A strategic plan for kea conservation -Strategic Objective 2:

National kea management plan

Photo by Fraser Chricton

Contents

1 Vision and Mission

The overall Vision and Mission of the Strategic Plan for Kea Conservation is;

Vision: A healthy and secure future for kea.

Mission: To secure a thriving kea population in the wilds of New Zealand's South Island – Te Wai Pounamu - and a well-managed global captive population that may be appreciated by, and inspire all who encounter them.

2 Purpose and scope of this document

The National Kea Management Plan has been developed to enable delivery of Objective 2 of the Strategic Plan for Kea Conservation, which states that the kea population (in-situ and ex-situ) is actively managed. This document will a) stakeholders with a better understanding of the significance of threats to populations and planned mitigation and insurance measures; and b) provide information to increase captive management potential to support in-situ conservation.

This document therefore outlines the background, justification, methods and projects needed to achieve this objective under the following Outcomes sections;

1. Threats to the wild kea population and their management are identified and quantified
2. Feasibility of an insurance population is investigated
3. The captive population is proactively managed to increase welfare, advocacy and research potential.

If model predictions are that current and predicted management is not enough to give a thriving population of keas across the present range, then additional management should be implemented in the form of a national recovery plan.

3 Background

Kea populations are currently under managed. The in-situ (wild) kea population is subject to a complex range of threats impacting on productivity and survivorship while ex-situ (captive) population welfare standards and advocacy potential in New Zealand facilitiesare generally poor.

As an endangered, NZ endemic, it is vital these populations are appropriately managed until such time as threats to wild kea have been mitigated and conservation of the species assured. Currently the impact of threats to kea on a population level is little understood and as a result the status of the wild population difficult to state with any certainty. What we do know is that catastrophic collapse of local kea populations can occur, without warning; noticed only when local population numbers decline to critical levels.

4 Outcomes

4.1 Threats and threat management

The range of the kea falls entirely within the South Island and largely within Public Conservation land. Consequently, habitat fragmentation and loss are not a major threat as with many of our native

species. However, eight threats, actual and potential, to the wild kea population have been identified by kea researchers. These may be broadly defined as either environmental and ubiquitous (1-5) or human and localised (6-8):

1) Predation by introduced mammals
2) Lead in kea habitat (e.g. flashings and lead-head nails, tyre weights, lead shot)
3) Poorly deployed pest control (e.g. poison baits and traps laid for pest control)
4) Avian diseases
5) Climate change (through changes in predator abundance, food availability and habitat)
6) Accidents with human objects (e.g. motor vehicles, snow groomers, rubbish bins, electricity sub-stations)
7) Destruction/removal of nuisance individuals (permitted or un-permitted)
8) Illicit trade in wildlife

The relative impact of each, their requirement for active management versus ongoing monitoring and, methods of threat mitigation (minimisation versus removal) are to be investigated.

4.1.1 Project: Develop and implement a threat monitoring, assessment and mitigation programme.

4.1.1.1 Aim

Investigate the relative impact of 8 identified threats to kea and develop a monitoring and threat mitigation plan to address each threat.

4.1.1.2 Background

Kea are endangered with numbers estimated at less than 5,000. Threats to kea continue to impact on populations across the length and breadth of the South Island. Eight broad threats have been identified as follows:

1. Predation by introduced mammals

The stoat and the possum have been identified as key predators of kea. These predators impact on the survival of kea nestlings and the survival of adult females. Stoats and possums are ubiquitous within kea habitat. Stoats can reduce nest survival to near zero in stoat plague years. Episodes of high adult female mortality may also occur during stoat plagues that follow mast events. Visitation by possums at kea nests is persistent and may impact significantly on productivity.

