State of Hawaii
Department of Agriculture
Agricultural Loan Division

June 28, 2022

Board of Agriculture
Department of Agriculture
Honolulu, Hawaii

Subject: **Loan Presentation**

APPLICANT: HAWAIIAN AGRICULTURAL PRODUCTS LLC.
KEN HIRATA & YUMIKO HIRATA, CO-BORROWERS
P.O. Box 952
Haleiwa, HI 96712

CLASSIFICATION & ELIGIBILITY: Hawaiian Agricultural Products, LLC (HAP), dba Hawaiian Shochu Company and co-borrowers Ken Hirata and Yumiko Hirata meets the eligibility requirements of Chapter 155 of the Hawaii Revised Statues as Food Manufacturers. Ken Hirata and Yumiko Hirata are citizens of Japan who possess valid USA E2 non-immigrant investor visas and have been brewing shochu in Haleiwa, Hawaii for over 10-years. Ken established Hawaiian Agricultural Products LLC on 3/10/2010, as its sole owner/member and Yumiko Hirata works full-time at the operation.

COMMODITY: Hawaii Manufactured Distilled Spirits: Traditional Japanese Shochu and Shochu based Gin produced from Hawaii grown sweet potato and Hawaiian botanicals.

CREDIT HISTORY: SEE EXHIBIT A (CONFIDENTIAL)

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OTHER STATE AGRICULTURAL LOANS:

Hawaiian Agricultural Products LLC, Ken Hirata and Yumiko Hirata made the following loans with the State of Hawaii:

Loan No.	Approval Date	Amount	Balance	Status	Maturity
DEF-6310	11/2/2011	$25,000	0	PIF	N/A
CBED-1-11	12/17/2011	$25,000	0	PIF	N/A
DEO-6322	6/14/2012	$125,000	0	PIF	N/A
DEF-6460	4/14/2020	$60,000	$49,693	Current	6/1/2030
CEBD 06-18	4/14/2020	$60,000	$49,364	Current	6/1/2030
Total:		**$120,000**	**$99,057**		

*CBED (Community Based Economic Development) is a program of the Department of Business Economic Development and Tourism.

In April 2020, State Agricultural Loan Division (SALD) loan DEF-6460 for $60,000 was approved for distillery equipment purchases and operational working capital.

In April 2020, Community Based Economic Development (CBED) program with the Department of Business Economic Development and Tourism (DBEDT) loan CBED 06-18 for $60,000 that was approved for distillery equipment purchases and operational working capital.

The total loan amount for the previously mentioned SALD and CBED state of Hawaii loans is $120,000 and the current balance is $99,057. HAP has completed all loan payments and obligations consistently as required.

LOAN REQUEST & PURPOSE:

Amount	Class
$31,500	E – Food Manufacturer Facility Loan (SALD)
$31,500	**Total Request**

Loan Purpose	
Stainless Steel Steamer	$12,000
Distillation Parts	$7,000
Holding Tanks	$4,500
Aging Barrel(s)	$4,000
Sweet Potato	$4,000
Total	$31,500

This request will finance the purchase, shipping, and installation of the new stainless-steel steamer, distillation parts, holding tanks, aging barrels, and sweet potato.

TERMS:

Class E – Food Manufacturer (SALD)

Amount:	$31,500
Period:	10 Years
Interest Rate:	3.00%
Repayment:	Monthly principal and interest payments of $305 until maturity.

SECURITY:

The SALD Class - E Equipment and Working Capital loans will be secured as follows:

Primary security:

A specific security interest will be taken on the equipment (steamer, distillery parts, holding vats, aging barrels) to be purchased totaling $27,500. A blanket security interest in crops, accounts receivable, inventory, furniture, fixtures, equipment, deposits, general intangibles, trademarks, and licenses. Existing assets include the distillery building and improvements, copper top still, traditional wooden still, ceramic vats, pumps, mashing machine, holding tanks, office equipment, and furniture totaling $378,969 per chattel appraisal 6/13/2022.

GUARANTORS:

None

FINANCIAL CONDITION:

SEE EXHIBIT A (CONFIDENTIAL)

REPAYMENT ABILITY:

SEE EXHIBIT A (CONFIDENTIAL)

INSURANCE:

HAP to maintain commercial general aggregate liability insurance coverage with policy amounts satisfactory to SALD.

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BACKGROUND/ MANAGEMENT ABILITY:

Hawaiian Agricultural Products LLC, dba Hawaiian Shochu Company is a limited liability company established on March 10, 2010, by Ken Hirata, its sole owner/member. The company was created to develop and produce shochu, a distilled alcoholic beverage that is native to Japan and made primarily made from local sweet potato and rice.

Ken Hirata and his wife Yumiko are Japanese citizens residing and working in Hawaii through a USA investment work visa. Ken is a well-respected businessman that earned an MBA from Lewis & Clark College of Portland, Oregon in 1995. He worked as a money market broker and a managing director for a design firm before pursuing his career as a shochu brewmaster.

In 2006, Ken was hired by the Manzen Shuzo Co. Ltd. distillery, in Kagoshima, Japan. This prefecture is known as the birthplace of sweet potato shochu in Japan and the Manzen Shuzo distillery is renowned for producing premium quality shochu using traditional recipes and methods. Ken was hired to oversee "koji" yeast production and to manage the shochu waste recycling. Eventually, this experience led him to a three-year apprenticeship under the company's founding brewmaster who is among the top shochu master brewers in Kagoshima. Ken's 3-year apprenticeship gave him a thorough understanding of traditional shochu brewing methodology and the business skills to operating a successful shochu distillery.

In 2010, Ken founded Hawaiian Agricultural Products, LLC, dba Hawaiian Shochu Company distillery in Haleiwa, Oahu with a 30-year lease of 11.95-acres from B. P. Bishop Trust Estate, situated in the North Shore Economic Development Zone. Ken and Yumiko work with two other employees to produce Hawaiian shochu with products labeled as Namihana Shochu and Banzai Premium Shochu. The process uses exclusively Hawaii grown sweet potato for all of their shochu products.

In early 2020, Ken reported HAP products where "doing well" with all of his shochu selling as fast as he could manufacture and bottle them. That year HAP was approved for a $120,000 loan from SALD and CBED to consolidate existing debt, purchase equipment upgrades, and operational funds. Despite the Covid-19 pandemic and shutdown that began in March of 2020, Ken received his new Copper Top Still in Summer of 2021 from Cage and Sons Distilling Equipment in Canada. He decided to go with the Canadian

manufacturer since his original stainless steel still order from Japan was canceled due to the Covid-19 pandemic.

By October 2021, Ken began using the copper top still to produce a new line of Hawaiian Shochu Gin he calls "Haleiwa Rainbow." Producing Gin uses 1.6 times more local sweet potato than regular shochu because the process requires the Gin to be distilled twice. First to make the base shochu alcohol and a second time to add a variety of Hawaiian botanical flavoring and juniper. Ken reported that "Shochu based Gin" is growing in popularity in Japan. He completed his first 500 bottle batch of "Haleiwa Rainbow Gin" in the fall of 2021. He said 90% of the first batch was sold @ $68 per bottle for a total sale of $30,600. Haleiwa Rainbow Gin will be sold through HAP's established distribution chain along with his popular Namihana Shochu and Banzai Premium Shochu to local restaurants and businesses catering to the Japanese travel markets. Since "Gin" is a spirit that has more global recognition than shochu, Ken believes his "Hawaiian" flavored Haleiwa Rainbow Gin will eventually have a wider appeal for out-of-state markets and other businesses to attract a wider following.

During the slowdown brought by the Covid-19 pandemic, Ken remained busy by renovating the distillery and adding a tasting and display room for visitors and followers. Over the years, many international guests and celebrities have visited the distillery to view the shochu brewing process and purchase Hawaiian Shochu along with T-shirts and memorabilia. Recently, distillery manufacturer Cage and Sons approached Ken and asked if he would display, promote, beta-test and endorse the distillery products manufactured for Hawaiian Shochu Company. In exchange, Cage and Sons is offering discounts on manufacturing and shipping for the custom steamer, holding vats, and upgraded distillery parts. Ken said he appreciates the manufacturer's offer and is looking forward to work with them in the future.

SUMMARY:

Ken Hirata is a good business manager, and hard worker that has invested significant time, money, and knowledge to make Hawaiian Shochu Company a successful venture. Loans with SALD and CBED have been paid as agreed and the company's financial statements have shown good business management, strong net worth and good cash flow to cover debt servicing. This request is sufficiently secured by specific equipment purchases and existing distillery facility and equipment assets that are well maintained. The company's projected cash flow assumptions are appropriate and sufficient to service this the proposal. The new and replacement equipment upgrades will increase production

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efficiency and reliability that will lead to an increase of purchases for more locally produced agricultural products.

TURNDOWNS:

The borrowers were denied credit from American Savings Bank on 3/15/2022: Loan request does not meet minimum business scoring parameters, and First Hawaiian Bank on 3/12/2022: Ability to generate sufficient profits to repay business debt:

- Ratio of balance to limit too high on revolving
- Lack of establish earnings
- Low debt servicing coverage ratio
- Number of personal accounts with balances in the last 6 months
- Number of active commercial accounts within the last 12 months

RECOMMENDATIONS: This loan for Hawaiian Agricultural Products LLC, Ken Hirata, and Yumiko Hirata is recommended for approval based on excellent credit history, management skills, manufacturing experience, historical and projected repayment ability and business assets offered as collateral.

Date

JUN 15 2022

Recommended by:

Wayne S. Takamine
Business Loan Officer I

Date

JUN 16 2022

Reviewed and concurred by:

Morris Atta
Acting Agricultural Loan Administrator

Date

6-17-2022

Approved for Submission:

Phyllis Shimabukuro-Geiser
Chairperson, Board of Agriculture

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STATE OF HAWAII
DEPARTMENT OF AGRICULTURE
AGRICULTURAL RESOURCE MANAGEMENT DIVISION
HONOLULU, HAWAII

June 28, 2022

Board of Agriculture
Honolulu, Hawaii

Subject: REQUEST APPROVAL TO CANCEL GENERAL LEASE NO. S-9009; MAHANA NURSERY & IRRIGATION SUPPLY INC., LESSEE; TMK: 2ND DIV/5-2-001:017, LOT NO. 8, MOLOKAI AGRICULTURAL PARK, HOOLEHUA, ISLAND OF MOLOKAI, HAWAII

Authority: Section 166-6(b), Hawaii Revised Statutes (HRS), and Sections 4-153-3(b)(3) and 34, Hawaii Administrative Rules (HAR)

Lessee: Mahana Nursery & Irrigation Supply Inc.

Land Area: Approximately 30.715 acres

Tax Map Key: 2ND DIV/5-2-001:017 (Exhibit "A")

Land Status: Encumbered by Governor's Executive Order No. 3696 to the Department of Agriculture for agricultural park land purposes in 1996

Lease Term: 35 years, January 1, 1999 to December 31, 2034

Current Rent: $2,000.00 per year

Character of Use: Diversified Agriculture

BACKGROUND:

In 1999, General Lease No. S-9009 was awarded by the Board of Agriculture (BOA) to Mahana Nursery & Irrigation Supply Inc. ("Mahana"), owned and operated by Egon Tensfeldt, for a nursery business.

Subsequently, due to health and family reasons Mr. Tensfeldt moved to the mainland, and Agrigenetics Molokai, LLC (aka Cargill, Incorporated) took over farming operations producing seeds. In 2018, Agrigenetics closed down its seed production operations at the Molokai Agricultural Park and terminated its operations on Mahana's leased premises. Since 2020, the lease rent has not been paid and there is a delinquent lease rent balance due of $4,310.00 as of this date. In addition, the real property taxes have not been paid since 2020 and there is a delinquent balance due.

