

Ballast Water Management

Statement to Policy & Resources Committee meeting, 14 November, 2013

No matter what approach is taken to ballast water management in Scapa Flow (other than a complete ban, that is,) there appears to be broad agreement now that there will be a low level of residual risk to the Loch of Stenness SAC. Where we differ is in our perception of the level of risk and in our level of willingness to take a chance on compromising the natural environment in the interests of making money through shipping operations.

We have been presented with estimates of the level of risk of introducing non-native species, based in part on hydrodynamic modelling. This gives the appearance of applying science and quantification to the problem. The exercise is useful in showing the relative risk of various methods of ballast water management, but it does not produce reliable absolute estimates. The absolute risk is not quantifiable, even if all of the assumptions of the model hold true.

A parable may help explain. Before the year, 1697 it would have been readily agreed that all swans are white. It was simply a matter of common everyday experience. Every time a swan was seen it reinforced the generalisation: swans are white.

What happened in 1697 was that a Dutchman, who had made landfall in Western Australia, set eyes on a black swan for the first time, becoming the first European to do so. It was coal black, with a bright red beak. Anyone from Europe seeing a black swan for the first time still feels the sense of shock Willem de Vlamingh must have experienced. The claim that all swans are white has turned out to be false. The beautiful irony was that, since classical times, writers had used the phrase “a black swan” as an expression of impossibility.

The point is: it takes only one counterexample to falsify a general universal statement made on the basis of experience. We now use the black swan as a metaphor for the fallibility of generalisations.

In 2008 there was a near-collapse of the world banking and finance systems. In spite of the billions of pounds spent on sophisticated computer modelling systems, none predicted the events which took place. Some savvy individuals knew that there was a potential problem with dodgy mortgages in the US, but the models hadn't made adequate provision for the effects of that kind of banking.

The black swan has been used to symbolise that kind of fallibility too. The mathematician, Nassim Nicholas Taleb, published his black swan theory in 2001 in his book, “Fooled by Randomness”.

Generalisations often hold within a well-understood frame of reference but break down outside that context. Similarly, computer models are useful only as long as the built-in assumptions which provide their context hold true. Many such assumptions may be implicit and unrecognised.

When we observe that we have been doing x, y and z in Scapa Flow for many years without any untoward effect, even if true, doesn't warrant the conclusion that we can go on doing x, y, and z in future without any consequences. The past is no guide to the future in this kind of situation. The inference from past experience is not strictly science, but a simple generalisation, which could be contradicted at any time in one of any number of ways.

You can smoke for years without suffering cancer or emphysema or any of the other terrible effects of cigarette smoke. Does that mean you're safe to go on smoking? The black swan says "no".

We now have from Intertek what is agreed to be the best possible hydrodynamic model of the waters around Scapa Flow. When a model breaks down it happens at the boundary – in the explicit and implicit assumptions made and how the model is used. The Intertek model doesn't factor in human error, negligence, dishonesty, equipment failure, extreme weather, shipwreck or any other contingencies. We can't imagine all of the possible ways in which the model might fail to have purchase. It's in the nature of the black swan that you never know where it's going to come from. Systems work in predictable ways but failure is chaotic.

Murphy's Law is a compelling piece of folk wisdom. In its simplest formulation Murphy's Law states that if anything can go wrong in human affairs then it will. An alternative formulation in the present context might be this: the more time, effort and money you put into showing that something can't possibly happen, the more likely you are to be proved wrong.

The black swan theory captures the spirit of Murphy's Law in a mathematically and philosophically respectable form. There is a good entry on black swan theory in Wikipedia for anyone interested.

The Orkney Manifesto Group concludes along with SNH and SEPA that it is not beyond reasonable scientific doubt that the proposal before us will have zero impact on the Loch of Stenness. Even within the assumptions and confines of the model there is a non-zero probability of non-native species reaching the Loch of Stenness. Potential risks outside of the assumptions of the model increase that probability beyond reasonable scientific doubt.

In our discussion of the proposal we have been focussing of the Loch of Stenness SAC because it is clear that the obstacle to SNH and SEPA support is demonstration of zero impact on this unique brackish lagoon. What's more, the focus of our discussion has not been on compliance with statutory consultee advice but on circumvention.

It is very clear that the latest Appropriate Assessment has failed. The ballast water proposal can only be legally adopted if there are no alternatives or if there is an overriding reason of public interest (which can be economic or social).

We concede that the proposal reduces risk with respect to current practice. We also concede that it is the safest ballast water management protocol available to us using today's technologies. However, the only safe alternative is a complete ban on ballast water discharge into Scapa Flow.

Can we make a case for the proposal based on overriding public interest? It's doubtful that a case could be made on social grounds.

An economic case might be more promising. However, the Manifesto Group does not believe that a case of sufficient weight could be made to convince the European Commission. The Orkney economy is not completely dependent on ship-to-ship transfers, after all. Furthermore, there is scanty evidence that STS transfer business in the Flow will benefit dramatically from introducing the revised procedure. There are other, more constructive ways of terminating the embarrassing and unsustainable losses of the towage service. And there are alternative and competing uses of the marine resource of the Flow.

In any case, we should look at the bigger picture, beyond the Loch of Stenness. The reality is that the proposal puts Scapa Flow, and Orkney waters in general, at even greater risk than the SAC. The Flow is a natural resource which we should jealously protect for its traditional value as a fishing ground, as well as for its natural biodiversity, under the provisions of the UN Convention on Biological Diversity 1992.

In summary, the risk of the proposal before us is not quantifiable, but is bigger than projected; it could be more devastating than projected in its potential for irreversible environmental damage; and the financial return on taking the risk is unquantifiable, but smaller and less significant than projected, certainly not worth the risk. For these reasons the Orkney Manifesto Group is against the proposal.

We have spent five years and about £500,000 in trying to develop an acceptable ballast water management protocol, without, incidentally, retaining intellectual property rights in any of the deliverables produced by the consultants. It would be a travesty if today we vote in favour of the proposal partly or wholly in order to avoid the accusation that this time and money has been wasted. The decision should be made on its merits; an analysis of the decision-making process and its cost can wait until another day.

As a footnote and a contribution to some of the irrelevant big numbers which are being bandied around, please consider this: the weight of an HIV retrovirus is around one attogram; that's a millionth of a millionth of a millionth of a gram. So the ratio of its weight to that of an average host is 1 in 7×10^{22} . It takes only one of these to get past the immune system to cause AIDS. It's in the nature of bio-systems that small things can cause huge damage, out of all proportion to their size. Bio-systems are essentially organic information systems where physico-chemical concepts such as dilution are less significant than in non-living science.

The Intertek hydrodynamic model is based on passive dispersal of inert matter. What would happen in reality is that introduction of alien species into the Flow would be followed by reproduction and colonisation near the point of ballast water discharge. This would be followed over a period of time by a spread of the population by means of swimming or crawling. The Intertek model is thus defective not only at its boundary but at its core. The process supposedly being modelled is not hydrodynamic but biological.