CULTURAL CONSTRAINTS AND CORROSIVE COLONIZATION: WESTERN COMMERCE IN AOTEAROA/ NEW ZEALAND AND THE EXTINCTION OF THE HUIA (*Heteralocha acutirostris*)

Clark S. Monson
Brigham Young University

Early Maori occupation of New Zealand was marked by profligate use of avian resources and the resultant extinction of numerous species including the archipelago's famed moas. As in other Polynesian cultures, however, Maoris came to adopt conservation strategies. I suggest that the Maori conservation technique of *tapu* or *rahui*—chiefly prohibitions governing the harvest of vulnerable biological resources—offers crucial insights for modern managers. The former efficacy of rahui is examined through a detailed case study of an extinct New Zealand bird—the huia. Formerly protected by the cultural and religious potency of tapu, the huia met a tragic demise as culturally enforced constraints upon its use were abandoned in order to satisfy European demand for its mounted effigies and tail feathers. The plight of the huia provides a compelling lesson concerning the destructive consequences of cultural erosion and commerce in rare species.

Introduction

THE FOUNDERS of New Zealand's indigenous Maori population emigrated from central Eastern Polynesia approximately 1000 years BP, eventually settling from North Island's North Cape southward to Stewart Island, a distance of 1600 km (Sutton 1994). Dispersion of villages across a diverse ecological palette, agricultural intensification with generation of significant food surpluses, and resultant social stratification common among other Polynesian cultures led to conditions appropriate for the development of trade in objects of cultural and religious rather than survival value (Kirch 1984). Much time and effort were expended by Maoris to secure desirable resources including greenstone, obsidian, shells, and feathers, which traveled through

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trade routes far beyond their places of origin (Shortland 1856; Grey 1994). In 1892, a small wooden box containing seventy huia tail feathers was discovered under a rock ledge in the south central region of New Zealand's South Island. Huia feathers were valued possessions of Maori chiefs, who wore them as symbols of rank and prestige (Best 1942; Phillipps 1963; Riley 2001) (Fig. 1). The feathers, believed to have been cached some seventy years previously, constituted a remarkable find since huia distribution was confined to a limited area of North Island. Phillipps (1963) suggested the feathers were likely traded to South Island Maoris for valuable greenstone articles.

The saga of the huia, the cultural desire for its feathers, and the protection of the species from overexploitation are similar to the histories of many other scarce resources among indigenous peoples. However, the transference of Maori cultural views of the importance of huia feathers as symbols of aristocracy to a European monarch and the resultant monetization of the huia feather trade among the fashion houses of London as well as European colonists in New Zealand are unusual. Moreover, this unique cultural exchange had disastrous consequences for the birds themselves—and serves as a lesson in the destructive effects of colonial erosion of indigenous conservation strategies.

Huia Natural History

The huia was one of three species of wattle birds, members of the endemic New Zealand family Callaeidae. Although the species was endangered by about 1900, small isolated populations and individual pairs of huias apparently endured as late as the 1930s. Small populations of the other two wattle bird species, the kokako (*Callaeas cinerea*) and the saddleback (*Philesturnus carunculatus*), are still found in New Zealand's forests. Saddlebacks, however, persist only on several small predator-free islands.

Wattle birds are believed to have descended from a crow-like ancestor that colonized New Zealand long ago, but their precise ancestry remains controversial. Some systematists assign wattle birds to the starling family (Sturnidae). Others group them with birds of paradise (Paradiseidae), bower birds (Ptilonorhynchidae), butcher birds (Cractidae), or magpie larks (Grallinidae) (Fuller 2001).

Wattle birds are identified by fleshy lobes at the base of the bill. Huia wattles were orange and measured 2 cm in diameter. The body length of the huia was forty-five to forty-eight centimeters. The huia's plumage was nearly black but possessed a striking blue-green iridescence. The tail was distinguished by a white terminal band. The bill was cream colored.

Huias had the most restricted distribution of New Zealand's wattle birds. Their nineteenth-century range was confined to several mountain

ranges and adjacent lowland forests in the southern half of the North Island, but this represents a reduced range following the Polynesian colonization of New Zealand. The huia fossil record indicates the species was formerly widespread from Wellington to North Cape (Flannery 1995; Trevor Worthy pers. comm.). Huia fossil remains are fewer than those of its congener, the kokako, suggesting huias had a more restricted ecological distribution.

Huias were famed for their unique bill characteristics. Male huia bills were stout, straight, and approximately 6 cm in length. Female bills were delicately curved and pliant and measured over ten centimeters (Phillipps 1963). This remarkable sexual dimorphism led Gould (1837), the first ornithologist to describe the huia, to classify males and females as different species. The divergent bill types possessed by male and female huias facilitated a partition in foraging strategies. Huias consumed a variety of insects, worms, and berries, but their summer diet consisted largely of huhu beetle larvae (*Prionoplus reticularis*). Potts (1885:475) monitored a breeding pair of huias and made this observation regarding their foraging techniques and habitat:

> Their activity was remarkable, especially the speed with which they traversed the wood, hopping or rather bounding with a slight opening motion of the wing, flying only very short distances. Owing to the moist character of the locality, the huge trees were clothed in mosses and ferns, and fragments of this parasitic vegetation were constantly dropping down from the branches where the huias were so zealously working for their young.

New Zealand's celebrated nineteenth-century ornithologist and statesman Sir Walter Lowry Buller managed to acquire a live pair of huias. Placing his captives in an aviary, Buller (1882:31) provided them a rotted log infested with huhu. "They at once attacked it," he said,

> carefully probing the softer parts with their bills, and then vigorously assailing them, scooping out the decayed wood till the larva or pupa was visible.... The very different development of the mandibles in the two sexes enabled them to perform separate offices. The male always attacked the more decayed portions of the wood, chiseling out his prey after the manner of some woodpeckers, while the female probed with her long pliant bill the other cells, where the hardness of the surrounding parts resisted the chisel of her mate. Sometimes I observed the male remove the decayed portion

FIGURE 1. *Te Kawa and His Nephew*. Watercolor painting by G. F. Angas. Te Kawa (sitting) was the principal chief of the Ngati Whatua tribe. The hair of his nephew, Tamahiki, is decorated with the tail feathers of the huia. The Ngati Whatua inhabited the Orakai Bay region near present-day Auckland—well north of the huia's historical range.

