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9th August 2024

Avian Behaviour and Welfare Assessment for Charlie Kākā held at Dunedin Botanic Gardens

General Information

Species	South Island Kākā *(Nestor meridionalis)*						
Name	Charlie	**Life stage**	Adult	**Age**	24+	**Sex**	Female
Hospital ID	2011155	**Band**	L49336 (right leg)				

History and Health Check

Charlie was moved to Dunedin on 7th June 2024 after approval of a final flocking plan for captive SI kākā made by DOC. Charlie was was first admitted to Dunedin Wildlife Hospital (DWH) for a health check and disease screening prior to being transferred to Dunedin Botanic Gardens (DBG) on 19th June to be integrated into the kākā flock in preparation for the upcoming breeding season.

While in hospital Charlie had a full health check which included a physical exam, blood tests including white cell count, full avian biochemistry panel, fibrinogen to assess inflammation (related to arthritis), PCR tests to rule out infectious disease i.e. Psittacine beak and feather disease (PBFD), avian chlamydia (Psittacosis) and faecal tests for internal parasites as well as presence of enteric bacteria such as Salmonella and Campylobacter. During her time in hospital Charlie was observed displaying some unusual swaying behaviour. Due to concerns this might be a stereotypie and a long term behavioural issue, DOC in Te Anau was contacted and video footage of the behaviour provided. They confirmed via email that this behaviour was indeed pre-existing and had been observed in Charlie while she was housed in the aviaries in Te Anau. It is a long-standing pre-existing issue that was triggered in early 2000's after she was kept in inadequate conditions after being hit by a car. She was moved to the Te Anau Bird Sanctuary a few years after her injuries but had already developed stereotypical behaviour described as swinging/swaying and excessive toe biting.

Once all the diagnostic results from Charlie were back and negative for infectious disease, and she was given a clean bill of health, she was transferred to DBG to start the process of settling her in and getting her used to her new home. The pre-existing stereotypical swinging/swaying behaviour was noted within an hour of her arrival at DBG and conversations regarding this were initiated immediately between DBG, DOC captive coordinators and DWH.

NOTE: no records were provided with Charlie in spite of this being a required minimum standard in any animal transfer, so apart from some medical records from 2023 and records we had on our data base from 2020, no detailed enrichment, nutrition, husbandry and extremely importantly behavioural or training records were forthcoming with this transfer between facilities which has made quantitative assessments of this bird, in particular with regards her pre-existing stereotypical behaviours, extremely challenging. At the end of July 2024 2 years worth of hand written diaries were finally provided but unfortunately the details are scant, there is no reference in any details to the training that was happening, there are scant daily behavioural observations and often times nothing is recorded. The standard of the record keeping from Te Anau is unfortunately extremely poor and not consistent with what is expected as outlined in the Kākā Captive Husbandry Manual.

Behaviour and Welfare Assessment

This assessment of Charlie's behaviour and welfare is part of DBG, DOC and DWH's commitment to ensuring a high standard of welfare in the DBG collection, in particular in individuals that arrive with pre-existing behavioural issues, as is the case with Charlie. The intention of this report is for a formal check in to assess how Charlie has settled since being moved from Te Anau to DBG. It is particularly imperative as we have no or extremely scant, subjective records (diaries, emails, personal comms) that describe her behaviour the last 24 years, there is nothing objective for us to work with.

I have assessed Charlie a number of times over the past few weeks since she arrived in Dunedin, and I will include my findings from all of these assessments as an appendix attachment. This document will focus on my observations I performed on **9/8/24**.

Distance Examination

My observations of Charlie started at 11:15am and concluded at 1:13pm.

11:15am – 12:35pm
Charlie was sitting on a perch at the front of the aviary. There was an area of leafy coverage providing by some browse however generally the spot she had chosen was in the sun and she was able to observe a wide range of activity around the gardens. She paid me little attention apart from looking in my direction when I stood outside her aviary. During this entire period of observation Charlie appeared relaxed with feathers slightly ruffled, a common indicator of contentment in parrots. She occasionally nibbled her toe but there was no aggression or franticness observed in this behaviour. Just after 12:00pm she moved away from this perch to a slightly higher, sunnier spot and she continued to sit in a relaxed posture and observe her surroundings.

12:35pm – 12:40pm
Something caught her attention (unsure what) and she perked up, feathers held sleekly against her body and she proceeded to move along the perch to the mesh. She swung briefly on the mesh for 5 seconds before returning to the perch. She then returned to the mesh, swung for another 5 seconds and then used the mesh to head to the bottom of the

aviary which is out of sight. On the ground she has the opportunity to engage with logs for chewing, fresh browse as well as food and water.

