NIHOA ISLAND TRIP REPORT, 23 SEPTEMBER TO 3 OCTOBER 2014

To: U.S. Fish and Wildlife Service, Hawaiian Islands National Wildlife Refuge, Honolulu, Hawai'i.

From: Sheldon Plentovich, Chris Farmer, Megan Laut, Annie Marshall, and Rachel Rounds

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EXECUTIVE SUMMARY

We conducted Variable Circular Plot surveys for Nihoa Millerbird (*Acrocephalus familiaris*) and Nihoa Finch (*Telespiza ultima*) 26 - 29 September 2014. Each of the 60 stations was surveyed 1–3 times. There were 297 Nihoa Millerbird and 512 Nihoa Finch detections, with a range of 0–8 and 1–13 for each species detected per survey, respectively. Both species were detected at each of the 60 survey stations. The detection rate of Millerbirds increased sharply between 2012 and 2013 and continued to increase in 2014, suggesting an increase in the Millerbird population. The detection rate of Nihoa Finches declined from 2012 to 2013, but increased in 2014. Nine banded Nihoa Millerbirds were resighted. Feather samples collected from 101 Nihoa Finches are being analyzed to identify any potential geographic differentiation within the population and the meta-populations level of heterozygosity and inbreeding. This, along with a photographic database of plumage variation in relation to sex, will be used to refine our ability to age and sex finches and will inform the age and sex composition of potential future translocation cohorts. Fourteen seabird species were observed on Nihoa (See Table 4 for information on species abundance and nesting phenology). Five species of migratory shorebirds were observed. A total of 96 grey bird locusts (*Schistocerca nitens*) were observed during passerine surveys, which is substantially more than the 25 observed in 2013. Dominant invasive ant species remained similar to last year and included three species. Fifteen native plant species and three invasive plant species were found. A single non-native sandbur (*Cenchrus echinatus*) was detected and removed. The plant was located down slope from Cluster 2, about 100 meters above our campsite, with a little bit of green growth still present. Weed cloth was placed at the new location to minimize sprouting of any remaining seeds. In addition, 50 individuals of New Zealand spinach (*Tetragonia tetragonioides*) were removed at the bottom of Devil's Slide. This is a substantial increase from last year when only six plants were found and removed.

ITINERARY

23 September. M/V Searcher departs Honolulu with all personnel aboard (see list below) at 07:45. Personnel include a 6-person terrestrial monitoring team and a 2-person monk seal team.

24 September. M/V Searcher arrives at Nihoa Island at 14:00. Disembark personnel and gear before 15:00. Begin setting up camp. Rounds, Plentovich, Farmer, Marshall and Aldeguer camp on island. Laut, Sullivan, Wurth sleep on vessel.

25 September. All personnel finish setting up camp. Rounds, Marshall, Laut, Farmer and Plentovich practice visual and aural bird identification and calibrate distance estimation with the naked-eye and rangefinders in preparation for passerine surveys. Terrestrial team set mist nets and began collecting feather samples from Nihoa Finches.

26 - 29 September. In the morning, Farmer, Plentovich, Rounds and Marshall conducted passerine point counts at established points and Laut initiated invasive plant surveys and control. In the afternoon, personnel captured and obtained feather samples from Nihoa Finches.

30 September – 1 October. All terrestrial personnel participated in capture and collection of feather samples from Nihoa Finches. Arthropod surveys and invasive plant control were conducted in Devil's Slide. Due to concern over increasing swell size that might make a 2 October off-load difficult, heavy items were off-loaded on 30 September.

2 October. Searcher departs Nihoa Island at approximately 07:30. All camp materials and refuse were removed from island.

3 October. Arrive in Honolulu at approximately 15:30 hrs. All personnel disembarked.

PERSONNEL:

- Sheldon Plentovich: Project Coordinator, United States Fish and Wildlife Service (USFWS)
- Rachel Rounds: USFWS
- Megan Laut: USFWS
- Rachel Rounds: USFWS
- Annie Marshall: USFWS
- Chris Farmer: American Bird Conservancy
- Tracy Wurth: National Oceanic & Atmospheric Administration (NOAA), Monk Seal Recovery Team
- Mark Sullivan: NOAA Monk Seal Recovery Team
- Walterbea Aldguer: Office of Hawaiian Affairs

OBJECTIVES:

- Conduct Nihoa Millerbird and Nihoa Finch population survey using distance sampling techniques at 60 points across the island.
- Collect feather samples from 100 Nihoa Finches for genetic analysis
- Resight previously banded Nihoa Millerbirds to collect data for demographic analyses.
- Search for and remove all individuals of the invasive grass *Cenchrus echinatus*.
- Remove all individuals of the invasive plant *Tetragonia tetragonioides*.
- Observe and record phenology and abundance of seabird and shorebird populations.
- Observe and record phenology and abundance of native and invasive flora.
- Observe and record phenology and abundance of native and invasive terrestrial arthropods.
- Sample invasive ants at likely introduction points.
- Survey for and opportunistically tag and observe Hawaiian Monk Seals.

NIHOA MILLERBIRD AND NIHOA FINCH POPULATION SURVEYS, OBSERVATIONS AND GENETIC ANALYSIS

Methods

Population Surveys. We surveyed a set of 60 stations 1–3 times with variable circular plots (VCP) to determine the density and calculate the abundance of Nihoa passerines (Figure 1 and 2). This same set of stations was also surveyed in 2013. The points were selected based upon 3-m resolution Quickbird2 satellite imagery (taken 17 April 2008), and corrected in the field if points were too close to cliffs or obstructions. The points were dispersed across the entire vegetated area of the island (Figure 1 and 2), with each point separated by 80–100 m. The 90% detection probability for the point counts in 2010–2011 was 40 m for Millerbirds and 34 m for Nihoa Finches (Gorresen et al. 2012), so this separation was chosen to minimize double-counting birds. Gorresen et al. (2012) inspected contemporary satellite imagery of Nihoa Island, and calculated the vegetated area of the island suitable for passerine habitat as 61.9 ha (6,663,000 square feet). This value will be used to calculate the abundance once the density is calculated in Program DISTANCE.

Each observer stood at the survey station and recorded the horizontal distance to every Nihoa Finch and Millerbird detected by sight or sound. The time and the initial habitat the bird was using were recorded for each detection. A digital range finder was used to measure the distance to each bird, with distances <10 m (below the range finder's operational range) estimated by the observer. Each observer also recorded percent cloud cover, precipitation, wind, dominant plant species, and percent cover. Precipitation was rare and never more than a "light rain" (VCP category 3), but high winds were a frequent problem. Only surveys with winds <13 mph were analyzed (0–3 on the Beaufort scale; two surveys with wind scores of 4 were excluded). All counts were started between 06:45 and 11:05 HST. We surveyed most stations twice, but some stations were surveyed one or three times (Appendix I).

