U.S. FISH AND WILDLIFE SERVICE
SPECIES ASSESSMENT
AND LISTING PRIORITY ASSIGNMENT FORM

SCIENTIFIC NAME: *Cyanoramphus malherbi*

COMMON NAME: Orange-fronted parakeet

HQ CONTACT: Elizabeth Maclin, Chief, Branch of Delisting and Foreign Species, 703–358–2464, elizabeth_maclin@fws.gov.

DATE INFORMATION CURRENT AS OF: July 2021

STATUS/ACTION

___Species petitioned for listing which we have determined is not a listable entity

___ Species petitioned for listing which we have determined does not warrant listing (does not meet the definition of a threatened or endangered species)

___Non-listed species for which we have not received a petition but for which we have undertaken a species status assessment on our own initiative and which we have determined does not warrant listing (does not meet the definition of a threatened or endangered species)

___Listed species petitioned for delisting which we have determined does not warrant delisting

___ Listed species petitioned for downlisting which we have determined does not warrant downlisting

___ Listed species petitioned for uplisting for which we have made a warranted-but-precluded finding for uplisting (this is part of the annual resubmitted-petition finding)

___ Listed species petitioned for uplisting which we have determined does not warrant uplisting

___ New candidate
_X_ Continuing candidate
Date when the species first became a candidate (as currently defined): May 21, 2004

___ Listing priority number change
Former LPN: ___
New LPN: ___

___ Candidate removal: Former LPN: ___
___ A – Taxon does not meet the Act's definition of "endangered species" or "threatened species" because it is more abundant or widespread than previously believed or

not subject to the degree of threats sufficient to warrant issuance of a proposed listing or continuance of candidate status.

___U – Taxon does not meet the Act's definition of "endangered species" or "threatened species" because it is not subject to the degree of threats sufficient to warrant issuance of a proposed listing or continuance of candidate status due, in part or totally, to conservation efforts that remove or reduce the threats to the species.

___ N – Taxon does not meet the Act's definition of "species."

___ M – Taxon mistakenly included in past notice of review.

___ X – Taxon believed to be extinct.

Petition Information:

___ Non-petitioned

_X_ Petitioned; Date petition received: November 28, 1980

90-day substantial finding FR publication date: May 12, 1981 (46 FR 26464)

12-month warranted but precluded finding FR publication date: May 21, 2004 (69 FR 29353)

FOR PETITIONED CANDIDATE SPECIES:

A. Is listing warranted? Yes
B. To date, has publication of a proposal to list been precluded by other higher priority listing actions? Yes
C. Why is listing precluded at this time? Higher-priority listing actions—including court-approved settlements, and court-ordered and statutory deadlines, for petition findings and listing determinations—continue to preclude the proposed and final listing rules for this species. We continue to monitor populations and, if necessary, will change the status of the species or implement an emergency listing. The "Progress on Revising the Lists" section of the current CNOR (https://endangered.fws.gov/) provides information on listing actions taken during the last 12 months.

PREVIOUS FEDERAL ACTIONS:

On November 28, 1980, we received a petition from the International Council for Bird Preservation to list 79 bird species, of which 60 were foreign species and 19 were occurring on U.S. territory, including orange-fronted parakeet (*Cyanoramorphus malherbi)*, as endangered or threatened species under the Act. On May 12, 1981, we published in the Federal Register (46 FR 26464) a 90-day finding in which we announced that the petition contained substantial information indicating that listing may be warranted for 77 of the 79 bird species, including the orange-fronted parakeet. This document constitutes our 12-month finding on the November 28, 1980, petition to list the orange-fronted parakeet under the Act.

[ANIMAL GROUP AND FAMILY/PLANT GROUP, ORDER AND FAMILY]: Birds, Parrots

(Aves: Psittacidae)

DISTINCT POPULATION SEGMENT (DPS)
N/A

BIOLOGICAL INFORMATION

To assess orange-fronted parakeet viability, we followed the species status assessment (SSA) framework and used the three conservation biology principles of resiliency, redundancy, and representation (Shaffer and Stein 2000, pp. 306–310). Briefly, resiliency supports the ability of the species to withstand environmental and demographic stochasticity (for example, wet or dry, warm or cold years, variation in demographic rates), redundancy supports the ability of the species to withstand catastrophic events (for example, droughts, large pollution events), and representation supports the ability of the species to adapt to both near-term and long-term changes in its physical and biological environment (for example, climate change, disease). A species with a high degree of resiliency, representation, and redundancy is better able to adapt to novel changes and to tolerate environmental stochasticity and catastrophes. In general, species viability will increase with increases in resiliency, redundancy, and representation (Smith et al. 2018, p. 306). Using these principles, we identified the species' ecological requirements for survival and reproduction at the individual, population, and species levels, and described the beneficial and risk factors influencing the species' viability.

The SSA process can be categorized into three sequential stages. During the first stage, we evaluated the species' needs. The next stage involved an assessment of the historical and current condition of the species' demographics and habitat characteristics, including an explanation of how the species arrived at its current condition (i.e., how threats and conservation actions have influenced the species). The final stage of the SSA involved assessing the species' plausible range of future responses to positive and negative environmental and anthropogenic influences. This process used the best available information to characterize viability as the ability of a species to sustain populations in the wild over time. We use this information to inform our regulatory decision.