> without being able to reach the grub, when the female would at once come to his aid, and accomplish with her long slender bill what he had failed to do.... I noticed, however, that the female always appropriated to her own use the morsels thus obtained.

Disregarding Buller's remark to the contrary, nineteenth-century science writer John Lubbock took literary license with Buller's description of huia foraging habits by asserting that females, after withdrawing larvae from bored-out passages, shared them with their mates. Buller was quick to correct this poetic error: "It seems a pity to destroy the pretty sentiment of the case as put by Sir John Lubbock," he said, "but science is inexorable, and the truth must be upheld" (Galbreath 1989:84). Although females withheld food items from their mates, male-to-female food transfers were described by several observers: "He hops along with a fine spider and very politely offers it to his better half, who seems to always appreciate his fine attention. And so they keep close together.... the female, with her slender bill, often getting a fine, fat insect, which, however, she does not give to her mate" (Caldwell 1911, cited in Riley 2001:103–104).

The advantage to the huia of possessing strikingly different bill types may explain why huias were almost always found foraging in pairs, keeping strictly to the shade of the forest. Observers noted that paired individuals always remained within audible distance of one another (Phillipps 1963). Buller (1882:31) noted a strong attachment between his own huias: "It was most interesting to watch these graceful birds, hopping from branch to branch, occasionally spreading the tail into a broad fan, displaying themselves in a variety of natural attitudes, and then meeting to caress each other with their ivory bills, uttering at the same time a low affectionate twitter."

Buller (1882:31) intended to export his huias to London's Zoological Society for display, but before the birds could be transferred the male was inadvertently killed, whereupon the female, "manifesting the utmost distress, pined for her mate and died ten days afterwards." Buller anthropomorphized the death of his remaining huia, but his belief is supported by Maori portrayals of surviving huias when pair bonds were severed: "I was always told by my old people that a pair of huia lived on most affectionate terms. The female dug the ground for the worms, but it was the male bird that picked the worms up to feed her, as she was unable to do it on account of the formation of her bill. If the male died first, the female died soon after of grief" (Makereti, n.d., cited in Riley 2001:104). Regardless of whether female huias succumbed to despair upon the death of their mates, the fact that such a phenomenon existed in Maori perception may partially explain their profound admiration for the birds.

The Huia in Maori Lore and Trade

Cultural Uses

Sacred and highly revered by the Maoris, the huia was admired for its stunning beauty, unique foraging habits, and pair fidelity. Maori esteem for the huia was manifest in myriad ways. Female huia heads with their gracefully curved, tapered bills were worn as pendants around the neck or dangled conspicuously from the ears of high-ranking individuals (Oliver 1930). A headdress or plume of twelve huia tail feathers, still joined at the base by the bird's own skin, was known as a *marereko* and was worn by chiefs at various ceremonies and when going into battle (Riley 2001).

Fuller (2001) observed that huias acquired a curious association with death. Indeed, Maori chiefs were especially inclined to don the huia's white-tipped tail feathers during funeral rites or *tangis*. A tangi scene painted by George Angas in 1844 depicts a deceased Maori chief in repose with a halo of huia feathers about his head, signifying the fallen leader's eminence (Fig. 2; Angas 1972). In all instances, the wearing of huia feathers conveyed distinction and was traditionally restricted to elites (Best 1942; Phillipps 1963; Riley 2001).

So valuable were huia tail feathers that Maori chiefs housed them in ornately carved wooden boxes called *waka huia* (Fig. 3). *Waka* is the Maori word for hollowed-out canoe, and waka huias were indeed fashioned in the manner of Maori watercraft (Buck 1952). An elaborately carved waka huia was presented to Captain James Cook during his first voyage to New Zealand; an illustration of this waka huia appears in Hawkesworth's (1773) account of the Endeavor voyage. Like the feathers they contained, waka huias were highly taboo or *tapu*. Balick and Cox (1996) suggested that a person could defile a waka huia by speaking disrespectfully of it or even looking upon it. In Maori cosmology, such individuals became subject to severe supernatural consequences unless properly purified.

Huia Folklore

A cultural intrigue with the huia is manifest in Maori legends and folklore. Maoris asserted the huia was obtained by their ancestor, Tawhaki (demigod of thunder, lightning, and health) from the heavens to provide feathers for his wife Maikukumakaka (Riley 2001). On earth, the huia became the leader of the multitudes of Hakuturi, sacred birds of the forest appointed to persuade Rata to follow forest protocol by seeking permission from Tane (god of the forest) before felling a tree from which to hollow out a canoe (Riley 2001).

A mythical explanation for the female huia's curved bill was described by Phillipps (1963), who learned of the following folktale from a Maori informant.

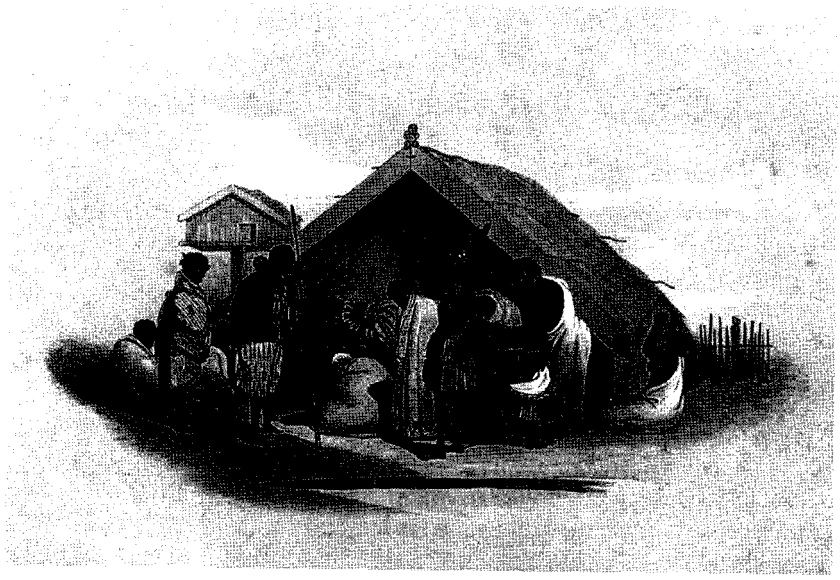

FIGURE 2. ***Weeping over a Deceased Chief.*** **Watercolor painting by G. F. Angas. The corpse is laid out beneath the veranda of the dwelling, wrapped in the finest mats. A halo of huia tail feathers about the head of the fallen leader signifies his eminence. A high-ranking individual in the foreground (also wearing huia feathers) utters incantations over the deceased chief.**

