Department of Conservation
Te Papa Atawhai

Risk factors for kea mortality during aerial 1080 operations

DOC Internal Report DOCCM 7610694
Date: March 2024
Prepared by: s9(2)(g)(ii)
Reviewed by: 9(2)(g)(ii)
Approved by:

sed under the Official Information Act

Purpose

This work revisits and extends prior work assessing survival of tagged kea through aerial 1080 operations (Kemp et al. 2019, Kemp et al. 2022). It uses an increased, updated dataset of 1080 operations and aims to further explore risk factors to kea mortality associated with 1080 operations, so as to inform the review of the Code of Practice (CoP) for Aerial 1080 Application in Kea Habitat and associated work programmes. This report provides results and recommendations based on the analysis, reflects on key limitations of the study, and provides advice regarding a structured design to kea monitoring through future 1080 operations to enable robust risk assessment.

The results presented here describe the ecological risks of 1080 operations for kea. It is imperative that the risks are viewed in the light of benefits to kea of 1080 operations at the population level. The current results will contribute to a comprehensive kea population-level cost-benefit analysis of 1080 operations in the near future.

Methods

As per the previous approaches (Kemp et al. 2019, Kemp et al. 2022), this study used a logistic regression mixed effect model approach to test the extent to which factors affect the probability of kea mortality in 1080 operations. Potential risk factors related to individual kea and characteristics of the operations were tested. The differences and similarities between this study and the previous methodological approaches are detailed in Appendix 1.

Kea monitoring data from 29 aerial 1080 operations across 17 locations between 2008 and 2022 were used. Prior to each operation a varying number of kea were radio-tagged. The dataset also included birds that were already tagged and enrolled in long-term studies measuring productivity and survival, and that were present in an operational area during the time of the operation. For all kea, location data were collected at several time points during the operation using aerial or ground-based radio tracking. Since location data had varying levels of accuracy, a 1-km buffer was applied to the treatment boundaries. These point-in-time location data provide information that a bird was present in the area at that time, but they cannot be used to determine the period of presence within a certain area. The key risk period of a 1080 operation for kea is while the applied bait is toxic. The amount of rainfall affects bait toxicity, and after 100 mm of accumulated rain, the toxicity levels of 1080 bait are considered negligible (Poutu et al. 2021). Since non-toxic pre-feeding, which as the name suggests occurs prior to the toxic application, may affect the probability of mortality of kea, the date of first non-toxic prefeed is considered the start of the risk period. The risk period of any operation was defined as starting at the first non-toxic pre-feeding, and finishing when the bait had non-negligible toxicity levels (100 mm accumulated rain).

All monitored kea that were presence in the treatment area during the risk period were assumed to have a non-zero probability of encountering bait (i.e. there was a chance that

they could encounter bait in the landscape) and were included in the dataset assessed here. So in summary, inclusion criteria were hence standardised across operations as follows: for each operation, monitored kea were included for assessment of survival during that 1080 operation if they were observed within 1 km of the operational boundary during the time frame between the first prefeed and the days until 100 mm of accumulated rain.

At the end of each operation, the status of each kea was determined (alive/dead). This binary outcome was then modelled as a function of a series of previously identified or hypothesised risk factors (Appendix 1, Table A1_1 and A1_2). These included characteristics of individual kea (i.e. age, sex, known prior exposure to 1080) as well as operational characteristics (bait size, bait type, 1080 history at the site, proximity to previously defined 'scrounge site', number of prefeeds, seasonal timing, pellets per hectare). Hypotheses regarding the impact of the various variables are presented in Table A1_2. All fixed effects were additive. The combination of many variables of interest and relatively small dataset did not allow testing of interactions. To account for the non-independence of the birds that were observed within each operation, the operation code was included as a random effect. The inclusion of a nested Site/Operation random effect did not improve model performance. Non-independence of the observations of some individuals across multiple operations could not be dealt with through a random effect component as this led to convergence issues. This was therefore included as a fixed effect in the models, and analyses were also repeated when known pre-exposed birds were excluded (kea with unknown prior exposure, n = 271; compared with n = 318 for the full dataset, reported in Appendix 3).

I used a multi-model inference approach, where a 'global model' containing all the variables was constructed, and models containing all possible combinations of these variables were created using the *dredge* function in the "MuMIn" package in R (Bartoń 2023) and ranked using Akaike's Information Criterion corrected for small sample sizes (AICc). Effect sizes of the informative top models (ΔAICc ≤ 2, Burnham & Anderson 2002) were individually plotted, and also constructed into an 'average model', which averages the parameter estimates across multiple models using the model weights and avoids the issue of model uncertainty. Multicollinearity of explanatory variables of the top-ranked models were assessed using the *check_collinearity* function in the "performance" package (Lüdecke et al. 2021), and in all cases showed low correlation. Diagnostics of model fit included tests for the uniformity of residuals, dispersion and outliers using the "DHARMa" package (Hartig 2022). For all top models, these tests passed. Additional quantile regression on the residuals showed a small deviation in Q1 residuals in most of these models; however, overall quantile deviation was always non-significant, and no corrections were applied. The r.squaredGLMM function in the "MuMIn" package was used to determine the coefficient of determination for the top-ranking model (Bartoń 2023).

The testing of different contrasts of the variable '1080 History at the site' showed that models with three levels (not treated before, recently treated – within the last 3 years - and not recently treated – i.e. more than 3 years ago) were most strongly supported, although inclusion as just two levels (treated and not treated before) and four levels (never treated before, very recently, recently and not recently) also received some support (Appendix 2). Averaging models with different contrasts for the same categorical variable (i.e. History of 1080 at the site level described by 2, 3 or 4 levels) yields nonsensical results (Bartón 2023). I therefore selected the most informative variable as described in the top-ranking model that included this variable for model averaging. For completeness, the model selection table that also includes the various other categorisations is also presented (Appendix 2, Table A2_1).

sed under the Official Information Act

Marginal means and 95% confidence intervals1 of predictor variables in the averaged model were calculated using the *ref_grid* function of the "emmeans" package (Lenth 2023) with results averaged over the levels of the factors present in the original dataset. Predictor variables with confidence intervals that include zero can then be deemed uninformative (given the data and the candidate model set), while those with confidence intervals that exclude zero can be said to have a noticeable effect on the response variable (Grueber et al. 2011). The relative importance of each predictor variable was calculated as the sum of the AIC weights of each informative model that included that predictor.

To test the extent to which certain operations had leverage on the results, the functions *influence_mixed* and *infIndexPlot* functions (associated with the glmmTMB package) were used to check the presence of influential observations. First, for each of the top-ranking models, any individual operation with high Cook's D leverage was determined (defined here as: D > 4/(number of operations), Altman & Krzywinski 2016). The operation with the highest D was removed from the dataset and the full dredge process (as per the main analysis) was re-run, and the variable importance of the average model (ΔAICc ≤ 2) was calculated, as were the coefficients and confidence intervals of the top-ranking model (ΔAICc = 0) of the various subsets of data are presented. The main text provides a summary of this sensitivity analysis, and a more detailed methodology, and the full results are presented in Appendix 4.

Appendix 5 provides a summary of the operational data and operation-level risk factors used for the analyses.

Results

Kea survivorship was monitored using 271 unique birds through 29 aerial 1080 operations between 2008 and 2022; data included some kea being monitored across multiple operations (total kea * operation observations n = 318). In 16 of the 29 operations, all monitored birds (n = 115) survived. Across the other 13 operations, 49 deaths were recorded. Across all kea * operation observations, the mean mortality rate was 15.4%. However, the proportion of recorded kea mortalities varied greatly between operations, as did the sample size. It is therefore more pertinent to provide the average mortality rate at the operation-level, which equates to 13.4%. Mortalities occurred mostly within 3 days from the date that toxic bait was placed (39 out of 49 birds, or 80%; an additional five birds died within 5 days, and the remaining five birds died 8-12 days after the toxic bait was applied/sown). All deaths were attributed to primary 1080 poisoning, except one individual in Arthur's Pass West 2022 operation was concluded to have died from secondary poisoning (pers. comm. Laura Young).

These data from all kea observations (n = 318) from 29 operations of aerial 1080 treatment provided substantial support (ΔAIC ≤ 2) for 25 models with various potential risk factors. Models fitted the data reasonably well, with theoretical marginal R^2 (proportion of the variance explained by the fixed effects) of 0.36 for the top-ranked model; the operation random effect explained near-zero variance. While the models differed in the number of variables contained within them, the coefficient estimates for any given variable differed only slightly between the models (Figure A2_1). These models contained always contained a version of the History of 1080 variable, with the three-level variable obtaining the highest

[1] 95% confidence interval refers to range of values you expect 95% of your estimates to fall into if you were to repeat this study many times, if all the assumptions used to compute the intervals were met.

Released under the Official Information Act

weight sum (sum of Akaike weights = 0.75, see Table A2_1). The 18 models containing this variable were model-averaged, which allows for model uncertainty (i.e. you don't know which model is best), and can provide better estimates and more reliable confidence intervals than selecting and reporting only on the top model.

Three variables were present in all top-ranked models, had substantial effect sizes in the averaged model and their 95% confidence intervals did not cross zero, which means they are associated with the non-target mortality of kea in 1080 operations (Figure 1, see also Figure A2_1). In order of decreasing effect size, they were

- History of 1080 at the site (lower mortality risk in places with more recent previous 1080 operations compared with first-time treatments),
- Number of prefeeds (single prefeed was associated with lower mortality risk than double prefeed),
- Proximity to scrounge sites (sites remote from predefined scrounge sites had lower risk compared with sites closer to scrounge sites)[2] – note, in the current analysis Perth was categorised as a remote site, even though this is of intermediate distance).

Other variables were present in some of the top-ranking models (Table 1), and in the averaged model had *confidence intervals that crossed zero* (Figure 1). For each of these variables, the effect on kea mortality was small (particularly compared with the above-mentioned variables), and while there is some evidence that their effect is in one direction (e.g. higher risk for males compared with females) their confidence interval crossing zero indicates that, overall, their effect is uncertain (given the data and the candidate model set). These variables were, again in order of decreasing effect size:

- Bait type (Wanganui #7 bait showed an uncertain, slightly lower risk than RS5 – confidence interval includes zero),
- Previous exposure of individual kea to 1080 (as captured in the 1080 operation kea monitoring dataset) – overall, kea with known prior exposure to 1080 had an uncertain slightly reduced risk of mortality,
- Sex (males showed an uncertain, slightly higher risk than females),
- Bait size (6g baits had an uncertain, slightly higher risk than 12g baits),
- Breeding season (operations outside the breeding season had an uncertain, slightly higher mortality risk than those inside the breeding season),
- Repellent trial (overall, operations with bird repellent trials had an uncertain, slightly higher mortality risk than non-trial operations),
- Pellets per hectare (an uncertain effect where increased pellets/hectare slightly reduced mortality).

Kea age and 1080 site history modified at the kea individual level (see Discussion, section *Potential risk factors*) were not present in any of the top models (Table 1, see also Table A2_1).

Importantly, some of the above patterns changed when some operations were excluded from the dataset and the analyses were redone (see section *Sensitivity analyses* below).

[2] Note: the definition of scrounge site pertains to either <20 km (adjacent) or >40km (remote) from predefined sites. In the current analysis Perth was categorised as a remote site, even though this may also be described as one of intermediate distance.

sed under the Official Information Act

Department of Conservation
Te Papa Atawhai

Table 1. Model selection table of top-ranking models (ΔAICc ≤ 2) for all kea monitored through 29 aerial 1080 operations (n = 318). History 1080 F3 refers to the three-level history 1080 categorisation (never treated, recently treated, not-recently - > 3 years ago). Variables are presented in decreasing order of number of models in which they occur. '+' indicates that a categorical variable was present in the model, where a number provides the estimate for a numerical variable (pellets per hectare only, in this case). Coefficient estimates of these different models are shown in Figure A2_2.

Model	Scrounge Proximity	History 1080 F3	Number of Prefeeds	Sex	Bait Type	Kea 1080 Exposure	Bait Size	Repellent Trial	Pellets per Ha	Breeding Season	ΔAICc	df	LogLik	Weight	WeightSubset
1	+	+	+	+	+	+					0	9	-113.54	0.026	0.096
2	+	+	+	+	+						0.02	8	-114.61	0.025	0.095
3	+	+	+	+	+	+	+				0.64	10	-112.79	0.019	0.07
4	+	+	+	+	+	+		+			0.65	10	-112.8	0.019	0.069
5	+	+	+	+	+		+				0.79	9	-113.94	0.017	0.064
6	+	+	+	+		+					1.04	8	-115.12	0.015	0.057
7	+	+	+	+							1.14	7	-116.22	0.014	0.054
8	+	+	+		+	+					1.26	8	-115.23	0.014	0.051
9	+	+	+	+		+	+		-0.35		1.3	10	-113.13	0.013	0.05
10	+	+	+		+	+		+			1.37	9	-114.23	0.013	0.048
11	+	+	+		+						1.42	7	-116.37	0.013	0.047
12	+	+	+		+	+	+				1.45	9	-114.27	0.012	0.046
13	+	+	+	+		+	+				1.46	9	-114.27	0.012	0.046
14	+	+	+	+	+					+	1.5	9	-114.3	0.012	0.045
15	+	+	+	+	+			+			1.55	9	-114.32	0.012	0.044
16	+	+	+	+			+				1.7	8	-115.45	0.011	0.041
17	+	+	+		+		+				1.79	8	-115.5	0.01	0.039
18	+	+	+	+		+			-0.25		1.88	9	-114.48	0.01	0.037

sed under the Official Information Act

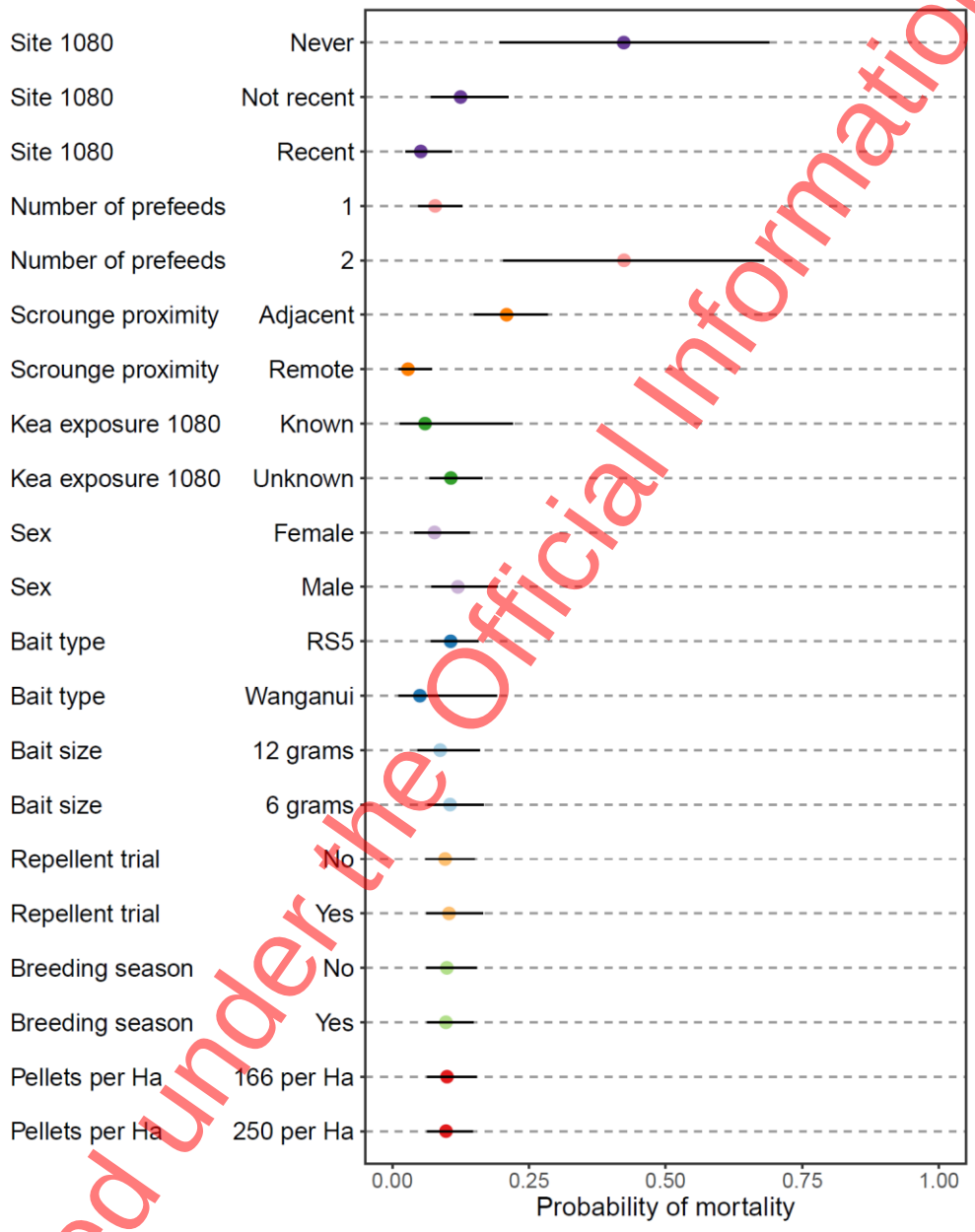


FIGURE 1. Marginal means and 95% confidence intervals of the variables included in the averaged model. Results are averaged proportionally over all the other variables in the dataset. Intervals were back-transformed from the logit scale.

Sensitivity analysis

Sensitivity analyses showed that a small subset of the 29 operations had substantial leverage on the results in terms of inclusion and importance of variables in the top-ranked models (i.e. FF08, OTT22, MT20, PE19, MA09, OTT22 and WJ20). Details are available in Appendix 4, but key results of the sensitivity analysis include:

- Importantly, two key risk-factors identified in the main analyses described above did not change: Scrounge proximity and History of 1080 at a site were *not* strongly affected by the in/exclusion of high-leverage operations, and remained important variables in all data subsets.

Released under the Official Information Act

For other variables, the importance (i.e. the summed weight of all the models that included each variable) did differ when certain operations were excluded (Figure A4_1). However, when a variable was retained, its estimated estimate for the top-ranking model was always similar in terms of direction and effect size to the main model (Figure A4_2). Notable results were:

- The importance of the number of prefeeds in the averaged model reported above appears to be very strongly driven by the MT20 operation; exclusion of this operation (without or in addition to subsequent high-leverage operations) resulted in the removal of the number of prefeeds as an important variable.
- The importance of bait type was very strongly dependent on which operations were removed (in particular, FF08 – where Wanganui #7 was used, or MT20, OTT22, or WJ20 which used RS5 baits).
- Sex and individual kea 1080 exposure both had a somewhat reduced importance when some of the operations were excluded but were still strong across all operations.
- Bait size had varying importance, becoming more *or* less important if some operations were removed.
- Exclusion of one of two operations (MA09 or OP14) resulted in a strong increase in importance of breeding season.

Discussion

This study confirmed previously identified risk factors of kea mortality through 1080 operations: distance to scrounge site and the history of 1080 at a site. Additional potential risk factors were also identified, including the number of prefeeds in an operation, exposure of individual kea known to have been present during previous 1080 operations, although these showed considerable uncertainty (see individual factors described below). The mechanisms that contribute to the patterns seen with distance to scrounge site and the history of 1080 at a site remain hypothetical, but the current analysis suggests that both individual-level and population-level processes may contribute to the reduced risk of mortality for sites and kea that have been more recently or previously exposed to 1080.

Below, I discuss (i) results and recommendations as they pertain to individual (potential) risk factors identified in the analysis, (ii) key limitations of the study, and (iii) provide advice regarding a structured design to kea monitoring to enable robust risk assessment.

Potential risk factors & risk factor-specific recommendations

- Aerial 1080 operations close to predefined **scrounge sites** carry higher mortality risk to kea than those further away (this study, Kemp et al. 2019, 2022). However, the mechanism that results in these patterns remains hypothetical (McLean et al. 2023). For example, is this effect of scrounging related the availability of food and/or human-kea interactions, and to what extent is this related to the intensity of human use/interactions? The current definition of scrounge site does not differentiate between, for example, Arthur's Pass village (people all year round) and Temple Basin (wintertime ski area). Moreover, the current delineations (closer than 20km to a scrounge site is labelled 'adjacent' and further away than 40km is classed as

sed under the Official Information Act

'remote') arose through a bimodal separation of the study birds of Kemp et al. (2019). It has not been further developed into a comprehensive model encompassing all places that kea live, and is unclearly defined (for example, is an operation adjacent if only one small part of the treatment area is closer than 20km, or does more the centroid of the treatment area need to be at that distance?). The original bimodal categorisation worked in Kemp et al. 2019 because it was based on the dataset at the time. However, subsequent operations/birds have been monitored without this consideration in mind, and the classification is now occurring at the operation level, no longer at the kea individual level.

  - *Recommendation*: to (i) revisit the definition of what constitutes a scrounge site, which could include different levels of food availability and/or human interactions, and to (ii) critically test this notion, with the aim to further understand the mechanisms involved that may contribute to the differential risk profiles (N. Gorman, in preparation; see also McLean et al. 2023).

- The mechanism through which **history of 1080 at a site** affects kea mortality has been hypothesised to relate to individual learned aversion or selection for innately cautious phenotypes (Kemp et al. 2019). While available data don't allow robust testing of these hypotheses and they are not mutually exclusive (i.e. they may both play a role), this study starts to somewhat differentiate between these hypotheses, by capturing the history of 1080 exposure at the site level (as done previously) as well as at the individual kea-level.

  In previous work, the time since the last 1080 operation at the site was described at different levels (see Table 2). In the current analyses, all different categorisations were tested, and a three-level variable (was the site never, recently or not recently treated?) was the most informative measure (featuring in 18 of the 25 top models), while the 4-level variable (differentiation between never, very recent, recent and not recent, see Table 2) or a simple binary variable (was the site ever treated before?) was also present in some top-ranking models. Sites with any previous treatment, and those with more recent treatment were associated with a lower mortality risk.

  To get some way to quantifying learned individual aversion, the analyses also included two other measures: firstly, the 1080 site history modified to a relevant kea-level measure: only if a kea was alive at the time of previous operation *at this site* can 1080 history be classified as very-recent/recent/not recent; if the kea was younger than the last 1080 operation at the site (i.e. had not actually experienced a previous operation at the site), would be classified as 'never'. Hence, although a kea may experience a 1080 operation at an adjacent or other site, this variable assumes that kea were only exposed to the 1080 operation at the same site. This individual-level variable was not selected in any of the top-ranking models, while the site level version was one of the most important variables. This suggests that there may be some site-level driver related to (the recency of) prior exposure. While this may relate to population-level selection of cautious individuals, as been suggested (Kemp et al. 2019), such a trend may also relate to confounding variables (e.g. if 1080 operations change the environment/habitat and subsequent mortality risk of kea, for example if possum control improves natural food supplies, which in turn reduces mortality risk of 1080 bait to kea).

  In contrast, the second **individual-level measure of prior known 1080 exposure**, i.e. whether or not an individual kea was known to have been exposed to previous operations, was an important variable in the average models. This is an

Sent under the Official Information Act

imperfect measure, as kea are only monitored in a small subset of 1080 operations, so it is almost certain that many more birds have been previously exposed to 1080 than our dataset suggests. Including, for example, birds at a site where monitoring did not occur during first treatment, but only during a subsequent operation. The data only allowed for a binary categorisation (known prior exposure vs not), rather than taking into account a more comprehensive number of known prior exposures. Nonetheless, there is some support that kea not known to have experienced a previous 1080 operation appear to have a slightly higher risk than those that with prior exposure, while other trends did not qualitatively differ (see Appendix 3). These results may mean that some learned (conditioned) individual aversion is occurring, although part of it will be a conditionality effect (i.e. only those kea that survive can be seen through multiple operations).

- *Recommendation*: in addition to the one-off monitoring of operations, the establishment of long-term core study sites will be invaluable, including sites that are to be first-time treated, and where the same set of kea are followed through multiple operations (e.g. using continuous GPS tracking, see 'robust monitoring' section below). Such an approach will allow a better understanding of the impacts of prior 1080 operations (known prior exposure) on mortality risk.

- The analysis also identified **prefeeding practice** as a potential risk factor, with a higher risk associated with double prefeeds. It is important to note that double prefeeding is not standard practise, and that this result was very strongly driven by one of the three operations where this practice was used (Matukituki 2020, 60% mortality). The other two operations (Perth 2019 Phase 1 and Perth 2019 Phase 2) had 14.3% and 0% mortality, respectively. Moreover, the Perth operations were part of a bird repellent trial, and followed each other by only a few weeks. Given this variability, and with kea monitoring through only three double prefeeding operations at this stage, data are not sufficient to allow a robust assessment of the cost-benefit of this practice.
  - *Recommendation*: additional data are required to robustly investigate the risks to kea (as well as its benefits) of different prefeeding practices. It is pertinent to require those operations with double prefeed to include kea monitoring (see section 'Robust monitoring' below).

- Other operational practices/characteristics - including **bait type, bait size, pellets per hectare,** and **timing of the operation** (breeding season) – each showed a small effect on mortality probability of kea but all with substantial uncertainty around the estimate (Figure 1). Some, (particularly bait type preference, bait size and breeding season) were sensitive to the dataset used (i.e. to the exclusion of certain operations).
  - *Recommendation*: additional data are required to robustly investigate the potential risks to kea (higher probability of mortality) as well as the benefits (e.g. lower mortality due to improved predator control) as a result of different practices. These need to be jointly assessed in a cost-benefit analysis. See sections 'Study limitations' and 'Robust monitoring' below for more details.

Released under the Official Information Act

- Other kea individual-level characteristics including **kea age and sex** were previously found to affect mortality probability of kea (Kemp et al. 2019, 2021). In the current study, only sex was identified as an important variable.
    - *Recommendation*: additional data are required to robustly investigate the potential risk profiles of kea of different ages and sex groups. Importantly, it is likely that there may be interactions between some of the operational practices and such kea groups, hence data should be gathered in such a way to robustly test these interactions over time. If methodology allows, adding whether an individual/pair is breeding would be an additional risk factor to assess. See section 'Robust monitoring' below.

Study limitations

The risk of any 1080 operation to a kea may be described as a function of the following:

(i) the probability of a kea encountering prefeed baits in the landscape,
(ii) the probability of a kea engaging with (and consuming) a prefeed bait (this is conditional upon (i), i.e. once a prefeed bait is encountered),
(iii) the probability of a kea encountering 1080 baits in the landscape,
(iv) the probability of a kea engaging with a 1080 bait (this is conditional upon (iii), i.e. once a toxic bait is encountered, and *may* be influenced by (i) and (ii)), and
(v) the probability of a lethal dose of 1080 toxin (this is conditional upon (iv), and also possibly moderated by (i) and (ii); the rate and quantity of consumption of a 1080 bait determines the dose, which together with the lethal dose of 1080 to kea, determines the probability of mortality)

This study, as previous approaches, has, by necessity, mostly assessed *the probability of a kea engaging with a bait (either prefeed (ii) or toxic (iv) bait)*. For example, variables such as age and sex of the kea, history of 1080 at a site (as a proxy for conditioned aversion or innate bait-shyness), and number of prefeeds are all hypothesised to affect the probability that a kea engages with a bait that it encounters. Some of the same variables of interest, such as sex, age and bait size may (also) influence *(v) the probability of consuming a lethal dose of 1080 bait* once engaged with the bait. In contrast, the closest we can currently get to accounting for *the probability of a kea encountering bait in the landscape (either prefeed (ii) or toxic (iv) bait)* is by using inclusion criteria and adding sowing rate (pellets per hectare) as a potential risk factor. Here, the inclusion criteria in the current approach were standardised: for each operation, radio-monitored kea observed through point-in-time locations within 1km of the treatment area buffer within the treatment period are included for risk assessment (the median number of days with observations during the risk period was 5, ranging from 1 – 37 days where kea locations were monitored). Unfortunately, we could not reliably use the frequency of observations within the treatment area and during the risk period in the analysis to estimate the probability of encounter.

Some of the kea in the dataset were part of a longer term monitoring study (that happened to be present during the time of an operation). Such longer time series, based on monthly collection of location data, could give a better picture of their usual home range – something poorly understood particularly for non-breeding juveniles. I investigated using these data as

sed under the Official Information Act

part of the current study, but the large variability in home range size, and uncertainties about the generalisability to all kea in the dataset, led this approach to be abandoned here. The study hence uses the point-in-time locations described above, and thus assumes an equal probability of encountering bait for all kea, although it is likely that this is not valid (e.g. some birds may have just used the treatment area temporarily and also accessed other non-treated areas, whereas others resided within it and solely moved within the treated area).

Methodological advances through GPS tracking could allow more continuous and accurate movement data. Acknowledging GPS tracking also has limitations, access to such movement data would allow estimation of the proportion of home range and time spent in certain habitats (e.g. below and above the treeline) that is treated with 1080 in any operation, potentially differentiated for sexes and life stages, and following multiple birds through multiple operations. These data could result in a vastly improved assessment of risk factors of 1080 operations.

The data upon which the above analyses are based were not gathered using a probabilistic sampling frame, and may be subject to selection bias both at the operation level and at the individual kea level. For example, it is likely that some operations had no chance of being included for monitoring, while others had high probability - however it is impossible to determine the probability of inclusion for any given operation. For example, in 2014, some remote operations in Kahurangi and South Westland were specifically selected with a view to test the scrounge hypothesis (J. Kemp, pers. comm.). While this in itself is useful as an exploration to test at those sites, if not sampled in a probabilistic manner, the results are not representative of all remote sites. Similarly, methods used to catch kea for tagging were not the same across operations (e.g. using a net projector or not), and may bias the sample, for example to contain more bold individuals (that are more likely to be caught) in some operations. Since the sampling probability is not equal and not defined across operations and across keas within an area, it cannot be assumed that the results presented here are generalisable to kea across 1080 operations around the South Island. Thus, rather than one of a wide scope inference, this study remains exploratory. For robust generalisation of risk factors across all operations, a more structured, ideally probabilistic, monitoring design is required (see section *Robust monitoring to inform 1080 operational practice* below).

Hence, if aiming to achieve the best possible outcomes for kea, the results of this (or other) risk analysis on kea mortality should not directly be implemented into management practices in the CoP or other guidelines. This is because the current analysis assessed only the *risks to kea of 1080 operations* in the dataset. It is imperative that these risks are viewed in the light of *benefits to kea of 1080 operations* at the population level (see e.g. Kemp et al. 2018), e.g. the benefits that control of predators may bring through reduced predation. Without analyses that also ascertain the benefits of operational practices aimed to increase efficacy of these pest control operations, it remains unclear whether an increased mortality risk may be offset by the increased productivity through reduced predation (Veltman & Westbrooke 2011). A full cost-benefit analysis of outcomes at the level of kea population hence needs to be undertaken. That is, population models need to be developed that incorporate both the probability and size of positive effects of 1080 operations on kea survival *and* the probability and size of negative effects of 1080 operations on kea mortality.

Released under the Official Information Act

Robust monitoring to inform 1080 operational practice

Despite its size and associated investment, this dataset allows exploration of only a few potential correlates, and interactions between variables could not be robustly tested. The current dataset of 29 operations contains many variables of interest at the operation and individual-level, and not all are sufficiently represented across the whole dataset. This resulted in large confidence intervals and high sensitivity to the in- or exclusion of certain operations. Moreover, the opportunistic approach with which (most) 1080 operations were monitored means that this study remains exploratory, rather than one with wide generalisability.

I hence recommend careful composition of an *a-priori* study design to monitor kea outcomes through 1080 operations. Rather than opportunistically monitoring a subset of operations, careful design will allow targeting of upcoming 1080 operations that fulfil certain criteria to fill established knowledge gaps effectively and efficiently, and result in a relevant scope of inference. The CoP can play an important role in supporting this.

Such a study design needs further development by various stakeholders, and should include, at the very least, details regarding the Why (objectives), What (sample design, includes where and when to sample), How (protocols and approaches) of monitoring:

Why? Clear objectives

- **Clear description of the objective(s) of the overall research programme**
    - For example, a key objective may be to generate positive population growth of kea through effective management of threats, including management of predators. Such an objective should include assessment of both negative (non-target kea mortality) and positive outcomes (e.g. increased reproductive success) (Veltman & Westbrooke 2011, Veltman et al. 2014).
- **What are the key knowledge gaps that will support operational management?**
    - The localised nature of existing data on post-1080 reproductive success and/or long-term population trends limits comprehensive assessment of population net-benefit of aerial 1080 operations.
    - Conceptual diagrams can help to make explicit the logic and assumptions, and causal relationships among components in the system, and provide the scientific foundation of the monitoring programme. Their development also aids understanding, what needs to be achieved and measured to demonstrate progress towards agreed objectives.
    - For example, the current study suggests that key operational considerations (including, but not limited to, prefeed and bait type) show considerable uncertainty in mortality risk and warrant further investigation to inform best-practice. Moreover, though perhaps more difficult to study, the contribution of conditioned bait aversion to the '1080 history' effect could be a key topic of interest.
    - The amount of time spent in an area during the risk period strongly determines the probability of encountering bait (and subsequent conditional probabilities leading to the ingestion of a lethal dose). The use of point-in-time observations of kea within the 1080 treatment area hampered the identification of operational risk factors.

sed under the Official Information Act

What? Sample design and approach

- **Representation across operations**
  - Monitoring even a sample of kea through every 1080 operation in kea habitat is expensive and logistically challenging if not impossible. Therefore, a sampling framework should be set up that ensures sampling with replication at the operation-level characteristics of interest. In order to infer the importance of risk-factors across a wide/full range of operations (wide scope of inference), ideally a probabilistic sampling frame is to be designed.
  - It is likely a higher priority to sample higher-risk operations with a higher mortality probability than those that are currently presumed lower-risk. 'Higher-risk' operations need to be predefined, and are likely to include those with previously identified risk factors (scrounge proximity, first time 1080 treatment etc), as well as those performed in areas with low population numbers.
  - Replication should also be considered at the various levels of other variables of known heterogeneity (even if not directly of research interest, e.g. scrounge proximity and site history of 1080 may be taken as a given risk factor, yet if an interaction between the effect of, for example, prefeed and history of 1080 is expected, then replication of different levels of prefeed needs to occur at sites of varying 1080 histories).
- **Representation at the individual kea level**
  - At each operation ensure that sufficient kea are being monitored. A larger number of monitored kea will provide a higher resolution survivorship estimate for any given operation (e.g. 10 kea will provide you with a 10% resolution). However, with limited resources, careful consideration of replication across operations *vs* replication at the operation-level (kea monitored per operation) is required. Inferences regarding general risk factors require substantial replication at the operation-level (see above).
  - It is likely pertinent to have a larger sample size (monitor more kea) in higher-risk operations (as has been the case).
  - Replication should be considered at various levels of other variables of interest or known heterogeneity across kea within an operation (including for example sex, previous exposure to 1080).
- **Long-term core study sites**
  - In addition to one-off monitoring of operations, it is pertinent to consider the establishment of long-term core study sites throughout the kea range. This should include (but not be limited to) sites that are monitored for at least one year (but ideally longer) prior to a first-time 1080 treatment. The same set of kea are followed through multiple operations over time (ideally using continuous tracking through GPS), and new individuals in the population are also added and then followed over time. As noted by Veltman & Westbrooke (2011), long-term population monitoring allows for quantitative assessment of the sign and rate of change in population size, and integrates non-target deaths and benefits of 1080 operations.

sed under the Official Information Act

- **Parameters of interest and covariates to be measured**
    - The development of the conceptual diagram will assist in the identification of the parameters of interest and covariates that need to be measured to allow evaluation of the overall objective of the programme.

How?

- **Monitoring protocols**
    - In addition to details on sample size per operation (see above), monitoring protocols should be developed that include, for example, (minimum) standards around the techniques used to capture, and tracking kea and other key considerations that allow robust measurement of the parameters of interest and covariates, and assessment of the outcomes across operations.
    - With respect to tracking methodology, I propose that continuous movement data through GPS tracking is crucial, because, in addition to providing general information on kea ecology, it will finally allow a crucial part of the risk analysis to be estimated, i.e. the probability of a kea encountering bait in the landscape.
- **Details of the analytical approach, and data management system**
    - It is important that requirements for data management and storage are determined and committed to, and that analytical approaches are outlined, prior to large implementation of any monitoring programme.

Acknowledgements

I would like to thank Kerry Weston, Josh Kemp, and Laura Young for their support, provision of data, fruitful discussions, and review of a draft of this report. I also thank Ian Westbrooke for helpful discussions and support.

References

Altman N, Krzywinski M. 2016. Analyzing outliers, influential or nuisance? Nature methods 13: 281-282. https://www.nature.com/articles/nmeth.3812

Bartoń K. 2023. MuMIn: Multi-Model Inference. R package version 1.47.5. https://CRAN.R-project.org/package=MuMIn

Blyth R. 2011. Comparative bait preference in captive Kea *(Nestor notabilis)*. Unpublished RMB Consultants Ltd report for Animal Health Board. 21p. https://doccm.doc.govt.nz/cwxv4/wcc/faces/wccdoc?dDocName=DOCDM-1103135

Brooks ME, Kristensen K, Van Benthem KJ, Magnusson A, Berg CW, Nielsen A, Skaug HJ, Maechler M, Bolker BM. 2017. glmmTMB Balances Speed and Flexibility Among Packages for Zero-inflated Generalized Linear Mixed Modeling. The R Journal, 9(2), 378-400. doi: 10.32614/RJ-2017-066.

Burnham KP, Anderson DR. 2002. Model selection and multimodel inference: a practical information-theoretic approach. 2nd edn. New York, Springer-Verlag. 488 p.

Grueber CE, Nakagawa S, Laws RJ, Jamieson IG. 2011. Multimodel inference in ecology and evolution: Challenges and solutions. Journal of Evolutionary Biology 24: 699–711.

Hartig F. 2022. DHARMa: Residual Diagnostics for Hierarchical (Multi-Level / Mixed) Regression Models. R package version 0.4.6. https://CRAN.R-project.org/package=DHARMa

Released under the Official Information Act

Kemp JR, Mosen C, Elliott GP, Hunter CM. 2018. The effects of the aerial application of 1080 to control pest mammals on kea reproductive success. New Zealand Journal of Ecology 42(2): 158–168.

Kemp JR, Hunter CM, Mosen C, van Klink P, Elliott GP. 2019. Kea survival during aerial poisoning for rat and possum control. New Zealand Journal of Ecology 43(1): 3351.

Kemp JR, Young L, McAulay J. 2022. An update on kea safety in aerial 1080 operations – 2022. Unpublished DOC report. https://doccm.doc.govt.nz/cwxv4/wcc/faces/wccdoc?dDocName=DOC-7129099

Lenth R. 2023. emmeans: Estimated Marginal Means, aka Least-Squares Means. R package version 1.8.4-1. https://CRAN.R-project.org/package=emmeans

Lüdecke D, Ben-Shachar MS, Patil I, Waggoner P, Makowski D. 2021. performance: An R Package for Assessment, Comparison and Testing of Statistical Models. Journal of Open Source Software, 6(60), 3139. https://doi.org/10.21105/joss.03139

Luey C. 2009 Preferences in captive Kea (*Nestor notabilis*) to Wangauiu7 and RS5 pre-feed cereal pellets. Unpublished Unitec negotiated study report. 43p. https://doccm.doc.govt.nz/cwxv4/wcc/faces/wccdoc?dDocName=DOC-6241691

McLean LRW, Goodman TF, Horton TW, Nelson XJ. 2023. Effects of proximity to humans on neophilia, foraging ecology and population structure of kea. New Zealand Journal of Zoology. https://doi.org/10.1080/03014223.2023.2274838

Poutu N, Fairweather AAC, Broome KG. 2021. Sodium Fluoroacetate Pesticide Information Review. Version 2021/3. DOC Unpublished report docdm-25427, p 134, Hamilton, New Zealand. https://doccm.doc.govt.nz/cwxv4/wcc/faces/wccdoc?dDocName=DOCDM-25427

Veltman CJ, Westbrooke IM. 2011. Forest bird mortality and baiting practices in New Zealand aerial 1080 operations from 1986 to 2009. New Zealand Journal of Ecology 35(1):21-29.

Veltman CJ, Westbrooke IM, Powlesland RG, Greene TC. 2014. A principles-based decision tree for future investigations of native New Zealand birds during aerial 1080 operations. New Zealand Journal of Ecology 38(1): 103-109.

Appendices:

Appendix 1: Comparison with previous approaches

Appendix 2: Model selection details

Appendix 3: Kea with known and unknown 1080 exposure

Appendix 4: Sensitivity of results to individual operations

Appendix 5: Summary of the data used

sed under the Official Information Act

Department of Conservation
Te Papa Atawhai

APPENDIX 1 – COMPARISON WITH PREVIOUS APPROACHES

Table A1_1. Details of the previous analysis approaches compared with the current work

Characteristic	Kemp et al. 2019	Kemp et al. 2022	This study
Modelling approach	Generalised linear mixed effect model	Generalised linear mixed effect model	Generalised linear mixed effect model
Number of operations	19	23 (additions: Hawdon 2017, 2019_1, 2019_2; Wet Jacket 2020)	29 (additions: Perth 2019_1 and 2019_2; Matukituki 2020, Otira-Taipo 2022, Arthurs Pass E 2022, Arthurs Pass W 2022)
Number of sites	12 (7 sites treated first time, 3 treated 2x, 2 sites 3x)	13 (8 sites treated first time; 3 treated 2x, 1 site treated 3x, 1 site 6x)	17 (10 sites treated for the first time; 5 sites treated 2x, 1 site treated 3x, 1 site 6x)
Excluded operations	None	Perth 2019 1 & 2, Matukituki 2020	None. Sensitivity to exclusion of individual operations tested
Response variable	Kea survived (1) or died (0) (binomial response, logit link)	Kea survived (1) or died (0) (binomial response, logit link)	Kea survived (1) or died (0) (binomial response, logit link)
Model selection	Dredge model combinations + AICc	Dredge model combinations + AICc	Dredge model combinations + AICc
Sensitivity tests	Yes, in/exclusion of 2 birds in Oparara 2014 operation	No	Yes. Sensitivity of results to in/exclusion of individual operations; sensitivity of including data for kea that were observed across multiple operations.
Which kea included for each operation	Variable – kea monitored for at least 3 weeks post operation. For some operations, kea observed beyond the operational area or months after the treatment period were included, for others not.	Variable – kea monitored for at least 3 weeks post operation. For some operations, kea observed beyond the operational area or months after the treatment period were included, for others not.	Spatial and temporal buffer defined: kea observed within 1km from the operational polygon between the time of 1st prefeed and the time of 100mm accumulated rainfall after the first day of toxic baiting
Number of unique kea monitored	205	247	271
Number of observations	222 (15 kea observed in 2 ops; 2 kea in 3 ops)	245	318 (39 kea observed in 2 ops; 4 kea in 3 ops)
Random effects	- Region (aggregated operations); - Kea-level repeated measure not included	- None; - Kea-level repeated measure not included	- Operation (level at which observations of kea are made) - A nested Region/Operation random effect was tested but did not improve model fit, so was not included in the final model - A kea-level repeated measure was not included (due to non-convergence). Instead known 1080 Exposure was added as a fixed effect, and data were separately analysed using (i) full dataset and (ii) excluding kea with known prior 1080 exposure.
Fixed effects	Additive only (no interactions)	Additive only (no interactions)	Additive only (no interactions)

sed under the Official Information Act

Department of Conservation
Te Papa Atawhai

Table A1_2. Details of the potential risk factors (fixed effects) assessed in the current work (and previous approaches)

Variable	Level	Hypothesis	Kemp et al. 2019	Kemp et al. 2022	This study
Age	Kea	Younger kea (in a phase of intensive learning and high behavioural flexibility) might be more susceptible to 1080 poisoning (Kemp et a. 2019)	3 levels: * 1st year (0-1 yr), * juvenile (1-2 yrs), * adult (≥3 yrs)	Simplified to 2 levels: * juvenile (<3 years) * adult (≥3 years)	Tested inclusion of Age as 2 or 3 level variables.
Sex	Kea	Dimorphic body size (females 750–800 grams, males 900–1050 grams) and/or breeding biology (adult males provide food to females) may result in sex differences in risk to 1080 (Kemp et al. 2019)	2 levels: F; M	2 levels: F; M	2 levels: F; M
Prior 1080 exposure	Kea	Repeated aerial 1080 operations may decrease risk of poisoning through creation of bait shy individuals (conditioned aversion) (Kemp et al. 2019)	-	-	2 levels: Naïve or pre-exposed. Is this the first operation for any given kea in which it has been monitored through a 1080 operation? Note: this only captures those operations in the dataset through which kea were monitored – clearly there are many other operations in which kea may have been exposed to 1080. Also ran models for the dataset containing only naïve kea.
1080 History	Site (i.e. kea population)	Repeated aerial 1080 operations may decrease risk of poisoning through selection for innately cautious phenotypes. This may also be through the creation of bait shy individuals (conditioned aversion – see below at kea level) (Kemp et al. 2019)	3 levels: * First time aerial 1080 treatment at site * 2-3 years after previous treatment; * Longer interval (also including partial block treatments)	Simplified to 2 levels: * Recent" short return time of 3 yrs or fewer since last 1080 * "Not recent" first treatment or return time ≥4 yrs Note! The Not recent level includes sites that have never been treated before and those that were treated > 4 years ago.	Tested inclusion of 1080 History as 2, 3, or 4 level variables: 2 levels as per Kemp et al. 2022; 3 levels as per Kemp et al. 2019; 4 levels: * Never * Not recent (>4 years since last operation) * Recent (3-4 years since last op) * Very recent (≤2 years since last op)
1080 History	Site / Kea	As above, but more directly testing the conditioned aversion hypothesis. Note! This assumes that kea were only exposed to 1080 operation(s) at the same site, and only through those operations in the dataset.	-	-	Only if a kea was alive at the time of previous operation at this site can 1080 history be classified as very-recent/recent/not recent; otherwise classed as 'never'. Tested inclusion as 2/3/4 levels tested (see 1080 history at site level).
Bait size	Operation	6 g or 12 g poison pellets with equal toxin concentration (1.5 mg g^{-1}). Larger baits (higher toxic content per bait) might elevate risk to kea when	2 levels of equal toxin concentration: * 6 g * 12 g	Not included - due to lack of support in Kemp 2019 and decreasing use of the larger bait size since 2009	2 levels of bait size (same toxin concentration): * 6 g * 12 g Note: Baits of 12g were used in 11 operations in the

sed under the Official Information Act

Variable	Level	Hypothesis	Kemp et al. 2019	Kemp et al. 2022	This study
		they interact with the bait (Kemp et al. 2019)			dataset, all prior to 2015; any effect captured by bait size is confounded with time
Bait type	Operation	Wanganui #7 carrot baits are hypothesised to have increased risk compared with RS5 cereal baits (Luey 2009; Blyth 2011)	-	Not included – since 2009, bait type has been restricted to cinnamon flavoured 'RS5' cereal pellets	Wanganui bait type was re-introduced in 2019, in the Perth operations. Tested 2 levels: RS5; Wanganui #7
Breeding season	Operation	Differential behaviour between the sexes during the breeding season (e.g. adult males foraging and feeding the nesting females) may incur increased risk for males	-	-	Did operation take place between July – Dec? 2 levels: Yes; No
Bird repellent	Operation	All kea repellent trials aim to reduce non-target risk to kea	-	-	2 levels: Yes; No (Was any type of bird repellent used? Note! different bird repellents may have different outcomes – this was not differentiated)
Home range	Kea x operation	Increased proportion of the home range that was subjected to 1080 operation will increase risk		-	Investigated, but not feasible with the data in the scope of the current study
Number of prefeeds	Operation	Prefeeding (the application of non-toxic cereal pellets prior to toxic application) is conducted specifically to achieve a greater mortality rate in target species. Double prefeeding (two separate applications of non-toxic cereal pellets) achieves yet greater mortality of pest species, but may also elevate the risk to non-target species	-	-	2 levels: single prefeed; double prefeed
Pellets per hectare	Operation	The number of pellets may increase probability of kea encountering and interacting with bait	-	-	Continuous variable (centred and scaled): Sowing rate (kg/ha) ÷ bait size (kg)
Sowing rate	Operation	Increased sowing rate increases amount of toxin in the landscape (at a given toxin concentration), which may increase risk	-	-	This variable was not included in the current analysis, instead its constituents were i.e. pellets/ha and bait size.
Scrounging		History of scrounging might increase 1080 poisoning risk due to learned neophilia and/or suppressed neophobia **>!** Note: in analysis this is	Distance of op to nearest predefined scrounge site, 2 levels: * remote ≥ 40km * adjacent ≤ 20 km	Distance of op to nearest predefined scrounge site, 2 levels: * remote ≥ 40km * adjacent ≤ 20 km	Distance of op to nearest predefined scrounge site, 2 levels: * remote ≥ 40km * adjacent ≤ 20 km - tested Perth both as a remote or adjacent site

sed under the Official Information Act

Variable	Level	Hypothesis	Kemp et al. 2019	Kemp et al. 2022	This study
		essentially expressed at an operational level.	* remote ≥ 40km * adjacent ≤ 20 km		- investigated whether all kea observations on record would allow scrounge level to be assigned to individual kea rather than whole operations (data insufficient)

sed under the Official Information Act

Department of Conservation
Te Papa Atawhai

APPENDIX 2 – MODEL SELECTION DETAILS

TABLE A2_1. Full table of top-ranking models (ΔAICc ≤ 2) for all kea monitored through 29 aerial 1080 operations (n = 318), including different categorisations of the Site 1080 History variable. Variables are presented in decreasing order of number of models in which they occur. Only the 18 models with the 3-level History 1080 variable (History 1080 F3: never treated before, recently treated, not recently treated) were averaged and reported on in the main text (see also Figure A2_1 below).