Species Description

The orange-fronted parakeet is a bright-blue-green parrot, averaging 23 centimeters (cm; 9 inches (in)) in length, with yellow and orange coloring on its head above its bill with some blue wing feathers (BLI 2017, unpaginated). Its appearance is very similar to the yellow-crowned parakeet (*Cyanoramphus auriceps*), but the orange-fronted parakeet has a frontal orange band, a pale-yellow crown, and orange patches on either side of the rump (del Hoyo *et al.* 1997, p. 372). The birds can be distinguished in the field by the coloration of both the frontal band and the rump patch which are dark red in the yellow-crowned parakeet (Kearvell *et al*. 2014, entire; Higgins 1999, p. 499). Female orange-fronted parakeets are slightly smaller than males and have a proportionally smaller bill (BLI 2017, unpaginated). Young birds have paler green head coloration and the frontal band appears within 2 to 4 weeks (NZDOC 2017a, unpaginated).

Figure 1. Image of orange-fronted parakeet (ARKive 2017, unpaginated. Photo Credit Luis Ortiz-Catedral)

The orange-fronted parakeet (*Cyanoramphus malherbi*) is a bird in the parrot or Psittacidae family. It was treated as an individual species until it was proposed to be a color morph of the yellow-crowned parakeet (*C. auriceps*) in 1974 (Taylor 1998, pp. 49–63, citing several sources). Subsequently, it was reestablished as a full species based on mitochondrial sequence data (Kearvell and Steeves 2015, pp. 71–72 citing several sources; Kearvell *et al.* 2003, p. 34). Nuclear microsatellite genotype data, behavioral and ecological analyses, and direct investigations of the frequency of mating between the orange-fronted and yellow-crowned parakeets where they overlapped further support the designation of the orange-fronted parakeet as a full species (Kearvell *et al.* 2015, pp. 72–74 citing several sources). Given this new information, the Checklist Committee for the Ornithological Society of New Zealand now recognizes the orange-fronted parakeet as a full species (Gill 2010, p. 257). The International Union for the Conservation of Nature (IUCN), BirdLife International (BLI), and the Integrated Taxonomic Information System (ITIS) all recognize *C. malherbi* as a full species (BLI 2017, unpaginated; ITIS 2017, unpaginated; BLI 2016, unpaginated). We have reviewed the available information and conclude that the orange-fronted parakeet (*C. malherbi*) is a full species in a multispecies genus. The common name "orange-fronted parakeet" is used by BLI as the common name for *Aratinga canicularis*, which is native to Costa Rica. Because New Zealand continues to refer to this species as the orange-fronted parakeet, we will use this common name in this document. Other common names for this species include Malherbe's parakeet and the orange-fronted käkäriki, or käkäriki karaka.

Habitat/Life History

Orange-fronted parakeet populations on New Zealand's South Island inhabit subalpine mature beech forests (*Nothofagus* spp.), making their nests within natural cavities of these trees and relying heavily on beech seeds as a major component of their diet (Kearvell *et al.* 2002, pp. 140–145; Kearvell 2002, pp. 261–262). On the islands where it has been introduced, it is less selective in its nest sites and does not require native mature forested habitat to breed (Ortiz-Catedral *et al.* 2009, p. 437; Ortiz-Catedral and Brunton 2009, p. 153). Orange-fronted parakeets feed on a range of plant material including seeds, buds, sprouts, fruits, blossoms, leaves, ferns and grasses; they also eat invertebrates such as aphids and caterpillars (NZDOC 2017b, unpaginated). While the naturally-occurring (non-introduced) colonies rely on beech seeds as a major component of their diet, the species on the island colonies feed on a wide variety of plants, mostly eating fruits and leaves (Ortiz-Catedral and Brunton 2009, pp. 386–387).

Breeding on the mainland is linked with the irregular seeding of beech trees when parakeet numbers can increase substantially (BLI 2017, unpaginated). In mast years (years with high levels of seed production), many pairs will lay a second clutch, and some may lay a third clutch (BLI 2017, unpaginated). Breeding begins in summer (December/January) and may continue through the austral winter (BLI 2017, unpaginated; NZDOC 2017b, unpaginated). Females typically lay between 5 and 8 eggs per clutch; the largest clutch found contained 10 eggs (NZDOC 2017a, unpaginated). Incubation takes 21-26 days and chicks fledge when they are 40–50 days old (NZDOC 2017b, unpaginated). Birds on Maud Island formed pairs at about 7 years of age (Kearvell *in litt*. 2011 and 2012 as cited in BLI 2017, unpaginated). Lifespan in the wild is unknown, but maximum lifespan in captive animals was slightly over 12 years (Young *et al.* 2011, p. 34).

Historical and Current Range/Distribution

During the 19th century, the species was well distributed on the South Island of mainland New Zealand and a few offshore islands (Harrison 1970, pp. 117–120) including Stewart Island (NZDOC 2017b, unpaginated). Although a handful of historical reports indicate it may have also occurred on the North Island, the accuracy of these records has been questioned (Harrison 1970, pp. 116–117). While the species primarily resided in beech forest-covered valleys, historical records suggest that in the late 1800s, during mast years, the parakeets would experience an increase in their breeding rates and disperse onto the Canterbury Plains (NZDOC 2017a, unpaginated).

The species' range contracted when its population was severely reduced in the late 1800s and early 1900s, for reasons unknown (Harrison 1970, pp. 116–120). By the late 1900s, the orange-fronted parakeet was restricted to an extremely small area of the South Island where its habitat is fragmented (BLI 2017, unpaginated). From 1999 to 2000, the population severely declined further from around 500 to 700 birds to around 100 to 200 birds as a result of intense ship rat (*Rattus rattus*) predation during two successive summers (van Hal *in litt.* 2008, 2009, as cited in BLI 2017, unpaginated).