Shortly after the Maori migrations to New Zealand, a high-ranking chief was surprised to encounter an unfamiliar bird in one of his snares. The chief was enamored of the bird, which turned out to be a female huia. He plucked two feathers from the bird's tail and placed them in his hair as a decoration. Before releasing the huia, the chief bestowed upon it a magic spell and *mana* with the command that the huia was to appear before him whenever he asked. On one occasion, the huia dutifully appeared before the chief during the nesting season. The chief was displeased because the huia's tail feathers were in poor condition. The chief angrily inquired of the bird why its feathers were disheveled. The huia told him that it was through sitting on its nest. The chief replied: "I will provide you with a means whereby you may keep your feathers in good order when next I call on you." He took hold of the huia and bent its beak until it assumed an elegant curving shape. He then instructed the bird to use its bill to lift its tail clear of its nest each time it prepared to settle onto its eggs.

Huias were sometimes kept as pets and trained to converse (Rout 1926;

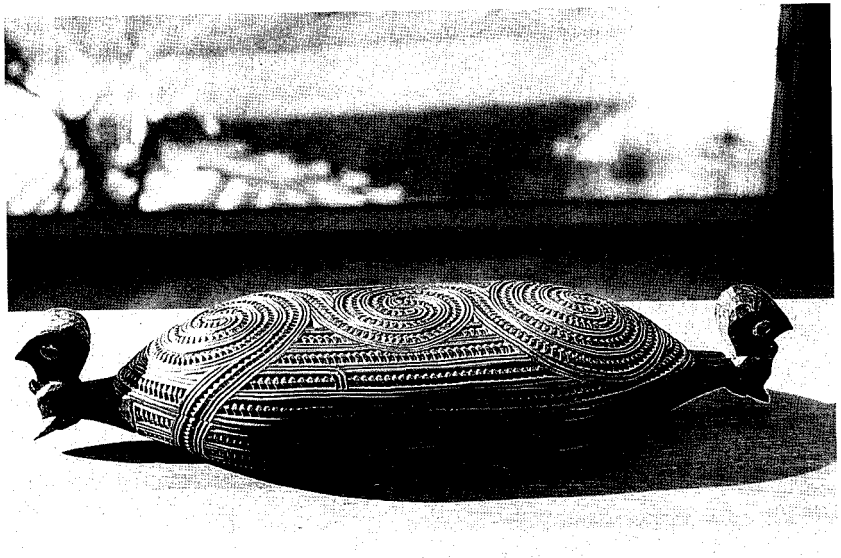

FIGURE 3. **An ornately carved waka huia. Such boxes housed the sacred tail feathers of the huia. The carved spirals depict the unfolding fiddle head of a tree fern, a Maori symbol of life and rebirth after death.**

Best 1942; Riley 2001). "Let the ears listen to the whispering of the pet of Tautu," implores a Maori song about a pet huia that once wandered the Tararua range. Tautu's huia was known throughout the district for its defamatory language and was consequently celebrated in song (Riley 2001). Rout (1926) noted that trained huias were indeed given considerable liberty, adding that they regularly returned to their cages, where they were periodically stripped of their valuable tail feathers.

Huia Snaring

The huia possessed little natural fear of people and was even curious of human activity. On trapping expeditions Maori fowlers tapped trees with sticks to arouse the huia's inquisitive nature (Riley 2001). Hunters, who often made no effort to conceal themselves, then mimicked the huia's call and lured the birds to within very close range, where they were readily snared. Huia snares were made of a flax fiber attached to the tips of poles called *tari* (Best 1942). Sometimes a huhu grub was tied to the snare as an additional enticement,

but Best (1942:223), who managed to capture a huia by hand without any artifice, reiterated that "the taking of the huia was by no means a difficult performance, for it had either a bold, simple, or trustful nature."

Huia Feather Trade

Due to New Zealand's temperate climate, Polynesians colonizing Aotearoa failed to establish most of their traditional tropical food crops such as coconut (*Cocos nucifera*) and breadfruit (*Artocarpus altilis*). Consequently, fowling became highly important and even assumed dietary primacy in some regions. Nearly all literature accounts of the huia describe the tapu nature of its flesh, but huia meat was almost certainly consumed for an indeterminate period in Maori prehistory. Moreover, as Polynesians began burning lowland forests, huia habitat diminished. Due perhaps to its dwindling range, the huia became tapu, and its feathers became the prerogative of chiefs. Eventually, an indigenous trade in huia tail feathers materialized.

The huia's limited distribution enhanced its value among the Maori (Best 1942). Yate (1970) stated that huia feathers were sometimes sent by Maoris in the Wellington area to tribes in the Bay of Islands 500 km north. Similarly, Best (1942) noted that feather plumes were passed from tribe to tribe by means of barter throughout the North Island and South Island. South Island Maori tribes exchanged greenstone for huia feathers, while tribes far to the north of the huia's range traded shark teeth for huia plumes (Orbell 1985).

Commercial trade in a species of high cultural saliency and of such a limited range and population as the huia is likely to terminate in extinction (Monson et al. 2003). Indeed, unless the extent of trade is highly restricted and a management strategy exists to ensure that no unauthorized commerce occurs, extinction is imminent. Such strategies for the conservation of wild-gathered species exist in nearly all traditional indigenous cultures (Colding and Folke 2000).