		Site 1080 History																
Model	Scrounge Proximity	History 1080 F3	History 1080 Before	History 1080 F4	Number of Prefeeds	Sex	Bait Type	Kea 1080 Exposure	Repellent Trial	Bait Size	Pellets per Ha	Breeding Season	ΔAICc	df	LogLik	Weight	WeightSubset
1	+	+			+	+	+	+					0	9	-113.54	0.01	0.072
2	+	+			+	+	+						0.02	8	-114.61	0.01	0.071
3	+	+			+	+	+	+		+			0.64	10	-112.79	0.007	0.052
4	+	+			+	+	+	+	+				0.65	10	-112.8	0.007	0.052
5	+	+			+	+	+			+			0.79	9	-113.94	0.006	0.048
6	+		+		+	+	+	+	+				0.92	9	-114.01	0.006	0.045
7	+	+			+	+		+					1.04	8	-115.12	0.006	0.043
8	+	+			+	+							1.14	7	-116.22	0.005	0.041
9	+		+		+	+		+	+		-0.35		1.22	9	-114.15	0.005	0.039
10	+	+			+		+	+					1.26	8	-115.23	0.005	0.038
11	+	+			+	+		+		+	-0.35		1.3	10	-113.13	0.005	0.038
12	+	+			+		+	+	+				1.37	9	-114.23	0.005	0.036
13	+	+			+		+						1.42	7	-116.37	0.005	0.035
14	+			+	+	+	+						1.42	9	-114.25	0.005	0.035
15	+	+			+		+	+		+			1.45	9	-114.27	0.005	0.035
16	+		+		+	+		+	+				1.46	8	-115.33	0.005	0.035
17	+	+			+	+		+		+			1.46	9	-114.27	0.005	0.035
18	+	+			+	+	+					+	1.5	9	-114.3	0.005	0.034
19	+		+		+		+	+	+				1.53	8	-115.37	0.004	0.034
20	+	+			+	+	+		+				1.55	9	-114.32	0.004	0.033
21	+			+	+	+	+	+					1.64	10	-113.3	0.004	0.032
22	+	+			+	+				+			1.7	8	-115.45	0.004	0.031
23	+		+		+	+		+					1.77	7	-116.54	0.004	0.03
24	+	+			+		+			+			1.79	8	-115.5	0.004	0.029
25	+	+			+	+		+			-0.25		1.88	9	-114.48	0.004	0.028

sed under the Official Information Act

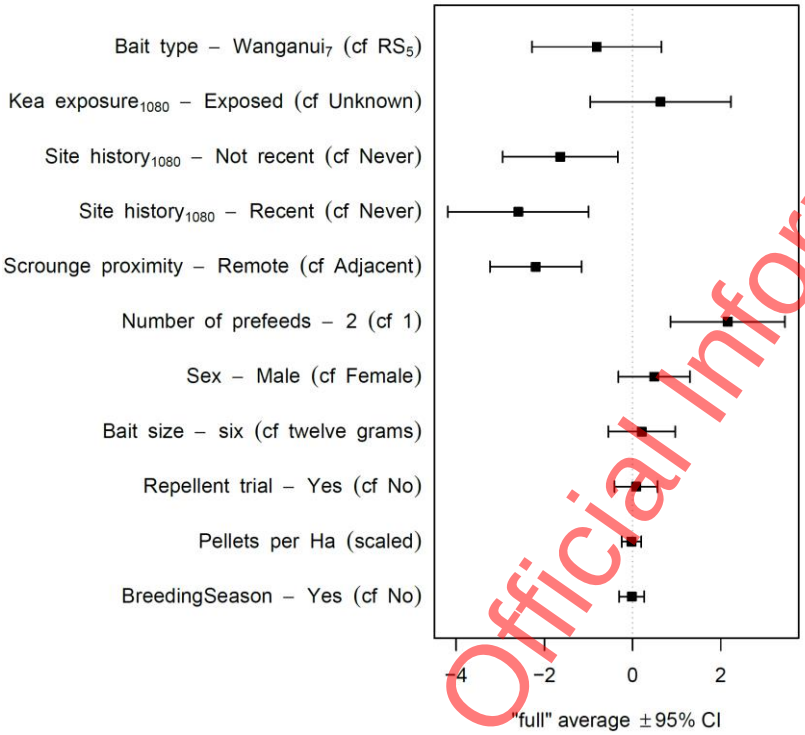


FIGURE A2_1. Model averaged coefficients (+/- 95% confidence interval) for risk factors for mortality of kea (all observations, n = 318). For each included variable, logit coefficient estimates are shown as the difference compared to the baseline level (in brackets), conditional on all the other variables.

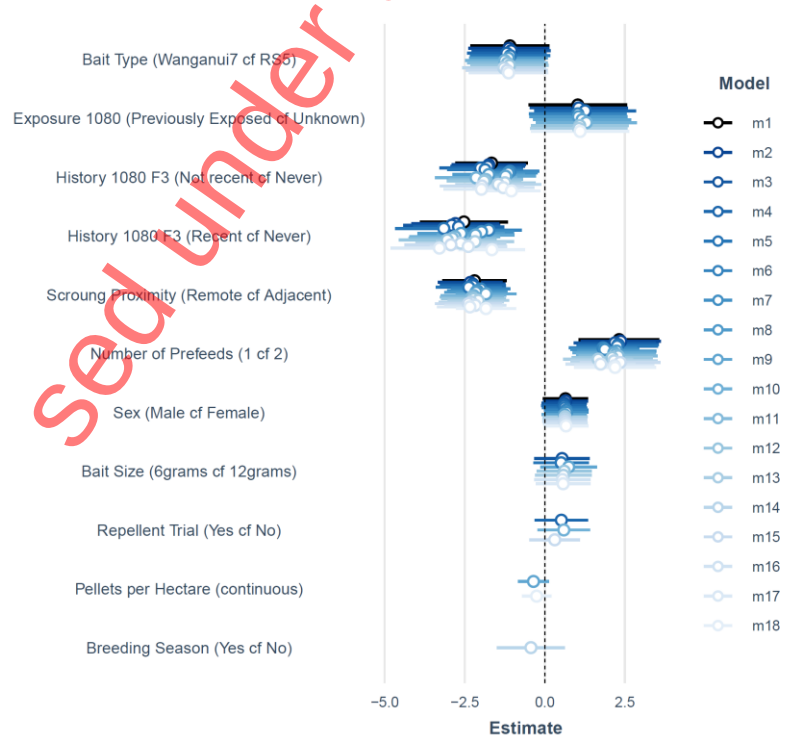


FIGURE A2_2. Coefficient estimates for the different variables in each of the 18 top-ranking models that used the History 1080 3-level factor (n = 318, 29 operations) and were used in the averaged model. Estimates are on the logit scale, and are presented as compared to their baseline level (indicated after the *cf* in brackets).

sed under the Official Information Act

Department of Conservation
Te Papa Atawhai

APPENDIX 3 – KEA WITH KNOWN AND UNKNOWN 1080 EXPOSURE

The full dataset of 318 kea observed through 29 aerial 1080 operations, contained 39 kea that were monitored through two operations, and 4 kea that were monitored through three operations. The conditionality that this imposes (a kea can only be included in the data subsequent times when it survived through an operation, not when it died), results in a violation of the assumption of non-independence and non-conditionality of observations. Due to issues with model convergence, this could not be accounted for by including a kea-level random effect, or other means. The small number of kea with known prior 1080 exposure (n = 43) also did not allow for a thorough risk assessment through several operations.

Going a small way to accounting for conditionality, the variable 'Kea 1080 exposure' was included in the models presented. For each kea in each operation in the dataset, this variable represents whether that individual bird is known to have been previously exposed to a 1080 operation, or not. It is important to note that we can only be certain about kea with a known previous exposure – as they were monitored multiple times and we know that they were at least exposed to one other operation. All other kea have an unknown prior 1080 exposure, which could mean that they were naïve to 1080 until the operation they were monitored through (i.e. first time encounters), OR that they were exposed to a 1080 operation that (a) was not part of the current dataset or (b) had other kea in the population monitored, but not that specific kea.

Prior exposure of kea to 1080 measured this way is an imperfect variable; nonetheless, it showed as an important variable in 16 out of 28 top-ranking models; the averaged model also showed some support for a reduced mortality risk for known prior exposed birds, compared to those with unknown exposure, although there was considerable uncertainty in the estimate. At this stage, we cannot say whether this pattern is related to an ecological phenomenon (e.g. individual bait shyness, learned aversion), or a statistical conditionality effect.

To reduce the potential impact of conditionality on the results as much as possible without knowing more about the movement history of the birds in the dataset, the same analyses as reported in the main text were conducted on the subset of kea of unknown exposure. Using the data from only those kea that were monitored through a 1080 operation for the first time (n = 271) showed that while these appeared to have an overall increased risk, coefficients and resulting inference for all potential risk factors were very similar to the full dataset (Figure A3_1, compared with Figure A2_1).

sed under the Official Information Act

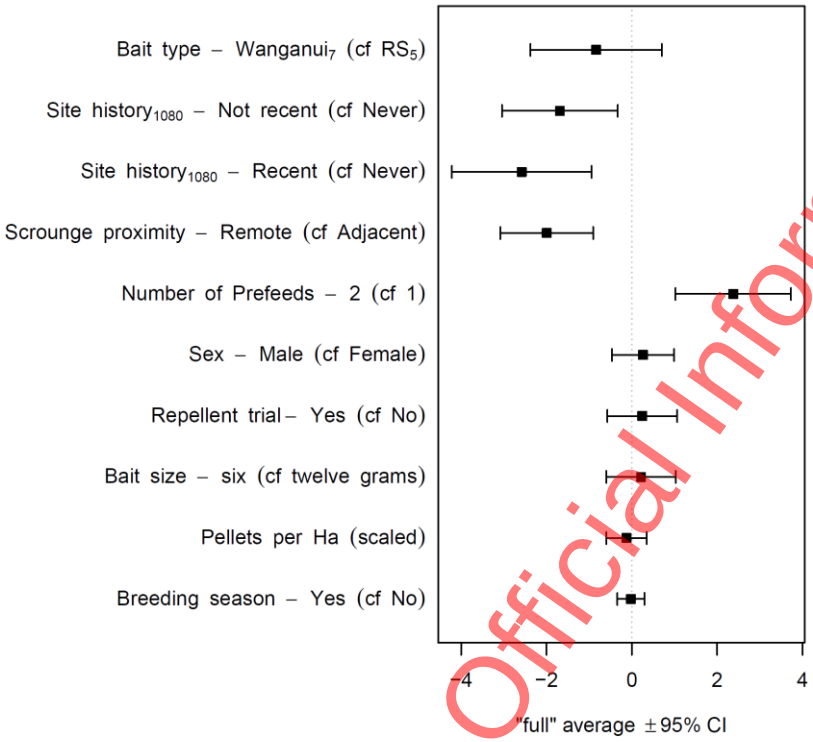


FIGURE A3_1. Model averaged coefficients (+/- 95% confidence interval) for risks for mortality of kea (only known first-time observations, n = 271). For each included variable, coefficient estimates are shown as the difference compared to the baseline level (in brackets) on the logit scale, conditional on the other variables in the model.

sed under the Official Information Act

TABLE A3_1. Variable importance in the different model sets. The most informative top-ranked models (ΔAICc ≤ 2) for all kea observations (n = 318) comprised 25 models. These modelled contained various contrasts of the History 1080 variable, with the three-level variable obtaining the highest weight sum (sum of Akaike weights = 0.75, 18 models) (labelled 'F3 models'). The dataset subset, excluding those kea with known exposure to 1080 (i.e. unknown kea, n = 271) resulted in 19 models, and 14 models, respectively. For each variable and each model set, the table shows the number of top-ranked models in which the variable is present, as well as the sum of the Akaike weights across those models.

	All kea observations (n = 318)				Unknown 1080 kea observations (n = 271)			
	All models		F3 models		All models		F3 models	
	weight sum	n models	weight sum	n models	weight sum	n models	weight sum	n models
Scrounge proximity	1	25	1	18	1	21	1	14
History 1080	1	25	1	18	1	29	1	13
History 1080 F3	0.75	18	1	18	0.69	14	1	14
History 1080 Before	0.18	5			0.28	6		
History 1080 F4	0.07	2			0.03	1		
Number of prefeeds	1	25	1	18	1	21	1	14
Sex	0.79	19	0.77	13	0.5	11	0.49	7
Bait type	0.68	16	0.71	12	0.63	12	0.67	8
Kea 1080 Exposure	0.64	16	0.57	10				
Repellent trial	0.27	7	0.16	3	0.55	12	0.39	6
Bait size	0.27	7	0.36	7	0.24	5	0.35	5
Pellets per Ha	0.1	3	0.09	2	0.34	8	0.28	5
Breeding season	0.03	1	0.05	1	0.03	1	0.05	1

sed under the Official Information Act

Department of Conservation
Te Papa Atawhai

TABLE A3_2. Summary table of top-ranking models (ΔAICc ≤ 2) for first-time monitored kea (i.e. those with unknown prior exposure) through 29 aerial 1080 operations (n = 271), including different categorisations of the Site 1080 History variable. Variables are presented in decreasing order of number of models in which they occur. For brevity, those variables that were included in the candidate model sets but not selected in the top models (see Table 1 in the main text) are excluded here. Only those models with History 1080 F3 (never, recent or not recent treatment of the site) were averaged and reported on above.

		Site 1080 History													
Model	Scrounge Proximity	History 1080 F3	History 1080 Before	History 1080 F4	Number of Prefeed	Bait Type	Repellent Trial	Sex	Pellets per Ha	Bait Size	Breeding Season	ΔAICc	df	LogLik	Weight	WeightSubset
1	+	+			+	+		+				228.33	8	0		0
2	+	+			+	+	+					228.38	8	0.05		0.002
3	+	+			+	+						228.52	7	0.194		0.009
4	+	+			+	+		+				228.61	9	0.276		0.012
5	+		+		+		+		-0.48			228.81	7	0.477		0.022
6	+	+			+	+				+		228.89	8	0.56		0.025
7	+		+		+		+	+	-0.46			228.94	8	0.613		0.028
8	+		+		+	+	+					228.94	7	0.614		0.028
9	+	+			+	+		+		+		229.08	9	0.748		0.034
10	+	+			+				-0.47	+		229.13	8	0.804		0.036
11	+		+		+	+	+	+				229.22	8	0.892		0.04
12	+	+			+			+	-0.45	+		229.33	9	1.001		0.045
13	+	+			+			+				229.92	7	1.59		0.072
14	+	+			+			+	-0.35			230	8	1.669		0.075
15	+	+			+	+	+				+	230.03	9	1.699		0.077
16	+	+			+		+		-0.45			230.04	8	1.716		0.078
17	+		+		+	+	+		-0.3			230.11	8	1.786		0.081
18	+	+			+		+	+	-0.43			230.12	9	1.791		0.081
19	+	+			+	+	+			+		230.17	9	1.839		0.083
20	+			+	+	+		+				230.18	9	1.846		0.083
21	+		+		+		+	+				230.29	7	1.959		0.089

sed under the Official Information Act

Department of Conservation
Te Papa Atawhai

APPENDIX 4. SENSITIVITY OF RESULTS TO INDIVIDUAL OPERATIONS

To test the extent to which certain operations had leverage on the results, the functions *influence_mixed* and *inflndexPlot* functions (associated with the glmmTMB package) were used to check the presence of influential observations. First, for each of the top-ranking models, any individual operation with high Cook's D leverage was determined (defined here as D > 4/(number of operations (Altman & Krzywinski 2016). First, the operation with the highest D was removed from the dataset and the full dredge process (as per the main analysis) was re-run, and the variable importance of the average model (ΔAICc ≤ 2) was calculated. For illustration, the coefficients and confidence intervals of the top-ranking model (ΔAICc = 0) of the various models are presented.

This was followed by an iterative process, where the next operation with the highest D > 0.4 was removed from the dataset and the full dredge process from the main analysis was re-run, before re-checking the Cook's D for remaining operations in the resulting top model (ΔAICc = 0), and repeating this step. For example, the top-ranking models (ΔAICc ≤ 2) for all kea showed that FF08 was a high leverage operation. Operation FF08 was removed from the dataset and all candidate models were re-run and ranked using ΔAICc. The resulted top-ranking model (ΔAICc = 0) was then assessed, and this showed that operation MA09 had a Cook's D > 0.4 – so this operation was removed as well, before re-running. While the intention of this process was to repeat this until none of the operations had high Cook's D. However, in almost all cases, the iterative process of removal of influential operations identified another highly influential operation, to the point that models no longer converged due to too small datasets.

I then compared the results after different high-leverage operation(s) were removed with the original results, in terms of the variable importance of all top-ranking models (Figure A4_1), and, for illustration, effect sizes and confidence intervals of each top model (Figure A4_2).

Cook's leverage analysis showed that operations FF08 and OTT22 had the highest leverage on the results in 14 and 4 of the top-ranked 18 models (in all cases D >> 4/(number of groups)). Another four operations also had substantial leverage on the results, in terms of inclusion and importance of variables in the top-ranked models (MA09, MT20, PE19, and WJ20; see Figure A4_1 caption for operational code abbreviations used, and Table A5_1 for operational characteristics). For each of these operations, we ran an iterative sensitivity analysis, removing operations with high Cook's D and re-running the main analysis until no high-influence observations remained. However, in almost all cases, the iterative process of removal of influential operations identified another highly influential operation. Results of removal of up to 3 operations are presented here, but in almost all cases, additional highly influential operations were identified in the models. This is an indication that the stability of the overall models leaves something to be desired, as is showcased by the differences in the importance of the variables in the averaged models.

Importantly, the importance and effect size of two variables in the main analyses (Scrounge proximity and History of 1080 at a site) were *not* strongly affected by the in/exclusion of high-leverage. For other variables, the importance of variables did differ (Figure A4_1), but *when variables were retained*, coefficient estimates for the top-ranked models were always similar in terms of direction and effect size. Figure A4_2 shows coefficient estimates for the first, i.e. top-ranking, model for each subset analysis.

Released Under the Official Information Act

Notable results of the sensitivity analysis were:

- Scrounge proximity *and* History of 1080 at a site were *not* strongly affected by the in/exclusion of high-leverage operations, and remained important variables in all data subsets.
- The importance of the number of prefeeds in the averaged model reported above appears to be very strongly driven by the MT20 operation; exclusion of this operation (without or in addition to subsequent high-leverage operations) resulted in the removal of prefeeds as an important risk variable.
- Sex and kea 1080 exposure both had a somewhat reduced importance when some of the operations were excluded, but were still strong across the board.
- The inclusion of bait type was strongly dependent on whether one of four operations were removed (FF08 – where Wanganui #7 was used, or MT20, OTT22, or WJ20 which used RS5 baits). Excluding one or more of these operations resulted in a strong drop in importance of bait type.
- Bait size had varying importance, becoming more important when OTT22 (which used 6 gram baits) was removed, and less important if MA09 or PE19 or WJ20 were omitted (which used 12, 6 and 6 gram baits, respectively).
- Exclusion of the MA09 or OP14 operations resulted in a strong effect of breeding season on mortality risk, with a lower risk of mortality in operations that occur within the breeding season (Jul-Dec).
- Repellent trial had higher variable importance than the reported average model if any of the identified high-leverage operations were removed.
- Pellets per hectare had higher variable importance when OTT22, PE19 or a combination of other operations was removed.
- Overall, age remained an unimportant variable, although it increased somewhat when some operations were removed.

sed under the Official Information Act

Sec under the Official Information Act

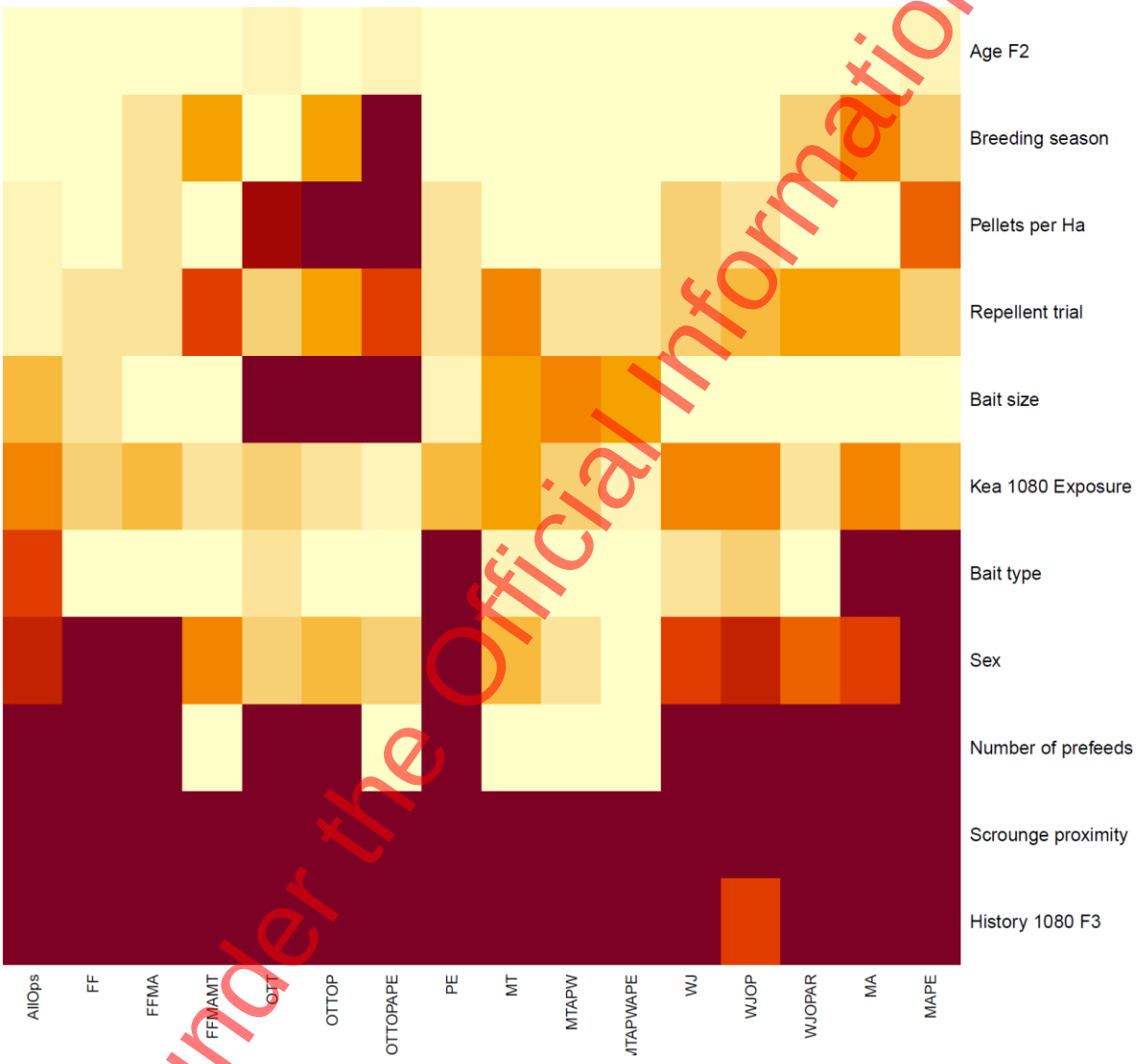


FIGURE A4_1 Sensitivity of the all-kea dataset (n = 318) to the exclusion of certain operations. Heat map showing the variable importance for all operations ("AllOps", left-most column) for all kea (n = 381) showing those subsets of models that use the categorisation of the History 1080 as 3-level factor (Never/Not recent/Recent). The heat map shows the importance of variables (rows) in the top-ranked models (ΔAICc ≤ 2) for different datasets (columns). The first column represents the all operations (i.e. full dataset "AllOps"), and the following columns each show the results when certain operations are dropped ("FF" uses all data, except those from the Fox-Franz 2008 operation). The intensity of the colour reflects the importance (i.e. darker colours represent variables which have an overall higher AICc weight sum across all the top-ranked models; for example, scrounge proximity has a variable importance of 1.0 for all datasets shown here, whereas Bait size has an importance of 0 for several datasets, but high importance when OTT (by itself or with other operations) are excluded. OpCodes: FF: Fox-Franz 2008, MA: Mt Arthur 2009; MT: Matukituki 2020; OTT: Otira-Taipo 2022; OP: Oporara 2014; APE: Arthurs Pass East 2022; PE19: Perth Phase 1 2019; APW: Arthurs Pass West 2022; WJ: Wet Jacket 2020; AR: Abbey Rocks 2014. Combinations of excluded operations that resulted in non-convergence in models are excluded here.

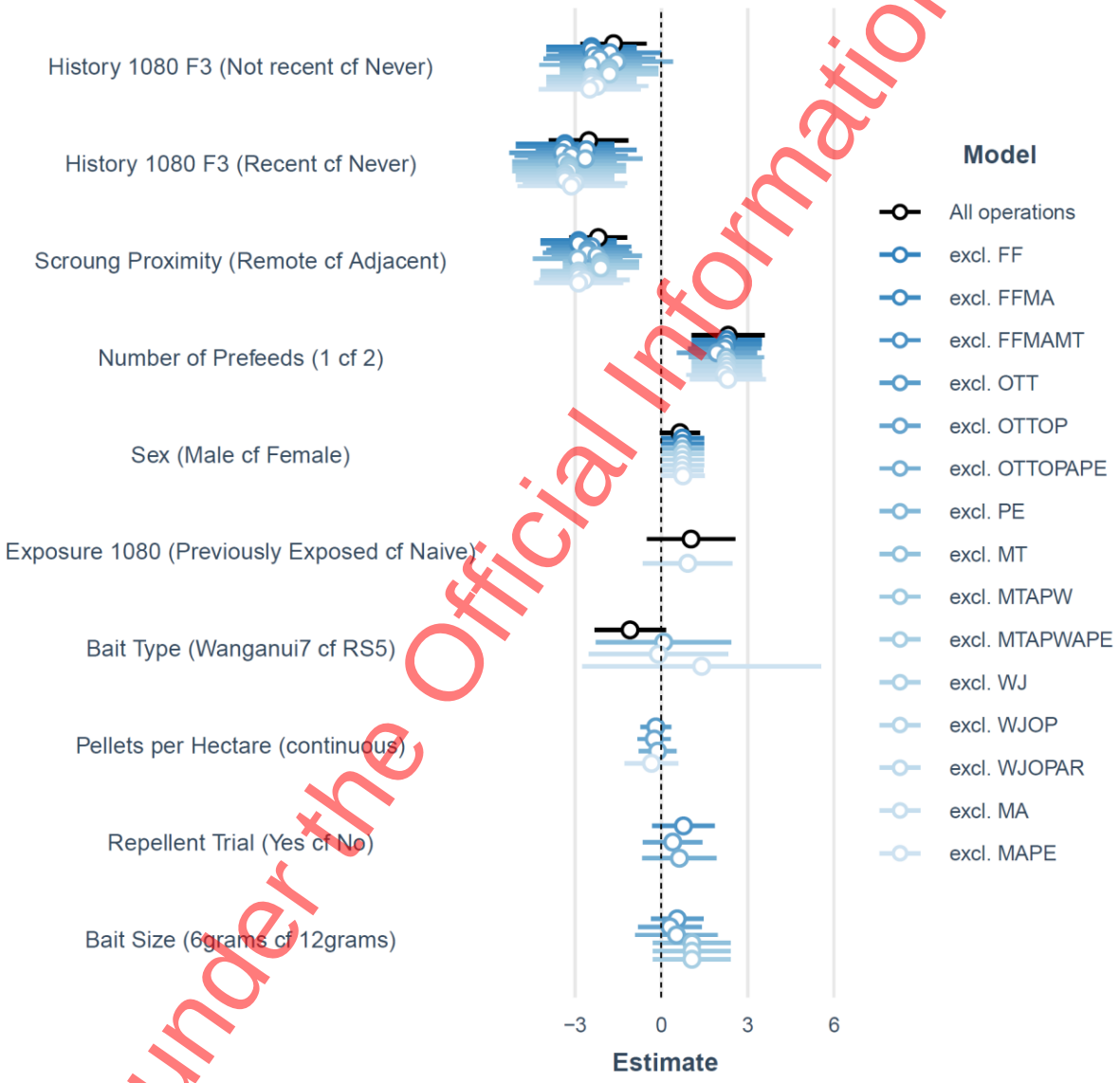


FIGURE A4_2. Coefficient comparisons of the top-ranked model that includes all operations, and those were one or more operations were excluded. Presented is, for illustration purposes, only one model (the top-ranked model) for each dataset; in contrast, the average model (for which variable importance is presented in Fig. A4_1) contains all models with ΔAICc ≤ 2. For each included variable, coefficient estimates are shown as the difference compared to the baseline level (in brackets) on the logit scale, conditional on the other variables in the model. See Fig. A4_1 for operation codes used.

Sec under the Official Information Act

APPENDIX 5 – SUMMARY OF DATA USED

Table A5_1. Summary of data from 29 aerial 1080 operations used in the analysis. See Table A1_2 for a description of the potential risk factors (fixed effects) tested.

Operation	Op Code	# Kea ob-served	Mor-tality (#kea)	Mor-tality (%)	Age (First-year/Juve-nile/Adult)	Sex (M/F)	Days until 100 mm rain	Number of prefeeds	Bait size (g)	Pellets /Ha	Bait Type	Scrounge proximity	Breeding season	Repel-lent trial	Years since 1080	Site 1080 History (Before/F2/ F3/F4)
Abbey Rocks 2011	AR11	8	0	0.0	0/1/7	4/4	7	1	12	167	RS 5	Remote	TRUE	No	2	TRUE/Recent/ Recent/VeryRecent
Abbey Rocks 2014	AR14	20	1	5.0	1/1/18	11/9	7	1	6	167	RS 5	Remote	TRUE	No	3	TRUE/Recent/ Recent/Recent
Anatoki 2014	AK14	2	0	0.0	0/0/2	1/1	15	1	6	167	RS 5	Remote	TRUE	No	5	TRUE/NotRecent/ NotRecent/NotRecent
Arawhata 2008	AW08	4	0	0.0	0/1/3	3/1	2	1	12	333	Wanganui #7	Remote	FALSE	No	4	TRUE/Recent/ NotRecent/Recent
Arthurs Pass East 2022	APE22	26	4	15.4	3/15/8	16/10	49	1	6	250	RS 5	Adjacent	FALSE	No	2	TRUE/Recent/ Recent/VeryRecent
Arthurs Pass West 2022	APW22	22	4	18.2	1/1/20	16/6	6	1	6	250	RS 5	Adjacent	TRUE	Yes	3	TRUE/Recent/ Recent/Recent
Copland 2012	CP12	2	0	0.0	0/0/2	0/2	11	1	12	167	RS 5	Adjacent	TRUE	No	6	TRUE/NotRecent/ NotRecent/NotRecent
Fox-Franz 2008	FF08	17	6	35.3	0/13/4	11/6	32	1	12	208	Wanganui #7	Adjacent	FALSE	No	NA	FALSE/NotRecent/ Never/Never
Hawdon 2009	HV09	10	0	0.0	2/3/5	5/5	15	1	6	333	RS 5	Adjacent	TRUE	No	3	TRUE/Recent/ Recent/Recent
Hawdon 2012	HV12	6	0	0.0	0/1/5	0/6	21	1	12	167	RS 5	Adjacent	TRUE	No	3	TRUE/Recent/ Recent/Recent
Hawdon 2014	HA14	4	0	0.0	0/0/4	0/4	24	1	6	167	RS 5	Adjacent	TRUE	No	2	TRUE/Recent/ Recent/VeryRecent
Hawdon 2017	WM17	4	0	0.0	0/0/4	1/3	56	1	6	333	RS 5	Adjacent	TRUE	No	1	TRUE/Recent/ Recent/VeryRecent
Hawdon 2019	HP19	6	0	0.0	1/1/4	3/3	6	1	6	500	RS 5	Adjacent	TRUE	No	2	TRUE/Recent/ Recent/VeryRecent
Hawdon 2019_2	HP19_2	6	1	16.7	1/1/4	3/3	8	1	6	250	RS 5	Adjacent	TRUE	No	0	TRUE/Recent/ Recent/VeryRecent
Matukituki 2020	MT20	10	6	60.0	0/0/10	5/5	15	2	6	250	RS 5	Adjacent	FALSE	No	3	TRUE/Recent/ Recent/Recent
Mt Arthur 2009	MA09	12	0	0.0	0/3/9	10/2	5	1	12	167	RS 5	Remote	FALSE	No	NA	FALSE/NotRecent/ Never/Never
Mt Arthur 2014	MA14	5	0	0.0	0/2/3	5/0	26	1	12	167	RS 5	Remote	TRUE	No	5	TRUE/NotRecent/ NotRecent/NotRecent

sed under the Official Information Act

Table A5_1 continued

Operation	Op Code	Kea Ob-served	Mor-tality	Mor-tality (%)	Age (FY/Juv/Ad)	Sex (M/F)	Days until 100 mm rain	Number of prefeeds	Bait size	Pellets /Ha	Bait Type	Scrounge proximity	Breeding season	Repel-lent trial	Years since 1080	Hist1080 (Before/F2/ F3/F4)
Okarito 2011	OK11	36	8	22.2	5/9/22	18/18	8	1	12	167	RS 5	Adjacent	TRUE	No	13	TRUE/NotRecent/ NotRecent/NotRecent
Oparara 2014	OP14	5	2	40.0	2/0/3	2/3	10	1	12	167	RS 5	Remote	TRUE	No	NA	FALSE/NotRecent/ Never/Never
Oparara 2016	OP16	3	0	0.0	0/0/3	1/2	8	1	6	250	RS 5	Remote	TRUE	No	2	TRUE/Recent/ Recent/VeryRecent
Otira-Taipo 2022	OTT22	28	7	25.0	2/10/16	17/11	20	1	6	167	RS 5	Adjacent	TRUE	Yes	9	TRUE/NotRecent/ NotRecent/NotRecent
Otira 2013	OT13	11	4	36.4	0/2/9	7/4	6	1	12	167	RS 5	Adjacent	TRUE	Yes	8	TRUE/NotRecent/ NotRecent/NotRecent
Perth Phase 1 2019	PE19	14	2	14.3	0/2/12	5/9	12	2	6	667	Wanganui #7	Remote	FALSE	Yes	5	TRUE/NotRecent/ NotRecent/NotRecent
Perth Phase 2 2019	PE19_2	13	0	0.0	0/2/11	6/7	9	2	6	333	RS 5	Remote	TRUE	Yes	0	TRUE/Recent/ Recent/VeryRecent
Rotoiti 2014	RT14	2	1	50.0	0/0/2	1/1	24	1	6	167	RS 5	Adjacent	TRUE	No	NA	FALSE/NotRecent/ Never/Never
Wangapeka 2011	WG11	13	0	0.0	0/2/11	8/5	10	1	12	167	RS 5	Remote	TRUE	No	5	TRUE/NotRecent/ NotRecent/NotRecent
Wangapeka 2014	WG14	8	0	0.0	2/1/5	3/5	15	1	6	167	RS 5	Remote	TRUE	No	3	TRUE/Recent/ Recent/Recent
Wangapeka 2016	WG16	15	0	0.0	1/0/14	6/9	11	1	6	250	RS 5	Remote	TRUE	No	2	TRUE/Recent/ Recent/VeryRecent
Wet Jacket 2020	WJ20	6	3	50.0	0/0/6	6/0	23	1	6	250	RS 5	Remote	FALSE	No	NA	FALSE/NotRecent/ Never/Never

sed under the Official Information Act

Reference Number	Type	Status	Case_Type	City	Date_Sent	Animal_Identification	Animal_Location	Animal_Location_Type	Animal_Location_Details	Animal_Breed	Animal_Sex_Classification	Animal_Age_Classification	History_Details	Findings_Gross	Findings_Post_Mortem_Date	Histopathology_Results	Clinical_Pathology_Results	Diagnosis	Diagnosis_Comments
61104	Post Mortem	Final	Other	Christchurch	6/09/2022	No leg band	Mainland Reserve	Wild	Franz Josef	Kea	Female	Juvenile	Sent over Franz Josef as weak and thin. Suspected lead poisoning. Lead low. Anorexic, reduced range of motion stifles and hip, particularly left side. Capillarria ++++, x-rays, distal femoral changes, severe changes hips stifles and one elbow, ate well with pain relief, decided to euthanaise, 23/08/2022.	The kea weighed 550 grams and was in poor body condition, with reduced pectoral muscle mass and minimal body fat reserves. The joint capsule of both coxo-femoral joints was markedly thickened with bands of fibrous tissue. The femoral head, trochanter and acetabular articular cartilage was dull yellow and granular to pitted; both round ligaments were intact. There was new bone formation around the femoral neck and trochanter (bilateral) Both stifles were fixed in ~45 degree flexion. The joint capsule of both stifle joints was markedly thickened with bands of fibrous tissue. Both joint spaces were largely obliterated and the small amount of articular cartilage present was dry and dull yellow. There was marked proliferation of new bone resulting in fusion of both stifle joints. The liver was diffusely pale.	26/08/2022	Liver: hepatocytes have diaphanous cytoplasm and also contain small amounts of iron. Sections of lung, spleen, kidney show no obvious abnormalities.		Euthanasia Severe bilateral osteoarthritis of the stifle and coxo-femoral joint	The changes to the joints of the hips and stifle were severe and chronic. Histology of the affected joints was a nightmare to try and interpret, but there were small pockets of ongoing inflammation, and although no bacteria were cultured from one of the affected hips, and the fact that multiple joints were affected, an initial bloodborne infection seems most likely. The changes to the stifles were so severe that both joints had fused and were subsequently fixed in flexion. Addendum: there was a growth of Staphylococcus aureus from an enrichment culture of the joint swab (hip). This supports an infectious cause as the inciting event for the severe osteoarthritis of multiple joints.
64169	Post Mortem	Pending	Other	Christchurch	27/11/2024	Junior White DP on Rd. Bands V4034	Mainland National Park	Wild	Arthurs Pass	Kea	Unknown	Subadult	Pb poisoning as juvenile 2 years ago, Pb 2.23mg/L, poorly responsive to fluids, initial and later I/V assist, vomiting. 1 round of chelation, deteriorated died, emaciated, lungs ok, proventric dis ended with fur trichobezoar with radiodense flecks, treated for bacterial crop infection.						
60165	Post Mortem	Final	Other	Lake Hawea, Wanaka	21/10/2021	N/A	Mainland National Park	Wild	Makarora, Mt Aspiring National Park	Kea	Male	Adult	N/A. The body was found next to an A12 possum trap and it is suspected that the trap killed the kea. Found at about 400m altitude, no snow on the ground. There has been recent storm activity.	The male adult kea is in good body condition, with adequate muscle mass and fat reserves (total body weight 1.065 kg). The carcass is submitted for gross postmortem examination frozen and left to thaw. Marked postmortem changes are present with numerous carrion beetles and larvae infesting the carcass. There is a diamond-shaped (1 x 1.2 cm) penetrating wound over the skull. The skin over this area is discontinuous, and there is moderate subcutaneous haemorrhage. Removal of the skin reveals a fracture involving the frontal and parietal bones, with internal displacement of the fractured bone segment. Examination of the coelom reveals marked decomposition of the coelomic viscera. No other gross lesions present elsewhere.	21/10/2021	There is marked autolysis of the tissues examined. No overt lesions present in the testes (1), heart (1), lung (1), kidneys (2), and liver (2).	Liver lead level: 0.042 mg/kg NZVP CASE NO : P21013975	Traumatic skull fracture	The skull lesion present in this case confirms the suspicion that this kea died due to a traumatic incidence involving a possum trap. There were no other obvious gross lesions present, and the bird was in good body condition. Although tissue preservation was not optimal for microscopic examination, there are no overt lesions to suggest an underlying disease process in this bird. The level of lead in the liver was low and would not have adversely impacted on the health of this bird.
64659	Post Mortem	Preliminary	Other	Christchurch 8051	10/04/2025		Mainland National Park	Wild	Franz Josef	Kea	Male	Juvenile	Found in Franz Josef town pale, able to hear heart over whole bid, ate food first day. S/C fluids and blood tests. PCV 2. WBC count 40-50 x 109. GA for full X-rays, IV catheter-died under GA. Looks like air sac disease, suspect aspergillosis.	The unknown age Kea is in moderate body condition, with slight atrophy of the pectoral muscles (body weight 620 grams). The most significant gross findings are present in the lung and air sacs. The lung parenchyma is diffusely congested and there are multifocal 2 mm firm white nodules throughout the parenchyma. The anterior and posterior air sacs are thickened and lined by a thin pale-yellow pseudo membrane. No other gross lesions present elsewhere.	4/04/2025		Liver lead level: 0.110 mg/kg IDEXX CASE NO : P25003869	Mycotic (fungal) pneumonia and air-sacculitis	The level of lead in the liver was low.
62842	Post Mortem	Final	Department of Conservation	Arthurs Pass	3/11/2023	V4205 V Band	Mainland National Park	Wild	Deaths Corner Otira Viaduct, North canterbury	Kea	Male	Juvenile	Recently banded, no issues noted. Warm day conditions over recent days with temperatures exceeding 20 degrees.	The male juvenile Kea is presented death in moderate state of preservation, and good body condition, with good muscle mass and adequate fat reserves (total body weight 917 gr). There is no evidence of external trauma. Legs have green bands (V Band V4205). Examination of the coleom reveals markedly distended intestinal loops, with numerous intraluminal up to 20 cm in length tapeworms (suspected Pulluterina nestoris). Examination of the intestinal mucosa reveals multifocal, patchy areas of mucosal reddening and accumulation of mucus. There is a moderate amount of soft (pasty), brown ingesta in the proventiculus and ventriculus. The wall of the ventriculus is diffusely thinned (2 mm). No other gross lesions present elsewhere.	3/11/2023	Liver (2). Diffusely, hepatocytes have a feathery cytoplasm. Spleen (2). Multifocally, macrophages contain a yellow-brown granular material in the cytoplasm. The material is negative on Perls iron stain. Bursa (3). Multifocally, the lumen of bursal follicles is distended and contains a pale homogenous purple material. In some follicles, there is crystalline material within the lumen surrounded by the same pale purple material. Intestine (4). A few cross-sections of parasites and eggs are present in the lumen. No lesions present in the heart (1), lungs (1), liver (2), kidney (2), testes (2), spleen (2), trachea (3), thyroid gland (3), crop (5), ventriculus (5), crop (5) and brain (5).	Liver lead level: 0.400 mg/kg IDEXX CASE NO : P23011343	Hepatic glycogenosis Intestinal parasitism Bursal atrophy	Unfortunately, the ultimate cause of death in this kea could not be established. The kea was in good body condition with no evidence of trauma. Histological evaluation of the tissues examined revealed no significant changes either. The severe parasite burden is somewhat puzzling, but little information is available on the clinical significance of this parasite in this species. Severe infections may be the result of immunocompromise. The degree of bursal atrophy is likely consistent with normal bursal regression and lead analysis on the liver revealed a low concentration. Toxin exposure is still a possibility to be considered in this case.
59182	Post Mortem	Final	Department of Conservation	Te Anau	30/10/2020	'Herb' V-1456	Mainland National Park	Wild	Milford Sound	Kea	Male	Adult	Picked up off roadside at 8pm on 27/10/20. Weak, unbalanced, vomiting, chewing and making hissing sound. Drinking and sleeping. Eating carrot, apple, banana very slowly. Brought to the Dunedin Wildlife Hospital on 28/10/20. Crop feels full and spongy and bird very weak on admission examination. No food since 8:30am as crop seemed to remain full. Died the same day.	The bird was in poor body condition score with reduced pectoral muscle mass and a body weight of 681 grams. Within the cranioventral portion of the left lung lobe, the parenchyma was light brown. A moderate amount of foamy fluid oozed on cut section of both lungs, however both lungs did float in formalin. The crop was markedly distended with a mixture of contents, mostly fruit. On the dorsal aspect of the cranial, middle and caudal lobes of both kidneys were circular masses invading the parenchyma between 2-3 mm in diameter, appeared slightly pale and firm on cut section. There was a small amount of dark brown fibrous material and melaena in the proventriculus and ventriculus. All other organs appeared grossly normal.	30/10/2020	Liver (d). Approximately 80% of hepatocytes and Kupffer cells contain a Perläč™s positive yellow-brown granular material in the cytoplasm (iron). There are scattered hypereosinophilic, shrunken hepatocytes and occasional binucleated hepatocytes throughout the parenchyma (degeneration, regeneration). Pro-ventriculus/ventriculus (c). Embedded within the mucosa and within the koilin layer are large aggregates of a yellow-brown granular material. Intestine (e). A similar yellow-brown granular material to that described in the proventriculus/ventriculus is present in the lumen of the intestines. No other lesions present elsewhere.	Liver lead level: 43 mg/kg NZVP CASE NO : P20016381	Lead toxicosis	There were no gross or microscopic lesions to explain the clinical signs this bird was presented with. However, the level of lead in the liver was extremely high and would explain the clinical signs and eventual death of this bird.