The orange-fronted parakeet is now considered the rarest parakeet in New Zealand and the three remaining naturally occurring colonies are restricted to a small area on the South Island (NZDOC 2017a, unpaginated). These natural populations are all within a 30-kilometer (18.6-mile) radius of one another in the beech forests of the upland valleys (BLI 2017, unpaginated NZDOC 2017a, unpaginated) of North Canterbury. These include two valleys located in Arthur's Pass National Park (Hawdon Valley and Poulter valley), and the South Branch of the Hurunui Valley located in Lake Sumner Forest Park (BLI 2017, unpaginated; NZDOC 2017a, unpaginated; Figure 2). Beginning in 2005, captive-bred orange-fronted parakeets have also been translocated to four predator-free islands: (1) Maud Island, (2) Blumine Island, and (3) Chalky Island on the South Island (Figure 2), and (4) Tuhua/Mayor Island on the North Island (BLI 2016, unpaginated; Figure 3). Breeding on every island has been confirmed (Farley 2014, p. 2; Ortiz-Catedral 2012, p. 149).

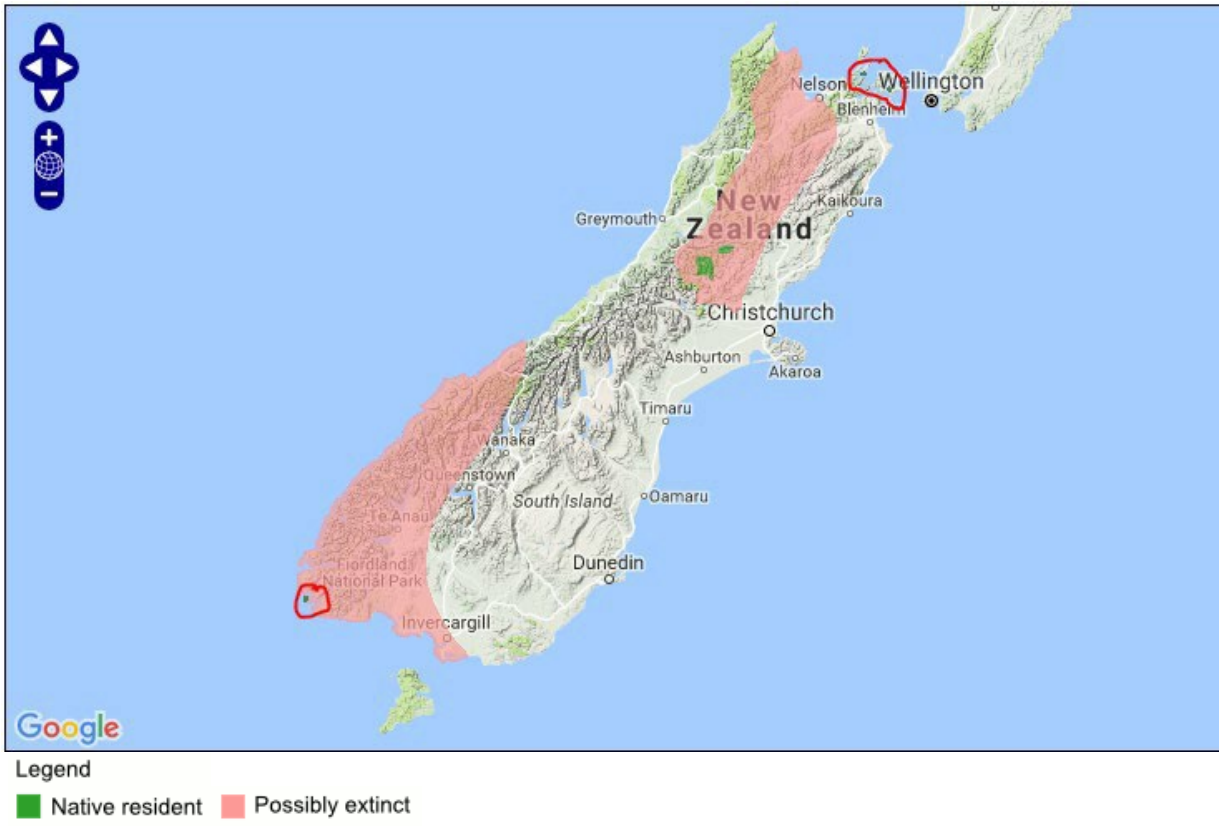

Figure 2. Current range of the orange-fronted parakeet on the South Island (BLI 2017, unpaginated). The native resident colonies are represented in green. Introduced colonies (on Maud Island and Blumine Island to the north, and Chalky Island to the south) are circled in red.

Figure 3. Current range of the orange-fronted parakeet on the North Island (BLI 2017, unpaginated). In 2009, the parakeet was introduced to the only occupied North Island site – Tuhua/Mayor Island (circled in red) (NZDOC 2011, unpaginated).

Population and Special Needs

The orange-fronted parakeet needs areas with trees that provide nesting and food resources. While the naturally occurring (non-introduced) colonies rely on beech seeds as a major component of their diet, the species on the island colonies (introduced) feed on a wide variety of plants, mostly eating fruits and leaves. Historically, the species primarily relied on beech forest-covered valleys, and during mast years, the parakeets would increase onto the Canterbury Plains. The range and population of the species has severely decline because of reduction of habitat that provides the species' needs.