12:45pm – 13:13pm
Charlie only remained on the ground for around 5 minutes before she headed back up to the high perch in at the front of the aviary. Once back up she climbed up the mesh a small way and started swinging for around 20 seconds. At this stage the sprinkler system was activated (12:45pm) as a form of enrichment to distract her from this behaviour. This worked and she stopped swinging and paid more attention to the water. I watched her until 13:13pm and she did not show any further stereotypical behaviour.

Note: We have a personal communication from one of the keepers in Te Anau that one of Charlie's favourite enrichment options was to play in the rain and/or sprinklers.

At no point during my observation of Charlie during this time did I note any behaviour that would indicate that she was distressed. I have used my training as an avian veterinarian, experience working with captive psittacines for over 24 years as well as information provided by the Association of Avian Veterinarians (AAV). The below excerpt is a brief summary from AAV.

Reading Bird Body Language

Fear or Stress Postures
- The bird pulls itself up into a stiff, Skinny posture
- The feathers are held flat against the body
- Quivering wings are held slightly away from the body in a preflight position.
- The head is held high and forward (some birds may jerk the head back and forth).

Relaxed or Comfortable Postures
- The plumage appears a little soft.
- Beak grinding
- The body is flattened out in a horizontal position
- Tail wagging or shaking of tail feathers
- In cockatoos and cockatiels, the facial feathers may be fanned over the beak
- "Tongue wiggling" is also commonly observed in cockatoos and cockatiels.

Begging Postures
- Staring intently at someone or something
- The plumage is usually fluffed, not stiff or tight
- The body is flattened out in a horizontal, crouched position
- Quivering wings are held out at the shoulder
- The neck is often shortened with the head held up

Stereotypic behaviour

In the appendix I have included the section on stereotypies from "Manual of Parrot Behaviour" to help generate a more thorough understanding of this behavioural issue. In my

assessment of Charlie I have taken this information in to account when providing my opinion on her behaviour and welfare.

It is still my opinion that the swinging behaviour is stereotypical and that it was caused by being housed in a suboptimal when she was first rescued after being hit by a car. Kākā are intelligent beings so mental and sensory stimulation are essential when caring for them in captivity and unfortunately this was not provided for Charlie. There is a relationship between stereotypies and restriction of foraging behaviour, locomotion or social content.

While the stereotypies performed by parrots take many forms, they can, for the most part, be classified into three main categories: oral stereotypies, locomotor stereotypies, and object-directed stereotypies. There have been few studies of stereotypy in parrots, but those that have been completed implicate both lack of foraging opportunity and limited physical complexity in the cage environment in the development of these behaviours. When parrots are housed in cages that lack foraging opportunity and physical complexity, stereotypy reliably develops.

Based on the swinging behaviour observed in Charlie and possibly also the toe nibbling I would err on saying that frustration from lack of space for movement (locomotion) as well as social contact with other kākā were the likely drivers behind development of these behaviours in Charlie.

Having said this, stereotypy is not simply a behavioural response to an inappropriate environment but rather the product of an abnormal developmental process resulting in both physiological and behavioural impairment.

It is likely that Charlie was a juvenile when she was hit by the car and as such has not had the benefit of normal behavioural development with other kākā. Unfortunately, lack of adequate record keeping means this is just an assumption. It is well documented that stereotypies change over time in both form and frequency however, again, lack of adequate record keeping makes this difficult to quantify in Charlie.

Lastly one of the most important aspects to consider is that stereotypies become increasingly difficult to reverse over time and eventually may become established in the behavioural repertoire of animals such that they remain unchanged even when the environment is modified.

Animal Welfare

This below is an excerpt from the ***Zoo Code of Welfare.*** My comments/opinions with regards to Charlie in the context of this document are italicized:

Possible indicators of distress in animals include:

1. evidence of physical ill-health

Charlie underwent a thorough health check by avian veterinarians at DWH and was found to be in good health. This concurs with findings from the veterinarian in Te Anau who also reported she was in good health.

2. need for the use of drugs to maintain the system of husbandry

Charlie is not on any behavioural altering medication. She is only on anti-inflammatory medication for discomfort associated with arthritis.

3. behavioural changes:
    a. performance of abnormal behaviours that are not normally in the animals' repertoire, and which appear to be of little benefit to the animal, e.g. running at bars, pacing

The swaying, while a stereotypical behaviour, does appear to now be a part of Charlie's normal repertoire. This is evidence by the fact that this is a known and chronic ongoing issue that has been observed for many years.

    b. stereotypies i.e. the performance of repeated behaviour fixed in all details and apparently purposeless (e.g. crib-biting, wind-sucking, weaving, head twisting, or pacing)

The swaying is a stereotypical behaviour however it was not initiated at DBG, it is a complex and pre-existing behaviour that is now likely habitual and part of Charlie's normal repertoire.