Released under the Official Information Act

62890	Post Mortem	Final	Department of Conservation	Franz Josef	1/12/2023	None	Mainland National Park	Wild	North Okarito, South Westland	Kea	Female	Adult	Found dead. Poisons in the area (1080 and brodifacoum). Recent rain event 28/11/2023.	The unknown age (suspected adult) female Kea is in adequate body condition (796 grams), with adequate muscle mass and fat reserves. There is marked tissue autolysis, and there are numerous maggots present throughout the body. A minimal amount of dried blood lines the oral mucosa. There is a comminuted fracture of the left carpometacarpus and a comminuted fracture of the right humerus proximal to the glenoid fossa. The skin over the left pectoral muscle has a 12 x 15 mm circular wound, with well-defined edges that perforates through the left pectoral muscle into the coelom. A moderate amount of clotted blood is present over the feathers next to the wound and numerous maggots are present in the subcutaneous tissue and the musculature. A corresponding 10 mm in diameter perforating wound extends through the left pectoral muscle into the coelom. The first left rib is fractured. A moderate amount of clotted blood is present covering the lungs and the heart. A minimal amount of red-tinged fluid is present in the lumen of the trachea and main bronchi. The liver is diffusely pale. On the right side of the chest, there is an irregular perforating wound that exits the coelom through the muscular layers of the right shoulder girdle. A subcutaneous haematoma is present in the subcutaneous tissue and an irregularly shaped wound is present in the corresponding skin. No other gross lesions are p[illegible]sent elsewhere.	1/12/2023		26597 Kea #62890: brodifacoum <MDL Landcare Report No. T8362 26596 Kea #62890: fluoroacetate <MDL Landcare Report No. T8363	Suspected projectile injury	The post mortem findings are consistent with a through-and-through gunshot injury. The projectile has entered the left side of the chest and exited near the right shoulder, resulting in marked internal haemorrhage on its way through the body. A radiograph showed no evidence of any fragmented ballistic material. An accurate caliber of the potential gun based on the entrance/exit wounds is not possible, but it is not a shotgun injury, and anything larger than a .22 caliber would have resulted in much more extensive damage; an air rifle is also a possibility. No brodifacoum (liver) or 1080 (skeletal muscle) residue was detected (testing by Landcare).
51514	Post Mortem	Final		Wanaka	19/11/2014	V-2387 K'E W			Moeraki Valley	Kea	Male	Adult	Kea caught on the 22/06/2014. Bird retrieved on the 13/11/2014, transmitted showed dead signal on the 16/7/14, 24 days after capture. Cause of death unknown, however the bird was slightly injured during capture (leading edge, left wing).	The specimen was in advanced stages of decomposition; only bones and feathers remain. The specimen weighed 447 grams. Bones distal to the hock were missing bilaterally, however the rest of the appendicular skeleton was present. The pelvis, skull and some vertebrae were present. No wounds or injuries were identifiable on the skeletal remains.	19/11/2014	Not performed given the advanced stages of decomposition.			Cause of death cannot be determined due to the advanced stages of decomposition of the specimen. However there was no evidence of trauma or fractures on the remains that were submitted
65359	Post Mortem	Preliminary	Other	Nelson	2/10/2025	Kowhai (L-43851)	Zoological Wildlife Park	Captivity	Natureland Wildlife Trust	Kea	Female	Adult	Elderly Kea - 5 weeks treated for sinusitis which appeared acute onset with pus coming down nares and acutely sick. Had received sinus flushing, antibiotics post culture, nebulisation etc for the last 4-5 weeks Wasn't improving, in fact deteriorating, losing weight and still had severe clinical signs CT scan done on Monday revealed severe chronic sinusitis / possibly neoplasia. Severe boney destruction in the sinuses and the palatine bone. Euthansia conducted 24/09/2025, via injectable GA and then pentobarb. via wing vein. Cosmetic-type post mortem requested.	The kea weighed 708 grams and was in fair body condition, with adequate pectoral muscle mass (captive bird) and adequate body fat reserves.	26/09/2025				
61447	Post Mortem	Final	Department of Conservation	Blenheim	23/11/2022	McEvoy (White CO[illegible]n black, V-2904)	Mainland National Park	Wild	Upper Poulter, Mt Koeti	Kea	Male	Juvenile	Mortality signal on the 24/10/2022, Upper Poulter, Mt Koeti. Body recovered 08/11/2022- suspect 1080 toxicity.	The bird weighed 950 grams and was in good body condition, with good pectoral muscle mass and adequate body fat reserves. The crop, proventriculus and ventriculus contained a large amount of bright green granular material.	15/11/2022		Liver lead level: 0.078 mg/kg NZVP Case Number: P22013930 25761 Muscle tissue, Kea 61447: Fluoroacetate: 4.55 Âµg/g Report No: T8077	Primary 1080 toxicosis	This was a young male kea in good body condition. Bright green cereal bait material was present in the stomach and muscle testing indicated the presence of 1080, indicating the cause of death is primary 1080 toxicosis. The level of lead in the liver was low.
54177	Post Mortem	Final		Palmerston North	1/02/2017	78540			Wildbase Ex Natureland	Kea	Male	Adult	Presented to Wildbase with suspect osteomyelitis of the mandible, respiratory disease and declining body condition. Unfortunately the bird died during recovery from anaesthesia following radiographs and biopsy (25/01/2017).	The bird weighed 702 grams and was in poor body condition; some fat reserves were still present but the pectoral and general skeletal muscle mass was vastly reduced. The right leg had previously been amputated to the level of the proximal tibiotarsus. There was loss of keratin from the lateral and ventral aspect of the caudal part of the right gnathotheca with obvious, fairly firm swelling of the soft tissue around the corresponding portion of the right mandible. There was laxity and slight crepitus of the mid-portion of the right mandible. Three simple interupted sutures were present in the lateral right mandibular area. On cut surface firm white to yellow caseous material interrupted normal bony architecture of the right mandible. The walls of the thoracic airsacs were diffusely but unevenly thickened and almost opaque ion many areas. Thoracic and abdominal airsacs contained multiple pieces of loose smooth yellow flattened flocculent material. In several areas these became firmer and more raised, up to 10-15mm in diameter and firmly adhered the thoracic walls and two loops of bowel. Nodules (at least 10) of similar size, colour and consistency were present in both lungs. No other abnormalities noted on gross post mortem.	25/01/2017	Lung: the parenchyma has been effaced and replaced by fairly discrete areas of eosinophilic and pyknotic debris admixed with amorphous eosinophilic material and fungal elements. At the margins of these lesions, parabronchi, atria amnd air-capillaries are filled with proteinaceous fluid (occasionally fibrin), heterophils and macrophages. There is variable hyperplasia and hypertrophy of corresponding epithelial cells. The interstitium is infiltrated and occasionally expanded by similar fluid and inflammatory cells. There are also scattered perivascular lymphoplasmacytic aggregates. No bacteria or acid-fast organisms were seen with Gram and Zn-stains. Heart: there is a small solitary accumulation of immature granulocytic cells within the myocardium. Liver: large numbers of Kupffer cells contain haemosiderin and small aggregates of haemosiderin-laden macrophages are visible within most portal areas. Spleen: small numbers of haemosiderin-laden macrophages are scattered throughout the parenchyma. Kidney: proximal tubular epithelial cells often contain pigment resembling iron in the form of haemosiderin. Adrenal gland: there is a selective reduction in the amount of cortical tissue. Sections of show no obvious abnormalities.	Feathers negative for PBFD (EPAGS sample ID 33495).	Severe mycotic (fungal) pneumonia and air-sacculitis Osteomyelitis of the right mandible	There was a severe fungal infection in both lungs and throughout the air-sacs. The poor body condition is likely due to an inability or reluctance to eat due to the severe lysis of the right mandible combined with the energy expenditure trying to mount an inflammatory response to both the jaw lesion and the severe fungal infection affecting almost the entire lower respiratroy system.
56646	Post Mortem	Final		Christchurch	7/11/2018	Coasty	Mainland Reserve	Wild	Franz Josef	Kea	Female	Subadult	Found weak and easily picked up in the wild. Transferred from WCWC to South Island Wildlife Hospital; radiographs indicate possible metallic foreign body within the ventriculus. Blood lead level was markedly elevated (1.94 mg/L). Despite supportive care the kea died 03/11/2018.	The bird weighed 498 grams and was in very poor body condition, with markedly reduced pectoral muscle mass and minimal body fat reserves. Both the liver and spleen were uniformly pale and shrunken. The gizzard contained grit admixed with fragments of silicon rubber.	7/11/2018	Liver: hepatic cords are shrunken while large numbers of Kupffer cells contain haemosiderin; a small number of hepatocytes also contain small amounts of haemosiderin. Adrenal gland: there is a subjective increase in the amount of cortical tissue. Sections of lung, heart and kidney show no obvious abnormalities.	Liver level: 36 mg/kg NZVP CASE NO : P18015680	Lead toxicosis Emaciation	Unfortunately the lead toxicity in this young female kea has resulted in such severe emaciation that by the time she was discovered her chances of survival were extremely poor.
61213	Post Mortem	Final	Department of Conservation	Blenheim	20/09/2022	Makau (V-3376, White DQ on Green))	Mainland National Park	Wild	Koropuku hut, Arthur's Pass NP	Kea	Male	Adult	Dead for over 130 days before recovery at Koropuku hut, Arthurâ€™s Pass NP. V-3376, White DQ on Green, Radiotransmitter freq 161.13331.	The kea weighed 700 grams (with transmitter) and despite decomposition, was in reduced body condition but not emaciated. The internal organs were in an advanced state of autolysis.	20/09/2022			Unknown cause of death	The bird was in reduced body condition, but not emaciated. The head and neck appeared normal (i.e. it doesn't appear to be a mustelid predation) and there were no other signs of trauma. Because of decomposition of the internal organs, no liver could be identified for lead testing.

Released under the Official Information Act

58775	Post Mortem	Final	Department of Conservation	Blenheim	15/07/2020	Wren (V-3281)	Mainland Reserve	Wild	Sylvia stream, Lewis Pass	Kea	Male	Juvenile	The bird died 13/06/2020 and was retrieved 09/07/2020 at ~1600 metres altitude, Sylvia stream, Lewis Pass. The remains were found up very high, dug out from snow and spread inside a cache area under an alpine bank under tussocks.	The entire left wing was separate but intact from the level of the humerus. skin and soft tissue was absent from the humerus, ulnar and radius but skin and feathers were present over the carpal areas; all bones were intact. The sternum, left coracoid and the distal half of the right coracoid were separate and devoid of skin and soft tissue. There was extensive "chewing" of the cranial and caudal aspects of the sternum and the end of the left corocoid also had "chew" marks. The proximal half of the right coracoid had been bitten through and was absent. The thoracic spine (with "chewed" but attached ribs) and synsacrum/pelvis were devoid of skin and soft tissue. There were extensive "chew" marks over the caudal aspect of the pelvis/synsacrum. The entire right leg was still attached to the pelvis but was devoid of skin and soft tissue to the level of the non-feathered skin; the bones were intact. The left femur was absent. The left leg from the level of the proximal tibiotarsus was separate and intact, but devoid of skin and soft tissue to the level of the non-feathered skin. The proximal aspect of the tibiotarsus had been "chewed". Most of the remaining material was loose feathers and plant matter.	14/07/2020			Likely mustelid predation and extensive scavenging	There was extensive chewing of the bones, most noticeably of the sternum and pelvis and several bones had also been bitten through. The pattern of the chew marks was very reminiscent of several previous kea in which stoat DNA was recovered from the chewed bones so it seem plausible that a stoat is responsible for the death and subsequent scavenging of this kea. The bones of this kea were swabbed and will be sent for DNA analysis.
55112	Post Mortem	Final		Arthur's Pass 7654	9/10/2017	None			Halpin's Creek	Kea	Male	Adult	Found dead (06/09/2017) on rocky embankment between highway and railway line, possible trauma.	The bird weighed 944 grams and was in excellent body condition. There was patchy feather loss of the dorsal lumbar region and hips but no obvious underlying skin abrasions. Clotted blood was present in the choanal slit and oral cavity, as well as the left cranio-cervical airsac, near the base of the left mandibular ramus as well as near the left thoracic inlet. There was marked haemorrhage in the subcutaneous, periosteal and skeletal muscular tissues over the back of the neck and skull as well as both sides of the head, being slightly more severe on the left side. There was marked haemorrhage within the underlying bones of the skull, being most severe at the mid-to-caudal aspect of the skull. There were two slightly depressed, elongated "C"-shaped skull fractures, both beginning near the dorsal orbital rim, extending caudally to almost meet at the dorsal midline of the mid/caudal skull. There was marked and extensive subdural haemorrhage over the dorsal and lateral apects of both the cerebral hemispheres as well as similar marked subdural haemorrhage in the ventral cranial vault and ventral aspect of both cerebral hemispheres, around the optic chiasma and ventral brainstem. There was a patch of haemorrhage within the intercostal muscles of the right mid lateral rib cage with a corresponding subcapsular haematoma of the parietal aspect of the right liver lobe. Clotted blood was present over the gonads and cranial poles of the kidneys due to several lacerations of the visceral aspect of the caudal aspect of the right liver lobe. The proventriculus and gizzard contained a small amount of seed material and grit. No other abnormalities were noted on gross post mortem.	9/10/2017		Liver lead: 0.183mg/kg NZVP CASE NO : P17017840	Brain trauma with several skull fractures, subdural haemorrhage and associated soft tissue damage	This bird has suffered severe damage to the top pf the head resulting in bruising of the associated muscles, two skull fractures and a massive amount of haemorrhage to the underlying brain. There was some secondary damage to the chest (not bone fractures) which has resulting in partial rupture of the liver with some internal bleeding. I think the damage to the head is the primary injury with the chest/liver injury secondary to possibly hitting the ground so it is likely the bird was in the air when he suffered the head injury. There was no evidence of any gunshot injury and the level of lead in the liver will not have adversely impacted on the health of this bird.
65315	Post Mortem	Final	Department of Conservation	Te Anau	17/09/2025	None	Mainland Private Land	Wild	Withheld under 9(2)a, 9(2)(g)(ii)	Kea	Male	Juvenile	Seen to be eating rubbish, found dead underneath lodge deck, 14/09/2025.	This bird weighed 560 grams and was in poor body condition (BSC 2/9), with reduced pectoral muscle mass and minimal subcutaneous or intra-coelomic fat. The crop was empty, and the ventriculus contained multiple small pieces of creamy white and black rubber and very small granular particulates. The rest of the GIT contents were melanic liquid. The adrenals were mildly enlarged bilaterally.	17/09/2025	Bearing in mind the autolysis, sections of lung, liver and kidney show no obvious abnormalities.	Liver lead level: <0.019 IDEXX CASE NO : P25007688	Emaciation	This was a young male kea in poor body condition. At the time of post mortem the stomach contained several small pieces of rubbery plastic; there was no obstruction of the stomach or intestines. An obvious cause for the poor body condition was no readily apparent; there were no signs of trauma and the lead level was very low.
61230	Post Mortem	Final	Department of Conservation	Blenheim	27/09/2022	Rupicapra (V-1473/White D6 on Blue)	Mainland National Park	Wild	Goat Hill	Kea	Male	Adult	Mortality signal triggered 07/09/2022, Goat Hill, bird recovered 16/09/2022. Received at Massey afternoon of 20/09/2022.	The kea weighed 1.040 kg (with transmitter attached) and was in good body condition, with good pectoral muscle mass and good body fat reserves. The crop dark green seed-like material and several small bright green granules. The proventriculus and gizzard also green seed-like material several small bright green granules (~ 8 grams) and the koilin was stained bright green; no similar material was visible within the intestine. No other abnormalities were noted on gross post mortem.	22/09/2022		25658 Muscle tissue, 61230 Kea: Fluoroacetate: 1.78 Âµg/g Landcare Report T8036 Liver lead level: 0.068 mg/kg NZVP CASE NO : P22011612	Primary 1080 toxicosis	The kea was in good body condition, and there were no signs of trauma. The stomach content differed slightly to the previous kea in that seed like material was present in the crop and stomach rather than a pure bright green paste. However, several bright green granules were visible within the seed-like material and the lining of the stomach was bright green. This is highly suggestive of 1080 ingestion, which was confirmed by Landcare testing showing 1080 residue in the pectoral muscle. The level of lead in the liver was low and would not have adversely impacted on the health of this bird.
57957	Post Mortem	Final	Department of Conservation	Arthur's Pass	3/10/2019	Chopper (V-1436)	Mainland National Park	Wild	Arthur's Pass	Kea	Male	Juvenile	The bird was found dead in the middle of the highway outside A.P. Cafe early morning 30/09/2019.	The bird weighed 1.049 kg and was in good body condition, with good pectoral muscle mass and plentiful body fat reserves. There were multiple fractures to the keel and left sternum and both the left clavicle and coracoid were luxated distally; the affected bones were mottled deep red. Bruising was present in both the left and right pectoral muscle and in addition there was a large split in the right pectoral musculature. The abdominal musculature had split releasing lops of intestine and pieces of lacerated liver into the right lateral abdominal subcutaneous space. There were multiple rib fracture of the left thoracic cage; the left lung was macerated and clotted blood was present throughout the coelomic cavity. The caudal thoracic spine was luxated and there was maceration of the overlying kidney. No other abnormalities were noted on gross post mortem.	1/10/2019		Liver lead level: 3.2 mg/kg NZVP CASE NO : P19014638	Severe musculoskeletal blunt force trauma consistent with vehicular injury.	This young male kea was in excellent body condition. The bird has sustained severe compression type injuries consistent with being struck by a vehicle. The sternum, multiple ribs and the spine were fractured and there was a tremendous amount of internal damage. The haemorrhage associated with these injuries indicate the bird was alive when they occurred. Lead was detected in the liver at a slightly elevated level but not high enough to be considered toxic (a toxic level is usually considered at >10 mg/kg; this bird's level was 3.20 mg/kg.
63663	Post Mortem	Final	Department of Conservation	Blenheim	24/07/2024	Rocket (V-3920)	Mainland National Park	Wild	Westland	Kea	Unknown	Juvenile	Rocket, juvenile, V-3920 (White DN on Orange), died 8th December 2023. Recovered 5th Feb 2024 up a tree splayed out on a mossy branch. Bald Range, Otira (Westland). 5264773 E1479603	The left wing was attached to the left clavicle and coracoid; these bones and the left humerus were devoid of skin and soft tissue. These bones were not frayed. The right wing was attached to matted feathers containing several loose cervical vertebrae. The right radius, ulna and distal humerus were devoid of skin and soft tissue. These bones were not frayed. There was desiccated skin containing the synsacrum, multiple loose ribs and most of both legs. Apart from the non-feathered skin of the distal legs, remaining bones were devoid of skin and soft tissue. These bones were not frayed. The skull was loose and largely devoid of skin and soft tissue; no bony defects were noted.	8/02/2024			Unknown cause of death	Most majority of the skeleton, including the skull were present, although mostly devoid of skin and soft tissue. The bones, including the skull, were intact and showed no signs of chewing or gnawing marks.
65010	Post Mortem	Final	Department of Conservation	Franz Josef	23/07/2025	No bands	Mainland National Park	Wild	State Highway 6, South Westland	Kea	Female	Adult	Found dead on the edge of the road (18.07.25) with lots of blood around the head and mouth. The tail feathers were strewn further up the road.	The bird was an adult female that weighed 797 grams and was in good body condition with good pectoral muscle mass and adequate subcutaneous fat reserves. There was a moderate amount of blood in and around the oral cavity. There was marked haemorrhage within the cranial coelom and cranial thoracic air-sacs, particularly in the left dorsal aspect. There were several fractures of the ribs of the left caudal thorax. The liver was mild-moderately pale in colour.	23/07/2025		Liver lead level: <0.019 mg/kg IDEXX CASE NO : P25005950	Musculoskeletal trauma consistent with vehicular strike	The adult female kea was in good body condition. Liver lead levels were not elevated.

Released under the Official Information Act

50742	Post Mortem	Final		Palmerston North	11/04/2014	63565			Wildbase Ex Hokitika	Kea	Male	Adult	Has been at Wildbase for ~6 weeks with a fractured right tibiotarsus. An external fixator had been placed but the fracture was not healing. The bird started to developing some respiratory signs several days prior to death and had an elevated WBC. Died 09/04/2014.	The bird weighed 563 grams and was in poor to moderate body condition, with reduced pectoral muscle mass and minimal body fat reserves. An external fixator device was present on the right tibiotarsus and proximal right tarsometatarsus. A large plug of white mucoid material was present in the glottis and a smaller amount of similar material was present in the proximal to mid trachea. A small amount of similar material was present in the larger intrapulmonary airways and there was slight reddening of the adjacent parenchyma. The oesophagus contained a large amount of white granular-to-pasty material (the same as was present in the respiratory system. No other abnormalities were noted on gross post mortem.	10/04/2014	Lung: multiple bronchi and parabronchi contain large amounts of food material as well as large numbers of mixed bacteria which can often be observed in the adjacent parenchyma. Elsewhere, parabronchi are slightly overinflated and contain small amounts of proteinacous fluid while there is extensive air-capillary collapse. Diffusely, the lamina propria of parabronchi is noticably expanded by loose connective tissue and both parabronchial and atrial epithelial cells are hyperplastic. Liver: within the majority of portal tracts are aggregates of small, polygonal cells with basophilic cytoplasm, which occasionaly form vague ductular structures (possibly oval-type cells). Spleen: there is a subjective reduction in the amount of lymphoid tissue. Adrenal gland: there is a moderate to marked increase in the amount of cortical tissue compared to chromaffin tissue. Gizzard (slides -3 and -4): the koilin layer is thickened, ragged and disorganised; large numbers of embyronated nematode eggs resembling Capillaria are scattered throughout the koilin, but no other stages are visible. Lysed erythrocytes, aggregates of pyknotic debris and rod-shaped bacteria are associated with some but not all of these eggs. There are several areas in which the koilin is absent and replaced by a thick band of heterophils admixed with large numbers of rod-shaped bacteria, mucoid to proteinacous material and small pieces of embedded food material. Elsehwere there are fairly significant numbers of heterophils, with fewer lymphocytes and plasma cells scattered throughout the base of the lamina propria; although glandular lumina appear free of debris, glandular epithelial cell nuclei are swollen and vesicular, often with a prominent nucleolus. The koiln layer is not present (likely artefactual). Sections of heart and kidney show no obvious abnormalities.		Aspiration pneumonia Chronic bacterial osteomyelitis, right distal limb Severe bacterial ventriculitis with numerous Capillaria witin the koilin layer	The glottis, segments of the trachea and parts of the lung parenchyma contained food material; this has occurred just before the bird died as there is no associated inflammatory reaction. There were some more chronic changes to the lung, with the lamina proria being expanded by loose connective tissue and both parabronchial and atrial epithelial cells being hyperplastic. Interestingly there was marked and often deep inflammation of the gizzard, with areas of koilin loss/ulceration and bacterial invasion. There were also quite large numbers of Capillaria eggs throughout all layers of the koilin; it is possible that the presence of the eggs, has in part, in part damaged the koilin and help a bacterial infection to become established. The severe inflammation of the gizzard may have predisposed to episodes of aspiration of irritant acidic stomach contents which in turn could explain some of the more chronic lung changes.
58175	Post Mortem	Final	Department of Conservation	Aoraki/Mt Cook Village	15/11/2019	Unbanded	Mainland National Park	Wild	Ball Hutt, Aoraki/Mt Cook NP	Kea	Female	Adult	Found dead 03/11/2019. Frozen prior to submission..	The bird weighed 600 grams and was in poor body condition, with reduced pectoral muscle mass and minimal body fat reserves. The internal organs were moderately decomposed and large numbers of small maggots were present in the caudal coelom. The gizzard contained only grit.	15/11/2019		Liver lead level: 33 mg/kg NZVP CASE NO : P19017020	Emaciation due to lead toxicosis	The level of lead in the liver was very high and would explain the bird's emaciated state.
63664	Post Mortem	Final	Department of Conservation	Blenheim	24/07/2024	Bean (V-3911)	Mainland National Park	Wild		Kea	Female	Adult	Bean, adult fema e V-3911 (White CP on Green), died 1st December 2023. Recovered 1st Feb 2024. Bird found in a huge ata ree that has certainly been a nest recently, carcass very decayed and mouldy, had to cut a hole in the tree trunk to get at the body and Tx. N5264773 E1479603.	The left and right wings were attached to the sternum; both clavicles were missing, as were the ribs; skin and soft tissue were missing from the sternum and and both humeri. These bones were not frayed. The skull was loose and largely devoid of skin and soft tissue. There were multiple bony defects to the top (caudal) and bilateral aspects of the skull. These ranged from roughly circular 1-2 mm in diameter defects to larger, irregular and slightly ragged defects.	8/02/2024			Probable stoat predation and scavenging	The bones of the proximal wings and sternum were devoid of soft tissue and showed no evidence of gnawing or chewing. There were multiple defects to the skull, which could be a predation sign rather than due to scavenging. Given the location in which the remains were found (stashed in a tree high off the ground), a stoat predation and scavenging seems likely.
61232	Post Mortem	Final	Department of Conservation	Blenheim	27/09/2022	Jewel (V-3943/White CQ on Blue)	Mainland National Park	Wild	Otira Valley TR	Kea	Male	Juvenile	Mortality signal triggered 15/09/2022, Otira Valley TR, bird recovered 17/09/2022. Received at Massey afternoon of 20/09/2022.	The kea weighed 976 grams (with transmitter attached) and was in good body condition, with good pectoral muscle mass and good body fat reserves. The crop dark green seed-like material and several small bright green granules. The proventriculus and gizzard also green seed-like material several small bright green granules (~ 15 grams). No bright green granules were visible within the intestine. No other abnormalities were noted on gross post mortem.	22/09/2022		25690 Muscle tissue, 61232 Kea: Fluoroacetate: 0.33 Âµg/g Landcare Report T8036 Liver lead level: 0.0096 mg/kg NZVP CASE NO : P22011612	Primary 1080 toxicosis	The kea was in good body condition, and there were no signs of trauma. The gonads were of a juvenile male rather than female. The stomach content differed slightly to the previous kea in that seed-like material was present in the crop and stomach rather than a pure bright green paste. However, several bright green granules were visible within the seed-like material and which is highly suggestive of 1080 ingestion, which was confirmed by Landcare testing showing 1080 residue in the pectoral muscle. The level of lead in the liver was low and would not have adversely impacted on the health of this bird.
62829	Post Mortem	Final	Department of Conservation	Franz Josef	7/11/2023	Unbanded	Mainland National Park	Wild	Whataroa track	Kea	Female	Subadult	Found dead by member of public on 24/10/23. Collected by ZIP 25/10/23. Refrigerated 25-26/10/23. Found on the Whataroa track between Harrys and Twister Creeks.	The keas weighed 815 grams and was in good body condition, with good pectoral muscle mass and adequate body fat reserves. The gizzard contained a moderate amount of green gritty to fibrous material and the koilin was stained bright green. No other abnormalities were noted on gross post mortem.	27/10/2023		Liver lead level: 0.060 mg/kg IDEXX CASE NO : P23011058 26503 Muscle tissue, Kea, 62829: 0.93 Âµg/g Fluoroacetate Landcare Report: T8343	1080 ingestion	This was a young female kea in good body condition. The bright green staining is suggestive of ingestion of dyed 1080 bait. Muscle sent to Landcare was positive for 1080 residue. The level of lead in the liver was low and unlikely to have adversely impacted on the health of this bird. The level of lead in the liver was low and unlikely to have adversely impacted on the health of this bird.
61690	Post Mortem	Final	Other	Christchurch	7/03/2023	No bands	Mainland Reserve	Wild	Franz Josef	Kea	Male	Juvenile	Found alive near Franz Josef, emaciated, not flying or walking, tail flick present, Uric acid over 1000, placed on a glucose drip in an incubator but died later that night (24/02/2023), Albumin 6 and PCV was 8.	The kea weighed 565 grams and was in poor body condition, with reduced pectoral muscle mass and minimal body fat reserves. The liver, spleen and kidneys were uniformly shrunken and pale. The gizzard contained a small amount of melena-stained grit and a small pieces of (non-obstructive) plastic.	1/03/2023	Spleen: there is patchy lymphoid depletion, with increased proximity of sheathed arterioles. Bursa: there is lymphoid depletion; autolysis precludes further evaluation. Intestine: within the duodenum there are moderate numbers of intraluminal nematodes, likely Capillaria. There are several small (<200 microns in diameter) foci of necrosis admixed with mixed bacteria within the mucosa; autolysis precludes further interpretation. Bearing in mind the autolysis, sections of heart, lung, liver, kidney and gizzard show no obvious abnormalities.	Liver lead level: 0.053 mg/kg IDEXX CASE NO : P23002273	Emaciation	This was a juvenile male kea in poor body condition. The intestine contained fairly large numbers of Capillaria, some of which appeared to be embedded in the mucosa and were associated with necrosis. The high Capillaria burden may explain in part, the kea's poor body condition. The level of lead in the liver was very low, there were no signs of old or recent trauma and there were no signs of Aspergillus within the lungs or air-sacs.
61225	Post Mortem	Final	Department of Conservation	Blenheim	23/09/2022	Pingo Pong (V-3146/Black DP on Grey)	Mainland National Park	Wild	Rolleston River	Kea	Male	Adult	Mortality signal triggered 07/09/2022, Rolleston River, bird recovered 19/09/2022. Received at Massey afternoon of 20/09/2022.	The kea weighed 990 grams (with transmitter attached) and was in good body condition, with good pectoral muscle mass and good body fat reserves. The crop contained light/bright green, slightly watery granular paste and the proventriculus and gizzard also contained a light/bright green granular paste; the total weight of this material (crop/PV/gizzard) was 7.50 grams. Similar green material was present in the proximal small intestine. No other abnormalities were noted on gross post mortem.	21/09/2022		25654 Muscle tissue, 61225 Kea: Fluoroacetate: 9.44 Âµg/g Landcare Report T8036 Liver lead level: 0.076 mg/kg NZVP CASE NO : P22011612	Primary 1080 toxicosis	The kea was in good body condition, and there were no signs of trauma. The bright green paste in the crop and stomach (~7.5 grams of bait) is highly suggestive of 1080 toxicosis, via primary ingestion of the 1080 bait; no other food items were present in the stomach. Green paste was also present in the proximal half of the small intestine, however this content was not deemed suitable for weighing as there was other material (e.g. digested food material and mucous) mixed with the paste so an accurate amount of the actual paste was not possible. Landcare testing showed the presence of 1080 residue with the pectoral muscle. The level of lead in the liver was low and would not have adversely impacted on the health of this bird.
61179	Post Mortem	Final	Department of Conservation	Arthur's Pass	14/09/2022	Miss Elizabeth (V-3927)	Mainland National Park	Wild	Arthur's Pass Village	Kea	Unknown	Juvenile	Found by local DoC staff on roadside early morning, 07/09/2022.	The kea weighed 807 grams (all the intra-coelomic organs were missing), with adequate subcutaneous body fat reserves. There were numerous fractures of both the axial and appendicular skeleton, including the head; basically the kea was a tangle of skin, muscle and broken bones.	14/09/2022			Vehicular strike	The kea could not be sexed as the internal organs were absent; as the liver and kidney were not present, we cannot test for the presence of lead. Subcutaneous fat was still present, and with a weight of 807 grams (internal organs absent), the kea appeared to be in pretty good body condition.

Released under the Official Information Act

55930	Post Mortem	Final		Arthur's Pass	7/06/2018	V-03030	Mainland Reserve	Wild	SH73, Otira Viaduct	Kea	Unknown	Adult	Found dead 02/06/2018.	The bird weighed 615 grams and was in moderate body condition. A wholebody radiograph showed multiple fractures of the head, both wings, both legs as well as the keel, both clavicles and both coracoids. Post mortem examination also revealed multiple rib fractures and multiple fractures of the synsacrum and pelvis with tearing of the associated soft tissues. Only the ribs fractures were associated with any significant degree of haemorrhage. There was maceration of the lungs and kidneys while the gastrointestinal tract, liver and heart were absent, possibly forced out of the cloaca.	7/06/2018			Severe musculoskeletal trauma consistent with vehicular strike	There was barely a bone that wasn't fractured in this bird. Several fractures were associated with soft tissue haemorrhage indicating the bird was alive when struck while other fractures were not indicating the bird may have been hit again when dead. Most of the internal organs were absent, possibly forced out the cloaca from the pressure of being run over; the bird could not be sexed as a result. The bird seemed in moderate body condition.
59571	Post Mortem	Final	Department of Conservation	Franz Josef	16/04/2021	Nacho (V-3402)	Mainland Reserve	Wild	Franz Josef	Kea	Male	Juvenile	Seen on the road before being hit by a car 31/03/2021. Cosmetic-type post mortem requested.	The bird weighed 919 grams and was in good body condition, with good pectoral muscle mass and adequate body fat reserves. There was a ~50 x 40 mm skin and muscle defect in the left caudo-ventral abdomen (including the cloaca) with exposure of the coelomic cavity; the edges of the exposed skin and soft tissue were not reddened or swollen. Apart from the heart, lungs and proximal kidney lobes the remaining internal organs were absent. A small amount of clotted blood was visible over the remaining kidney. There was haemorrhage into the peripheral lung fields. The crop was full of pasty white granular material. There was clotted blood in the mouth as well as the subcutaneous tissues and fascia over the ventral and bilateral chest, abdominal and inguinal areas. No other abnormalities were noted on gross post mortem. The bones of the sternum, including the keel, were mottled deep red.	1/04/2021		Kidney lead level: 0.770 mg/kg NZVP CASE NO : P21005669	Soft tissue and musculoskeletal trauma consistent with vehicular strike	This juvenile male kea was in good body condition. The injuries sustained are consistent with being struck (but not run-over) by a car. The gastrointestinal tract and liver appeared to have been scavenged through a large hole in the skin near the cloaca, possible by another avian species such as a weka. The level of lead in the kidney (the liver had been scavenged so could not be tested) was very low and would not have adversely impacted on the health of this bird.
54152	Post Mortem	Final		Arthur's Pass	18/01/2017	None			Outside Chapel, HWY 73	Kea	Female	Subadult	Found dead beside highway 12/01/2017.	The bird weighed 584 grams and was in poor body conedition, with reduced pectroal muscle mass and minimal body fat reserves. The gizzard was largely empty while multiple sections of intestine contained moderate amounts of black tarry material. The lungs were pale and both the liver and spleen were uniformly shrunken. No other abnormalities were noted on gross post mortem.	17/01/2017	Liver: large numbers of Kupffer cells contain haemosiderin. Adrenal gland: there is a subjective increase in the amount of cortical tissue. Sections of lung, heart, spleen and kidney show no obvious abnormalities.	Liver lead level: 23mg/kg. NZVP CASE NO : P17000881	Emaciation Lead toxicosis Heavy Capillaria burden	This was a younger female bird in poor body condition which is likely the result of lead poisoning. Lead has adverse effects on multiple body systems but one of the most serious is damage to the nervous system which prevents the bird from being able to forage and affected birds then slowly starve. The lead poisoning will have also compromised to bird's immune system allowing large numbers of Capillaria to proliferate within the intestine, further contributing to the bird's decline.
61402	Post Mortem	Final	Other	Christchurch	27/10/2022	'Booty'	Mainland National Park	Wild	Arthur's Pass	Kea	Male	Juvenile	The kea was spotted notably ill in Arthur's Pass 4 weeks ago, but was unable to be caught. It eventually was, and brought to South Island Wildlife Hospital. It was found to be emaciated at 531 grams and poor body condition, weak, and vomiting. Stabilization was attempted with subcutaneous fluids and 75% dietary requirement before he was anesthetized for attempted intravenous catheterization. Under anesthesia, he deteriorated, exhibiting poor blood pressure, and was unable to be resuscitated.	On post mortem examination, the kea was 610 grams, emaciated, with poor muscle mass and no subcutaneous or visceral fat noted, and exhibiting anasarca: subcutaneous edema, moderate intracoelomic edema, and a uniformly moderately dilated fluid-filled intestinal tract. There was some liquid recovery diet within the crop and proximal GI tract.	20/10/2022		Liver lead level: 11.80 mg/kg NZVP CASE NO : P22012655	Chronic lead toxicosis with secondary emaciation	
63369	Post Mortem	Final	Department of Conservation	Arthurs Pass Village	1/05/2024	Unbanded	Mainland National Park	Wild	Arthurs Pass, North Canterbury	Kea	Unknown	Juvenile	Unknown bird, found still warm on the roadside.	The bird weighed 877 grams and was in good body condition, with moderate amounts of subcutaneous fat and good pectoral muscle coverage. Bone bruising was present on the keel and the sternum. There were blood clots and haemorrhage present underneath the sternum and ribcage, in the vicinity of the heart and the lungs. There was a significant tearing of the abdominal muscle and evisceration of the contents of the coelomic cavity. Most of the organs of the lower coelomic cavity were either not present or could not be identified due to maceration. There were also multiple fractures of both legs and the spine. The fractures of the legs were not associated with any obvious haemorrhage.	1/05/2024		Liver lead level: 0.370 mg/kg IDEXX CASE NO : P24004317	Blunt force trauma consistent with vehicular strike	This was a young kea in good body condition. The gross post mortem findings are consistent with being struck by a car while alive, then possibly again, after the bird died. The level of lead in the the liver was low and would not have adversely impacted on the health of this bird. The sex of the bird could not be determined due to extensive internal damage.
57296	Post Mortem	Final	Department of Conservation	Wellington	24/04/2019	V-2547 (CH77) Red on White	Mainland National Park	Wild	Elizabeth Stream, Perth Valley	Kea	Female	Subadult	Found dead 19/04/2019, estimated date of death ~15/04/2019.	The kea weighed 693 grams and was in moderate to good body condition. The crop, proventriculus and gizzard contained a moderate amount of green granular-to-pasty material and the lining of the gizzard was stained bright light blue-to-green. No other abnormalities were noted on gross post mortem.	24/04/2019		Liver lead level: 0.22 mg/kg NZVP CASE NO : P19005696 Skeletal muscle: 1.78ug/g Fluoroacetate (Landcare Report No: T7093)	1080 toxicosis	This was a young female kea in good body condition, with no signs of trauma of obvious underlying disease. Dyed material consistent with 1080 cereal bait was present in the stomach and subsequent testing of the skeletal muscle showed 1080 residue; 1080 ingestion is the cause of death. The level of lead in the liver was not elevated to the point where it would have adversely impacted on the health of this bird.
60674	Post Mortem	Final	Department of Conservation	Nelson	3/05/2022	White Blon Black Koeti	Mainland National Park	Wild		Kea	Unknown	Adult	Submitted for post mortem examination after being sent to Landcare Research for 1080 testing. Frozen prior to submission.	The adult kea weighed 743 grams and was in moderate body condition with moderate pectoral muscle mass but a reduced amount of subcutaneous fat present. It was missing a small piece of the left pectoral muscle. There were large numbers of maggots present in the coelom and its sex was unable to be determined due to decomposition. The liver and other internal organs were missing (invertebrate consumption).	2/05/2022		Fluoroacetate, 0.74 Âµg/g (Landcare report number: T7869)	1080 toxicity	There were large numbers of maggots present in the coelom and its sex was unable to be determined due to decomposition. The liver and kidney were missing so a lead level could not be determined.
58444	Post Mortem	Final	Department of Conservation	Wanaka	2/03/2020	Monty-V-0650	Mainland National Park	Wild	E1256407 N5071519	Kea	Female	Adult	Found dead on 20/02/20. Known use of 1080 poison in the area.	The bird weighed 779 grams and was in moderate-good body condition with good pectoral muscle mass and minimal body fat reserves. The crop was empty. The proventriculus and gizzard contained 3.5 grams of green/blue-tinged pasty material.	28/02/2020		23718 Muscle tissue, 58444, Kea: 0.77 ug/g Landcare Report No: T7416.	1080 toxicosis	The dyed pasty material in the stomach is highly suggestive of 1080 ingestion. Skeletal muscle was sent for 1080 testing and the result indicates this bird has ingested 1080. Given this result and the lack of any other obvious gross post mortem findings, 1080 ingestion is the most likely cause of death.

Released under the Official Information Act

55471	Post Mortem	Final		Palmerston North	16/02/2018	Cornerstone number 84791	Mainland Reserve	Wild	Haast	Kea	Male	Adult	The kea was sent to Wildbase for treatment on 9/2/18 by the DOC at Haast after being noted to have a severe injury to the right eye. The bird was moribund on examination with apparent rupture of the right eye. Blood results showed a low lead level (0.05mg/L), severe hyperuricaemia, hyperkalaemia, and hypoglycaemia. The bird died overnight on the 11/2/18 despite IV fluid therapy, analgesia and supportive care.	The kea weighed 500g and was in poor body condition with minimal pectoral musculature and intracoelomic fat reserves. The ventriculus was devoid of ingesta, and there was an air gun pellet sitting on top the outer wall of the ventriculus. There was no evidence of local peritonitis surrounding this pellet. In addition, no entry wounds could be found on thorough examination of the entire skeleton and subcutaneous tissue. There were multifocal to coalescing areas of firm yellow spherical nodules within the lung parenchyma bilaterally. These nodules were surrounded by a rim of red inflammation in some areas, and had occasional areas of fluffy green material present on cut section. There was serous atrophy of the coronary fat. There was moderate hepatomegaly, with an enhanced reticulate pattern diffusely. The kidneys were slightly pale in colour, and contained pinpoint areas of white chalky material on cut section. There was a discrete white nodule present within the surface of the axial cornea of the right eye, and solid opaque material present diffusely within the anterior chamber. All other organs were within gross normal limits.	12/02/2018	Right eye: there is distortion and partial separation of the scleral ossicles and almost complete replacement of the normal intraocular structures with mature trabecular bone embedded in large amounts of often hyalanised collagenous stroma with several large areas of skeletal muscle differentiation. Adjacent to the cornea there is a large plug of hyperplastic retinal pigment epithelium infiltrating between two scleral ossicles and extending into the corneal stroma through a ruptured and an extensively disrupted Descemet's membrane. The corneal stroma itself contains increased amounts of collagen (often hyalanised superficially) and several small caliber blood vessels. Lung: there are extensive and coalescing areas of parenchymal coagulative necrosis (including multiple blood vessels) with the addition of dense mats of fungal elements as well as the accumulation of proteinaceous fluid and pyknotic debris within air-capillaries. Heart: ~50% of cardiomyocytes contain small amounts of perinuclear granular yellow pigment, likely lipofuscin. Liver: there are several large portal tracts in which the bile duct lumina are filled with granulocytes with infiltration through the wall and into the adjacent hepatic parenchyma which is necrotic and admixed with proteinaceous material. Within several other large portal tracts there is loss of the primary bile duct and replacement with fibrous tissue and smaller irregular bile duct. There are increased numbers of bile duct profiles within smaller portal tracts. Large numbers of Kupffer cells contain haemosiderin. In many areas hepatocytes are often individualised and slightly shrunken. Spleen: there are moderately increased numbers of haemosiderin-laden macrophages scattered throughout the parenchmya. Kidney: within a fairly localised area, both proximal and distal tubules as well as collecting ducts are filled with heterophils as is the interstitium; for the most part epithelial cells appear viable. There is a solitary fungal plaque extending partially into the underlying parenchyma.		Emaciation Acute mycotic pneumonia/ coelomitis Osseous metaplasia of the right eye Possible ascending cholangitis and nephritis	This kea was in very poor body condition, with multiple severe health issues occurring simultaneously. This kea was shot with an air gun pellet, but this incident seems to have occurred some time ago as the pellet was not associated with any inflammation, and no entry wound for the pellet could be found. However, there was severe pathology to the right eye which was likely initially traumatic in origin. This bird was blind in that eye and that would have limited his ability to fly and forage leading to emaciation. This will have then predisposed to the bird to developing the fungal infection of the lungs. This bird also had damage to the liver, the cause of which is not clear but may be related to periodic obstruction of the biliary tree. He also had a minor kidney infection, probably bacterial in origin.
65480	Post Mortem	Final	Department of Conservation	Te Anau	24/10/2025	Poochie V-3270	Mainland Private Land	Wild	Withheld under 9(2)a, 9(2)(g)(ii)	Kea	Male	Adult	Seen by public to be vomiting and lethargic. Was caught by an experienced volunteer but unfortunately died on the way to Te Anau.	The kea weighed 770 grams and was in poor body condition, with reduced pectoral muscle mass and minimal body fat reserves. The crop and proventriculus were empty while the gizzard contained a small amount of bile stained grit and fibrous material. The intestines were fairly autolysed.	22/10/2025	Liver: moderate numbers of Kupffer cells contain haemosiderin. Sections of lung, heart, spleen, kidney, intestine and brain show no obvious abnormalities.	Liver lead level: 17.00 mg/kg IDEXX CASE NO : P25008950	Lead toxicosis Poor body condition	The kea was in poor body condition and there were no signs of trauma. I couldn't see anything in the gizzard that didn't belong there. The level of lead in the liver was in the toxic range and would be the most likely explanation for the poor body condition, vomiting, lethargy and eventual death.
57541	Post Mortem	Final	Department of Conservation	Te Anau	19/06/2019	No leg bands	Mainland National Park	Wild	Monkey Creek, Fiordland	Kea	Male	Juvenil	Juvenile kea found dead at Monkey Creek 14/06/2019, probably hit by car or fell from car at speed.	The bird was in very good body condition with substantial pectoral muscle mass, generous subcutaneous and visceral fat reserves, and a weight of 790 grams. There was a moderate amount of blood on the feathers of the right side of the face, beak and within the oral cavity. There was a blood clot in the right deep pectoral muscle and both the sternum and keel contained multiple areas of haemorrhage (bone bruising). There was a large blood clot covering the great vessels at the base of the heart extending over the cranial half of the heart. There was also a large blood clot over the ventral aspect of the right lung lobe. The visceral aspect of both the left and right liver lobes contained irregular linear lacerations associated with the presence of clotted blood. The liver was diffusely and moderately pale. All other organs appeared grossly normal.	18/06/2019		Liver lead level: 0.031 mg/kg NZVP CASE NO : P19008642	Severe trauma to the sternum/keel resulting in severe internal haemorrhage	This injury is consistent with the bird colliding with a car front on, such that the force of the impact has been transmitted through the bird's sternum/keel and into the body cavity. As a result there was a large amount of haemorrhage over the heart and lung and the liver had been split, also resulting in a large amount of haemorrhage. This was a young male bird in good body condition. The level of lead in the liver was low and would not have adversely impacted the health of this bird.
58784	Post Mortem	Final	Department of Conservation	Arthur's Pass	15/07/2020	No bands	Mainland Reserve	Wild	Viaduct lookout, AP	Kea	Female	Juvenile	Found dead beside SH 73 in vicinity of viaduct lookout 13/07/2020; possible vehicle strike.	The bird weighed 890 grams and was in good body condition, with good pectoral muscle mass and good body fat reserves. Clotted blood was present in the mouth and over the right side of the face. There was a ~20 x 20 mm patch of feather loss and skin bruising with a central ~10 mm skin defect with exposure of the underlying bruised muscle over the right dorsal hip area. There was bone bruising to the dorsal synsacrum and right pelvic bones. Most of the right ribs and several of the caudal left ribs were fractured and there was extensive haemorrhage into the right lung. Much of the kidney was macerated and covered in clotted blood. There was marked bone bruising to the ventral aspect of the synsacrum and pelvic bones. The gizzard contained only grit.	15/07/2020		Liver lead level: 4.8 mg/kg NZVP CASE NO : P20009755	Severe blunt force trauma consistent with a vehicular strike Lead toxicosis	This young female kea was in good body condition. She has suffered severe blunt force trauma to the back of spine resulting in multiple broken ribs and severe internal bleeding and this would be most consistent with being struck by a vehicle. The level of lead in the liver was elevated, and while not as high as some of the kea we have tested, it is at a level considered in the near toxic range so it is likely the lead has altered the kea's behaviour which may have predisposed her to being struck by a vehicle.
61457	Post Mortem	Final	Department of Conservation	Arthur's Pass	12/12/2022	Omaka (V-3772)	Mainland National Park	Wild	Arthur's Pass NP	Kea	Male	Subadult	Found dead and decomposed, Crusher Loop, Arthur's Pass Village.	Due to decomposition the kea was not weighed. The left leg was missing at the level of the distal tibiotarsus and the right leg was missing at the level of the hock. Most of the left nasal/orbital bones were absent and the exposed edges were frayed. The skin over the right pectoral muscle was missing as was most of the right pectoral muscle. All the internal organs were absent.	21/11/2022			Unknown cause of death Possible avian scavenging	There were still some muscle mass around the thighs so the kea was not emaciated. There was decomposition and the internal organs were missing, including the liver and kidneys, so a lead level could not be determined. The scavenging sign could, as you suggested, be due to another kea, or a least another avian species.
54942	Post Mortem	Preliminary		Arthur's Pass	30/08/2017	V-2639 "Opawa"			Temple Basin	Kea	Male	Adult	Found dead near power pole 27/08/2017.	The bird weighed 1.012kg and was in good condition. The crop was empty while the gizzard contained a moderate amount of semi-digested seed-like material. No abnormalities were noted on gross post mortem.	29/08/2017	Lung: There is marked congestion of the liver, spleen, kidney, active testis/epididymis. Sections of heart, proventriculus, gizzard and brain show no obvious abnormalities.	Liver lead level: 0.098mg/kg NZVP CASE NO : P17017037		This adult male kea was in excellent body and there were no signs of trauma or obvious underlying disease. Hopefully histology of the internal organs will reveal more; we have also sent the liver to test for the presence of lead (this can take ~2 weeks to get a result).
53317	Post Mortem	Final		Arthur's Pass	9/05/2016	None			Arthur's Pass	Kea	Female	Subadult	Found dead beside Highway 73.	The bird weighed 692g and was in good body condition. No external injuries or fractures were found. The trachea contained a moderate amount of frank blood in the lumen. There was extensive deep red mottling of the bones of the keel and sternum. There was bruising to the right caudal area of both pectoral muscles, the muscles of the distal right tibiotarsus, the left cranial thigh muscles, the dorsal surface of the thoracic and lumbar vertebrae and the synsacrum. There was a moderate amount of clotted blood in the coloem, over the parietal aspect of the right liver love and apex of the heart. The right caudal lobe of the liver had multiple lacerations to the parenchyma. The proventriculous contained 3 small square pieces of soft white plastic, and the venticulus contained a small amount of seed, green coloured ingesta, and multiple pieces of plastic.	9/05/2016		Liver lead level: 0.046mg/kg NZVP CASE NO : P16008460	Trauma	This bird has suffered blunt force trauma to both the back region and thorax, possibly the result of being hit by a vehicle. The trauma has also resulted in internal bleeding.
55978	Post Mortem	Final		Queenstown	21/06/2018	V-0016 (Right) V-0091 V-0146 (Left)	Mainland National Park	Wild	Milford Road	Kea	Male	Adult	There had been reports of a kea with a sore leg in the vicinity. Found dead 14/06/2018. Frozen prior to submission.	The bird weighed 778 grams and was in poor body condition, with reduced pectoral muscle mass and minimal body fat reserves. There was a ~15-20 mm in length segment of circumferential constriction of the mid left tarsometatarsus where the two metal leg bands were located. This was associated with marked firm and circumferential soft tissue thickening immediately proximal and distal to the area of constriction, with thickened skin over growing the metal bands in several places. The gizzard contained a large amount of soft brown granular material and the small intestine had a moderate cestode burden.	19/06/2018		Liver lead level: 0.162mg/kg NZVP CASE NO : P18008637	Emaciation Constriction band injury to left leg	The two bands placed on the left leg appeared to have caused a constriction type injury with areas of thickened skin and soft tissue starting to grow over the metal bands. This will have been very painful and is probably the most likely cause of the bird's poor body condition. The level of lead in the liver was low and unlikely to have adversely impacted on the health of this bird.