In Polynesia, unwritten rules or taboos historically prohibited activities deemed deleterious to society. Numerous taboos were designed to protect wild-gathered resources from overexploitation. Such prohibitions included the temporary closing of octopus gathering areas; forbidding the harvest of certain fish species during spawning season; size limits on fish harvested; restrictions on taking seabirds and their eggs; bans on entering turtle nesting areas; and permanent prohibitions against the taking of fruit doves and flying foxes in sacred forests (Johannes 1978; Brooke and Tschapka 2002). In New Zealand, taboos that forbade (either temporarily or permanently) the harvesting of wild-gathered species in order to ensure their perpetuation were called *rahui*. Some researchers dismiss the legitimacy of rahui, citing the Maori plunder of moas and other flightless birds as evidence that a conservation ethic

was absent among native New Zealanders (Anderson 1997). Others contend that such extinction events are precisely what led Polynesian societies to develop resource conservation strategies like rahui (Orbell 1985; Belich 1996). Still others, including Elsdon Best, are reluctant to implicate the Maori as the primary factor in the demise of the moas. It was Best's opinion that "though the stragglers of the moa family may have been killed off by the Maori, it is incredible that the extinction of the moas as a whole can be laid at their door" (Myers 1923:70). Best's faith in Maori conservation strategies may appear naive in light of modern revelations concerning the extinction of the moas, but his views are supported by geographer Patrick Nunn, who attributes the extinction of the moas to natural, catastrophic changes in New Zealand's forest structure approximately 1300 BP (Nunn 1993). Like Best, Nunn concedes that the Maoris played an ancillary role in the demise of the dinornithiformes, but it is presumptuous, he maintains, to place the entire blame on humans.

Rahui in Maori Forest Lore

Ecological conditions in Maori tribal areas were continually evaluated by individuals assigned as *kiatiaki*. Kiatiaki were stewards of all living things on behalf of past, present, and future generations (Gillespie 1998). For the Maori, the fruits of the land and sea were intended for human use, but when a particular forest or marine resource became vulnerable to overexploitation, its use was strictly prohibited (Best 1942; Best 1982; Riley 2001). Forest birds, for example, were protected by a rahui during the breeding season. "In olden times," wrote Raymond Firth (1929:138),

> birds were strictly preserved. When they were nesting, or when the young were newly fledged and unable to fly, no person was allowed to take them unless under circumstances of extreme need. A tapu was set upon the forest, and no one would dare break it.

The conservation value of rahui is also described in Meyers' (1923:69–70) account of Maori fowling ethics: "Birds formed a very considerable portion of the food of the ancient Maori," he noted,

> but his exploitation of these, as of all other forest products, was carried on under the most scientific and rigid supervision of the tohunga, or priestly expert. The most numerous and complicated rules were punctiliously observed as religious rites to prevent in any way the disturbance of the bird population, leading possibly to its exodus into the hands of another tribe; while on any signs of fright,

> diminution, or poor condition the tohunga might place under tapu either the whole of a certain area or all or certain of the bird species in that area.... All these restrictions were enforced purely by spiritual authority, acting on a living faith in immediate punishment.

Usually the protection of wild-gathered resources for a particular locality was manifest by a physical marker such as a stake either festooned with fern fronds or capped with a lock of human hair (Best 1942; Best 1982). In many instances, a chiefly declaration of the rahui was also issued. "Such a pronouncement as this," wrote Best (1942:163), "would very soon be known far and wide."

Penance for an inadvertent breech of rahui required that the offender offer a gift to the individual who had imposed the restriction, but intentional infractions could provoke warfare, particularly if conducted on burial or other sacred grounds (Riley 2001). Best (1942:165) described the potential consequences for such a desecration:

> when Mahia was slain at Te Papuni, the lands thereat were made-tapu at once, he being a prominent man of the district. Some of the people of the district violated the condition of tapu by procuring and consuming certain food-supplies of the land.... This enraged the widow of Mahia, who raised a party of her relatives at Maungapohatu, and descended upon Te Papuni like a wolf on the fold; when the raiders marched homeward they left the offenders past all need of future food-supplies.

Even more ominous in the Maori mind than the threat of physical punishment for a breach of rahui was the fear of retribution by the dread powers of witchcraft (Best 1982). When a high-chief or priest (*tohunga*) declared a rahui on a particular resource, it was strictly observed by the populace due to their "living faith in immediate punishment" (Meyers 1923:71). Domett (1883:150) similarly recognized the spiritual powers wielded by the tohunga: "Departed spirits were their dumb police, and ghosts enforced their lightest laws."

Riley (2001) noted that for the Maori, huia tail feathers were of celestial origin and were highly tapu. In some areas, only tohunga fowlers were permitted to capture huias. Best (in Meyers 1923:70) stated unequivocally that under the ancient regime of rahui, the Maori would never have exterminated a single species. "Man and birds," he argued, "had reached a state of equilibrium." Indeed, although the huia was tapu due to its close association with Maori elites, tapu also served an important conservation strategy against indigenous hunters who might otherwise have sought wealth and elevated social status

by trading huia feathers for other valuable items. By the 1840s, however, the cultural saliency of tapu and its power to conserve nature were steadily being eroded by the introduction to Aotearoa of a foreign cosmology.

Huia Commercialization and the Demise of Tapu

Nineteenth-century Europeans were ardent collectors of exotic wildlife mounts and study skins. Consequently, when word arrived from New Zealand of a bird possessing sexually dimorphic bills, orange wattles, and white-tipped tail feathers prized by Polynesian chiefs and shamans, the huia was instantly in demand. Although many specimens were harvested for display in colonial drawing rooms, dealers found foreign markets for mounted huias and study skins among museums, universities, and private collectors. During the latter half of the nineteenth century, several thousand specimens were shipped to Europe and the United States (Phillipps 1963).