    c. substantial increase in inter- or intra-specific aggression compared to natural, wild or feral states

Not observed in Charlie. She appears generally very relaxed in the company of other kākā.

    d. substantial increases in behaviour related to frustration or conflict (e.g. often behaviour relating to locomotion and/or excessive scratching or self-mutilation)

*Hard to quantify whether the behaviour has increased due to lack of records accompanying Charlie when she moved to Dunedin. I suspect that the behaviour has increased but this is not unexpected as moving to a new environment can and is likely stressful. Charlie has only been housed at DBG for just over **4 weeks** at the time of writing this report. Time is required to allow her to settle adequately into her new environment and to bond with her new keepers. I am satisfied that she is not experiencing undue distress at this time.*

    e. substantial deviations from normal patterns of developmental or age-related behaviour

Not currently relevant. This was relevant around 24 years ago when she was housed inappropriately.

f. sudden changes in an animal's normal behaviour.

Not noted in Charlie. While she has been observed displaying the swaying behaviour this is certainly not a sudden change in her normal behaviour as this is already noted as a pre-existing chronic condition that she displayed in Te Anau. The swaying is seemingly now part of her normal repertoire as I have already indicated above.

4. a restriction on behaviour – i.e. the inability to perform all the behaviour in the animals' natural repertoire

Not noted in Charlie. She has been provided with adequate perches, foraging opportunities, social connection and other enrichment as per the requirements of the kākā husbandry manual.

5. reduction or disappearance of reproductive behaviour e.g. absence of courtship and mating, egg abandonment, infanticide.

Not noted at this stage in Charlie however the upcoming breeding season will give us some more information on this. There is a chance that she won't display any breeding behaviour this year due to the move. We are all hopeful that she was moved in time to give her ample time to adjust before hormones kick in for breeding however only time will tell if she was moved in time to allow her to settle and prepare for the breeding season.

In my assessment I have also taken into consideration the following aspects of the MPI Zoo code of Welfare 2018 when observing Charlie kākā. As an accredited member of the Zoo and Aquarium Association (ZAA), the DBG are required to follow this code.

Part 2.1: The Zoo Operator

"The operator is responsible for the welfare of the animals and ensuring the orderly and proper operation of the exhibited animal collection and for compliance with the minimum standards of this Code. Whilst these duties may not necessarily be performed directly by the operator (keepers having responsibility for the day-to-day care of animals in their charge), it is incumbent upon the operator to ensure that staff are adequately trained and performing their duties in this regard."

Dunedin City Council (DCC) is the operator. [redacted]

In my opinion the minimum standard has been met and points a and b, under the recommended best practice, have been met.

Part 2.2: Inspections

"The frequency and level of inspection by animal keepers should be related to the needs of the species although a minimum daily inspection is required."

Every single bird at DBG is inspected on a daily basis and any concerns are immediately noted and veterinarians are contacted promptly if medical intervention is required.

In my opinion the minimum standard has been met and the recommended best practice has been met.

Part 2.3: Acquisition and Disposal of Animals

"In taking in or breeding additional animals operators are making a commitment to those animals for their future management. When zoo animals are being transferred to other zoos within New Zealand all welfare provisions of this Code apply."

Every acquisition and disposition is very thoughtfully considered. With particular reference to Charlie kākā there is over a year of discussion around the proposed move from Te Anau to DBG. The implications of moving her from a long-term familiar environment was considered as well as how to manage her should she not adapt well to the move. Charlie's welfare was at the forefront of all decision making.

In my opinion the minimum standard has been met and the recommended best practice has been met.

Part 2.4: Staffing and Staff Training

"The care of zoo animals requires both experience and the observance of high standards. Staff should be familiar with the following:
• animal husbandry and care
• animal handling, restraint and transport
• biology of species under their care
• the normal range of behaviours of the animals with particular emphasis on seasonal and/or day-to-day variations in both individuals and groups
• an understanding of the changes in behaviour associated with ill-health
• indicators of disease, injury or distress
• an understanding of animal welfare generally
• methods to minimise distress experienced by animals
• methods for integrating animals into social groups
• methods of habituating animals to humans before exhibiting them
• the provision of adequate diets for the respective zoo animals"

In my ongoing work with DBG I am satisfied that 9(2)(g)(ii) have demonstrated they have an understanding of and are familiar with all the above.

In my opinion the minimum standard has been met and the recommended best practice has been met.

Part 2.6: Management of Animal Reproduction

"To ensure the future of an animal population, or to avoid the problems of surplus animals for which there is no satisfactory future, the operator is responsible for ensuring that animals in their collection breed on a planned basis."

The kākā breeding plan is developed by the Captive Coordinators at the Department of Conservation (DOC) and this plan is implemented by facilities that hold permits, issued by DOC, to care for kākā as is the case with DBG.