Released under the Official Information Act

53705	Post Mortem	Final		Arthur's Pass 7654	23/08/2016	V-1641 Xaphod			Temple Bain, Arthur's Pass	Kea	Male	Adult	Very likely hit by a car on Hwy 73.	The bird weighed 1.031kg and was in excellent body condition. There was a ~50 x 50mm area of feather loss accompanied by reddening and abraiding of the skin over the mid-thoracic area. There was blood at the corner of the mouth and a transverse fracture of the right mid-tibiotarsus. The majority of the ribs were fractured, with extensive haemorrhage of the intercostal muscles and overlying subcutaneous tissues. There was a 20 x 40mm split in the musulature of the left lateral abdomen with associated haemorrhage (the overlying skin was still intact). There was a large amount of clotted blood throughout the coelomic cavity as well as mutiple deep liver lacerations. No other abnormalities were noted on gross post mortem.	23/08/2016		Liver lead level: 0.350mg/kg NZVP CASE NO : P16015491	Severe musculoskeletal trauma consistent with being struck by a vehicle	The liver lead level was not elevated.
51542	Post Mortem	Final		Nelson	2/12/2014	Leg band V-1345				Kea	Female	Juvenile	Healthy until shortly after aerial 1080 bait drop (09/11/2014). Animal died on the 09/11/2014. The bird had been frozen prior to submission.	The bird weighed 923.0 grams and was in good body condition; moderate pectoral muscle mass, moderate subcutaneous fat stores. The crop contained a small amount of bright green pasty granular material. The ventriculus and proventriculus were moderately full and contained some green food material and bright green pasty granular material. No other abnormalities were observed on gross post-mortem.	2/12/2014			Likely 1080 poisoning	The bright green material within the crop, ventriculus and proventriculus is highly suggestive of 1080 bait ingestion resulting in the death of this bird. Stomach, muscle and liver samples have been retained if further testing is desired.
60677	Post Mortem	Final	Department of Conservation	Nelson	3/05/2022	White BO on Green Jay Joseph, DOC V-3790				Kea	Unknown	Adult	Submitted for post mortem examination after being sent to Landcare Research for 1080 testing. Frozen prior to submission.	The adult kea w ighed 739 grams and was in moderate body condition with some subcutaneous fat present. A piece o the left pectoral muscle was missing. Due to the extent of decomposition it was not possible to identify the bird's sex and the liver was missing.	2/05/2022		Fluoroacetate 0.82 Âµg/g (Landcare report number: T7869)	1080 toxicity	Due to the extent of decomposition it was not possible to identify the bird's sex and the liver was missing.
51276	Post Mortem	Final		Rotorua	10/09/2014	"Howie" L-426430			Rainbow Springs	Kea	Male	Adult	Died 07/09/2014, after a fairly rapid deterioration, involving progressive lethargy, self mutilation, seizure activity and shifting leg lameness. The only biohmical abnormality was a slightly elevated uric acid. Blood lead level was not elevated. Ha been tube-fed 2-3 times/day since 03/09/2014.	The bird weighed 706 grams and was in poor body condition. There were blood stained skin and missing feathers over the left lateral thigh and a large piece of bloody skin was hanging from left lateral digit. The oral cavity contained a moderate amount of light green pasty material. The proventriculus and gizzard contain a large amount of similar material; the wall of the proventriculus appeared thin and flaccid. The intestines were largely devoid of material while the cloaca was markedly distended with dark green faeces and light green-white urates. The cloacal wall was moderately and evenly thickened; approximately 30-40% of the wall was also markedly reddened and light green urates were adhered to these areas. The pleura of the lungs contained multiple small, loosely adherent plaques (~5mm in diameter) of green pasty material similar to that observed in the oral cavity and gizzard. These were surrounded by a rim of deep red lung parenchyma. Both the liver and kidneys were moderately and uniformaly shrunken; the spleen and testes were markedly shrunken. No other abnormalities were noted on gross post mortem and no obvious abnormalities were noted on whole body radiographs.	9/09/2014	Lung: there are multiple areas, usually centered on parabronchi in which the parenchyma (including entrapped blood vessels) is necrotic and replaced with abundant eosinophilic and pyknotic debris admixed with large numbers of fungal elements. Elsewhere, most parabronchi contain small numbers of macrophages containing small amounts of granular brown-to-black refractile intracytoplasmic material within the lamina propria; parabronchial epithelium is slightly hyperplastic. Heart: small numbers of cardiomyocytes contain small amounts of perinuclear, yellow granular pigment, likley lipofuscin. Liver: there are multifocal to coalescing areas of hepatocellular coagulative necrosis and infiltration with small numbers of heterophils; an obvious distribution is difficult to ascertain. Small numbers of Kupffer cells contain haemosiderin. Kidney: there are several areas in which the medullary interstitium is infiltrated with moderate numbers of heterophils which can occasionally be observed bewteen epithelial cells and within lumina of collecting ducts. Aorta (coelomic): there is marked expansion of the sub-intima due to accumulation of clear, whipsy material and hypertrophied smooth muscle cells, many of which contain similar clear whispy material within their cytoplasm. Cloaca: there are extensive areas in which the mucosa is ulcerated and replaced by large numbers of heterophils admixed with proteinaceous fluid and fibrin, colonies of mixed bacteria and small fragments of embedded plant material. There is congestion of the underlying soft tissues as well as variable heterophilic infiltration. Brain: multiple neurons, most noticably within the cerebellum contain moderate to large amounts of granular brown intracytoplasmic pigment, likely lipofuscin. Sections of proventriculus, gizzard, intestine and pancreas show no obvious abnormalities.	Liver lead level: 0.04mg/kg. This is a very low level and would not have adversely impacted the bird's health. NZVP CASE NO : P14019184	Unknown cause of neurological signs Mycotic (acute) pneumonia-Aspergillosis Ulcerative and bacterial cloactitis Aorta-segmental atherosclerosis	The cause of the clinical and neurological signs is unknown. The kidneys were not enlarged (if anything they were moderately atrophied, as were the liver, spleen and gonads) and are not the cause of the shifting lameness. Liver lead levels were not elevated. Histological examination of the brain did not show any obvious abnormalities. There were, however, segments of the aorta which showed degenerative changes similar to atherosclerosis. It is possible similar changes were present in the carotid arteries and some of the large blood vessels supplying the brain, perhaps resulting in fluctuations in or a decreased blood flow to parts of the brain- a sort of vascular dementia. The cloaca was ulcerated with secondary bacterial infection which is likely secondary to prolonged retention of faeces/urates. The fungal infection of the lungs is very acute and is the immediate cause of death.
64872	Post Mortem	Final	Other	Dunedin	16/06/2025	250502	Mainland National Park	Wild	Kepler Track, Fiordland	Kea	Female	Subadult	Admitted 1/5/24 to the hospital in a weak, almost comatose state with extensive injuries. Multiple head wound, swollen right eye, old injury and ankylosis of the right hock and fracture right lateral back toe. With supportive care improved and once strong enough head wounds treated surgically. Persistently high white cell count despite treatment with oral antibiotics and anti-fungal as well as nebulizing with anti-fungal. Taken for CT scan on 30/5 due to concerns regarding Aspergillosis - see attached report. Had been bright and gaining weight in recent days but died unexpectedly overnight 10/6.	Gross post mortem performed at DWH. General: External exam - very small scab left over the head wound, mostly healed. Crop is quite full with food from the evening feed which was given by crop tube. Moderate body condition. Integument: Mild pododermatitis lesion over the right hock which is anykylosed. Some swelling around the fracture site of the right lateral back toe. Small scab on head from prior head injuries, rest of skin normal. Musculoskeletal: Some bruising over the cranium beneath the scab and had appears to be fracture to the skull, this is healed. Right hock ankylosed with firm swelling around the joint. Small amount of mobility at the fracture site of the right lateral toe. Circulatory: Heart appears normal Respiratory: Lungs are bright pink and aerated. Small amount of food/mucus within the distal third of the trachea. Cranial thoracic airsacs appeared to be very slightly increased opacity but no evidence of granulomas or vascularisation. No fluid seen within airsacs Digestive: Stomach contained normal ingesta and normal appearance. Intestinal tract NAD - some small areas of reddening but likely post mortem change. Hepatobiliary: Liver very friable and mottled appearance - see photos. Spleen mottled appearance and enlarged Genitourinary: Small underdeveloped ovary, rest of tract NAD	11/06/2025	Lung: there is congestion and patchy overinflation of parabronchi. Heart: there is a subendocardial myocardial focus of ~200 x 300 microns in diameter of necrotic, hyalinized myocardium bordered by a thin layer of macrophages, with small numbers of lymphocytes, plasma cells and the rare heterophil. Small numbers of lymphocytes and heterophils mildly expand the overlying endocardium. Several more sections are examined and there are similar but small subendocardial myocardial foci of hyalinization and mononuclear inflammation as well as mineralisation of papillary muscles. Liver: there are several small foci in which hepatocytes contain large lipid vacuoles. There is a small (~100 microns in diameter) randomly scattered focus of loss/atrophy of hepatic cords with replacement of adjacent sinusoids with hyalinized collagen. Spleen: there is scattered lympho-follicular formation and there are increased numbers of plasma cells. Sections of kidney show no obvious abnormalities.		Multifocal lymphoplasmacytic myocarditis Possible asphyxiation	Histologically there were several areas of myocardial damage accompanied by infiltration with lymphocytes and plasma cells. While these foci are relatively small, they are in areas which Purkinje cell fibers pass along, so it is possible they may have induced some kind of conduction abnormality. I think the presence of food and mucous in the distal trachea is significant as well; in my experience this material can only make its way that far down the trachea is if the bird is alive; i.e. an aspiration/asphyxiation event, possibly as a result of concurrent cardiac event. No infectious agents were visible within the myocardial lesions, but they do not appear to be due purely to an ischaemic event. Given the presence of lymphocytes, plasma cells and mineralisation, Toxoplasma would have to be on the list of possible differentials.
58939	Post Mortem	Final	Department of Conservation	Westport	1/09/2020	None	Mainland Private Land	Wild	Karamea township	Kea	Male	Juvenile	Found dead under washing line in Karamea township, in poor body condition 15/04/2020. Frozen prior to submission.	The bird weighed 485 grams and was in poor body condition with reduced pectoral muscle mass and minimal body fat reserves. Both the liver and spleen were pale and shrunken while the gizzard and segments of rather autolysed intestines contained melena. No other abnormalities were noted on gross post mortem.	20/08/2020	Liver: large numbers of Kupffer cells contain haemosiderin; autolysis precludes further evaluation. Bearing in mind the autolysis sections of lung, heart, kidney, adrenal gland and brain show no obvious abnormalities.	Liver lead: 0.201 mg/kg NZVP CASE NO : P20011890	Poor body condition	It is unclear why this young male kea was in such poor body condition; the level of lead in the liver was low and would not have adversely impacted on the health of this bird. Unfortunately most of the internal organs were quite decomposed but histology of the lung, heart, liver, kidney and brain did not show any major abnormalities and no parasites were present in the faeces..
52330	Post Mortem	Final		Rangiora	20/08/2015	V-0308			Porter's Ski Field	Kea	Male	Adult	Bird has been hanging around the egineers workshop for a few months. Last two days it had been seen vomiting a less mobile than other kea. The bird had died (30/07/205) by the time DoC picked the bird up. The bird was forzen and sent to Wildbase.	The bird weighed 689 grams and was in poior body condition. Both the crop and entire oesophagus were full of partially digested pieces of white flesh-like material while the gizzard was impacted with fibrous material and feathers and a small amount of grit. No other abnormalities were noted on gross post mortem.	4/08/2015		Liver lead level: 15.20mg/kg. NZVP CASE NO : P15015064	Lead toxicity	The level of lead in the liver was very high and would explain the vomiting, loss of coordination and eventual death of this adult male kea.
53888	Post Mortem	Final		Arthur's Pass	5/10/2016	None			Bealey Hotel, Arthur's Pass	Kea	Male	Subadult	Kea brought to DoC by Bealey Hotel staff at 0830hrs with obvious trauma but breathing normally, died suddenly at 0900hrs.	The bird weighed 778grams and was in good body condition. There was extensive bruising and patchy feather loss over the proximal right leg as well as blood stained feathers on the medial aspect of the left elbow and caudo-ventral abdomen. A radiograph showed an closed, oblique fracture of the proximal right tibiotarsus but no other abnormalities. There were small areas of bruising to the medial left thigh. The proventriculus and gizzard were full of partially digested seed-like material and the gizzard also contained a flattened square piece of blue-to-green crumbly material (~10 x 10mm). No other abnormalities were noted on gross post mortem.	4/10/2016	Sections of lung, heart, liver, spleen, kidney, adrenal gland and brain show no obvious abnormalities.	Liver lead level: 0.069mg/kg. NZVP CASE NO : P16018483	Musculoskeletal trauma, with fracture of the right tibiotarsus	There was severe trauma to the right leg which was also fractured and there were several other small areas of bruising to the left leg and left wing (but no broken bones). An x-ray did not show any evidence of gun shot injury or other metallic particles. The bird was in good body condition with no obvious indication of any underlying disease. Histology of the internal organs did not reveal any abnormalities and the level of lead in the liver was very low and would not have adversely impacted on the health of this bird.

Released under the Official Information Act

62563	Post Mortem	Preliminary	Department of Conservation	Fox Glacier	1/09/2023	None	Mainland National Park	Wild	Fox Glacier	Kea	Male	Subadult	Found dead on 29.8.23 in Timms Trap that had been baited with carrot.	The subadult male kea weighed 929 grams and was in good body condition with good subcutaneous and visceral fat reserves. The left radius was luxated at the elbow joint but there was no swelling or discoloration to the skin in this region. The crop was empty and the ventriculus contained a fibrous mat of organic material and small pieces of plastic. No other abnormalities were seen on postmortem.	1/09/2023	Lung: Liver: there is marked sinusoidal congestion. Spleen: there is marked congestion. Kidney: there is marked congestion.	Liver lead level: 0/071 mg/kg IDEXX CASE NO : P23008978		
58630	Post Mortem	Final	Department of Conservation	Blenheim	10/06/2020	Confuschia (V-3112)	Mainland Reserve	Wild	Mt Plinlimmon, Rangiora	Kea	Female	Subadult	Remains found under several centimetres of snow most of the way up the slope of Mt Plinlimmon, North Canterbury 04/06/2020.	Only the sternum/keel (with portions of several ribs still attached) with both coracoids and wings were present (all attached to each other). Apart from the skin and feathers over the carpal areas all the remaining bones were completely devoid of skin and soft tissues. Most of the keel and caudal aspect of the sternum as well as the ends of the ribs were irregular and roughened (chew or gnaw marks).	10/06/2020		Swabs from the ends of the scavenged bones were sent to Ecogene for analysis. Resulting Cytb fragments from the multiplex assay for S1099_01 (PM#58629) and S1099_02 (PM#58630) produced an ambiguous match to a single peak of Mustela erminea (stoat) and possibly Rattus exulans (kiore) respectively, when compared against a reference ladder of 19 mammalian species present in New Zealand. Primer pair Universal400b/M.erminea3 (RamÃ³n-Laca et al. 2013, Tobe and Linacre 2008) produced a result for both samples and was sequenced. Resulting sequence from both S1099_01 and S1099_02 most closely matched Mustela erminea (stoat), with a maximum identity of 100%, when compared against sequences from GenBank. The top three most appropriate matches for both sequences can be identified via the following GenBank accession numbers: KM224405.1, KM091450.1 and AB564119.1.	Likely stoat predation Extensive scavenging	Due to the extensive scavenging and parts of the skeleton missing a cause of death could not be established on gross post mortem. Swabs taken from the chewed ends of the bones were sent for DNA analysis and stoat DNA was found. As far as I'm aware stoats are not primary scavengers so a stoat is most likely responsible for both the death and resultant scavenging of this kea.
60547	Post Mortem	Final	Other	Christchurch	25/03/2022	None	Mainland National Park	Wild	Franz Josef; taken to South Island Wildlife Hospital	Kea	Male	Juvenile	The kea arrived at the South Island Wildlife Hospital very weak and possibly blind. Fluid therapy and oxygen supplementation were initiated, while voriconazole and enrofloxacin trials were initiated. It was assist-fed, as it exhibited anorexia, and also exhibited ongoing respiratory distress. It never stabilized and died 24/3/22.	The kea was in a good state of decomposition (fresh), and weighed 545 grams. It's condition was extremely poor and emaciated, with very little pectoral musculature, and no subcutaneous or visceral adipose tissue deposits noted during post mortem examination. Superficially, thick yellow-white mucoid liquid was found throughout the oral cavity and esophagus, but not in the trachea. Approximately 50 to 60% of the lungs were effaced by multifocal, coalescing firm nodular lesions varying in color between white, yellow, blue, green, grey, and black. These exhibited an array of textures, from smooth and firm, to roughened, soft, and fluffy. Less than 50% percent of normal parenchyma remained, and of that, much was deep red and consolidated. No other abnormalities were noted on gross post mortem.	25/03/2022		Liver lead level: 0.670 mg/kg NZVP CASE NO : P22003822	Emaciation Severe mycotic pneumonia	This was a young male kea in poor body condition. Although there was a severe fungal pneumonia, I'm not convinced this is the primary cause for the emaciation- he may have been one of the young kea destined to never make it to adulthood due to inexperienced foraging etc. The declining body condition would have predisposed him to the fungal pneumonia. The level of lead in the liver was low and would not have adversely impacted on the health of this kea.
64040	Post Mortem	Final	Department of Conservation	Wanaka	10/10/2024	V-4596	Mainland Reserve	Wild	Wanaka	Kea	Male	Subadult	Found dead by a DOC ranger on the 23/09 and then buried. The body was recovered on the 25/09 and submitted for PM. Was found ~5m from a fallen-over long drop toilet with diphacinone bait pellet stations nearby.	The kea weighed 763 g and was in moderate body condition (BCS 2/5), with reduced pectoral muscle mass but adequate subcutaneous and intra-coelomic fat reserves. Radiographs showed a displaced fracture at C6 (cervical vertebrae 6) and multiple pinprick metallic opacities in the ventriculus. No bruising or haemorrhage was seen around the cervical fracture site. There was a moderate amount of vividly green contents in the proventriculus and ventriculus, which contained multiple pieces of plastic, rubber, and fabric material and a small amount of seed.	10/10/2024	Lung: several parabronchi contain small numbers of squames or foreign material admixed with variable numbers of short rod-shaped bacteria, which often extend into adjacent atria and air-capillaries; there is no associated inflammatory response. Bearing in mind the autolysis, sections of heart, liver, spleen and kidney show no obvious abnormalities.	Liver lead level: 34.00 mg/kg IDEXX CASE NO : P24009439	Reduced body condition Lead toxicosis	This young male kea, while not emaciated, was in reduced body condition. He had multiple small pieces of rubbery plastic and fibrous material in his stomach. On x-ray, there were several tiny pieces of metal in his stomach (they could not be readily identified at post mortem); these were likely pieces of lead, as the level of lead in the liver was in the toxic range. He also had a broken neck, but there was no bruising/haemorrhage associated with the fracture, so it appears to have happened after he died.
55866	Post Mortem	Final		Queenstown	18/05/2018	TC (L--34292)	Zoological Wildlife Park	Captivity	Kiwi Birdlife Park	Kea	Male	Adult	His mate (Kasey PM55846) was euthanased the previous week with hepatic neoplasia. He has been a bit "mopey" since then but eating okay. He was observed eating and playing with enrichment at 2pm but deteriorated rapidly ~5pm and died (16/05/2018)/	The bird weighed 675 grams and was in reduced body condition. Both thyroid glands were moderately and uniformly enlarged. The caudal edges of both liver lobes were rounded and there was an enhanced reticular pattern throughout. The gizzard contained bile stained grit. No other abnormalities were noted on gross post mortem.	17/05/2018	Thyroid glands: around one third of follicles contain moderate amounts of pale staining colloid with around another third of follicles being collapsed and containing little to no colloid. The remaining third of the follicles, often in several reasonably distinct areas, are variably distended with granular to fibrillar proteinaceous material often admixed with aggregates of intact and lysed erythrocytes, pyknoic debris and small numbers of heterophils; similar material is often present in the interfollicular connective tissues. For the most part, epithelial cells in the latter follicles appear intact. Follicular epithelial cells throughout both glands are cuboidal and often contain pigment resembling haemosiderin. A small number of follicles contain small numbers of haemosiderin-laden macrophages and there is scattered interstitial fibrosis. Liver: there a multiple small scattered areas in which sinusoids contain proteinaceous material; in several areas this is associated with shrinkage, increased cytoplasmic eosinophilia and individualisation. Small numbers of Kupffer cells contain haemosiderin. There is moderate hepatocellular anisokaryosis. Spleen: there are increased numbers of histiocytic-like cells around many sheathed arterioles; small numbers of these cells contain pigment resembling haemosiderin. Kidney: small numbers of proximal tubular epithelial cells contain small numbers of intracytoplasmic eosinophilic droplets or material resembling haemosiderin. Adrenal gland: there is a subjective increase in the amount of cortical tissue. Sections of heart, gizzard, intestine, pancreas and inactive testis show no obvious abnormalities.		Uncertain cause of death Acute bilateral thyroid haemorrhage and degeneration	This is a rather strange case and I'm not confident I have established a cause of death. He was in slightly reduced body condition but certainly not emaciated. Histology of the internal organs did not show any evidence of an obvious inflammatory/infectious process and no significant bacteria were isolated from the liver. The only really abnormal changes I could find were in the thyroid glands which showed acute degenerative changes and some haemorrhage within the glands. I'm at a loss to explain these changes and can find little in the avian or human literature. The only report I can find with vaguely similar changes was in a study in which chickens and quail were feed a diet high in rape-seed for several months. I'm sorry I could not have been of more use to you in this case.
61244	Post Mortem	Final	Department of Conservation	Blenheim	6/10/2022	Fluffhead (V-3147/White DM on Red)	Mainland National Park	Wild	Trent TR, Arthur's Pass NP	Kea	Male	Juvenile	Mortality signal triggered 23/04/2022, recovered 16/09/2022, Trent TR.	Due to decomposition the kea was not weighed. The head was separated from the rest of the remains. There was a tag of skin from the back of the head; the underlying subcutaneous was dark brown and contained 3 pairs of puncture wounds (1-2 mm in diameter) and each was ~7-8 mm apart. The right wing was separated at the shoulder joint while the left wing was still attached to the sternum/keel, which in turn was separate from the thoracic spine, synsacrum and both legs, which were largely devoid of soft tissue. The rib ends, spinous processes and caudal synsacrum were frayed (and largely devoid of soft tissue).	23/09/2022			Likely mustelid (stoat) predation	Despite the extensive scavenging, puncture wounds and evidence of haemorrhage were visible on a tag of skin over the back of the head, making a stoat predation the likely cause of death. The stoat may well also be responsible for the extensive scavenging.

Released under the Official Information Act

54724	Post Mortem	Final		Palmerston North	26/06/2017	Clinic ID 80947			Wildbase Ex Franz Joseph	Kea	Male	Adult	The Kea presented to Wildbase on 23/6/17 after referral from a local vet near Frans Josef for treatment of a femoral fracture. The bird was anaesthetised upon arrival for blood tests, x-rays and surgical repair of the femoral fracture. The fracture was repaired by placement of a tie-in ESF. The bird went into cardiac arrest during surgery, and was successfully resuscitated but had a prolonged recovery from anaesthesia. The bird arrested again following recovery from the procedure and could not be resuscitated.	The bird weighed 843g and was in moderate body condition with prominent pectoral musculature and minimal subcutaneous and intracoelomic fat reserves. There was a linear sutured surgical wound over the lateral aspect of the left femur, with a tie in external skeletal fixator in place. Beneath the surgical wound there was a highly comminuted (closed) fracture of the left femur, with more than 10 shards of bone present beneath areas of necrotic muscle. There were two puncture wounds visible externally. The first puncture wound was present in the skin of the right lateral abdominal area, and was 8mm wide, full thickness and surrounded by a 20mm rim of bruising. Beneath this puncture there was a discrete area of yellow, dry casseous material as well as haemorrhage extending into the pectoral muscle, associated with a 4mm diameter roughly circular defect in the distal right aspect of the sternum. There was also an ellipitical, full thickness defect in the intercostal musculature of the left lateral body wall, and on the medial aspect of the mid left femoral musculature. The second extenal puncture wound was present in the skin adjacent to the surgical site over the lateral aspect of the left thigh. There was diffuse haemorrhage into the bone of the sternal apparatus. The thoracic and abdominal airsacs and the pericardium were thickened, opaque and yellow, with lose adhesions between the keel, liver and heart. The liver was yellow, dry and firm on palpation over discrete areas involving 50% of the left liver lobe and 33% of the right lobe. The ventriculus contained minimal ingesta and bile. All other internal organs were within gross normal limits.	26/06/2017			Musculoskeletal trauma with severe internal organ damage: likely ballistic injury	The appearance of the puncture wounds seen on gross examination is consistent with shot injury. The gross findings suggest that the bird was shot, with the bullet entering the right hand side of the body, penetrating the keel bone, through the liver, then exiting through the left lateral body wall and through the left thigh, destroying the left femur in the process. These injuries are not consistent with a dog attack or being struck by a vehicle which usually involves much more severe crushing and tearing of the muscles. The injuries are similar in nature to a previous kea in which an air-rifle pellet of ~4.5mm in diameter was retrieved. The injuries are not consistent with a shot gun and I'm guessing a rifle of any caliber above a .225 rifle will have produced more severe damage and perhaps left some fragments of bullet behind (which will have been seen on x-ray) as well as a large exit wound.
58731	Post Mortem	Final	Department of Conservation	Te Anau	6/07/2020	Graeme (V-1415)	Mainland National Park	Wild	Wet Jacket Peninsula, Fiordland National Park	Kea	Male	Adult	These birds were part of a study to determine fate of kea through a 1080 operation. Transmitters were attached in April 2019, birds still alive on June 19th 2020. The 1080 drop occurred on the 26th and 27th of June and then these birds were on 'mortality mode' when checked on 1st July. Transmitters go into mortality mode only after 48 hours with no activity, this means birds likely died before 30th of June. Bodies were recovered on July 2nd. TX TR4 Channel: 108. TX Mhz Ref Tune 161.2002. Tuning used for June 19 flight 161.2032. Band combination Black M on Pink.	The bird weighed 1.031 kg and was in good body condition with good pectoral muscle mass and good body fat reserves. There was 15.7 grams of green to bright green pasty granular content within the proventriculus and gizzard. The crop was empty. There was no evidence of feather loss or skin thickening or ulceration from the transmitter or harness.	6/07/2020		Liver lead level: <0.010 NZVP CASE NO : P20009194 Fluoroacetate: 18.2 Âµg/g Landcare Report No: T7479	1080 poisoning	The bright green stomach contents is highly suggestive of 1080 ingestion and analysis of the skeletal muscle confirmed the presence of fluoroacetate. The bird was in good body condition and there was no evidence of feather loss or skin thickening or ulceration from the transmitter or harness. The level of lead in the liver was very low and would not have adversely impacted on the health of this bird.
60675	Post Mortem	Final	Department of Conservation	Nelson	3/05/2022	Yellow CP on Blue Hickory Dickory	Mainland National Park	Wil		Kea	Male	Subadult	Submitted for post mortem examination after being sent to Landcare Research for 1080 testing. Frozen prior to submission.	The subadult male kea weighed 812 grams and was in moderate to good body condition, with adequate pectoral muscle mass and body fat reserves. A small piece of the left pectoral muscle was missing. There was green grit present in the proventriculus and ventriculus. No other abnormalities were seen on gross post mortem.	2/05/2022		Fluoroacetate 5.93 Âµg/g (Landcare report number, T7869) Liver lead level: 0.140 mg/kg NZVP CASE NO : P22005482	1080 toxicity	The level of lead in the liver was low and would not have adversely impacted on the health of this bird.
50506	Post Mortem	Final		Rotorua	12/02/2014	Totara Leg band L26400			Paradise Valley Springs	Kea	Male	Adult	Three weeks prior to death he was seen perched in a very high and hard to access position in the aviary. He has never used that area before and didn't use it again after this sighting. He usually stays on the ground. The keepers had not seen him flying over the last few months and may have been when the wing injury occured. Slight behavioural changes in the last three weeks - more interaction with keepers for food especially during training times, also allowing another male Kea to feed him. He lived in an aviary with 3 other male kea and 1 female kea. He was fairly dominant in the group but no conflict seen between him and the other kea. Dramatic weight loss recently.	This bird weight 699g and was in poor body condition with minimal pectoral muscle mass or subcutaneous fat stores. This bird previously had its left foot amputated at the site of the proximal tibiometatarsus but the amputation site looked normal. On the right foot there were areas of proliferative hyperkeratosis on the footpad and the toepad at the P1-P2 joint of the back toe. On the underside of the left wing in the region of the metacarpus there was a large, necrotic, open wound approximately 50mm by 25mm. Radiographs of the bird revealed a fracture on the left wing at the distal end of the major metacarpal with severe osteomyelitis. Internally the liver was enlarged and felt solid and meaty when cut open. The gizard contained seed and carrot. The caudal half of both lungs were deep red, firm and contained approximately 5 firm, yellow noules about 5mm in diameter. No other abnormalities were dected on gross post mortem.	11/02/2014	Lung: Liver: small numbers of Kupffer cells and hepatocytes contain haemosiderin. Sections of heart, spleen, kidney, inactive testis, proventriculus/gizzard, show no obvious abnormalities.		Squamous cell carcinoma major metacarpal bone (left wing) with pulmonary metastases	
64093	Post Mortem	Final	Department of Conservation	Te Anau	10/10/2024	Unbanded	Mainland Reserve	Wild	Te Anau	Kea	Male	Juvenile	Sighted on the 3/10/2024 and found dead on the 4/10/2024 at a public campsite, Te Anau.	This kea weighed 581.7 g and was in poor body condition (1/5 BSC) with reduced pectoral muscle mass and minimal subcutaneous or intra-coelomic fat reserves. Radiographs of the left wing showed fractures of the distal radius and ulna that had displaced proximally and formed stable calluses, with the wing distal to the fracture site angled medially. The extensor and flexor tendons had contracted and the elbow joint had reduced range of motion compared to the right wing. The left carpal joint had similar range of motion to the right with no crepitus felt on palpation. No evidence of skin wounds were seen over the fracture site. The proventriculus and ventriculus contained a small amount of green leafy material, and the rest of the gut was empty. In the large intestine, there was a heavy burden of cestodes. The liver, spleen, and kidneys were atrophied.	7/10/2024		Liver lead level: <0.019 mg/kg IDEXX CASE NO : P24009394	Poor body condition secondary to healing fractures of the left wing	This was a juvenile male kea in poor body condition, which will be due in large part to healing fracture of the left ulna and radius. The fractured bones were healing, but due to misalignment of these broken bones, the tendons/muscles of that wing had become shortened and limited the bird's ability to fly and adequately forage. The level of lead in the liver was very low and would not have adversely impacted on the health of this bird.
62941	Post Mortem	Final	Other	Christchurch	5/01/2024		Mainland National Park	Wild	Franz Josef	Kea	Male	Juvenile	Found in Franz Josef, weak and wobbling on 25/12/23. Flown to South Island Wildlife Hospital 26/12/23. Increased respiratory sounds with squeaks, high capillaria count, lead 7.8 ug/ dL, anaemic, and a leukocytosis with toxic change noted. Nebulized with voriconazole, given IV fluids and Baytril, died despite treatment. Suspect aspergillosis. Frozen over the holiday period.	The bird was in poor body condition at post mortem, and weighed 684 grams with moderate subcutaneous and intra-coelomic fat reserves. Some bruising was noted on the ventral right elbow and the medial aspect of both tarsometatarsus. Multiple firm, dull yellow circular nodules were present on the air sacs, ranging from 1mm-3mm in diameter. Both lungs contained multiple coalescing grey nodules, up to 10mm in diameter and invading around 50% of the lung parenchyma. Multiple discrete, pale yellow firm nodules were also present on the surface of the liver.	5/01/2024	Lung: there are multiple large foci of necrotic parenchyma, with partial retention of architecture admixed with zones of eosinophilic and pyknotic debris, often centered on and and around parabronchi; the latter and affected parabronchial lumen contain fungal elements. Liver: there are several fairly extensive areas of subcapsular lytic and coagulative necrosis. Large numbers of Kupffer cells contain haemosiderin. Spleen: moderate to large numbers of haemosiderin-laden macrophages are scattered throughout the parenchyma. Bursa: there is both cortical and medullary lymphoid depletion, with the later often containing aggregates of macrophages and/or mineralized concretions. Bearing in mind the freeze-thaw artifact, sections of heart, kidney and intestine show no obvious abnormalities.	Liver lead level: 1.060 mg/kg IDEXX CASE NO : P24000066	Mycotic (fungal) pneumonia and air-sacculitis; Aspergillosis	The gross and microscopic findings are consistent with Aspergillosis. The liver lead level was low.

Released under the Official Information Act

51359	Post Mortem	Final		Te Anau	7/10/2014	None			Te Anau Wildlife Park	Kea	Female	Adult	Bird has been unwell, one in-contact bird.	The bird weighed 633 grams and was in moderate body condition; pectoral muscle mass was adequate but body fat reserves were reduced. The upper bill was overgrown and there was marked reddening, with variable skin thickening and feather loss of the right lateral face and top of skull. There was marked subcutaneous and muscular haemorrhage of the proximal cervical spine. The was bilateral and moderate thickening of the skin of the plantar aspects of the hocks as well as several lacerations and associated skin reddening over the plantar aspect of the left claw/tarsometatarsus. The liver was uniformly shrunken and quite firm. The majority of the small intestine contain large numbers of cestodes and the mucosa of several segments was moderately thickened, tan and friable. No other abnormalities were noted on gross post mortem.	3/10/2014	Spleen: there ar irregular areas of lymphoid depletion with increased proximity of sheathed arterioles. Adrenal gland: Intestine: multiple sections of intestine contain multiple intraluminal sections of cestodes as well as smaller numbers of Capillaria nematodes within the superficial mucosa. Sections of lung, heart, liver, kidney, proventriculus, gizzard, pancreas and brain show no obvious abnormalities.	Liver lead level: 0.03mg/kg. This is a very low level and would not have adversely impacted the bird's health. NZVP CASE NO : P14021469		This bird had very large numbers of tapeworms and Capillaria nematodes within the intestinal tract which may explain the recent history of ill health. This may have made the bird more susceptible to aggression from any in-contact birds; there was quite severe trauma to the head and neck of this bird. The faecal sample from the 2nd in-contact bird also contained a reasonable number of Capillaria intestinal parasites so anthelmintic therapy maybe warranted. A liver lead level of 0.03mg/kg is very low and would not have adversely impacted the bird's health.
54828	Post Mortem	Final		Christchurch	7/08/2017	Sarah (V-2453, WB00308)			Willowbank Wildlife Reserve	Kea	Female	Adult	Was noted quiet and not coming immediately to food the previous day. She was found dead 30/07/2017. Has been very cold and wet the previous 2 days.	The bird weighed 831 grams and was in good body condition. The liver was slightly e largeid, rounded, and mottled pale. The oesophagu contained a moderate amount of granular seed-like material material admixed with mucus. The gizzard contained a moderate amount of seed and grit that was stained deep green as was the koilin surface, while the intestine contained a moderate amount of dull yellow mucoid material. The left ovary contained multiple (over 6) follicles, the largest measuring ~25mm in diameter. A remant of the right ov duct was still present.	1/08/2017	Lung: there is mild pneumoconiosis. Liver: large numbers of Kupffer cells contain haemosiderin. Spleen: moderate numbers of haemosiderin-laden macrophages are scattered throughout the parenchyma. Kidney: large numbers of proximal tubular epithelial cells have swollen, vacuolated to fragment cytoplasm and there are rare shrunken, hypereosinophilic epitelial cells with pyknotic nuclei. Intestine: one section of intestine contains several cross sections through small immature nematodes. Ovary: there are several involuting follicles. Brain: multiple neurons within the brainstem contain moderate to large amount of granular pigment within their perikaryon, likely ceroid/lipofuscin. Sections of heart, adrenal gland, proventriculus, gizzard and pancreas show no obvious abnormalities.	Liver lead level: 0.390mg/kg NZVP CASE NO : P17013507	Uncertain cause of death	Sarah was in good body condition and there were signs of trauma; microbiological culture of the liver did not grow any nasty bacteria. The only obvious abnormality noted on histological exam of the internal organs, including the brain, was evidence of recent red blood cells breakdown within the liver and splee. This is not an unusual finding in emaciated birds but this kea was in good body condition. Other causes of red blood cell breakdown include Avian Malaria (Plasmodium), lead and zinc toxicity. There was no evidence of a Plasmodium infection and the level of lead in the liver was very low; zinc toxicity is usually accompanied by damage to the pancreas which was not seen in this bird. Unfortunately the cause of the red blood cell breakdown and ultimate cause of death is unknown.
61923	Post Mortem	Pending	Department of Conservation	Motueka	18/04/2023	Unbanded	Coastline	Wild	Marahau	Kea	Male	Subadult	Found dead 14/04/2023.	The bird was in good body condition and weighed 921 grams at presentation. The ventriculus contained a moderate amount of grit and plant material. Much of the small intestine was moderate distended with large numbers of cestodes. No other abnormalities were noted on gross post mortem.	18/04/2023				This young male kea was in good body condition despite having large numbers of tapeworms within his intestine, so these are unlikely to have caused the death of this kea. Histology of the internal organs is pending and liver has been sent for lead testing.
55981	Post Mortem	Final		Te Anau	21/06/2018	No bands	Mainland National Park	Wild	Milford Road	Kea	Unknown	Adult	Found dead 14/06/2018.	The bird weighed 1.012 kg and was in good body condition. Radiographs showed multiple fractures to the skull and mandibles, bilateral slightly oblique fractures of the mid-humeri, multiple rib fractures and bilateral metatarsal fractures. There was a roughly T-shaped (~100 x 100 mm) skin defect over the right lateral thoracic area extending over the dorsal thorax with exposure of the ribs and thoracic vertebrae; a 200 mm length of intestine had been pulled through this defect. The exposed skin edges were not reddened or raised. There was a ~50 x 50 mm skin defect over the left medial humerus (overlying the fracture) and left pectoral region; the skin edges and exposed musculature were slightly reddened and swollen. The skull fractures were associated with a small amount of clotted blood. Almost all the ribs had mid-diaphyseal fractures, there was a fracture of the caudal thoracic spine, multiple pelvic/synsacral fractures and the left coxofemoral joint was luxated. The heart, liver and gastrointestinal tract were absent and there was extensive maceration of the lungs and kidneys.	19/06/2018			Massive musculoskeletal trauma consistent with vehicular strike Seconday avian scavenging	This bird had numerous fractures, including both wings, the head, chest, spine and both feet; several of the fractures were associated with haemorrhage indicating the bird was alive when these fractures occurred. Given the extensive nature of the fractures, being struck by a car would seem the most likely cause. It is possible some of the fractures occurred after death (i.e. the bird may have been struck again after death). Most of the internal organs, including the liver had been scavenged, possibly by a harrier for instance and so we can not test for the presence of lead.
64218	Post Mortem	Final	Other	Christchurch	18/12/2024	Black DW on orange both legs, left leg metal band V-4090, Brae	Mainland Reserve	Wild	Rotoiti, Nelson Lake, South Island	Kea	Male	Adult	Caught in leg hold trap, right leg just above hock. Small amount of tissue anterior and posterior, fractured tibiotarsus: fly eggs and maggots, dirt in wound, stifle unstable laterally. Euthanised 15/12/24	The bird weighed 910 grams and was in moderate body condition. There was a small amount of internal fat reserves, and moderate pectoral muscle coverage. A deep contaminated encircling wound was present on the right leg just above the hock, with muscle, tendon and bone exposure. The tibiotarsus was fractured, and the proximal end of the bone was protruding from the wound. There was also extensive bruising and oedema on the medial side of the stifle extending down towards the wound at the hock. A catheter was present in the right ulnar vein, and the right wing was wrapped in a figure of 8 bandage. The crop was distended and full of greenish khaki organic material. The ventriculus was filled with similar material as well.	18/12/2024		Liver lead level: 0.380 mg/kg IDEXX CASE NO : P24011569	Euthanasia due to fractured right tibiotarsus and secondary wound infection; leg trap injury	This was an adult male kea in reasonable body condition. There was an open and infected fractured of the right leg due to a leg trap injury. The level of lead in the liver was low and would not have adversely impacted on the health of this bird.
60862	Post Mortem	Final	Department of Conservation	Franz Josef	8/07/2022	Cookie (V-3801)	Mainland Reserve	Wild	Watangitaona	Kea	Female	Juvenile	Found dead in 3/4 full water drum, near Watangitaona, 04/07/2022.	The kea weighed 1.095 kg (wet) and was in good body condition, with good pectoral muscle mass and adequate body fat reserves. The internal organs were in an advanced state of decomposition. The crop was empty and the gizzard contained a small amount of pasty brown material and several small pieces of translucent-to-white rubbery plastic.	7/07/2022		Liver lead level: 0.20 mg/kg NZVP CASE NO : P22008137 25502 Muscle tissue, Kea, 60862: Fluoroacetate, Âµg/g <MDL Report No: T7986 25503 Liver tissue, 60862, Kea: Pindone, Âµg/g <MDL Report No: T7987	Probable misadventure; drowning	This young female kea was in good body condition and there were no signs of trauma. The internal organs were too decomposed for microscopic examination. Tissue will also be sent for 1080 and anticoagulant residue testing (there were no signs of bleeding to indicate anticoagulant toxicity). The level of lead in the was low and would not have adversely impacted on the health of this bird. No 1080 residue was found in the skeletal muscle and no pindone residue was found in the liver; unfortunately there was not enough remaining liver tissue to test for brodifacoum.
50546	Post Mortem	Preliminary		Christchurch	26/02/2014	Silver, L-35940			Orana Wildlife Park	Kea	Male	Adult	Housed in free flight aviary with 1 female and 2 other male Kea. Appears to have been attacked by female and found alive by keepers bleeding from the mouth. Died on the way to the local vet clinic.	This bird weighed 755g and was in moderate to good body condition. He had a BCS of 4/9 with good pectoral muscle mass and subcutaneous fat stores. On external examination there was blood in his mouth and some bruising on both sides of the caudal abdomen. There was a proliferative, hyperkerototic lesion on the plantar surface of the hock. Internally, there was a severe amount of haemorrhage (approx 5ml) in the coelomic cavity and air sacs. There was also extensive subcapsular haemorrhage of the left lobe of the liver. The liver itself was pale and creamy yellow in colour, with multiple nodules of various size throughout both lobes (up to 15mm in diameter and were slighly firmer than the surrounding parenchyma). The right lobe was more severely affected than the left. The proventriculus and ventriculus was distended with food particulates. The lungs were very frothy and copious amounts of fluid flowed out it when cut. No other abnormalities were noted on gross post mortem.	26/02/2014				It is unlikely that this degree of internal bleeding could occur from trauma due to an attack by another bird. The liver of this bird showed changes in colour and texture and we suspect may be the result of previous damage and subsequent scarring (cirrhosis) that this was the birds primary problem. In severe liver disease, the liver is unable to produce coagulation factors which are very important for the blood cloting process. We are suspicious that this bird had liver disease which resulted in a coagulopathy, and therefore suffered from excessive blood loss when he sustained trauma (likely through fighting with other bird). Hopefully histology of the liver tissue will give more information regarding the type of liver disease.

Released under the Official Information Act

58446	Post Mortem	Final	Department of Conservation	Wanaka	2/03/2020	V-3059	Mainland National Park	Wild	E1253094 N5065622	Kea	Male	Adult	Found dead on 20/02/20. Known use of 1080 poison in the area.	The bird weighed 958 grams and was in good body condition with good pectoral muscle mass and low body fat reserves. The crop was empty. The proventriculus and gizzard contained 7.8 grams of green/blue-tinged pasty material.	28/02/2020		23720 Muscle tissue, 58446, Kea: 2.30 ug/g Landcare Report No: T7416.	1080 toxicosis	The dyed pasty material in the stomach is highly suggestive of 1080 ingestion. Skeletal muscle was sent for 1080 testing and the result indicates this bird has ingested 1080. Given this result and lack of any other obvious gross post mortem findings 1080 is the most likely cause of death.
58732	Post Mortem	Final	Department of Conservation	Te Anau	6/07/2020	Stimpy (V-2958)	Mainland National Park	Wild	Wet Jacket Peninsula, Fiordland National Park	Kea	Male	Adult	These birds were part of a study to determine fate of kea through a 1080 operation. Transmitters were attached in April 2019, birds still alive on June 19th 2020. The 1080 drop occurred on the 26th and 27th of June and then these birds were on 'mortality mode' when checked on 1st July. Transmitters go into mortality mode only after 48 hours with no activity, this means birds likely died before 30th of June. Bodies were recovered on July 2nd. TX TR4 Channel: 111. TX Mhz Ref Tune 161.233. Tuning used for June 19 flight 161.2330. Band combination Yellow/â– on Blue	The bird weighed 1.088 kg and was in good body condition with good pectoral muscle mass and good body fat reserves. There was 7.1 grams of green to bright green pasty granular content within the proventriculus and gizzard. The crop was empty. There was no evidence of feather loss or skin thickening or ulceration from the transmitter or harness.	6/07/2020		Liver lead level: 0.013 NZVP CASE NO : P20009194 Fluoroacetate: 5.5 Âµg/g Landcare Report No: T7479	1080 poisoning	The bright green stomach contents is highly suggestive of 1080 ingestion and analysis of the skeletal muscle confirmed the presence of fuoroacetate. The bird was in good body condition and there was no evidence of feather loss or skin thickening or ulceration from the transmitter or harness. The level of lead in the liver was very low and would not have adversely impacted on the health of this bird.
55323	Post Mortem	Final	Other	Christchurch	8/12/2017	Iwa (V-2630)	Mainland National Park	Wild	Arthur's Pass	Kea	Male	Adult	Iwa the kea died Tuesday night 05/12/2017).He was on IV fluids, metoclopramide and as of Monday morning Clavulox. He had had one round of chelation and the vomiting had settled over the weekend but started again badly Monday night (04/12/2107).	The kea weighed 570 grams and was in very poor body condition, with markedly reduced pectoral muscle mass and minimal body fat reserves. The oral cavity contained a large amount of pasty light orange material; a large amount of similar material was present in the proventriculus and gizzard. Occupying the mid-portion (~one third) of the right lung and adhered to the right thoracic wall was a fairly discrete 25 x 25 x 10mm firm tan dry mass. No other abnormalities were noted on gross post mortem.	8/12/2017	Lung: in two sections, although the pulmonary architecture is largely preserved, it has a pale ghosted appearance and is infiltrated with dense mats of fungal elements admixed with pyknotic debris and numerous small deposits of proteinaceous fluid. Numerous blood vessels are also involved including several large pulmonary veins which show eccentric smooth muscle necrosis with early heterophilic infiltration and lumina filled with fungal elements and pyknotic debris. There is also extension into the adjacent intercostal musculature. Spleen: there is a reduction in the amount of lymphoid tissue with increased proximity of sheathed arterioles. Moderate numbers of haemosiderin-laden macrophages are scattered throughout the parenchyma. Liver: large numbers of Kupffer cells contain haemosiderin while most hepatocytes contain small amounts of similar pigment. Gizzard: the koilin is layer is thickened and disorganised and contains several large adult nematodes (containing embryonated eggs) near the submucosa while numerous embryonated eggs are scattered throughout the remaining koilin. Intestine: several sections contain moderate numbers of intraluminal nematodes and there is mild multifocal necrosis of villous tips; autolysis precludes further evaluation. Sections of heart and kidney, show no obvious abnormalities.	Liver lead level: 2.9 mg/kg NZVP CASE NO : P17021275	Emaciation Acute mycotic pneumonia (Aspergillosis)	There was an extensive fungal pneumonia probably due to a previous aspiration but would not explain the bird's poor body condition. Iwa was also pretty skinny; the liver lead levels were elevated but no severely so (above 5 mg/kg is suggestive of toxicity) but that doesn't rule out previous high lead levels as a cause of the decreased body condition. Nematodes were also present in the gizzard and intestine which may have also contributed in part to the decline in body condition.
60855	Post Mortem	Final	Department of Conservation	Franz Josef	1/07/2022	"Otaf" V-3767	Mainland National Park	Wil	Arthur's Pass NP	Kea	Male	Subadult	Treated at SI Wildlife Hospital in October 2021 for extremely high lead level. Died sometime in December 2021.	Most the the appendicular skeleton was present, but many of the bones were loose and largely devoid of soft tissue. Feathers were still present on the wing tips and there were also loose feathers and a transmitter harness. Skin was still present on the distal parts of both legs. The sternum and synsacrum/pelvis were attached to each other by desiccated skin. Most of the ribs, thoracic and cervical vertebrae were missing, as was the skull/	30/06/2022			Unknown cause of death Extensive scavenging	Due to the extensive scavenging and some missing bones, such as the skull, a cause of death could not be determined. There were no broken long bones or notches in the keel so it does not appear to have been scavenged by another avian species. In addition, there were no chew/gnaw marks on the bones, so the scavenging may have been due to invertebrates rather than vertebrates. Unfortunately, New Zealand does not have a commercial lab that can test either bone or feathers for the presence of lead.
59250	Post Mortem	Final	Department of Conservation	Arthur's Pass	25/11/2020	None	Mainland Private Land	Wild	Arthur's Pass Village	Kea	Male	Juvenile	Unknown bird, found in reasonably fresh condition. Grass temperature approximately 16 degrees, and down to 1 degree overnight on days prior.	The kea weighed 720 grams and was in good body condition with developed musculature and adequate subcutaneous and visceral fat reserves. Moderate generalised damage to feather tips was present. Within the proventriculus and gizzard was a large volume of fibrous material that was green-brown in colour.	24/11/2020	Liver: small number of Kupffer cells contain haemosiderin or one to several phagocytosed erythrocytes. Spleen: moderate to large numbers of macrophages contain one to several phagocytosed erythrocytes. Kidney: there are numerous urate tophi and scattered proximal tubular epithelial cells contain multiple, variably-sized eosinophilic intracytoplasmic droplets Intestine: there is a focal area in which the lamina propria is expanded by haemorrhage and proteinaceous material. Sections of lung, heart, gizzard, pancreas and brain show no obvious abnormalities.	Liver lead level: 84 mg/kg NZVP CASE NO : P20017406	Severe acute lead toxicosis	This poor kea had easily the highest liver lead concentration I've seen in my 10 years performing post mortems on kea. The source of the lead was not apparent; no obvious metal items/particles were seen in the proventriculus/gizzard.
63654	Post Mortem	Pending	Department of Conservation	Takaka 7110	23/07/2024	None	Mainland Reserve	Wild	Golden Bay	Kea	Male	Juvenile	Wild kea that had been seen eating plastic prior to being found dead.	The bird was a juvenile male that weighed 558 grams, that was in an emaciated body condition with poor subcutaneous fat reserves and poor pectoral muscle mass. The bird was in an advanced state of autolysis. The proventriculus/ventriculus contained a moderate amount of ingesta including several small pieces of rubber and plastic. Each lung contained at least 3 fairly discrete, firm raised brown nodules (up to ~15 mm in diameter) with a fluffy green core on cut surface. No other abnormalities were noted.	23/07/2024		Liver lead level: IDEXX		This was a young male kea in poor body condition; there were no signs of trauma. There were nodule in the lung which would be consistent with a fungal pneumonia, such as Aspergillous. We will test the liver for lead levels to see if possibly lead poisoning contributed to the kea's decline, which can make a bird more susceptible to developing a fungal pneumonia.
61227	Post Mortem	Final	Department of Conservation	Blenheim	23/09/2022	Schist (V-1521/White Non Red)	Mainland National Park	Wild	Otira Valley TR	Kea	Male	Adult	Mortality signal triggered 07/09/2022, Otira Valley TR, bird recovered 16/09/2022. Received at Massey afternoon of 20/09/2022.	The kea weighed 978 grams (with transmitter attached) and was in good body condition, with good pectoral muscle mass and good body fat reserves. The crop contained light/bright green, granular paste and the proventriculus and gizzard also contained a light/bright green granular paste; the total weight of this material (crop/PV/gizzard) was 12.00 grams. Similar green pasty material was visible along most of the length of the small and large intestine (weight ~3 grams). No other abnormalities were noted on gross post mortem.	21/09/2022		25655 Muscle tissue, 61227 Kea: Fluoroacetate: 2.85 Âµg/g Landcare Report T8036 Liver lead level: 0.070 mg/kg NZVP CASE NO : P22011612	Primary 1080 toxicosis	The kea was in good body condition, and there were no signs of trauma. The bright green paste in the crop and stomach (~12.00 grams of bait) is highly suggestive of 1080 toxicosis, via primary ingestion of the 1080 bait; no other food items were present in the stomach. ~3 grams of green paste was also present along most of the length of the intestine, however this weight of paste is not deemed particularly reliable due the presence of other material such as digested food material, mucous and faeces. Landcare testing showed the presence of 1080 residue with the pectoral muscle. The level of lead in the liver was low and would not have adversely impacted on the health of this bird.