To increase their success at harvesting huias, hunters hired Maori guides who, ironically, were willing accomplices in the assault on the huia. Dealers who trafficked in huia skins lured Maoris into harvesting the birds for miniscule cash rewards. In the 1880s, Buller (1888) recorded that a team of eleven Maoris, scouring the forests between Manawatu Gorge and Akitio, harvested 646 huia skins in a single month's time. Such a devastating raid could not have occurred without the widespread demise of the Maori taboo system. As Meyers (1923:70) noted: "Needless to say, tapu is now a thing of the past, and the present-day Maori shoots pigeons and kakas in great numbers with no more compunction than his pakeha [European] brethren." Krech (1999) investigated a similar phenomenon among eighteenth-century Native Americans, who ignored traditional hunting taboos and engaged in the European trade in deer and beaver pelts. He largely dismisses the conventional wisdom that American Indians were corrupted by Europeans into forsaking traditional conservation strategies. Instead, he opts for a view where Indians merely "created choices for themselves, defined new roles, [and] found paths in the new order in myriad and contradictory ways" (Krech 1999:152). Unlike the violation of eastern Native American hunting taboos described by Krech, however, historical Maori infractions of rahui could be lethal. Consequently, there was great incentive to adhere to traditional harvesting protocol unless the former system of physical punishment and faith in supernatural retaliation was no longer operational. Financial reward alone would have offered insufficient motive to desecrate traditional taboos in Aotearoa.

Early Christian missionary work in New Zealand coupled with the rapid and widespread immigration of colonists to the country in the mid-1800s introduced new customs and worldviews wholly alien to the Maori mind. In-

digenous beliefs and practices rapidly disintegrated (Cowan 1910). "Indeed, there was a disconsolate feeling among the older Maori at that time," notes Murdoch Riley (2001:37),

> that both their race and the native birds of the country were declining radically in numbers for the reason that belief in the old gods, spirits, and the laws of tapu had been forsaken.

Speaking of this loss of traditional Maori beliefs, a Maori informant of Best (in Riley 2001:38) somberly stated:

> We have no mana now.... Our clothing and our bodies are now washed with warm water, and there is no more tapu. We have abandoned our own gods and their laws.

Because the strictest laws of taboo had been abandoned, huia feathers were no longer the sole possession of elites. Soon, Maoris with any claim to rank desired at least one huia feather (Phillipps 1963). Despite the rapidly waning power of tapu, the demise of the huia was not lost upon the minds of Maori leaders. In the 1880s, several influential chiefs in Manawatu and Wairarapa tabooed the Tararua Range in an attempt to reassert the huia's former protection as a sacred species (Phillipps 1963), but such proclamations had lost their religious potency.

The erosion of cultural taboos coupled with the introduction of a new and powerful economic system may have been perceived by some Maoris, particularly those of lower social classes, as an opportunity to improve their status with both peers and colonists. Given that the preservation of native biological resources could not have appeared important in the new socioeconomic order, selling items of former value (such as huias) for things of modern worth (such as cash) was probably a rational, adaptive response to changing patterns of power.

While indigenous conservation strategies were rapidly deteriorating under Western religious and political pressures, New Zealand's colonial government was slow to implement Western-style conservation practices. In 1890, however, an event occurred that placed the huia's plight squarely on New Zealand's colonial consciousness. Lady Onslow, wife of New Zealand's governor-general, the Earl of Onslow, gave birth to a son in Wellington. It was the first time a governor's wife had borne a child in New Zealand. Newspapers drew attention to the fact that the child's birth coincided with New Zealand's fiftieth jubilee year since the signing of the Treaty of Waitangi and expressed the hope that a Maori name might be bestowed upon the child (Galbreath

1989). Governor Onslow, who was sympathetic to the plight of the Maori people, was enamored of the idea and sought advice from respected leaders regarding a name. Walter Buller, a close friend to the governor, suggested "Huia." The name was enthusiastically embraced and a week later, the child was baptized Victor Alexander Herbert Huia Onslow. As Galbreath (1989:179) noted: "The first three names were hardly noticed; in New Zealand he would always be Huia Onslow, and so he was known all his life." Newspapers reported that the culminating event of the ritual occurred when an elegant huia feather was affixed to the child's headband, a symbolic act that established the child as a chief in Aotearoa.

Several days after the infant's baptism, the Onslow and Buller families traveled to Otaki for a prearranged ceremony with the Ngati Huia, an important and aristocratic subtribe of the Ngati Raukawa (Phillipps 1963). Governor Onslow had evidently received prior permission to give his son the clan's name, and he now desired the child to be formally presented before the Ngati Huia elders for adoption into the tribe (Galbreath 1989). Upon arriving at Otaki, the governor's party was welcomed to the Ngati Huia marae. Buller, who spoke fluent Maori, translated for the group as the tribe's orator commenced speaking:

> Other governors have said kind things and done kind things, but it has been reserved for you, O Governor, to pay this great compliment to the Maori people—that of giving to your son a Maori name.... It has long been said, let the Pakeha and the Maori be one people.... We invoke the spirits of our ancestors to witness this day that in your son Huia the friendship of the two races becomes cemented.

Turning and pointing toward the distant mountains, the orator resumed his speech:

> There yonder is the snow-clad Ruahine range, the home of our favorite bird! We ask you, O Governor, to restrain the Pakehas from shooting it, that when your boy grows up he may see the beautiful bird which bears his name (Phillipps 1963:64; Galbreath 1989:180).

At the conclusion of the speech, Onslow replied by reciting a quote he'd seen engraved on one of his son's christening gifts: *E hoa ma, puritia mai taku huia*—friends, hold onto my huia! The phrase derived from an old Maori song and was most fitting as it was based on the figurative meaning of "huia," a word connoting something valuable. For the Maori, "the huia was like the pearl of great price," and Governor Onslow expended considerable

energy to ensure that the publicity surrounding his son's Maori name was linked to the bird's conservation (Galbreath 1989:180).

