

## Submission on climate targets - Verdun M. King, PhD.

My name is Verdun King, I have BSc and MSc in Zoology (ecology) from the University of Auckland and a PhD in Zoology from the University of Bristol, England. Between 1991 and 2001 I worked in the UK doing research into the neurobiology of behaviour at the University of Bristol and the University of Cambridge. I now live in Nelson, New Zealand and am actively involved in conservation work around the Waimea Inlet. I am a member of the Waimea Inlet Working Group, the Battle for the Banded Rail and the Bell Island Project Group. The Waimea Inlet Forum was formed in September 2010 as a result of the Waimea Inlet Strategy which is an inter-agency strategy that is committed to the ongoing health and wellbeing of the Waimea Inlet. I have been a member of the Working Group since its inception. We have recently initiated the Battle for the Banded Rail which is a 3 year programme of ecological restoration around the estuary margin. With a friend I was responsible for establishing the Bell Island Project Group that is working on an ecological restoration programme on Bell Island in the Waimea Inlet. I am greatly concerned about the consequences of global warming for the Waimea Inlet and for the communities who live around it.

### Issues

Waimea Inlet is a wetland habitat of international significance for migratory species such as the bartailed godwit, red knot and turnstones; and of national significance for endemic and native species such as wrybill, pied oystercatchers, banded rail, bittern, fernbird and marsh crake. The estuary is also home to native plants such as the native iceplant, coastal peppergrass and grey salt bush. The inlet is an important habitat for different life-cycle stages of fish making it ecologically and economically important to the rivers and streams that run into the inlet, and also to Tasman Bay.

A high carbon future will have huge effects on the Waimea Inlet and its ecosystem, and for the community; these include effects on the nature of the estuary itself, the intertidal, fringing, inland and upstream ecosystems, as well as large areas of low-lying agricultural, commercial, industrial and residential areas that fringe the estuary. The changes to the Waimea Inlet will likely have major implications for Tasman Bay as well.

### The Waimea Estuary and Tasman Bay.

Changes in the Waimea Estuary due to sea level rise are likely to be significant and dramatic.

1. As sea level rises flushing of the estuary will increase, with the potential to wash much of the soft sediment out of the estuary into Tasman Bay. This would have significant consequences for the benthic communities in the bay and likely damage or destroy the scallop fishery as well as other inshore fisheries.
2. The loss of mudflat exposure will greatly reduce the productivity of the estuary, again having consequences for Tasman Bay, reducing the productivity of the food web (and fisheries) dependent on this daily algal production.

3. Rising sea levels in the estuary will result in a large reduction in the intertidal ecosystem. As water levels rise large expanses of intertidal mudflats will be lost with major consequences for this ecosystem and the large numbers of nationally and internationally significant bird populations dependent on these habitats for their survival. In addition, the intertidal habitats around the edge of the estuary will be greatly reduced, particularly as the first response of human communities will be to build sea defences to protect their properties, leaving nowhere for the intertidal zone to retreat to. Rising sea levels combined with these defenses will also result in loss of what little remains of the continuity between the estuarine and the terrestrial ecosystems, and the loss of the birds in particular that need both habitats to survive. This will result in the loss of a whole suite of plants and animals that are integral to the estuary and the land/sea boundary.

4. At the extreme end of potential consequences of sea level rise would be the erosion of Rabbit Island/Moturoa which acts as the barrier island for the estuary. At some point a threshold will be reached when the eroding island no longer acts as a barrier and the estuarine ecosystem will be lost in its entirety.

### Freshwater environments

In addition to sea level rise, the changing climate is already be delivering larger and more frequent storm events as well as rising temperatures. There will be a number of damaging effects:

1. The freshwater ecosystems will be driven inland as higher tides push salt water levels further up the rivers.

2. Native biodiversity will be reduced as water temperatures increase and as greater sediment and contaminant loads are carried in the streams and rivers.

3. Culverts and channels will reduce and even eliminate the transitional plant and animal communities that naturally exist between the freshwater and terrestrial ecosystems. Floodplains and wetlands will be increasingly built out of existence.

4. Increasing frequency and severity of droughts, and increased demand for the natural resources (such as gravels found in fresh water systems for sea level rise mitigation) will also greatly add to the biodiversity losses suffered by already damaged ecosystems.

### The Human Community and Economic Consequences.

1. As mentioned above, it is likely that effects on the Waimea Estuary will in turn have significant detrimental effects on the fisheries in Tasman Bay.