Released under the Official Information Act

60175	Post Mortem	Final	Department of Conservation	Motueka	27/10/2021	None	Mainland Private Land	Wild	Dovedale	Kea	Male	Subadult	Found alive on private property in Dovedale 23/10/2021. Seen hopping around but deteriorated rapidly. Tried to eat and drink but was unable. Taken to local vet; the bird was virtually non-responsive, emaciated and could not grasp with feet. Despite supportive care the bird died with the hour.	The kea weighed 609 grams and was in poor body condition, with reduced pectoral muscle mass and minimal body fat reserves. The liver, spleen and kidneys were uniformly pale and shrunken. The gizzard contained a small amount of melena stained fibrous material and grit; segments of the small intestine also contained melena. No other abnormalities were noted on gross post mortem.	27/10/2021		Liver lead level: 33 mg/kg NZVP CASE NO : P21014214	Lead toxicosis Emaciation	This was a young male kea in poor body condition. The clinical signs shown before death are consistent with lead toxicity, and testing of the liver showed a hugely elevated level and so lead toxicity is the cause of the emaciation and death.
61699	Post Mortem	Final	Department of Conservation	Franz Josef	14/03/2023	Unbanded	Mainland Reserve	Wild	Okarito	Kea	Female	Juvenile	Found dead on road 17/02/2023, Okarito Pakihi Walk.	The bird weighed 660 grams and was in good body condition, with good pectoral muscle mass and adequate body fat reserves. There was blood in the oral cavity and proximal oesophagus. The crop and gizzard were empty. There was a closed, slightly oblique mid-diaphyseal of the right humerus; there was no associated soft tissue reddening. The keel and sternum were mottled deep red and there was reddening of the right intercostal musculature. There was clotted blood over the base of the heart and great vessels as well as both thoracic air-sacs and between the left and right liver lobes. Both lungs were mottled deep red. There was some tearing of the cranial lobes of the kidneys associated with some underlying blood clots. The synsacrum was mottled deep red as were the pelvic bones. There was reddening of the musculature over the dorsal aspect of the pelvis as well as the overlying subcutaneous tissue. No other abnormalities were noted on gross post mortem.	2/03/2023		Liver lead level: 0.031 mg/kg IDEXX CASE NO : P23002273 26025 Muscle tissue, 61699 Kea: 0.002 Âµg/g Fluoroacetate Landcare Report T8226 Liver, 61699 Kea: brodifacoum Âµg/g: <MDL Landcare Report: T8211	Blunt force trauma: vehicular strike	The kea was in good body condition. The pattern of damage to the skeleton, soft tissue and internal organs is consistent with compressive blunt force trauma as would be seen with being struck with a vehicle. The level of lead in the liver was very low and would not have adversely impacted on the health of this bird. 1080 residue was detected in the muscle but in very small amounts compared to kea that have almost certainly died from 1080 exposure (i.e. dyed cereal bait visible in the stomach and much higher 1080 levels in the muscle). The level of 1080 in the tissues will decrease in the tissues as an animal decomposes, however, this kea was fairly fresh so the very low level in the kea may represent recent exposure to 1080 at a non-lethal level. The presence of 1080 and death due to vehicular strike are likely non-related. No brodifacoum residue was detected in the liver (both brodifacoum and 1080 were tested at Landcare).
55105	Post Mortem	Final		Christchurch	6/10/2017	Kikimo (L-19331)			Orana Wildlife Park	Kea	Male	Adult	Adult male Kea wild caught as an adult in 1985 (minimum of 24 year of age) and recently maintained in a walk-through planted aviary with 4 other Kea of varying ages. Veterinary assessment on 4/10/17 due to deteriotating health found arthritis, cataracts and light body condition. Euthanased. Previously diagnosed with heart murmur and arteriosclerosis at Massey in 2006. Arrived at Orana with an eye issue in 2003 which worsened over time.	At post-mortem the bird was in poor body condtion (BCS 2/5) all retrices were missing or damaged. There was a centrally located large (3mm diameter) yellow/white spot in the left cornea. A circular ulcerated lesion with a dry necrotic core was present on the plantar surface of the left hock and extension into the underlying tendons (clinical Grade IV pododermatitis). There was marked enlargement of the interphalangeal joints on the left foot most significantly on digit III. White crystals and friable firm congealed material was present within the right side of the heart and the cranial and caudal vena cavae (pentobarbitone induced artefact). Several well demarcated raised dull areas were visible on the internal surface of the base of the aorta with overlying milliary white spots. The liver was friable with diffuse patchy areas of discolouration and multiple prominent enlarged capusular vessels. Two fluid-filled cystic structures each 5mm in diameter were present within the parenchyma of the left liver lobe. Within the caudal segment of the right kidney were was a 4mm cystic structure containing a small amount of turbid fluid and firm yellow/white nodules. The remaining kidney tissue appeared normal. Within the wall of the proventriculus was a raised pale irregular firm mass measuring approximately 25 x 25 x 10mm. The ventriculus and proventriculus contained a large amount of seed material, while the crop was empty. The ventricular wall was thin and flaccid. The proximal small intestine contained a large amout of mucoid pale tan ingesta. There was enlargement of the last three mobile intervertebral spaces before the synsacrum. Bands of white fibrous material surrounded the hock, pedal and inter-phalangeal joints of the left hind limb. The articular surfaces of these joints was dull in appearance.	6/10/2017	Left eye: apart from the ciliary body and iris the remaining internal ocular structures (including the lens and retina) have been replaced by mesenchymal tissue; this includes mature trabecular bone (complete with adipocytes, erythroid and myeloid precursor cells) and oedematous fibrovascular tissue often admixed with thin bundles of what appears to be smooth muscle). The choroid is replaced and expanded by large amounts of whipsy fibrous tissue admixed with numerous thin-walled vascular channels of varying diameter. There is a deficit in Descemet's' membrane with adhesion of the iris; melanocytes and capillaries have invaded the deep corneal stroma. The corneal stroma itself is thickened and contains increased numbers of capillaries and small numbers of scattered heterophils and mononuclear cells. There is goblet cell metaplasia of the overlying corneal epithelium. Heart: cardiomyocytes often contain small amounts of finely granular yellow perinuclear pigment, likely lipofuscin. There is irregular thickening of the aortic valve and aortic subintima with mucinous material. Liver: there is a ~3mm in diameter cyst elevating the capsule; it composed of thin layers of collagen lined by a single layer of low cuboidal epithelium. Kidney: there are several adjacent cysts (up to 1mm in diameter) elevating the renal capsule; they contain large amounts of proteinaceous debris and are lined by single to double layered cuboidal epithelium with rare papillary projections. Proventriculus: there is transmural expansion by an unencapsulated, highly infiltrative epithelial neoplasm consistent with an adenocarcinoma. Sections of lung, spleen and intestine show no obvious abnormalities.		Euthanasia due to deteriorating quality of life 1. Osteoarthritis of the left leg 2. Adenocarcinoma of the proventriculus 3. Intraocular osseous metaplasia of the left eye	Kikimo had considerable arthritic changes in the joints of his left leg and foot. The pododermatitis lesion on his left hock suggests that this joint was being used as the main weight bearing surface on that leg. He also had cancer of the proventriculus called an adenocarcinoma, a tumour derived from the glandular cells of the proventriculus. There were also some age related changes in the heart valves and aorta. Interestingly most of the internal structures of the eye had been replaced by bone and bone marrow. Cartilage and bone are normal structures in the eyes of birds and reptiles but these make up the scleral ossicles, the supporting tissue found in the outer lining of the eye but in the case of Kikimo it is likely some previous injury to the eye (this likely occurred years ago) has resulted in a very abnormal healing response.
57653	Biopsy	Final	Massey University	Palmerston North	31/07/2019	Lewis 78112	Zoological Wildlife Park	Captivity	Orana Park	Kea	Male	Adult	Facial mass/cellulitis	Facial mass submitted in formalin	29/07/2019	Most of the biopsy consists of a serocellular crust composed of large amounts of proteinaceous material admixed with bands of eosinophilic and pyknotic debris. Scattered throughout this material are large numbers of yeast and bacteria (predominantly coccoid) and fragments of plant material. There is a small piece of attached dermis heavily infiltrated with mixed inflammatory cells.		Ulcerative dermatitis with a prominent serocellular crust	Most of the submitted material is composed of a serocellular crust containing large numbers of embedded yeast, bacteria (mostly cocci) and fragments of plant material. There is no evidence of a pox-viral infection in the sections examined.
64199	Post Mortem	Final	Department of Conservation	Franz Josef	10/12/2024	Unbanded	Mainland Reserve	Wild	Roadside, South Westland	Kea	Male	Subadult	Found dead on the road side, 300m south of Bonar Ck on Harihari Highway/State Highway 6, South Westland. Body warm when collected at 9:00am on 01/12/24. Presumed car strike.	The sub-adult kea (unbanded) weighed 850g and was in good body condition with adequate skeletal muscle and visceral fat reserves. A puncture wound 8mm in diameter was present over the dorsal pelvic spine slightly right of the midline with extensive associated haemorrhage and bruising. Immediately caudal to this region, underlying crepitus was palpated. Ventrally, a circular region of bruising to the skin and underlying muscle approximately 10mm in diameter was present on the caudal border of the keel, just right of the midline. Moderate amounts of blood was present within the oral cavity. Upon reflecting the skin, moderate amounts of haemorrhage was present within the left inguinal region and multiple pelvic fractures were identified. A tear along the length of the lateral aspect of the left pectoral muscle was evident and multiple unilateral rib fractures were present along the right side of the keel. Moderate amounts of haemorrhage were present within the coelomic cavity along with extensive visceral tearing with particular damage to the liver. Two testes were identified indicating that this kea was a subadult male.	10/12/2024		Liver lead level: <0/019 mg/kg IDEXX CASE NO : P24011285	Trauma consistent with vehicle collision	The kea was in good body condition. The gross post mortem signs are consistent with being struck by a car. Radiographs were taken and no evidence of bullet fragments were identified making cause of death by gunshot unlikely. The level of lead in the liver was low and would not have adversely impacted on the health of this bird.

Released under the Official Information Act

53535	Post Mortem	Final		Haast 7844	20/07/2016	No ID			Haast	Kea	Unknown	Adult	The Kea was found dead and submitted for post mortem examination. Other kea in the area have been treated for lead toxicity recently.	The Kea weighed 870g and was in good body condition, with prominent subcutaneous and intracoelomic fat reserves. An radiograph was taken to investigate the possibility of a gun shot injury. The radiography showed fractures of the right humerus and ulna, with metal particles distributed in the soft tissues surrounding the fracture site, and thoracic integument bilaterally. On gross post mortem there was an open comminuted fracture of the distal third of the right humerus. There was also a comminuted fracture of the proximal to middle thirds of the right ulna. There was bruising and haemorrhage of the muscle and skin surrounding these fracture sites. There was also a full thickness skin deficit over the palmar and dorsal aspects of the integument overlying the ulna fracture site. These skin deficits were circular in shape, 5mm in diameter and extended through the skin to the level of the underlying fracture. There was an ovoid hole in the integument of the right flank that was 20mm in diameter, and penetrated the thoracic cavity. There was also an ovoid hole in the integument of the contralateral flank (left thorax) that was 15-20mm in diameter, and also penetrated the thoracic cavity. These two holes appeared to communicate freely. There was a rim of brown green discolouration of the skin 5mm wide, that surrounded the circumference of the holes bilaterally. The intercostal musculature surrounding these ovoid thoracic holes w s m cerated, and 4 ribs were fractured bilaterally within the circumference of the penetrating injuries. There was extensive maceration of the thoracic viscera, with only the heart being left intact. The heart was free within the thorax, with the attachment to the great vessels being severed diffusely. The thoracic cavity was also filled with blood clots diffusely. There was maceration of the gonads and cranial poles of the kidneys bilaterally. The liver was diffusely pale. The gastrointestinal tract appeared to be intact, but was moderately decomposed.	18/07/2016			Ballistic injury causing fatal thoracic trauma	This bird had several penetrating wounds resulting in severe damage to the internal organs as well as multiple fractures to one of the wings. A radiograph of the bird showed multiple small metallic fragments associated with these wounds indicating this bird had been shot. Looking at the small fragments on the radiograph it's possible the type of ammunition would be in the range of .222, .22-50 or .223. A possible trajectory could be the bird was in a standing position, the bullet entered the top of the left chest area and exited through the right flank and smashed the inner part of the right wing; so it is possible the shooter was in an elevated position relative to the kea.
58326	Post Mortem	Final	Departme nt of Conservati on	Franz Josef	18/01/2021	Unbanded	Mainland Private Land	Wild	Franz Josef	Kea	Female	Juvenile	Found alive but with raspy breathing in Franz Josef township 30/12/2020 but died soon afte being collected by DoC. F ozen rior to submis n.	The bird weighed 510 grams and was in poor to moderate body condition, with reduced pectoral muscle mass but some remaining body fat reserves. Both lungs contained multifocal to coalescing, moderately discrete and slightly firm tan nodules (up to ~10 mm in diameter); the left cranial thoracic inlet contained a small amount of soft tan mucoid material.	11/01/2021		Liver lead level: 0.650 mg/kg NZVP CASE NO : P21000383	Pneumonia Reduced body condition	This young kea was in reduced body condition, which in large part was due to a pretty severe pneumonia (most likely caused by fungus) and this would also explain the respiratory distress noted when the bird was alive. The level of lead in the liver was low and would not have adversely impacted on the health of this bird.
52609	Post Mortem	Final		Motueka	8/10/2015	No bands			Kaiteriteri	Kea	Male	Adult	Found dead kea at Kaiteriteri Beach, Motueka on the 29/09/2015. Stored it in our freezer then submitted to Wildbase.	The bird was in good body condtion and weighed 1.132kg. Blood was present in the oral cavity and both nares. Radiographs did not find any evidence of skeletal trauma or metallic projectiles/foreign bodies. A small amount of blood coated the lumen of the trachea for the whole lenth from the glottis to the syrinx. The lungs were spongy, dense and mottled deep red, but floated in formalin. Gizzard contents consisted of small stones and light green coloured fibrous plant material.	8/10/2015	Lung: parabronchi and air-capillaries are filled with homogenous, eosinophilic material, likely the result of freeze-thaw. Liver: in one section there is a fairly large subcapsular focus in which many hepatocytes contain one large, discrete, clear intracytoplasmic vacuole. Bearing in mind the freeze-thaw artifact, sections of skeletal muscle, heart, spleen, kidney, oesophagus, gizzard, intestine, pancreas and brain show no obvious abnormalities.	Liver lead level: 0.03mg/kg. NZVP CASE NO : P15020070	Uncertain cause of death	This was an adult male kea in good body condition. The level of lead in the liver was very low and would not have adversely impacted on the health of this bird. There were no signs of trauma or ballistic injury (on radiography and gross post mortem). The lungs and trachea appeared to have blood in them but some of this may be due to freezing-thawing, however we can not completely exclude there is some bleeding due to something such as anticoagulant ingestion. Histology of the internal organs did not reveal any obvius evidence of an infectious/inflammatory process.
61246	Post Mortem	Final	Departme nt of Conservati on	Blenheim	31/10/2022	Montigena (V-3576/White BM)	Mainlan National Park	Wild	Trent TR, Arthur's Pass	Kea	Male	Juvenile	Mortality signal 29/08/2022, retrieved Trent TR , Arthur's Pass NP, 16/09/2022.	The remains were not weighed due to extensive scavenging. Both the axial and appendicular were largely intact but mostly devoid of soft tissue and skin, except for the extremities of all four limbs. There was fraying of some of the rib ends.	23/09/2022			Unknown cause of death	A cause of death could not be established due to decomposition and extensive soft tissue scavenging.
63345	Post Mortem	Final	Departme nt of Conservati on	Te Anau	26/04/2024	Wahi (V 3483)	Mainland National Park	Wild	Homer Tunnel, Milford Rd, Te Anau	Kea	Male	Adult	Run over by a car (witnessed) on the 17/04/24.	The bird was an adult male that was in good body condition, consisting of good pectoral muscle mass and moderate subcutaneous fat reserves. The feathers of the ventrum were blood-stained. The proximal right tarsometatarsus was palpable fractured. The keel and sternum had marked bone bruising. There was moderate haemorrhage within the coelom, especially surrounding the heart. The liver was moderately pale. The proventriculus and ventriculus contained moderate amounts of seed material, and several small (non-obstructive) pieces of plastic and rubber.	26/04/2024		Liver lead level: 0.090 mg/kg IDEXX CASE NO : P24004167	Blunt force trauma-vehicular strike	This adult male kea was in good body condition; the gross post mortem signs are consistent with being struck by a car. The level of lead in the liver was low and unlikely to have adversely impacted on the health of this bird, or contributed to being struck by a vehicle.
62930	Post Mortem	Final	Departme nt of Conservati on	Franz Josef	19/12/2023	Jaro (White CZ on green band)	Mainland National Park	Wild	Scenic Hotel Lawn	Kea	Male	Juvenile	Found dead on the 27/07/23. 1080, cyanide and brodifacoum used in the area. Frozen prior to submission.	The bird weighed 727 grams at post mortem and was in good body condition with significant subcutaneous and coelomic fat reserves. The crop contained a small amount of liquid material with soil, the ventriculus contained a moderate amount of dark green stained ingesta, as did several segments of intestine.	19/12/2023		Liver lead level: 250 mg/kg IDEXX CASE NO : P23013083 29638 kea: Brodifacoum, Âµg/g <MDL Landcare Report T8389	Acute lead toxicity	No evidence of brodifacoum poisoning was noted on gross post mortem and no brodifacoum was detected in the liver (testing done by Landcare).
53026	Post Mortem	Final		Wellington	14/03/2016	Awhina			Wellington Zoo	Kea	Male	Adult	The Kea entered the collection at Wellington Zoo 12 months previously. During the health check upon arrival scarring of the right cornea was identified as well as subcutaneous granulomas over the chin and thoracic inlet. These granulomas were biopsied for histology. The biopsy and subsequent culture identified candida albicans as the causative organism. Chlamydia and PBFD PCR testing performed in April 2015 were both negative, and Polyoma virus PCR testing was also negative in November 2015. Awhina was treated with systemic antifungal therapy, with the most recent treatment course being fluconazole for the last 5 months. Further lesions were biopsied and cultured from the keel and hock, and candida albicans was again cultured from these samples.	Awhina was in good body condition, with prominent pectoral musculature, subcutaneous and intracoelomic fat reserves. There was visible barbering to the feathers over the shoulders. The right eye contained a discrete circular white opacity extending over 50% of the corneal surface, with a slightly blue rim surrounding the margins of the opacity. There were 2 discrete raised circular areas present within the skin overlying the keel. These areas were firm on palpation, and 5mm in diameter. There was a 15mm long deficit within the keel beneath these skin thickenings. This deficit in the keel was 3mm deep, with yellow discolouration of the tissue extending over a longitudinal area 15mm in diameter either side of the keel. At the caudal most aspect of the keel there was a bi-lobed brown mass that was 40mm x 20mm in size. This mass was brown in colouration; firm and the mass was anchored within keel on the left hand side. On cut section of the keel, the mass was visible extending within the bone 20mm proximal to the base of the keel. The subcutaneous tissue did not appear to be attached or involved with this keel mass. The ventriculus contained grit and a small quantity of partially digested ingesta. The pancreas was diffusely dark red purple in colour, with possible mild thickening of the duodenal wall. All other organs were normal on gross examination.	8/03/2016	Bilobed brown mass (caudal keel): this material consists almost entirely of extravasated erythrocytes admixed with lakes of proteinaceous material. Partially bordering or exteding into this material are thin bands of multinucleated giant cells admixed with small numbers of epithelioid macrophages and heterophils; a Young's fungal stain fails to reveal any obvius fungal elements. Pectoral muscle: there are at least two discrete granulomas (up to 1mm in diameter) composed of a central core of amorphous to granular eosinophilic debris bordered by a thick layer of multinucleated giant cellsand epitelioid macrophages and an outer band of concentric fibrous admixed with heterophils and scattered mononuclear cells. There is periosteal new bone formation around the keel bone as well as areas of skeletal muscle loss and replacement with fibrous tissue. Within the necrotic debris of the granulomas are multiple PAS-positive, refractile strucutres resembling fungal spores but they vary a reasonable amount in size and morphology. Lung: parabronchial and atrial connective tissue are often moderately expanded by loose myxomatous material infiltrated with small numbers of macrophages (containing refractile spicular brown material) and heterophils, often with mild hyperplasia/hypertrophy of the atrial epithelium. Liver: there is a solitary 200 micron in diameter granuloma composed centrally of several multinucleated giant cells with abundant pale eosinophilic granular cytoplasm bordered by a collar of granulocytes admixed with lymphocytes and plasma cells. Spleen: there is marked congestion. Adrenal gland: there are areas of increased cortical tissue compared to chromaffin tissue. Proventriculuar/ventricular junction: there are fairly large numbers of granulocytes with fewer lymphocytes and plasma cells within the lamina propria. Intestine: within the duodenal lamina prorpria there are moderately increased numbers of plasma cells and fewer lymphocytes. Pancreas: there is patchy congestion and coalescing areas of haemorrhage but with no associated inflammation or obvious degenerative changes to exocrine cells. Sections of heart. Kidney and proventriculus show no obvious abnormalities.		Euthanasia due to chronic fungal dermatitis and early osteomyelit is of the keel; Candidiasis	There were several granulomas within the pectoral musculature and there were small numbers of suspicious fungal spores associated with these granulomas. The hyphal forms usually associated with invasive/pathogenic Candida were not clearly present in these lesions. The only internal lesions noted were increased numbers of heterophils, lymphocytes and plasma cells within the gastrointestinal tract; at the time of post mortem these inflammatory cells were not associated with mucosal erosion/ulceration or the presence of Candida organisms. In theory, if this was an "inflammatory bowel" type lesion (not in the human medical sense) then previous episodes of more severe inflammation could have provided a leaky intestinal lining or frank ulceration to allow Candida to translocate across the bowel wall into the bloodstream. There were no other lesions noted that would cause obvious immunosuppression.

Released under the Official Information Act

61229	Post Mortem	Final	Department of Conservation	Blenheim	23/09/2022	Clive (V-3918/Yellow DO on Blue)	Mainland National Park	Wild	Kelly Range	Kea	Male	Adult	Mortality signal triggered 07/09/2022, Kelly Range, bird recovered 17/09/2022. Received at Massey afternoon of 20/09/2022.	The kea weighed 1.01 kg (with transmitter attached) and was in good body condition, with good pectoral muscle mass and good body fat reserves. The crop and oesophagus contained light/bright green, granular paste and the proventriculus and gizzard also contained a light/bright green granular paste; the total weight of this material (crop/PV/gizzard) was 13.00 grams. Similar green pasty material was visible along most of the length of the small and large intestine (weight ~2 grams). No other abnormalities were noted on gross post mortem.	21/09/2022		25657 Muscle tissue, 61229 Kea: Fluoroacetate: 10.30 Âµg/g Landcare Report T8036 Liver lead level: 0.200 mg/kg NZVP CASE NO : P22011612	Primary 1080 toxicosis	The kea was in good body condition, and there were no signs of trauma. The bright green paste in the crop and stomach (~13.00 grams of bait) is highly suggestive of 1080 toxicosis, via primary ingestion of the 1080 bait; no other food items were present in the stomach. ~2 grams of green paste was also present along most of the length of the intestine, however this weight of paste is not deemed particularly reliable due the presence of other material such as digested food material, mucous and faeces. Landcare testing showed the presence of 1080 residue with the pectoral muscle. The level of lead in the liver was low and would not have adversely impacted on the health of this bird.
60198	Post Mortem	Final	Department of Conservation	Takaka	29/11/2021	No bands	Mainland Reserve	Wild	Ligar Bay	Kea	Male	Adult	Two kea found dead in close proximity (unknown date) Ligar Bay. Handed to Department of Conservation 08/11/2021. Frozen prior to submission.	The bird arrived at Massey University (Turitea campus) frozen 10/11/2021 and the post mortem was performed the following day. The bird weighed 920 grams and was in good body condition, with good pectoral muscle mass and adequate body fat reserves. Radiographs showed multiple fractures of the axial skeleton but no evidence of retained radiodense ballistic material. There were at least four roughly circular skin defects (the largest ~10 mm in diameter) within a ~25-30 mm radius over the right lateral aspect of the thoracic and abdominal/hip area; several of these had small numbers of feathers pulled through the defect. There were corresponding slit-like defects in the right pectoral muscle and intercostal musculature with associated reddening of the soft tissues. Several of the ribs of the right thoracic cage were fractured. Both lungs were deep red and the right lung contained multiple lacerations. Clotted blood was also present over the lungs. There were at least three ovoid to slit-like skin defects (up to 5 mm in length) over the dorsal thoracic area, just right of midline, accompanied by reddening of the adjacent skin and underlying soft tissue. There was a ~15 mm in diameter skin defect near the point of the left shoulder; there were multiple maggots (up to 10 mm in length) in the defect and underlying soft tissue. Both clavicles were fractured and there was a slightly displaced fracture of the cranial keel. No other abnormalities were noted on gross post mortem.	11/11/2021			Musculoskeletal injury consistent with gun-shot	This kea appears to have been shot at least 4 times; the injuries are "through-and-though", meaning the ballistic material has passed into then out of the body without leaving any ballistic material behind. The haemorrhage associated with these injuries indicate the bird was alive when shot. My feeling is that the projectiles have entered the right side of the chest and abdomen and exited near the thoracic spinal area. It's difficult to be certain of the type of firearm or the caliber based on the size of entry wounds, especially if the bird was shot in the air, as the ground impact could potentially alter the size of an entry wound. However, I would think a .22 or smaller caliber weapon, and given the close spread of the entry wounds, possibly a weapon with an automatic or semi-automatic capability. I think anything larger than a .22 would have created much more internal damage.
58324	Post Mortem	Final	Department of Conservation	Aoraki NP	3/02/2021	Unbanded	Mainland National Park	Wild	Sefton Biv, Aoraki NP	Kea	Male	Adult	Suspected drowning. Frozen prior to submission.	The bird weighed 1.139 kg (wet) and was in good body condition, with good pectoral muscle mass and adequate body fat reserves. Light red bubbly fluid was visible at the entrance of both nares. The crop contained watery, mostly clear fluid; the proventriculus and gizzard contained seed material and several small pieces of hard orange plastic and multiple white to grey matted hair fibres up to ~50 mm in length. The lungs were mottled red and oozed pink frothy fluid. No other abnormalities were noted on gross post mortem.	8/01/2021	Limited histology pending	Liver lead level: 0.123 mg/kg NZVP CASE NO : P21000271	Probable drowning (see comments)	This bird was in good body condition with no signs of trauma. Drowning will often not produce specific post mortem findings, but being found dead in the water and frothy fluid in the lungs is suggestive. The level of lead in the liver was low and would not have adversely impacted on the health of this bird. The drowning of two otherwise fit and seemingly healthy kea on the same day and in the same location seems a bit strange which raises the possibility that something indirect could have contributed to the kea's demise. With the stomach were multiple fibres resembling mammalian hair, so I was wondering about the possibility of a secondary type poisoning? I have frozen the stomach contents, liver and muscle and have also retained the hair fibres if any further testing is required.
61550.1	Post Mortem	Final	Department of Conservation	Blenheim	27/02/2023	Poppy O'Gladdis (V-3939, Black BM on White)	Mainland National Park	Wild	Arthur's Pass	Kea	Male	Juvenile	Remains found 7 Mile Creek at Kelly Range.	Both legs were attached to the synsacrum/pelvis (only the caudal half was present); apart from the non-feathered skin over the feet, skin and soft tissue was largely absent. The bones of the synsacrum and pelvis were frayed. Both wings were present, but separated from each other and the sternum (which was not present, as were the thoracic and cervical vertebrae and skull). The ends of the scapulae and clavicles were frayed. Multiple loose feathers were also present.	15/12/2022			Mammalian scavenging	A cause of death could not be determined because of missing bones/soft tissue (such as the head and neck), advanced decomposition and scavenging. None of the long bones (from the wings and legs) were crunched/broken so an avian scavenger seems less likely. There were marks on the pelvis/synsacrum which were similar in appearance to what we have seen with stoat scavenging but they are not definitive.
58449	Post Mortem	Final	Department of Conservation	Wanaka	2/03/2020	Tatra-V-1287	Mainland National Park	Wild	E1256144 N5072042	Kea	Male	Adult	Found dead on 20/02/20. Known use of 1080 poison in the area.	The bird weighed 779 grams and was in moderate-good body condition with good pectoral muscle mass and minimal body fat reserves. The crop was empty. The proventriculus and gizzard contained 4.6 grams of green/blue-tinged pasty material.	28/02/2020		23723 Muscle tissue, 58449, Kea: 0.63 ug/g Landcare Report No: T7416.	1080 toxicosis	The dyed pasty material in the stomach is highly suggestive of 1080 ingestion. Skeletal muscle was sent for 1080 testing and the result indicates this bird has ingested 1080. Given this result and lack of any other obvious gross post mortem findings 1080 is the most likely cause of death.
61231	Post Mortem	Final	Department of Conservation	Blenheim	27/09/2022	Little Jimmy (V-3980/White B8 on Red)	Mainland National Park	Wild	Goat Pass	Kea	Male	Subadult	Mortality signal triggered 11/09/2022, Goat Pass, bird recovered 16/09/2022. Received at Massey afternoon of 20/09/2022.	The kea weighed 1.0126 kg (with transmitter attached) and was in good body condition, with good pectoral muscle mass and good body fat reserves. The crop contained a small balled-up pieces of tissue resembling skin/subcutaneous tissue containing multiple animal fibers (~1.7 grams) and the proventriculus and gizzard contained a single large mass of matted fur admixed with a small amount of seed-like material (11.83 grams). No other abnormalities were noted on gross post mortem.	22/09/2022		25659 Muscle tissue, 61231 Kea: Fluoroacetate: 0.036 Âµg/g Landcare Report T8036 25661 Crop contents, 61231 Kea: Fluoroacetate: 0.107 Âµg/g 25662 Stomach contents, 61231 Kea: Fluoroacetate: 0.018 Âµg/g Landcare Report T8037 Liver lead level: 0.062 mg/kg NZVP CASE NO : P22011612	Likely secondary 1080 toxicosis	The kea was in good body condition, and there were no signs of trauma. No bright green paste or granular material was present in the crop, stomach or intestines. Instead, the crop and gizzard contained contained what looked to be a small amount of mammalian flesh and matted fur. Landcare testing showed 1080 residue, albeit at a much lower level than the previous kea with primary 1080 toxicosis. The as yet identified flesh and fur found in the crop and stomach also contained 1080 residue, so this appears as a likely case of secondary 1080 toxicosis. The level of lead in the liver was low and would not have adversely impacted on the health of this bird.

Released under the Official Information Act

61489	Post Mortem	Final	Other	Christchurch	6/12/2022	Elespie (V-3667-orange B8)	Mainland National Park	Wild		Kea	Female	Juvenile	Arrived emaciated, weak and with a dilated crop. Blood Pb was 0.5 mg/L. Survived a GA but then began fitting and never regain consciousness.	The keas weighed 633 grams and was in poor body condition, with reduced pectoral muscle mass and minimal body fat reserves. There was extensive subcutaneous oedema over the ventral abdomen and inguinal areas. There were increased amounts of clear, yellow-tinged fluid within the pericardial sac. Both the liver and spleen were pale and uniformly shrunken. The crop contained a moderate amounts of tan pasty material while the gizzard contained only grit. The intestine was large devoid of content except for segments that contained a small amount of melaenic material. No other abnormalities were noted on gross post mortem.	6/12/2022	Lung: there is congestion. Liver: moderate numbers of Kupffer cells contain haemosiderin. Spleen: there is lymphoid depletion and aggregates of haemosiderin-laden macrophages are scattered throughout the parenchyma. Intestine: the lumen of the duodenum contains large numbers of Capillaria nematodes. Sections of heart, kidney and pancreas show no obvious abnormalities.	Liver lead level: 10.8 mg/kg NZVP CASE NO : P22014409	Lead toxicosis	Capillaria nematodes were present in the duodenum and have likely taken advantage of the bird's immunocompromised (as a result of lead toxicosis) state to proliferate.
54399	Post Mortem	Final		St Arnaud	23/03/2017	None			Murchison	Kea	Unknown	Adult	Found dead 20/03/2017.	The bird weighed 602 grams and was in reduced body condition and a poor state of preservation; the internal organs were either absent or severely decomposed.	23/03/2017		Liver lead level: 0.002 mg/kg NZVP CASE NO : P17005440 Feathers were negative for PBFD on PCR (34005 EPAG)	Emaciation	This bird was quite skinny but unfortunately the internal organs were too decomposed to ascertain if there was ay obvious underlying disease. The liver lead level was not elevated and feathers were negative for PBFD on PCR.
62073	Post Mortem	Final	Department of Conservation	Franz Josef	11/05/2023	Unbanded	Mainland National Park	Wild	Otto's/Macdonald Campground, Westland Tai Poutini NP	Kea	Male	Juvenile	Found dead on the side of the road near the Otto's/Macdonald Campground, 07/05/2023. Potentially a car strike, as found on the side of the road. 1080 and brodifacoum poisons are used in the area.	The Kea weighed 745 grams at post mortem and was in good body condition with good pectoral muscle mass and adequate body fat reserves. There was a small graz was seen on the dorsal aspect of the left digit 3. There was also superficial graze with bruising over the right pectoral muscle. Internally, there was a tear through the lateral side of the right abdominal musculature as well as was bruising on the left pectoral muscle (near the point of the shoulder) and caudal ribs. The liver was diffusely pale and there were multiple ragged lacerations to both lobes with associated clotte blood. A small bruise was seen on the right side of the skull just caudal to the nares. The crop, proventriculus and ventriculus contained a moderate amount of plant material.	11/05/2023		Liver lead level: 0.120 mg/kg IDEXX CASE NO : P23005020 Muscle, 62073 Kea: Fluoroacetate; Âµg/g: <MDL Landcare Report T8224 Liver, 62073 Kea: brodifacoum Âµg/g: <MDL Landcare Report: T8211	Compressive blunt force trauma	The injuries noted are suggestive of compressive blunt force trauma to the chest/abdomen. This has resulted in an increase in intra-abdominal pressure which resulted in lacerations to the liver and internal haemorrhage. This was a young male kea in good body condition. The level of lead in the liver was low and would not have adversely impacted on the health of this bird. 1080 was not detected in the muscle and brodifacoum was not detected in the liver (testing via Landcare).
58825	Post Mortem	Final	Department of Conservation	Arthur's Pass	24/07/2020	None	Mainland National Park	Wild	Arthur's Pass National Park	Kea	Male	Juvenile	The bird had been feeding at an Arthur's Pass resident's place prior. Found dead on road opposite cruncher loop in village on 23/07/20.	The bird weighed 1.077kg and was in good body condition, with good pectoral muscle mass and plentiful body fat reserves. The rectrices (tail feathers) were broken midshaft. The crop was full of pale yellow pasty material. There was pale yellow to orange pasty material in the proventriculus and yellow granular-pasty material in the ventriculus. There was marked subcutaneous haemorrhage over the caudodorsal cranium and the bones of the underlying skull were speckled deep red. A ~5 mm diameter and ~2 mm deep indentation of the bone was present on the right occipital bone. Clotted blood was present in the epidural and subdural space overlying the caudal aspect of the right cerebrum which extending ventrally below the cerebellum and brainstem. On sagittal section, haemorrhage extended into the parenchyma of the caudal right cerebrum. No other abnormalities were noted on gross post mortem.	24/07/2020			Blunt force trauma to the head	This was a juvenile male bird in very good body condition. This bird has suffered blunt force trauma to the head with no evidence of trauma elsewhere in the body. There was a ~5 mm indentation to the back of skull associated with bruising to the overlying subcutaneous tissue, the bones of the skull and haemorrhage into the back of the brain. This type of injury would not be typical of a vehicle struck and would be strange for a falcon strike since the overlying skin was intact. I wonder if this bird has suffered a low energy ballistic injury to the back of the skull. A .22 rifle or air rifle would probably have too much energy and would likely have penetrated the skull resulting in much more destruction of the head. A BB gun pellet could be a possibility, low enough energy to not penetrate the skin but high enough energy to dent the skull. The resulting energy transfer through the skull has then caused haemorrhage in and around the back of the brain resulting in a fairly instant death. Liver has been sent for a lead level.
60052	Post Mortem	Final	Department of Conservation	Arthurs Pass	17/08/2021	None	Mainland National Park	Wild	Arthurs Pass	Kea	Female	Juvenile	Found dead 17/08/2021 in riverside gravel beside Bealey River but not in the water.	The bird weighed 789 grams and was in good body condition, with good pectoral muscle mass and adequate body fat reserves. The lungs were moderately pale and oozed clear light red fluid. The gizzard contained a moderate amount of bile stained grit and seed material. The colon and cloaca contained a moderate amount of fairly bright green faeces. No other abnormalities were noted on gross post mortem.	17/08/2021	Liver: there is marked congestion and Kupffer cells often contain haemosiderin or phagocytosed erythrocytes. Spleen: several sheathed arterioles are surrounded by small amounts of ribbon-like eosinophilic material. Small numbers of haemosiderin-containing macrophages are scattered throughout the parenchyma. Kidney: several adjacent tubules have been placed by refractile crystalline material bordered by several multinucleated giant cells. Sections of lung, heart, proventriculus, gizzard, intestines, pancreas and adrenal gland show no obvious abnormalities.	Liver lead level: 17.700 mg/kg NZVP CASE NO : P21010869	Lead toxicosis	The kea was in good body condition and there were no signs of trauma. The level of lead in the liver was extremely high and is the cause of death.
59673	Post Mortem	Final	Other	Christchurch	5/05/2021	V-3163 (20-392)	Mainland National Park	Wild		Kea	Male	Unknown	Found alive but debilitated by a rubbish dump, weak and emaciated. Died despite supportive therapy.	Tissues submitted in formalin.		Lung: although parabronchi and large blood vessel architecture is largely intact the intervening parenchyma is reduced to dense mats of fungal elements admixed with pyknotic debris and proteinaceous material. There is eccentric necrosis of the smooth muscle in several large caliber blood vessels. Liver: large numbers of Kupffer cells contain haemosiderin. Sections of heart, kidney, adrenal gland, gizzard and intestine show no obvious abnormalities.		Severe acute mycotic pneumonia Emaciation	
58749	Post Mortem	Final	Department of Conservation	Hokitika	8/07/2020	No bands	Mainland National Park	Wild	Arthur's Pass Village	Kea	Male	Juvenile	Found alive but injured on SH 73 in Arthur's Pass village on 22/6/20. Member of the public picked it up. The bird died on the way to Hokitika.	The bird weighed 1.196kg and was in excellent body condition with good pectoral mass and very good body fat reserves. There was blood on the left side of the head, but no evidence of subcutaneous haemorrhage bruising. The lungs were mottled red and fluid filled. The crop and proventriculus were filled with pasty off-white material. No other abnormalities were noted on gross post mortem.	8/07/2020		Liver lead level: 4.5 mg/kg NZVP CASE NO : P20009371	Lead toxicosis	The level of lead in the liver was elevated and is the likely cause of death in this kea.
59921	Post Mortem	Final	Other	Nelson	21/07/2021	Unbanded	Mainland National Park	Wild	Pearse Valley, Kahurangi NP	Kea	Male	Juvenile	The kea was found dead on a skid site in one of the plantation forests on 19/07/2021.	No abnormalities were noted on a whole body radiograph. The kea weighed 844 grams and was in good body condition, with good pectoral muscle mass and adequate body fat reserves. The liver was pale and slightly enlarged, with rounded edges in some areas. The bursa was swollen and oedematous; multiple pin-point haemorrhages were present externally and on cut surface. The crop was empty and the gizzard was moderately full. No other abnormalities were noted on gross post mortem.	21/07/2021	Lung: there is marked congestion. Heart: short rod-shaped bacteria are often visible in small caliber blood vessels within a congested myocardium. Liver: most hepatocytes have slightly swollen vacuolated cytoplasm, likely lipid. Occasionally sinusoids contain small amounts of proteinaceous material and pyknotic debris often associated with small numbers of both gram-negative and gram-positive rod-shaped bacteria. Spleen: there are numerous small deposits of proteinaceous material scattered throughout a congested parenchyma; small numbers of these deposits contain both gram-negative and gram-positive rod-shaped bacteria. Bursa: there is multifocal haemorrhage within the stroma with occasional extension into adjacent lymphoid lobules. Adrenal gland: there is marked congestion and coalescing haemorrhage disrupting cortical lobules. Intestine: there is marked congestion of villi and capillaries often also contain deposits of proteinaceous material. Sections of pectoral muscle, kidney, proventriculus and pancreas show no obvious abnormalities.	Liver lead level: < 0.010 mg/kg NZVP CASE NO : P21009569	Acute bacterial septicaemia	A radiograph and gross post mortem examination show no signs of external or internal trauma. Examination of several internal organs showed a suggestion of a possibly bacterial infection which was confirmed by histology of the internal organs and bacterial culture of the liver. The bacterium most likely responsible is either E.coli or Pseudomonas which are present in the environment. The bird has likely ingested the bacteria from the environment but the exact source is unknown; he will however not have been any danger in terms of spreading it to any other in-contact kea. The level of lead was below the minimum detectable level of the analyser (i.e. no lead was detected) so lead has not played a factor in this kea's death.
61214	Post Mortem	Final	Department of Conservation	Blenheim	20/09/2022	Rose Aniya (V-3068, Orange OP)	Mainland National Park	Wild		Kea	Female	Subadult	Found scavenged/depredated in subalpine scrub under Dracophyllum bushes. Time Since Death (from transmitter) is 69 days prior to today (13th September). V-3068, White AP on Orange, Radiotransmitter freq 161.1544.	The left leg was fractured at the distal tibiotarsus and was covered in a flap of skin and soft tissue; no associated reddening of swelling. The right leg was fractured at the mid-tibiotarsus and was covered in a flap of skin and soft tissue; no associated reddening of swelling. The rest of both upper legs were absent. The left wing separate and was fractured at the distal humerus and was covered in a flap of skin and soft tissue; no associated reddening of swelling. The right wing was also fractured at the distal humerus and was covered in a flap of skin and soft tissue; no associated reddening of swelling; it was attached by a strip of skin to the skin of the thorax. Although the overlying skin was present, the sternum, ribs, thoracic and cervical vertebrae were absent. The edges of the synsacrum were frayed.	20/09/2022			Scavenging	This is a strange case. Both legs and wings were broken, possibly due to an avian scavenger; there was no bruising or swelling, so these occurred post mortem. The head was present but separated from the rest of the remains and the sternum, ribs and vertebrae were missing. Again, this had occurred post mortem, potentially by an avian scavenger. There were marks on the synsacrum more consistent with a mammalian scavenger.