NZDOC uplisted the orange-fronted parakeet in 2016 from "Nationally Endangered" to "Nationally Critical" (most severely threatened, facing an immediate high risk of extinction; Robertson *et al*. 2016, p. 5; NZDOC 2017c, unpaginated). Qualifiers for this classification include that it is conservation dependent, range restricted, and experiences extreme fluctuations (Robertson *et al.* 2016, pp. 7, 9). The species is also listed as "Critically Endangered" on the IUCN's Red List due to its very small population that has declined throughout the last decade (BLI 2017, unpaginated). It is listed in Appendix II under the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES; CITES 2015, p. 22).

SUMMARY OF BIOLOGICAL INFORMATION

The orange-fronted parakeet is the rarest parakeet in New Zealand and the three remaining naturally occurring colonies are restricted to a small area on South Island and inhabit subalpine mature beech forests. Beginning in 2005, captive-bred orange-fronted parakeets were translocated to four predator-free islands and bred successfully. The population size of the orange-fronted parakeet is approximately 350 individuals, with the offshore population around 100 individuals and the mainland population around 250 individuals. In 2019, the orange-fronted parakeet had one of its best breeding seasons in decades with more than three times as many nests compared to previous years and produced at least 150 wild-born chicks, potentially doubling the population. However, we do not have information on the current size of the population after the 2019 breeding season.

FACTORS INFLUENCING THE STATUS

The Act directs us to determine whether any species is an endangered species or a threatened species because of any factors (or threats) affecting its continued existence (i.e., whether it meets the definition of a threatened species or an endangered species). We use the term "threat" to refer in general to actions or conditions that are known to or are reasonably likely to negatively affect individuals of a species. The term "threat" includes actions or conditions that have a direct impact on individuals, as well as those that affect individuals through alteration of their habitat or required resources. The term "threat" may encompass—either together or separately—the source of the action or condition or the action or condition itself.

However, the mere identification of any threat(s) does not necessarily mean that the species meets the statutory definition of an "endangered species" or a "threatened species." In determining whether a species meets either definition, we must evaluate all identified threats by considering the expected response by the species, and the effects of the threats—in light of those actions and conditions that will ameliorate the threats—on an individual, population, and species level. We evaluate each threat and its expected effects on the species, then analyze the cumulative effect of all of the threats on the species as a whole. We also consider the cumulative effect of the threats in light of those actions and conditions that will have positive effects on the species—such as any existing regulatory mechanisms or conservation efforts. The Secretary determines whether the species meets the definition of an "endangered species" or a "threatened species" only after conducting this cumulative analysis and describing the expected effect on the species now and in the foreseeable future.

The Act does not define the term "foreseeable future," which appears in the statutory definition of "threatened species." Our implementing regulations at 50 CFR 424.11(d) set forth a framework for evaluating the foreseeable future on a case-by-case basis. The term foreseeable future extends only so far into the future as the Services can reasonably determine that both the future threats and the species' responses to those threats are likely. In other words, the foreseeable future is the period of time in which we can make reliable predictions. "Reliable"

does not mean "certain"; it means sufficient to provide a reasonable degree of confidence in the prediction. Thus, a prediction is reliable if it is reasonable to depend on it when making decisions.

It is not always possible or necessary to define foreseeable future as a particular number of years. Analysis of the foreseeable future uses the best scientific and commercial data available and should consider the timeframes applicable to the relevant threats and to the species' likely responses to those threats in view of its life-history characteristics. Data that are typically relevant to assessing the species' biological response include species-specific factors such as lifespan, reproductive rates or productivity, certain behaviors, and other demographic factors.

Threats

The most prominent factors affecting the species on the mainland are predation by nonnative species such as the stoat (*Mustela erminea*) and rats (*Rattus* spp.), as well as habitat destruction (NZDOC 2017a, unpaginated). Stoats and rats are excellent hunters on the ground and in trees and exploit the fact that parakeets nest and roost in tree cavities (NZDOC 2017a, unpaginated). During beech mast years, which occur every 2–6 years, rats and stoats breed prolifically – fueled by an abundant food source – and prey on native birds, including the orange-fronted parakeet (NZDOC 2014, pp. 1, 3). When rat tracking rates (the percentage of monitored tunnels in which rats are detected) exceed 5%, orange-fronted parakeets can suffer significantly from predation (Elliot *et al* 2016, p. 203). Additionally, some trapping efforts designed to reduce the populations of individual predators have had counterproductive effects on the orange-fronted parakeet. For example, stoat trapping within two of the naturally occurring parakeet colonies on the South Island (Hurunui and Hawdon Valleys) was followed by rat plagues and declines in orange-fronted parakeet populations (Pollard 2016, p. 8). Nonnative brush-tailed opossums (*Trichosurus vulpecula*) have also been reported to prey on the orange-fronted parakeet, taking chicks, eggs, and adults in recent years (NZDOC 2017b, unpaginated).

Habitat loss and degradation is another factor that has affected the orange-fronted parakeet on the mainland (NZDOC 2017b, unpaginated). Historically, large areas of native forest were cut down or burned – decreasing available habitat (NZDOC 2017b, unpaginated). Before humans arrived at New Zealand, about 80% of the North and South Islands was forested. By about 1840, forest destruction by Polynesians reduced the forest cover from 80% to 50%, and European settlement further reduced forest cover to about 24% (Hammond 1997, p. 46). In addition, silviculture (care and cultivation) of beech forests in the past had removed trees in a manner that did not facilitate the development of mature trees with suitable nest cavities for species such as the orange-fronted parakeet (Kearvell 2002, p. 261). Presently, natural forests cover a quarter of New Zealand's land area and are managed by the NZDOC; forests are almost entirely protected by statute and are tightly controlled (Hammond 1997, p. 48). Additionally, the species' habitat is currently being degraded by browsing or over-browsing of vegetation by brush-tailed opossum, cattle (*Bos taurus*), and deer (family Cervidae), which changes the forest structure in a way that reduces available feeding habitat of the orange-fronted parakeet (NZDOC 2017a, unpaginated; Kearvell 2002, p. 261).