2. Rising sea levels will push salt water up into the fresh water systems causing salt water intrusions into the aquifers on the Waimea plains, with major consequences for the region's agricultural economic base.

3. Much of Nelson's and Richmond's infrastructure including roads, sewage treatment facilities, residential, commercial and industrial areas are already very low lying, some of which is already prone to flooding when high rainfall co-occides with high tides. This will be defended in the short term and inevitably withdrawn

to higher ground in the long term. Both defence and retreat will be extremely expensive and potentially economically crippling for the district.

4. The rapidly changing conditions and weakened state of the native ecology will create conditions even more conducive to invasive pests and weeds, both terrestrial and marine. This will compromise further our native biodiversity and add potentially massive costs to the region's agricultural and marine based economy.

## Conclusions

Climate change is real. The scientific evidence for past and ongoing climatic changes is documented and irrefutable. There is sufficient scientific understanding of the causes and consequences to make failure to act now an act of stupendous irresponsibility and a blind lack of foresight. Indeed, it is likely that we are already starting to experience the consequences. The principal cause of global climate change is greenhouse gas emissions by human activities. These emissions must be addressed by verifiable science-led approaches.

I support NZ setting real goals to reduce our green house gas emissions and backing up those goals with real intent and positive actions to achieve them. I feel strongly that NZ should be doing its part to reducing overall greenhouse gas emissions to maintain the international target of limiting the increased average global temperatures to 2°C or less while recognising that there are costs and opportunities in meeting agreed targets. The costs of not acting include:

- Reductions to indigenous biodiversity
- Increases in invasive pest species adapted to warmer climates
- Drought affecting growth and extent of vulnerable native species and ecosystems
- Deforestation of existing native forest and shrubland species affecting existing carbon uptakes
- Maintaining farm productivity by increasing farmland conversion and irrigation rates, affecting adjacent freshwater ecosystems and water systems
- Changes in ocean acidity affecting plankton growth and community structures as well as shellfish species extent and growth
- Changing freshwater, intertidal, estuarine and marine ecosystems, their resilience and their productivity

Conversely, measures to reduce impacts on native biodiversity produce effects that support measures to restrict global warming, add carbon sinks and aid mitigation against climate change effects:

Biodiversity is important because biodiverse ecosystems are more resilient, more sustainable and more able to provide sustainable ecosystem service provision. We depend on biodiversity to maintain healthy ecosystems that provide New Zealanders with the environment that we want to live in, that we *need to live*, and that we need to support our economy.

- Weed and invasive biosecurity pest management and control leads to healthier faster growing forests and marine ecosystems that mop up CO<sub>2</sub>

- Land change rules to minimise/reduce impacts on valued native biodiversity preserve the carbon storage in native vegetation
- Riparian management and retirement planning to maintain and enhance native fish habitats leads to more woody vegetation and retains organic carbon on the land and also reduces oxidative stress on wetlands, and provides appropriate and sustainable flood management
- Coastal land management, retirement planning and assisted ecological retreat to maintain and enhance coastal and intertidal habitats create healthy, resilient ecosystems storing carbon, retiring low productivity agricultural land with a high greenhouse footprint and providing protection for inland ecosystems and human communities.
- Management/treatment of urban runoff stemming from increased vehicular traffic to adjacent coastal areas which otherwise affects seagrass beds and estuarine productivity reducing their capacity for carbon capture

I also believe there are considerable economic opportunities in taking on the challenge of global climate change, and being leaders in the field will yield even greater economic opportunities. It will also give NZ greater moral authority on the international stage. For these reasons I believe that the current target of 5% by 2030 is too conservative and does not keep pace with the emerging world consensus on greenhouse gas emission targets.

**I favour the government taking on it's own long term target of a 50% cut of 1990 levels by 2050.** Given the current situation in NZ's greenhouse gas emissions and the current date, this is no longer a 'long term' target and I believe the government should take real actions to implement actual processes by which this target can be achieved. The approach should also integrate NZ's domestic policies and measures on biodiversity:

- to reduce the sources of greenhouse gases in our economy and
- reduce and mitigate the impacts of climate changes on our vulnerable and endangered native species.

For this reason the proposed intention to principally use offsets via the ETS Trading scheme does not satisfy the imperative to cut greenhouse gas emissions or reduce impacts on native biodiversity via the Biodiversity Accord signed by the Government in 2000. I therefore urge setting a robust target supported by real intent and a more indepth consideration of a raft of complementary activities to both lower greenhouse gas emissions and support retention and recovery of our native biodiversity.

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