Released under the Official Information Act

64200	Post Mortem	Final	Department of Conservation	Blenheim	13/12/2024	V-3140 (White A2 on Black), 'Earl Grey'	Mainland National Park	Wild	Wet rocky gulley, Mt Alexander	Kea	Male	Adult	We have monitored this kea through two 1080 operations since 2022. He has likely died in this recent operation. Found dead on 06/12/24.	The adult male kea (V-3140, white A2 on black, 'Earl Grey') was in good body condition (919 grams wet) with adequate muscle mass and fat reserves. The carcass was severely decomposed with marked tissue autolysis and numerous maggots present throughout the body which made identification of significant lesions difficult. Cream coloured, compacted and crumbly material with a slight green tinge was present in crop and gizzard weighed approximately 19 grams. No other gross lesions were identified elsewhere.	13/12/2024		Liver lead level: 0.090 mg/kg IDEXX CASE NO : P24011410 Landcare Report No: T8632 Lab No 28092: Muscle tissue, Kea: 0.855 ug/g Fluoroacetate	1080 toxicosis	Given the level of decomposition, the actual amount of 1080 within the muscle may well have been higher at the time of death. It looks like a case of primary rather than secondary poisoning. The level of lead in the liver was low.
58180	Post Mortem	Final	Department of Conservation	Arthur's Pass 7654	19/11/2019	V-2194	Mainland National Park	Wild	Arthur's Pass National Park	Kea	Male	Subadult	Severe lead poisoning in June 2019. helation treatment at South Island Wildlife Hospital; released to wild late June 2019. Appeared in good health on 15/11/19. Would like lead toxicology done if possible. Also look for signs of anti-coagulant poisoning (blue/green) as rats and mice baited in area. Extreme weather 16/11/19. Very heavy rain, mild temperatures. Found dead 17/11/19	The bird was in good body condition and weighed approximately 926 grams. Frank blood was present in the mouth. No skull fractures were appreciated. The lungs were bilaterally deep red, heavy and wet due to congestion and haemorrhage. All the left ribs were fractured. The left cranial thoracic airsac was ruptured. The left coracoid was dislocated ventrally into the pectoral muscles. Haemorrhage was present around the left shoulder, left pectoral muscles and throughout the keel. A single well demarked hard raised bony lump was attached to/involving the right edge of the keel. On cut section it appeared to be organised cancellous bone. The liver was pale in colour with small lacerations present and associated blood clots in the coelom. The gizzard contained a small amount of fibrous digesta, stones and grit.	19/11/2019		Liver lead level: 1.070 mg/kg NZVP CASE NO : P19017152	Musculoskeletal trauma and internal haemorrhage	The gross post mortem findings are consistent with blunt trauma to the left side of the body resulting in dislocation of the left coracoid, multiple rib fractures and internal haemorrhage; this kind of trauma could be consistent with vehicular strike. There was no evidence of blue/green discolouration suggesting anticoagulant bait ingestion. Lead was present in the liver but at a low level (~1.0 mg/kg); levels over ~5 mg/kg are suggestive of toxicity and levels above 10 mg/kg are considered toxic.
51601	Post Mortem	Final		St Arnaud	9/01/2015	LN-1076 CEEJAY			Nelson Lakes	Kea	Female	Adult	Possible exposure to 1080 - trasmitter indicates the bird died 06/12/2014, found 23/12/2014 The bird was frozen over the Christmas period.	The bird weighed 870 grams and was in good body condition. The internal organs were in a fairly advanced state of decomposition. The gizzard contained a moderate amount of seed-like material and the koilin was stained bright green. No other abnormalities were noted on gross postmortem.	8/01/2015		Muscle 1080 level: 0.67 micrograms/gram. Landcare Report No: T5772, Lab number 19017. Liver lead level: 0.03mg/kg NZVP CASE NO : P15000543	1080 exposure	This bird was in good body condition and there were no signs of external trauma. The lining of the stomach was bright green which could indicate the presence of the dyed 1080 bait. The muscle level of 1080 was 0.67 micrograms/gram of muscle, indicating the bird has indeed been exposed to 1080; whether this is a lethal dose is difficult to say as definitive cut-off levels for lethal and sub-lethal levels are not readily available. 1080 muscle levels in five kea with likely 1080 bait present in their gizzards ranged from 0.95-3.44 micrograms/gram of muscle. In the absence of any other obvious pathology or cause of death (liver lead level is still pending), it seems reasonable to suppose that 1080 contributed to the death of this bird. The liver lead level was very low and unlikely to have adversely impacted the health of this bird.
56960	Post Mortem	Final		Palmerston North	19/03/2019		Zoological Wildlife Park	Captivity	Rainbow Springs	Kea	Male	Adult	Captive kea been at Rainbow Springs for 2 years after being removed from previous location as part of the kea uplift program. Noticed before Christmas (2 months ago) to be quiet and declining weight despite always being seen by the food bowl. Was removed into isolation and fed separately weight loss continued. recent bloods by local vet showed considerable biochem and haematological derangments and referred to us. was also found to have a moderate Capillaria burden that was treated with one off moxidectin. On admittance to Wildbase: Extreme emaciation and significant muscle wastage. tacky MM and slow CRT. Generalised poor feather quality. Grade II pododermatitis on both hocks. crepitus in multiple joints on both feet.	The kea weighed 755 grams and was in poor body condition, with reduced pectoral muscle mass and minimal body fat reserves. There was thickening/swelling of the plantar aspect of both hocks, each with an accompanying ~5 mm in diameter ulcer. There was a moderate amount of pericardial, perihepatic and intracoelomic clear fluid. The lungs were diffusely deep red and oozed frothy white material on cut surface. Both liver lobes were irregularly shrunken, mottled pale and slightly firmer in areas. A ~40 mm length segment of the proximal jejunum was markedly thickened (up to 2-3 times), with the wall reduced to a thin, smooth translucent membrane due to replacement with abundant crumbly yellow material which was partially adhered to the remnant intestinal wall and producing partial (not full) occlusion of the lumen. No other abnormalities were noted on gross post mortem.	18/02/2019	Lung: the parenchyma is pale due to a subjective decrease in the number of erythrocytes while air-capillaries and parabronchi often contain pale proteinaceous fluid. Heart: throughout the myocardium are multiple scattered irregular bands of fibrous tissue while the majority cardiomyocytes contain small amounts of perinuclear pigment resembling lipofuscin. Liver: there are areas of increased proximity of portal tracts with occasional bridging fibrosis; hepatic cords exhibit moderate anisocytosis and anisokaryosis. Throughout the parenchyma there are numerous individual or small groups of hepatocytes with rounded, shrunken hypereosinophilic cytoplasm and pyknotic nuclei, likely apoptotic hepatocytes. Numerous Kupffer cells contain haemosiderin. Spleen: there are several poorly circumscribed foci in which the parenchyma is largely replaced by short inter-lacing strands of pale fibrillar eosinophilic material. There are moderate numbers of haemosiderin-laden macrophages scattered throughout the parenchyma. Kidney: there are numerous proximal tubules in which epithelial cells lack visible nuclei and the cytoplasm is pale eosinophilic and fragmented or absent; basement membranes remain intact. Small intestinal mass: in most areas there is complete replacement of the intestine wall and filling of the lumen with abundant amorphous to fibrillar eosinophilic material admixed with ghosted cytoplasmic remnants, bands of pyknotic debris and large numbers of bacteria, predominantly gram-negative coccobacilli and short rods. The wall has been reduced to a thin band of oedematous fibrous tissue with multiple granulomas containing central aggregates of necrotic debris and gram-negative bacteria. No acid-fast organisms were seen on Zn-staining.			Chronic segmental bacterial enteritis Chronic-active hepatitis	A segment of this birds small intestine was partially occluded by a mass resembling an bacterial abscess. This looks to have been present for quite some time but was not causing complete blockage of the gut. What caused the abscess is unclear; it is possible there has been some previous physical damage from passage of a foreign body or less likely, an old intussusception; there was no underlying neoplasia. This intestinal mass would explain in part the progressive weight loss and weakness. In addition, the bacteria involved in the intestinal mass have likely produced bacterial toxins that have periodically entered the bloodstream and caused progressive liver damage; this will also account for some of the progressive loss of body condition. A Zn-stain showed no evidence of an underlying Mycobacterial infection in the intestinal mass.
64217	Post Mortem	Final	Department of Conservation	Christchurch	19/12/2024	V-2533	Mainland Private Land	Wild	Olympus Skifield	Kea	Male	Adult	Was trapped in a possum trap (Timms trap). Found dead on 1/10/24, has been frozen	The bird weighed 958 grams and was in good body condition- there was a moderate amount of visceral fat reserves and good pectoral muscle coverage. There was an open wound present proximal to the hock on the left leg. An open transverse fracture of the left tibiotarsus was present, with the proximal end of the bone protruding from the open wound. A small amount of bruising and erythema was present around the hock. The crop was moderately distended with yellow food material. The proventriculus and ventriculus were filled with food material, and there was yellowish grey digesta present in the intestines.	18/12/2024		Liver lead level: 0.113 mg/kg IDEXX CASE NO : P24011569	Open fracture of the left tibiotarsus due to trap injury	This was an adult male kea in good body condition. There was an open fracture of the lower left leg due to a leg trap injury. The level of lead in the liver was low and will not have adversely impacted on the health of this bird.
63758	Post Mortem	Pending	Massey University	Palmerston North	14/08/2024	Mati	Zoological Wildlife Park	Captivity	Otorohanga Kiwi Birdhouse	Kea	Female	Adult	Reproductive issues, admitted to Wildbase for workup. During surgery, severe reproductive pathology was observed and the decision was made to euthanise her while still under GA. Multiple affected tissues were then taken and submitted in formalin.	Multiple affected tissues were then taken and submitted in formalin.	13/08/2024				
61281	Post Mortem	Pending	Department of Conservation	Arthur's Pass	31/10/2022	None	Mainland National Park	Wild	Arthur's Pass NP	Kea	Female	Adult	Found dead 23/09/2022 within Temple Basin ski-field next to top of goods left. Found within 2km of closest part of recent 1080 drop (07/09/2022). NZTM E1483760 N5248325.	The kea weighed 780 grams and was in good body condition, with good pectoral muscle mass and adequate body fat reserves. There was clotted blood over both the parietal and visceral aspects of both liver lobes; there were several small irregular lacerations to the visceral aspect of both liver lobes. The liver was diffusely pale. The proventriculus contained a moderate amount grit and seed material as well as several pieces of bright green material. No other abnormalities were noted on gross post mortem.	30/09/2022		Liver lead level: 1.880 mg/kg NZVP CASE NO : P22011875		

Released under the Official Information Act

60848	Post Mortem	Final	Department of Conservation	Arthurs Pass	17/06/2022	"Kuschla" (white BN on red)	Mainland National Park	Wild	Arthurs Pass Village	Kea	Female	Juvenile	Banded and transmitter fitted in Feb 2022. Found dead on 15/6/22.	The bird weighed 908 grams and was in good body condition with good pectoral muscle mass and good body fat reserves. The distal tip of the rhinotheca was fractured and there was an open comminuted fracture of the proximal left tibiotarsus. There was a large opening into the coelomic cavity laterally on the left side due to a deficit in the skin and abdominal muscle. The heart and intestinal tract were external to the coelomic cavity. There was severe bone bruising to the keel and the synsacrum. The left dorsal skull was indented with a small fracture and the left hemisphere of the cerebrum was missing. The crop and distal cranial oesophagus was full of cream-coloured pasty ingesta. There was no liver and most of the lungs and the entire proventriculus and gizzard were missing.	17/06/2022		Kidney lead level: 1.790 mg/kg NZVP CASE NO : P22007430	Musculoskeletal trauma consistent with vehicular strike	This young female was in excellent body condition. The bruising to the keel and synsacrum suggest antemortem blunt force trauma consistent with being struck by a vehicle. The increase in intra-abdominal pressure as a result of the trauma, has caused a split in the abdominal skin and muscle, exposing the internal organs, many of which have been pulled out (possibly scavenged by other kea?). The liver was not present so we have sent kidney away for lead testing. There was pasty cream-coloured material in the crop, almost with a porridge or soggy white bread consistency....I recall having seen this material in the crop of kea before but I'm not sure how we would actually go about definitively identifying it. The level of lead in the kidney was low.
54119	Biopsy	Final		Palmerston North	10/01/2017	78112			Wildbase Ex Orana Park	Kea	Unknown	Subadult	18 month old captive bred Kea from Orana Park. Admitted to Wildbase with large firm swelling of the right commissure of the beak. Subsequent to 2 surgical debridements over 2 weeks swelling markedly worsened and was almost completely occluding the oral cavity and entrapping the tongue. A further extensive sugical debridement and opening externally was carried out on Sunday 8/1/17. Samples collected for histopathology. Previous samples have cultured E.coli and Enterococcus.	Samples submtited in formalin.	8/01/2017	Tissue consists of large amounts of eosinophilic and pyknotic debris bordered by a thick layer of granulation tissue that gives way to abundant hyalinised fibrous stroma containing isolated bundles of regenerating skeletal muscle. The necrotic debris is partically bounded by a thin layer of multinucleated giant cells and epithelioid macrophages. Large number of heterophils are visible within both the granulation tissue and outer fibrous stroma. Small numbers of gram-positive coccoid bacteria and a smaller number of gram-negative short rod-shaped bacteria are visible within the necrotic debris.		Necrotising bacterial myositis with fibrosis	Large amounts of necrotic debris were present in the biopsy along with small numbers of both gram-positive and gram-negative bacteria which fits well with the bacteria (Enterococcus and E.coli) cultured from the lesion. No fungal elements were observed. Large amounts of granulation and more mature fibrous tissue were also present suggesting a degree of chronicity. The necrotic tissue was not particularly well-walled off from the adjacent "normal" tissue. No foreign material was observed but this possibility can not be entirely excluded based on the biopsy alone.
58733	Post Mortem	Final	Department of Conservation	Te Anau	6/07/2020	Tiger (V-3031)	Mainland National Park	Wild	Wet Jacket Peninsula, Fiordland National Park	Kea	Male	Adult	These birds were part of a study to determine fate of kea through a 1080 operation. Transmitters were attached in April 2019, birds still alive on June 19th 2020. The 1080 drop occurred on the 26th and 27th of June and then these birds were on 'mortality mode' when checked on 1st July. Transmitters go into mortality mode only after 48 hours with no activity, this means birds likely died before 30th of June. Bodies were recovered on July 2nd. TX TR4 Channel: 114. TX Mhz Ref Tune 161.2597. Tuning used for June 19 flight 161.2615. Band combination Black C on Pink.	The bird weighed 1.136 kg and was in good body condition with good pectoral muscle mass and good body fat reserves. There was 7.5 grams of green to bright green pasty granular content within the proventriculus and gizzard. The crop was empty. There was no evidence of feather loss or skin thickening or ulceration from the transmitter or harness.	6/07/2020		Liver lead level: 0.016 NZVP CASE NO : P20009194 Fluoroacetate: 19.2 Âµg/g Landcare Report No: T7479	1080 poisoning	The bright green stomach contents is highly suggestive of 1080 ingestion and analysis of the skeletal muscle confirmed the presence of fuoroacetate. The bird was in good body condition and there was no evidence of feather loss or skin thickening or ulceration from the transmitter or harness. The level of lead in the liver was very low and would not have adversely impacted on the health of this bird.
60979	Post Mortem	Final	Other	Rotorua	2/08/2022	Louis (L-09067)	Zoological Wildlife Park	Captivity	Paradise Valley Springs Wildlife Park	Kea	Male	Adult	This kea was found dead, wedged in a Hebe bush, 29/07/2022. Submitted by VetPlus Rotorua on behalf of Paradise Valley Springs Wildlife Park. Animal ID 127061, Sub reference 622931A.	The kea weighed 895 grams and was in good body condition, with adequate pectoral muscle and body fat reserves. There was a large amount of clotted blood over the feathering of the right lateral chest, abdomen and proximal thigh. There was a ~ 5 x 3mm skin and subcutaneous defect of the right lateral aspect of the thorax; there was reddening of the adjacent subcutaneous tissue. There was a slightly larger defect in the subjacent intercostal musculature (right), again with reddening of the adjacent musculature. Two of the cranial (right) ribs were fractured, while the subjacent cranial right lung was lacerated and most of the right lung was slightly swollen and mottled deep red. Both the liver and spleen were diffusely pale. There were bilateral lens opacities. No other abnormalities were noted on gross post mortem.	2/08/2022	Lens: within both lens there is multifocal degeneration of cortical fibers while medullary lens fibers appear mostly normal. Affected fibers are either swollen and rounded or pale, fragmented and contain fluid. This is accompanied by hyperplasia and hypertrophy of lens epithelial cells.		Impalement: penetrating sharp-force trauma to the chest (right side) with pulmonary haemorrhage Bilateral cataracts	There was a penetrating wound to the right chest which has also resulted in laceration of the right lung leading to extensive bleeding into that lung. This kea also had age-related cataracts in both eyes; it is difficult to say whether the bird was fully blind based only on histology of the lens, but vision will certainly have been affected to some degree.
58987	Post Mortem	Final	Department of Conservation	Arthur's Pass	7/09/2020	Tenacious D	Mainland National Park	Wild	Arthur's Pass Village	Kea	Male	Subadult	Always observed as a healthy bird. Age is sub-adult, almost adult. Found about 2 m off SH73, opposite Crusher Loop Road on grass/snow. Seemed quite fresh (not quite warm at 11:20 am) Has obvious head injury and scuffing of plumage. Suspect vehicle strike. Some blood coming from beak/oral cavity.	This was a sub-adult male kea weighing 806 grams in moderate to good body condition. There was a moderate amount of clotted blood within the oral cavity and choanal slit. There was an approximately 20 mm laceration and associated clotted blood to the visceral aspect of the left liver lobe. There were three 20- 30 mm polygonal pieces of black rubber within the gizzard as well as a green fibrous material. There was patchy feather loss over the skull and side of the face. There was subdural haemorrhage over both cerebral hemispheres as well as haemorrhage into the overlying sinuses and periosteum. No other abnormalities were noted on gross post mortem.	4/09/2020		Liver lead level: 26 mg/kg NZVP CASE NO : P20012968	Head trauma Lead toxicosis	This was a sub-adult male Kea in fairly good body condition. He has sustained trauma to the head resulting in some bleeding over the brain. There was also some mild internal haemorrhage due to trauma to the liver (the ribs and sternum were intact). These injuries could be consistent with a glancing type of blow to the head from a vehicle. This kea also had a very high level of lead in the liver which potentially could have resulted in some abnormal behaviour making him more susceptible to death by misadventure. If he hadn't of suffered the trauma it is possible he would have succumbed to the effects of the high level of lead in his body. The gizzard contained several pieces of black rubber.
57604	Post Mortem	Final	Department of Conservation	Franz Josef	23/07/2019	No bands	Mainland Reserve	Wild	Roadside near Fox Glacier	Kea	Male	Juvenile	Found dead by roadside, frozen prior to submission.	The bird weighed 992 grams and was in good body condition. Clotted blood was visible around the nares and mouth. There was reddening of the subcutaneous tissues and intercostal musculature along the right lateral thorax as well as the caudal aspect of the right pectoral musculature. There was deep red mottling of the bones that make up the keel and sternum. There was a fairly large amount of clotted blood around the heart and between the liver lobes; there were multiple lacerations to the visceral aspect of both liver lobes. No other abnormalities were noted on gross post mortem.	19/07/2019		Liver lead level: 0.036 mg/kg NZVP CASE NO : P19010339	Musculoskeletal trauma consistent with vehicular strike	This was a young male kea in good body condition. He has suffered vehicular trauma with the impact likely occurring front-on, directly to the chest region. The level of lead in the liver was very low and would not have adversely impacted on the health of this bird.

Released under the Official Information Act

55320	Post Mortem	Final		Arthur's Pass 7654	8/12/2017	None	Mainland National Park	Wild		Kea	Female	Juvenile	Found dead floating in plunge pool of upper Avalanche Creek Falls 03/12/2017.	The bird weighed 814 grams and was in poor to moderate body condition, while the internal organs were in a fairly advanced state of decomposition. Small abrasions were visible over the stifles and dorsal synsacrum. No other abnormalities were noted on gross post mortem and a radiograph also showed no abnormalities.	8/12/2017		Liver lead level: 37 mg/kg NZVP CASE NO : P17021275	Lead toxicosis	This was a young female kea who was on the skinny side. The level of lead in the liver was very high and would explain the bird's reduced body condition and eventual death.
59116	Post Mortem	Final	Other	Rotorua	7/10/2020	Joey	Zoological Wildlife Park	Captivity	Paradise Valley Springs	Kea	Male	Adult	Around 18/08/2020 he became unwell, lethargic and anorexic. Diagnostics performed at the Vet clinic, including radiographs showed no obvious abnormalities apart from osteoarthritis in both hocks (which had been present for a number of years). He was readmitted 27/08/2020, dehydrated and largely unresponsive and despite attempts at stabilisation he died later that evening.	The bird weighed 756 grams and was in poor body condition, with reduced pectoral muscle mass and minimal body fat reserves. There was marked soft tissue swelling on the plantar, medial and lateral aspects of both hocks; the skin was thickened and there were several plantar ulcers on both hocks. There was bilateral fibrillation and eburnation of the condyles of the distal tibiotarsus. Both the proventriculus and gizzard were distended with large amounts of yellow to green pasty material. the proximal half of the small intestine was markedly distended with gas and semi-liquid and granular khaki material. Just distal to this a ~60 mm segment of intestine was markedly narrowed and irregularly firm causing almost complete occlusion of the lumen. The left testis was 4-5 times the size of the right testis. No other abnormalities were noted on gross post mortem.	29/09/2020	Lung: there is moderate congestion and patchy overexpansion of air-capillaries. Heart: there is patchy contraction band formation and cardiomyocytes often contain small amounts of perinuclear pigment, likely lipofuscin. Liver: large numbers of Kupffer cells contain haemosiderin. Spleen: there is a solitary granuloma of ~150 x 300 microns composed of central colonies of coccoid bacteria surrounded by eosinophilic debris bordered by a layer of multinucleated giant cells, epithelioid macrophages and a thin outer band of fibrous tissue. There is lymphoid depletion and there are large numbers of haemosiderin-laden macrophages scattered throughout the parenchyma. Kidney: proximal tubular epithelial cells often contain one large or several small intracytoplasmic eosinophilic globules; and small number of cells contain haemosiderin. Small intestine: there is almost transmural necrosis and while the mucosal architecture is visible it is necrotic while the submucosa is expanded by abundant eosinophilic and pyknotic debris which at the deep margins is partially lined by a layer of multinucleated giant cells and epithelioid macrophages. What was the tunica muscularis is largely replaced by oedematous and inflamed granulation tissue. Very few bacteria are visible. Left testis: the histology is consistent with an intratubular seminoma.		Small intestinal obstruction Severe osteoarthritis of both hocks Seminoma of the left testis	About halfway along the small intestine was a ~60 mm segment of narrowed and firm intestine with almost complete occlusion of the lumen. Histology of this segment showed most of the wall was dead but with some retention of the mucosal architecture. This could be consistent with a vascular type lesion such as a partial intussusception; this looks to have been present for at least several days. As a result of the partial obstruction there was marked distension of the proximal small intestine and stomach with fluid and gas. The seminoma of the left testis is considered an incidental finding at the time of post mortem.
60548	Post Mortem	Final	Department of Conservation	Franz Josef	20/05/2022	None	Mainland National Park	Wild	South Westland	Kea	Unknown	Juvenile	Found dead by roadside, between Okarito Road and Lake Wakapo, 21/03/2022.	The kea weighed 915 grams and was in good body condition, with good pectoral muscle mass and adequate body fat reserves. There was watery red fluid within the oral cavity and trachea. The keel and sternum were speckled deep red; bilaterally, several of the cranial ribs were fractured and there was reddening of the adjacent intercostal musculature. There were large amounts of clotted blood within the cranial coelomic; the distal oesophagus was ruptured, the heart had been separated from the great vessels and the lungs were diffusely red. The left ilium was fracture and there was skin reddening over the dorsal pelvis/synsacrum, with deep red speckling of the underlying bones. The right hip was luxated.	25/03/2022		Liver lead level: 0.120 mg/kg NZVP CASE NO : P22003822 25534 Muscle tissue, Kiwi, 60548: Fluoroacetate, Âµg/g <MDL Landcare Report No: T8000 25535 Liver tissue, Kea 60548: Pindone, Âµg/g <MDL Landcare Report No: T8001 25535 Liver tissue, Kea 60548: Brodifacoum, Âµg/g <MDL Landcare Report No: T8002	Musculoskeletal trauma consistent with vehicular trauma	This was a young male kea in good body condition. The injuries are consistent with being struck by a vehicle. The level of lead in the liver was very low and would not have adversely impacted on the health of this birds. No 1080 residue was found in the skeletal muscle and no pindone or brodifacoum residue was found in the liver.
62928	Post Mortem	Final	Department of Conservation	Franz Josef	20/12/2023	Padfoot (White AN on Red)	Mainland Private Land	Wild	Franz Josef	Kea	Male	Subadult	Seen several days earlier drinking water and throwing up. Found dead 11/12/2023. Frozen prior to submission.	The kea weighed 619 grams and was in poor body condition, with reduced pectoral muscle mass and minimal body fat reserves. The gizzard contained a small amount of melena stained grit and segments of intestine also contained melena.	19/12/2023		Liver lead level: 40 mg/kg IDEXX CASE NO : P23013083	Emaciation secondary to chronic lead toxicity	The cause of emaciation and eventual death is lead toxicosis.
58445	Post Mortem	Final	Department of Conservation	Wanaka	2/03/2020	V-3127	Mainland National Park	Wild	E1252822 N5065816	Kea	Male	Adult	Found dead on 20/02/20. Known use of 1080 poison in the area.	The bird weighed 1020 grams and was in good body condition with good pectoral muscle mass and low body fat reserves. The crop was empty. The proventriculus and gizzard contained 7.4 grams of green/blue-tinged pasty material.	28/02/2020		23719 Muscle tissue, 58445, Kea: 7.50 ug/g Landcare Report No: T7416.	1080 toxicosis	The dyed pasty material in the stomach is highly suggestive of 1080 ingestion. Skeletal muscle was sent for 1080 testing and the result indicates this bird has ingested 1080. Given this result and lack of any other obvious gross post mortem findings, 1080 ingestion is the most likely cause of death.
65011	Post Mortem	Final	Department of Conservation	Franz Josef	23/07/2025	No bands	Mainland National Park	Wild	State Highway 6, South Westland	Kea	Male	Juvenile	Found alive on roadside near the MacDonald's campground. DOC ranger approached bird, still breathing/alive, took it to the Franz Josef base for vet consultation. Advice was given to euthanise by blunt force trauma. The bird was frozen prior to submission.	The bird was a juvenile male that weighed 943 grams and was in good body condition, with good pectoral muscle mass and good subcutaneous fat reserves. The feathers of the head and ventrum were blood soaked. The maxillary beak was mal-aligned and mobile. There were multiple skull and cervical spine fractures with associated haemorrhage. There was blood in the oral cavity, oesophagus and crop. The proventriculus and ventriculus were moderately full of grit and fibrous ingesta. There were no other findings on gross post-mortem.	23/07/2025	Bearing in mind the freeze-thaw artifact, sections of lung, heart, liver, spleen, kidney and intestine show no obvious abnormalities.	Liver lead level: <0.020 mg/kg IDEXX CASE NO : P25005950	Euthanasia with blunt force head trauma	The bird was in good body condition and apart from the damage to the head, there were no other signs of trauma. However, trauma to the head prior to being euthanased, cannot be ruled out. The level of lead in the liver was not elevated.
64278	Post Mortem	Final	Department of Conservation	Arthur's Pass Village	17/01/2025	Awa (V-3661)	Mainland Reserve	Wild	SH73, Greyneys Creek Road bridge	Kea	Male	Adult	Found dead, flattened on the roadside, SH73, Greyneys Creek Road bridge, 07/01/2025.	The remains weighed 300 grams. The head was missing as were most of the bones of the axial skeleton, including the entire vertebrae, sternum, ribs and pelvic bones. The neck skin was largely intact and attached by shreds of muscle and skin to both wings and other large pieces of torn skin and soft tissue. The humeri/radii/ulnas were either absent or fractured. One leg was largely absent except for a separate (loose) foot while the remains of the other leg consistent of attached, but shredded muscle and several bone fragments. The tongue and proximal trachea were located within the sock like arrange of neck skin. All internal organs were absent.	17/01/2025			Probable vehicular strike Extensive scavenging	This kea had been heavily scavenged, with most of the bones (including the entire vertebral column) absent but with large areas of skin still attached but torn. Given that the bird was found on the road, vehicular strike seems like a reasonable conclusion for the cause of death and then possibly some scavenging by an avian species such as a harrier or even another kea? It's is a strange one- I haven't really seen a pattern of scavenging like this before.
51495	Post Mortem	Final		Wanaka	11/11/2014	V-1605 'thirty3'			Wanaka	Kea	Male	Adult	Caught at kaka creek on the 5/9/14. Bird found dead on the 8/11/14, transmitter outputs stated the bird died on the 7/11/14. Aerial application of sodium fluoroacetate in the area on the 6th and 7th Nov. Suspect 1080 is the cause of death. Sample of breast muscle tissue removed for toxicology testing.	The bird weighed 818 grams and was in moderate body condition; good pectoral muscle mass, moderate amount of subcutaneous fat. The left pectoral muscle mass was absent ; collected prior to presentation for toxicological studies. There was bright green liquid material within the crop and the proventriculus. The ventriculus was moderately full with granular, bright green material. The right liver lobe was mildly enlarged with rounded edges. The testicles were approximately 18mm x 10mm. No other abnormalities were noted on gross post-mortem.	10/11/2014	Lung: there is marked diffuse congestion. Liver: there is marked sinusoidal congestion. Intestine: several sections contain multiple trematodes within their lumina. Brain: there are several small areas in which neurons appear shrunken and pyknotic. Sections of heart, spleen, proventriculus, gizzard, kidney, active testis show no obvious abnormalities.	Lead assay to follow	Likely 1080 poisoning	The green food material within the crop and gut is suggestive of sodium fluoroacetate ingestion.
54893	Post Mortem	Final		Palmerston North	18/08/2017	No bands (81661)			Wildbase Ex Arthur's Pass	Kea	Male	Subadult	Suspect hit by vehicle, transported to Wildbase (10/08/2017) and after stabilisation and assessment, euthanasia was elected (11/08/2017).	The bird weighed 917 grams and was in good body condition. There was extensive deep red speckling to the bones of the sternum and keel. Mid-diaphyseal, transverse fractures were present in the right coracoid, clavicle and scapula; the proximal fragment of the righ coracoid was displaced medially and dorsally. There was clotted blood (~1ml) loosely adhered between the gizzard, parietal aspect of the left liver lobe and left lateral body wall. There were multiple lacerations (with adherent clotted blood) to the visceral aspect of the left liver lobe accompanied by several small areas of yellowed (necrotic) liver parenchyma. Both the colon and cloaca were moderately distended with fluid and gas. There was extensive deep red speckling to the bones of the pelvis and synsacrum (dorsally and ventrally). No other abnormalities were noted on gross post mortem.	14/08/2017			Euthansia due to severe musculoskeletal trauma consistent with vehicular strike	This was a younger male kea in good body condition. He has suffered trauma to the chest and lumbar region, consistent with being struck by a vehicle. The force of the impact has fractured multiple bones as well as causing lacerations to the liver associated with blood loss. The level of lead in the blood was very low and would not have adversely impacted the health of this bird.
63265	Post Mortem	Final	Department of Conservation	Te Anau	9/04/2024	Unbanded	Mainland National Park	Wild	Monkey ck carpark, SH 95, Fiordland NP	Kea	Male	Juvenile	Found dead on the roadside by a member of the public and brought into the Fiordland NP visitor centre (03.04.24). No obvious signs of trauma on quick inspection, but noted a small amount of blood in the corner of the mouth. 1080 Operation on the 09.03.24 approximately 15km away.	The bird was a juvenile male that weighed 761 grams, and was in good body condition consisting of good pectoral muscle mass and adequate subcutaneous fat reserves. The bird was unbanded. There was a moderate amount of blood in the oral cavity and most of the tail feathers were missing. There was moderate skin bruising of the caudal ventrum that extended to the skin of the medial left thigh. The bursa had prolapsed out of the vent. There was moderate subcutaneous haemorrhage of the caudal ventrum and moderate haemorrhage of the caudal pectoral muscles. There was extensive splitting of the left abdominal wall musculature and multiple fractures of the left caudal-most ribs. The liver had extensive splitting with a marked amount of associated haemorrhage. The left pelvis had multiple fractures.	9/04/2024		Liver lead level: 0.024 mg/kg IDEXX CASE NO : P24003659	Blunt force trauma	The gross post mortem findings are consistent with being struck by a vehicle, with multiple pelvic fractures and internal bleeding. The kea was in good body condition. The level of lead in the liver was low and unlikely to have been adversely impacting on the health of this bird, or altered it's behaviour so as to making him more likely to be struck by a vehicle.

Released under the Official Information Act

63681	Post Mortem	Final	Other	Waikanae	30/07/2024	None	Zoological Wildlife Park	Captivity	Nga Manu	Kea	Female	Neonate	Two kea chicks born 6 days ago and yesterday (26/07/2024) at 2pm were both seen alert. This morning (27/07/2024) at 8.30am one was found almost out of the nest. Made almost no movement and was very cold; euthanasia was elected.	The chick weighed 88 grams and was in poor body condition, with minimal body fat reserves; remaining at reserves were reddened. The crop contained a small amount of mucoid to watery yellow tinged fluid. The proventriculus and gizzard contained a large amount of pasty seed and vegetable material. Segments of intestine contained a moderate amount of gas and watery yellow-to-orange fluid. The cloaca contained a fairly large amount of green faeces admixed with urates. The liver was diffusely pale and the bursa was subjectively small. There was a ~5 mm in diameter yolk sac present. Two ribs were fractured (right side) and the lungs were mildly red and wet.	29/07/2024	Lung: there is moderate congestion and small numbers of parabronchi and adjacent air-capillaries contain proteinaceous fluid and erythrocytes. Liver: most hepatocytes contain small amounts of intracytoplasmic material, likely lipid; there is moderate sinusoidal EMH. Kidney: many proximal tubular epithelial cells have lacy to fragmented cytoplasm with karyolytic or absent nuclei. Spleen: there is a prominent immature granulocytic infiltrate as well as lymphoid depletion resulting in increased proximity of sheathed arterioles. Bursa: follicles appear subjectively shrunken but with adequate numbers of lymphocytes; there is a fairly prominent immature granulocytic infiltrate within the interfollicular connective tissue. Intestine: most sections contain food material, predominantly plant/seed material; this material is associated with a moderate mixed bacterial overgrowth. Sections of heart, crop, proventriculus, gizzard, pancreas and regressing yolk sac show no obvious abnormalities.	Liver lead level: <0.040 mg/kg IDEXX CASE NO : P24007147	Reduced body fat reserves Blunt force trauma	This was a neonatal female kea chick with minimal body fat reserves. While the crop was empty, the stomach contained a fairly large amount of (largely undigested) food material. Microscopically, food material was also visible in the intestinal tract; it appeared to be mostly plant/seed material. Microscopic examination of the internal organs showed no signs of an obvious infectious/inflammatory process. Liver was also tested for the presence of lead, and none was found. There were two fractured ribs, perhaps the result of being pushed out of the nest.
61446	Post Mortem	Final	Department of Conservation	Blenheim	23/11/2022	Ngarimu (White AA on red, V-1950)	Mainland National Park	Wild	Arthur's Pass Village	Kea	Male	Juvenile	Mortality signal on the 18/10/2022, Arthur's Pass Village, body recovered 08/11/2022.	The bird weighed 798 grams and was in poor body condition, with reduced pectoral muscle mass and minimal body fat reserves. Internal organs were moderately decomposed. The proventriculus and ventriculus contained grit and melaena as did segments of the intestine.	15/11/2022		Liver lead level: 7.1mg/kg NZVP Case Number: P22013930	Poor body condition Lead toxicity	This was a young male kea in poor body condition due to chronic lead toxicosis.
57297	Post Mortem	Final	Department of Conservation	Wellington	24/04/2019	V-2573 (CH72) White on Pink	Mainland National Park	Wild	Tiechelman, Perth Valley	Kea	Male	Adult	Found dead 19/04/2019, estimated date of death 15/04/2019.	The kea weighed 781 grams and was in moderate body condition, with adequate pectoral muscle mass but reduced and reddened body fat reserves. The proventriculus and gizzard contained a moderate amount of dark green pasty material admixed with seed like material. No other abnormalities were noted on gross post mortem.	24/04/2019		Liver lead level: 0.66 mg/kg NZVP CASE NO : P19005696 Skeletal muscle: 0.046 ug/g Fluoroacetate (Landcare Report No: T7093)	1080 toxicosis	This was an adult male kea in reduced body condition. There were no signs of trauma or any obvious underlying disease. Testing of skeletal muscle showed this kea had been exposed to 1080. The level of lead in the liver was not elevated to a level where it would have adversely impacted on the health of this bird.
62017	Post Mortem	Final	Department of Conservation	Franz Josef	9/06/2023	Unbanded	Mainland Reserve	Wild	Franz Josef	Kea	Male	Juvenile	Found dead near side of the road, 07/05/2023, near Otto/MacDonald campground, near Franz Josef.	The kea weighed 745 grams and was in good body condition, with good pectoral muscle mass and adequate body fat reserves. The skin over the right pectoral muscle and dorsal aspect of the left foot were grazed and reddened. There was bruising of the left pectoral muscle, near the shoulder joint, reddening of the left intercoastal musculature and there was a tear in the right abdominal musculature, with associated reddening of the margins. The liver was diffusely pale and there were multiple irregular lacerations to the parietal and visceral aspect of both liver lobes, along with loosely adherent clotted blood. No other abnormalities were noted on gross post mortem.	11/05/2023		Liver lead level: IDEXX	Blunt force trauma	
65545	Post Mortem	Final	Department of Conservation	Blenheim	24/11/2025	Good Guy (White GG on Red, V-4477)	Mainland Reserve	Wild	Camp Stream, North Branch Hurunui River	Kea	Male	Adult	Transmitter signal in 'mortality' mode. Tracked him down to a stream, dead in between rocks in the water in alpine stream. Time since death on the transmitter suggests he has been deceased since 26th-ish October. Pretty fresh and intact when pulled from the stream but one wing couldn't be recovered as it was wedged between the rocks. Hopefully the organs are intact and some lead testing can also be done. Falcons in the area at the time of recovery - it would be interesting to see if any falcon attack marks too. Recovered 16th Nov, walked out by 19th Nov, posted (overnight courier) on 20th Nov 2025.	The kea weighed 742 grams (very wet) and was in poor body condition, with reduced pectoral muscle mass and minimal body fat reserves. There was a ~50 mm skin defect in the left inguinal region with exposure of intact underlying soft tissue. There was a large skin defect over the left shoulder region; only the proximal left humerus remained of the left wing, and the left scapular, coracoid, clavicle and thoracic wall were exposed and devoid of muscle (picked clean). Gravel was present in the exposed soft tissue. The internal organs were in a fairly advanced state of decomposition. The gizzard contained melena stained grit.	24/11/2025		Liver lead level: 36 mg/kg IDEXX CASE NO : P25009991	Chronic lead toxicosis (leading to poor body condition) Likely avian scavenging	The kea was emaciated but unfortunately the internal organs were too decomposed to perform any histology. However, testing of the liver revealed very high levels of lead, which would explain the loss of body condition and eventual death. The left wing had been removed during retrieval but there were skin defects of the shoulder and inguinal area that could be due to an avian scavenger; there was nothing to indicate an predation event.
61291	Biopsy	Final	Massey University	Palmerston North	4/10/2022	Blue	Zoological Wildlife Park	Captivity	Orana Park	Kea	Male	Adult	Admitted to Wildbase because one of the other males was feeding him which led to a build up of food and dermatitis around the oral commisures. This has resolved and all other tests have been normal (CBC, biochem, cyto from beak lesions on admit). Some thickening of the right caudal thoracic airsac was seen on radiographs so Blue was scoped and the air-sacs were biopsied.	Air-sac biopsies submitted in formalin.	3/10/2022	The biopsies consist of thickened air-sac stroma (collagen) infiltrated with scattered heterophils (including marginated heterophils within blood vessel lumina) and mononuclear cells, normal epithelium and several large foci of osseous metaplasia.		Air-sac: Osseous metaplasia	The thickening of the air-sac seen on endoscopy is the result of the presence of small deposits of bone (osseous metaplasia), which is likely an age-related process. There is very mild inflammation within the air-sac stroma but the epithelium is intact and no bacteria or fungi were observed.
65128	Post Mortem	Final	Department of Conservation	Franz Josef	13/08/2025	Unbanded	Mainland Private Land	Wild	Cron Street, Franz Josef	Kea	Male	Juvenile	Found at the end of Cron Street, Franz Josef, 04/08/2025.	This bird was in a moderate state of autolysis with small maggots on the skin and in the respiratory tract. The kea weighed 757 grams and was in good body condition, with good pectoral muscle mass and adequate body fat reserves. There was a small amount of soil in the rostral end of the mandible. In the skin over the left pectoral muscle in the 2/3 cranial and medial aspect was a ~3 mm in diameter skin defect that communicated with a tract through the pectoral muscle, the keel, and into the right supracoracoideus muscle; there was haemorrhage in the associated soft tissues. There was a metal air-rifle pellet lodged at the end of the tract in the right supracoracoideus muscle. The crop was empty and the proventriculus and ventriculus contained a large amount of green/yellow/brown papery fibrous material with ~10 pieces of clear silicon pieces and black stones both 2-3 mm in diameter. The rest of the gut contained brown-green liquid contents.	12/08/2025			Ballistic injury due to air-rifle	This kea has been shot in the left side of the pectoral muscle with an air-rifle; the pellet had penetrated the keel bone and lodged in the musculature on the right side of the chest.

Released under the Official Information Act

62380	Post Mortem	Final	Department of Conservation	Blenheim	9/08/2023	White BN on Orange (V-3936)	Mainland National Park	Wild	AP National Park	Kea	Male	Subadult	Captured and banded in January 2022 as a fledgling. Radiotracked monthly via fixed wing aircraft through til death date when it was detected (around July 20th, from Time Since Death function on radio transmitter). Spotted several times on camera in alpine repellent trials seemingly healthy and active. Found dead under rocks in a rocky hole in ground on top of Mt Olsen area west of APNP 28/07/2023), the hole sloped vertically down so it wouldnâ€™t have been easy to get out of. Covered in snow so digging snow was required to extract the bird from the hole. I had to pull hard on her transmitter harness to get her out of the awkward hole so thatâ€™s why itâ€™s all loose and floppy on the back now. I would love to know if there is any sign of elevated lead, or	The kea weighed 728 grams and was in moderate body condition, with reduced pectoral muscle mass but adequate body fat reserves. The crop contained a moderate amount of watery, granular dark green material and the gizzard contained a small amount of light green-to-green stained grit and fibrous plant matter.	1/08/2023	Lung: a bronchus and several adjacent parabronchi and atria are lined by mixed bacteria and small numbers of squames; there is no associated inflammatory response (likely terminal aspiration). Liver: there is congestion of centrilobular sinusoids and moderate numbers of Kupffer cells contain haemosiderin. Spleen: large numbers of haemosiderin-laden macrophages are scattered throughout the parenchyma. Intestine: there are small numbers of intra-luminal Capillaria. Sections of kidney are too autolysed to critically interpret. Sections of heart, gizzard and proventriculus show no obvious abnormalities.	Liver lead level: 30 mg/kg IDEXX CASE NO : P23007846	Lead toxicosis	This was a subadult male kea, and while not emaciated, was in reduced body condition. The cause of death and reduced body condition is lead toxicosis.
58394	Post Mortem	Final	Other	Queenstown	10/03/2020	Wally (V-2508)	Mainland Reserve	Wild	Sudden Valley	Kea	Male	Adult	Potential exposure to toxi 1080 drop 19th Dece ber 2019. This bi d died 23rd December in S dden Valley and was r ieved 14/02/2020.	The bird was not weighed due to advanced decomposition; large numbers of maggots were present externally and most of the intracoelomic organs, including the liver, were absent. A body condition could not be accurately assessed due to decomposition of the body fat reserves and skeletal musculature, however a small amount of pectoral muscle was still present and submitted for 1080 testing.	20/02/2020		23731 Muscle tissue, 58394, Kea: 0.061 ug/g Landcare Report No: T7418	Likely 1080 ingestion	This kea was very decomposed, however testing of the pectoral muscle for 1080 showed this kea has been exposed to 1080. Even though the level was quite low, the fact that it was detected after such as long post mortem interval is potentially significant (1080 should not normally be present in tissues, even in small amounts); it is likely 1080 ingestion is the cause of death in this kea. Due to decomposition, no liver was available for lead testing.
60835	Post Mortem	Final	Department of Conservation	Arthur's Pass	8/06/2022	V-3693	Mainland National Park	Wild	Arthur's Pass Village	Kea	Female	Juvenile	Found dead on road by local on 3/6/2022.	The bird weighed 920 grams and was in good body condition with good muscle mass and adequate body fat reserves. The right humerus and left coracoid were fractured. There were multiple displaced fractures of the thoracic vertebral column and there were multiple bilateral rib fractures. The left hip was luxated. The ventral thoracic and abdominal skin was split, exposing the coelomic cavity. The internal organs were missing except for half the heart. A small caudal portion of the right pectoral muscle mass was absent. There was bone bruising of the keel, sternum and synsacrum. There was a complete fracture and displacement of C1 with associated haemorrhage and blood clots. The back of the skull and cranial vault had multiple fractures.	8/06/2022			Severe soft tissue and musculoskeletal trauma (vehicular strike)	This kea was in good body condition with good muscle mass and body fat reserves. The bruising to the bone of the keel and synsacrum, combined with the C1 fracture and associated haemorrhage indicates ante-mortem trauma, likely the result of being struck by a vehicle. There is a lack of bruising associated with the other fractures (humerus, coracoid) which could indicate the kea was struck again after death. As a result of the increase in intra-abdominal pressure (from being struck by a vehicle), the abdominal skin/muscle had split and almost all the internal organs were missing so no liver could be retrieved for lead testing.
51663	Post Mortem	Final		Nelson	9/02/2015	"Road_ill"			St Arnaud	Kea	Unknown	Subadult	Killed by vehicle- check lead levels. Found SH63 between Nelson turn-off and St Arnaud.	The bird weighed 702 grams and was in good body condition. There were multiple fractures, including the proximal right humerus, proximal right coracoid, the synsacrum and both tibiotarsi; fractures were associated with reddening and swelling of surrounding soft tissues. Maggots had removed the majority of the coelomic organs including the liver. No other abnormalities were noted on gross post mortem.	4/02/2015			Severe musculoskeletal trauma	Unfortunately maggots had removed most of the internal organs including the liver, so we can not measure the lead levels, however we do have a masters student that is looking to validate lead levels in muscle so if that works out we can test the pectoral muscle from this kea.
61450	Post Mortem	Final	Department of Conservation	Blenheim	23/11/2022	Lanegan (White BO on orange, V-3143)	Mainland National Park	Wild	Haupiri headwaters	Kea	Male	Adult	Mortality signal on the 22/10/2022, Haupiri headwaters. Body recovered 07/11/2022- suspect 1080 toxicity.	The bird weighed 1.013 kg and was in good body condition, with good pectoral muscle mass and adequate body fat reserves. The crop, proventriculus and ventriculus contained a large amount of bright green granular material.	15/11/2022		Liver lead level: 0.089 mg/kg NZVP Case Number: P22013930 25764 Muscle tissue, Kea 61450: Fluoroacetate: 1.14 Âµg/g Report No: T8077	Primary 1080 toxicosis	This was a young male kea in good body condition. Bright green cereal bait material was present in the stomach and muscle testing indicated the presence of 1080, indicating the cause of death is primary 1080 toxicosis. The level of lead in the liver was low.
61215	Post Mortem	Final	Department of Conservation	Blenheim	27/02/2023	Ptica (V-3357, White B8 on Green)	Mainland National Park	Wild	Arthur's Pass NP	Kea	Male	Juvenile		Most of the axial and appendicular skeleton were present but lacking in skin and soft tissue. The skull and several attached cervical vertebrae were separated from the rest of the skeleton. The keel had several notches and the edges of the caudal synsacrum were frayed.	20/09/2022			Scavenging	There may have been at least two different scavengers on the remains of this kea. There were notches in the keel which likely indicate an avian scavenger and the edges of the synsacrum were frayed/chewed which could indicate a mammalian scavenger as well.
58448	Post Mortem	Final	Department of Conservation	Wanaka	2/03/2020	Noam-V-0622	Mainland National Park	Wild	E1253730 N5064429	Kea	Male	Subadult	Found dead on 20/02/20. Known use of 1080 poison in the area.	The bird weighed 875 grams and was in moderate-good body condition with good pectoral muscle mass and minimal body fat reserves. The crop was empty. The proventriculus and gizzard contained 7.2 grams of green/blue-tinged pasty material.	28/02/2020		23722 Muscle tissue, 58448, Kea: 1.57 ug/g Landcare Report No: T7416.	1080 toxicosis	The dyed pasty material in the stomach is highly suggestive of 1080 ingestion. Skeletal muscle was sent for 1080 testing and the result indicates this bird has ingested 1080. Given this result and lack of any other obvious gross post mortem findings 1080 is the most likely cause of death.
59129	Post Mortem	Final	Department of Conservation	Franz Josef	5/10/2020	No leg bands	Mainland Reserve	Wild	Fox Hills	Kea	Unknown	Adult	Found dead on the side of the road, with traumatic injuries the Franz Josef side of Fox Hills 01/10/2020.	The bird weighed 784 grams and was in moderate to good body condition. The chest and thoracic areas were flattened in the dorso-ventral plane. There was extensive haemorrhage and some tearing of the pectoral musculature due to multiple fractures of the sternum (including the keel) and both clavicles. There were multiple fractures of the appendicular skeleton which included; A closed comminuted fracture of the proximal right humerus, Closed comminuted fractures of the distal left radium and ulnar, A closed comminuted fracture of the distal right tibiotarsus, A closed comminuted fracture of the left tarsometatarsus, An open fracture of the proximal left femur. Most of these fractures had reddened and tearing of the associated soft tissues. Apart from the gizzard (which was empty), the remaining gastrointestinal tract was absent; the gizzard was located near the cloaca so presumably the intestinal tract had herniated through the cloaca. The liver was absent, again presumably having also herniated through the cloaca. The heart was floating loose within the coelomic cavity and there was extensive tearing of both the lungs and kidneys along with the presence of clotted blood. The spine had dislocated at the level of the caudal thoracic spine and synsacrum; there were several pelvic fractures and multiple bilateral rib fractures. There was a fracture to the base of the skull with areas of sub-dural haemorrhage over the right cerebral hemisphere. No other abnormalities were noted on gross post mortem.	5/10/2020		Kidney lead level: 0.02 mg/kg NZVP CASE NO : P20014752	Severe musculoskeletal trauma consistent with a vehicular strike	This kea was in fairly good body condition; due to the extensive damage to the internal organs the sex of this kea was unable to be determined. The kea had multiple fractures to both wings and both legs. There were multiple fractures to the sternum, ribs, pelvis and spine with severe internal bleeding indicating the bird was alive when the injuries occurred. These injuries are consistent with being run over by a car. The resulting increase in intra-abdominal pressure has caused the liver and most of the intestinal tract to herniate out through the cloaca. The level of lead in the kidney was very low and was unlikely to have adversely impacted on the health of this bird or contributed to the trauma this bird sustained.