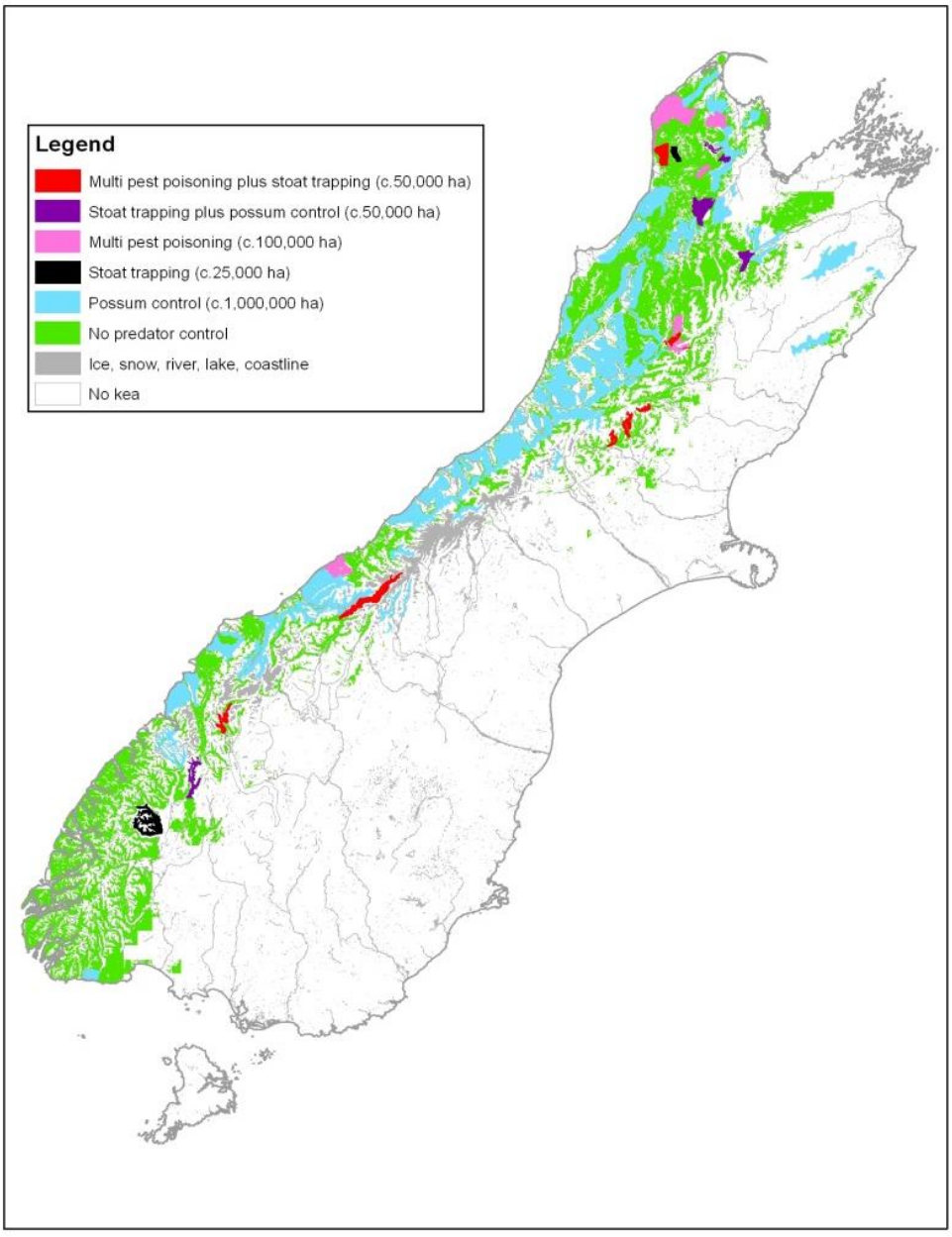
Five forms of predator control are currently deployed in kea habitat on the scale required to influence kea populations (Figure 2). These are:

1) Multi pest poisoning* plus stoat trapping
2) Stoat trapping plus possum control
3) Stoat trapping (without possum control)
4) Multi pest poisoning (without stoat trapping)
5) Possum control (ground based or aerial but not delivering stoat control)

** multi pest poisoning is where the timing of baiting and the active ingredient are carefully chosen to control stoat plagues at the same time as controlling possums and rats. Aerial 1080 after mast seeding is an example of multi pest poisoning, because 1080 is transferred secondarily to stoats by*

predation of rising rodent populations. This occurs in time to prevent the otherwise likely stoat plague. It also reduces the magnitude of rat plagues, giving benefit to species smaller than the kea.

Figure 2. Map showing distribution of keas and the five different predator control regimes under which they may live.



The degree of protection offered to keas and hence effects on kea population growth rates can be expected to differ among the five regimes. Migration across control boundaries is to be expected due to strong powers of dispersal. The net outcome for the South Island kea population will likely reflect be a balance of the different population growth rates under different predator control regimes and areas not under predator control.

We must aim to achieve sufficient area under predator management that sufficient surplus birds are produced in 'source' areas to outweigh losses in 'sink' areas.

Testing of these six options entails measurement of kea nest survival, fledgling survival and adult female survival and comparison with survival at untreated sites. Table 1 summarises the current state of knowledge with respect to nest survival and the sites at which measurement has occurred.