Resource managers have been reluctant to introduce orange-fronted parakeets to areas that are already occupied by yellow-crowned parakeets because of the potential for hybridization (Kearvall and Steeves 2015, p. 72). However, a study of the three naturally occurring orange-fronted parakeet populations indicated very low incidence (1%) of mixed pairing with the yellow-crowned parakeet (Kearvall and Steeves 2015, p 73). Although more work is needed to understand factors such as the appropriate numbers of individuals to be introduced, total absence of yellow-crowned parakeets at release sites may not be required for successful reintroductions or introductions of orange-fronted parakeets to mainland or island sites (Kearvall and Steeves 2015, p 74).

The species' small population is a concern. Small populations are subject to both demographic and unpredictable environmental events that can contribute to extirpations. Small populations are generally at greater risk of extinction from habitat loss, predation, disease, loss of genetic diversity, and stochastic (random) environmental events (Davies *et al.* 2004, pp. 265–271). We considered specific stressors that may affect or exacerbate the small population size for the orange-fronted parakeet and conclude that the stressors noted above (e.g., predation by nonnative species and ongoing habitat degradation due to browsing) have the ability to exacerbate risks to this small population.

Conservation Measures

The orange-fronted parakeet is protected under the Wildlife Act of 1953 and no one may kill or possess a parakeet without a permit (NZDOC 2017d, unpaginated). The NZDOC closely monitors all known populations of the orange-fronted parakeet and inspects nest cavities (NZDOC 2017a, unpaginated). NZDOC also conducts surveys for evidence of any new nesting sites (NZDOC 2017a, unpaginated). Each orange-fronted parakeet nest found is individually protected from predator access by tin tree wraps, ground predator traps and opossum traps (van Hal *in litt.* 2008, 2009, as cited in BLI 2016, unpaginated). Despite these controls, predation by nonnative species is still a factor affecting the species and predators have not been eradicated from this species' range.

NZDOC's "Operation ARK" program ran from 2004 to 2010, to respond to predator problems in mainland beech forests (NZDOC 2017e, entire). Operation ARK used intensive predator management and monitoring to protect four key species (including orange-fronted parakeets), from stoats, rats and opossums, and to control pest plagues resulting from beech seed masting (NZDOC 2017c, entire; Elliot and Suggate 2007, entire). Predators were controlled with traps, bait stations, bait bags, aerial application of bait (for rats), when necessary, and individual nest protection (NZDOC 2017c, entire; Elliot and Suggate 2007, entire). Lessons learned included: (1) successful trapping methods to control stoat populations; and (2) the realization that aerial application may be needed to effectively control rats in plague years (NZDOC 2017c, entire; Elliot and Suggate 2007, pp 15-16). Funding for pest control in these areas is now provided directly to the sites and a new contingency fund was established for plague years (NZDOC 2017c, entire).

Additionally, a landscape-scale pest control program ("Battle for Our Birds") was initiated in 2014 to control rodent and stoat booms in beech forests during the 2014 mast year (Elliot and Kemp 2016, entire). This effort was successful at reducing rat tracking rates at Hawdon, Poulter and Huruni (Elliot and Kemp 2016, p. 206); however, appropriate timing may have been an issue because there was another decline in the mainland population of the orange-fronted parakeet in the 2014/2015 mast year (NZDOC 2017f, unpaginated; Robertson *et al.* 2016, p.5). NZDOC is planning another, even larger scale aerial application of rat bait, building on the lessons learned in 2014 (Elliot and Kemp 2016, p. 208).

As noted above, the NZDOC initiated a captive-breeding program for the orange-fronted parakeet and established self-sustaining populations on four predator-free islands; although recent information indicates that persistence of these populations appears to still be tenuous (Grant *in litt.* 2016 as cited in BLI 2017, unpaginated). Additionally, in 2016, a second captive breeding population was initiated at the Auckland Zoo to start a fifth offshore sanctuary on Rotoroa Island on the North Island (Greene *in litt.* 2016, as cited in BLI 2017, unpaginated).

Cumulative Effects

On the South and offshore islands, interactions between the stressors associated with small population size and limited geographic range (e.g., low genetic diversity), continued habitat loss (due to over-browsing) and predation by nonnative species (stoats, rats, and possums) will lead to further declines of the orange-fronted parakeet throughout its range. Conservation measures include protective New Zealand legislation, individual nest protections (tin tree wraps and predator traps), and captive breeding programs. Despite these controls, predation by nonnative species is still a factor affecting the species and predators have not been eradicated from this species' range. After analyzing the factors that affect the species, including the ongoing conservation measures, we have determined that the interactions and combinations of factors decrease the viability of this species and further warrant listing.

CURRENT CONDITION

Resiliency: The orange-fronted parakeet has low to moderate resiliency because the population size of the orange-fronted parakeet is approximately 350 individuals, with the offshore population around 100 individuals and the mainland population around 250 individuals. Habitat is limited because of historical deforestation and predation. New Zealand actively manages the species throughout its range.