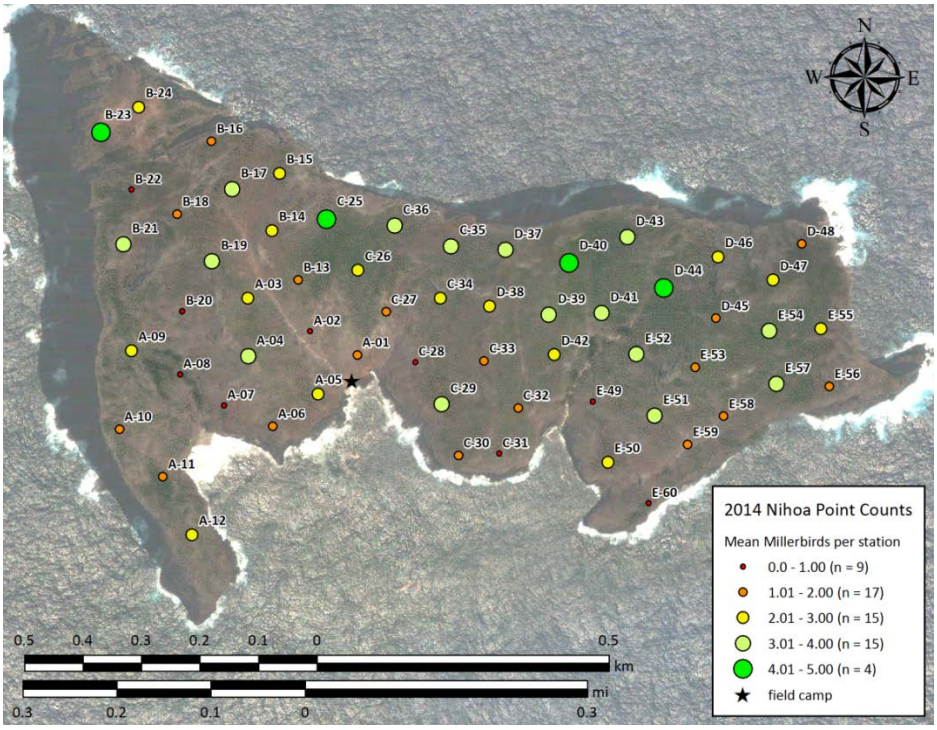

Figure 1. Mean detections of Nihoa Millerbirds at the 60 VCP stations in 2014

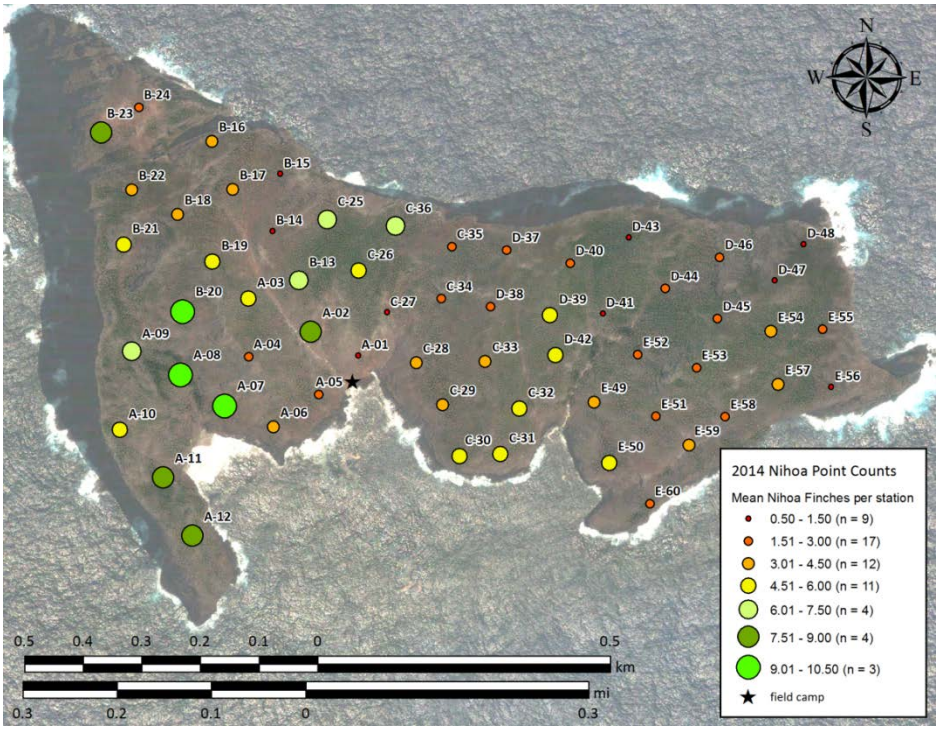

Figure 2. Mean detections of Nihoa Finches at the 60 VCP stations in 2014.

Resights and Incidental Observations. During the VCP surveys any banded Millerbirds were noted. After the VCP surveys were completed, the surveyors attempted to resight additional banded birds as they returned to camp. The surveyors also searched for nests, particularly of the Nihoa Finch, in the vegetation during the afternoon return to camp.

Nihoa Finch Banding and Genetic Analysis. This expedition also captured Nihoa Finches to collect feather samples for genetic analysis and to photo-document plumage variation. The genetic analysis will be used to identify the sex of each bird and any potential geographic differentiation and the meta-populations level of heterozygosity and inbreeding. These data, combined with information and photographs on plumage, will be used to refine our ability to age and sex finches (e.g., Banks and Laybourne 1977) and will inform the age and sex composition of potential future translocation cohorts. Areas with high densities of finches that also had suitable mist-net lanes were selected, and then the birds were gently herded towards the modified mist nets by the capture team (Figure 3A-B). We worked in teams of 2–5 people. Every bird's leg was measured with a banding leg gauge, and if size-appropriate, a silver USFWS band (size 1B) was placed on its right leg. All birds were released at their capture site.

Results

Population Surveys. Each of the 60 stations was surveyed 1 - 3 times from 26 - 29 September 2014 by Farmer, Marshall, Plentovich, and Rounds for a total of 121 surveys (Appendix I). There were 297 Nihoa Millerbird and 512 Nihoa Finch detections, with a range of 0 - 8 and 1 - 13 for each species detected per survey, respectively. Localities and number of stations surveyed before 2013 were substantially different (Marshall et al. 2012, VanderWerf et al. 2011), so the mean detections per effort are not directly comparable (Table 1).

Every station surveyed had at least one Nihoa Finch detected (Figure 2). They seemed to be more common in the western half of the island, particularly in the southwest to northeast band from West Valley – West Palm Valley – Miller's Valley – Middle Valley. They were less common on the slopes of Tanager Peak down along the eastern edge of the island and at the unnamed high spot in the middle of the island (D37, D38, C34, C35). Millerbirds were distributed across the island with all stations having at least one Millerbird detected across all surveys (Figure 1), as opposed to 2013 when some stations had no Millerbirds across all surveys. They seemed to be more common in an arc across the island's mid-higher elevations (E57, D44, D40, D37, C35, C36, C25). The lowest detections tended to be at the lower elevations (E60, A08) or edges of the island (B22). The 2010 - 2014 datasets, some of which included strip transects and VCP surveys, were analyzed in hopes of improving the accuracy of population estimates and trends (Gorrensen et al. in review). Over that period, the population trend for Millerbirds is inconclusive and the trend for Nihoa Finch appears to be increasing since the 1990s (Gorrensen et al. in review).

Figure 3A-B. Two mist-net locations for capturing Nihoa Finches used during 2014 (photos by C. Farmer).

Table 1. Number of Nihoa Millerbirds and Nihoa Finches detected on point counts from 2010 - 2014 (See Marshall et al. 2012 for details on 2010 – 2012 data and Plentovich et al. 2013 for 2013 data).

Species	Year	# Stations	Survey Effort[1]	Detections	Detections/Effort
Nihoa Millerbird	2014	60	121	297	2.45
	2013	60	180	270	1.50
	2012	108	263	116	0.44
	2011	108	200	284	1.42
	2010	90	91	197	2.16
Nihoa Finch	2014	60	121	512	4.23
	2013	60	180	569	3.16
	2012	108	263	1447	5.50
	2011	108	200	681	3.41
	2010	90	91	373	4.10

[1] total number of surveys conducted during each year.

Resights and Incidental Observations. The majority of Millerbirds were unbanded, with only nine resights of banded birds collected in 2014 (Table 2). No morning hours were devoted to resights but observers were focused on determining if birds were banded during the afternoon as personnel hiked back to camp.

Observers, especially Plentovich, Rounds and Farmer, spent the afternoons searching for Nihoa Finch nests in the vegetation, but were unsuccessful. The proposed finch translocation sites (Lisianski and Kure) do not have natural rocky substrate and therefore determining the plasticity of the species' nesting requirements is a high priority for planning translocation of Nihoa Finches. All previously documented Nihoa Finch nests occurred in rocks, cliffs, rubble, or other similar substrate (Amerson 1971, Berger 1981, Conant 1983, Morin and Conant 2002, Richardson 1954, Sincock and Kridler 1977, Vanderbilt and de Schauensee 1941). Of note, Mark MacDonald (*pers. comm.* on 5/27/15) said that he found a Nihoa Finch nest near the center of a tussock of *E. variablilis* just below Miller's Peak during the summer of 2007. He mentioned that it was placed similarly to Laysan Finch nests found regularly on Laysan.