Table 1. Predator Control Types and nest survivorship results

Predator control	Results	
1) Multi pest poisoning* plus stoat trapping	Hawdon Valley 2009-2012	High nest survival rates.
2) Stoat trapping plus possum control	Rotoiti 2009-2012,	High nest survival rates.
3) Multi pest poisoning (without stoat trapping)	Okarito 2011-2012	High nest survival for two years after control.
4) Stoat trapping (without possum control)		
5) Possum control (ground based or aerial but not delivering stoat control)	Mt Arthur 2009, Wangapeka 2011-2012	Moderate-low nest survival rates but sample size small.
6) No predator control	Fox-Paringa 2010-2012, Okarito 2008-2010, Raglan Range 2009-2012, Wangapeka 2009-2010, Rotoiti 1993-1999, Rotoiti 2000-2009.	Near zero nest survival in stoat plague years. Moderate nest survival in non stoat years

In summary, multi pest poisoning alone, such as mast triggered aerial 1080, can boost kea productivity but needs to be on a very large scale and carefully timed to deliver effective stoat control. Multi pest poisoning with stoat trapping, by extension, should similarly boost kea productivity. The scale of operation is probably very important. Stoat trapping alone can probably boost kea productivity, but this has not been measured and needs to occur on a large scale (e.g. 5,000 ha or greater). Possum control alone, such as aerial 1080 in non-mast years, may give some benefit but this might be quickly undone during the next stoat plague. Sites without predator control are likely to be population 'sinks'. Multi pest poisoning and/or stoat trapping are the best options for kea conservation. There is evidence that aerial 1080 improves survival rates for fledglings and adults. By implication, stoat trapping will also improve survival rates.

The dataset on adult female survival with respect to predator control requires expansion and must be continued through a major stoat plague.

Controlling the kea's predators, especially stoats and especially in stoat plague years, should result in significantly increased kea productivity and survival, such that population growth becomes strongly positive.

Project: Measure kea nest survival rates after aerial 1080 possum control (i.e. without rodents).

Project: Measure adult female survival and test effectiveness of predator control through stoat plagues.

Project: Initiate a nest protection programme around monitored nests in Nelson Lakes and measure kea nest survival rates.

2. <u>Lead in kea habitat</u>

Lead fixtures on old buildings in areas of the backcountry (e.g. huts, mines) and where kea and human habitats overlap (e.g., alpine villages, areas referred to here as "populated") have been identified as a source of lead exposure for kea. Young kea sampled in these areas have been found with significantly higher blood lead levels than those in remote areas. Kea have been observed chewing these fixtures, and damage to lead-bearing buildings has been observed throughout the kea's range. All kea sampled (both in populated and remote areas) were exposed to lead, and all but a very few sampled in populated areas had elevated lead levels. Two nestling kea were also found to have elevated lead levels, indicating that breeding kea are capable of passing lead onto their offspring. Any level of lead exposure is considered unsafe, as lead can have subclinical effects that can compromise survival (e.g. depressed immune function, impaired development, decreased cognitive function etc.), as well as directly causing illness and/or death.

Removal of lead from all buildings, out houses and structures in the range of keas should be undertaken. Removal of lead from DOC structures as well as from private dwellings and commercial buildings within kea habitat will require cooperation between contractors, DOC as well as land owners. There are options to involve volunteers through appropriate partnerships with organisations that have suitable H&S practices already in place (eg Conservation volunteers NZ, Federated Mountain Clubs etc).

Project: Develop a strategy to remove lead throughout kea habitat. To include a review of each DOC Conservancy's plans for removal of lead on conservation land and identify and approach possible groups who may be interested in funding or directing volunteer.

Project: Identify and engage groups (including DOC maintenance) to remove and safely dispose of lead from buildings in the kea range.

3. Poorly deployed pest control

Kea have been killed through accessing of ground based kill traps and bait stations as well as ingesting 1080 baits during aerial operations.

Ground based possum control within kea habitat is primarily undertaken by TB Free contractors, as well as private fur hunters and some DOC operations. Allowing possums to access bait/traps whilst excluding keas is technically challenging. The larger size and greater body mass of the possum is perhaps the only exploitable difference. Some inventors are currently working on this problem. Ground based rat control within small segments of kea habitat is undertaken by DOC. Enabling rats but not keas to access bait is reasonably easy and many bait station designs achieve this already.

Keas have been recorded dead or injured from investigating Timms traps, Sentinel traps, Victor traps, Fenn traps, and Philproof bait stations. Tampering with poison bait bags and long life gel baits (various toxins) has been reported. A recent report of cyanide paste smeared on rocks to kill possums above bush line is of concern.

Quantifying the impact of ground based pest control devices on overall kea numbers is challenging. The control devices deployed are constantly changing at any one place. The area of possum control is usually small relative to the home ranges of adult kea. The movements of juvenile kea flocks are unpredictable. These factors combine to make robust estimation of by kill rates almost impossible.