Through Egon Tensfeldt's family contacts on Molokai, he requested cancellation of the lease, however, there is no provision for the lessee to cancel the lease. Mahana is in default and

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breach of the provisions of the lease as there are delinquent balances due of lease rent and real property taxes, required liability insurance coverage was cancelled, and the premises is not being farmed. The lessee is in breach of the lease provisions paragraphs 1, 2, 5, and 2, respectively.

Annual inspections of the premises were completed with the most recent on March 23, 2022 which confirmed that Mahana has not been utilizing the premises in accordance with the lease. Letters of violation and default were sent via certified mail and there have been numerous phone calls and emails with Mr. Tensfeldt's family conveying notification of the violations and default. To date, the defaults have not been remedied. No responses have been received from Lessee nor his contacts since March 23, 2022.

Staff deems the Lessee to be in breach and default of this lease due to numerous violations of the lease. The account is uneconomical and impractical to remedy and collect, and staff recommends referral of the account to the Office of the AG to expedite resolution of the outstanding lease rent balance due.

RECOMMENDATIONS:

That the Board of Agriculture:

1. Approve the cancellation of General Lease S-9009, pursuant to Sections 4-153-3(b)(3) and 34, HAR, and terminating all right, title, and interest granted to the Lessee therein effective as of the date of approval of this submittal;
2. Authorize issuance of a lease cancellation document to be executed by the chairperson and recorded at the Bureau of Conveyances;
3. Authorize staff to prepare TMK: 2ND DIV/5-2-001:017 for disposition by public notice, pursuant to Sections 4-153-19 and 22, HAR; and
4. Approve the request to refer General Lease No. S-9009 as a delinquent account to the Office of the Attorney General for review and disposition in accordance with Section 40-82, Hawaii Revised Statutes.

All documents are subject to the approval as to form by the Office of the Attorney General, and such other terms and conditions as may be prescribed by the Chairperson to best serve the interests of the State.

Respectfully submitted,

FOR BRIAN KAU, P.E.
Administrator and Chief Engineer
Agricultural Resource Management Division

Attachment - Exhibit "A"
APPROVED FOR SUBMISSION:

PHYLLIS SHIMABUKURO-GEISER
Chairperson, Board of Agriculture

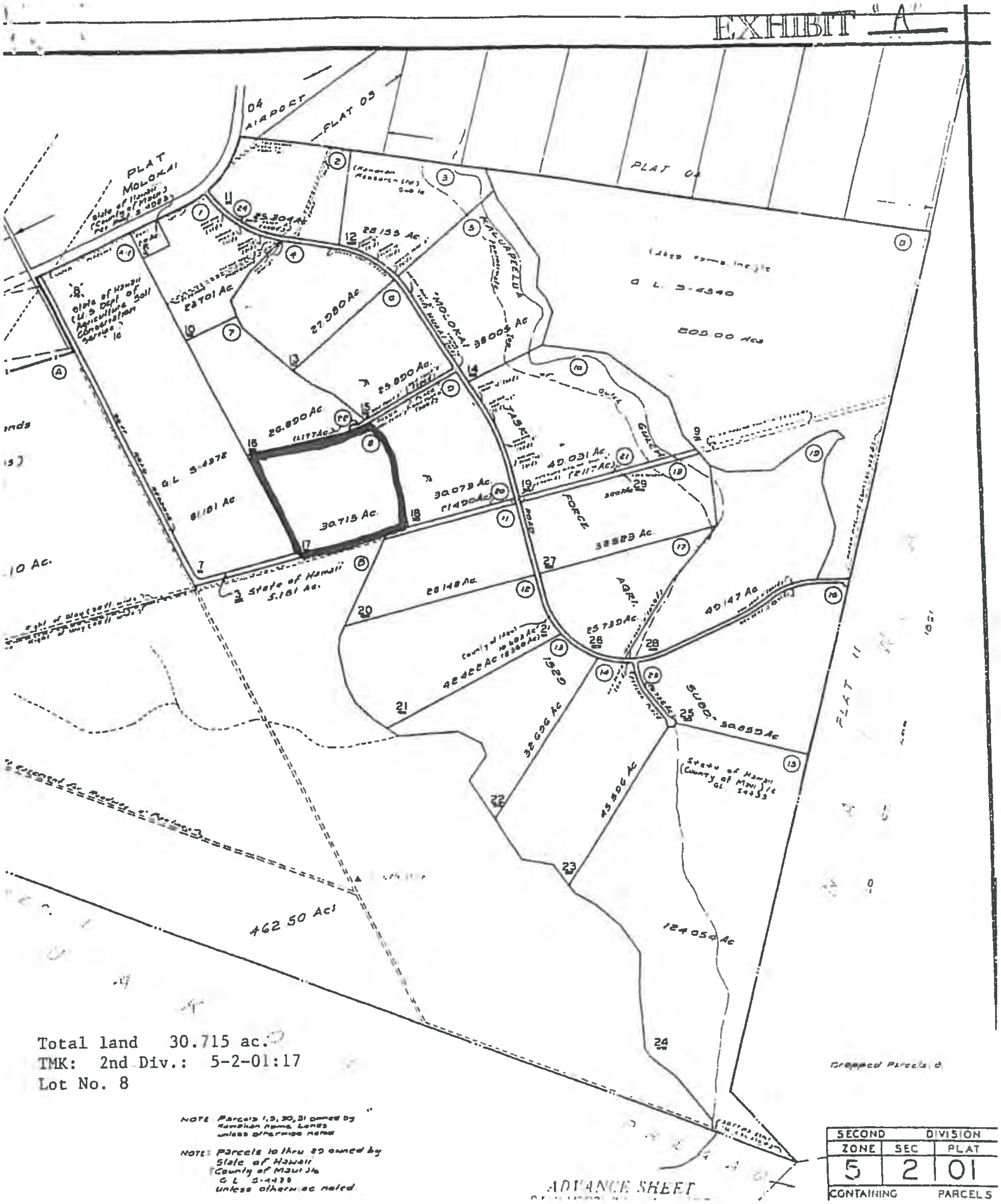
EXHIBIT "A"
PLAT MOLOKAI
AIRPORT
PLAT 03
PLAT 04
30.715 Ac.
462.50 Ac.
124.054 Ac.
Total land 30.715 ac.
TMK: 2nd Div.: 5-2-01:17
Lot No. 8
ADVANCE SHEET
SECOND DIVISION
ZONE 5
SEC 2
PLAT 01
CONTAINING PARCELS

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STATE OF HAWAII
DEPARTMENT OF AGRICULTURE
AGRICULTURAL RESOURCE MANAGEMENT DIVISION
HONOLULU, HAWAII

June 28, 2022

Board of Agriculture
Honolulu, Hawaii

Subject:	REQUEST TO AMEND PRIOR BOARD ACTIONS APPROVING CONVERSION OF REVOCABLE PERMIT NO. S-7713 TO A NEW GENERAL LEASE AND THE ANNUAL BASE RENTAL; DALE HARDINGER AND CARLA HARDINGER, PERMITTEE; TMK: (1) 4-1-018:049; KOOLAUPOKO, WAIMANALO, ISLAND OF OAHU, HAWAII
Authority:	Section 166E-4 and 11, Hawaii Revised Statutes (HRS), and Section 4-158-8, Hawaii Administrative Rules (HAR)
Permittee:	Dale Hardinger and Carla Hardinger
Land Area:	0.826 gross acres
Tax Map Key:	(1) 4-1-018:049 (Exhibit "A")
Land Status:	Encumbered by Governor's Executive Order No. 4535 to the Department of Agriculture for Non-Agricultural Park Lands purposes in 2017
Permit Term:	Month-to-Month Permit
Annual Rent:	$500.52 per year
Character of Use:	Pasture Purposes

REMARKS:

At its meeting on November 30, 2021, the Board of Agriculture (Board) approved the request to convert the DLNR Revocable Permit No. S-7713 held by Dale Hardinger and Carla Hardinger for pasture purposes to a new Non-Agricultural Park Lands lease. At its October 26, 2021 meeting, the Board approved the appraised annual lease rental for pasture purposes. The DLNR Revocable Permit No. S-7713 is for the specific use of Pasture purposes which included the permittee's activity of boarding horses. Under the Department of Agriculture standard general leases, the definition of Pasture purposes is defined as the conduct of livestock operation consisting of keeping cattle, primarily, and others, in a minor role, such as horses and sheep where animals graze the land for feed produced thereon. Special Equestrian Activities according to the general lease accurately defines the character of use for the lessee. An updated appraisal

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was requested by the Lessor for the purpose of determining the fair market annual rental and additional rents for Special Equestrian Activities purposes which been determined at $3,720.00 per year.

RECOMMENDATION:

Staff requests that the Board of Agriculture approve the amended fair market annual rental for the converted Non-Agricultural Park Lands Program general lease for Special Equestrian Activities purposes of $3,720.00 per year for the initial lease term.

All documents are subject to the approval as to form by the Department of the Attorney General, and such other terms and conditions as may be prescribed by the Chairperson to best serve the interests of the State.

Respectfully submitted,

BK FOR

BRIAN KAU, P.E.
Administrator and Chief Engineer
Agricultural Resource Management Division

Attachments - Exhibit "A"

APPROVED FOR SUBMISSION:

Phyllis Shimabukuro-Geiser

PHYLLIS SHIMABUKURO-GEISER
Chairperson, Board of Agriculture

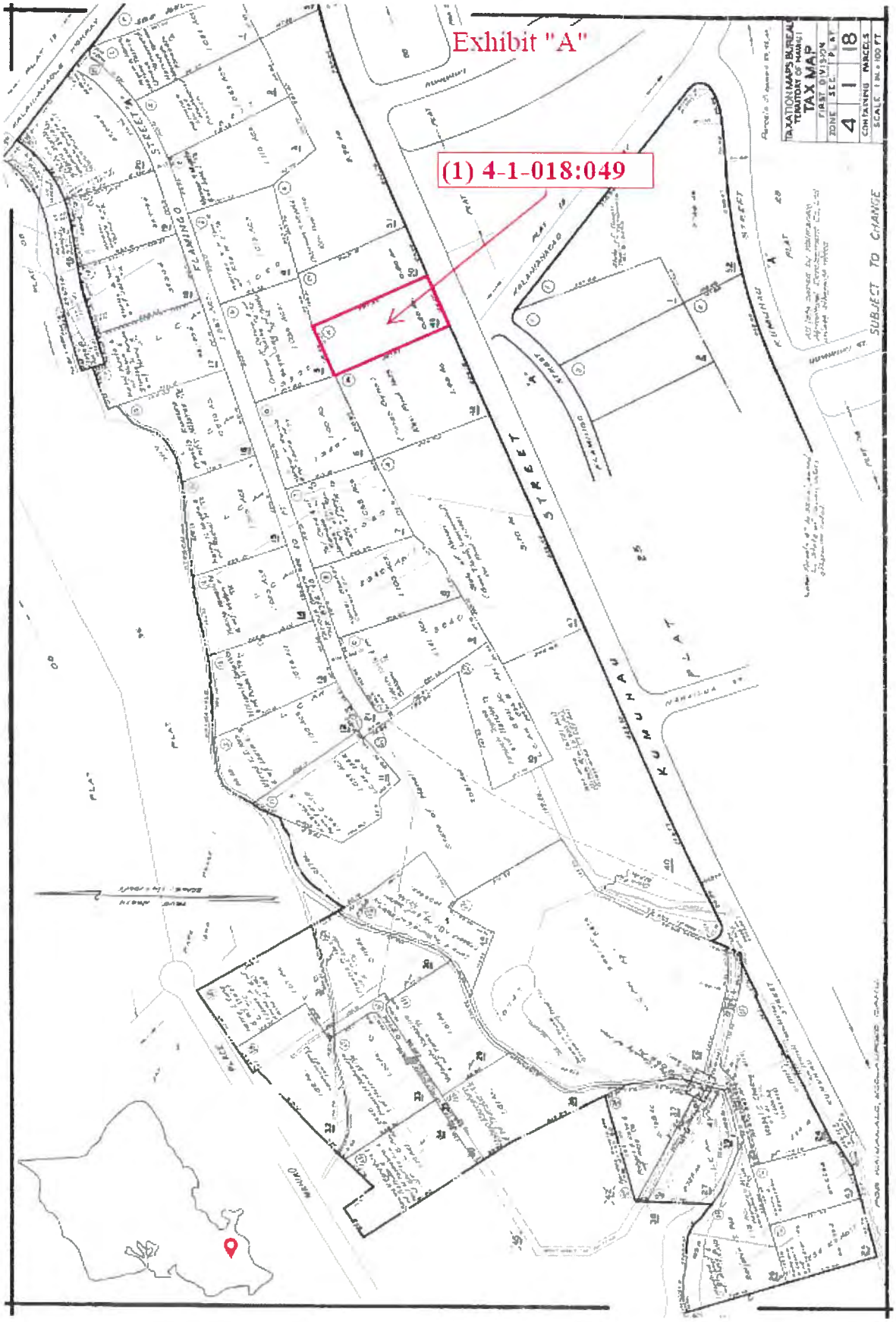
Exhibit "A"
(1) 4-1-018:049
TAXATION MAPS BUREAU
TERRITORY OF HAWAII
TAX MAP
FIRST DIVISION
ZONE 4 SEC 1 P 18
CONTAINING PARCELS
SCALE 1 IN = 100 FT
KUMUHAU STREET
SUBJECT TO CHANGE

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STATE OF HAWAII
DEPARTMENT OF AGRICULTURE
AGRICULTURAL RESOURCE MANAGEMENT DIVISION
HONOLULU, HAWAII

June 28, 2022

Board of Agriculture
Honolulu, Hawaii

Subject:	REQUEST FOR CONSENT TO ASSIGNMENT OF GENERAL LEASE NO. S-6002; RICKY YOUNG, LESSEE/ASSIGNOR, TO SHANE TYLER RUPP, ASSIGNEE; TMK: (1) 5-6-006:030, KAHUKU AGRICULTURAL PARK, LOT 2, KOOLAULOA, KAHUKU, ISLAND OF OAHU, HAWAII
Authority:	Sections 166-7 and 166-9, Hawaii Revised Statutes (HRS), and Sections 4-153-33(a)(6)(B) and (C), Hawaii Administrative Rules (HAR)
Lessee/Assignor:	Ricky Young
Assignee:	Shane Tyler Rupp
Land Area:	6.693 gross acres
Tax Map Key:	(1) 5-6-006:030 (see Exhibit "A")
Land Status:	Encumbered by Governor's Executive Order No. 3867 to the Department of Agriculture for Agricultural Park purposes in 2001
Annual Rental:	$7,000.00 per year
Character of Use:	Diversified Agriculture
Lease Term:	45 years, April 1, 2000 through March 31, 2045
Consideration:	$169,000.00

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REMARKS:

General Lease No. S-6002 was awarded to Ricky Young in 2000 by way of public drawing. Mr. Young developed the lot into a successful farm that produces coconuts, limes, banana, tomatoes, and dragon fruit. Mr. Young's declining health has made him unable to farm, and he began experiencing extreme economic hardship. Mr. Young requests that the lease be assigned to Shane Tyler Rupp pursuant to Sections 4-153-33(a)(6)(B) and (C), HAR.

Shane Rupp worked on his father's farm after graduating from BYU-Hawaii in 2011. His duties included growing vegetables and building raised beds and high tunnel green houses. From 2017 to present Mr. Rupp has owned and operated his farming business in Hauula where he cultivates sweet potatoes, yam, taro, banana, dragon fruit, bread fruit, sugarcane, and floral plants. Mr. Rupp would like to expand his operations by growing taro, banana, bread fruit, and various vegetables and herbs on the subject farm lot. Mr. Rupp qualifies as a bona fide farmer with more than two years of fulltime farming experience and meets the eligibility requirements for Agricultural Parks pursuant to Sections 4-153-1 and 13, HAR.

There is a consideration $169,000.00, which includes an inventory of mature trees and plants. In accordance with Paragraph 17. Assignments of lease, lease interest, etc., any net proceeds are subject to a premium percentage charge benefitting the Lessor. In this case, calculations in accordance with this provision net $0.00 to the Lessor (see attached Exhibit "B").

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RECOMMENDATION:

Staff recommends that the Board of Agriculture consent to the assignment of General Lease No. S-6002 from Ricky Young, Lessee/Assignor, to Shane Tyler Rupp, Assignee. All documents shall be subject to review and approval as to form by the Department of the Attorney General, and such other terms and conditions as may be prescribed by the Chairperson to best serve the interests of the State.

Respectfully Submitted,

FOR

BRIAN KAU, P.E.
Administrator and Chief Engineer
Agricultural Resource Management Division

Attachments – Exhibits "A" and "B"

APPROVED FOR SUBMISSION:

PHYLLIS SHIMABUKURO-GEISER
Chairperson, Board of Agriculture

B10

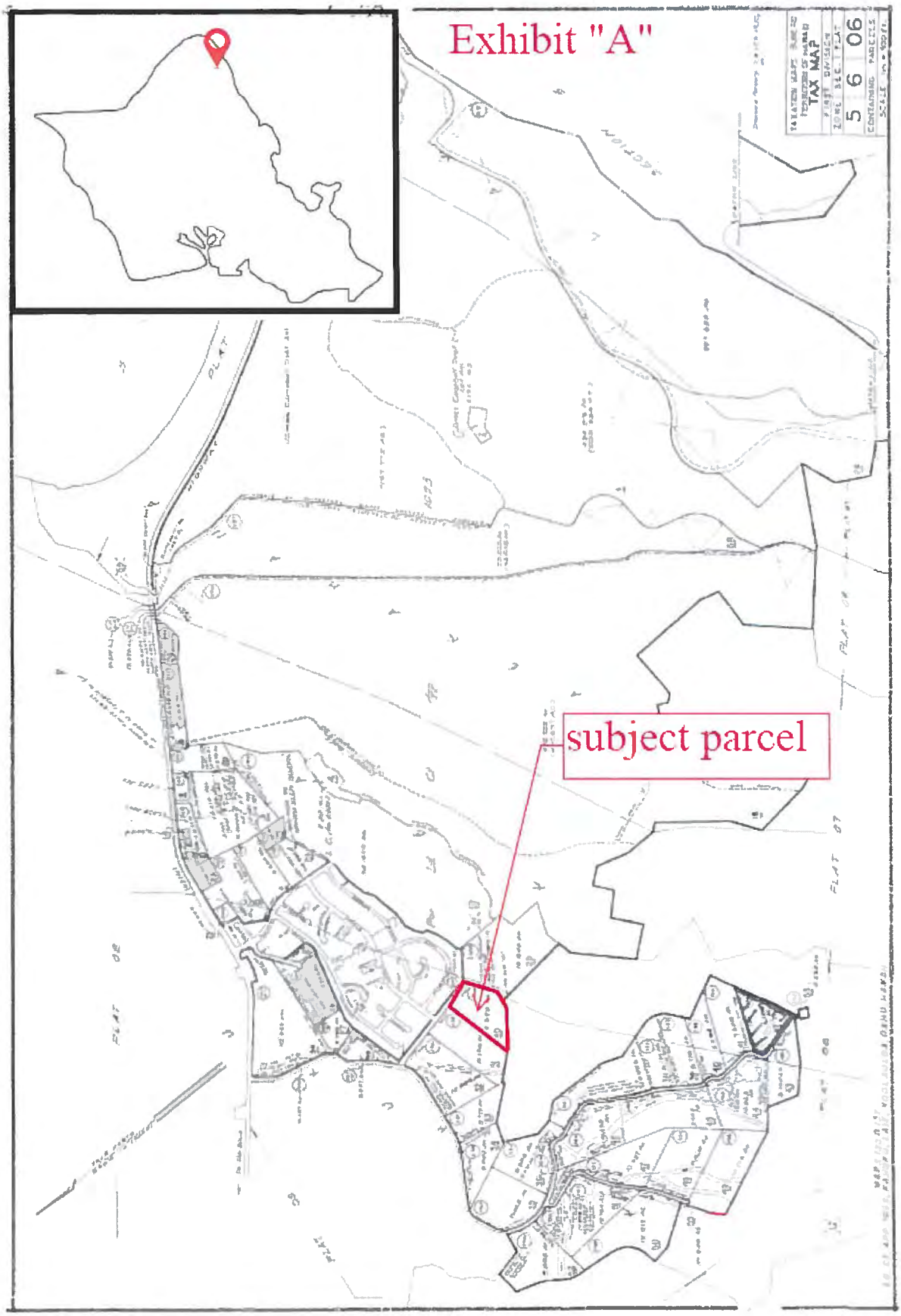

EXHIBIT "B"
ASSIGNMENT OF LEASE CALCULATIONS FOR
GENERAL LEASE NO. S-6002

Adjusted Depreciation Cost of Improvements or Renovations

Total Consideration:	$ 169,000.00
Less: Inventory	$ 170,800.00
Net Consideration:	$ (1,800.00)

Actual Cost:	$0.00
CCI (most recent):	n/a
CCI (base):	n/a
Expired Term:	266
Whole Term:	540

1. Adjusted Cost of Improvments or Renovations:

Actual Cost x CCI (most recent)/CCI (Base)

CCI (recent)	n/a
CCI (base)	n/a
CCIR/CCIB	

Actual Cost x CCI(R)/CCI(B) =

$0.00 0.00 $0.00

2. Depreciation:

Adjust. Cost Impr./Whole Term x Expired Term =

$0.00 540 266 $0.00

3. Adjusted Depreciated Cost of Improvements:

Adjust cost - Depreciated cost =

$ - $ - $ -

1. TOTAL NET CONSIDERATION			$ (1,800.00)
2. Adj Cost of Imp/Renov	$ -		
	$ -	$	-
3. Adj. cost of Trade Fixtures	$ -		
	$ -		
4. Excess			$0.00
5. Premium	Percentage: 30%		$0.00

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STATE OF HAWAII
DEPARTMENT OF AGRICULTURE
AGRICULTURAL RESOURCE MANAGEMENT DIVISION
HONOLULU, HAWAII

June 28, 2022

Board of Agriculture
Honolulu, Hawaii

Subject:	REQUEST FOR: 1) CONSENT TO ASSIGNMENT OF GENERAL LEASE NO. S-4934; LLOYD Y. C. CHING AND MARILYN B. Y. CHING, LESSEE/ASSIGNOR, TO CC REPAIR & MAINTENANCE SERVICE, INC., ASSIGNEE; AND 2) APPROVAL OF EXTENSION OF LEASE; TMK: (1) 4-1-035:013, WAIMANALO AGRICULTURAL PARK LOT 13, KOOLAUPOKO, WAIMANALO, ISLAND OF OAHU, HAWAII
Authority:	Sections 166-6, 166-7 and 166-9, Hawaii Revised Statutes (HRS), and Sections 4-153-33(a)(2) and (b), and 4-153-33-(a)(6)(C), Hawaii Administrative Rules (HAR)
Lessee/Assignor:	Lloyd Y. C. Ching and Marilyn B. Y. Ching
Assignee:	CC Repair & Maintenance Service, Inc.
Land Area:	7.164 acres
Tax Map Key:	(1) 4-1-035:013 (see Exhibit "A")
Land Status:	Encumbered by Governor's Executive Order No. 3464 to the Department of Agriculture for Agricultural Park purposes in 1990
Annual Rental:	$4,700.00 per year
Character of Use:	Diversified Agriculture
Lease Term:	35 years, August 1, 1986 through July 31, 2021
Consideration:	None

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REMARKS:

General Lease No. S-4934 was awarded to Lloyd Y. C. Ching and Marilyn B. Y. Ching in 1986 by the Board of Land and Natural Resources. In 1990 Governor's Executive Order No. 3464 transferred the Waimanalo Agricultural Park lands to the Department of Agriculture for management purposes. Mr. and Mrs. Ching developed the premises producing landscape plants. In 2012, Mr. Ching passed away, and Mrs. Ching can no longer manage the farm due to her deteriorating health. General Lease No. S-4934 expired as of July 31, 2021, and the Lessee is currently on holdover until July 31, 2022 as staff has been working with the Lessee to correct compliance issues which have since been remedied. Mrs. Ching requests that the lease be assigned to CC Repair & Maintenance Service, Inc. pursuant to Section 4-153-33(a)(6)(C), a landscape company which is wholly owned by her son Eric Ching.