Table 2. Resights of color banded Nihoa Millerbirds in 2014.

Date	Time	Obs [1]	Color combo [2]	Latitude (N)	Longitude (W)	Comments
9/25/14	09:13	SMP	Y/O:W/S	23.06103°	-161.92331°	with an unbanded (?) NIMI.
9/25/14	10:38	CAF	O/B:S/Bk	23.06110°	-161.92370°	Alone in *Solanum nelsonii*. Not singing
9/25/14	10:49	RAR	W/Y:O/S	23.06156°	-161.92377°	alone in *Sida fallax*, not singing, probably female.
9/26/14	10:52	SMP	Y/O:G/S	23.063037	-161.92758	
9/26/14	16:08	CAF	Y/O:W/S	23.06125°	-161.92343°	chipping and calling, moving alone through *Solanum nelsonii.*
9/27/14	15:39	RAR	O/Y:B/S	23.06125°	-161.92238°	
9/27/14	——	CAF	W/W:G/S	23.06120°	-161.92299°	paired with unbanded NIMI, chipping and moving together in *S. nelsonii.* Near point C-26.
10/1/14	11:50	RAR	W/W:G/S	23.06119°	-161.92257°	singing in *Sida fallax* on central plateau.
10/1/14	0800	SMP	S/B:G	23.06125°	161.92488°	Singing male

[1] observer: CAF = Chris Farmer; SMP = Sheldon Plentovich; RAR = Rachel Rounds
[2] color bands: B = blue; Bk = black; G = green; O = orange; S = silver; W = white; Y = yellow

R. Rounds detected a leucistic Millerbird, near survey point E-56 (lat: 23.05955°, long: -161.91509°). This bird had white tail feathers and flight feathers, but its body was a mottled white and gray (Figure 4). This bird was singing, so is likely a male. A similar, or the same, bird was seen by Daniel Tsukayama in 2012.

Figure 4A, B. The leucistic Millerbird observed approximately 30 meters from the eastern most cliffline of Nihoa near survey point E56 (Photos: Rounds).

Nihoa Finch banding and genetic analysis. We captured 101 Nihoa Finches in 29.5 hrs of banding from 25 September–1 October 2014. We put size 1B aluminum USFWS bands on 73 finches, the legs of the other 28 birds did not fit this band size (most individuals were larger), so these birds were released

without a band. We marked the unbanded birds' tail feathers with a sharpie marker to prevent re-sampling the same bird at a site. The finches were captured from across Nihoa (Figure 5), although the largest portion were from the central section of the island - Miller's Valley (n = 27) plus the central plateau region (n = 14). There was also significant numbers of finches captured from East and West Palm Valleys, as well as the flat plateau northwest of Miller's Peak.

Results: The Nihoa Finches' morphometrics were entered in an Access database and the genetic analysis of feathers is underway. Adam Vorsino (USFWS) is conducting the analyses and expects it to be completed by May 2016. The genetic analyses will also identify the sex of each bird and will allow us to construct a photographic database of plumage variation. See Appendix 2 for a characterization of plumage variation in Nihoa Finches.

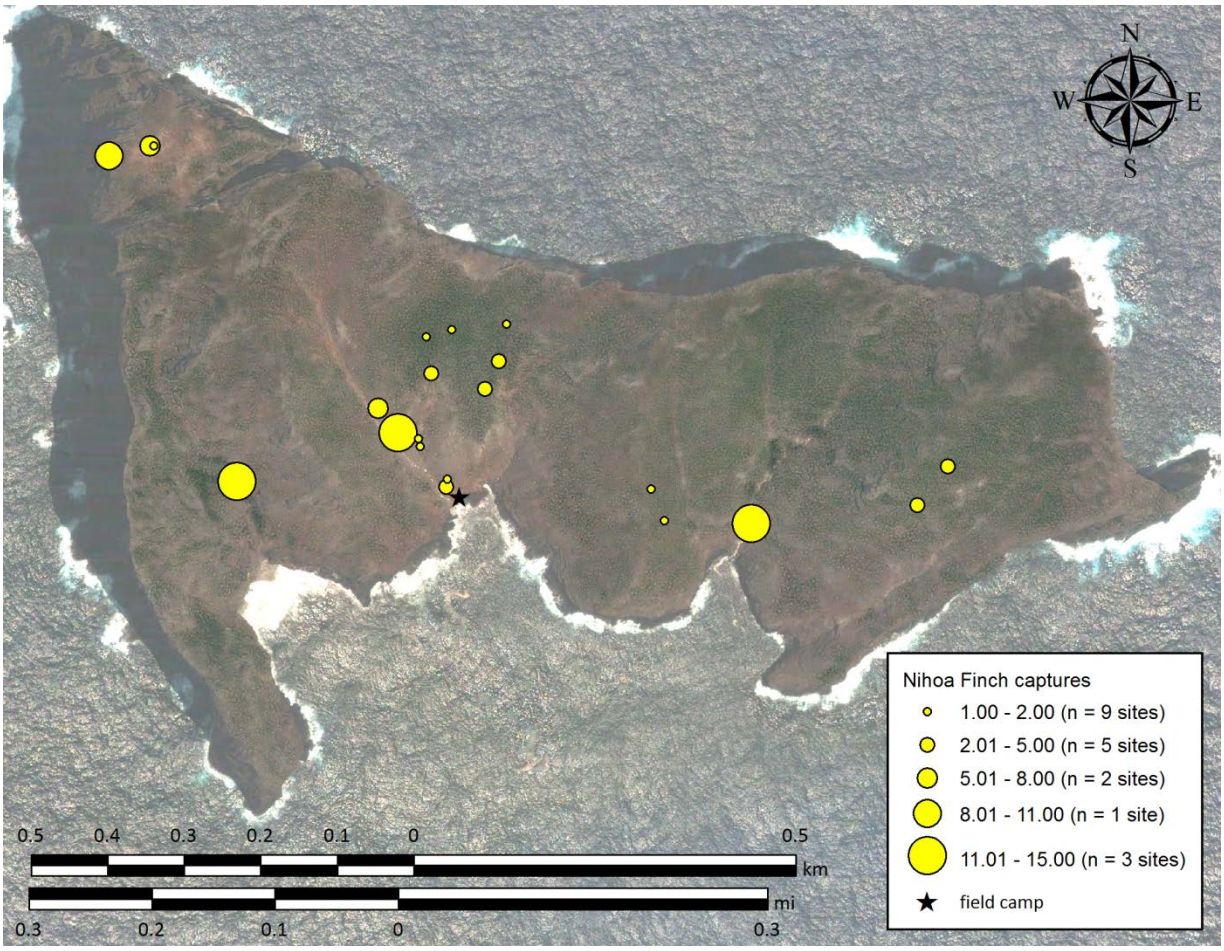

Figure 5. Number of Nihoa Finches mist-netted at each of the 20 capture sites on Nihoa in 2014.

***Miscellaneous Behavioral Observations*:**

Seabirds

Table 4 provides a summary of the presence, order-of-magnitude abundance, and stage in breeding chronology of Nihoa's seabirds. Summary notes on each species are presented below. In general, the

majority of birds were not breeding. The species with the greatest number of unfledged chicks were Frigatebirds and Red-footed Boobies. A large number of fledged Red-footed and Brown Booby chicks were also observed. No nests with eggs were observed for any species.

Wedge-tailed Shearwater or **`Ua`u** (*Puffinus pacificus*). Abundant throughout the island. Birds were still calling through the night and early morning. A handful of chicks were observed.

Christmas Shearwater (*Puffinus nativitatus*). Birds were present in low numbers throughout the island and were heard calling at night. A few chicks, close to fledging, were observed.

Bulwer's Petrel or **`Ou** (*Bulweria bulwerii*). Common on island with chicks near fledging.

Red-footed Booby or **`A** (*Sula sula*). Very common and widely distributed where woody shrubs and palms provided suitable nesting and roosting substrate. Downy to fledged chicks observed.