In my opinion the minimum standard has been met and the recommended best practice has been met.

Part 3: Food and Water

"Animals should receive a daily diet in adequate quantities and containing adequate nutrients to meet their requirements for good health and welfare."

I am satisfied that 9(2)(g)(ii) is well versed in the dietary requirements for all the species under 9(2)(g)(ii) care. With specific reference to Charlie kākā, the diet she is offered is the same diet fed to all the kākā at DBG which has been assessed by vets at DWH. However, ideally a diet sheet/record would have accompanied Charlie on her transition from Te Anau to DBG so that a diet transition could be implemented especially in light of anecdotal reports from keepers in Te Anau that state that Charlie can be a fussy eater. Charlie has seemingly adjusted well to the new diet and her weight is now maintaining/increasing after a slight expected decrease soon after her arrival at DBG.

In my opinion the minimum standard has been met and the recommended best practice has been met.

Part 4.1: Physical and Social Environments

"Animals in zoos need to be held and exhibited in an environment in keeping with their physical, health and behavioural needs, and as far as possible in keeping with their natural or ecological habitats."

The staff at DBG ensure the aviaries birds are housed in are spacious enough for the species being house, they have adequate perching and natural browse, the spaces are large enough for flight, there are water misters provided for the birds to bathe and they are provided fresh vegetation regularly. There is adequate provision of shelter from the elements as well as off display areas for birds to retreat. The aviary that Charlie is currently housed in has heating in the off-display area which is essential for a bird with arthritis. The kākā husbandry manual requirements are followed with regards the habitat that Charlie is housed in.

In my opinion the minimum standard has been met and the recommended best practice has been met.

Part 4.2: Facilities, Equipment and Maintenance

"Animals have to be protected through the provision of animal handling facilities appropriate to the species being handled. These facilities should be effective and well maintained."

While the aviaries at DBG are aging, they are well maintained and I am satisfied that every care has been taken to minimise/prevent harm or injury to the animals.

In my opinion the minimum standard has been met and the recommended best practice has been met.

Part 4.3: Housing and Controlled Environments

"Under prevailing conditions in New Zealand, many animals, e.g. non-indigenous reptiles and amphibians, some species of penguins, etc., may require a controlled environment or access to a larger controlled climate space, heat pads, basking lamps, or artificial ventilation etc."

As already mentioned, water misters are provided to ensure bathing and cooling of the birds during hot weather as well as sheltered areas that are heated in winter.

In my opinion the minimum standard has been met and the recommended best practice has been met.

Part 5.1: Opportunity to Display Normal Patterns of Behaviour

"Animals in zoos may have their behaviour restricted by their environment and/or their management. In such circumstances, provision for the animals to remain physically active and psychologically stimulated is crucial to their health and well-being."

I am satisfied that the staff at DBG provide a species appropriate enrichment programme for the birds in their care. This is done by altering the environment for e.g. the provision of play boards, logs for chewing, provision of fresh vegetation on a regular basis, attention to perch placement to encourage flying etc. Providing a stimulating social environment such as contact with animals of the same species, other species as well as humans. Provision of training e.g. T-perch training to facilitate weighing without the need to catch the bird. As far as training it is important to note that trust between keeper and bird needs to be established and this can take time. In the case of Charlie 9(2)(g)(ii) is still slowly working on building trust but is making good progress with encouraging Charlie to interact with the T-perch on the scale as well as take treats with medication from her hand. Parrots are creatures of habit so this will take time but with patience and consistency will hopefully be successful. Other social enrichment includes allowing the animals to engage in play with aviary mates and social interactions including breeding and raising young. For parrots in

particular, another important form of enrichment to stimulate them is to alter the method of feeding so that the birds have to manipulate objects and/or work in order to obtain the food. This along with provision of vegetation for browsing for food is all done at DBG.

In my opinion the minimum standard has been met and the recommended best practice has been met.

Part 5.2: Provision of Protection from Fear and Distress

"Some species in zoos are more prone than others to having their behaviour restricted by confinement."

Parrots are very intelligent beings and at risk of developing stereotypical behaviour if not cared for appropriately. I have discussed this particular aspect in more detail earlier in this document.

In my opinion the minimum standard has been met and the recommended best practice has been met.

Part 6: Animal Health and Disease

"The importance of competent animal handling cannot be over-emphasised. A skilled animal keeper needs to understand the full range of normal behaviour so that abnormal behaviour and signs of illness, injury, distress and nutritional disorders can be recognised and prompt, appropriate, remedial action taken."

[redacted]. Any bird that is sick or injured receives prompt veterinary advice by DWH vets or they are admitted for treatment as/if required at DWH. With regards to Charlie I particular, regular updates and behavioural assessments are performed to monitor how she is settling in.