The threat of ground based pest control devices to kea is best managed via the DOC and TB Free Best Practise systems. The exclusive use of kea-safe devices should be part of best practise. The deployment of baits in bait bags, long life gel baits and exposed cyanide baits should not be considered best practise in kea areas.

Kea proof bait stations are being developed for use in possum and rat control in kea areas. The best emerging contenders are the Henry self-resetting possum trap and the Earth Station from Corliss engineering and the Goodnature A12 (possum) and A24's (stoat). However, testing is still required. Philproof bait stations are easily accessed by keas but can be fitted with an internal baffle.

Project: Continue research and development into surface repellents to keep keas off traps.

Project: Continue testing safety of traps and encourage development of new trap designs

Project: Work with agencies on best practise for ground based possum control in kea habitat. Both the DOC and the NPCA (National Possum Control Agencies) maintain a system of current agreed Best Practise. These are essentially a series of documents describing ways to deploy pest control devices (toxins and traps) in the field. The priority action required is to examine these documents (and websites) to assess whether the safety of kea is adequately considered. In cases where a risk to kea is identified, then liaison with the agencies is required to update their best practise documents. When changes are made to documents, follow up work with local contract supervisors and practitioners is required to ensure uptake of the changes in field deployment.

Fifteen deaths have been recorded out of 116 radio tagged individuals monitored through aerial 1080 baiting. Risk varies between sites/operations, with zero apparent risk at some sites and a concerning level of risk at others. Keas in the lowland rimu forests of Westland appear to be more susceptible to death by 1080 than do keas in upland beech forests. However, the sample size for upland beech forests is too small to give statistical confidence that they are safe enough.

An aerial 1080 programme currently exists over about 1 million ha of the c.3.5 million ha kea species range. Aerial 1080 is one of the few tools available to control the predators of kea on a large scale.

Preventing the by kill of keas through the use of bird repellent in toxic baits is the preferred approach, rather than restricting the use of aerial 1080. In the event that by kill cannot be entirely eliminated, quantification of the costs versus benefits of aerial 1080 to kea is also required.

Registration of a bird repellent bait for aerial distribution is the aim of a current DOC/TB Free funded project. It is hoped that such a bait will be available in the future. However, the challenge of repelling birds but not target pests (possums and rats) may be insurmountable.

At Okarito, where 8/37 radio tagged keas died from eating 1080 pellets in 2011, the by kill was compensated for by improved nest survival over two seasons in a reduced predator environment. However, the by kill meant that the full benefits of the predator control were not delivered. If by kill can be reduced or eliminated, then the outcome of multi pest poisoning with aerial 1080 should be strongly positive for the kea population.

By kill appears to be very low, even absent, in upland beech forest aerial 1080 operations. An improved sample size on which to base this conclusion is desirable.

Project: Continue research and development into bird repellent bait additives. Work with industry to ensure effective repellents are introduced into 1080 bait mixtures and used in operations throughout kea habitat.

Project: If bird repellent is not forthcoming, ensure adequate monitoring of keas through 1080 (collaborate with DOC).

4. Avian diseases

Current diseases of concern in psittacines in NZ are Beak and feather disease virus (BFDv) (known in captive and wild parakeet on North and South Island), Avian Polyoma virus (APV) (suspected cases in parakeet in North Island awaiting confirmation), feather follicle mites (known in captive and wild kakariki in North and South Island), avian malaria and West Nile Virus (WNV) (both a cause of mortality in captive kea overseas). Testing for BFDv on approximately 70 wild kea was negative. The status and susceptibility of kea to the rest of these diseases is generally unknown. In a naïve population, a new disease has the potential to cause a high level of mortality (death rate) and morbidity (incidence of ill health) and spread is more likely where birds may congregate at food sources e.g. ski fields and rubbish dumps. In addition to known diseases, NZ parrots are at risk of exotic diseases arriving via smuggled birds.

On-going blood sampling of kea populations across the species range should be undertaken as part of any research involving kea capture (ie. all permit applications which include handling of kea should be identified as possible blood sampling opportunities (dependant on applicant expertise)). Additionally a system should be developed to process all samples as part of the national wildlife health monitoring programme. All samples of live kea and necropsy results of dead kea should be entered into the central kea database. A person/persons or organisation should be identified to ensure this database is maintained and up to date.

Project: Develop and initiate policy across all conservancies to ensure on-going disease screening is undertaken during any research where permits are secured for handling of kea. Develop and initiate policy to ensure all dead kea are necropsied and results entered into central data base. Database is updated.

5. Climate change

Climate change is a natural warming of our atmosphere occurring over many tens of thousands of years. Human driven climate change is an unnatural process drive by release of green house gases into the atmosphere and reduction of natural regulation services (eg deforestation). “Anthropogenic warming over the last three decades has likely had a discernible influence at the global scale on observed changes in many physical and biological systems”. IPCC {WGII 1.4, SPM}.