Buller wrote an account of the tribal ceremony in Otaki for the *New Zealand Times*. The story also appeared in British newspapers, where it was enthusiastically received by readers "as a tale of Empire: the fair child of a noble English house taking his place at the head of a dusky tribe, amid curious native customs" (Galbreath 1989:180). Newspapers pointed out that if strict measures were not swiftly taken to ensure the huia's protection, it would suffer the same fate as the moa.

Governmental protection for the huia did come, and the huia's inclusion on the Wild Birds Protection Act in 1892 was the direct result of an eloquent letter written by Governor Onslow to Prime Minister John Balance. Thereafter, on all hunting proclamations, a statement appeared that expressly prohibited any molestation of the huia. Reflecting on the former efficacy of Maori conservation strategies, Meyers (1923) pointed out that "the protection laws of our own time will bear not the faintest comparison with the game laws of the old-time Maori." Indeed, the law had little effect. In 1896, two dealers in the commercial traffic of New Zealand birds, Henry Travers and A. J. Jacobs, were convicted of killing seven huias. Each man was required to pay a £5 fine—hardly a deterrent since a single huia skin was worth more than that (Galbreath 1989).

Commercial harvesting was the major factor in the huia's extinction (Meyers 1923), but deforestation also reduced huia numbers. Buller (1905:157), for example, lived to see an extensive podocarp/hardwood forest near Wellington (where he had formerly collected numerous huias) converted to a district completely covered in "green pastures and smiling farms." The destruction of the bush, wrote Buller (1905:157), angered Maori leaders, who were greatly distressed over the huia's plight: "You have prohibited the killing of the huia under a heavy penalty," they told the colonial government, "and yet you allow the forests, whence it gets its subsistence, to be destroyed!"

In the early 1890s, the New Zealand government sponsored the first of a number of expeditions into North Island's southern ranges for the purpose of securing several huia pairs for liberation on offshore islands where they would be free from human persecution and habitat destruction. Specifically, Little Barrier Island north of Auckland and Resolution Island in Fiordland were identified as potential sanctuaries. Governor Onslow was the principal champion of this acclimatization project, but ornithologists such as Buller were pessimistic that huia relocation efforts would succeed (despite publicly supporting the governor's plan). Little Barrier Island, for example, was considered too warm and dry for the huia. Moreover, it was infested with feral cats (Galbreath 1989; Riley 2001). Despite these concerns, a reward of £4

per pair of live huias was promised to several individuals experienced in trapping the birds (Phillipps 1963).

Concurrent with efforts to prevent the huia's extinction, an event occurred that ultimately sealed the huia's fate. During his 1901 tour of New Zealand, the Duke of Cornwall and York, the future king, visited Rotorua where the local Maoris presented a grand welcoming ceremony (Phillipps 1963). During the affair a native guide ceremoniously removed the single huia feather from her hair and placed it in the hatband of the Duke as a gesture of respect and in acknowledgement of his royal status. Pictures of the simple act ran in London newspapers, and a British mania for the Maori symbol of rank and prestige commenced. The price for single huia tail feather began at £0.25, but soon increased fourfold to £1.00 (Phillipps 1963). Some years later, the price topped out at £5.00 for a feather in good condition. A huia with a full complement of twelve tail feathers became a highly valuable commodity. North of Wellington, hunters took to the mountains hoping to bag even a single bird. Other individuals pilfered feathers from mounted huias and museum study skins hoping to cash in. From his examination of huia specimens in New Zealand's Dominion Museum, Phillipps (1963) found that only six of fifty-three birds possessed all twelve tail feathers. Some museum skins possessed no tail feathers at all.

In the same year that the Duke visited Rotorua, Henry Travers offered to provide live huias for release on Little Barrier Island at £20 a pair (Galbreath 1989). This was five times the amount the New Zealand Government was willing to pay collectors for a pair of huias, and the offer was ignored. With the huia worth more dead than alive there was little incentive to turn in live birds. Unfortunately, law enforcement officials did little to discourage the thriving feather trade.

The last huia sighting documented by a trained ornithologist occurred in 1907. However, virtually all literature on the species suggests isolated pairs persisted for a considerable time afterward. A photograph of a preserved pair of huias, purportedly collected near York Bay, Wellington in 1912, appears in Fuller's (2001) account of the huia. A summary of alleged huia sightings after 1907, many of seemingly indisputable veracity, is detailed by Phillipps (1963).

Discussion

Rarity-Value Curves: A Model

The Polynesian taboo system of species management, as exemplified by the former protection of the huia in New Zealand, provides a predictive model for wildlife managers attempting to determine organisms likely to become

endangered by species commercialization. Species vulnerable to overharvesting are apt to possess high cultural value, while resilient species can be predicted to have comparatively low cultural value.[1] Several characteristics of each category are listed in Table 1.

The survival prognosis for species under monetized trade can also be represented by a series of curves on a graph where rarity is measured against cost or value. If N is the population size, k the population size at carrying capacity, V the monetary value attributed to a single individual at any point in time, and V_{max} the maximum value attained, N/k *versus* V/V_{max} can be plotted with both axes ranging between zero and one (Fig. 4). The diagonal line (where $N/k + V/V\text{max} = 1$) can be taken to represent a species for which increasing rarity results in a simple linear increase in value to the harvester/consumer. If the equation yields a number greater than one, that species will have a convex rarity-value curve and will most likely endure the impacts of commercial traffic. Species with convex curves were tabooed only periodically (if at all) by indigenous cultures. The extent of harvesting and trade in these species can be contained because consumers shift to alternative resources when rarity stimulates large price increases in the product. Examples of species likely to possess convex rarity-value curves include medicinal plants used to treat minor ailments for which alternative pharmaceuticals are available.

A concave trajectory occurs for species when the rarity-value equation yields a number less than one. Increasing rarity fails to arrest demand for these species because there are no comparable alternative resources. These species often possess low reproductive rates, have small geographic ranges, and occur in naturally low densities. Additionally, specimens (or their parts) of species that have concave rarity value curves are likely to impart prestige to their owner due to their cultural or monetary value. Orchids, whose singular beauty and extreme rarity ensure high prices, are an example. Species with concave rarity-value trajectories were either permanently tabooed by indigenous cultures or their use was restricted to a certain small segment of society—usually elites.