In my opinion the minimum standard has been met and the recommended best practice has been met.

Behavioural, Welfare and Husbandry Conclusions for Charlie Kākā

Stereotypical behaviours are extremely difficult to manage and often you cannot eliminate them even in the absence of the initiating stressor. This is because the behaviour becomes a habitual behaviour which is included in the normal repertoire of the animal.

Stereotypical behaviours, especially those that are pre-existing, can be extremely difficult to use as a measure of the current welfare state of an animal because of this.

For Charlie this behaviour is chronic and developed when she was reportedly rescued from the road and subsequently housed in inappropriate conditions prior to being transferred to Te Anau Bird Sanctuary. To eliminate or even reduce 24 years of a behaviour that has now become habitual is going to be next to impossible.

Having observed Charlie a number of times since she arrived in Dunedin, and in consultation with 9(2)(g)(ii) , we have yet to determine whether there is a trigger for this swinging behaviour. As already alluded to, the record keeping prior to moving her has been scant and records that have been provided in diary format are inadequate. There is no relevant information regarding the stereotypical behaviours recorded in these books. There is also no information around enrichment programmes and preferred enrichment apart from an email from one of the keepers indicating that Charlie enjoys water sprinklers. As such, forming a robust quantitative assessment of Charlie is extremely difficult.

Based on my observations I suspect that the swinging behaviour is triggered by periods of high activity such as morning flock-call. This is the period of the day when parrots ramp up activity as they are waking up and calling to con-specifics to ensure everyone is accounted for. They also know the routine of the keepers caring for them and this is the busiest period of feed out, cleaning, and general husbandry provision for the collection. This is an exciting time with increased activity so it makes sense that the swinging behaviour, which is most likely now habitual, part of the normal repertoire and not induced by stress, is increased during this time period. This fits with the observations we have both made thus far with regards documenting frequency of the behaviour. Potentially, the fact that we cannot pinpoint a trigger is suggestive that there isn't one which would fit with this behaviour being part of her normal repertoire.

As far as general husbandry, in particular dietary information, again nothing robust has been recorded in the diaries despite some subjective communications indicting that Charlie can be a fussy eater. There is reference to some "special pellets" that are formulated on site by keepers however no nutritional information regarding these is provided e.g. are they compete and balanced and formulated to meet the required nutritional needs of a kākā? Did an avian veterinarian/nutritionist formulate these pellets using animal nutrition software for e.g. zootrition?

Regular weigh-ins have indicated that Charlie is eating the food that is offered at DBG as her weight is slowly trending upwards after a small period of weight loss in the first week spent at the DBG aviaries. While stable/increasing weight is a good sign and indicates no serious

health issues, it is not being used as the sole indicator that all is well with Charlie, it is just a small part of the overall assessment.

It is well known that provision of enrichment is essential to reducing stererotypical behaviours and this is something that is being used to distract Charlie from swinging. As mentioned earlier, water sprinklers are a preferred enrichment item and I have observed first-hand how this has distracted Charlie from swinging. Other forms of kākā appropriate enrichment are also regularly provided including chew logs, fresh browse, and opportunities to forage for food. Unfortunately, due to poor records, it is still a process of elimination to determine which of these is preferred by Charlie.

Very importantly, Charlie is now housed with another kākā permanently as well as having pairs in adjacent aviaries she can interact with. She has also been given the opportunity to choose her preferred aviary and it seems she has settled on the 3rd aviary in the row. She was originally placed in the 4th aviary at the end of the bank. She seems to prefer this third aviary, possibly as it is between two aviaries so provides an added level of security. This is obviously difficult to quantify however my overall impression is that she seems very settled in this space.

The kākā husbandry manual states that kākā should be housed in pairs if breeding or in groups of at least 4-5 birds in order to meet the social needs of the species. The universities federation for animal welfare (UFAW) have found that "parrots in full or partial contact with another bird, those in larger cages, and those with a wider captive diet were significantly less likely to exhibit whole body stereotypic behaviour. They question the ethicality of housing parrots singly, as is common practice with pets and in laboratories."

Overall, Charlie is an extremely complex case in particular with regards to her pre-existing stereotypical behaviour.

In my observations I have not seen any behaviour from Charlie that suggests she is in distress which is triggering the swinging. Since arriving at DBG the frequency of the swinging does appear to be reducing and often I have noted Charlie to be sitting on a perch in the sun with a relaxed posture. A follow-up behavioural assessment will be performed in late October as there are anecdotal reports that once Charlie's hormones for breeding season are triggered, the stereotypical behaviour disappears.

In conclusion, as mentioned previously, pre-existing chronic stereotypical behaviours are extremely difficult to use as a measure of the welfare state of an animal. What is important is that all other welfare needs are met to ensure there are no stressors that contribute to the behaviour to make it worsen. It is my professional opinion that DBG is currently meeting all of Charlie's welfare needs and that currently Charlie is not displaying any signs that indicate she is distressed.