Eric Ching has been working on the subject farm lot since 1986, started his landscape business in 1994, and plans to continue growing ornamental plants along with avocado and breadfruit on the premises. The lease may be assigned to CC Repair & Maintenance Service, Inc., which qualifies as an agricultural company with at least 75 percent of its owners who qualify as bona fide farmers and meet residency eligibility requirements. Eric Ching, the sole owner of CC Repair & Maintenance Service, Inc. qualifies as a bona fide farmer with more than two years of fulltime farming experience and meets the eligibility requirements for Agricultural Parks pursuant to Sections 4-153-1 and 13, HAR.

There is no consideration for the assignment of lease.

Subject to the approval of the assignment of lease, Eric Ching requests a 20-year extension of the lease term from August 1, 2021 through July 31, 2041 for a cumulative total of not more than fifty-five years pursuant to Section 4-153-33(a)(2), HAR. The Board of Agriculture (Board) may extend the term of the lease to qualify the lease for lending purposes, pursuant to Section 4-153-33(b), HAR. Consequently, Eric Ching has been preapproved for a $65,000 line of credit, subject to Board approval of extension of the lease term. The proceeds will be used solely for farming operations and improvements on the demised premises. At its October 26, 2021 meeting, the Board approved the annual base rent of $9,473.00 per year for the extension period, as determined by an independent appraiser.

RECOMMENDATION:

Staff recommends that the Board of Agriculture: 1) consent to the assignment of General Lease No. S-4934 from Lloyd Y. C. Ching and Marilyn B. Y. Ching, Lessee/Assignor, to CC Repair & Maintenance Service, Inc., Assignee; and 2) approve the extension of General Lease No. S-4934 to expire on July 31, 2041. This approval of extension of the lease term shall be conditioned on the full execution of the Extension of General Lease No. S-4934 document on or before July 31, 2022 and shall include related previously executed lease extension documents. All documents shall be subject to review and approval as to form by the Department of the Attorney General, and such other terms and conditions as may be prescribed by the Chairperson to best serve the interests of the State.

Respectfully Submitted,

FOR

BRIAN KAU, P.E.
Administrator and Chief Engineer
Agricultural Resource Management Division

Attachments – Exhibit "A"

APPROVED FOR SUBMISSION:

PHYLLIS SHIMABUKURO-GEISER
Chairperson, Board of Agriculture

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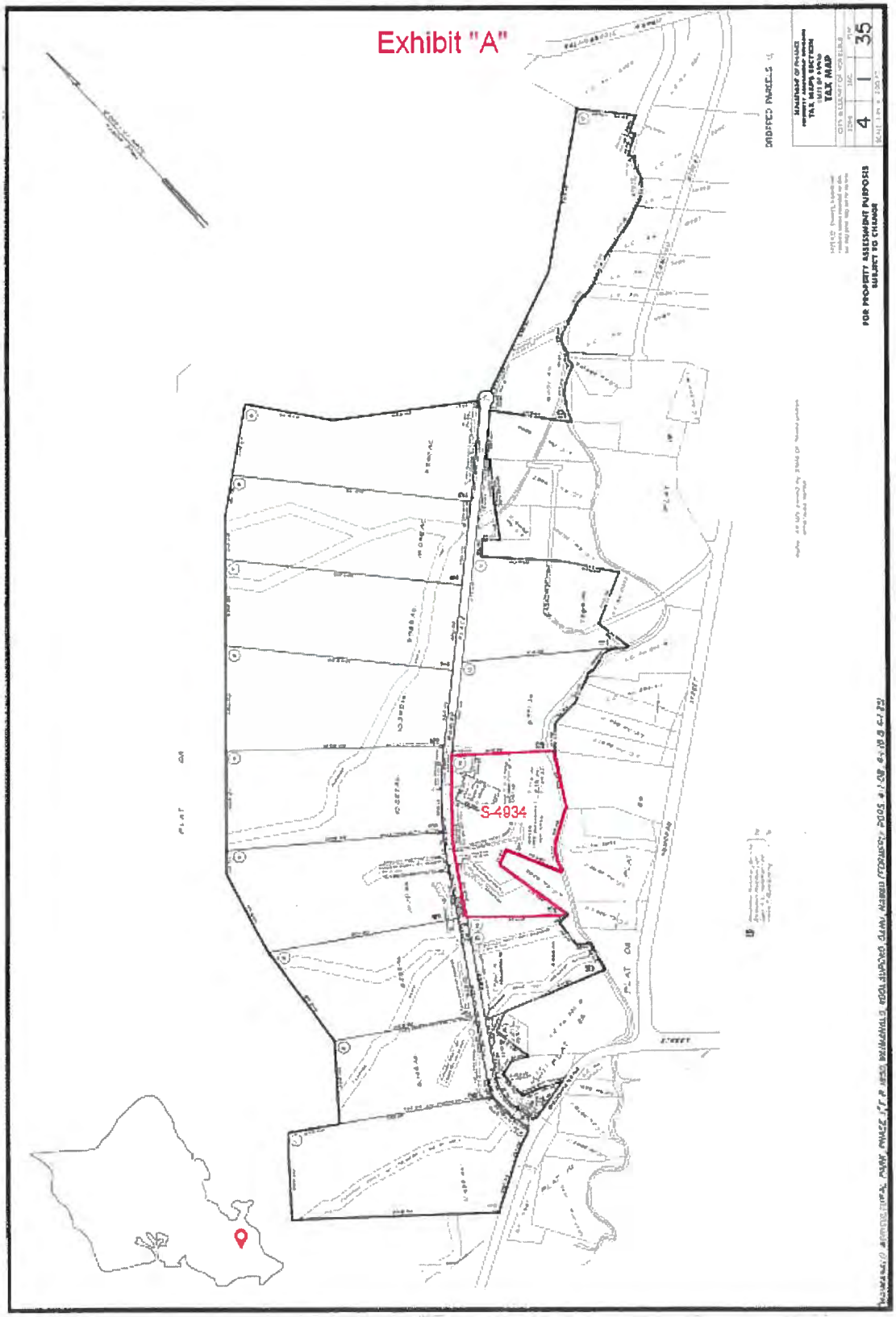

STATE OF HAWAII
DEPARTMENT OF AGRICULTURE
AGRICULTURAL RESOURCE MANAGEMENT DIVISION
HONOLULU, HAWAII

June 28, 2022

Board of Agriculture
Honolulu, Hawaii

Subject:	REQUEST FOR APPROVAL FOR EXTENSION OF LEASE TERM, GENERAL LEASE NO. S-4933; ALVIN M. TSURUDA, LESSEE; TMK: (1) 4-1-035:012; WAIMANALO AGRICULTURAL PARK LOT 12, KOOLAUPOKO, WAIMANLO, ISLAND OF OAHU, HAWAII
Authority:	Section 166-6, Hawaii Revised Statutes (HRS), and Sections 4-153-33(a)(2) and (b), Hawaii Administrative Rules (HAR)
Lessee:	Alvin M. Tsuruda
Land Area:	5.771 gross acres
Tax Map Key:	(1) 4-1-035:012 (see Exhibit "A")
Land Status:	Encumbered by Governor's Executive Order No. 3464 to the Department of Agriculture for Agricultural Park purposes
Annual Rental:	$7,375.00
Lease Term:	35 years, August 1, 1986 through July 31, 2021
Character of Use:	Nursery

REMARKS:

General Lease No. S-4933, dated November 14, 1986, was issued to Alvin M. Tsuruda and Gail N. Y. Tsuruda, as Tenants by the Entirety, by the Board of Land and Natural Resources. Governor's Executive Order No. 3464, dated August 22, 1990, transferred the Waimanalo Agricultural Park lands to the Department of Agriculture for management purposes. Gail Tsuruda passed away in 2014 and the lease automatically passed by operation of law upon her death to the surviving spouse, Alvin M. Tsuruda.

General Lease No. S-4933 expired as of July 31, 2021, and the Lessee is currently on holdover until July 31, 2022 as staff had been working with the lessee to correct compliance issues which have since been remedied. The Lessee's nursery business produced primarily exotic varieties of anthuriums.

B16

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The Lessee requests a 20-year extension of the lease term from August 1, 2021 through July 31, 2041 for a cumulative total of not more than fifty-five years pursuant to Section 4-153-33(a)(2), HAR. The Board of Agriculture may extend the term of the lease to qualify the lease for mortgage lending purposes, pursuant to Section 4-153-33(b), HAR. Consequently, the Lessee applied for and has been preapproved for a $25,000.00 loan, subject to Board of Agriculture approval of extension of the lease term. The loan proceeds will be used solely for the operations and improvements on the demised premises.

An appraisal was ordered by the Lessor for the purpose of determining the fair market annual base rental and additional rents for the subject parcel for the extension term commencing August 1, 2021. The fair market annual rental has been determined at $12,885.00 per year.

RECOMMENDATION:

That the Board of Agriculture approve: (1) the Lessee of General Lease No. S-4933 as a holdover lessee; (2) the request for extension of General Lease No. S-4933 commencing from August 1, 2021 to and including July 31, 2041; and (3) the fair market annual rental of $12,885.00 for the term of the extension period. This approval of extension of the lease term shall be conditioned on the full execution of the Extension of General Lease No. S-4933 document on or before July 31, 2022 and shall include related previously executed lease extension documents. All documents shall be subject to review and approval as to form of the lease extension and related documents by the Department of the Attorney General, and such other terms and conditions as may be prescribed by the Administrator and approved by the Chairperson to best serve the interests of the State.