Brown Booby or **`A** (*Sula leucogaster*). Brown Boobies were most numerous on steep slopes, cliffs and cliff-edges around Miller's Peak, Tanager Peak, and the edges of the island generally, and along the rocky ridges of the island. Many fledged juveniles observed as well as downy and partly feathered chicks. A handful of Brown Bobbies followed the Searcher as we departed the island, including some fledged juveniles.

Masked Booby or **`A** (*Sula dactylatra*). There were numerous fledged young on Miller's Plateau. There was also a large group of adults congregating nearby.

Great Frigatebird or **`Iwa** (*Fregata minor*). Roosting adults, fledglings, and nests were abundant throughout the island in areas where woody shrubs provided suitable substrate. Young of the year ranged from chicks with little down remaining to fledglings. No eggs or small chicks were seen.

Red-tailed Tropicbird or **Koa`e Ula** (*Phaethon rubricauda*). Low numbers of adults in aerial courtship were seen and heard around the island. A few partially feathered chicks observed.

Sooty Tern or **`Ewa`ewa** (*Sterna fuscata*). Low numbers of adults and chicks were heard vocalizing in flight over the island (*e.g.*, at night, from camp), and seen flying along cliffs. The greatest concentration of Sooty Terns was observed on the east side of the island.

Gray-backed Tern or **Pakalakala** (*Sterna lunata*). Widely distributed at low density around the island. No chicks were seen, but a number of fledged young were observed.

Brown Noddy or **Noio Koha** (*Anous stolidus*). Very abundant. Adults, juveniles, and a few young were present throughout the island. Most of the few chicks observed were well feathered; several downy young were also observed.

Black Noddy or **Noio** (*Anous minutus*). Black Noddies were observed flying along sheer cliffs of the northern and western sides of the island and perched on the rocky ledges over the cliffs. Rarely observed flying over the island. Because Black Noddies are restricted to these cliff habitats, abundance and phenology were difficult to determine for this species.

Blue-gray Noddy (*Procelsterna cerulea*). Especially numerous on the sheer cliffs of the northern side of the island. No nesting activity was observed. Because Blue-gray Noddy nesting apparently is concentrated in these cliff habitats, abundance and phenology were difficult to determine for this species. There were a number of birds that roosted near camp.

White Tern or **Manu-o-ku** (*Gygis alba*). Observed flying along sheer cliffs of the northern and western sides of the island and perched on the rocky ledges protruding from cliff faces. Rarely observed flying over the island. Because White Terns are restricted to these cliff habitats, abundance and phenology were difficult to determine for this species.

Table 4. Approximate order of magnitude for seabird abundance and nesting phenology on Nihoa Island, 23 September 2015.

Species	**Relative Abundance, Order of Magnitude**[1]	**Nesting**	**Chicks Present**
Laysan Albatross	0	No - absent	No - absent
Bulwer's Petrel	1000s-10,000	Yes	Yes – near fledging
Wedge-tailed Shearwater	10,000s-50,000+	Yes	Yes – downy to partly feathered
Christmas Shearwater	1000s	Yes	Yes - near fledging
Tristram's Storm-petrel	0	No - absent	No - absent
Red-footed Booby	10,000s	Yes	Yes - downy to partly feathered and lots of fledged chicks
Brown Booby	100s-1000	Yes	Yes – downy to partly feathered
Masked Booby	100s-1000	Finished	Yes, many fledged young
Great Frigatebird	10,000s-50,000+	Yes	Yes, chicks in nests and many fledged young also observed
Red-tailed Tropicbird	100s	Yes	Yes, large chicks
Sooty Tern	100s	Finished	Fledged
Gray-backed Tern	1000s	No	Fledged young present
Brown Noddy	>50,000	Yes	Yes, a few chicks observed
Black Noddy	Common on sheer cliffs	Unknown	Unknown
Blue-gray Noddy	1000s, maybe more	Unknown	Unknown
White Tern	Common on sheer cliffs	Unknown	Unknown

[1]These numbers are coarse order-of-magnitude estimates, based on qualitative assessment of the relative abundance of the species observed during this trip.

INDIGENOUS MIGRATORY BIRDS

Pacific Golden-Plover or **Kolea** (*Pluvialis fulva*). Scattered individuals were seen in uplands and on the rocky shoreline. Estimated 10-15 individuals observed.

Ruddy Turnstone or **'Akekeke** (*Arenaria interpres*). This species was common, with individuals observed foraging on the rocky shoreline and small flocks seen in the uplands. Estimated 10-20 individuals observed.

Wandering Tattler or **'Ulili** (*Heteroscelus incanus*). A flock of about 11 birds was observed flying away from the landing site, and scattered individuals were also seen in the uplands and on the rocky shoreline.

Bristle-thighed Curlew or **Kioea** (*Numenius tahitiensis*). One observed on Miller's Plateau.

Sanderling or **Hunakai** (*Calidris alba*)**.** One observed in camp.

NON-NATIVE BIRDS

Cattle Egret (*Bubulcus ibis*): One Cattle Egret was detected at 07:53 during point count surveys on 26 September by C. Farmer. This bird was approximately in the middle of West Palm Valley (station A09), and was never seen again by any surveyor on Nihoa this year.

Northern Mockingbird (*Mimus polyglottos*). None observed.

MONK SEAL OBSERVATIONS

Two NOAA Monk Seal Recovery Program biologists (Tracey Wurth and Mark Sullivan) joined us on this trip. During day trips to Nihoa from the M/V Searcher, the seal team accomplished the following tasks: 1) conducted 7 monk seal surveys (including three surveys of the western ledge; 2) flipper tagged 10 monk seals (8 weaned pups and 2 adults); 3) applied temporary bleach marks to 11 seals; 4) conducted one necropsy on a young pup; and 4) performed testing and maintenance on the time lapse camera systems mounted above the main beach at Nihoa. During the trip, the team identified a total of 59 unique seals.

TURTLES

Opportunistic observations of green sea turtles (*Chelonia mydas*) were recorded. Two turtles were observed on 25 September and one turtle was observed below East Palm valley on 27 September.

NATIVE ARTHROPODS

Nihoa Trap-door Spider (*Nihoa mahina*). Plentovich observed and photographed two individuals near the middle and bottom of Devils Slide on 1 October 2014 (Figure 5). One individual had at least 12 babies that were exposed when a rock was dislodged.

Figure 5. Nihoa Trap-door spider near the middle of Devil's Slide (Photo: Plentovich).

Nihoa Conehead Katydid (*Banza nihoa*). *Banza* was not observed in 2014. In 2013, Rounds found the exoskeletons of two adult individuals in the main wash above camp on 27 and 28 September.

Unknown Lycosid (Family Lycosidae). This spider not seen in 2014 but was fairly common in Devil's Slide in 2013.

Perkin's Yellow-faced Bee (*Hylaeus perkinsianus*). A total of three males were observed. One of which was along the eastern edge of the island on *P. villosa* (Figure 6) and the other two were in camp.

Figure 6. Male Perkin's yellow-faced bee collecting floral resources from a *Portulaca villosa* flower (Photo: Plentovich).

ALIEN ARTHROPODS

Gray Bird Grasshopper (*Schistocerca nitens*). In an attempt to estimate relative abundance of this species, bird counters noted all locusts encountered during transit to counting points. A total of 96 grasshoppers were observed on the passerine bird survey transects, which was substantially more than the 25 reported in 2013. The highest single day tally in 2014 was 16. The species seemed more common on the east end of the island.

Invasive ants (Family Formicidae). Invasive ants were collected using bait stations and during visual searches around camp and at the base of West Palm Valley. Three species of invasive ants were collected during the 1 October 2014 survey of 13 stations initially established in 2013. There are seven stations along the ledge through camp and then six additional points moving north up the main wash. Stations are separated by at least 15 m. Surveys involved placing centrifuge tubes baited with peanut butter, honey, and Vienna sausage in the shade for approximately one to two hours. Similar to last year, *Paratrechina longicornis* was the most widespread species observed and occurred at eight of 13 stations (Table 4). Both *Tetramorium bicarinatum*, and then *Monomorium floricola* occurred at 4 of 13 stations (Table 4). *Tapinoma melanocephala* was observed at bait stations in 2013, but not this year. *Cardiocondyla kagutsuchi/venustula* was hand-collected on the beach below West Palm Valley in 2013, but not in 2014. No new species were observed and the ant community appears stable. All ants were identified by Plentovich.