The Case of the Huia

In traditional Maori culture, the huia exemplified every characteristic typical of species of "high value," as listed in Table 1. Although it is impossible to

[1] By "low cultural value" I do not suggest low cultural usefulness. Rather, low cultural value in this sense implies limited monetary, trade, or religious value. In Polynesia, for example, resources such as coconuts and common fish species are important food items, but such readily obtainable resources lack significant trade value. Nor does the possession of such common resources impart prestige to the owner. Some rare food resources, however, such as flying foxes in Guam, do possess considerable cultural value.

TABLE 1. **Characteristics of Species Possessing High Value versus Low Value to an Indigenous Society***

Indices of Value	
High Value	Low Value
Rare	Ubiquitous
Hard to obtain	Easy to obtain
Restricted to elites	Available to everyone
Command respect	Do not command respect
Respect terminology	Common terminology
Associated with clan of distinction	No particular clan association

estimate precise population and carrying capacity figures for the huia at any point in time, the history of the species' rapidly appreciating value as well as its ultimate extinction permit the construction of a concave rarity-value curve. In 1901, the price of a huia tail feather was £0.25. A wild-harvested bird with a complete set of twelve tail feathers would therefore be worth £3.00. Huia feather values peaked in 1916 at £5.00, or £60.00 for a fully feathered specimen. In this instance, the V/V_{max} portion of the rarity-value formula becomes:

$$3/60 = .05$$

Any value for N/k less than 0.95 will produce a point that establishes a concave population rarity-value curve for the huia. In other words, regardless of whether the carrying capacity for the huia remained as high as 1,000 or had been reduced to as low as 100, unless the remaining habitat was at least 95 percent saturated with huias, the species had a concave curve. Hypothetically, if continuing deforestation had reduced the huia carrying capacity to a mere 300 birds by 1901, and one allows for a remaining population of 200 huias, one is left with the following N/k value for the rarity-value formula:

$$200/300 = .67$$

The complete rarity-value equation, then, yields the following sum:

$$200/300 + 3/60 = .72$$

Despite the great probability of this value being artificially high, it still establishes the huia as possessing a concave rarity-value curve (Fig. 5).

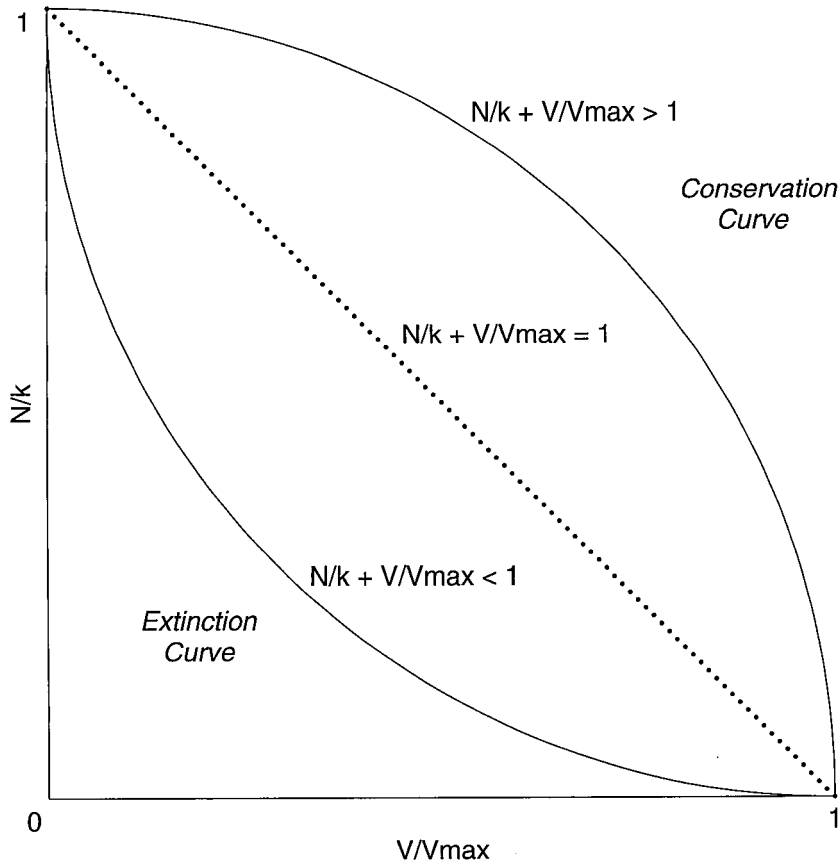

FIGURE 4. **Relationship between rarity and value for wild-gathered and commercialized species. Species with convex curves are likely to endure commercial harvesting by indigenous societies while species with concave curves are prone to extinction.**

Rarity-value trajectories can be constructed for any commercialized species provided that figures for carrying capacity, population, and maximum values are known or can be ascertained with reasonable accuracy. A rarity-value curve, for example, can be constructed for African elephants based on data derived from international trafficking in ivory (Barbier et al. 1990). Detailed harvesting records were also recorded by the Hudson's Bay Company during the eighteenth-century beaver pelt trade in eastern Canada (Carlos and Lewis 1995). Likewise, the government of Guam recorded population

and price histories associated with that island's recent trade in Pacific Island flying foxes (Wiles and Payne 1986).

The usefulness of the taboo-based conservation model is that it permits managers to predict wildlife population trajectories subsequent to species commercialization. The model can therefore help conservation efforts be proactive and proscriptive in guiding efforts to protect wild-gathered populations while ensuring sustainable harvests for indigenous gatherers. In the absence of population and price data for a commercialized species, the characteristics of "high value" species in Table 1 should be consulted.

Resource managers should be extremely wary of any action that might lead to the commercialization of a culturally salient or high value species. High value species were permanently tabooed by indigenous societies, who possessed profound knowledge of each organism's vulnerability to overexploitation. Even species that were only temporarily tabooed should not be commercialized unless harvesting techniques can be restricted to traditional methods. Indeed, rarity-value curves can flip from convex to concave by the adoption of modern harvesting technologies such as firearms and sonar fish-finding equipment (Monson and Cox, in review; McGuire 1997).