Respectfully Submitted,

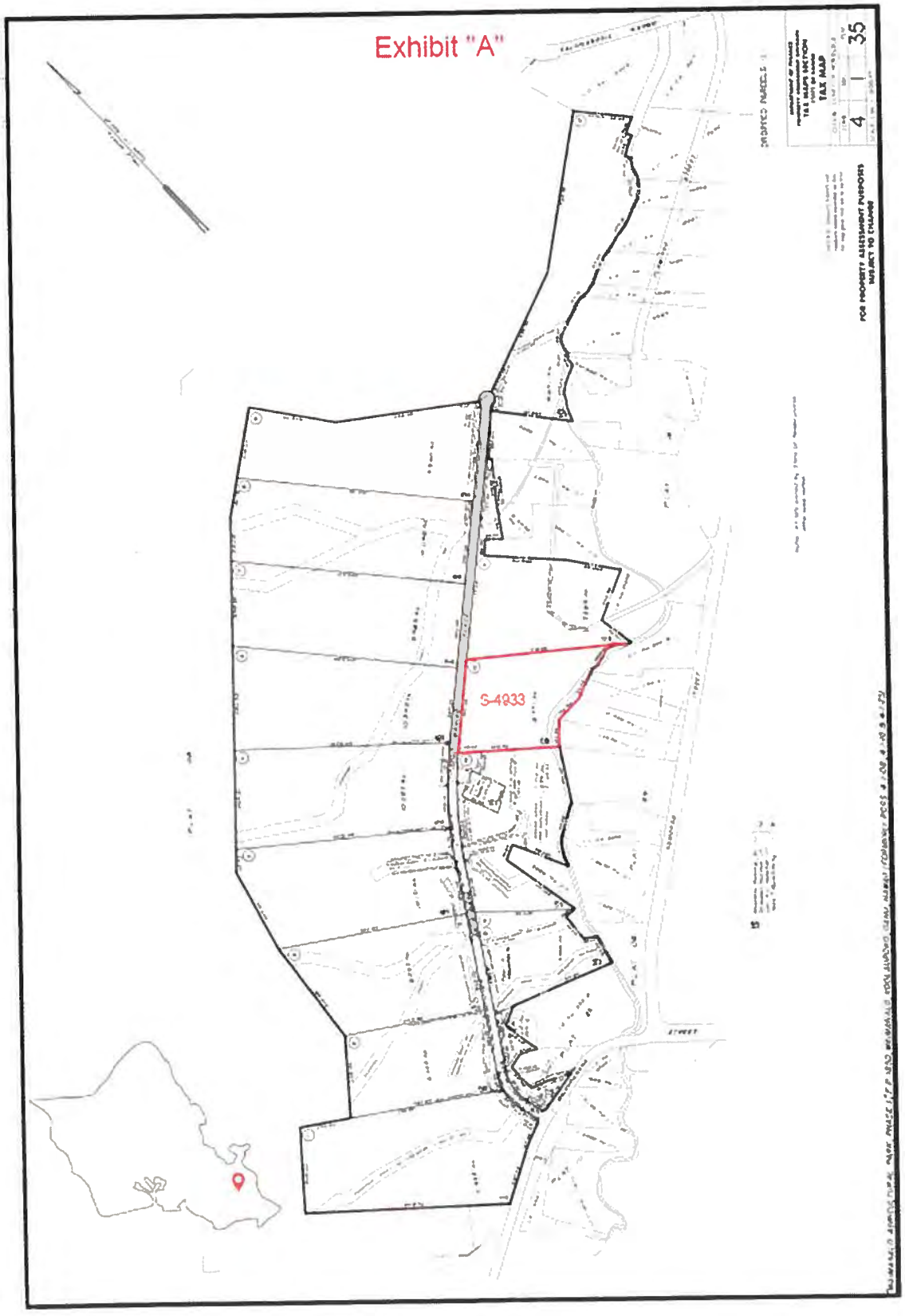
FOR

BRIAN KAU, P.E.
Administrator and Chief Engineer
Agricultural Resource Management Division

Attachments – Exhibit "A"

APPROVED FOR SUBMISSION:

PHYLLIS SHIMABUKURO-GEISER
Chairperson, Board of Agriculture



B18

STATE OF HAWAII
DEPARTMENT OF AGRICULTURE
AGRICULTURAL RESOURCE MANAGEMENT DIVISION
HONOLULU, HAWAII

June 28, 2022

Board of Agriculture
Honolulu, Hawaii

Subject: REQUEST FOR CONSENT TO ASSIGNMENT OF GENERAL LEASE NO. S-3003; KONA PRODUCERS COOPERATIVE, LESSEE/ASSIGNOR; HAWAII ULU PRODUCERS COOPERATIVE, ASSIGNEE; TMK: 3RD DIV/7-9-016:018 AND 19, LOT NOS. 018 AND 019, HONALO, NORTH KONA, ISLAND OF HAWAII, HAWAII.

Authority:	Section 171-36(a)(5), Hawaii Revised Statutes (HRS)
Lessee/Assignor:	Kona Producers Cooperative
Assignee:	Hawaii Ulu Producers Cooperative
Land Area:	Parcel 18: 1.91 acres Parcel 19: 0.125 acres Total: 2.035 acres
Tax Map Key:	3rd Div/7-9-016:018 and 019 (Exhibit "A")
Lease Term:	50 years, December 1, 1993 to November 30, 2043
Land Status:	Encumbered by Governor's Executive Order No. 3503 to the Department of Agriculture for marshalling yard purposes in 1991
Character of Use:	Solely for agricultural processing; defined by the lease as "the processing of agricultural products, including marshalling, cooling, treating or transshipping, which are grown, raised or produced within the State."

BACKGROUND:

In 1993, General Lease No. S-3003, a 25-year lease, was awarded by the Board of Agriculture (BOA) to Kona Producers Cooperative (KPC). By Extension of General Lease No. S-3003, the term of this lease was extended for 25 years to expire on November 30, 2043.

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The KPC facility currently serves as an aggregation center for ulu (breadfruit) at which they process, store and market the ulu as well as process value-added ulu products.

KPC is requesting to assign General Lease S-3003 to Hawaii Ulu Producers Cooperative (HUPC) as the successor entity to KPC. Pursuant to the terms of General Lease S-3003 and Sections 171-11 and -36(a)(5), HRS, an assignment of this lease is permitted subject to approval by the Board of Land and Natural Resources.

HUPC is an agricultural cooperative which was organized to help revitalize the ulu industry in Hawaii and to make ulu a viable crop and dietary staple, thereby contributing to food security in Hawaii. HUPC will continue as an aggregation center for ulu and ulu products.

There is no consideration for the assignment of lease.

RECOMMENDATION:

That the Board of Agriculture approve the assignment of General Lease S-3003 from Kona Producers Cooperative Lessee/Assignor, to Hawaii Ulu Producers Cooperative, Assignee. All related documents are subject to the review and approval as to form by the Department of the Attorney General, and such other terms and conditions as may be prescribed by the Chairperson to best serve the interests of the State.

Respectfully submitted,

FOR

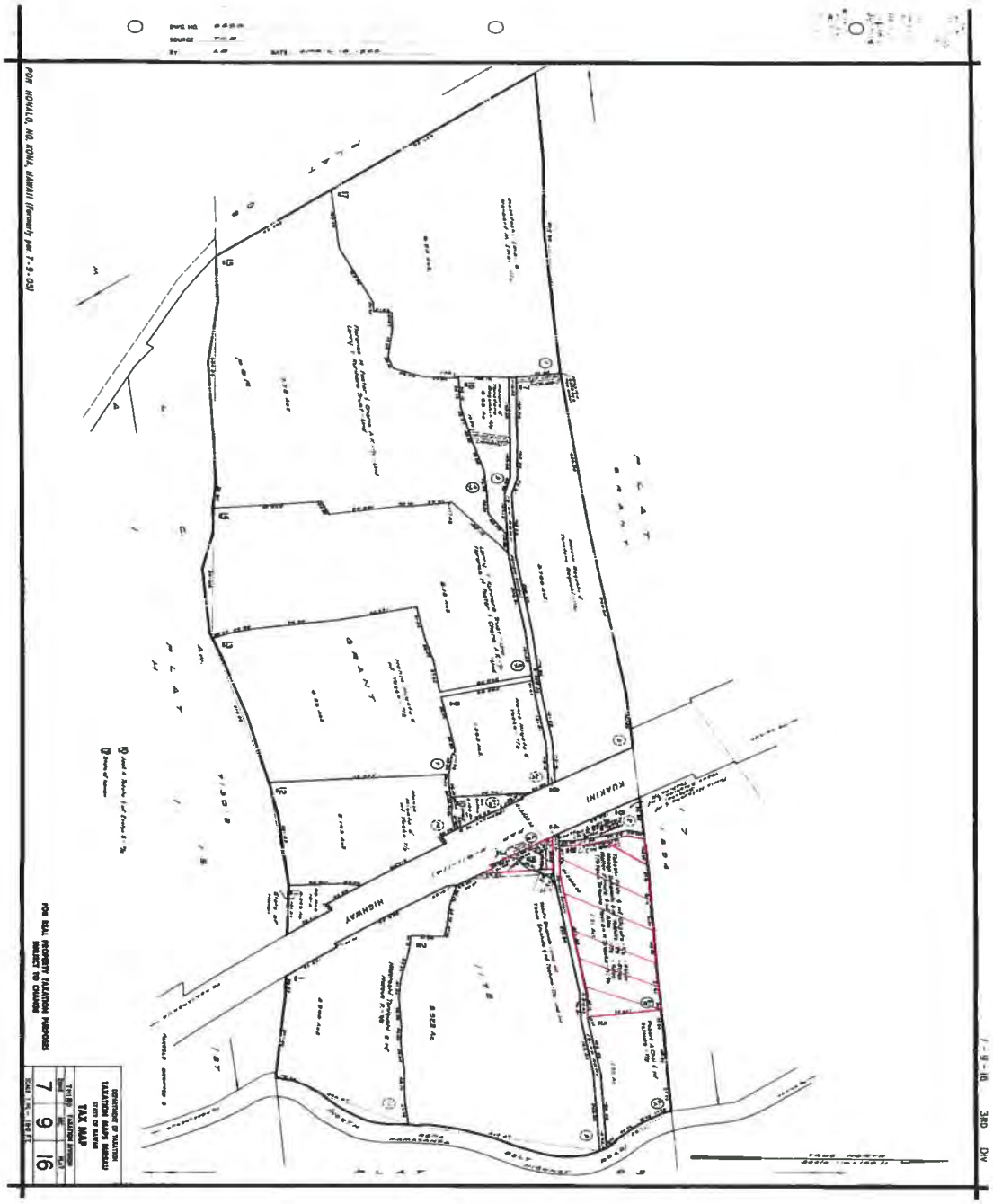
BRIAN KAU, P.E.
Administrator and Chief Engineer,
Agricultural Resource Management Division

Attachments - Exhibit "A"

APPROVED FOR SUBMISSION:

PHYLLIS SHIMABUKURO-GEISER
Chairperson, Board of Agriculture

Exhibit "A"



B21

STATE OF HAWAII
DEPARTMENT OF AGRICULTURE
AGRICULTURAL RESOURCE MANAGEMENT DIVISION
HONOLULU, HAWAII

June 28, 2022

Board of Agriculture
Honolulu, Hawaii

Subject: REQUEST FOR CONSENT TO ASSIGNMENT OF GENERAL LEASE NO. S-4801; RONALD T. NITTA AND MERLENE S. NITTA, LESSEE/ASSIGNOR; JOSHUA MCCLUNG, ASSIGNEE; TMK: 3rd DIV/1-5-116:037, LOT 10, PAHOA AGRICULTURAL PARK, PUNA DISTRICT, ISLAND OF HAWAII, HAWAII

Authority:	Section 166-7 Hawaii Revised Statutes, (HRS), and Section 4-153-33(a)(6)(B), Hawaii Administrative Rules (HAR)
Lessee/Assignor:	Ronald T. Nitta and Merlene S. Nitta
Assignee:	Joshua McClung
Land Area:	5.000 acres
Tax Map Key:	3rdDiv/1-5-116:037 (Exhibit "A")
Lease Term:	55-years, May 1, 1982, through April 30, 2037
Land Status:	Encumbered by Governor's Executive Order No. 3380, dated February 26, 1988, to the Department of Agriculture for Agricultural Park Purposes
Annual Base Rent:	$830.00 per year (until 5/1/2022 re-opening)
Character of Use:	Diversified Agriculture

BACKGROUND:

The Board of Land and Natural Resources (BLNR) awarded General Lease No. S-4801 to Albert Nishimura and Florence Nishimura commencing on May 1, 1982. At its meeting held on October 26, 1984, BLNR consented to the assignment of lease from Albert and Florence Nishimura to Ronald T. Nitta and Merlene S. Nitta. The subject property was transferred to the Department of Agriculture by Governor's Executive Order No. 3380, dated February 26, 1988.

