Hon Eugenie Sage

Minister of Conservation
Minister for Land Information
Associate Minister for the Environment

Minita mō Te Papa Atawhai
Minita mō Toitū Te Whenua
Minita Tuarua mō Te Taiao

05 JUN 2018

Simon Upton
Parliamentary Commissioner for the Environment
Box 10-421
Wellington

Dear Simon

Thank you for your letter of 28 March 2018 regarding actions the Department of Conservation is taking in response to climate change issues highlighted in the report *Our Atmosphere and Climate 2017* by the Ministry for the Environment and Department of Statistics.

As you will see from the examples enclosed, the actual and potential effects of climate change are already being considered alongside other threats by the department's biodiversity teams. I expect that emphasis to increase and become more systemic in the department's operations over the next few years as the government's proposals for climate change response are implemented.

The department is focused on ensuring that its work on mitigating and adapting to climate change impacts on our biodiversity and natural systems is complemented by good decision-making in relation to impacts on our economy and society.

Attached to this letter is a brief response to your questions. I would be happy to meet with you to discuss the matters you have raised and to provide any further information you require. Should you wish to meet, please contact my Private Secretary Conservation, Henley McKegg (ph. 04 8179150).

Yours sincerely

Hon. Eugenie Sage
Minister of Conservation

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Annex: Responses to questions to the Minister of Conservation

1 What plans or actions are in place to address the threat of temperature-induced hatchling sex ratios to North Brother Island tuatara?

The Brothers Island population of tuatara was once considered a separate species, but recent DNA analyses have led to recognition that all remnant tuatara populations are a single species, with distinctive geographical variants.

The North Brother Island population has extremely low genetic diversity and is at risk from inbreeding effects. This is likely due to being driven almost to extinction by extreme habitat modification and collecting in the late 19th century.

Long-term data shows a dramatic population recovery, but declining body condition (particularly in adult females), male-biased sex ratio and low reproductive output, which are symptoms of a population that has exceeded the carrying capacity of its environment.

With significant investment, management could target sex ratios for example through artificial incubation, rearing female hatchlings for release as juveniles, or translocations of adults. As this population has probably exceeded its environmental carrying capacity, the overall population size would need to be reduced for this intervention to succeed. Sensibly, males would be removed to even the sex ratio, but there is no available place to house excess males. Further, manipulation of sex ratios and management by supplementing females or harvesting males might offer a short-term solution, but may not improve long-term viability without sustained effort. Given that there are several other populations in the Cook Strait region, and the species has a relatively low threat classification (At Risk, Relict), it is not currently a priority for DOC at this site.

2 Is climate change induced change in hatchling sex ratios a threat to other tuatara species, and if so, [what] plans or actions are in place to address this threat?

Tuatara are now considered a single species with distinctive geographical variants. Invasive mammals and habitat fragmentation have isolated the remnant populations of tuatara, and all are being managed by ensuring their islands remain free of predators. There are currently 47 wild populations, up from 32 in 1995.

The effect of warmer temperatures on hatchling sex ratio is just one of the climate change effects which may threaten tuatara populations. Increased drought frequency, and water availability, may be an issue for some populations, particularly on the East Coast, and sea-level change will affect habitats on some low-lying islands. Recent research suggests that, although the North Brother Island population is particularly vulnerable to climate change due to drought and the lack of shade for nesting, even large forested islands will ultimately become too warm for tuatara due to their sex determination mechanism, including Takapourewa / Stephens Island and Hauturu / Little Barrier Island.

Translocations (reintroductions and reinforcements) are mainly guided by science, but cultural values, advocacy and affordability are also important considerations. Recent research has provided insights into the processes shaping the tuatara's range limits and is guiding translocation planning through the identification and testing of sites that have greater resilience under future climates.

3 How many other reptiles face similar or other threats from climate change, and what plans or actions are in place to address these threats?

As the tuatara is the only NZ species with temperature-dependent sex determination it is also the only species vulnerable to that particular threat.

However, we recognise that climate change poses other threats to reptiles. These are difficult to quantify, but species whose remnant populations have been isolated by invasive mammals and habitat fragmentation are more vulnerable, and those which are already Threatened or At Risk are at greatest risk.

Many of the Nationally Critical species whose population are already precariously small are in ecosystems vulnerable to changing climate, such as coastal fringes (Muriwai gecko, Chesterfield and cobble skinks) and alpine areas (Burgan and Rangitata skinks).

In 2016 a severe storm caused the extinction in the wild of the Nationally Critical cobble skink from Granity beach near Westport. In 2018, cyclones Fehi and Gita caused sea surges over the remaining Nationally Critical Chesterfield skink habitat near Hokitika. In both cases, habitat loss and predation made the species highly vulnerable to storm events. The cobble skink is currently represented by a captive population of 32 animals, and a captive population of Chesterfield skink has been established as an insurance measure.