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Dunedin Wildlife Hospital

Appendix: Stereotypical Behaviour from "Manual of Parrot Behaviour"

"Stereotypies are defined as behaviour patterns that are repetitive, invariant, and have no obvious goal or function. While the precise etiology of these behaviours is not yet understood, it has been suggested that stereotypies develop in animals housed in environments that are suboptimal in one or more dimensions. For example, in many species, stereotypic behaviours are significantly more evident in environments that do not provide sufficient sensory stimulation (Mason 1991), opportunity to interact with objects or conspecifics (Carlstead 1998), or that leave the animal with little control over its surroundings (Markowitz & Aday 1998).

Stereotypy development may be related to the frustration of specific motivational systems. For example, a number of experiments demonstrate a relationship between stereotypies and restriction of feeding or foraging behaviours, locomotion, or social contact. Feed restriction is closely associated with stereotypy performance in pigs (Ter- louw et al. 1991), chickens (Savory et al. 1992), and sheep (Mardsen & Wood-Gush 1986). However, feeding-related stereotypies can occur even when food intake is not restricted. In these cases, it is thought that motivation to perform foraging behaviours underlies stereotypy performance. This idea is supported by evidence that, in both mammals and birds, stereotypy performance is reduced when opportunities to work in order to locate, access and consume food items are provided (e.g., Keiper 1969; Kastelstein & Wiepkema 1989; Line et al. 1989; Carlstead et al. 1991).

Some stereotypies are thought to develop from frustrated locomotor behavior. Hediger (1955) suggested that the stereotyped pacing common to zoo animals might develop from normal patrolling behaviours that are thwarted due to limited space. Increasing the complexity of the cage environment and providing opportunity for additional perching and swinging behaviours reduced stereotypic route tracing in Canaries (Keiper 1969), suggesting that this behavior might be related to frustrated locomotor behaviours.

Finally, motivation for social contact may underlie some forms of stereotypy. For example, frustrated motivation for maternal contact is thought to be associated with some primate stereotypies such as rocking and self-clasping (Marriner & Drickamer 1994), and providing horses with either a mirror or social contact reduces stereotypic weaving behaviours (Nicol 1999).

Thus, there is ample evidence that the frustration of highly motivated behaviours is involved in the development and performance of some forms of stereotypy. However, developmental evidence suggests that stereotypy is not simply a behavioural response to an inappropriate environment but rather the product of an abnormal developmental process resulting in both physiological and behavioral impairment. For example, stereotypies change over time in both form (Meyer-Holzapfel 1968; Cronin et al. 1984; Mason 1993) and frequency (e.g., Mason 1993; Würbel et al. 1998; Powell et al. 2000). In addition, stereotypies may become more difficult to reverse over time (Kiley-Worthington 1977; Cronin et al. 1984; Cooper et al. 1996) and eventually may become established in the behavioural repertoire of animals such that they remain unchanged even when the environment is modified. Thus, the fact that the nature and form of stereotypy change with

time, even when the captive environment remains constant, indicates that stereotypy is the result of environmentally induced qualitative changes in the animal (Garner 1999; Würbel 2001).

Similar behaviours are also extremely common in a number of human mental disorders. Stereotypies are performed by approximately 70% of chronic schizophrenic patients (Owens et al. 1982) and are core symptoms of both Tourette's syndrome and autism (American Psychiatric As- sociation 1994). Recent evidence suggests that, like in human patients, stereotypy in caged animals reflects a general disinhibition of behavioural control mechanisms (Garner & Mason 2002; Garner et. al. 2003). Thus, it is possible that stereotypies seen in captive animals are the result of environmentally induced neurological deficits similar to those seen in human psychiatric disorders.

The frequency of stereotypy in the captive parrot population at large has not been estimated. Many parrot owners are not aware of this class of abnormal behavior since stereotypies are often difficult to recognize without prior experience and training. In addition, parrots may only perform stereotypies when they are alone (which is why videotaping is necessary for stereotypy re-earch), and thus owners may never witness their parrots performing stereotypies. While the stereotypies performed by parrots take many forms, they can, for the most part, be classified into three main categories: oral stereotypies, locomotor stereotypies, and object-directed stereotypies.

Oral stereotypies include such behaviours as spot pecking, sham chewing, bar biting, or tongue rolling. Locomotor stereotypies include route tracing and pacing. Object-directed stereotypies involve repetitive, invariant manipulation of objects such as toys, feeders, and waterers.