Since taking over the lease in 1984, Mr. and Mrs. Nitta have been growing Dracaena Marginata. Due to physical disabilities, Ronald and Merlene Nitta are requesting the assignment of General Lease S-4801 to Joshua McClung. Pursuant to the terms of General Lease No. S-4801 and Section 4-153-33(a)(6)(B), HAR, an assignment of lease is permitted due to physical disability.

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Joshua McClung has been in the nursery business since 2012 and currently grows a variety of potted foliage that are exported to wholesale nurseries in California. By acquiring this lot, Mr. McClung will expand his existing business by taking over the existing inventory of Dracaena Marginata and producing additional foliage, Eucalyptus trees and Bird of Paradise.

Joshua McClung qualifies as a bona fide farmer, with more than two (2) years of full-time farming experience and satisfies the eligibility requirements pursuant to Sections 4-153-1 and 13, HAR.

There is no consideration for the assignment of lease.

RECOMMENDATION:

That the Board of Agriculture approve the assignment of General Lease S-4801 from Ronald T. Nitta and Merlene S. Nitta, Lessee/Assignor, to Joshua McClung, Assignee. All related documents are subject to the review and approval as to form by the Department of the Attorney General, and such other terms and conditions as may be prescribed by the Chairperson to best serve the interests of the State.

Respectfully submitted,

FOR

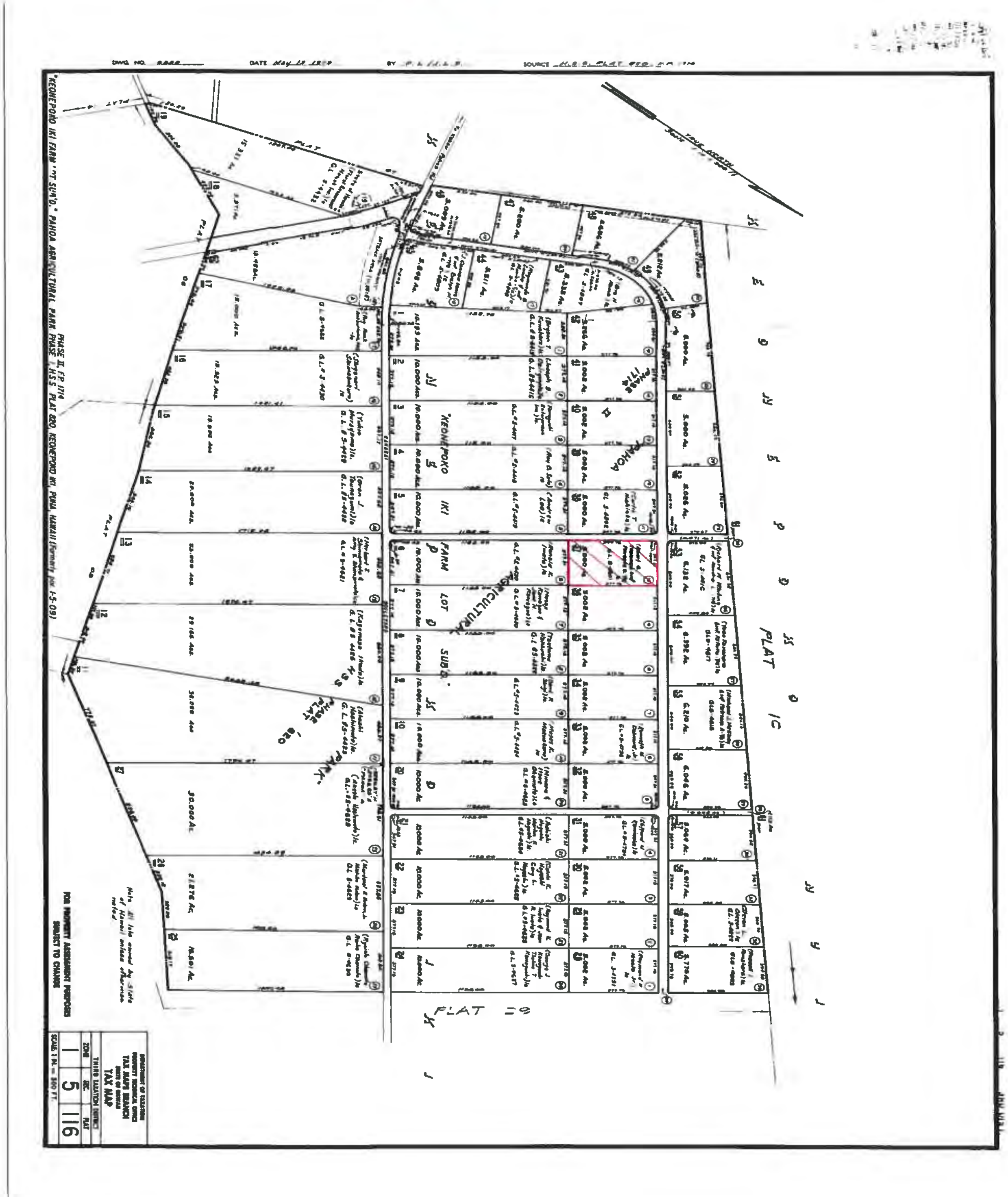
BRIAN KAU, P.E.
Administrator and Chief Engineer,
Agricultural Resource Management Division

Attachments - Exhibit "A"

APPROVED FOR SUBMISSION:

PHYLLIS SHIMABUKURO-GEISER
Chairperson, Board of Agriculture

EXHIBIT "A"



B24

STATE OF HAWAII
DEPARTMENT OF AGRICULTURE
AGRICULTURAL RESOURCE MANAGEMENT DIVISION
HONOLULU, HAWAII

June 28, 2022

Board of Agriculture
Honolulu, Hawaii

Subject: CERTIFICATION OF ACREAGE ASSESSMENTS FOR THE HONOKAA-PAAUILO, KAHUKU, MOLOKAI, WAIMANALO, AND WAIMEA IRRIGATION SYSTEMS, 2023 FISCAL YEAR

BACKGROUND:

Section 167-19(a), Hawaii Revised Statutes, states, "The board shall determine and certify on or before June 30 of each year the amount of acreage assessments necessary in that fiscal year for the acquisition, construction, operation, and maintenance of irrigation facilities for each project, and the acreage of agricultural and pastureland of each land occupier within the project." For the 2023 fiscal year, the Agricultural Resource Management Division has determined that acreage assessments for the following irrigation systems are:

Irrigation System	Acreage Assessment
Honokaa-Paauilo	$90,195.00
Kahuku	$27,156.00
Molokai	$90,195.00
Waimanalo	$90,195.00
Waimea	$90,195.00

The acreage of agricultural and livestock lands of each land occupier within the Irrigation Systems are as follows:

Irrigation System	Agricultural Acreage	Livestock Acreage	Land Occupier Exhibit
Honokaa-Paauilo	764	6,383	A
Kahuku	168	None	B
Molokai	3,436	None	C
Waimanalo	1,003	None	D
Waimea	736	None	E

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RECOMMENDATION:

1. That the Board determine and certify that the amount of acreage assessments necessary for annual maintenance of the listed five (5) irrigation systems for fiscal year 2023 are as listed.

2. That the Board determine and certify that the acreage of agricultural and livestock lands of each land occupier within the listed irrigation system is as set forth in attachments A through E.

3. That the Board determine and certify that agricultural lands shall bear 100% of the annual acreage assessments, for the Kahuku, Molokai, Waimanalo, and Waimea Irrigation Systems; and

4. That the Board determine and certify that agricultural and pastoral lands shall bear 70% and 30%, respectively, of the annual acreage assessments for the Honokaa-Paauilo Irrigation System.

Respectfully submitted,

FOR BRIAN KAU, P.E.
Administrator
Agricultural Resource Management
Division

Attachments

APPROVED FOR SUBMISSION:

PHYLLIS SHIMABUKURO-GEISER
Chairperson, Board of Agriculture

Exhibit A – Honokaa-Paauilo, Acreage by Account FY2023

ACCT	ACRES	ACCT	ACRES	ACCT	ACRES	ACCT	ACRES
6801	7	6901	5	68260	4	7016	57
6803	10	6904	4	68341	5	7017	27
6804	7	6905	14	68381	6	7018	260
6810	2	6907	9	68402	6	7020	163
6812	2	6908	5	68430	4	7036	677
6813	5	6909	9	68461	12	7037	125
6819	9	6910	6	68600	5	7038	3
6822	11	6911	22	68680	4	7040	3
6823	20	6914	39	68690	5	7042	311
6824	5	6916	2	68790	3	7043	351
6830	14	6917	5	68910	15	7044	32
6832	6	6921	17	68930	16	7045	716
6833	5	6935	1	68981	6	7047	682
6835	3	6940	4	68990	3	7048	47
6837	4	6953	11	69311	3	7049	32
6841	3	6954	13	69331	10	7050	13
6845	7	6955	16	69341	5	7051	2
6851	5	6956	8	69360	4	7052	4
6853	5	6960	12	69371	7	7053	10
6855	5	6962	21	69380	2	7054	142
6857	5	6967	8	69410	2	7055	140
6859	5	6969	7	69581	11	7056	4
6861	2	6970	4	69640	13	7057	6
6862	4	6971	4	69650	8	7058	594
6863	5	6972	3	69661	10	7059	15
6864	5	6975	12	69760	10	7060	29
6865	5	6987	2	69830	8	7061	1
6867	5	6990	5	6821	14	7062	2
6868	3	6991	4	7000	15	7063	446
6870	5	6993	6	7002	623	7064	17
6871	4	6995	6	7005	60	7066	163
6873	5	6996	2	7006	21	7069	68

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Exhibit A – Honokaa-Paauilo, Acreage by Account FY2023

ACCT	ACRES	ACCT	ACRES	ACCT	ACRES	ACCT	ACRES
6874	5	6997	5	7007	4	7073	100
6875	5	6998	14	7008	8	7077	26
6876	5	6999	5	7009	10	7078	22
6880	3	68011	13	7010	192	7080	100
6892	5	68060	13	7011	9	**Total**	**7,147**
6894	12	68091	5	7012	3		
6897	10	68250	3	7013	34		

Exhibit B – Kahuku, Acreage by Account FY2023

ACCT	ACRES
3501	15
3502	7
3503	7
3504	11
3505	4
3506	4
3507	9
3508	7
3509	9
3510	4
3511	4
3512	4
3513	6
3514	5
3515	2
3516	6
3517	8
3518	7
3519	8
3520	9
3521	6
3522	8
3523	8
3524	10
Total	**168**