Table 4. Numbers of invasive ants identified at thirteen survey points at camp and along the wash above camp.

Point	*Paratrechina longicornis*	*Tetramorium bicarinatum*	*Monomorium floricoloa*
1	10	1	0
2	3	0	0
3	0	50	0
4	0	0	1
5	0	0	20
6	0	0	130
7	120	0	0
8	2	0	0
9	3	0	50
10	50	0	0
11	1	70	0
12	0	20	0
13	3	0	0

NATIVE PLANTS

'Emoloa (*Eragrostis variabilis*). Observed in abundance throughout the island, particularly on the south-facing slopes of Millers Peak and Tanager Peak where this plant is dominant. Most plants consisted of more than 50% dry matter with empty seed heads, though some plants still displayed ripe seed.

Kakonakona (*Panicum torridum*). This native bunch grass was common and widespread over much of the island, but all plants observed had senesced and were brown and withered.

Kīpūkai (*Heliotropium curassavicum*). A few individuals were found at base of West Palm Valley.

Lo'ulu (*Pritchardia remota*). Lo'ulu stands in West Palm Valley and East Palm Valley remain healthy. Fruit and flowers were present. There are also a few individuals above camp and in Middle Valley.

Rumex albescens. A few hundred healthy plants were observed in the lower section of Devil's Slide. No fresh flowers or seeds were observed. The plant was doing well, but remains limited to the rich soil and semi-shaded areas in this locale.

'Āweoweo (*Chenopodium oahuense*). This species was sparsely distributed on steeper slopes and ridges, and more common on Miller's Plateau, Devils Slide, Central Valley and Dog's Head. Several plants were observed with seeds. Many plants showed evidence of herbivory.

Schiedea verticillata. Like *Rumex albescens*, this endemic species was mostly found in the lower section of Devil's Slide, though it is also found on other areas of the island during spring and winter months.

‘**Ohai** (*Sesbania tomentosa*). ‘Ohai was common over much of the island. This plant, though apparently perennial, seems to have a pattern of senescence on Nihoa, with large (up to 1 m) ‘skeletons’ of dead individuals common over the island, and new seedlings emerging around this time of year.

Nohu (*Tribulus cistoides*). A few individuals were noted on the rocky ridges of the eastern end of the island. No seeds or flowers were observed.

***Amaranthus brownie*.** Not observed.

‘Akoko (*Chamaesyce celastroides*). This species was common on the rocky ridges on the eastern and western ends of the island, where it often formed thick stands. Plants were observed with flowers and seeds.

‘Ilima (*Sida fallax*). ‘Ilima was very abundant on the island. This species exhibited a large range of characteristics; from long, nearly leafless stems, to leafy verdant shrubs. Many plants had both flowers and seeds.

Ipomoea indica. Not observed

Pōpolo (*Solanum nelsoni*). One of the most abundant plant species on Nihoa, the pōpolo on Nihoa displays a large range of characteristics and leaf-shapes. While some plants exhibited sparse, fuzzy, silver-green foliage, other plants had large leaves (10 cm), with a waxy appearance. This variance does not seem to be phenological, but reflective of the substrate in which the plant grows. The plants were heavy with fruit, though not as prolific as last year, ranging in color from light orange or red to purple or black.

Sicyos pachycarpos. This species was observed in a small patch on the northeast face of Miller’s Peak where it is commonly present, and at the top and throughout Devil’s Slide. Plants were observed with flowers and seedpods.

Portulaca lutea* and *Portulaca villosa. Both *Portulaca* species were common in steep rocky areas and were especially common on Dog’s Head. Both species were observed with flowers. Perkin’s yellow-faced bee was observed on a *P. villosa* flower.

NON-NATIVE PLANTS

***Portulaca oleracea*.** This species was commonly observed in less rocky areas with substantial amounts of soil. The species was observed along the trail from the landing to camp.

Sandbur (*Cenchrus echinatus*). This species was previously recorded on Nihoa in 1961, 26 August 1968, May 1969, and a single plant was pulled on the slope above the camp area in 1981 by S. Conant (Conant 1985). It was not seen again until September 2011 when six small patches were observed in two distinct areas. The first area (Cluster 1) was located in Miller’s Valley and consisted of four plants, and the second area (Cluster 2) was observed in the lower part of Middle Valley and consisted of two plants (Figure 8). The plants were almost completely yellow and dry and the remaining plant matter and the

fallen seeds were collected and removed. Areas with the highest concentration of fallen seeds were covered with black plastic trash bags.

In 2012 four *Cenchrus* plants were observed and pulled from two areas (one known from 2011 and one new). Two plants were completely dry and two had some green growth at the base of the plants; one of these had three green seeds. Of the four plants observed, just one was outside of the two areas where *Cenchrus* had been documented in 2011. This single individual was found and pulled by D. Tsukayama on the western ridge above Miller's Valley, constituting a third distinct area where *Cenchrus* was found recently. The other three plants were found within Cluster 1, very near to where plants had been observed in 2011. No additional *Cenchrus* plants were observed in the area around Cluster 2.

In 2013, recent locations of *Cenchrus* were re-visited, but no evidence of any recruitment, plants, or plant material was found at those locations. In an effort to increase the likelihood of detecting new plants, surveys of 50-m concentric circles were conducted around each prior detection locality during this trip. No plants were observed at recent sites. However, one plant was detected during opportunistic surveying outside of the known *Cenchrus* points and their buffers. The plant was located down slope from Cluster 2 and was about 100 meters above our campsite. The plant was removed and ground cloth was laid down to prevent future recruitment in the immediate vicinity.

In a short reconnaissance visit during June 2014, three new *Cenchrus* plants were detected at two sites (Table 5; Duhr-Schultz *et al.* unpubl. data). All plants were removed and seeds encountered were removed. During the subsequent September trip, each of the 2011–2014 detection sites was revisited between 25 – 27 September, and a 50-m area around each site was searched. No living or dead plants were detected.

Identifying this weed once it has senesced is extremely difficult, since it can be mistaken for the native grasses *Panicum torridum* and *Eragrostis variabilis*, which were also in senescence and mostly composed of dry leaf matter during our September surveys. The photograph in Figure 7 was used as a visual aid to differentiate *Cenchrus* from *Eragrostis*, in particular we used the corkscrew culm as the primary distinguishing feature. Future trips in Spring and early Summer while *Cenchrus* is still green and therefore easier to find, but prior to seed production, will improve the success of control efforts.

Excluding opportunistic searching during passerine surveys, approximately 8 hours were spent surveying for *Cenchrus* on Nihoa.

The presence of *Cenchrus echinatus* on Nihoa is of great concern given the history of *Cenchrus* in the archipelago and the relatively pristine condition of the island. The currently limited occurrence and distribution of this species on the island supports immediate action to eradicate it before it becomes established.

Table 5. Localities where *Cenchrus* has been found on Nihoa Island. See VanderWerf *et al.* 2011, Marshall *et al.* 2012, and Plentovich *et al.* 2013 for more details.

Number	Year Found	North_Lat.	West_Long.	Comments
1	2011 & 2012	23.061253	161.924272	Area covered with weed cloth, no *Cehchrus* obs. in 2013, 2014
2	2011	23.060213	161.922736	No *Cenchrus* obs. in 2012, 2013, 2014
3	2011 & 2012	23.061154	161.924321	Area covered with weed cloth, no *Cenchrus* observed in 2014
4	2011	23.060872	161.924461	No *Cenchrus* obs. in 2012, 2013, 2014
5	2011	23.061153	161.92432	No *Cenchrus* obs. in 2012, 2013, 2014
6	2011	23.06021	161.922386	No *Cenchrus* obs. in 2012, 2013, 2014
7	2011 & 2012	23.060907	161.924258	Area covered with weed cloth, no *Cenchrus* observed in 2014
8	2012	23.06097	161.92461	New point within Cluster 1. Covered with weed cloth. No plants in 2013, 2014
9	2012	23.06017	161.92522	New point = Cluster 3, no plants 2013, 2014
10	2013	23.05992	161.92317	1 seeded plant removed and area covered in weed cloth in 2013, 2014
11	2014	23.061100	161.921200	Found in June 2014, plants and seeds pulled. Revisited in September 2014, no plants or seeds observed.
12	2014	23.060950	161.924900	Found in June 2014, plants and seeds pulled. Revisited in September 2014, no plants or seeds observed.