Conclusion

Elements of indigenous conservation strategies are increasingly incorporated into modern resource management models because traditional patterns of aboriginal resource use worked toward long-term horizons (Gillespie 1998). Such wise use practices, however, were not characteristic of original colonizers settling virgin lands, as the record of extinctions coinciding with Polynesian dispersal events attests (Steadman 1997). The loss of wild-gathered food resources through overexploitation and the resultant diminution in human carrying capacity, however, motivated many traditional cultures to develop conservation techniques. Indigenous societies, including the Maori, adopted sustainable practices because such measures helped ensure survival (Redclift 1987). The rahui system of wild-gathered resource conservation in New Zealand effectively served Maori society by curtailing the persistent and unsustainable harvesting practices that exterminated the archipelago's famed moas. Indeed, if a conservation ethic had never been adopted by the Maoris, their favorite bird of the bush, the huia, would have disappeared long before curious Europeans desired mounted specimens and emulated their future king by wearing the bird's prestigious feathers. Such taboos have proven highly effective in resource management, and while such strictures are quite recent in the developed world, they have been practiced for centuries by traditional societies (Johannes 1978). A modern analogue to the indigenous taboo system

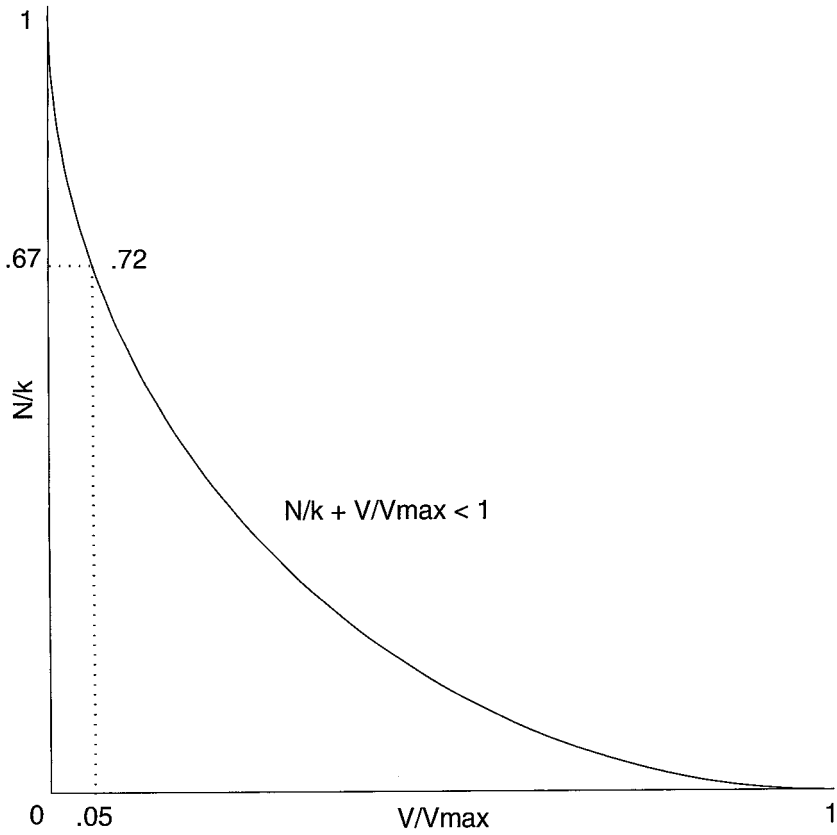

FIGURE 5. **Hypothetical concave rarity-value trajectory for the huia (based on population and value figures given in the text).**

of regulating trade in biological resources is the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES).

Walter Buller, privileged to witness and study New Zealand's stunning avifauna in the mid-1800s, resigned himself to the inevitability of its destruction. In his later years, he emigrated to England, and although he intended to return to New Zealand, he fell seriously ill. Feeble and unable to carry on in his former robust manner, Buller dictated the final pages of the *Supplement* to his monumental work, *A History of the Birds of New Zealand*. "The old order changeth," he reflected. Buller was ruminating on the fact that the native fauna, flora, and people of New Zealand were being supplanted by European invaders. He recalled the words of his elderly Maori friend, Ihaka,

who likewise lamented the demise of Aotearoa's native birds and the invasion of exotic species: "Now they are all gone—as completely as the moa! Soon also will my race vanish from the land, and the white man, with his sheep and his cattle and his birds, will occupy the country" (Buller 1905:11). In the end, the Maori people, and even some of New Zealand's indigenous avifauna, proved more resilient than Ihaka predicted. The huia, however, was doomed. Reflecting back to his antipodal roots in New Zealand and his adventurous life among the archipelago's unique biota, Buller wrote a characteristically colorful and poignant memorial to the huia:

> I do not know of any more picturesque sight in the New Zealand woods—now, alas! the opportunities are becoming few and far between—than that of a small party of these handsome birds, playfully disporting themselves among the branches, in the intervals between their customary feeding times. Take for our purpose a dense piece of native vegetation ... and furnish it, in imagination, with two pairs ... they are hopping actively from branch to branch, and at short intervals balance themselves and spread to their full extent their broad white-tipped tails, as if in sheer delight; then the sexes meet for a moment to caress each other with their beautiful ivory bills, while they utter a low, whimpering love-note; they bound off in company, flying and leaping in succession, to some favorite feeding-place, far away in the silent depths of the forest.

Buller had long foretold the huia's inevitable demise. The traditional cultural constraints that successfully preserved it for hundreds of years had been broken down and replaced by reckless exploitation. "*Ka ngaro i te ngaro, a te moa*" run the words of a Maori lament—"Lost as the moa is lost" (Anderson 1989). Indeed, as Galbreath (1989:11) noted, the huia "passed into a myth, a symbol of the nobility of an old New Zealand living on only in the mind."

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