Exhibit C – Molokai, Acreage by Account FY2023

ACCT	ACRES	ACCT	ACRES	ACCT	ACRES	ACCT	ACRES
5000	3	5072	3	5151	3	5222	35
5001	3	5073	2	5152	25	5223	98
5002	9	5074	2	5153	30	5225	2
5003	5	5075	3	5155	2	5226	25
5004	4	5076	2	5156	2	5227	3
5005	2	5077	2	5157	2	5228	2
5006	110	5078	2	5159	2	5229	2
5007	92	5079	2	5161	5	5230	2
5010	4	5080	2	5162	2	5231	2
5011	2	5081	3	5163	2	5232	2
5012	35	5082	2	5164	4	5233	2
5013	3	5083	30	5165	28	5234	2
5014	2	5084	2	5166	3	5235	2
5015	2	5085	2	5167	2	5236	2
5016	2	5086	5	5168	2	5239	2
5017	2	5087	8	5169	35	5240	2
5018	2	5088	2	5170	10	5241	2
5020	2	5089	2	5171	27	5242	2
5021	2	5090	5	5172	3	5243	2
5022	5	5091	2	5174	45	5244	2
5023	2	5092	2	5175	2	5246	2
5024	26	5093	2	5177	3	5247	2
5025	2	5094	2	5178	148	5248	2
5026	2	5095	2	5179	2	5249	2
5027	2	5096	2	5180	4	5250	2
5028	3	5097	2	5181	5	5251	2
5029	2	5099	20	5182	2	5252	2
5030	2	5100	2	5183	3	5253	12
5031	2	5101	2	5184	2	5254	2
5032	4	5103	2	5185	2	5255	2
5033	2	5105	19	5186	8	5256	2
5034	2	5107	2	5187	7	5257	2

Exhibit C – Molokai, Acreage by Account FY2023

ACCT	ACRES	ACCT	ACRES	ACCT	ACRES	ACCT	ACRES
5035	7	5108	20	5188	30	5258	2
5036	2	5109	2	5189	50	5259	2
5038	10	5110	2	5190	90	5260	2
5039	2	5111	2	5192	314	5261	2
5040	5	5112	2	5193	2	5262	2
5041	15	5113	6	5194	2	5267	2
5043	3	5115	5	5195	2	5271	2
5044	30	5117	25	5196	2	5272	2
5045	11	5118	2	5197	2	5273	20
5046	2	5119	2	5198	3	5274	5
5047	2	5120	2	5199	2	5276	5
5048	3	5121	2	5200	2	5280	5
5049	95	5122	6	5201	2	5281	322
5050	46	5123	30	5202	2	5282	27
5051	30	5124	21	5203	377	5283	16
5052	2	5126	2	5204	2	5284	9
5053	2	5127	2	5205	2	5285	25
5055	3	5128	30	5206	2	5286	5
5056	2	5129	2	5207	2	5288	16
5057	23	5130	2	5208	2	51360	2
5058	2	5131	150	5209	2	51770	2
5059	29	5132	2	5210	2	52240	30
5060	39	5133	3	5211	25	**Total**	**3,436**
5061	30	5134	2	5212	2		
5062	30	5135	2	5213	2		
5063	2	5138	3	5214	2		
5064	5	5139	2	5215	2		
5065	2	5140	2	5216	2		
5066	3	5141	12	5217	2		
5067	2	5142	2	5218	2		
5068	3	5143	2	5219	2		
5069	22	5148	16	5220	2		
5070	26	5150	2	5221	2		

Exhibit D – Waimanalo, Acreage by Account FY2023

ACCT	ACRES	ACCT	ACRES	ACCT	ACRES	ACCT	ACRES
2000	10	2053	6	2106	8	2162	2
2001	3	2054	9	2107	128	2163	3
2002	9	2055	4	2109	5	2164	5
2003	8	2057	3	2110	9	2165	3
2004	9	2058	6	2111	5	2167	2
2005	3	2060	5	2112	48	2170	0
2006	11	2061	2	2114	3	2171	0
2007	9	2062	2	2115	10	2172	2
2008	6	2064	9	2116	5	2173	3
2010	9	2065	5	2117	8	2180	9
2012	2	2068	9	2118	3	2182	8
2015	9	2069	8	2119	3	2183	9
2016	6	2070	4	2120	11	2184	4
2018	9	2072	2	2121	12	2186	6
2021	8	2073	3	2122	7	2187	2
2022	10	2074	8	2123	11	2188	3
2023	6	2075	9	2124	11	2189	7
2024	2	2076	8	2125	11	2190	10
2026	11	2079	9	2126	10	2192	3
2028	3	2081	5	2127	11	2193	2
2029	4	2082	14	2128	9	2195	2
2030	9	2083	4	2129	10	2196	2
2032	2	2084	4	2131	8	2198	2
2033	6	2085	11	2132	6	2199	2
2034	10	2088	6	2133	2	2200	10
2036	10	2089	7	2137	3	2201	2
2037	9	2090	8	2138	2	2203	2
2039	2	2091	9	2142	4	2204	3
2040	10	2092	9	2143	3	2205	5
2041	11	2093	5	2147	0	2207	2
2042	7	2094	2	2148	0	2208	3
2043	10	2095	4	2149	0	**Total**	**1,003**

Exhibit D – Waimanalo, Acreage by Account FY2023

ACCT	ACRES	ACCT	ACRES	ACCT	ACRES	ACCT	ACRES
2044	2	2096	3	2150	0		
2046	7	2097	5	2157	8		
2047	5	2098	10	2158	8		
2048	3	2102	5	2159	2		
2049	10	2104	2	2160	2		
2050	9	2105	4	2161	2		

Exhibit E – Waimea, Acreage by Account FY2023

ACCT	ACRES	ACCT	ACRES	ACCT	ACRES	ACCT	ACRES
1000	8	1045	7	1090	2	1133	6
1002	11	1048	6	1092	2	1134	2
1003	4	1049	5	1093	3	1135	2
1004	2	1050	5	1094	2	1136	5
1005	17	1052	2	1095	2	1137	5
1006	0	1053	3	1096	2	1138	5
1007	10	1054	6	1097	2	1139	2
1008	10	1056	4	1098	2	1140	2
1009	10	1057	2	1099	2	1141	5
1011	21	1058	2	1100	2	1142	6
1012	8	1059	2	1101	2	1143	6
1013	10	1060	2	1102	2	1144	5
1014	23	1061	2	1104	2	1145	5
1015	11	1062	3	1105	2	1146	2
1016	9	1064	2	1106	2	1150	3
1017	9	1066	3	1107	2	1151	2
1018	9	1068	2	1108	2	1153	21
1019	9	1069	2	1109	2	1154	9
1020	10	1070	2	1111	2	1155	4
1023	7	1071	2	1112	2	1156	5
1024	3	1072	7	1113	2	1157	3
1026	10	1073	2	1115	5	1158	5
1027	9	1074	4	1116	2	1159	5
1028	9	1075	2	1117	4	1160	2
1029	2	1076	4	1118	5	1161	9
1030	9	1077	3	1119	5	1162	5
1031	11	1078	2	1120	2	1163	5
1032	10	1079	10	1121	4	1166	4
1033	9	1080	2	1122	2	10140	0
1034	9	1082	4	1124	6	10250	7
1036	2	1083	6	1126	5	10460	7
1037	12	1084	0	1127	2	10470	6
1038	12	1085	2	1128	5	**Total**	**736**

Exhibit E – Waimea, Acreage by Account FY2023

ACCT	ACRES	ACCT	ACRES	ACCT	ACRES	ACCT	ACRES
1040	6	1086	2	1129	10		
1041	12	1087	4	1130	6		
1042	4	1088	2	1131	6		
1043	6	1089	5	1132	6		

State of Hawaii
Department of Agriculture
Plant Industry Division
Plant Quarantine Branch
Honolulu, Hawaii

June 28, 2022

Board of Agriculture
Honolulu, Hawaii

Subject: Request for: Approval of the Board of Agriculture's Proposed Order Amending Chapter 4-71, Hawaii Administrative Rules, "Non-Domestic Animal Import Rules," to add the Asian Tiger Mosquito, *Aedes albopictus*, Yellow Fever Mosquito, *Aedes aegypti,* and the Southern House Mosquito, *Culex quinquefasciatus*, to the List of Restricted Animals, Part A, Pursuant to HAR §4-71-4.2 for the Hawaii Department of Land and Natural Resources and Hawaii Department of Health.

I. Background:

In April 2022, the Plant Quarantine Branch (PQB) received permit applications from the Hawaii Department of Health (DOH) and the Hawaii Department of Land and Natural Resources (DLNR) requesting the Hawaii Board of Agriculture (Board) add the Asian Tiger Mosquito, *Aedes albopictus*, Yellow Fever Mosquito, *Aedes aegypti,* and the Southern House Mosquito, *Culex quinquefasciatus*, to the List of Restricted Animals, Part A (RA List), by Board Order. The DOH and DLNR requests are included as Attachment A and B respectively.

DLNR is requesting list placement of the Southern House Mosquito, *Culex quinquefasciatus*, for immediate field release applications to suppress mosquito populations in areas where Hawaii fauna are at risk of disease transmission due to the presence of these mosquitoes.

DOH is requesting list placement of all three aforementioned mosquito species for immediate field release applications to suppress mosquito populations in areas where Hawaii residents are at risk of disease transmission due to the presence of these mosquitoes.

At its May 9, 2022 meeting, the Board approved the requests from DLNR and DOH to preliminarily place the three mosquito species on the RA List by Board Order, pursuant to §150A-6.6, Hawaii Revised Statutes (HRS) and §4-71-4.2, Hawaii Administrative Rules (HAR).

C1

The Hawaii Department of Agriculture (Department) issued a press release on May 10, 2022 seeking public comment and subsequently notified the Environmental Review Program (formerly the Office of Environmental Quality Control) on the proposed Board order. The PQB submitted DLNR and DOH's requests to the Advisory Subcommittee on Entomology on May 26, 2022 and June 2, 2022 respectively. The proposed Board order and received public comments were presented for review and recommendation by the Advisory Committee on Plants and Animals at their publicly noticed meeting held via Zoom meeting on June 9, 2022.

II. List Additions By Board Order

Pursuant to HRS §150A-6.6, the Board has the authority to adopt administrative rules to make additions to or deletions from the lists required to be maintained under HRS §150A-6.1 through §150A-6.3, which include the List of Restricted Animals, Part A. Changes to the lists can be made without regard to the notice and public hearing requirements of HRS Chapter 91 provided that there is notice and opportunity for public input regarding additions or deletions to the lists.

HAR §4-71-4.2, "Public Input and Notification for Listing," details the specific process that the Board must follow to make a change to the lists maintained by PQB. It requires that, thirty days or more prior to the effective date of the Board order, the Department issue a press release and mail a notice to the Environmental Review Program for publication and to all persons who have made a timely written request of the Department for advance notice of the order or the Department's rulemaking proceedings.

The press release is required to have the following information:

a. A statement summarizing the substance of the proposed order which may include examples of the kinds of animals being added to or deleted from the lists required under HRS §150A-6.2;

b. A statement that a copy of the proposed order and the proposed exact changes will be mailed to any interested person who requests a copy upon payment in advance of costs for photocopying, preparing, and mailing the copy;

c. A statement as to where to obtain a copy of the proposed order and the proposed exact changes for inspection, or for pick-up after payment in full of costs for photocopying and preparing; and

d. A statement that the department is soliciting comments regarding the proposed order during the next thirty days, where comments may be forwarded to, and where the proposed order will be discussed.