Redundancy: The orange-fronted parakeet is known to occur on in multiple populations on several different islands. The three remaining naturally occurring colonies are restricted to a small area on South Island. Captive-bred orange-fronted parakeets have been translocated to four predator-free islands. Therefore, the species has moderate to high redundancy because there are at least five populations, including four on islands free of predators.

Representation: The orange-fronted parakeet geographic range on each island is limited. On South Island, the subalpine mature beech forests has been subject to historical deforestation;

although, the remaining forest habitat is protected. On the islands where it has been introduced, the species is less selective for breeding and feeding resources. Thus, the species has representation in more than one habitat type throughout its range. There is no information to date on genetic diversity of the species/populations.

FUTURE CONDITION

Condition of the orange-fronted parakeet is expected to decline in the future because stressors associated with small, isolated populations (e.g., low genetic diversity), habitat loss (due to over-browsing), and predation by nonnative species (stoats, rats, and possums) on the mainland will continue to limit the population. However, New Zealand implements conservation measures to help slow and mitigate the impacts of the primary threats with varying success. Individual nest protections (tin tree wraps and predator traps) and captive breeding programs have been used to introduce individuals to the mainland and predator-free offshore islands. However, predation by nonnative species will continue to be a factor affecting the species on South Island.

FINDING

Standard for Review

Section 4 of the Act (16 U.S.C. 1533) and its implementing regulations (50 CFR part 424) set forth the procedures for determining whether a species is an "endangered species" or a "threatened species." The Act defines an endangered species as a species that is "in danger of extinction throughout all or a significant portion of its range," and a threatened species as a species that is "likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range." The Act requires that we determine whether any species is an "endangered species" or a "threatened species" because of any one or a combination of the following factors:

(A) The present or threatened destruction, modification, or curtailment of its habitat or range;
(B) Overutilization for commercial, recreational, scientific, or educational purposes;
(C) Disease or predation;
(D) The inadequacy of existing regulatory mechanisms; or
(E) Other natural or manmade factors affecting its continued existence.

These factors represent broad categories of natural or human-caused actions or conditions that could have an effect on a species' continued existence. In evaluating these actions and conditions, we look for those that may have a negative effect on individuals of the species, as well as other actions or conditions that may ameliorate any negative effects or may have positive effects.

Summary of Analysis

After evaluating threats to the species and assessing the cumulative effect of the threats under the section 4(a)(1) factors, we determine that the orange-fronted parakeet experiences habitat loss (due to over-browsing), predation by nonnative species (stoats, rats, and possums), tenuous

captive breeding introduction results, and stressors associated with small, isolated populations (e.g., low genetic diversity). New Zealand has implemented conservation measures to increase the population and habitat of the orange-fronted parakeet with varying success. Thus, after assessing the best available information, we conclude that orange-fronted parakeet is warranted for listing, but precluded by other higher priority actions.

RECOMMENDED CONSERVATION MEASURES

- Increase invasive mammal (stoat and rat) eradication efforts.
- Increase public accessibility to information about the importance of conserving the orange-fronted parakeet and its habitat, partially through keeping pet cats indoors.
- Restore areas that have been deforested or degraded from deer, cattle, and opossum browsing, with help from private landowners.
- Introduce orange-fronted parakeets to the most safe and suitable areas with low or no yellow-crowned parakeets within its historical range.
- Closely monitor nests and chicks.

LISTING PRIORITY

THREAT			
Magnitude	Immediacy	Taxonomy	Priority
High	Imminent	Monotypic genus	1
		Species	2
		Subspecies/population	3
	Non-imminent	Monotypic genus	4
		Species	5
		Subspecies/population	6
Moderate to Low	**Imminent**	Monotypic genus	7
		Species	**8***
		Subspecies/population	9
	Non-imminent	Monotypic genus	10
		Species	11
		Subspecies/population	12

Rationale for listing priority number

In the previous Assessment (81 FR 71457), the orange-fronted parakeet was assigned an LPN of 8. After reevaluating the threats to the orange-fronted parakeet, we have determined that no change in LPN for the species is warranted at this time. The orange-fronted parakeet does not represent a monotypic genus. The current population is small, and the species' distribution is extremely limited. The species is subject to predation by nonnative animals, particularly the nonnative stoats and rats, and habitat degradation by invasive grazers. However, because the

NZDOC is actively involved in measures to aid the recovery of the species, including introductions to predator-free islands, we find the threats are moderate in magnitude. Despite conservation efforts, the threats are ongoing and, therefore, imminent. Lack of suitable habitat and predation, combined with the orange-fronted parakeet's small population size, are threats to this species that are moderate in magnitude. Thus, the LPN remains an 8 to reflect imminent threats of moderate magnitude.

Magnitude: Predation from the nonnative rats and stoats, habitat degradation and competition for food and nesting cavities, combined with stressors associated with the orange-fronted parakeet's small population size threaten the species. We find these threats are moderate in magnitude because the NZDOC is actively involved in measures to manage the threats and aid the recovery of the species.

Imminence: Predation from the nonnative rats and stoats, habitat degradation and competition for food and nesting cavities, combined with stressors associated with the parakeet's small population size are ongoing, and are therefore, imminent.

Rationale for Change in Listing Priority Number
N/A

Is Emergency Listing Warranted?
No; There is currently no emergency posing a significant risk to the conservation of the orange-fronted parakeet.

DESCRIPTION OF MONITORING

The candidate notice of review (CNOR) and accompanying species assessment forms constitute the Service's system for monitoring and making annual findings on the statis of petitioned species under sections 4(b)(3)(c)(i) and 4(b)(3)(c)(ii) of the Act. We review all new information on candidate species as it becomes available, prepare annual species assessments that reflect monitoring and research results and any other new information.

