salmon<sup>1</sup>. Preliminary studies indicate that the disease transfer from the farms is just as prolific and harmful.
- Closed tank technology will mitigate the transfer of sea lice and disease from salmon farms, which currently jeopardize the survival of passing juvenile wild salmon and the ecosystem that depends on them.
- Closed tanks will also greatly reduce the need for antibiotic and pesticide treatment to control frequent disease outbreaks and parasites. Closed containment will eliminate interactions with the surrounding marine environment, alleviating fears of contamination of other important species such as clams and prawns.

#### **Predator Control**

- Salmon farmers are granted licenses to kill predators such as sea lions and seals to stop them from eating their fish. According to a report by the Department of Fisheries and Oceans Canada, between 1989 and 2000, BC salmon farmers reported killing 6,243 seals and California and Steller sea lions<sup>2</sup>.
- Salmon farmers are not required to report marine mammal drowning deaths caused by entanglement in nets. However, in April 2007, Creative Salmon did report 51 drowned California sea lions in one month and approximately 110 drowned sea lions since the beginning of the year (*Westcoaster*, April 20, 2007).
- Closed tank technology would eliminate drowning deaths caused by entanglement in nets and greatly reduce seal and sea lion kills.

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<sup>1</sup> Krkosek, M., M.A. Lewis, A. Morton, L.N. Frazer and J.P. Volpe (2006). Epizootics of wild fish induced by farm fish. *Proceedings of the National Academy of Sciences of the USA*. 103:15506-15510.

<sup>2</sup> Jamieson, G.S. and P.F. Olesiuk, Department of Fisheries and Oceans Canada. (2001). *Salmon Farm Pinniped Interactions in British Columbia: An Analysis of Predator Control, its Justification and Alternative Approaches*. [http://www.dfo-mpo.gc.ca/csas/Csas/DocREC/2001/RES2001\\_142e.pdf](http://www.dfo-mpo.gc.ca/csas/Csas/DocREC/2001/RES2001_142e.pdf)

## Pollution

- The concentration of waste feed and feces from millions of penned fish in B.C.'s coastal waters is a source of pollution. This pollution accumulates not only under the fish pens but is also carried by tidal currents to other areas. The waste smothers bottom-dwelling marine life and increased nitrogen, phosphorous and other nutrients have led to algal blooms. The waste from feed and feces has been linked to increased mercury levels in rockfish, a main component in the diets of many coastal people<sup>3</sup>.
- Recent research in Scotland shows major loss of seabed flora and fauna from salmon farm wastes, even in strongly tidal areas<sup>4</sup>. A 1994 European study estimates that one farm can dump the waste equivalent to between 2,250 and 5,580 people<sup>5</sup>.
- Closed containment technology would allow for the opportunity to capture the waste and turn it into energy production, fertilizer and other useful means.

## Escapes

- DFO's own estimates show that Atlantic salmon have been found in over 81 BC rivers and streams that were surveyed<sup>6</sup>.
- Provincial escape numbers do not account for consistent "leakage" where salmon escape through holes in nets. Industry states this can be anywhere from 1-5% of annual production which would translate into 350,000 fish per year in British Columbia<sup>7</sup>.
- By closing off farmed salmon from the marine environment, escapes of farmed fish into the wild would be eliminated, thus reducing the threat to wild salmon and their habitat.

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<sup>3</sup> DeBruyn, A.M., M. Trudel, N. Eyding, J. Harding, H. McNally, R. Mountain, C. Orr, D. Urban, S. Verenitch and A. Mazumder. (2006). Ecosystemic effects of salmon farming increase mercury contamination in wild fish. *Environmental Science and Technology*. 40(11): 3489-3493.

<sup>4</sup> Hall-Spencer, J., N. White, E. Gillespie, K. Gillham and A. Foggo. (2006) Impacts of fish farms on maerl beds in strongly tidal areas. *Marine Ecology Progress Series*. 326:1-9.

<sup>5</sup> Folke, C., N. Kautsky and M. Trell. (1994). The costs of eutrophication from salmon farming: Implications for policy. *Journal of Environmental Management*. 40:173-82.

<sup>6</sup> Naylor, R. L., K. Hindar, I. Fleming, R. Goldberg, S. Williams, J. Volpe, F. Whoriskey, J. Eagle, D. Kelso and M. Mangel. (2005). Fugitive Salmon: Assessing the Risks of Escaped Fish from Net-Pen Aquaculture. *Bioscience*. 55(5):427-437.

<sup>7</sup> Morton, A.B. and J. Volpe. (2002). A Description of Escaped Farmed Atlantic Salmon *Salmo salar* Captures and Their Characteristics in One Pacific Salmon Fishery Area in British Columbia, Canada, in 2000. *Alaska Fisheries Research Bulletin*. 9(2):102-110.