Confirmed impacts on New Zealand’s sensitive alpine environments include increased seed production in South Island beech (1973 to 2002) and decreased glacial ice in Franz Josef. In Australia there has been increased penetration of feral mammals into alpine and high sub-alpine areas (Parry et al, 2007). These three separate studies show that major changes are already taking place to Australasia’s alpine environment. Of particular concern for the kea is the potential for increased predator pressure on kea nests and adult females. Potential expansion of feral pigs into alpine areas

is also a concern. Pigs, like keas, dig up alpine plants for food and the two species may be in direct competition.

What other impacts climate change will have on kea in relation to their reproductive biology, behaviour or interactions with humans long-term is currently unknown.

Although mitigating the impacts of climate change is outside the scope of this strategy, the issue of anthropogenic global warming and its impact for species such as kea needs to be brought to the attention of the public and policy makers. Climate change is a significant threat to kea and their alpine habitat and must be documented as such in the South island management plan. Monitoring of the possible effects of climate change on kea populations (predator invasion, frequency/intensity of masts, impact of temperature) should be encouraged. The potential for pigs to invade alpine areas as a consequence of climate warming has been identified.

Project: Prepare a literature review of the likely impact of indirect impact of temperature warming on kea through i) predator or pest invasion, ii) change in frequency of mast events iii) changes in environmental ice cover

Project: Produce information to increase awareness of the possible impacts of climate change on kea and their alpine ecosystem

6. Accidents with human objects

A surprising number of dead keas are handed to DOC offices each year. Causes of death are various, including entrapment in rubbish bins, drowning in vessels of water, accidents with cars and trucks, food poisoning, electrocution at sub-stations, ingestion of foreign bodies, entanglement in fishing lines etc. Easy gains stand to be made through the on-going management of risk to kea at sites of human activity.

In addition to localities where regular accidents have occurred in the past (e.g Arthur's Pass roadsides, at ski fields etc) identification of other 'at risk' areas is a priority. Erection of signage in these areas to alert the public of potential threats to kea as well as to educate and support at risk communities (eg ski-fields, alpine villages) and the wider public should also be undertaken. This information should be contained within a Community Engagement (Education/Advocacy) plan.

Project: Develop a database to log incidents with human objects (to ascertain prevalence and risk of certain items/areas/situations

Project: Introduce this information into a Community Engagement Plan which would include a plan to mitigate the following human/kea threats i) Minimise accidents with human objects, ii) Destruction/removal of nuisance individuals and iii) Illicit wildlife trade. This should identify risks to kea and identified mitigation measures and priority actions method/s, key stakeholders, priority threats which require/ can engage community input and mitigation options in key areas. Robust evaluation and reporting of conservation outcomes to be built into the plan.

7. Destruction/removal of nuisance individuals

Kea have had a long and unusual history of persecution in New Zealand. Some people living in or visiting the South Island still view kea to be 'pests' and see little value in them. Kea sometimes

interfere with and cause damage to private property and commercial operations, e.g., at forestry sites, ski-fields, telecommunication sites, alpine villages and high country sheep farms. Occurrence of 'kea strike'; when kea attack sheep on high country holdings causing illness and/or death to stock, historically resulted in a government bounty which culled an estimated 150,000 kea from the population over a 100 year period through until the early 1970's. Lethal control of kea that attack sheep still occurs today although the prevalence of such incidents are largely unknown.

Farmers may be given permits by DOC to shoot kea on their farms if they are having problems with kea strike. Other farmers and landowners are suspected to poison or shoot kea illegally. In yet other circumstances kea are persecuted and this is likely due to perceptions of kea as pests because of kea damage to property (e.g. cars parked in kea habitat).

Engaging the public to raise an appreciation for kea as well as increase awareness of the unique suite of threats impacting on them is crucial if persecution is to be stopped and protection into the future is to be accorded the kea. People will only care for or respond positively to something which they know about. Continuing to develop a positive advocacy plan both online and face to face is therefore essential to the long-term survival of kea.

Currently there is no consistent approach to identifying or dealing with 'nuisance' individuals. Identification of un-banded individuals is unreliable. Kea have been subject to lethal removed in response to sheep strike incidents only for the problem to continue. Caution should be applied in all cases where removal is considered (whether lethal or non-lethal). The birds age and status should be taken into account as well as the time of year e.g. removal of an adult male may be problematic as he may be paired with a nesting resident female feeding chicks. Removal of adult birds from the population is considered unsustainable "A decrease in adult survivorship will cause a much more rapid decline than any other parameter" (Elliott and Kemp, 1999). Additionally removal of 'nuisance' kea to other areas may just transfer the issue to another population, and is undertaken reluctantly by many conservancies. Removal of adult birds into captivity is not considered appropriate due to welfare issues.