Figure 7. Visual key of *Cenchrus echinatus* culm compared to the common bunchgrass *Eragrastis variabilis*. Notice the corkscrew shaped culm visible once seeds are gone (Photo: J. Fisher).

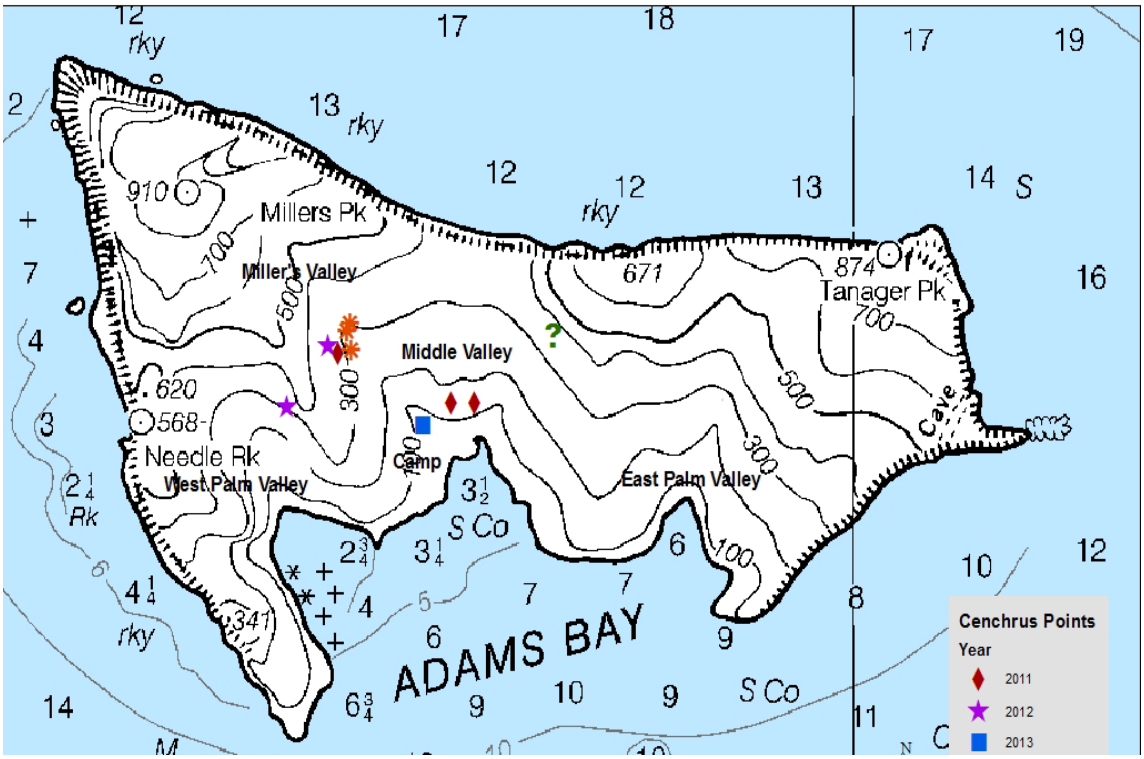

Figure 8. Location of *Cenchrus echinatus* clusters or individual plants found between 2011 and 2014.

New Zealand spinach (*Tetragonia tetragonioides*). This invasive species was detected within the lower 70m at the bottom of Devil's Slide, where it has been observed for several years. Plentovich removed approximately 50 plants on 1 October and piled them on a rock in the sun at the bottom of the slide. Plants ranged in size from seedlings to bushy mature plants covering up to a square meter of ground. The majority of plans occurred in the vicinity of latitude 23.06369°, longitude -161.92623°. The entirety of Devil's Slide's walkable area was surveyed, and it is believed all plants were removed. This was substantially more than last year when only six plants were found and removed. Given the high density of endemic species in the small area of Devil's Slide and the invasive nature of this species, continued monitoring and removal of this alien plant should remain a priority for future trips to Nihoa.

RECOMMENDATIONS

- Determine who or where Nihoa passerine VCP data will be analyzed in future years.
- Develop a simple, standardized method for indexing abundance of seabirds by species.
- Obtain and use staging protocols for seabird chicks from Beth Flint. These staging protocols vary among taxa.
- If a seabird mortality event is suspected, collect carcasses for necropsy by Thierry Work.
- Continue to improve measure of relative abundance for the gray bird locust.
- Identify ways to monitor the remaining *Chenopodium* and explore the relationship between gray bird locust and *Chenopodium* abundance.

- Inspect the distribution and relative abundance of Millerbirds and Finches with respect to vegetation data collected at each VCP point and assess whether patterns exist that warrant adjustment or refinement of vegetation data protocol. Alternatively, review vegetation data protocol to yield the most useful information for monitoring the status of the island's vegetation.
- Continue monitoring invasive ants at likely introduction points (camp and the beach) to ensure new introductions are detected as early as possible.
- Continue monitoring and controlling *Cenchrus echinatus* and *Tetragonia tetragonioides. Cenchrus* is much easier to locate during the growing season, so opportunistic control during Spring or early Summer trips will facilitate control efforts.

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Appendix I. Point count locations and mean detections of Nihoa Finches (NIFI) and Nihoa Millerbirds (NIMI)

Station	Latitude (North)	Longitude (West)	Num. of Surveys	mean NIFI detected	mean NIMI detected
A-01	23.05988	-161.92298	2	1.50	1.50
A-02	23.06024	-161.92377	2	9.00	0.50
A-03	23.06073	-161.92482	3	4.67	3.00
A-04	23.05983	-161.92480	2	2.50	3.50
A-05	23.05927	-161.92362	1	2.00	3.00
A-06	23.05876	-161.92436	2	4.00	1.50
A-07	23.05907	-161.92518	3	9.67	0.00
A-08	23.05953	-161.92593	2	10.50	1.00
A-09	23.05988	-161.92675	2	6.50	2.50
A-10	23.05867	-161.92692	2	6.00	1.50
A-11	23.05795	-161.92618	2	9.00	1.50
A-12	23.05706	-161.92568	1	8.00	3.00
B-13	23.06102	-161.92399	2	6.50	2.00
B-14	23.06177	-161.92444	2	1.50	2.50
B-15	23.06265	-161.92433	2	1.00	3.00
B-16	23.06313	-161.92548	2	4.00	1.50
B-17	23.06240	-161.92512	2	4.00	3.50
B-18	23.06199	-161.92603	2	4.50	2.00
B-19	23.06128	-161.92543	2	5.00	3.50
B-20	23.06050	-161.92591	2	9.50	1.00
B-21	23.06151	-161.92692	2	6.00	3.50
B-22	23.06236	-161.92680	2	3.50	0.50

B-23	23.06323	-161.92733	2	9.00	4.50
B-24	23.06363	-161.92671	2	3.00	2.50
C-25	23.06197	-161.92354	1	7.00	5.00
C-26	23.06119	-161.92299	2	5.50	3.00
C-27	23.06056	-161.92251	3	1.00	2.00
C-28	23.05979	-161.92201	2	4.50	1.00
C-29	23.05915	-161.92155	2	3.50	4.00
C-30	23.05837	-161.92125	2	5.00	1.50
C-31	23.05841	-161.92058	2	5.50	0.50
C-32	23.05912	-161.92028	3	5.33	2.00
C-33	23.05983	-161.92086	2	3.50	2.00
C-34	23.06078	-161.92161	2	2.50	2.50
C-35	23.06159	-161.92145	2	2.50	4.00
C-36	23.06189	-161.92240	2	6.50	4.00
D-37	23.06155	-161.92054	2	3.00	4.00
D-38	23.06068	-161.92079	2	2.50	2.50
D-39	23.06056	-161.91980	2	5.00	3.50
D-40	23.06137	-161.91948	2	3.00	4.50
D-41	23.06061	-161.91892	2	1.50	3.50
D-42	23.05995	-161.91969	2	5.50	2.50
D-43	23.06178	-161.91851	2	1.50	3.50
D-44	23.06101	-161.91789	2	2.50	4.50
D-45	23.06056	-161.91701	2	2.50	2.00
D-46	23.06150	-161.91700	2	3.00	2.50
D-47	23.06116	-161.91607	2	0.50	3.00
D-48	23.06173	-161.91560	2	1.50	1.50