Important lizard populations on small offshore islands (eg Muriwai gecko on Oaia Island) are also vulnerable, as there is little room to move as sea level rises, and storm surge becomes a greater threat.

The prospects of alpine lizards (eg the Nationally Critical Sinbad skink) may worsen as warmer winter conditions enable the ranges of mammalian predators (eg mice and rats) to expand upwards. The low reproductive rates of New Zealand lizards, particularly those at high altitudes, make them particularly vulnerable to an increase in predation pressure.

Current research to assess the vulnerability of New Zealand's lizard fauna to climate change indicates that it threatens whole clades (related groups) of lizards. Modelling will be used to forecast biodiversity losses and inform conservation management (including translocations).

4 What work is underway or planned to manage the changing threats from vespulid (common and German) wasps due to climate change?

Climate change is considered to be a factor enabling invasions and exacerbating impacts of the vespulid wasp species. The Department is an active participant in the Wasp Tactical Group, which brings together government agencies and research institutes, the Queen Elizabeth II National Trust, regional councils, universities and a private entomological services company.

The Group co-ordinates funding and research into the impacts of vespulid wasps and control measures.

Vespex bait for Vespula wasp species is increasingly being used to manage both environmental threat and relief for people in the outdoors. Sites up to 1000 ha in size or many kilometres of track can be treated. The Department uses this tool throughout the country.

Several potential tools for wider scale wasp control are being explored with modest funding from MBIE's Biological Heritage National Science Challenge.[1] Vespula bio-controls are being investigated by Manaaki Whenua funded by MPI's Sustainable Farming Fund. The Department is a key stakeholder in these research programmes through the Wasp Tactical Group.

Public perceptions of novel wasp control are also being investigated.[2] Understanding Maori and public perceptions of the urgency to address pest problems in New Zealand using novel technologies is as important as recognising the part played by climate change in exotic pest invasion and impact.

DOC hopes to extend this collaborative approach to the invasive Polistes paper wasps (family Vespidae) for which there is currently no research and no control tools. The long-established

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[1] http://www.biologicalheritage.nz/programmes/risks/pest-control
[2] http://www.biologicalheritage.nz/programmes/risks/public-perceptions

Asian paper wasp Polistes chinensis is a significant but less well documented environmental pest.

The newly arrived and rapidly invading European paper wasp Polistes dominula is established in Nelson and Marlborough, and is predicted to become a more significant pest across mild regions of the North Island in the next three years.

5 *What work is underway on the potential impacts of climate change on other existing pests, including Myrtle Rust? Further, what work is underway or planned to address the risk of establishment of new pests due to climate change?*

While there has been some research on the climatic envelopes of exotic weed species based on climate change scenarios for New Zealand (the MBIE-funded 'Climate Changes, Impacts and Implications' project) there is currently a dearth of research on potential changes to the establishment risk of new pests. A 2015 report commissioned by the Ministry for Primary Industries (MPI) summarises the current state of knowledge.[3]

MPI is the lead central government agency responsible for managing the risk of new pests establishing. Where an incursion of a new pest species has occurred, and if it has been identified to have a potential impact on conservation values (eg Myrtle rust, great white butterfly). DOC's role is to work alongside MPI to eradicate / manage the incursion.

Myrtle rust

In response to the immediate need for information on Myrtle Rust infection risk, Plant and Food Research was commissioned by MPI in 2017 to produce a Myrtle Rust pathogen process model. The model was run using inputs of hourly temperature, solar radiation and relative humidity data derived from NIWA's convective scale numerical weather model, and weekly output risk maps were provided in real-time to MPI and DOC. These maps were utilised for surveillance, resource deployment and latterly for long-term monitoring and management. The model could also be run using projected climate data from NIWA's regional climate model to assess scenarios of future risk under climate change.

6 *What other threats has the Department identified for native species and ecosystems from climate change? How are these threats being incorporated into the Department's strategic approach to dealing with the risks that climate change poses to New Zealand's native biodiversity and ecosystems?*

DOC is aware that climate change will have a multitude of effects on native species and ecosystems. However, because of the many uncertainties associated with climate change, predicting with certainty what the impacts of climate change will be on a specific species or ecosystem is difficult. Therefore, DOC's focus is on enhancing our understanding of climatic sensitivity, whereby species and ecosystems that have the greatest climatic sensitivity are likely to be those at greatest risk from climatic change.

A commissioned review of climate change risks to terrestrial biodiversity (McGlone & Walker 2011) identified that coastal, alpine and freshwater ecosystems may be particularly at risk, as well a native species with highly specialised habitat requirements such as tuatara, native frogs and bats. This report also noted that climate change impacts will compound existing stresses and threats to native species and ecosystems, and this may have a more immediate effect on native species. For example, invasive animal pests may increase in abundance or range (eg more frequent ship rat population irruptions in native beech forest resulting from temperature driven increased beech mast frequency (Barron et al. 2017)).