Released under the Official Information Act

65474	Post Mortem	Final	Department of Conservation	Malborough	21/10/2025	Corvus V-2025, White DT on Black	Mainland Reserve	Wild	Craigieburn Valley	Kea	Male	Subadult	Found dead 12 August 2025 in a DOC200 Trap box on the Craigieburn Valley ski area road. Only the head was sent to us so we have only sent you this. It was killed by the trap when it got into it as it hadn't been properly closed with the screw.	The head and 1st two cervical vertebrae were submitted. There was a large and irregular skin/soft tissue defect over the rostral aspect of the left side of the skull. The bones that make up the left rostral side of the skull has sustained multiple, often depressed fractures, with exposure of parts of the left nasal sinus and the damage communicating with the left nostril. The damage was directed from lateral and rostral to caudal and medial.	17/10/2025			Skull fracture due to accidental trap injury	The type of damage to the head, including the nature of the skull fractures, are consistent with the kea putting it's head inside a DoC 200 trap.
57482	Post Mortem	Final	Department of Conservation	Te Anau	30/05/2019	V-2145	Mainland National Park	Wild	Milford Rd, Monkey Creek	Kea	Female	Juvenile	Found deceased on the side of the road.	The kea weighed 735 g and was in good body condition, with adequate subcutaneous and coelomic fat reserves and well developed muscle mass. The feathers across the head were blood stained and there was a tear to the skin over the caudal skull. Instability could be felt in the left temporomandibular joint. The rostral rhinotheca was partially broken. Subcutaneous haemorrhage was present across the ventrum and extended up the left side of the neck and across the head. Haemorrhage was also present through the pectoral muscles. There was a mucoid blood clot partially occluding the trachea, approximately 3 cm from the glottis. Two circular ecchymoses were present across the crop mucosa. Caudal intracoelomic fat was heamorragic. The gizzard contained green fibrous material, stones and two small pieces of artificial material (either rubber or silicon).	30/05/2019		Liver lead level: 0.029 mg/kg NZVP CASE NO : P19007695	Musculoskeletal trauma consistent with vehicular strike	This was a young female kea in good body condition. The level of lead in the liver was very low and would not have adversely impacted on the health of this bird. Post-mortem radiographs revealed no ballistic material.
58248	Post Mortem	Final	Other	Christchurch	12/12/2019	V-0754 Byron	Mainland National Park	Wild	Arthur's Pass	Kea	Male	Juvenile	Weighed 940 grams in March. Presented to SIWH weighing 659 grams, emaciated, high blood lead level. Died despite intensive supportive therapy.	The bird weighed 674 grams and was in poor body condition, with reduced pectoral muscle mass and minimal body fat reserves. The crop and the length of the oesophagus contained large amounts of pasty light brown material; a small amount of similar material was lodged over the glottis. The gizzard contain a ball of bile stained fibrous material and the intestinal tract was largely devoid of digesta.	5/12/2019	Lung: there is moderate congestion as well as patchy areas of air-capillary collapse. Liver: there are numerous, randomly scattered foci of hepatocellular necrosis ranging from one or two shrunken and rounded hypereosinophilic hepatocytes with pyknotic nuclei to foci of coagulative necrosis up to ~150 microns in diameter. Moderate numbers of Kupffer cells contain haemosiderin. Spleen: there is lymphoid depletion and moderate numbers of haemosiderin-laden macrophages are scattered throughout the parenchyma. Sections of heart and kidney show no obvious abnormalities.	Liver lead level: 42.00 mg/kg NZVP CASE NO : P19018114	Lead toxicosis	This poor bird had one of the highest liver lead levels I've come across. On histology there were areas of acute hepatic necrosis; this is probably the result of peri-mortem bacterial translocation (or their toxins) from the gut due to increased intestinal permeability secondary to the the lead-induced emaciation.
57237	Post Mortem	Final	Massey University	Palmerston North	8/04/2019	Tihae (L-20978)	Zoological Wildlife Park	Captivity	Wildbase ex Rainbow Springs	Kea	Male	Adult	Presented to Wildbase in Jan. 2019 for weight loss. Diagnosed with caudal spinal lesion on radiography. Lively, eats well and gains weight wit butorphanol and metacam but intractable pain recurs when weaned off pain relief so the decision was made to euthanase 05/04/2019.	The kea weighed 700 grams and was in moderate body condition, with decent pectoral muscle mass and adequate body fat reserves. There was complete bony bridging spondylosis between the 5th and 6th thoracic vertebral bodies (i.e. ventrally and laterally). No other abnormalities were noted on gross post mortem.	5/04/2019	Heart: the majority of cardiomyocytes contain small amounts of perinuclear pigment, likely lipofuscin. Thoracic spine: there is complete bridging of the ventral aspect between the 5th and 6th vertebrae with a thick band of chondro-osseous tissue. This is accompanied by prominent osteophyte formation along the ventral aspect of these vertebrae. There is protrusion of chondroid disc material causing dorsal displacement of the dorsal longitudinal ligament, which shows chondroid metaplasia near its insertion onto the mildly osteophytic aspect of the dorsal vertebral bodies (5th and 6th thoracic vertebrae). Sections of lung, liver, spleen, kidney, proventriculus, intestine and pancreas show no obvious abnormalities.		Bridging spondylosis of caudal thoracic spine Euthanasia due to chronic back pain	There was complete chondrosseous bridging (accompanied by osteophyte formation) of the ventral aspect of the vertebral bodies of the 5th and 6th thoracic vertebrae. Disc material was protruding dorsally producing dorsal displacement of the dorsal longitudinal ligament. The pain in this case could be due to a combination of reduced flexibility in this part of the spine (i.e. arthritis) as well as potential impingement of the dura mater which can cause significant pain.
56154	Post Mortem	Final		Te Anau	7/08/2018	V-1116	Mainland Reserve	Wild	Milford Sound	Kea	Male	Adult	Came from Milford previously looking lethargic and not flying- moderate to high blood lead level (Dunedin Wildlife Hospital), treated and returned to Milford. 30/07/2018 reports of sick kea at Milford, but couldn't be located (01/08/2018). That same evening reports of kea wading into water and appeared to have drowned.	The bird weighed 734 grams and was in poor body condition, with reduced pectoral muscle mass and minimal body fat reserves. The crop and proventriculus were empty while the gizzard contained a large amount of black rubber plastic, silicon plastic and several small pieces of a red balloon. The medial and peripheral lungs fields were deep red and slightly sunken. There were coalescing raised, slightly roughened dull yellow plaques on the aortic and pulmonic outflow tracks. The liver was mottled pale. No other abnormalities were noted on gross post mortem.	7/08/2018	Lung: there is patchy congestion as well as mixed-bacterial overgrowth within several bronchi and adjacent parenchyma; there is no associated inflammatory response. Heart: there are several small foci of fibrosis within the superficial myocardium. Cardiomyocytes often contains small amounts of perinuclear pigment, possibly lipofuscin. Liver: hepatic cords are atrophied and small to moderate numbers of Kupffer cells contain haemosiderin. Kidney: there is a solitary subcapsular cyst of ~400 microns in diameter, lined by a single-to-double layer of cuboidal epithelial and filled with serous fluid. Brain: small numbers of neurons contain small amounts of pigment resembling lipofuscin with the perikaryon. Sections of proventriculus, gizzard and inactive testis show no obvious abnormalities.	Liver lead level: 0.510 mg/kg NZVP CASE NO : P18010838	Presumptive drowning Reduced body condition Gastric foreign body impaction Myocardial fibrosis and atherosclerosis	This kea was in poor body condition and there was a fair amount of plastic in the gizzard with nothing that looked like food material (no metal foreign bodies were found). There were no signs of trauma or other signs of foul play. Weakness as a result of emaciation may have resulted in the bird being unable to extricate itself from the water. Older age may have played a role in this bird's decline in body condition (as well as the previous lead exposure mentioned in the history); there were changes in the heart, great vessels and brain usually only seen in older birds. At the time of post mortem the level of lead in the liver was fairly low.
53308	Post Mortem	Final		Wellington	6/05/2016	Gordon (WG0427)			Wellington Zoo	Kea	Male	Adult	Thirty seven year old male Kea, previously housed individually at Gore, noted to have chronic feather destructive behaviour. Translocated to Wellington Zoo for evaluation and rehabilitation April 2016. Initial blood results indicated elevated AST, CK and Uric acid. Subsequent blood tests on 30/04 showed persistently elevated AST, CK and uric acid with additional mild elevations in Phos and Potassium. Found dead 5/5/16 and submitted for post-mortem.	At time of necropsy the bird weighed 730g and was in light body condition. There was a reduced range of motion of the left shoulder compared to the right and a slightly reduced muscle mass associated with the left shoulder. A chronic incongruity was present in the keel with a sigmoid deviation in the caudal 1/3 of it's length. There were extensive areas of alopecia from the mid cervical region extending caudally over the ventral trunk and down both legs, involving both the dorsal and ventral surfaces of the wings and dorsum of the trunk. The degree of feather loss varied between areas with some heavily barbered but normal length feathers present over the ventral trunk, through to areas of short, chewed or pinched regrowing feathers over the lateral body wall, dorsum and thighs, to the empty follicles and areas of pterylae devoid of feathers. Some regrowing feathers were grouped with multiple follicles exiting through the same follicle, occasional small areas of skin trauma were present associated with these apparently ingrown feathers. Generally the skin was of normal texture and showed no other gross abnormalities. The primary remiges and all the retrices were intact and largely normal, with small areas of peripheral barbering and loss of blue pigment evident on the innermost primary remiges. Internally there were several small yellow or white mucoid plaques on the coastal wall of the left caudal thoracic air sac. Air sacs were otherwise grossly normal. There was no intracoelomic or subcutaneous fat deposits. The liver had moderately rounded margins with a diffuse pale mottling and prominent engorged vessels within the parenchyma. There was an irregular light mottled pattern of the spleen with normal size and texture. The cloaca was dilated with urine-like fluid and the distal gastrointestinal tract had minimal faceal contents. The proximal small intestine contained a moderate amount of tan mucoid ingesta. The proventriculus was empty and the ventriculus contained a small amount of grit and seed. The length of the gastrointestinal tract was grossly normal in structure, however serousal blood vessels were prominent.	6/05/2016	Lung: there is mild pneumoconiosis and elastic fibres appear more prominent and ragged in many of the muscular arteries. Aorta: there are patchy areas of mild intimal fibrosis. Heart: small numbers of cardiomyocytes contain small amounts of perinuclear, granular yellow pigment, likely lipofuscin. Within many of the medium-to-large caliber arteries elastic fibres appear more prominent and ragged. Spleen: moderate numbers of immature granulocytes and plasma cells are scattered throughout the parenchyma; there is moderate congestion. Kidney: there is marked congestion. Brain: within the optic lobes multiple neurons contain moderate to large amounts of granular, golden-brown intracytoplasmic pigment, likely lipofuscin. Sections of thyroid/parathyroid gland, liver, adrenal gland, proventriculus, gizzard, intestine, pancreas and skin show no obvious abnormalities.		Uncertain cause of death	There were extensive areas of feather loss with evidence of ongoing barbering and abnormal feather regrowth which due to irritation would have resulted in further self mutilation and re-enforcement of this behaviour. Histology of several pieces of skin/feather follicles show no evidence of inflammation or any other underlying reason for the feather loss. An actual cause of death was not readily apparent. Grossly there was what looked like possible hypertrophy of the left ventricle of the heart, which can predispose to cardiac arrhythmia and death. Atherosclerosis was not seen on histology of the aorta but denegerative changes to the elastin fibers were observed in many of the muscular arteries of the body. Other age-related changes included lipofucsin (the "wear and tear" pigment) within the myocardium and neurons of the brain and mild pneumoconiosis.
45670a	Post Mortem	Final		Waikanae 5250	23/02/2011	"Jess" legband L 34910			Nga Manu Nature Reserve	Kea	Male	Adult	This bird has had a recent history of respiratory difficulties and periodic lethargy and anorexia. The bird deteriorating rapidly today and died early afternoon.	The bird weighed 1.038kg and was in poor to moderate body condition. There were several millilliters of clear, straw-coloured fluid in the coleomic cavity and large areas of the thoracic and cranial abdominal airsacs were slightly opaque and thickened; the pericardium was similarly affected. Each testicle was replaced by a large (70 x 40 x 30mm), moderately firm, tan mass which were firmly adhered to each other and much of the underlying renal tissue. Both masses were cranially displacing the proventriculus and gizzard (which were empty). On cut surface both masses were homogenous pale yellow and glistening and were completely surrounded by a 2-3mm fibrous capsule. The liver was slightly pale and moderately firm. Large amounts of clear frothy fluid oozed from both lung lobes and similar fluid was observed in the distal trachea. No other abnormalities were noted on gross post-mortem.	22/02/2011	No significant findings in the heart, skeletal muscle, liver, intestine, pancreas, proventriculus or gizzard The testes is replaced by loosley aggregated cords of neoplastic cells separated by interlacing fibrous tissue bands. The neoplastic cells are round cells with a variable nuclear size, a high mitotic index, and poorly defined eosinophilic cytoplasm. There are large areas of avascular necrosis. The lungs show large areas of the pulmonary interstitium that are infilatrated by large macrophages that contain either eosinophilic droplets, or just a foamy cytoplasm. There is also metaplasia of the parabronchial epithelial cells. The parenchyma of the spleen has been replaced by a heterogenous mix of erythrocytes, heterophils and a predominant cell line that has large highly variable nuclear size with a high mitotic index and multiple nucleoli.		1. Testes- Bilateral seminomas 2. Splenic metastasis 3. Fluid pneumonia, chronic	The kea had a massive tumour in each testicle. The most likely type of tumour is a seminoma, a tumour derived from the germ cells (that eventually go on to mature and form sperm) of the testicle. The histology confirms the mass as a seminoma but unusually there is evidence of splenic metastasis. The lungs show a severe chronic infiltration with macrophages, that appear to be attempting to phagocytose fluid. The fluid's origin is undetermined but may be linked to the neoplasm. In humans seminomas often metastasize to regional lymph nodes and/or retroperitoneum. The spread to the spleen in this bird may be by the same process.

Released under the Official Information Act

61180	Post Mortem	Final	Department of Conservation	Arthur's Pass	14/09/2022	V-3926	Mainland National Park	Wild	Arthur's Pass Village	Kea	Male	Juvenile	Found dead 02/09/2022, transmitter indicates the bird died 08/08/2022.	The kea weighed 620 grams and was in poor body condition, with reduced pectoral muscle mass and minimal body fat reserves. The internal organs were in a fairly advanced state of decomposition. The proventriculus contained a moderate amount of grit and bright green-stained matted fibrous material.	14/09/2022		Liver lead level: 39.00 mg/kg NZVP CASE NO : P22011124	Poor body condition Lead toxicosis	This was a young male kea in poor body condition due to the presence of very high levels of lead. There were no signs of trauma, including predation.
62637	Post Mortem	Final	Department of Conservation	Arthur's Pass Village	3/10/2023	Sam Manson (V-1823/ Blue BV)	Mainland National Park	Wild	Roadside, APNP	Kea	Male	Juvenile	Found dead roadside, central village, Arthur's Pass, 07/09/2023.	The kea weighed 700 grams and was in moderate to good body condition, with adequate pectoral muscle mass and adequate body fat reserves. There was blood in and around the mouth with an abrasion over the top of the left eye. There was bruising to the skin over the back of the neck and head, with associated reddening of the underlying soft tissue. There was patchy deep reddening of both lungs. There was significant bone bruising to the keel and both sides of the sternum.	20/09/2023		Liver lead level: 0.390 mg/kg IDEXX CASE NO : P23009697	Blunt force trauma: vehicular strike	This was a young male kea in fairly good body condition and the gross post mortem is consistent with a vehicle strike, with most of the force centered on the front of the chest. Liver lead levels were low and unlikely to have adversely impacted on the health of this bird.
61449	Post Mortem	Final	Department of Conservation	Blenheim	23/11/2022	Andre the Giant (Black DO on white, V-2903)	Mainland National Park	Wild	Otehaki West headwaters	Kea	Male	Adult	Mortality signal on the 24/10/2022, body recovered 08/11/2022- suspect 1080 toxicity.	The bird weighed 942 grams and was in good body condition, with good pectoral muscle mass and adequate body fat reserves. The crop, proventriculus and ventriculus contained a large amount of bright green granular material.	16/11/2022		Liver lead level: 0.029 mg/kg NZVP Case Number: P22013930 25763 Muscle tissue, Kea 61447: Fluoroacetate: 1.25 Âµg/g Report No: T8077	Primary 1080 toxicosis	This was an adult male kea in good body condition. Bright green cereal bait material was present in the stomach and muscle testing indicated the presence of 1080, indicating the cause of death is primary 1080 toxicosis. The level of lead in the liver was low.
57790	Biopsy	Final	Massey University	Palmerston North	30/08/2019	Lewis (78112)	Zoological Wildlife Park	Captivity	Orana Park	Kea	Male	Adult	Being treated for facial mass/cellulitis	Excised dermal mass submitted in formalin.	28/08/2019	Dermal mass: there is an invaginated piece of hyperplastic stratified squamous epithelium with a slit-like lumen within the dermis. There is an area ulcerated invaginated epithelium and the lumen contains small numbers of squames. The dermis surrounding the invaginated epithelium is heavily infiltrated with perivascular lymphoid aggregates and a more interstitial heterophilic infiltrate. There is a broken feather in which the pulp is oedematous and haemorrhagic; no circoviral or polyoma-viral inclusions were observed.		Intra-dermal epithelial cyst	it's difficult to be sure due to plane of section but excision looks to be complete.
57386	Post Mortem	Final	Department of Conservation	Queenstown	10/05/2019	"Waitī" V-2302	Mainland National Park	Wild	Arthur's Pass village	Kea	Unknown	Subadult	Found near Arthur's Pass village on 8th May 2019. Last seen alive on 24th April 2019 near same location. Kea are regularly supplementary fed in this location. No poison or toxins used in the area. Previously treated for lead poisoning at South Island Wildlife Hospital. At this time also had pneumonia and other symptoms. Three other fledgling kea have died in the area over the past month from vehicle strike.	Advanced stage of decomposition severely limited post-mortem examination. Presented as carcass with severe maggot infestation and rotting soft-tissues. Skull, beak and claws appeared intact and some recent feather growth of primary feathers was able to be recognised. There was no liver or other visceral tissues identifiable for lead toxicology.	10/05/2019			Unknown cause of death	Unfortunately the kea was too decomposed to determine a cause of death. No liver was present so we cannot test for the presence of lead.
53704	Post Mortem	Final		Arthur's Pass 7654	23/08/2016	None present			Arthurs Pass National Park	Kea	Female	Adult	Bird found laying on back in Bealey Hotel car park at 0730hrs, was gasping rapidly. Died shortly after being handled. No fluids, vomiting etc noted.	The bird weighed 818 grams and was in good body condition; good pectoral muscle mass and subcutaneous and intra-abdominal fat reserves. There was superficial bruising of the ventral cervical vertebral muscles, proximal to the thoracic inlet. No instability was palpable in the cervical spine. The ventriculus was moderately full with granular food material and some stones. The crop was empty. The duodenum was mildly distended with ucoid yellow material. There was mild serosal injection of the proximal small intestines. No other abnormalities were detected on gross post-mortem.	23/08/2016	Lung: there is marked congestion and multiple parabronchi and adjacent air-capillaries contain small amounts of proteinaceous material; a small number of these parabronchi also contain small numbers of squames and heterophils. Liver: there is marked congestion. Spleen: there is prominent congestion and increased numbers of plasma cells. Kidney: there is marked congestion. Sections of heart, adrenal gland, proventriculus, gizzard, intestine, pancreas and brain show no obvious abnormalities.	Liver lead level: 0.021mg/kg NZVP CASE NO : P16015491	Uncertain cause of death (see comments) Pulmonary oedema	The bird was in good body condition and there were no signs of trauma. Histological examination of the internal organs showed fluid build-up in the lungs and early signs of inflammation (pulmonary oedema). This could be due to aspiration of acidic stomach contents into the lungs or possibly exposure to some noxious gas, it is difficult to be certain. There no signs of any other underlying disease and the liver lead level was not elevated.
58629	Post Mortem	Final	Department of Conservation	Blenheim 7273	30/06/2020	Juicebox (V 2429	Mainland Reserve	Wild	Devilskin Spur, Canterbury	Kea	Female	Juvenile	Fitted with radio transmitter early Jan 2020. The bird's remains were found in cache, head of Nina-Devilskin area (North Canterbury) 04/06/2020.	As well as the skeletal remains there were loose feathers and dirt. The skull was devoid of skin/soft tissue. There was a depressed fracture of the rostral frontal bone near the junction with the premaxilla. There were at least 10 circular to curvilinear depressions in the frontal bone; the diameter of the largest circular depression was 2-3 mm. There were several bony defects to the mid and right aspects of the occipital bone. The sternum/keel were devoid of skin and soft tissue; several ribs were still attached and the ends of these ribs were fractured and "chewed" as were the cranial aspect of the keel and caudal aspect of the sternum. Multiple long bones from the wing and legs were loose and devoid of skin/soft tissue and had one or both ends fractured and "chewed". The synsacrum was devoid of skin and soft tissue and the caudal aspects had been "chewed". Both femurs were attached but fractured and the distal ends "chewed".	10/06/2020		Swabs from the ends of the scavenged bones were sent to Ecogene for analysis. Resulting Cytb fragments from the multiplex assay for S1099_01 (PM#58629) and S1099_02 (PM#58630) produced an ambiguous match to a single peak of Mustela erminea (stoat) and possibly Rattus exulans (kiore) respectively, when compared against a reference ladder of 19 mammalian species present in New Zealand. Primer pair Universal400b/M.erminea3 (RamÃ³n-Laca et al. 2013, Tobe and Linacre 2008) produced a result for both samples and was sequenced. Resulting sequence from both S1099_01 and S1099_02 most closely matched Mustela erminea (stoat), with a maximum identity of 100%, when compared against sequences from GenBank. The top three most appropriate matches for both sequences can be identified via the following GenBank accession numbers: KM224405.1, KM091450.1 and AB564113.1.	Likely mustelid predation with extensive mustelid scavenging	There was damage to the skull including multiple puncture wounds which would be most typical of a mustelid predation. Most of the rest of the bones had evidence of being chewed or gnawed on and DNA results suggest a stoat is also responsible for the extensive scavenging after the initial predation event.
58824	Post Mortem	Final	Department of Conservation	Franz Josef	24/07/2020		Mainland National Park	Wild	Roadside, Franz Josef	Kea	Female	Juvenile	Found dead on roadside on 22/07/2020.	The bird weighed 736 grams and was in good body condition with good pectoral muscle mass and adequate body fat reserves. There was a displaced transverse fracture of the left ulna and radius, with mild associated haemorrhage in the overlying skin and surrounding soft tissue. The caudal sternum and keel were speckled deep red. There was a dislocation between the 2nd and 3rd thoracic vertebrae. There was a comminuted fracture and associated subcutaneous haemorrhage of the caudal skull and cranial cervical vertebrae, with destruction of the cerebellum and caudal cerebrum. There was a moderate amount of free clotted blood in the cranial coelomic cavity, and thoracic airsacs. There were several lacerations to the right liver lobe (with some loosely adherent blood clots) and the lungs were diffusely dark red. The gizzard contained a small amount of seed-like material. No other abnormalities were noted on gross post mortem.	24/07/2020			Musculoskeletal trauma consistent with a vehicle strike	This was a juvenile female bird in good body condition. There is evidence of extensive trauma to the back of the head (and underlying brain), thoracic spine, keel and left wing. This has resulted in some internal haemorrhage. These types of injuries are most consistent with being struck by a vehicle.
60718	Post Mortem	Final	Department of Conservation	Arthur's Pass	11/05/2022	None	Mainland National Park	Wild	Near Otara Viaduct Lookout, ESI, on old rd 150 m NW	Kea	Male	Juvenile	Found dead on 6/5/22 on open ground. No obvious signs of trauma but was found in an area where there are high tension power lines and vehicles as well as toxins including 1080, rodenticides, Fentatox and lead.	The juvenile male kea weighed 597 grams and was in moderate body condition with a small amount of remaining subcutaneous fat reserves and moderate pectoral muscle coverage. A radiograph taken prior to post mortem exam did not show any evidence of metallic foreign bodies present in the body or skeletal abnormalities. The head and neck were in a moderate state of decomposition compared to the rest of the body. The kidneys were diffusely pale. The ventriculus contained seed, plant material and grit. No other abnormalities were seen on gross post mortem.	11/05/2022	Lung: there is patchy congestion. Bearing in mind the autolysis, sections of pectoral muscle, heart, liver, spleen and kidney show no obvious abnormalities.	Liver lead: 59.00 my/kg NZVP CASE NO : P22005918	Lead toxicosis	I'd have to double check my records but I think this may be the highest liver lead level I've come across.

Released under the Official Information Act

64129	Post Mortem	Final	Department of Conservation	Fox Glacier	21/11/2024	V-4139 White D3 on Orange (Sheepish)	Mainland Private Land	Wild	South Westland, WSI	Kea	Male	Juvenile	Found dead in water barrel behind restaurant on 24/10/24. Banded near Fox Glacier/Weheka as a fledgling in May 2023.	The kea (V-413, white D3 on orange) weighed 1.152kg and was in good body condition with adequate skeletal muscle mass and visceral fat reserves. Superficial grazes and associated hyperaemia were present on the medial aspect of the intertarsal joint of both limbs. The crop and gizzard were both full indicating the bird had recently fed. Two immature testes were identified indicating that this kea was a juvenile male. No signifiant gross abnormalities were observed on examination of the musculoskeletal, endocrine, cardiac, respiratory, gastrointestinal, urogenital or neurological systems.	8/11/2024	No histological abnormalities were noted in sections of spleen, kidney, liver, lung, heart, gizzard, intestine or brain, though tissue preservation was poor with extensive autolysis.	Liver lead level: 0.430 mg/kg IDEXX CASE NO : P24010334	Open	Unfortunately, due to the poor preservation of tissues a diagnosis was not able to be made based off histology. The lack of significant gross findings leaves the cause of death uncertain, though the kea was in good body condition and had recently ate suggesting an acute condition. There was no indication of trauma and the level of lead in the liver was low and would not explain the cause of death.
61451	Post Mortem	Final	Department of Conservation	Arthur's Pass	12/12/2022	Ronan (V-2810, Blue B8)	Mainland National Park	Wild	Arthur's Pass NP	Kea	Male	Juvenile	This kea was struck by a vehicle yesterday afternoon (14/11) on SH 73, central village and it was decided to euthanise it due to its injuries after consultation with the vet at the SI Wildlife Hospital in Christchurch. Velocity at impact estimated to be 30-40 km/hour.	The kea weighed 829 grams and was in good body condition, with good skeletal muscle mass and adequate body fat reserves. There was a ~5 mm in diameter skin and underlying skull defect (just right of midline, rostral), a slit-like defect in the hard palate and 5 mm in diameter skin defect between the mandibles (ventrally). There was blood within the nostril and right ear. The keel and both sides of the sternum were speckled deep red, there was bilat ral bruising to the intercostal muscles and several ribs on each sides of the thorax were fractured. he pelvic bones were speckled deep red. No other abnormalities were noted on gross post mortem.	17/11/2022		Liver lead level: 2.10 mg/kg NZVP CASE NO: P22013930	Euthanasia due to severe vehicular trauma	The level of lead in the liver was on the lower side (levels above ~8 mg/kg are considered in the toxic range).
51497	Post Mortem	Final		Twizel	11/11/2014	RHL V0007, LHL V0090 and V0189			Mt Cook	Kea	Male	Subadult	Found on the 6/11/14 near a catÃ© in Mount Cook, lethargic and dry-retching. Died 3 hours after being caught in the late afternoon.	The bird weighed 701 and was in poor body condition; body condition score 3.5/9. There w s a small amount of greyish fluid within the crop. The ventriculus contained black, tarry fluid and 10-12 seeds. The distal colon contained black, tarry faeces. The intestintes were moderately autolysed. The kidneys were diffusely pale pink. The tested were small, measuring approximately 5 x 7mm. No other abnormalities were found on gross post-mortem.	10/11/2014	Liver: large numbers of Kupffer cells contain haemosiderin; there is a single small focus of hepatocellular necrosis. Spleen: there are large numbers of haemosiderin-laden macrophages scattered throughout the parenchyma; there is a decrease in the amount lymphoid tissue. Gizzard: there is a single cross section through an adult nematode at the glandular/depp koilin junction; there is no associated inflammatory response. Intestine: a section of duodenum contains large numerous intraluminal nematodes resembling Capillaria. Sections of lung, heart, kidney, proventriculus, testis and brain show no obvious abnormalities.	Lead levels to follow	Emaciation Possible lead intoxication	This bird was in poor body condition; there were no obvious gross or histological abnormalities that would explain the bird's emaciated state. The clinical signs before death are suggestive of lead poisoning. Lead test results on the liver to follow
59303	Post Mortem	Final	Department of Conservation	Hokitka	17/12/2020	None	Mainland Private Land	Wild	South of Hokitika	Kea	Male	Juvenile	Was found alive on a local helicopter pilotâ€™s property Very weak and floppy and was euthanised at the vets 11/12/2020. There has been some TB Free ground control in the area using handlay 1080 and cyanide .	The kea weighed 899 grams and was in good body condition, with good pectoral muscle mass and adequate body fat reserves. There was patchy bruising to the skin over the back and top of the head. There was considerable haemorrhage and clotted blood in the underlying soft tissue (subcutis and periosteum). There was a roughly "M"-shaped depressed fracture (~10 mm in length) of the right parietal bone and a ~5 mm depressed fracture of the left parietal bone. There were two full-thickness circular defects in the rostral part of the frontal bone, each ~1mm in diameter and ~6-7 mm apart. There was subdural and leptomeningeal haemorrhage subjacent to the parietal skull fractures as well as a circular depression in the left cerebrum subjacent to the left parietal fracture. The gizzard contained a moderate amount of khaki fibrous and seed material. No other abnormalities were noted on gross post mortem.	16/12/2020			Severe head trauma	There was bruising to the top of the head which corresponded to a large amount of soft tissue haemorrhage and several skull fractures. Three of these looked suspiciously like bite/puncture wounds and although not absolutely typical I'm wondering if this could be a failed falcon strike or less likely a failed mustelid predation event. I didn't see any meat-like material or any abnormal material in the gizzard to suggest a secondary poisoning with either 1080 or cyanide but I have frozen the appropriate samples if testing is wanted.
60197	Post Mortem	Final	Department of Conservation	Takaka	9/12/2021	V-3351 (AK)	Mainland Reserve	Wild	Ligar Bay	Kea	Male	Adult	Two kea found dead in close proximity (unknown date) Ligar Bay. Handed to Department of Conservation 08/11/2021. Frozen prior to submission.	Due to the pathologist going on leave, the post mortem of this kea was delayed until 08/12/2021. Radiographs (taken 11/11/2021) showed multiple fractures of the axial skeleton but no evidence of retained radiodense ballistic material. The bird weighed 840 grams and was in good body condition, with good pectoral muscle mass and adequate body fat reserves. There was a ~5 mm in diameter skin defect just right of the dorsal thoracic midline. There was extensive reddening of the surrounding skin, extending to involve the dorsal lumbar area as well. There was similar reddening of the underlying subcutaneous tissues and musculature. There was also tearing of the epaxial musculature of the thoracic vertebral column. There was a long, almost diagonal and ragged and deep tear of the left pectoral muscle, with some, but not extensive associated reddening of the torn muscle. There was however extensive deep red mottling (bilateral) of the sternum, including the keel. There was a solitary rib fracture of the right and multiple rib fractures of the left causing partial collapse of the thoracic cage. There was tearing of the intercostal muscles, being more severe on the left. Both lungs were lacerated and diffusely deep red. There were multiple fractures to the left pelvic bones, maceration of the left caudal lobes of the kidneys with a small amount of associated clotted blood. There was a slit-like tear in the left caudal abdominal musculature and some tearing of the musculature of the left caudo-medial femur. There was a ~5 x 3 mm skin defect overlying this torn muscle, along with some embedded maggots up to 5 mm in length. No other abnormalities were noted on gross post mortem.	8/12/2021			Musculoskeletal injury consistent with gun-shot	This kea has also been shot and my feeling is that the projective has entered near the thoracic spine (i.e in the back), traveled through the body and exited out the medial side of the upper left leg. No ballistic material was seen on radiographs so this appears to be a single shot through-and-through injury. My feeling is that this bird was shot in the air as some of the observed changes were consistent with compression-type injuries that could occur if the bird was to fall from a height. The proposed diameter of the entrance wound was ~5 mm, so a .22 caliber weapon could be a possibility, but without an actual projectile, it is difficult to be absolutely sure.
51543	Post Mortem	Final		Nelson	4/12/2014	Leg band V-1343			Kahurangi National Park	Kea	Male	Juvenile	Healthy until shortly after aerial 1080 baiting. Died on the 09/11/2014. The bird had been frozen prior to submission.	The animal weighed 1.08 kg and was in good body condition; moderate pectoral muscle mass and subcutaneous fat reserved. The crop was empty. The ventriculus and proventriculus were moderately full and contained some green food material and bright green granular material. No other abnormalities were observed on gross post-mortem.	2/12/2014			Likely 1080 poisoning	The bright green material within the crop, ventriculus and proventriculus is highly suggestive of 1080 bait ingestion resulting in the death of this bird. Stomach, muscle and liver samples have been retained if further testing is desired.
61448	Post Mortem	Final	Department of Conservation	Blenheim	23/11/2022	Pfeiffer (White CQ on green, V-3370)	Mainland National Park	Wild	Whaiti stream	Kea	Male	Subadult	Mortality signal on the 22/10/2022, body recovered 07/11/2022- suspect 1080 toxicity	The bird weighed 1.053 kg and was in good body condition, with good pectoral muscle mass and adequate body fat reserves. The crop, proventriculus and ventriculus contained a large amount of bright green granular material.	15/11/2022		Liver lead level: 0.05mg/kg NZVP Case Number: P22013930 25762 Muscle tissue, Kea 61448: Fluoroacetate: 6.96 Âµg/g Report No: T8077	Primary 1080 toxicosis	This was a young male kea in good body condition. Bright green cereal bait material was present in the stomach and muscle testing indicated the presence of 1080, indicating the cause of death is primary 1080 toxicosis. The level of lead in the liver was low.
64398	Post Mortem	Final	Department of Conservation	Franz Joseph	12/02/2025	Submitted with animal: 1376170 5206825	Mainland National Park	Wild	Franz Joseph Highway/ SH6	Kea	Male	Subadult	Very fresh on collection. 28/02/2025, blood not totally dry. Reported as roadkill, 9am. Collected couple of hours later. Franz Joseph Highway/ SH6, South Westland, E:1376160, N:5206907 (approx).	The kea weighed 903 grams and was in excellent body condition, with moderate coelomic and subcutaneous fat reserves, and well-developed pectoral musculature. The tip of the rhinotheca was abraded, with jagged keratin and localized hemorrhage. There was marked bruising over the caudal right occipital region of the cranium visible on external exam. The left wing was missing all primary feathers, with evidence of traumatic avulsion. There was a moderate volume of non-clotted blood in the caudal oropharynx. There was a laceration across the caudal aspect of the left tarsus with superficial flexor tendon exposure. The left hip had marked, localized bruising in the adjacent epaxial muscle (rom the dorsal view) and proximal hip flexor musculature. The crop was half full of partially masticated material, with a noted sour smell. The preventiruculus and ventriculus had a small amount o digesta and normal grit present. The liver was subjectively pale, with moderate autolysis of the coelomic organs present. There was marked localized subdural hemorrhage 5 x 5mm of the right rostral cerebral lobe, and more extensive hemorrhage of the right caudal ventral cerebrum and optic lobe including the brainstem and cerebellum.	12/02/2025		Liver lead level: <0.020 mg/kg IDEXX CASE NO : P25001050	Blunt force trauma consistent with vehicular strike	This was a young male kea in good body condition and with injuries consistent with being struck by a vehicle. The level of lead in the liver was very low and unlikely to have adversely impacted on the health of this bird.

Released under the Official Information Act

62823	Post Mortem	Final	Department of Conservation	Blenheim	26/10/2023	Rita A (Black C6 on Yellow, V-3785 /160.1443)	Mainland Reserve	Wild	Avoca Valley	Kea	Female	Subadult	Remains found on valley floor in beech forest above Basins Creek, Avoca Valley, North Canterbury, 25/10/2023. This kea was banded in Arthur's Pass village in October 2021 and lived around the village area for a while. She has a radiotransmitter attached and monitored monthly via aerial fixed-wing radio tracking flights. She flew great distances west, north and south and eventually seems to have settled in the Avoca area. She was found on 20th Oct on the valley floor and her transmitter Time Since Death details show she died 49 prior to today (25 Oct 2023).	The remains consisted of: The skull, which was largely devoid of skin and soft tissue. Much of the bone from the back of the skull was either missing or fractured and depressed into the cranial vault. Exposed bone edges were ragged. There were two ~4 x 2 mm full thickness indentations (depressed fractures) in the right frontal bone, with external beveling. There was a similar sized indentation just caudal to the right orbital rim and a further three smaller indentations almost immediately above. Both wings were separate and the skin and feathers were largely intact. Both wings had been removed at the level of the mid-humerus, and the exposed bony ends were splinted. The proximal half of the femur was still articulated to the synsacrum/pelvis but both were devoid of skin and most of the soft tissue. The exposed bony end of the femur was splinted whereas the edges of the synsacrum/pelvic were somewhat frayed. The left leg was present, at the level of the proximal tibiotarsus; skin and soft tissue was largely intact and the exposed bony end of the tibiotarsus was splinted. The right foot was present, at the level of the distal tarsometatarsus; skin and soft tissue was largely intact and the exposed bony end of the tarsometatarsus was splinted. Several loose tail feathers were also present.	26/10/2023			Extensive scavenging	The broken long bones (humerus, femur, tibiotarsus) are typical of an avian scavenger, as are the peck marks to the top of the skull. The pelvis/synsacrum (and possibly parts of the broken long bones) looked to have gnaw marks, more typical of a mammalian scavenger. The ribs, cervical and thoracic spine were not present.
60676	Post Mortem	Final	Department of Conservation	Nelson	3/05/2022	Black AQ on Grey Lyn, DOC-V3244	Mainland National Park	Wild		Kea	Male	Adult	Submitted for post mortem examination after being sent to Landcare Research for 1080 testing. Frozen prior to submission.	The adult male kea weighed 828 grams and was in moderate to good body condition, with adequate pectoral muscle mass and body fat reserves. A small piece of the left pectoral muscle was missing. There was a moderate degree of decomposition present.	2/05/2022		Fluoroacetate 2.78 Âµg/g (Landcare report number: T7869) Liver lead level: 0.045 mg/kg NZVP CASE NO : P22005482	1080 toxicity	The level of lead in the liver was low and would not have adversely impacted on the health of this bird.
63371	Post Mortem	Final	Department of Conservation	Te Anau	3/05/2024	None	Mainland National Park	Wild	Monkey Creek Carpark in Fiordland National Park	Kea	Male	Juvenile	Found by a tourist at Monkey Creek Carpark on SH 94 in Fiordland National Park and was handed to a DOC ranger who brought it back into town with him. Bloody patch between bill and right eye. A1080 operation was conducted on 09/03/2024 approximately 15km away.	The kea weighed 844 grams and was in good body condition with adequate skeletal muscle mass and body fat reserves. On external examination, haemorrhage was present within both nostrils and within the mouth. Palpation around the head revealed crepitus between the skull and the maxillary beak. Intra-coelomic organs were in a mild state of decomposition. Subcutaneous and visceral fat appeared pale and there was diffuse pallor to the liver with rounded margins. The crop and gizzard were empty. Blood clots were visualised within the trachea and subcutaneously in the region of the dorsal neck and within the ears. Removal of the skin revealed a complete, comminuted naso-frontal fracture between the skull and maxillary beak with extensive associated haemorrhage.	1/05/2024		Liver lead level: 0.105 mg/kg IDEXX CASE NO : P24004317	Blunt force trauma to head	This was a young male kea ion good body condition. The blunt force trauma was largely limited to the head, with several fractures to the head, with associated haemorrhage. The level of lead in the liver was low and unlikely to have adversely affected the health of this bird.
55846	Post Mortem	Final	Other	Queenstown	18/05/2018	Kasey (M-38561)	Zoological Wildlife Park	Captivity	Kiwi Birdlife Park	Kea	Female	Adult	Kasey had deteriorated rapidly over the last month and after consultation with the vet the decision was made to euthanase.	The bird weighed 802 grams and was in reduced body condition. There was a ~15 mm in diameter smooth, translucent yellow, fairly mobile cystic mass in the subcutaneous of the ventral mandible. The abdomen was moderately distended. The right liver lobe was markedly enlarged and had been completely replaced by a mass composed of fairly soft mottled deep red-to-cream tissue with multiple, often large (up to 20 mm in diameter) dull and dry yellow foci. There was a large amount of straw-coloured gelatinous material expanding the perihepatic ligament of the right lobe. The duodenal loop was loosely adhered to the mass occupying the right liver lobe. The coelomic cavity contained a small amount of clear straw-coloured fluid. No other abnormalities were noted on gross post mortem.	15/05/2018	Pending		Hepatic neoplasia	Most of Kasey's liver had been replaced by a cancerous mass which would explain her recent deterioration. The tumour would have been inoperable and euthanasia was the most humane option.
57497	Post Mortem	Final	Department of Conservation	Franz Josef	7/06/2019	None	Mainland National Park	Wild	Westland National Park	Kea	Unknown	Subadult	Found dead on the side of the road 25/04/2019. Frozen prior to submission.	The bird weighed 730 grams and was in moderate body condition (most of the internal organs were absent). The bird was flattened in the dorso-ventral plane, including the head which had sustained multiple fractures to the skull; there was blood staining of the adjacent feathers. There were multiple fractures to both wings and legs as well as multiple fractures to the ribs, thoracic spine, synsacrum and pelvis. Most of the internal organs were absent (herniated out the cloaca) or severely macerated as a result of the multiple spinal and pelvic fractures. The bird could not be sexed.	7/06/2019			Severe musculoskeletal trauma consistent with vehicular strike	The bird appeared in reasonable body condition (i.e. not emaciated). The bird had sustained multiple fractures to the head, wings and body; the associated haemorrhage indicates the bird was alive when struck. Most of the internal organs were absent so we could not determine the sex or test the liver for the presence of lead.
53839	Post Mortem	Final		Franz Josef	21/09/2016	V-1554 "Hobbit" Yellow F on Blue			Okarito Sanctuary	Kea	Female	Adult	Found 3 metres from nest entrance. Nest has old chicks. Found dead day of 1080 drop at about 11am, but cold and stiff. No sign of predation at the site.	The bird weighed 928 grams and was in good condition; moderate amounts of subcutaneous and intra-abdominal fat reserves. The crop was moderately full with homogenous brown pasty material. The same substance was found within the pharynx, oesophagus, proventriculus, ventriculus and intestinal tract. The ventriculus additionally contained a few small stones. The liver was slightly pale and friable and there were multifocal pinpoint white lesions distributed throughout the organ and also extended into the parenchyma. The spleen appeared grossly normal. No other abnormalities were identified on gross post-mortem.	21/09/2016	Liver: the majority of hepatocytes appear swollen and contain diaphenous cytoplasm and there is a focal area where groups of hepatocytes or sinusoidal lining cells contain one or several fairly discrete and clear intracytoplasmic vacuoles; how much of the former is due to autolysis is unclear. There is congestion of the lung, kidney, ovary and brain. Sections of heart show no obvious abnormalities.	20410 Muscle tissue, 53839, Kea, 21/9/16. The level of 1080 was below the minimum detectable level (MDL). The determination was carried out using TLM005, the assay of 1080 in water, soil and biological materials by GLC. The method detection limit (MDL) is 0.001Î¼g/g and the uncertainty (95% c.i.) is Ã± 9%. Landcare Research Report No: T6301.	Theobromine (chocolate) toxicity	There are very few reports of chocolate toxicity in birds (but there is a previous report in a kea almost a decade ago), but it is well studied in mammals. Extrapolating from mammals, ingestion of chocolate as seen in this bird is likely to have resulted in mortality. No 1080 residue was detected in the pectoral muscle (tested at Landcare Research).
58773	Post Mortem	Final	Department of Conservation	Blenheim	15/07/2020	Annie (V-3178)	Mainland National Park	Wild	Walker Pass, APNP	Kea	Unknown	Juvenile	Died 8/06/2020, remains recovered 09/07/2020 Walker Pass, Hawdon Valley, APNP.	Most of the submitted material was composed of loose feathers and plant matter. Three fragments of long bone were found, each with both ends "chewed".	14/07/2020			Extensive scavenging	Apart from loose feathers only three fragments of bone were found and all three had evidence of chew marks. These were swabbed and will be sent for DNA analysis.
58774	Post Mortem	Final	Department of Conservation	Blenheim	15/07/2020	Meggo (V-2962)	Mainland National Park	Wild	Brown Hill, APNP	Kea	Female	Subadult	Died 21/05/2020, remains recovered 09/07/2020 at an altitude of ~1500 metres at Brownhill. Carcass cleaned up, dug out from under snow with parts spread over ~1 metre.	Most of the submitted material was plant matter admixed with loose feathers. A fragment of long bone with broken ends was found. Both the upper and lower bill were also present, with "chew" marks on the proximal ends.	14/07/2020			Extensive scavenging	Apart from loose feathers only three fragments of bone were found and all three had evidence of chew marks. These were swabbed and will be sent for DNA analysis.
60762	Post Mortem	Final	Department of Conservation	Westport	24/05/2022	None	Mainland Reserve	Wild	South Westland	Kea	Female	Juvenile	Found dead by the side of the road, presumed hit by car.	The keas weighed 807 grams and was in good body condition, with good pectoral muscle mass and adequate body fat reserves. The tips of both the upper and lower bill (including the rhamphotheca and underlying bone) were absent; the exposed edges of the rhamphotheca and underlying bone were split and abraded and reddened. There was crepitus of the skull due to multiple displaced skull fractures; fractured bones were often speckled dark red and there was patchy reddening of associated soft tissues. There were bilateral closed fractures of the radius and ulnar (mid-right and distal left) and there were bilateral closed mid-diaphyseal femoral fractures; there was reddening of the associated soft tissues. A ~50 mm segment of small intestine had herniated through the vent. There was bilateral superficial reddening of the lateral aspects of the pectoral muscle and overlying subcutaneous tissues and a ~10 mm circular split in the right abdominal musculature. Both clavicles were fractured (mid-diaphyseal), both coracoids were luxated, and there was extensive deep red speckling of the sternum, including the keel. There was a slightly displaced fracture of the cranial right aspect of the sternum while the right coracoid was displaced dorsally and had lacerated the right ventricle; clotted blood was present over the ventral aspect of the heart. The liver was diffusely pale. The synsacrum and pelvic bones were speckled deep red. No other abnormalities were noted on gross post mortem.	18/05/2022		Liver lead level: 0.041 mg/kg NZVP CASE NO : P22006214	Severe soft tissue and musculoskeletal trauma consistent with vehicular strike	This was a young female kea in good body condition. The injuries are consistent with being struck by a vehicle and the haemorrhage associated with many of the injuries indicate the kea was alive when the injuries occurred. The level of lead in the liver was low and would not have adversely impacted on the health of this bird.