There have been few studies of stereotypy in parrots, but those that have been completed implicate both lack of foraging opportunity and limited physical complexity in the cage environment in the development of these behaviours. When parrots are housed in cages that lack foraging opportunity and physical complexity, stereotypy reliably develops. For example, 96% of parrots in a colony housed in these conditions performed stereotypy, and individuals spent between 5% and 85% of their active time performing these behaviours (Meehan 2002).

Enriching the environment with foraging devices and increasing the physical complexity of cages significantly decreased the development of stereotypy in young Orange-winged Amazon Parrots (Meehan et al., submitted). Parrots in the control condition spent significantly more of their active time performing stereotypies than did parrots in the enriched condition. However, the degree of environmental modification used in this study was not sufficient to completely prevent the development of stereotypic behavior. At the end of 48 weeks the parrots in the enriched condition performed stereotypies an average of 4% of their active time. This is a common outcome of studies examining the role of specific environmental factors in stereotypy development (e.g., Odberg 1987; Würbel et al. 1998; Powell et al. 2000). For example, increasing the physical complexity of cages with twigs prevents most, but not all, stereotypy development in young voles (Odberg 1987). Similarly, the combination of feeding sunflower seeds and increasing physical complexity has a

significant effect on the amount of time deer mice spend performing stereotypy but does not eliminate the development of these behaviours altogether (Powell et al. 2000). These results indicate that additional research is necessary to determine the specific environmental qualities needed to completely eliminate stereotypy from the behavioral repertoire of parrots.

Parrots in the control condition developed both locomotor and oral stereotypies, while those in the enriched condition developed almost exclusively locomotor stereotypies. This suggests that specific forms of stereotypy may be associated with the absence of specific environmental elements (Mason & Mendl 1997). In this case, if oral stereotypies were associated with frustration of foraging behaviours, then the foraging enrichments may have successfully eliminated this frustration. If the development of locomotor stereotypies was associated with limited space, prevention of flight, or lack of social contact, then this would explain why these behaviours were not prevented by the physical enrichments we provided. There is evidence in Canaries that the development of oral stereotypies is related to lack of opportunity to perform foraging behaviours, while the development of locomotor stereotypies is related to a lack of space and physical complexity (Keiper 1969). Thus, additional experiments assessing the effectiveness of increased flight space and social housing are needed to determine appropriate environ- mental remedies for locomotor stereotypy."

Appendix: Charlie's Behavioural observations since arrival in Dunedin

20/7/24

Visit to DBG at 12:30pm.

S/O: Charlie was observed from afar 9(2)(g)(ii) for a period of around 45 minutes. During this time she was engaged with other kākā in the adjacent aviary, including her ex-mate Bling. She did intermittently display swinging behaviour from the side of the aviary and/or the roof but these bursts lasted no longer than 1 minute at a time on average and then she would return to the perch and/or the ground of the aviary where we then couldn't observe what she was doing.

We then proceeded to observe her from the front of the aviary where she seemed interested in us but didn't come down from the high perch. We observed her for around 15 minutes and again the swinging displays were short and intermittent.

We then moved to the service area and entered the aviary. In the scant email communications 9(2)(g)(ii) has received thus far from her keepers in Te Anau there is mention that she doesn't like it when keepers etc. enter her aviary. While Charlie didn't seem unduly distressed by our presence we kept a respectful distance and just stayed at the back of the aviary so we didn't unnecessarily stress her. Charlie remained high at the front and continued to remain engaged with the activity of Bling and other kākā in the adjacent aviaries. She also showed a lot of interest in children, a behaviour that has been noted by her keepers in Te Anau. We remained in the aviary for less than 10 minutes as we didn't

want to cause unnecessary distress to Charlie. In this time she again displayed intermittent bouts of swinging but most of the time was spent on the perch chewing the bark or wandering down the aviary mesh to the trees at the front to chew on the leaves.

We did a final observation from the front of the aviary, this was around 1:45pm or thereabouts. Charlie spent lot of time relaxing on the perch and just observing the visitors to the gardens. She did do some short bursts of swinging behaviour in response to children but for the most part she was relaxed and just sitting on her perch or climbing to the aviary floor to investigate.

A/Conclusions:

Charlie has been residing in this aviary for 4 weeks so there is understandably going to be an adaptation period. The swinging behaviour is definitely stereotypical but as yet we are struggling to determine a consistent trigger and it is possible it is just now habitual and not triggered by any specific stressor. In some instances she will perform this behaviour in response to noisy children but not all the time. This is a pre-existing stererotypie that has been observed in Te Anau however it is difficult to determine extent/frequency/severity and how it compares to what she is doing now as we have still not received any of the health, nutrition, husbandry and behaviour records from Te Anau keepers. This info would provide useful information for us to more closely monitor and make an assessment of how Charlie is progressing with settling in.