Investigating ways in which the nuisance value of kea can be reduced or eliminated either through changes in human practice or employment of deterrent methods (use of repellents, coatings etc) is a priority. Research on kea strike and further mitigation methods of this problem, as well as ways of minimising property damage by kea will reduce kea deaths from human persecution and aid kea advocacy efforts.

This information should be contained within a **Community Engagement (Education/Advocacy) plan**.

Project: Develop a consistent method of identifying and dealing with 'nuisance individuals' with DOC and other stakeholders.

Project: Introduce this information into a Community Engagement Plan.

8. Illicit trade in wildlife

Kea are curious of human activity. Young naïve birds and habituated adults can be relatively easy to catch. As a result they are vulnerable to capture by wildlife smugglers. New Zealand species which

are of particular value to smugglers include our rare parrots, reptiles and plants as these are either relatively easy to conceal and/or are particularly lucrative on the international black market.

Recorded incidents of kea smuggling are rare although this does not mean they do not occur. In 1990 two suitcases confiscated at Christchurch airport bound for Singapore contained eight drugged kea stuffed into plastic tubes. One of these was already dead. The kea had been stolen from three zoos and two national parks throughout the South Island (Diamond and Bond, 1999).

The Wildlife (Smuggling Deterrence) Amendment Bill, introduced through parliament in late 2012, will provide an increased deterrent to would be smugglers. The maximum penalty for smuggling of native animals including parrots has been increased from 6 months imprisonment or a $100,000 fine to up to five years imprisonment and/or a $300,000 fine. Monitoring is maintained by Biosecurity New Zealand at the country's exit and entry points. Increasing public awareness of the potential risk to kea and encouraging local communities to report any suspicious human behaviour in areas of kea habitat should be part of an advocacy plan. This information could also be included in signage at key areas where kea congregate and are vulnerable to capture (eg Arthurs Pass).

Project: Develop information to inform the public about possible poaching of kea.

4.1.1.3 Method

(to insert)

4.1.1.4 Assessment criteria

Project: Measure kea nest survival rates after aerial 1080 possum control (i.e. without rodents).

Project: Measure adult female survival and test effectiveness of predator control through stoat plagues.

Project: Initiate a nest protection programme around monitored nests in Nelson Lakes and measure kea nest survival rates.

4.2 Insurance population

Insurance populations are used by conservationists to guard against species extinction. Insurance populations preserve important genetics through 2 main methods; captive breeding programmes or development of island populations (mainland vs offshore). Both methods are resource intensive and in the case of kea, have a number of practical challenges which must be weighed up (extinction risk to the species versus cost of setting up and maintaining an insurance population).

Intensive monitoring of kea over the past 5 years has shown that local population crashes can occur within short time frames of just a few years. Although intensive monitoring can pick up major changes in population stability, it is not feasible to carry out across the species range. Potentially less than 5,000 kea remain in an area of 3.5 million hectares – much of which is inaccessible and the population within it little studied. The most vulnerable life stages for kea are females nesting, chicks prior to fledgling and potentially, juveniles. Diamond and Bond (1995) and Jackson (1969) estimated mortality of juveniles in Arthurs Pass to be as high as 50% and 68% respectively. Bond and Diamond also estimated the median life expectancy of sub-adult kea in the same area to be about 5 years. A similar

conclusion has been arrived at individually (and anecdotally) by kea researchers involved in long-term population research in the area (van Klink, pers comm.2012).

Nesting females are extremely cryptic with nests difficult to find and protect. Females sitting on nests are vulnerable to predation; their eggs and chicks even more so. Although well timed pest control can reduce predation threat, there is also the risk of unintentional by-kill which must be acknowledged and factored in.

As such the feasibility of an insurance population should be investigated until such time as threats in the wild are mitigated to an acceptable level.

Project: Conduct an insurance population feasibility study.

4.2.1 Island Insurance populations

To contain a viable kea population an island must be suitably large. Only two such islands exist; Resolution (20,800 ha) and Secretary (8,100ha). Both are within swimming distance of the mainland for stoats and therefore ongoing trapping and surveillance is required. However, the cost of keeping these islands stoat free should be substantially lower than predator control on the mainland and may be lower than maintaining an adequate captive population.

Both Resolution and Secretary islands have been recently 'cleared' of stoats after 130 years of invasion. Kea are known to be present, but the density is unknown. We can expect kea numbers to increase dramatically over the next few decades until the population is limited by density dependent factors (carrying capacity). The carrying capacity for kea on these islands is unknown, but it is anticipated that Resolution could probably hold at least 1000 kea and Secretary probably a few hundred.