E-49	23.05924	-161.91903	2	4.00	0.50
E-50	23.05831	-161.91876	2	5.50	2.50
E-51	23.05904	-161.91800	2	3.00	3.50
E-52	23.05998	-161.91832	2	3.00	3.50
E-53	23.05980	-161.91734	2	2.50	2.00
E-54	23.06038	-161.91612	2	3.50	3.50
E-55	23.06043	-161.91526	2	3.00	3.00
E-56	23.05955	-161.91509	2	1.50	2.00
E-57	23.05957	-161.91598	2	3.50	4.00
E-58	23.05905	-161.91685	2	2.50	2.00
E-59	23.05861	-161.91744	2	4.00	2.00
E-60	23.05769	-161.91807	2	3.00	0.50

Appendix I. Point count locations and mean detections of Nihoa Finches (NIFI) and Nihoa Millerbirds (NIMI).

Station	Latitude (North)	Longitude (West)	Num. of Surveys	mean NIFI detected	mean NIMI detected
A-01	23.059884	-161.922977	3	3.00	0.67
A-02	23.060235	-161.923772	3	4.00	0.67
A-03	23.060727	-161.924819	3	4.67	2.67
A-04	23.059829	-161.924798	3	2.00	1.33
A-05	23.059271	-161.923621	3	2.33	2.00
A-06	23.058761	-161.924362	3	2.00	0.00
A-07	23.059066	-161.925183	3	1.33	0.67
A-08	23.059529	-161.925925	3	4.67	1.00
A-09	23.059880	-161.926745	3	3.00	1.00
A-10	23.058669	-161.926917	3	2.67	2.00
A-11	23.057950	-161.926178	3	4.00	2.00
A-12	23.057064	-161.925675	2	1.50	0.00
B-13	23.061023	-161.923989	3	4.67	1.67
B-14	23.061771	-161.924439	3	2.33	1.67
B-15	23.062653	-161.924333	3	3.67	1.33
B-16	23.063130	-161.925479	3	4.67	1.33
B-17	23.062399	-161.925122	3	2.33	2.00
B-18	23.061994	-161.926026	3	2.33	3.33
B-19	23.061278	-161.925431	3	3.00	3.00
B-20	23.060503	-161.925908	3	2.67	1.00
B-21	23.061512	-161.926916	3	3.33	2.00
B-22	23.062359	-161.926797	3	2.00	0.67
B-23	23.063234	-161.927326	2	2.50	2.50
B-24	23.063631	-161.926709	3	4.33	1.33
C-25	23.061965	-161.923537	3	3.33	2.33
C-26	23.061187	-161.922993	4	3.50	2.75
C-27	23.060555	-161.922512	3	5.33	1.33
C-28	23.059791	-161.922007	3	3.00	0.67
C-29	23.059152	-161.921554	3	4.00	2.33
C-30	23.058369	-161.921254	3	2.67	1.67
C-31	23.058410	-161.920577	3	1.33	0.33
C-32	23.059116	-161.920275	3	1.67	1.33
C-33	23.059832	-161.920860	3	1.33	0.33
C-34	23.060782	-161.921611	3	1.33	0.33
C-35	23.061587	-161.921451	3	4.33	1.00

Station	Latitude (North)	Longitude (West)	Num. of Surveys	mean NIFI detected	mean NIMI detected
C-36	23.061887	-161.922400	3	4.00	3.33
D-37	23.061549	-161.920541	3	3.67	0.33
D-38	23.060676	-161.920787	3	1.00	1.00
D-39	23.060563	-161.919795	3	2.33	1.00
D-40	23.061367	-161.919478	3	3.00	1.33
D-41	23.060606	-161.918919	4	3.75	3.00
D-42	23.059947	-161.919693	4	4.00	2.25
D-43	23.061783	-161.918514	3	3.00	2.00
D-44	23.061006	-161.917886	3	3.67	2.33
D-45	23.060559	-161.917011	3	5.00	1.67
D-46	23.061502	-161.916997	3	5.00	0.67
D-47	23.061164	-161.916070	3	3.33	1.00
D-48	23.061731	-161.915600	4	2.67	1.00
E-49	23.059238	-161.919034	3	6.00	0.33
E-50	23.058311	-161.918764	3	2.00	1.00
E-51	23.059039	-161.917999	3	1.67	1.00
E-52	23.059983	-161.918321	3	2.33	0.00
E-53	23.059796	-161.917340	2	2.00	1.00
E-54	23.060379	-161.916116	3	5.00	1.67
E-55	23.060428	-161.915255	3	3.67	1.00
E-56	23.059548	-161.915095	3	2.67	1.33
E-57	23.059566	-161.915977	3	3.00	3.33
E-58	23.059052	-161.916847	4	4.33	4.67
E-59	23.058606	-161.917440	3	4.00	1.33
E-60	23.057693	-161.918071	3	2.00	0.67

Appendix 1 –List of Nihoa Finch feathers collected for genetic analysis.

Date	NIFI #	Band	Location	UTM	UTM	Coll.	dummy band	Pictures
9/25/2014	1	no band	camp	200464	2553112	SMP/CAF	99999	RAR
9/25/2014	2	no band	camp	200464	2553112	SMP/CAF	99998	RAR
9/25/2014	3	no band	camp	200464	2553112	SMP/CAF	99997	RAR
9/25/2014	4	1271-74410	camp- higher up	200428	2553175	SMP/CAF		RAR
9/26/2014	5	1271-74437	central plateau	2306093	16192343	CAF		MEL
9/26/2014	6	1271-74438	central plateau	2306093	16192343	CAF		MEL
9/26/2014	7	1271-74439	central plateau	2306093	16192343	CAF		MEL
9/26/2014	8	1271-74440	central plateau	2306093	16192343	CAF		MEL
9/26/2014	9	no band	central plateau	2306136	16192352	CAF	99994	MEL
9/26/2014	10	1271-74441	central plateau	2306145	1619232	CAF		MEL
9/27/2014	11	no band	central plateau	2306109	16192259	CAF	99973	RAR
9/27/2014	12	1271-74442	central plateau	2306109	16192259	CAF		RAR
9/27/2014	13	1271-74443	central plateau	2306109	16192259	CAF		RAR
9/27/2014	14	1271-74444	central plateau	2306109	16192259	CAF		RAR
9/27/2014	15	1271-74445	central plateau	2306153	1619225	CAF		RAR
9/27/2014	16	1271-74446	central plateau	2305969	16192322	CAF		RAR
9/28/2014	17	1271-74447	East Valley	2305949	16191722	CAF		??
9/28/2014	18	no band	East Valley	2305949	16191722	CAF	99972	??
9/28/2014	19	no band	East Valley	2305949	16191722	CAF	99971	??
9/28/2014	20	1271-74448	East Valley	2305949	16191722	CAF		??
9/28/2014	21	1271-74449	East Valley	2005996	16191684	CAF		??
9/28/2014	22	1271-74450	East Valley	2005996	16191684	CAF		??
9/28/2014	23	1271-74451	East Valley	2305996	16191684	CAF		??
9/28/2014	24	1271-74452	East Valley	2305996	16191684	CAF		??
9/28/2014	25	1271-74453	East Valley	2305996	16191684	CAF		??
9/29/2014	26	1271-74454	Miller's plateau	2306355	16192709	CAF		??
9/29/2014	27	no band	Miller's plateau	2306355	16192709	CAF	99970	??