Released under the Official Information Act

58362	Post Mortem	Final	Department of Conservation	Franz Josef	11/02/2020	None	Mainland Private Land	Wild	Montrose Backbackers, South Westland	Kea	Female	Juvenile	Found alive in carpark. Reported to have been trying to fly but flew into a wall. DoC found the bird on the ground unable to sit up or lift its head.The bird died 20 minutes after being collected (08/02/2020).	The bird weighed 478 grams and was in moderate body condition, with reduced muscle mass but adequate body fat reserves. The crop was empty while the proventriculus and gizzard contained only bile stained grit. The duodenum contained a moderate amount of yellow granular pasty material while the remainder of the intestine was largely empty. Bright green urates were present in the cloaca. No other abnormalities were noted on gross post mortem.	11/02/2020		Liver lead level: 21 mg/kg NZVP CASE NO: P20002092	Lead toxicosis	This was a juvenile female kea in moderate body condition; there were no signs of trauma. The level of lead in the liver was very high and is the cause of death of this bird.
54395	Post Mortem	Final		Christchurch	23/03/2017	V-1514			Red Beach Stream	Kea	Female	Adult	Found 20/03/2017 on a rocky tree line. Died 06/03/2017.	The bird was not weighed due to advanced decomposition. The remains were accompanied by large numbers of beetles and maggots which had removed the internal organs and much of the musculature.	22/03/2017			Unknown cause of death due to advanced decomposition	Unfortunately the bird was too decomposed to ascertain a cause of death or assess body condition; no liver was present so we could not test for lead.
62656	Post Mortem	Final	Other	Christchurch	4/10/2023	V-4033 (black on yellow)	Mainland National Park	Wild	APNP	Kea	Male	Juvenile	found weak and vomiting in Arthurs Pass, Pb 1.93mg/L at Gribbles, intractable vomiting, lead on x-ray in ventriculus, continued to deteriorate, died 16/09/2023. On post mortem knotted piece of synthetic material partially blocking proventriculus to ventriculus, proventriculus 2/3 full of small pieces of plastic foam matting, fibers an organic material, emaciated, right lung ventral diseased including small abscesses with liquid pus, left lung similar lesions ventrally and occasional lesions through the left lung. Weight 625 grams.	Tissues submitted in formalin.	16/09/2023	Lung: several bronchi and multiple parabronchi are distended and filled with food/plant material admixed with small numbers of short rod-shaped bacteria. There is often collapse of adjacent air-capillaries as well as patchy congestion. Liver: there are numerous, randomly scattered, rounded and individualized hepatocytes with hypereosinophilic cytoplasm and pyknotic nuclei. Large numbers of Kupffer cells contain haemosiderin. Sections of heart, kidney and adrenal gland and show no obvious abnormalities.	Liver lead level: 18.10 mg/kg IDEXX CASE NO : P23009621	Lead Toxicity Aspiration	The lead toxicity will have in part resulted in the intractable vomiting, with eventual aspiration of food material into the lung, and death.
61228	Post Mortem	Final	Department of Conservation	Blenheim	23/09/2022	Uncle Kenny (V-3919/Yellow 89 on Blue)	Mainland National Park	Wild	Kelly Range	Kea	Female	Juvenile	Mortality signal triggered 07/09/2022, Kelly Range, bird recovered 16/09/2022. Received at Massey afternoon of 20/09/2022.	The kea weighed 830 grams (with transmitter attached) and was in good body condition, with good pectoral muscle mass and good body fat reserves. The crop contained light/bright green, granular paste and the proventriculus and gizzard also contained a light/bright green granular paste; the total weight of this material (crop/PV/gizzard) was 11.00 grams. Similar green pasty material was visible along most of the length of the small and large intestine (weight ~3 grams). No other abnormalities were noted on gross post mortem.	21/09/2022		25656 Muscle tissue, 61228 Kea: Fluoroacetate: 2.70 Âµg/g Landcare Report T8036 Liver lead level: 0.082 mg/kg NZVP CASE NO : P22011612	Primary 1080 toxicosis	The kea was in good body condition, and there were no signs of trauma. The bright green paste in the crop and stomach (~11.00 grams of bait) is highly suggestive of 1080 toxicosis, via primary ingestion of the 1080 bait; no other food items were present in the stomach. ~3 grams of green paste was also present along most of the length of the intestine, however this weight of paste is not deemed particularly reliable due the presence of other material such as digested food material, mucous and faeces. Landcare testing showed the presence of 1080 residue with the pectoral muscle. The level of lead in the liver was low and would not have adversely impacted on the health of this bird. Gross post mortem indicated this kea was a young female rather than a male.
57198	Post Mortem	Final		Queenstown	29/03/2019	No leg band	Mainland National Park	Wild	Routeburn Road	Kea	Male	Subadult	Flew into glass panel Routeburn Road and died 28/02/2019. Frozen prior to submission.	The bird weighed 712 grams and was in good body condition. Clotted blood was present around the nares and within the oral cavity. Clotted blood was also present over the right lung and within the right thoracic aisac. The right lung was diffusely dark red. The gizzard contained a moderate amount of seed material and a small amount of grit. The liver was diffusely and moderately pale. There was deep reddening of the dorsal spinal processes of the distal cervical spine, thoracic spine as well as patchy deep reddening of the dorsal synsacrum and pelvis. No other abnormalities were noted on gross post mortem.	29/03/2019	Sections of heart, lung, liver, spleen and kidney show no obvious abnormalities.	Liver lead level: 0.122 mg/kg NZVP CASE NO : P19004498	Blunt force trauma to the spine with internal haemorrhage	There was bruising to the cervical, thoracic and lumbar spine which is consistent with blunt force trauma. The force transmitted through these bones has resulted in internal haemorrhage, mostly within the lung. This was a young male bird in good body condition and histology of the major organs did not reveal any obvious evidence of any underlying disease. The level of lead in the liver was low and would not have adversely impacted on the health of this bird.
63996	Post Mortem	Final	Other	Christchurch	2/10/2024	Maungatere (V-2537)	Mainland National Park	Wild	Arthur's Pass NP	Kea	Male	Adult	Maungatere was seen stumbling and very wobbly. He was caught and rushed from Arthurs Pass to the South Island Wildlife Hospital. Unfortunately he died 10 minutes before arrival, 30/09/2024. Maungatere was treated for lead toxicity in 2019.	The bird weighed 603 grams and was in poor body condition, with reduced pectoral muscle mass and minimal body fat reserves. The liver was diffusely pale. The gizzard contained a small amount of grit and seed material, while segments of the intestine as well as the cloaca, contained moderate amounts of khaki, watery-to-granular fluid.	1/10/2024		Liver lead level: 17.600 mg/kg IDEXX CASE NO : P24009115	Lead (chronic) toxicosis	The cause of the poor body condition and eventual death is lead toxicosis.
60840	Post Mortem	Final	Other	Christchurch	10/06/2022	V-1821	Mainland National Park	Wild	Franz Josef	Kea	Female	Juvenile	Arrived From Franz Josef - vomiting, palpable old wing fractures ulna and carpal bone Blood lead 1.21mg/l Gribbles, crop wash OK, faecal direct +++ capillaria. Biochem NAD. Had first round chelation, intractable vomiting. Weight got up to 590 grams but then she went rapidly down hill and died on 9/6/2022.	The bird weighed 509 grams and was emaciated with reduced muscle mass and minimal body fat reserves. There was a fracture callus of the mid left radius and ulna. There was marked distension of the pericardium with gelatinous yellow-tinged clear material and fluid; similar material was present beneath the liver capsule. There was moderate ascites. The periphery of each lung was reddened and the lungs oozed clear liquid. The small and large intestine were largely devoid of ingesta/digesta and the walls were thin and flabby. There was a small amount of green-tinged ingesta (seeds) in the ventriculus and the intestines contained yellow liquid ingesta. The spleen was reduced in size but the liver was not shrunken. There were no other gross abnormalities.	10/06/2022	Lung: there is congestion. Heart: the epicardium is expanded by proteinaceous fluid and cardiomyocytes frequently contain one or several, moderately discrete clear vacuoles within the sarcoplasm. Liver: many hepatocytes contain small amounts of lipid and numerous Kupffer cells contain haemosiderin. Spleen: there is a patchy reduction in the amount of lymphoid tissue. Large numbers of haemosiderin-laden macrophages are scattered throughout the parenchyma. Kidney: proximal tubular epithelial cells are often swollen and vacuolated. Sections of brain show no obvious abnormalities.	Liver lead level: 5.0 mg/kg NZVP CASE NO : P22007171	Emaciation Lead toxicosis	This was an emaciated juvenile female kea, which is due in large part to elevated blood and liver lead levels. The Capillaria would have taken advantage of the bird's declining body condition, further contributing to the bird's demise. What was quite striking was the marked hydropericardium; low plasma protein is the likely cause, as no other pathology was present that would explain the fluid build-up around the heart.

Released under the Official Information Act

60158	Post Mortem	Final	Other	Rotorua	15/10/2021	B90116; Band: Yellow M Right; Band: L-20898 Right; Puihi	Zoological Wildlife Park	Captivity	Rainbow Springs	Kea	Female	Adult	Was being caught for a pre-export PBFD test and general health check and suddenly passed away during handling. Was incubating 2 eggs at the time after laying 3 but kicking one out of nest. A recent faecal test was negative for coccidia, yersinia, and salmonella but tested positive for gape worm. She was housed in a mulch aviary and the weather has been quite wet recently. She spent most of her time in a nest box with pine shavings on the bottom and 2 eggs.	The adult female Kea weighed 1.05 kg and was over conditioned with extensive subcutaneous and coelomic fat reserves. On external exam the skin on the plantar surface of both feet was thickened and red just distal to the hocks with the right being more affected than the left. The liver was diffusely pale. The internal surface of the aorta had several light yellow, gritty plaques but otherwise appeared normal. The crop, proventriculus and gizzard were filled with yellow-green fibrous material. There were no other abnormal findings on gross post mortem.	15/10/2021	Lung: within several bronchi and adjacent parabronchi, the submucosa is mildly to moderately expanded with lymphocytes, plasma cells (including Mott cells) and small numbers of heterophils; there is a similar infiltrate in the overlying pleura. Within the adjacent interlobular septae, blood vessels are cuffed by moderate numbers of lymphocytes and plasma cells. There is hyperplasia of parabronchi, atrial and air-capillary epithelial cells and these air-capillaries often contain small numbers of heterophils and proteinaceous fluid. Throughout the sections there is marked congestion and mild pneumoconiosis. Liver: the majority of hepatocytes contain small amounts of lipid and/or glycogen. Spleen: there is patchy congestion. Kidney: there is marked congestion. Sections of heart, adrenal gland, intestine, pancreas and brain show no obvious abnormalities.	Liver lead level: 0.015 mg/kg NZVP CASE NO : P21013662	Uncertain cause of death (see comments)	There were no histological changes in the heart or adrenal gland but that doesn't rule out a stress-related massive release of adrenal that could have stopped the heart. In a fairly localised area of the lung there was a low grade, smoldering pneumonia of uncertain aetiology. It doesn't sound like this kea had any clinical signs of respiratory distress so it's difficult to say if or how much this has contributed to the death.
64455	Post Mortem	Final	Other	Christchurch	27/02/2025	Unbanded	Mainland Reserve	Wild	Fox Glacier township	Kea	Male	Juvenile	Found alive by member of the public 24th. S.Q fluids given by DoC rangers then flown to SI Wildlife Hospital. Arrive cold and collapsed and died despite initial supportive treatment. night of 24/02/2025. .	The kea weighed 640 grams and was in poor body condition, with reduced pectoral muscle mass and minimal body fat reserves. There was a small amount of clear watery fluid in the crop. The proventriculus and gizzard contained a small amount of bright green-stained matted/fibrous material. Large segments of the intestine contained melena Both the liver and spleen were uniformly pale and shrunken.	27/02/2025		Liver lead level: 27 mg/kg IDEXX CASE NO : P25001552	Emaciation secondary to lead toxicity	This was a young male kea in poor body condition due to chronic lead toxicity.
56818	Post Mortem	Final		Dunedin	8/01/2019	Cheeky (L-39440) 181229	Zoological Wildlife Park	Captivity	Queens Park Gardens, Invercargill	Kea	Male	Adult	Anorexia for 4 days prior to admission to hospital. Lethargic, hd qu et, blood biochemistry was normal, WBC elevated. Body weight 780 grams. Started on antibiotics and antifungals as well as daily nebulisation with F10. No radiographic abnormalities. No interest in food so crop feeding started (B.I.D) often with regurgitation. Started to improve and eating, but after ~10 days his respiration deteriorated and inappetence returned. Moved to I.C.U but died 48 hours later (01/01/2019).	Gross post mortem performed at Wildlife Hospital Dunedin and tissues submitted in formalin. The lungs appeared darker than normal, large amount of pericardial fluid as well as pallor to the epicardium. Hepatomegaly and pallor.	1/01/2019	Lung: within parabronchi there is variable expansion of the submucosa by mucinous oedematous tissue with patchy hyperplasia and hypertrophy of both the parabronchial and atrial epithelial cells. There is marked congestion and patchy filling of air-capillaries with proteinaceous fluid as well as ectasia of interlobular lymphatics. There is mild pneumoconiosis. Heart: within the left ventricle are multiple, fairly large areas of myocardial fibrosis, with replacement of both individual and small groups of cardiomyofibers; remaining fibers often appear vacuolated. There is epicardial fibrosis. Cardiomyofibers often contain small amounts of perinuclear pigment resembling lipofuscin. Liver: around 50% of hepatocytes contain one or several large, fairly discrete, clear intracytoplasmic vacuoles resembling lipid. Testis: there is a lack of interstitial tissue and although the tubular architecture is retained throughout most of the parenchyma it appears most tubules are occupied solely by germ-like cells resembling intra-tubular seminoma. Sections of kidney show no obvious abnormalities.		Myocardial fibrosis Intratubular seminoma	This kea had areas of fibrosis most noticeably within the left ventricle which has likely reduced left-sided function resulting in waxing and waning but likely progressive pulmonary oedema. Heart muscle fibers also contained a "wear and tear" pigment which is often seen in older birds; the pigment is a by-product of oxidative injury and so accumulates over a bird's lifetime. There was also early development of a seminoma within one of the testes.
61412	Post Mortem	Pending	Other	Christchurch 8051	27/10/2022	L-34268 'Angelina'	Zoological Wildlife Park	Captivity	Willowbank Wildlife Reserve	Kea	Female	Adult	The kea was the older female in the enclosure. She was being hand fed and monitored daily. She reportedly had an eye removed due to infection in 2012. She has been coming to the feeder and moving normally on days before death. There have been no major changes to her environment.	The kea was 778 grams at post mortem examination. The body was in a mild, early state of decomposition, and generally in good condition. Muscle mass was slightly low, but expected for captive birds. There was a mild to moderate amount of subcutaneous and visceral fat reserve. The bird was noted to have two intact eyes. Subcutaneous and intramuscular hemorrhage, accompanying tears through the quadriceps muscle bellies, was evident on the right leg and inguinum. The liver was grossly mildly diffusely mottled and pale red to brown, more pronounced on the left lobe with a small adhesion to the connective tissue of the adjacent airsac along the lateral margin of the liver. The spleen was markedly enlarged and uniformly pale with petechiations and ecchymoses across its surface. A small amount of seed and grit was found in the proventriculus and gizzard. The reproductive tract exhibited active follicle formation, with one membranous amorphous sac of yellow-tinged transparent fluid adjacent to recognizable follicular development. Oviducts appeared grossly normal and active.	26/10/2022		Liver lead level: 0.038 mg/kg NZVP CASE NO : P22012755		
64589	Post Mortem	Final	Department of Conservation	Franz Josef	28/04/2025	Ehan (V-4157)	Mainland Private Land	Wild	Scenic Hotel, Franz Josef	Kea	Male	Juvenile	Found dead in patch of bush by Scenic Hotel, 15/03/2025.	The kea weighed 595 grams and was in poor body condition, with reduced pectoral muscle mass and minimal body fat reserves. Occupying at least 50% of the parenchyma of both lungs were multifocal to coalescing, firm and irregularly expansile firm masses. The masses often had a mottled tan appearance with a thin dark brown to black rim; the cut surface of these masses had a similar colour and affect the normal architecture but in other areas the honey-comb architecture was retained. The gizzard contained green-stained grit and small amounts of fibrous material.	20/03/2025	Lung: large areas of the parenchyma are effaced by abundant eosinophilic and pyknotic debris admixed with numerous fungal elements. In other areas, the lobular architecture is somewhat retained but is infiltrated by large numbers of fungal elements. There is frequent invasion of blood vessel walls with fungal elements accompanied by necrotic debris, including necrosis of the smooth muscle. Within much of the remaining parenchyma, the interstitium and air-capillaries contain proteinaceous material; there is also congestion and increased numbers of heterophils and mononuclear cells within the interstitium. Liver: large numbers of Kupffer cells contain haemosiderin. Spleen: there is lymphoid depletion and moderate numbers of haemosiderin-containing macrophages scattered throughout the cytoplasm. Most sheathed arterioles are bordered by a layer of amorphous, pauci-cellular eosinophilic material; this material is Congo-Red negative. Kidney: proximal tubular epithelial cells often have lacy to fragmented cytoplasm with karyolytic or absent nuclei.	Liver lead level: 2.30 mg/kg IDEXX CASE NO : P25002200	Severe mycotic (fungal) pneumonia; Aspergillosis Reduced body condition	This was a young male kea in poor body condition. He also had a severe infection of the lungs due to the fungus Aspergillus. These infections are usually due to a compromised immune system (eg secondary to lead toxicity) or to an overwhelming environmental exposure to fungal spores, or a combination of both. The level of lead in the liver of this kea, while not in the toxic range, could have somewhat compromised the immune system and perhaps combined with an elevated level of exposure to fungal spores, resulted in the fungal pneumonia. The fungal infection looked fairly acute so I'm not convinced this would completely explain the bird's poor body condition.
61672	Post Mortem	Final	Department of Conservation	Blenheim	27/02/2023	Curtis (V-3476, White Y on Orange)	Mainland National Park	Wild	Arthurs Pass NP	Kea	Male	Adult	Found dead 03/01/2023.	Apart from the head and all the cervical vertebrae, which were were missing, the axial and appendicular skeleton were largely intact. Apart from tail and wing primary feathers, the remains were devoid of skin and soft tissue.	24/02/2023			Advanced scavenging	The head and neck were missing and the bones of the remaining skeleton were completely devoid of soft tissue. Long bones were intact (making an avian scavenger less likely) and the bones did not appear to have been chewed, so perhaps this is purely due to invertebrate scavenging.
60290	Post Mortem	Final	Other	Queenstown	20/12/2021	V-3486	Mainland National Park	Wild	Mt Aspiring N.P.	Kea	Male	Juvenile	Found dead caught in a trap Matukituki Valley 28th October 2021 near trap 32 Robin Loop trapline. Frozen prior to submission.	The bird weighed 551 grams and was in poor body condition, with reduced pectoral muscle mass and minimal body fat reserves. The internal organs were in a fairly advanced state of decomposition. The gizzard contained a small amount of melena stained fibrous material and grit.	20/12/2021		Liver lead level: 0.640 mg/kg NZVP CASE NO : P21016932	Emaciation Misadventure- Trap entanglement	This kea was in poor body condition but unfortunately the internal organs were too decomposed to perform any histology, however the liver lead level was low so this would not explain the emaciated condition of the bird. The history indicates the kea was found under the strike bar of a trap; there were no broken bones and the skull was intact; however, any soft tissue injury may have been obscured by post mortem decomposition. My feeling is that the bird was probably emaciated prior to the entrapment, as the bird will have succumb to dehydration and kidney failure well before starving to death after being caught in the trap. An obvious cause for the poor body condition was not established.

Released under the Official Information Act

58447	Post Mortem	Final	Department of Conservation	Wanaka	2/03/2020	Kelly-V-1580	Mainland National Park	Wild	E1253087 N5065494	Kea	Female	Subadult	Found dead on 20/02/20. Known use of 1080 poison in the area.	The bird weighed 743 grams and was in moderate-good body condition with good pectoral muscle mass and minimal body fat reserves. The crop was empty. The proventriculus and gizzard contained 3.3 grams of green/blue-tinged pasty material.	28/02/2020		23721 Muscle tissue, 58447, Kea: 2.28 ug/g Landcare Report No: T7416.	1080 toxicosis	The dyed pasty material in the stomach is highly suggestive of 1080 ingestion. Skeletal muscle was sent for 1080 testing and the result indicates this bird has ingested 1080. Given this result and lack of any other obvious gross post mortem findings 1080 is the most likely cause of death.
60846	Post Mortem	Final	Department of Conservation	Twizel	20/06/2022	No band	Mainland National Park	Wild	Mackenzie District	Kea	Male	Adult	A hunter allegedly shot two tahr and wounded one. They tracked the wounded animal and took a second shot at about 100m in failing light. After the shot, a bird jumped up from the wounded animal. They got over there and found the kea in distress. The kea died shortly after being delivered to the vet in Twizel on Sunday 5th June. Frozen and submitted for post mortem examination.	The kea weighed 999 grams and was in good body condition, with good pectoral muscle mass and good body fat reserves. Radiographs showed one large and at least six much smaller radiodense objects in the vicinity of a comminuted fracture of the right tibiotarsus. There was also a slightly displaced fracture of the left 3rd metacarpal bone; no radiodense material was associated with this fracture. There was an open fracture (resulting in a ~10 x 5 mm skin defect) involving the medial aspect of the left metacarpal joint, with blood staining of the surrounding feathers and reddening of the surrounding skin and soft tissue. Exposed skin edges were smooth or irregular and slightly ragged. There was matting and blood staining of the feathers and blood staining of the skin of the left thorax, abdomen and left thigh; the skin was intact. There was matting and blood staining of the feathers and blood staining of the skin over the right abdomen and right thigh. There was a ~10 x 5 mm skin defect over the cranial aspect of the right proximal tibiotarsus (just below the right stifle joint); medially the exposed skin edges were smooth but laterally they were slightly irregular and ragged and the surrounding skin was deep red. There was reddening and tearing of the subcutaneous tissue underlying the skin defect and several small clumps of feathers had been pulled through the skin defect. There was extensive reddening of the subcutaneous tissue and fascia over most of the proximal right leg which extended up the right lateral abdominal area. There was a ~8-10 mm diameter defect in the fascia with an irregular slit-like defect in the underlying muscle of cranial aspect of the proximal right tibiotarsus. There was a slightly displaced, closed comminuted fracture involving the proximal two thirds of the right tibiotarsus. A roughly bean-shaped (~6 x 3 x 2 mm) metallic fragment with irregular margins, was retrieved from the marrow cavity of the fractured proximal right tibiotarsus. There was extensive reddening as well as areas of tearing of the musculature of the entire right tibiotarsus. No gross abnormalities were noted on examination of the intra-coelomic organs.	17/06/2022		Liver lead level: 1.790 mg/kg NZVP CASE NO : P22007430	Comminuted fracture of the right tibiotarsus secondary to ballistic injury	Radiographs showed the presence of radiodense material near the region of the right knee associated with a severe fracture of the right tibiotarsus. This material was retrieved during post mortem examination and is consistent with a bullet fragment. An entrance wound was located over the cranial aspect of the right leg, below the knee. There was a large amount of haemorrhage in the soft tissue/musculature of the right leg, indicating the kea was alive when the ballistic material entered the leg. No exit wound was found. There was also an anti-mortem fracture of the left wrist region but no associated ballistic material was seen on radiographs. Given the history, this could be consistent with the kea being hit by "shrapnel", i.e. a fragment from a larger projectile, that has lost some of its energy, fractured the kea's leg but failed to exit the body. A direct shot with a higher powered rifle, such as a .303, would have likely caused catastrophic damage to entire bird. Depending on the distance, even a direct shot to the leg with a .22, the projectile would probably have retained enough energy to exit, or at least some fragments, to exit the leg. This was an adult male kea in good body
64450	Biopsy	Pending	Massey University	Palmerston North	26/02/2025	Takaka				Kea	Unknown	Juvenil	Biopsy from the left caudal thoracic airsac (lung consolidation, occluded bronchus and fluid on CT - visually yellow and fluid filled airsac).		25/02/2025				
53118	Post Mortem	Final		Arthur's Pass	30/03/2016	None			Arthur's Pass Village	Kea	Male	Adult	Found alive but moribund on exposed grass covered embankment within Arthur's Pass village. Vomiting large quantities of clear fluid. Weather fine with air temperature 10 degrees Celcius and wind chill of 4 degrees. Died shortly after recovery.	At time of post mortem the bird weighed 765g and was in fair body condition. The tail feathers and secondary flight feathers of the left wing were damaged or missing, with replacement blood feathers at various stages of growth. Vomitus consisting of fluid and food particules was present on the feathers around the head and within the oral cavity. Ingesta was present throughout the length of the oesophagus and consisted of the same watery fluid and seed combination seen in the oral cavity and the proventriculus. The left lung appeared congested. The right lung was diffusely discoloured light brown and fluid of a similar brown colour discharged from a cut surface. Both lungs were buoyant in formlin. Cranial areas of both lobes of the liver had localised areas of light discolouration with associated fissures in the parenchyma and subpleural haemorrhage. Caudal areas of the liver lobes, the overall size and texture was grossly normal. There was no associated bruising or abnormalities of the adjacent body wall. The ventriculus was grossly normal and contained particles of a black rubber material in place of grit. There was watery ingesta throughout the length of the gastrointestinal tract and a small amount of intracoelomic and subcutaneous fat deposits.	30/03/2016	Lung: there are irregular patchy areas of air-capillary collapse as well as over-inflation. Liver: there are coalescing, vaguely linear areas, often briding portal and centrivenular areas in which the cytoplasm of hepatocytes is hypereosinophilic associated with dilation adjacent sinusoids with blood and proteinaceous fluid (likely corresponding to areas of gross liver damage). Kidney: there is a focal area of subcapsular interstitial and intratubular haemorrhage; in this area as well as several other small foci, proximal tubular epithelial cells often have hypereosinophilic and slightly vacuolated cytoplasm and karyolytic nuceli. Gizzard: two cross sections of adult nematodes (with lateral alae) are visible between glands in the lamina propria; there is no associated inflammatory response. Sections of heart, oesophagus, proventriculus, adrenal gland, intestine, pancreas and brain show no obvious abnormalities.	Liver lead level: 12mg/kg NZVP CASE NO : P16005778	Lead toxicosis	The cause of the vomiting, aspiration and eventual death was due to lead poisoning; the level of lead measured in the liver was very high. The bird was in moderate to good body condition suggesting the illness was fairly acute in onset.
63519	Post Mortem	Final	Department of Conservation	Arthur's Pass Village	30/05/2024	Unbanded	Mainland National Park	Wild	SH73 Viaduct Lookout Intersection	Kea	Male	Subadult	Found dead on 24/05/24 by road workers at Arthurs Pass National Park SH73 Viaduct Lookout intersection on the side of the road in a mountainous area. Common vehicle strike point. Blood looked fresh so likely died within the last 24 hours, the temperature was about 0.0 degrees Celsius when picked up.	The kea (unbanded) weighed 760g and was in good body condition with adequate skeletal muscle mass and adequate body fat reserves. Extensive bilateral fractures to the axial and appendicular skeleton were present with associated soft tissue haemorrhage. Multiple comminuted skull and beak fractures with extensive crepitus was palpated throughout the head but no associated haemorrhage was observed suggesting these were secondary cranial impact injuries. A tear in the abdominal musculature with consequent evidence of evisceration was present. The thoracic area was flattened in a dorsoventral plane with extensive bilateral rib and spinal fractures. Extensive scavenging to organs had occurred with only small amounts of kidney remaining.	30/05/2024		Liver lead level: 0.260 mg/kg IDEXX CASE NO : P24005351	Blunt force trauma consistent with vehicle collision	This kea was in good body condition. The gross post mortem signs are consistent with being struck by a car. The level of lead in the liver was low and would not have adversely impacted on the health of this bird.
65052	Post Mortem	Final	Department of Conservation	Franz Josef	4/08/2025	Callery	Mainland Private Land	Wild	Private property, Franz Josef township.	Kea	Female	Juvenile	Found dead, lying on her back 24/07/2025. Unfortunately she fridge went into freezer mode over the weekend.	The kea weighed 704 grams and was in mostly poor-to-moderate body condition; pectoral muscle mass was reduced but body fat reserves were adequate. The crop contained a small amount of watery, brown granular fluid, while the gizzard contained only grit. Segments of the small intestine contain dark green watery to pasty fluid.	30/07/2025		Liver lead level: 32.00 mg/kg IDEXX CASE NO : P25006206	Lead toxicosis	The level of lead in the liver was very high and would explain the cause of death.
56890	Post Mortem	Final	Other	Christchurch	29/01/2019	Snag (L-23926)	Zoological Wildlife Park	Captivity	Orana Wildlife Park	Kea	Male	Adult	First noted to be behaving abnormally on 23rd Jan and sitting puffed up on 24th Jan, 2019. Received veterinary diagnostics including blood work, fecal exam and radiographs. Therapeutics including intravenous fluid therapy, antibiotics and de-worming. Also received metoclopramide and lactulose. CK and AST elevated. Working diagnosis was crop stasis or blockage, and there was clinical evidence of dehydration and poor body condition. Euthanised on 25th Jan 2019.	The bird weighed 873 grams and was in reduced body condition, with reduced pectoral muscle mass and minimal body fat reserves. Brown mucoid fluid and foam was visible in the oral cavity but the tracheal lumen was clear. The crop was markedly distended crop with a high volume of light brown to green semi-solid material, admixed with a high amount of foamy material and small seeds. The proventriculus was mildly distended with similar material, as well as green vegetative matter. The gizzard contained small stones and green vegetative matter. The cloaca was moderately distended with watery dark green fluid, soft green urates, and a small amount of soft brown feces. No impacted material in cloaca. Significant pentobarbitone artifact to the right kidney, major arteries including the aorta, the heart and the liver.	29/01/2019	Lung: there is marked congestion. Kidney: proximal tubular epithelial cells often contain multiple small, reasonably discrete, clear intracytoplasmic vacuoles. Sections of heart, liver, spleen, crop, proventriculus, gizzard, intestine and brain show no obvious abnormalities.	Liver lead level: 0.034 mg/kg NZVP CASE NO : P13001290	Crop stasis of unknown aetiology Euthanasia	An obvious cause for the clinical signs was not readily apparent on gross post mortem. He had a very distended crop but with no obvious blockages/constrictions; histology of the internal organs, including the crop showed no obvious abnormalities and the level of lead in the liver was not elevated.

Released under the Official Information Act

60858	Post Mortem	Final	Department of Conservation	Arthurs's Pass	7/07/2022	Dillon (V-3760)	Mainland National Park	Wild	APNP	Kea	Male	Juvenile	Hit by car at 1805 hrs 03/07/2022, died immediately. Blood lead level September 2021 was 25 ug/DL.	The kea weighed 1.117 kg and was in good body condition, with good pectoral muscle mass and good body fat reserves. There was a ~50 x 40 mm skin and soft tissue defect in the right caudal abdomen, exposing the coelomic cavity; there was no reddening or swelling of the exposed skin/soft tissue edges. There was also a large skin/soft tissue defect over the right caudal thorax, abdomen and proximal right thigh, but with no reddening or swelling of the exposed skin/soft tissue edges. There was a closed, slightly oblique, mid-diaphyseal fracture of the right humerus but with no skin or soft tissue reddening. There was a displaced (closed) fracture of the right frontal bone which extended caudally to involve both occipital bones; the back of the skull had essentially been pulled away from the remainder of the head, but again there was no reddening of the skin and soft tissue, including the brain which had herniated through the fracture site. There were abrasions and reddening of the skin over the dorsal surface of the right foot. There was extensive deep red-speckling of the sternum (bilateral), keel and right coracoid, which also had a chip fracture and was slightly luxated. The left part of the sternum was completely separated from the keel. There was also bruising to multiple ribs and intercostal muscles of the right thorax. There was patchy deep reddening of both lungs but no lacerations. Apart from the kidneys and lungs, the remaining intra-coloemic organs were missing. The crop was empty.	6/07/2022		Kidney lead level: 1.47 mg/kg NZVP CASE NO : P22008133	Soft tissue and musculoskeletal trauma consistent with vehicular strike	The pattern of damage is consistent with compressive blunt force trauma, such as a vehicle strike. The increase in intra-abdominal pressure as a result of the trauma had split the abdomen open and most of the internal organs had been lost as a result, with only the kidney remaining; the level of lead in the kidney was low and would not have adversely impacted on the health of this bird. Considering the very high level of lead in the blood less than one year ago, this kea had done very well to recover and reach a body weight of over 1 kg.
59599	Post Mortem	Final	Other	Nelson	7/05/2021	None	Mainland National Park	Wild	Nelson Lakes NP	Kea	Unknown	Juvenile	Last seen alive 11/11/2020, found dead Saint Ronans Stream (nest sight) 15/12/2020. Three chicks were present up until 11/11/2020, only two present on the 27/11/2020 with a stoat seen on camera the same day but no carcass was found. This chick was found dead in next bowl which is located on a south facing gully under a large boulder at ~1000 m in beech forest.	Due to advanced decomposition the chick was not weighed. Most of the skeleton and skin were intact, but feathers were missing along the dorsal neck, thorax and lumbar regions while most of the soft tissue (musculature and internal organs) was absent as was much of the left wing. Much of the head was flattened except for the frontal bones and bill. There were at least 9 skin defects (up to ~10 mm in diameter) along the dorsal and lateral thorax and lumbar regions. There were two large (~40 x 40 mm and ~50 x 30 mm) defects in the skin over the ventral right shoulder and mid-to-distal aspect of the ventral neck.	14/04/2021			Unknown cause of death: possible avian scavenger and/or predation	There were multiple skin defects along the back of this chick as well as several large defects of the right shoulder and neck. No convincing skin defects were visible over the back of the neck and head so a mustelid predation seems less likely. The location of the skin damage makes me wonder about the possibility of another avian species; would falcon or weka be found at the altitude this chick was found? Due to decomposition and prolonged freezing samples for potential predator DNA were not taken.
60414	Post Mortem	Final	Department of Conservation	Takaka	2/03/2022	None	Mainland Private Land	Wild	Pohara, Golden Bay	Kea	Male	Subadult	The kea's body was found close to dwellings in Golden Bay.	The kea weighed 557 grams and was in poor body condition, with reduced pectoral muscle mass and minimal subcutaneous and intra-coelomic fat reserves. The internal organs were somewhat autolysed. There was a 90 x 70 mm ovoid skin defect over the dorsal thorax/synsacrum and right thigh, with the majority of muscular layers removed from underlying skeletal structures. Exposed skin and muscle edges were not reddened or swollen. Severed ribs were partially absent so that the right lung and kidney were appreciable; there was a small amount of clotted blood over the right lung. The right lateral aspect of the sternum was fractured longitudinally directly adjacent to the keel, and overlying an area of thickened irregular periosteum, indicative of a previous chronic bony change to the same area. The right coracoid suffered an acute, transverse, mid-diaphyseal fracture. The left lateral aspect of the sternum was heavily bruised. Upon inspection of the lungs, there were numerous (30-40) 1-5 mm firm, spherical soft tissue yellow nodules scattered throughout the lung parenchyma on both sides. No other abnormalities were noted on gross post mortem.	1/03/2022		Liver lead level: 0.024 NZVP CASE NO : P22002677	Poor body condition Mycotic (fungal) pneumonia Probable avian predation and scavenging	This was a young male kea in poor body condition and with signs of a possible avian predation and scavenging event. The poor body condition will have predisposed to the predation. The level of lead in the liver was very low and would not account for the poor body condition. He also had a fairly severe fungal infection of the lungs, which will have contributed to the poor body condition but I don't think was the initial cause, i.e. the fungus have taken advantage of the bird's declining body condition. There was also an old fracture of the sternum but it didn't appear to be inhibiting the bird's flight apparatus. I wonder if this is one of the young kea that die every year due to inexperienced foraging abilities, as with many other avian species.
60109	Post Mortem	Final	Other	Lincoln	30/09/2021	V-3779	Mainland National Park	Wild	Arthur's Pass NP	Kea	Female	Juvenile	Found dead on the side of the road 16/09/2021.	The remains consisted largely of flattened skin/feathers with soft tissue (torn subcutaneous tissue and musculature) as well as the distal wings and distal legs. The head and entire vertebral column were missing as were all the internal organs.	17/09/2021			Vehicular trauma	As per the history the cause of death appears to have been vehicular trauma. There was not enough left of flattened remains to glean any further information and the internal organs were no longer present so the liver can not be tested for lead.
63894	Post Mortem	Final	Department of Conservation	Blenheim	9/09/2024	Lucifer (V-3666, White CV on black)	Mainland National Park	Wild	Arthur's Pass NP	Kea	Male	Subadult	Banded nearly three years ago. Found dead beside waterway. Died 53 days ago from 6th September.	The kea weighed 1.06 kg (wet) and was in fairly poor body condition, with reduced pectoral muscle mass and minimal body fat reserves. The crop was empty and the gizzard contained only grit.	9/09/2024		Liver lead level: 31.00 mg/kg IDEXX CASE NO : P24008421	Lead toxicosis	The bird was in reduced body condition, but not emaciated. There were no signs of trauma. Due to some decomposition of the internal organs, no histology will be performed, however the level of lead in the liver was very high and is the cause of death in this kea.
58574	Post Mortem	Preliminary	Department of Conservation	Takaka	4/05/2020	No bands	Mainland Private Land	Wild	Pakawau, Golden Bay	Kea	Male	Juvenile	The kea was found yesterday afternoon (Monday 13/4/2020) on a personâ€™s lawn gasping for breath. They held it in a cage overnight, but it was dead this morning 14/4/2020. .	The bird weighed 552 grams and was in poor to moderate body condition. Both lungs were diffusely deep red and each contained at least 10-15 moderately firm, circular pale green foci up to ~5 mm in diameter. The gizzard contained a moderate amount of dark green pasty material. No other abnormalities were noted on gross post mortem..	15/04/2020		Liver lead level: 0.017 mg/kg NZVP CASE NO : P20004988		This was a younger male kea in reduced body condition; there were no signs of trauma. Both lungs were deep red (indicating inflammation) and also contained multiple green plaques, usually an indication of a fungal lung infection. We will do some histology but this may be weeks away depending on the lockdown level. The level of lead in the liver was low and would not have adversely impacted on the health of this bird.
58004	Post Mortem	Final	Department of Conservation	Arthur's Pass	8/10/2019	V-3246 (Hugh Logan)	Mainland National Park	Wild	Arthur's Pass Village	Kea	Male	Juvenile	Was in good health (900 grams) 24/08/2019. Found dead beside SH 73 05/10/2019.	The bird weighed 557 grams and was in poor body condition, with reduced pectoral muscle mass and minimal body fat reserves. There was a ~30 mm in diameter skin and soft tissue defect in the ventral abdominal mid-line resulting in exposure of the coelomic cavity; skin and soft tissue margins were not reddened or swollen. The liver, spleen and kidneys were diffusely pale and uniformly shrunken. The crop and proventriculus were empty and the gizzard contained only grit.	8/10/2019	Lung: there is marked congestion. Spleen: there is lymphoid depletion with increased proximity of sheathed arterioles. Small numbers of haemosiderin-laden macrophages are scattered throughout the parenchyma. Kidney: multiple collecting ducts contain urate tophi bordered by pyknotic debris and small numbers of heterophils. Brain: there is marked congestion. Sections of skeletal muscle, heart, liver, adrenal gland and intestine show no obvious abnormalities.	Liver lead level: 13.10 mg/kg	Emaciation secondary to lead toxicosis	This juvenile male kea was very skinny and this is due to lead intoxication. There was no evidence of trauma. The crop and stomach were empty. There were no areas of haemorrhage or haematoma formation to suggest a possible secondary poisoning with an anticoagulant.

Released under the Official Information Act

56753	Post Mortem	Final		Wanaka	5/12/2018	K02, K03 and K04	Mainland National Park	Wild	West Matukituki Valley	Kea	Unknown	Adult	Suspect predation of kea, remains sent to Landcare prior to being sent to Wildbase. Remains found West Matukituki Valley, Bridal Veil Falls 04/09/2018.	Four plastic bags containing kea remains were examined (one bag labelled K02, one bag labelled K03 and two bags labelled K04). K02: The cranial half of the sternum/keel with both coracoids attached, as well as both humeri, ulna and radii as well as the left carpal bone were present but largely devoid of soft tissue. The edges of the sternum and keel had been chewed. Multiple loose primary and secondary feathers were also present. K03: The skull, with maxilla and mandible partially attached were separate from the other bones. The distal thoracic vertebrae were attached to the synsacrum/pelvis, as were the caudal vertebrae as well as both femurs. The transverse processes of the thoracic vertebrae had been chewed and the distal parts of both femurs were absent; all bones were devoid of soft tissue. The proximal and distal regions of the left tibiotarsus were absent. All bones were largely soft tissue. Multiple loose feathers were also present. K04: The sternum/keel with both coracoids attached, as well as both humeri, ulna and radii, carpi and metacarpi were attached to each other and largely devoid of soft tissue. The edges of the sternum and keel had been chewed Most of the thoracic vertebrae and several distal cervical vertebrae were present and attached to each other; largely devoid of soft tissue and with several processes chewed. The synsacrum (with caudal vertebrae) had both femurs as well as the right tibiotarsus attached. There was a single small depressed fracture to the left and right ischium. All these bones were largely devoid of soft tissue. The left leg, from the tibiotarsus distally was separate; non-feather skin was present from the hock distally and the proximal tibiotarsus appeared chewed. Multiple loose feathers were also present.	5/12/2018			Extensive scavenging, likely rodent	All the bones were largely devoid of sift tissue. In the remains of all three birds the edges of multiple bones were chewed, likely by scavenging rodents rather than an avian scavenger. The hip bone from K04 had two small defects that could be consistent with a bite wound but ascribing this to a cat would be a stretch given the paucity of the remains. While it can't be excluded as a possibility there is no definitive evidence from these remains that a cat is responsible for the death of these kea.
63895	Post Mortem	Final	Department of Conservation	Blenheim	9/09/2024	Crimea (V-2940, White P on black)	Mainland National Park	Wild	Arthur's Pass NP	Kea	Male	Subadult	Banded nearly three years ago. Found dead by waterway, 19 days ago (from September 6th).	The kea weighed 987 grams (wet) and was in poor body condition, with reduced pectoral muscle mass and minimal body fat reserves. The crop was empty and the gizzard contained only grit.	9/09/2024		Liver lead level: 46.00 mg/kg IDEXX CASE NO : P24008421	Lead toxicosis	The kea was in poor body condition. There were no signs of trauma. Due to some decomposition, no histology will be performed, but the level of lead in the liver was very high and is the cause of death in this kea.
61245	Post Mortem	Final	Department of Conservation	Blenheim	31/10/2022	Wahlenbergia (V-3268/Black DQ)	Mainland National Park	Wild	Waimak Falls, Arthur's Pass NP	Kea	Male	Juvenile	Mortality signal 15/04/2022, retrieved Waimak Falls, Arthur's Pass NP, 16/09/2022.	Due to decomposition and scavenging, the body was not weighed, but some subcutaneous fat deposits were present. Most of the appendicular and axial skeleton were present but in several different pieces, with some skin/feathers and soft tissue remaining. The head and neck were separated from the remaining skeleton; the skin and subcutaneous tissue along the proximal-to-mid neck were deep brown and there were at least 10 puncture wounds, up to ~5 mm in diameter; an intercanine distance could not be stablished.	23/09/2022			Likely mustelid predation (and scavenging)	Despite the extensive scavenging, puncture wounds and evidence of haemorrhage were visible in the skin and subcutaneous tissue over the neck, making a mustelid predation the likely cause of death; a stoat is the probable culprit. The stoat may well also be responsible for the extensive scavenging.
64247	Post Mortem	Final	Department of Conservation	Franz Josef	10/01/2025	Kea.2025.01.06.bin	Mainland Private Land	Wild	Franz Josef township	Kea	Female	Juvenile	Found alive in rubbish bin, not righting itself, heavy breathing. Potential left wing issue, holding differently. Near non-responsive when subcutaneous fluids given (50ml at 9am). Attempted to give fluid before travel to vet at 11am but bird deceased, 06/01/2025.	The bird weighed 498 grams and was in adequate body condition, with adequate amounts of internal fat reserves and pectoral muscle coverage. Skin bruising was present on the right ventral side of the body and neck, the right side of the face as well as the base of the neck and head. Significant muscle bruising was focused on the right dorsal neck at the base of the skull. In this area, there was a small muscle tear at the level of the caudal right mandible, and the right mandible appeared to be dislocated. There was a small amount of frank blood present in the oral cavity. In the subcutaneous tissue in this area were two suspicious defects, ~20 mm apart. A mixture of synthetic (likely silicon or rubber) and organic material was observed in the ventriculus.	10/01/2025	Lung: there is patchy congestion. Sections of heart, liver, kidney, bursa and brain show no obvious abnormalities.	Liver lead level: 0.950 IDEXX CASE NO : P25000194 Landcare Report No: T8631 Lab No: 28091 Muscle tissue, Kea 64247: Fluoroacetate <MDL	Head and neck trauma of uncertain origin	This is a rather strange case. There was bruising and some muscular tearing over the base of the skull and neck, with dislocation of the right jaw. Puncture wounds were difficult to appreciate in the skin but there were some suspicious circular defects in the subcutaneous tissue, around 20 mm apart. This pattern of damage could be consistent with a mustelid or feline predation, possibly the later. This would be a strange pattern of injury for an impact/collision type injury and would also not be typical of anticoagulant exposure. The level of lead in the liver was low and would not have adversely impacted on the health of this bird and no 1080 residue was detected in the muscle.
62591	Post Mortem	Final	Department of Conservation	Arthur's Pass	4/10/2023	None	Mainland Reserve	Wild	Otira Viaduct	Kea	Male	Juvenile	Presumed vehicle strike, found alive but died during transport, 31/08/2023. SH 73 Death's Corner, Otira Viaduct.	The kea weighed 986 grams and was in good body condition, with good pectoral muscle mass and good body fat reserves. There was grazing and bruising to the skin over the right thigh and hip. There was a closed, oblique, mid-diaphyseal fracture of the left humerus as well as extensive bone bruising of the left coracoid, keel and bilateral sternum. There were several linear splits to the visceral aspect of the right liver lobe with associated clotted blood.	6/09/2023		Liver lead level: 0.145 mg/kg IDEXX CASE NO : P23009135	Vehicular strike	This was a young male kea in good body condition. The gross post mortem findings are consistent with being stuck by a vehicle. The liver lead level was low.
59325	Post Mortem	Pending	Department of Conservation	Aoraki NP	3/02/2021	V-3207	Mainland National Park	Wild	Sefton Biv, Aoraki NP	Kea	Male	Adult	Found dead 04/01/2021, suspected drowning. Frozen prior to submission.	The bird weighed 1.292 kg (wet) and was in good body condition, with good pectoral muscle mass and adequate body fat reserves. Light red bubbly fluid was visible at the entrance of both nares. The crop was full of material resembling skeletal muscle and fat; the proventriculus and gizzard contained similar but semi-digested material as well as several small pieces of hard black plastic and numerous white to grey matted hair fibres up to ~50 mm in length. The lungs were mottled red and oozed pink frothy fluid. No other abnormalities were noted on gross post mortem.	8/01/2021	Limited histology pending	Liver lead level: 0.158 mg/kg NZVP CASE NO : P21000271	Probable drowning	This bird was in good body condition with no signs of trauma. Drowning will often not produce specific findings, but being found dead in the water and frothy fluid in the lungs is suggestive. The level of lead in the liver was low and would not have adversely impacted on the health of this bird. The drowning of two otherwise fit and seemingly healthy kea on the same day and location seems a bit strange which raises the possibility that something indirect could have contributed to these keas demise. With the crop and stomach was material resembling muscle and fat and there were multiple fibres resembling mammalian hair, so I was wondering about the possibility of a secondary type poisoning? I have frozen the stomach contents, liver and muscle and have also retained the hair fibres if any further testing is required.
58522	Post Mortem	Final	Department of Conservation	Haast	18/03/2020	No leg band	Mainland National Park	Wild	Lake Greaney	Kea	Male	Subadult	Found dead 25/02/2020 near Lake Greaney. Frozen prior to submission.	The bird weighed 665 grams and was in poor to moderate body condition; the internal organs were in a fairly advanced state of decomposition.	13/03/2020		Liver lead level: 0.041 mg/kg NZVP CASE NO : P20004021	Unknown cause of death	This was a young male bird in reduced body condition. Unfortunately the internal organs were too decomposed to glean much information. There was no obvious evidence of trauma, including predation. The level of lead in the liver was low and would not have adversely impacted on the health of this bird.

Released under the Official Information Act

60105	Post Mortem	Final	Other	Dunedin	23/09/2021	Bruce (L-35910) 101359	Zoological Wildlife Park	Captivity	Dunedin Botanic Gardens	Kea	Male	Adult	Admitted to DWH after noted being unwell, lethargic, anorexic and loose yellow faeces. High WCC, mostly a heterophilia. Chlamydia PCR negative. Treated with broad spectrum ABs but WCC continued to increase. Continued weight loss, inappetence, green urates in loose faeces, regurgitation and vomiting. Radiographs normal, friable gizzard on endoscopy. Due to long term hospitalisation (44 days), non-response to treatment and old age, euthanasia was elected (10/09/2021).	Gross post mortem performed at DWH. Poor BSC. Multiple circular pale foci in liver parenchyma, not uniform in size and not raised. Cranial right kidney lobe shrunken and firm. Empty PV/V.	16/09/2021	Liver: there are multiple, randomly scattered and variably-sized areas in which groups of hepatocytes contain one or several large fairly discrete, clear intracytoplasmic vacuoles (with eccentric nuclei) or have foamy cytoplasm, with central nuclei and with or without cytoplasmic swelling. Bearing in mind the pentobarbitone-induced artifact, sections of lung, heart, spleen, kidney, intestine and pancreas show no obvious abnormalities.		Euthanasia Unknown cause of clinical signs	The only major abnormalities noted on histology was the presence of macrovesicular and microvesicular steatosis within the liver. This was not associated with any necrosis, acute or chronic inflammation or the presence of scar tissue. It's hard to be sure what the cause is but it does appear reasonably acute so is unlikely to be the cause of the initial presenting signs. It could be the result of on-going bouts of anorexia +/- in combination with medications. Sections of lung and kidney showed only pentobarbitone-induced artifact- there was no indication of obvious damage including inflammation or scarring.

Official Information Act
Released under the