Monitoring the recovery of kea on these islands until density stabilises would help establish their value as an insurance population. Data on stoat reinvasion rates is being collected by DOC, and together these will allow development of simulation models for exploring the cost effectiveness of the islands as insurance populations.

Conversely, effective predator control can generate rapid population growth; ie. we can potentially create mainland insurance populations relatively quickly if predator control areas are large enough to contain >500 individuals and predator control is applied constantly. However, no single currently implemented population control area meets these criteria, so we cannot claim to already have an insurance population. Offshore island insurance populations are generally thought to be more secure as they buffer against new diseases. However, no NZ offshore island is both large enough to contain 500+ kea and distant enough to prevent movements of kea from the mainland.

4.2.2 Captive Insurance Population

Globally, reputable zoos work cooperatively under regional umbrella organisations to hold self-sustaining ex-situ populations of threatened species. These populations are sometimes viewed and managed as insurance populations; preserving important genetics for potential reintroduction to boost wild populations which have catastrophically declined (e.g due to high magnitude stoat irruptions, disease outbreaks etc).

Successful NZ programmes include kaka, brown teal, Western Otago skink and kiwi species, while international examples include the black footed ferret, North American bat species, African penguin, Oszark hellbender, and Tasmanian devil among a swathe of others (WAZA, 2013). Regional umbrella organisations include the World Association of Zoos and Aquariums (WAZA), the European Association of Zoos and Aquaria (EAZA), the Association of Zoos and Aquariums (AZA) in America, the South East Asian Zoos Association (SEAZA) and Zoos and Aquarium Association (ZAA) which covers the Australasian region.

Internationally, kea are held at a number of zoos and sustainable breeding populations are presently managed under the EAZA and AZA studbooks. Within NZ, conversely, a breeding ban followed by limited breeding over the past 10 years has resulted in a NZ captive population of just 65 individuals with an unsustainable age-structure (i.e. an ageing population) and poor genetic diversity.

A genetically viable captive population, if managed carefully, could serve as an insurance population.

The resources required to maintain a viable captive population is extensive, however these would continue to be the responsibility of individual holders and population managers (ZAA with support from the CBSG). The cost to DOC and/or the KCT would be restricted to 5 yearly facility audits to ensure captive standards are achieved and maintained (as per the 2010 Kea Husbandry Manual); a cost which is already required under the new captive standards.

Project: Develop proposal to identify the best insurance population option/s for kea

4.2.3 Captive Supplementation of the Wild Population

A number of captive avian species contribute to 'breed to release' programmes inclusive of the North Island Kaka. Kea are not, nor have they ever been held as part of a supplementation programme. It has been proposed that should wild populations fall to critical levels, wild stock could be taken to provide a functional breeding pool. Judging when the kea population had reached 'critical threshold' would be extremely difficult. As a case in point, the Keas threatened listing status has just returned to 'nationally threatened' after it was downgraded to naturally uncommon; a decision challenged by a number of stakeholders as all evidence suggested kea were declining. This process took 5 years to resolve; time which could spell the end of a species.

It has been found in some areas that numbers of adult females are lower than their male counterparts, potentially as a result of stoat plague years which see female kea predated at the nest site. Possible supplementation of such areas with captive bred females could work in favour of wild kea populations as well as the captive populations. Female territoriality during breeding season has seen a number of captive females killed by other females. As a result some captive facilities are reluctant to hold more than one female.

Nonetheless, some large predator control areas have very low density of kea for historical reasons and natural recovery is very slow (e.g. Rotoiti Nature Recovery Project, Friends of Flora, Murchison Mountains, Lewis Pass kiwi protection areas). A sex bias is likely within these areas as a result of stoat plague years which see female kea predated at the nest site. Possible supplementation of such areas with captive bred females could work in favour of wild kea populations.

Project: Investigate possible use of captive population to supplement monitored wild populations.

4.3 Captive population is actively managed

Captive kea in New Zealand are held in facilities whose standards range widely between complex and enriched environments to cages and husbandry practices which constitute a serious welfare issue. Additionally a lack of standardised advocacy requirement and research opportunities means that the value of captive kea is currently underutilised and conservation benefit to the wild population is not maximised. A new husbandry manual and audit document, developed by the KCT (Orr-Walker, 2010) and endorsed by DOC and the ZAA, aims to address in part, these inconsistencies. The new manual requires kea be held in large, complex, enriched environments which provide opportunity to express natural behaviours, thereby increasing mental and physical health and encouraging more positive public interactions and education opportunities.