9/29/2014	28	1271-74455	Miller's plateau	2306355	16192709	CAF		??
9/29/2014	29	1271-74456	Miller's plateau	2306355	16192709	CAF		??
9/29/2014	30	1271-74457	Miller's plateau	2306355	16192709	CAF		??
9/29/2014	31	1271-74458	Miller's plateau	2306355	16192709	CAF		??
9/29/2014	32	1271-74459	Miller's plateau	2306355	16192709	CAF		??
9/29/2014	33	1271-74460	Central Valley Ridge	2305962	16192062	CAF		??
9/30/2014	34	1271-74462	Mo`o Ridge	2305925	16192044	CAF		APM
9/26/2014	50	1271-74411	plateau	200023	2553545	SMP		RAR
9/26/2014	51	1271-74412	plateau	200023	2553545	SMP		RAR
9/26/2014	52	1271-74413	plateau	200023	2553545	SMP		RAR
9/26/2014	53	1271-74414	plateau	200023	2553545	SMP		RAR
9/26/2014	54	1271-74415	plateau	200023	2553545	SMP		RAR
9/26/2014	55	1271-74416	plateau	200023	2553545	SMP		RAR
9/26/2014	56	1271-74417	plateau	200023	2553545	SMP		RAR
9/26/2014	57	1271-74418	plateau	200023	2553545	SMP		RAR
9/26/2014	58	1271-74419	plateau	200023	2553545	SMP		RAR
9/26/2014	59	no band	plateau	200023	2553545	SMP	99996	RAR
9/26/2014	60	no band	plateau	2.0023	2553545	SMP	99995	RAR
9/28/2014	61	no band	West Palm - Stn. A8	20019	2553119	SMP	99992	APM
9/28/2014	62	1271-74424	West Palm - Stn. A8	20019	2553119	SMP		APM
9/28/2014	63	no band	West Palm - Stn. A8	20019	2553119	SMP	99991	APM
9/28/2014	64	1271-74426	West Palm - Stn. A8	20019	2553119	SMP		APM
9/28/2014	65	1271-74427	West Palm - Stn. A8	20019	2553119	SMP		APM
9/28/2014	66	no band	West Palm - Stn. A8	20019	2553119	SMP	99990	APM
9/28/2014	67	no band	West Palm - Stn. A8	20019	2553119	SMP	99989	APM
9/28/2014	68	no band	West Palm - Stn. A8	20019	2553119	SMP	99988	APM
9/28/2014	69	1271-74428	West Palm - Stn. A8	20019	2553119	SMP		APM
9/28/2014	70	1271-74429	West Palm - Stn. A8	20019	2553119	SMP		APM
9/28/2014	71	no band	West Palm - Stn. A8	20019	2553119	SMP	99987	APM
9/28/2014	72	no band	West Palm - Stn. A8	20019	2553119	SMP	99986	APM
9/28/2014	73	no band	West Palm - Stn. A8	20019	2553119	SMP	99985	APM

9/29/2014	74	1271-74430	East Palm Valley	200863	2553064	SMP		APM
9/29/2014	75	1271-74431	East Palm Valley	200863	2553064	SMP		APM
9/29/2014	76	1271-74432	East Palm Valley	200863	2553064	SMP		APM
9/29/2014	77	1271-74433	East Palm Valley	200863	2553064	SMP		APM
9/29/2014	78	1271-74434	East Palm Valley	200863	2553064	SMP		APM
9/29/2014	79	1271-74435	East Palm Valley	200863	2553064	SMP		APM
9/29/2014	80	no band	East Palm Valley	200863	2553064	SMP	99984	APM
9/29/2014	81	no band	East Palm Valley	200863	2553064	SMP	99983	APM
9/29/2014	82	no band	East Palm Valley	200863	2553064	SMP	99982	APM
9/29/2014	83	no band	East Palm Valley	200863	2553064	SMP	99981	APM
9/29/2014	84	no band	East Palm Valley	200863	2553064	SMP	99980	APM
9/29/2014	85	no band	East Palm Valley	200863	2553064	SMP	99979	APM
9/29/2014	86	1271-74436	East Palm Valley	200863	2553064	SMP		APM
9/29/2014	87	no band	East Palm Valley	200863	2553064	SMP	99977	APM
9/29/2014	88	no band	East Palm Valley	200863	2553064	SMP	99976	APM
9/30/2014	89	1271-74500	Camp	200401	2553183	SMP		RAR
9/30/2014	90	1271-74499	Camp	200401	2553183	SMP		RAR
9/30/2014	91	1271-74498	Camp	200401	2553183	SMP		RAR
9/30/2014	92	1271-74497	Camp	200401	2553183	SMP		RAR
9/30/2014	93	no band	Camp	200401	2553183	SMP	99975	RAR
9/30/2014	94	1271-74496	Camp	200401	2553183	SMP		RAR
9/30/2014	95	1271-74495	Camp	200401	2553183	SMP		RAR
9/30/2014	96	1271-74494	Camp	200401	2553183	SMP		RAR
9/30/2014	97	no band	Camp	200401	2553183	SMP	99974	RAR
9/30/2014	98	1271-74493	Camp	200401	2553183	SMP		RAR
9/30/2014	99	1271-74491	Camp	200401	2553183	SMP		RAR
9/30/2014	100	1271-74492	Camp	200401	2553183	SMP		RAR
9/30/2014	101	1271-74490	Camp	200401	2553183	SMP		RAR
10/1/2014	110	1271-74463	Upper Cmp -Miller's Rvne	2306051	16192412	CAF		RAR
10/1/2014	111	1271-74464	Upper Cmp -Miller's	2306051	16192412	CAF		RAR

			Rvne					
10/1/2014	112	1271-74465	Upper Cmp -Miller's Rvne	2306051	16192412	CAF		RAR
10/1/2014	113	no band	Upper Cmp -Miller's Rvne	2306051	16192412	CAF	99969	RAR
10/1/2014	114	1271-74466	Upper Cmp -Miller's Rvne	2306051	16192412	CAF		RAR
10/1/2014	115	1271-74467	Upper Cmp -Miller's Rvne	2306051	16192412	CAF		RAR
10/1/2014	116	1271-74468	Upper Cmp -Miller's Rvne	2306051	16192412	CAF		RAR
10/1/2014	117	1271-74469	Upper Cmp -Miller's Rvne	2306051	16192412	CAF		RAR
9/28/2014	118	no band	East Valley	2005996	16191684	SMP	99993	APM
9/30/2014	119	1271-74461	Mo`o Ridge	2305925	16192044	CAF		APM
9/27/2014	120	1271-74420	central plateau	2306076	16192276	SMP		MEL
9/27/2014	121	1271-74421	central plateau	2306076	16192276	SMP		MEL
9/27/2014	122	1271-74422	central plateau	2306076	16192276	SMP		MEL
9/27/2014	123	1271-74423	central plateau	2306007	16192357	SMP		MEL
9/27/2014	dead finch			2306102	16191901	APM		none
9/29/2014	dead finch		East Ridge above Camp	2305993	16192126	unk		none

Appendix 2: Variation of Nihoa finch plumage coloration in birds banded in 2014

The plumage of the Nihoa Finch described in this paragraph is from Banks and Laybourne (1977). Nihoa finches have a single immature stage with birds acquiring the adult aspect in a single year. Juveniles have more streaked and black plumage than adults, while adults of both sex have yellow heads (NIFI A, B, C). In adult males the head, neck, and back are yellow, with a gray band between the neck and mid-back (NIFI A). In adult females, the head and back feathers are edged with yellow and streaked with black, the sides of the head are yellow, along with throat, breast, and edgings of secondaries (see NIFI C below).

We hope that genetic work, banding measurements, and plumage pictures will help us identify birds by sex for potential future Nihoa Finch translocations.

NIFI A, Adult Male

NIFI B. Adult male, wider gray band

NIFI C. Adult female

NIFI D, Unknown

NIFI E, Unknown

NIFI F. Juvenile?

References

Banks, R.C. and R.C. Laybourne. Plumage sequence and taxonomy of Laysan and Nihoa finches. Condor 79 (3):343-348.