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[3] https://www.mpi.govt.nz/dmsdocument/10979-effects-of-climate-change-on-current-and-potential-biosecurity-pests-and-diseases-in-new-zealand

The McGlone & Walker (2011) report also highlighted the importance of linking our thinking about climate change, water yield and native biodiversity. In the short to medium term the report identified the greatest risk to native species and ecosystems was likely to come from climate change mitigation and adaptation actions by other land use sectors. For example, increasing irrigation on farmland in dry eastern areas to adapt for climate change adaptation purposes could dry freshwater ecosystems and displace native biodiversity. Likewise, planting of pine species for carbon sequestration in dry eastern areas will impact catchment water yield, potentially drying freshwater ecosystems, while increasing wilding pine pressure and fire risk.

Over the last decade, DOC has developed an overview of the strategic and operational needs in relation to climate change. For example, DOC's Climate Change Adaptation Framework (Christie 2014) and a workshop on climate change implications for freshwater (Robertson et al. 2016). Work is also underway to incorporate climate change sensitivity as a qualifier in the Threat Classification System and the Translocation Standard Operating Procedure (SOP).

At present, DOC's primary focus is on acquiring greater knowledge about which ecosystems and species have greatest climate sensitivity, and are therefore at the greatest risk from current climatic variability and extremes, and future climate change. Information from DOC's long-term biodiversity monitoring programme and specific research programmes are being used to inform this goal as opportunity allows. Research on how sea level rise will affect coastal assets, infrastructure, ecosystems and species; how temperature affects native bat and bird species; and the relationships between invasive pests, phenology and temperature are three examples of research which is increasing our understanding of climate sensitivity.

7 What targets or goals, if any, has the Department set for managing biodiversity in the face of climate change impacts? What policies or plans is the Department recommending to achieve any targets or goals?

The Department does not currently have formal targets or goals specifically addressing climate change. However, as previous responses illustrate, the impacts of climate change go to the core of DOC's responsibilities and are being addressed alongside other risks in research, planning and operations.

There is a growing awareness that climatic risk needs to be treated at a similar level as other risks (eg predators, habitat degradation, anthropogenic pressures). Examples of this include consideration of how climatic risk can be incorporated in the Zonation model for Ecosystem Management Unit (EMU) prioritisation, the threatened species evaluation process, the translocation SOP, and the designation of marine protected areas.

There are a number of operational examples where climate change is being specifically addressed:

- DOC's Whakaoriori / Masterton office is developing options for managing the Nationally Critical matuku / Australasian bittern at Lake Wairarapa, with its management planning including looking at the implications of sea level rise alongside other threats and management options;
- the Battle for our Birds (BFOB) incorporates climate mast prediction likelihood (based on delta T model (Kelly et al, 2012)) and beech and tussock mast phenology information into ship rat population irruption predictions to make decisions about whether aerial predator control operations should be undertaken to protect threatened native species.

However, DOC is just beginning to incorporate climate change risk into management processes, including asset management, statutory planning, and permissions.

If a National Adaptation and Action Plan (NAAP) is initiated, as recommended by the Climate Change Adaptation Technical Working Group (CCATWG), then the Department will need to consider an internal plan that is linked to the NAAP and other agencies' plans.

8 What work has the Department done, or is [it] planning to do, with other government agencies to address issues where greenhouse gas reductions require co-ordinated actions from multiple stakeholders?

DOC is an active participant in government processes relating to climate change, including legislation, policy, research and operations. As with DOC's own work, climate change is often a component of a wider programme. Several of these have been referred to in this letter.

Other current examples are policy development for the Zero Carbon Bill and the Climate Change Board of Public Sector Chief Executives, development of the Billion Trees Programme, and implementation of Crown Conservation Contracts.

9 What gaps has the Department identified in scientific understanding or management systems for dealing with the effects of climate change on biodiversity?

Significant research and monitoring is still required to understand the potential impacts of climate change on New Zealand's biodiversity, including our threatened ecosystems and species. For example, while work is underway it is currently not well understood what the effects of warmer temperatures may have on the timing of breeding, the supply of food, the abundance of predators, and hence the future survivability of native bats in Fiordland. Likewise we know phenology is a key driver of invasive predator dynamics and native species loss in many ecosystems, and while research and monitoring is being undertaken, there are still many gaps in our understanding of how phenology responds to climate. The complexity of ecosystem dynamics, including the competition for resources and the impacts of human activities, means that understanding climate change risk on New Zealand's biodiversity will require ongoing and significant investment for many years to come.

The zonation model is currently used to assess the vulnerability of threatened ecosystems and species and is the basis for the management of ecosystem and species management units. The model does not currently consider the sensitivity to climatic variability and climate change, although work is underway to determine how this may be included. DOC also manages the species translocation programme. More work is required to understand the current and future climate suitability of potential translocation habitats, so that the risk of re-establishment failure is minimised.