The species is actively monitored at all sites by NZDOC (NZDOC 2017a, unpaginated).

COORDINATION WITH STATES

No countries provided information or comments on the species or latest assessment.
The range country, **New Zealand**, did not provide information or comments.

LITERATURE CITED

ARKive (2017). Malherbe's parakeet (Cyanoramphus malherbi). Image. Retrieved from http://www.arkive.org/malherbes-parakeet/cyanoramphus-malherbi/image-

G126189.html. Accessed June 07, 2017.

BirdLife International (2017). Species factsheet: *Cyanoramphus malherbi*. Retrieved from http://www.birdlife.org. Accessed on March 30, 2017.

BirdLife International. (2016). *Cyanoramphus malherbi. The IUCN Red List of Threatened Species 2016*: e.T22724562A94871843. Retrieved from http://dx.doi.org/10.2305/IUCN.UK.2016-3.RLTS.T22724562A94871843.en. Accessed March 30, 2017.

BirdLife International. (2015). Species factsheet: *Cyanoramphus malherbi*. Retrieved from http://www.birdlife.org. Accessed September 30, 2015.

CITES (Convention on International Trade in Endangered Species of Wild Fauna and Flora). (2015). Appendices I, II, and III. Valid from 5 February 2015. Retrieved from: *https://www.cites.org/sites/default/files/eng/app/2015/E-Appendices-2015-02-05.pdf*. Accessed October 1, 2015.

Davies, K. F., Margules, C. R., & Lawrence, J. F. (2004). A synergistic effect puts rare, specialized species at greater risk of extinction. *Ecology*, *85*(1), 265-271.

del Hoyo, J., A. Elliot, and J. Sargatal (eds.) (1997). Page 372 in Handbook of the birds of the world. Vol. IV: Sandgrouse to cuckoos. Lynx Ediciones, Barcelona.

Elliott, G., & Kemp, J. (2016). Large-scale pest control in New Zealand beech forests. *Ecological Management & Restoration*, *17*(3), 200-209.

Elliot, G., & Suggate, R. (2007). Operation Ark. A three year progress report. Department of Conservation, Christchurch.

Farley, M. (2014). Orange-fronted parakeet monitoring on Blumine Island. New Zealand Department of Conservation. November 10, 2014. Retrieved from: *http://blog.doc.govt.nz/2014/10/11/parakeet-bluemine-island/.* Accessed September 30, 2015.

Gill, B.J., Bell, B.D., Chambers, G.K., Medway, D.G., Palma, R.L., Scofield, R.P., Tennyson, A.J.D. & Worthy, T.H. (2010). Checklist of the birds of New Zealand, Norfolk and Macquarie Islands, and the Ross Dependency, Antarctica. Fourth Edition. Te Papa Press (in association with the Ornithological Society of New Zealand, Inc.), Wellington, NZ.

Hammond, D. (1997). Asia-Pacific forestry sector outlook study: Commentary on forest policy in Asia-Pacific region (A Review for Indonesia, Malaysia, New Zealand, Papua New Guinea, Philippines, Thailand and Western Samoa). Working Paper No: APFSOS/WP/22

FAO Website, Available at: http://www. fao. org/DOCREP/W7730E/w7730e0a. htm [Cited: June 2007].

Harrison, M. (1970). The orange-fronted parakeet (*Cyanoramphus malherbi*). *Notornis*, *17*(2), 115-125.

Higgins, P. J., Peter, J. M., & Steele, W. K. (1999). Handbook of Australian, New Zealand and Antarctic Birds.

ITIS (Integrated Taxonomic Information System). (2017). *Cyanoramphus malherbi*. Retrieved from http://www.itis.gov. Accessed March 30, 2017.

Kearvell, J. C. (2002). Short note. Nest sites of sympatric orange-fronted (*Cyanoramphus malherbi*) and yellow-crowned parakeets (*C. auriceps*). *Notornis*, *49*, 261-263.

Kearvell, J. C., & Steeves, T. E. (2015). Evidence for assortative mating in sympatric populations of orange-fronted (Cyanoramphus malherbi) and yellow-crowned (*C. auriceps*) kakariki. *Notornis*, *62*, 71-75.

Kearvell, J. C., Connor, C.O., & Farley, M. E. (2014). Field identification of the orange-fronted parakeet (*Cyanoramphus malherbi*): pitfalls for the unwary. *Notornis*, *61*, 200-204.

Kearvell, J. C., Grant, A. D., & Boon, W. M. (2003). The orange-fronted parakeet (*Cyanoramphus malherbi*) is a distinct species: a review of recent research into its taxonomy and systematic relationship within the genus *Cyanoramphus*. *Notornis*, *50*, 27-35.

Kearvell, J. C., Young, J. R., & Grant, A. D. (2002). Comparative ecology of sympatric orange-fronted parakeets (*Cyanoramphus malher*bi) and yellow-crowned parakeets (*C. auriceps*), South Island, New Zealand. *New Zealand Journal of Ecology*, 139-148.

Knafler, G. J., Ortiz-Catedral, L., Jackson, B., Varsani, A., Grueber, C. E., Robertson, B. C., & Jamieson, I. G. (2016). Comparison of beak and feather disease virus prevalence and immunity-associated genetic diversity over time in an island population of red-crowned parakeets. Archives of virology, 161(4), 811-820.