In 2012 DOC conducted an audit of all NZ kea facilities and as a result a number of birds have been removed, or identified for removal from substandard facilities, and/or enclosures and husbandry techniques required to be upgraded. Further follow up to ensure compliance with husbandry standards for kea is still required. Until such time as kea standards are consistent across the board, the welfare and conservation value of many kea remains compromised.

Project: Develop and initiate a plan (encompassing welfare, advocacy and research) for ex-situ kea holders to support ins-situ conservation. The captive industry's role in supporting wild population initiatives needs to be clearly defined. The value of captive facilities lies in i) their ability to connect to the public and thereby deliver advocacy messages to a large audience and ii) use of a captive population for ethically acceptable research purposes. A statement to this effect should be developed to define this relationship. In conjunction with DOC a directed Advocacy Plan which is in line with this documents agreed key strategic objectives to be developed to ensure consistency of conservation message for the captive population. Discussions with Captive Kea TSO (Bruce McKinley) and captive industry representatives to be initiated to discuss key strategic objectives. A captive advocacy plan reflecting this strategy to be developed to assist this process.

4.3.1 Increasing captive standards

(info to be inserted)

4.3.2 Increasing advocacy potential of captive kea

(info to be inserted)

4.3.3 Use of captive population for in-situ research

The captive population has proved to be an important research resource. Captive kea have been involved in developing threat mitigation methods including research on repellents (eg bird repellents to dissuade kea eating 1080 baits and surface repellents to deter investigation of traps, sheep and other human property) and establishing growth curves for chicks from hatching to fledging. With the development of the strategic plan and the projects associated with each aim, it is envisaged that the captive population will be utilised to continue this work for the foreseeable future.

A number of kea holders (international and national facilities) are also providing significant annual funding for in-situ projects inclusive of nest monitoring, pest control, community engagement and surface repellent testing.

Project: Develop a policy in regards to use of captive kea in research for support of wild population

Project: Develop list of projects within which captive institutes can become involved with (funding and professional development)

5 Assessment of management objectives – implementation, monitoring, reporting and review

Evaluation to be conducted at the end of each project or annually (whichever comes first) to ascertain programmes effectiveness. Evaluation summaries to be discussed to ensure appropriate incorporation into further programmes.

6 Appendices

6.1 Projects List

Introduced mammalian predators

Project: Measure kea nest survival rates after aerial 1080 possum control (to measure the value of operations to kea that aren't carefully timed with respect to stoat plagues).

Project: Measure adult female survival and test effectiveness of predator control through stoat plagues.

Project: Advocate and fundraise for expanded landscape-scale predator control using proven methods. Where landscape control is not cost-effective due to low numbers of kea initiate pest control around monitored nest sites.

Lead in kea habitat

Project: Identify and engage groups (including DOC maintenance) to remove and safely dispose of lead from buildings in the kea range.

Poorly deployed/selected ground based pest control devices

Projects: Trial surface repellents to keep keas off possum traps.

Project: Review the safety for kea of currently used possum control tools, including review of current and likely future use.

Project: Liaise with TBFree NZ to improve safety for keas of contractor-based annual possum control in kea areas.

Poorly timed aerial 1080 pest control

Project: Develop bird repellent bait (DOC).

Project: Monitor >20 radio tagged keas through another remote 1080 operation (collaborate with DOC).

Project: If bird repellent development is unsuccessful, ensure adequate monitoring of keas through 1080 (collaborate with DOC).

Project: Advocate for all aerial 1080 to be multi pest (designed with stoat control in mind).

Avian diseases

Project: Devise protocol for sampling. Oversee implementation and data capture.

Climate change

Project: Map distribution of invasive animal species (including pigs) in alpine zone. Assess effect of climate change on distribution.

Assist DOC / Landcare / Canterbury university with recording location and frequency of mast events.

Accidents with human objects

Project: Develop a database to log incidents with human objects (to ascertain prevalence and risk of certain items/areas/situations

Project: Introduce this information into a Community Engagement Plan.

Destruction/removal of nuisance individuals

Project: Develop a consistent method of identifying and dealing with 'nuisance individuals' with DOC and other stakeholders.

Project: Introduce this information into a Community Engagement Plan.

Illicit wildlife trade

Project: Increase public awareness of risk within a Community Engagement plan.

Insurance population

Captive Insurance Population

Project: Develop proposal to identify the best insurance population options for kea

Captive Population

Project: Support captive facilities to increase husbandry standards through driving of regular audits and review of kea husbandry manual standards to incorporate current research

Project: Develop a strategy to deal with captive kea unable to be appropriately housed

Role of Captive Managers

Project: Develop an MOU between all stakeholders (the KCT, DOC and captive kea facilities) which identifies each groups responsibilities and communication channels in regards management of the captive population.