Overall, while it is not ideal that she is displaying this stereotypical behaviour, it is pre-existing so not a new behaviour, and she does need time to adjust to her new surrounding. As only 4 weeks have gone by it is too soon to make any conclusions about how she is settling especially without the benefit of the records from Te Anau for comparison.

Recommendation: Obtain records from Te Anau ASAP.

P: [redacted] will continue 3x a day behavioural obs and let us know if [redacted] has any concerns. [redacted] will look at doing a behavioural assessment, similar to what was done for Jimmy kākā, within the next 4-6 weeks, sooner if necessary.

23/7/24

[redacted] observed Charlie alongside the MPI welfare inspector on 23 July. Visit initiated at 10:30am.

Initially we kept our distance so I could point out the 4 aviaries that housed some of the breeding kākā as well as observe Charlie from a distance. From a distance we could see she was displaying the swaying behaviour which is the behaviour DWH/DOC/DBG have flagged as consistent with stereotypical behaviour. We observed her from a distance for around 15-30 minutes and during this time she also displayed normal behaviour which involved moving between perches, accessing the floor of the aviary, during which time she was out of sight but was likely eating and/or engaging with her enrichment items. She did reappear and intermittently display the swinging behaviour.

Our observations of Charlie from the front of the aviary were similar in that we noted the swinging/stereorypical behaviour in conjunction with a range of normal behaviours we'd expect a kākā to display. These included investigating perches, preening, interacting with adjacent birds, observing her surrounds, eating and likely interacting with the foraging/enrichment logs at the bottom of the aviary (out of sight due to the barriers on the front of the aviary).

We were then taken behind the scenes by 9(2)(g)(ii) , where we were invited to observe Charlie from inside the aviary. Due to reports from Te Anau keepers that people/keepers entering her aviary stresses her out we ensured we kept a respectful distance so as not to cause undue stress to Charlie. Charlie did not display any stereotypical behaviour while we observed her but she was quite suspicious of us and watched what we were doing with interest. She remained high in the aviary either on a perch or on the mesh wire. We kept this internal assessment short so as not to cause unneccesary stress to Charlie and the other kākā she is housed with.

We had the opportunity to observe Charlie once again from the front of the aviary and this second time she displayed the stererotypical behaviour with much less frequency and engaged in more normal behaviours including roosting on the perch, chewing, moving between perches, engaging with adjacent kākā, observing other activities around the gardens.

24/7/24

Visited aviary at around 11:00am to assess Charlie's weight and BCS with 9(2)(g)(ii)

S/O: Satisfactory weight (468g)which is slowly increasing after the initial decline when she first arrived. Body condition 4/9 - lean, slightly reduced pectoral mass but not surprising as she doesn't fly much. Quick PE while in the hand indicates no obvious concerns.

Released back in to aviary and she quickly returned to the top perch where she watched us suspiciously for a while. She then climbed onto the aviary mesh and did a brief spell of swinging behaviour for around 5-10 seconds after which she returned to the perch. We exited the aviary at this point so as not to cause any unnecessary stress and continue to observe her from the front to ensure no negative impact from being caught to weigh her.

She spent most of the time on the perches either waking along the mesh between them or flying short bursts between them. Incidentally it was great to see her flying as we have reports that she didn't fly much/at all when in Te Anau? We would need her full records from Te Anau to be able to properly quantify this however.

Ceasar showed some interest in engaging with Charlie however she remains quite aloof and not too interested in bonding with him. For the rest of the observations of around 45 minutes Charlie was relaxed, showed no stereotypical behaviour, sat on the perch with one of her legs tucked which is a sign of contentment, and she just watched what was going on around her. Occasionally she would move to a different perch if Caesar got too close to her.

I observed no aggressive behaviour between these two kākā, just disinterest from Charlie in spite of Caesar's attempts to engage with her.

Overall it was nice to see Charlie in a very relaxed manner with only a single short burst of swinging behaviour. There is a chance she was sulking because we had captured her to weigh her however her posture and demeanour the entire time was very relaxed.

1/8/24

Visit to DBG to drop a young kākā off for rehab.

Visit 11:30am.

Observed Charlie for a short while. Noted a mix of swinging behaviour in very short bursts (less than 45 seconds) but mostly she was on the perch preening and watching activity around her or out of site presumably on the ground interacting with the logs and other enrichment in the aviary.

4/8/24

Visited Aviary on a casual basis to have lunch so took the opportunity to observe Charlie and the other kākā in that aviary group.

Time 13:30 - 14:15

Bling and Ceasar? In the far aviary were flying around, investigating browse and enrichment, calling back when the TOS kākā were calling and were generally just behaving as I would expect.

Charlie was in the in the 3rd aviary, usually where Bling hangs out. She spent the entire time on a perch preening and roosting (right leg tucked up) and just watching what was going on around her. I saw no signs of distress and she displayed no stereotypical behaviour while I was there.