Massaro, M., Ortiz-Catedral, L., Julian, L., Galbraith, J. A., Kurenbach, B., Kearvell, J., Kemp, J., van Hal, J., Elkington, S., Taylor, G., Greene, T., van de Wetering, J., van de Wetering, M., Pryde, M., Dilks, P., Heber, S., Steeves, T.E., Walters, M., Shaw, S., Potter, J., Farrant, M., Brunton, D.H., Hauber, M., Jackson, B., Bell, P., Moorhouse, R., McInnes, K., & Varsani, A. (2012). Molecular characterisation of beak and feather disease virus (PBFD) in New Zealand and its implications for managing an infectious disease. *Archives of virology*, *157*(9), 1651-1663.

NZDOC (New Zealand Department of Conservation). (2017a). Orange-fronted parakeet/kakariki karaka. Retrieved from http://www.doc.govt.nz/orange-fronted-parakeet. Accessed March 30, 2017.

NZDOC (New Zealand Department of Conservation). (2017b). Orange-fronted parakeet/ kakariki. Retrieved from http://www.doc.govt.nz/Documents/about-doc/concessions-and-permits/conservation-revealed/orange-fronted-parakeet-kakariki-lowres.pdf. Accessed April 6, 2017.

NZDOC (New Zealand Department of Conservation). (2017c). Conservation status of plants and animals. Retrieved from http://www.doc.govt.nz/nature/conservation-status/. Accessed September 8, 2017.

NZDOC (New Zealand Department of Conservation). (2017d). Wildlife Act 1953: Legislation. Retrieved from http://www.doc.govt.nz/about-us/our-role/legislation/wildlife-act/. Accessed September 8, 2017.

NZDOC (New Zealand Department of Conservation). (2017e). Operation Ark. Retrieved from http://www.doc.govt.nz/our-work/operation-ark/. Accessed April 21, 2017.

NZDOC (New Zealand Department of Conservation). (2017f). Orange-fronted parakeet. Retrieved from http://nzbirdsonline.org.nz/species/orange-fronted-parakeet. Accessed September 18, 2017.

NZDOC (New Zealand Department of Conservation). (2017g). Wildlife Act 1953. Retrieved from http://www.doc.govt.nz/about-us/our-role/legislation/wildlife-act/. Accessed September 8, 2017.

NZDOC (New Zealand Department of Conservation). (2014). The science behind the Department of Conservation's beech mast response and predator control. Battle for our birds, NZDOC, Wellington, NZ. July 2014.

NZDOC (New Zealand Department of Conservation). (2011). Tuhua welcomes first baby orange-fronted parakeet. Retrieved from http://www.doc.govt.nz/news/media-releases/2011/tuhua-welcomes-first-baby-orange-fronted-parakeet/. Accessed September 11, 2017.

Ortiz-Catedral, L. (2012). Habitat use by the critically endangered orange-fronted parakeet (*Cyanoramphus malherbi*) on Maud Island: its relevance for future translocations. *Notornis*, *59*, 148-152.

Ortiz-Catedral, L., & Brunton, D. H. (2009). Notes on the diet of the critically endangered orange–fronted parakeet (*Cyanoramphus malherbi*) on Maud Island. *New Zealand Journal of Zoology*, *36*(4), 385-388.

Ortiz-Catedral., L., Kearvell, J. C., & Brunton, D. H. (2012). Population Increase of Critically Endangered Malherbe's Parakeet (*Cyanoramphus malherbi)* introduced to Maud Island, New Zealand. *Conservation Evidence, 9*, 54-57.

Ortiz-Catedral, L., Kurenbach, B., Massaro, M., McInnes, K., Brunton, D. H., Hauber, M. E., Martin, D.P., & Varsani, A. (2010). A new isolate of beak and feather disease virus from endemic wild red-fronted parakeets (*Cyanoramphus novaezelandiae*) in New Zealand. *Archives of virology*, *155*(4), 613-620.

Ortiz-Catedral, L., Kearvell, J. C., Hauber, M. E., & Brunton, D. H. (2009). Breeding biology of the critically endangered Malherbe's parakeet on Maud Island, New Zealand, following the release of captive-bred individuals. *Australian Journal of Zoology*, *57*(6), 433-439.

Pollard, J. C. (2016). Aerial 1080 poisoning in New Zealand: Reasons for concern. *1080Science.*

Robertson, H. A., Barid, K., Dowding, J. E., Elliott, G. P., Hitchmough, R. A., Miskelly, C. M., McArthur, N., O'Donnell, C. F., Sagar, P.M., Scofield, R.P., & Taylor, G. A. (2016). Conservation status of New Zealand birds, 2016. New Zealand threat classification series, 19.

Snyder, N., P. McGowan, Gilardi, J., & Grajal, A. (eds.). (2000). Orange-fronted parakeet. Page 54 in Parrots. Status survey and conservation action plan 2000–2004. IUCN, Gland, Switzerland, and Cambridge, UK.

Taylor, R. H. (1998). A reappraisal of the Orange-fronted Parakeet (*Cyanoramphus* sp.) species or colour morph? *Notornis*, *45*, 49-63.

Young, A. M., Hobson, E. A., Lackey, L. B., & Wright, T. F. (2012). Survival on the ark: life-history trends in captive parrots. *Animal conservation*, *15*(1), 28-43.

Approve: _____ 2/16/22

Gary Frazer, Assistant Director for Ecological Services — Date

Concur: _____ 03/31/2022

Director, U.S. Fish and Wildlife Service — Date

Do not concur:_____

Director, Fish and Wildlife Service Date

Director's Remarks:

Date of annual review: July 2021
Conducted by: Branch of Delisting and Foreign Species