Pursuant to HAR §4-71-4.2(b), the Department shall consider all oral and written comments and may incorporate those comments in its review of the proposed order by the Advisory Committee on Plants & Animals (Advisory Committee) in a noticed, public meeting.

Pursuant to HAR §4-71-4.2(c), upon approval by the Board at a noticed, public meeting, the order to adopt additions to, or deletions from, the lists of animals shall take effect ten days after the Department gives public notice of the order in a daily or weekly publication of statewide circulation or in separate daily or weekly publications whose combined circulation is statewide.

III. Summary of Proposed Additions to the List of Restricted Animals, Part A

The DOH and DLNR permit applications are requesting the following additions to the List of Restricted Animals (Part A) in Chapter 4-71, HAR:

§4-71-6.5, HAR, List of Restricted Animals (Part A)

Adds Scientific Name: "*Aedes albopictus*" and Common Name "Asian Tiger Mosquito".

Adds Scientific Name: "*Aedes aegypti*" and Common Name "Yellow Fever Mosquito".

Adds Scientific Name: "*Culex quinquefasciatus*" and Common Name "Southern House Mosquito".

IV. Public Comments

Written Testimony:

The PQB received a total of 213 written testimonies for consideration by the Advisory Committee.

107 testimonies were in support. The majority supported the protection of native bird species and/or to prevent the extinction of native bird populations through disease spread mitigation. Some testimonies indicated support for the suppression of vectors of diseases impacting public health and explained that the technique utilizing *Wolbachia* does not utilize genetically modified (GM) or genetically engineered (GE) mosquitoes. A few testimonies indicated general support for the cultural significance of native bird species. Of note, two official letters of support were received from State legislators, Representative David Tarnas and Senator Lorraine Inouye.

C3

106 testimonies were against the proposals with the majority being against the mosquitoes being genetically modified (GM) or genetically engineered (GE) and a handful that were generally against the release of anything into the environment. The testimonies also brought up issues such as: the lack of long-term studies, concern that the releases could have un-intended results such as the historical release of the mongoose, a few questioned if there really were diseases of concern, and one testimony indicates that if bird survival is the goal, then cats should be eradicated.

At the Advisory Committee meeting, four oral testimonies were received. All were in support of both the DLNR and DOH proposals. They were from the American Bird Conservancy, the Coordinating Group on Alien Pest Species, the Hawaii Invasive Species Council, and the Nature Conservancy. They emphasized that the proposed technique is used elsewhere in the world; is not using GM/GE organisms; protects native bird species and public health through mosquito vector controls. There were no oral testimonies provided in opposition.

V. Advisory Review

Advisory Subcommittee Review:

Both the DLNR and DOH requests were sent to the Advisory Subcommittee on Entomology for their review and recommendation. Their recommendations and comments for each request are listed below:

For DLNR:

I recommend approval____/____disapproval of future placement of the currently unlisted Southern House Mosquito, *Culex quinquefasciatus* (Diptera: Culicidae) on the List of Restricted Animals (Part A) by Board Order, for immediate field release to suppress wild populations of *Culex quinquefasciatus*, by the State of Hawaii Department of Land and Natural Resources (DLNR).

Dr. Daniel Rubinoff: Recommends Approval.

Ms. Janis Matsunaga: Recommends Approval.

Comments: "I recommend and support future placement of the currently unlisted southern house mosquito, *Culex quinquefasciatus* (Diptera: Culicidae) on the List of Restricted Animals (Part A) by Board Order, for immediate field release to suppress wild populations of *C. quinquefasciatus*, by DLNR. This is a necessary step to move this project forward."

Dr. Mark Wright: Recommends Approval

Comments: "The potential benefits for taking this action are extensive."

For DOH:

I recommend approval____/____disapproval of future placement of the currently unlisted yellow fever mosquito, *Aedes aegypti*, Asian tiger mosquito, *Aedes albopictus*, and southern house mosquito, *Culex quinquefasciatus* (Diptera: Culicidae) on the List of Restricted Animals (Part A) by Board Order, for immediate field release to suppress wild populations of *Aedes aegypti, Aedes albopictus*, and *Culex quinquefasciatus*, by the State of Hawaii Department of Health (DOH).

Dr. Mark Wright: Recommends Approval.

Comments: "The applicants present information that indicates that the intended importation will be environmentally safe."

Ms. Janis Matsunaga: Recommends Approval.

Comments: "I recommend approval of future placement of the currently unlisted *A. aegypti*, *A. albopictus*, and *C. quinquefasciatus* on the List of Restricted Animals (Part A) by Board Order."

Dr. Daniel Rubinoff: Recommends Approval.

Dr. Peter Follett: Recommends Approval.

Dr. Jesse Eiben: Recommends Approval.

Comments: "Necessary regulatory step."

Advisory Committee Review:

Both the DOH and DLNR requests, Advisory Subcommittee review and public testimony were presented to the Committee at its June 9, 2022 meeting. The PQB provided a synopsis of both submittals to the Committee members and noted that both proposals are using mosquitoes and bacterium that originate from Hawaii, are already used elsewhere in the world, are not GM or GE, and releases are only utilizing males, which

was noted that the requests are not using GM or GE mosquitoes and that both agencies are working on completions of EAs. The Committee unanimously recommended approval (7-0) of both DLNR and DOH's requests for placement of the three mosquito species on to the RA List by Board Order.

STAFF RECOMMENDATION: Based on the favorable responses by the responding Advisory Subcommittee Members' responses, the Advisory Committee's unanimous (7-0) recommendation to approve this request and considering the public comments regarding the proposed list change, the Plant Quarantine Branch recommends approval of the proposed rule amendments to place the three mosquito species on the RA List by Board Order.

Respectfully Submitted,

Becky Azama
Acting Manager, Plant Quarantine Branch

CONCURRED:

Helmuth Rogg, Ph.D.
Administrator, Plant Industry Division

APPROVED FOR SUBMISSION:

Phyllis Shimabukuro-Geiser
Chairperson, Board of Agriculture

Subcommittee on Entomology
Hawaii Department of Health

Attachment A

https://hdoa.hawaii.gov/wp-content/uploads/2019/08/Plant-and-Non-Domestic-Animal-Quarantine-Non-Domestic-Animal-Import-Rules.pdf

Date: April 6, 2022

To:
Advisory Subcommittee on Entomology

From:
Elizabeth A. Char, MD, Director
Hawaii Department of Health
1250 Punchbowl Street
Honolulu, HI 96813

Gracelda Simmons, Program Manager
Hawaii Department of Health
Vector Control Branch (HDOH VCB)
99-945 Halawa Valley St.
Aiea, HI, 96701

Summary Description of the Requests
In accordance with the provisions of Chapter 150A, Hawaii Revised Statutes, we are requesting to import the following animal commodities:

Commodity	Scientific Name	Quantity
Asian Tiger Mosquitoes (Male Adults)	*Aedes albopictus*	Continued shipments for immediate release.
Yellow Fever Mosquitoes (Male Adults)	*Aedes aegypti*	Continued shipments for immediate release.
Southern House Mosquitoes (Male Adults)	*Culex quinquefasciatus*	Continued shipments for immediate release.

Additionally, we are requesting the listing of *Aedes albopictus*, *Aedes aegypti*, and *Culex quinquefasciatus* mosquito species on the Hawaii Department of Agriculture's (HDOA) List of Restricted Animals Part A given that specific conditions, as outlined and enforced by HDOA, are met at the time of importation. Suggested conditions for importation are included within this application.

Reason for importation:
For immediate field release applications to suppress mosquito populations in areas where Hawaii residents are at risk of disease transmission due to the presence of these mosquitoes.

Shippers:

1) Stephen Dobson, MosquitoMate, Inc.
   2520 Regency Rd.
   Lexington, KY, 40503

2) Verily Life Sciences
   269 E Grand Ave.
   South San Francisco, CA 94080

Importers:

1) Hawaii Department of Health Vector Control Branch - Oahu
   99-945 Halawa Valley St Aiea, HI, 96701, (808) 586-4708

2) Hawaii Department of Health Vector Control Branch - Hilo
   75 Aupuni Street #201, Hilo, HI, 96720, (808) 933-0917

3) Hawaii Department of Health Vector Control Branch - Kona
   79-1015 Haukapila Street Kealakekua, HI, 96750, (808) 322-1507

4) Hawaii Department of Health Vector Control Branch - Maui
   54 South High Street Rm. #301, Wailuku, Maui, HI, 96793, (808) 984-8230

5) Hawaii Department of Health Vector Control Branch - Kauai
   3040 Umi Street, Lihue, HI, 96766, (808) 241-3323

Project:

This is an application for:

-A permit to import three separate male mosquito species: *Aedes albopictus*, *Aedes aegypti*, and *Culex quinquefasciatus*.

-The listing of these mosquito species on the Hawaii Department of Agriculture's (HDOA) List of Restricted Animals Part A given that specific conditions, as outlined and enforced by HDOA, are met at the time of importation. Suggested conditions for importation are included within this application.

As outlined in the suggested conditions for importation, these mosquitoes will either contain the same wild type bacterium (*Wolbachia* spp.) which is already endemic in the three mosquitoes in Hawaii, or will be inoculated with an incompatible bacterium (*Wolbachia* spp.) that is not native to the wild mosquito's current internal fauna. The presence of this different strain of bacteria within the male mosquito's reproductive system will render the imported male mosquitoes unable to successfully mate with wild females found within Hawaii, a process called cytoplasmic incompatibility. Cytoplasmic incompatibility has been used with much success in other parts of the world to reduce mosquito populations and thus reduce the potential of transmission of mosquito vectored diseases. We intend to import male, sexually incompatible mosquitoes for

direct release onto the environment. This process uses cytoplasmic incompatibility to reduce current populations of these species, which are potential vector of human pathogens including Zika virus, dengue virus, chikungunya virus, yellow fever virus, West Nile virus, and lymphatic filariasis. Additionally, these mosquito species are vectors for pathogens to Hawaii's fauna, including pathogens such as avian malaria, avian pox, and dog heartworm. Importing Hawaii lineage mosquitoes which contain the wild type bacterium, will ensure that we can conduct genetic analysis to confirm that the wild *Culex quinquefasciatus* is the wild type originally provided to the collaborators, and that the inoculated mosquitoes are indeed incompatible.

These three species are invasive, disease-spreading mosquitoes that can be found throughout Hawaii. These species were introduced accidentally to Hawaii in either the 1800s or early 1900s. *Aedes albopictus* and *Aedes aegypti* are known vectors of arboviral pathogens such as Zika virus, dengue virus, yellow fever virus, and chikungunya virus. These species are believed to have been the primary vectors during Maui's 2001 dengue virus outbreak, Oahu's 2011 dengue virus outbreak, and Hawaii County's 2015-2016 dengue outbreak, which led to more than 264 cases of the illness. *Culex quinquefasciatus* is also a mosquito species of public health concern as it is known to vector West Nile virus on the US mainland and lymphatic filariasis in other Pacific nations. The species is present on Hawaii, Maui, Molokai, Lanai, Kahoolawe, Oahu, Kauai, and the northwest Hawaiian islands. *Culex quinquefasciatus* can thrive at sea-level to 4800ft in elevation. In Hawaii, these species are also able to transmit pathogens to Hawaii's native forest birds. *Culex quinquefasciatus* is a known vector of avian malaria and *Aedes albopictus* is a vector of avian pox. These diseases have contributed to the extinction of more than half of Hawaii's endemic honeycreepers and continue to pose a risk to the remaining species. Lastly, these mosquito species are known to transmit dog heartworm within pets found throughout Hawaii.

Efforts to suppress these mosquitoes through utilization of traditional vector control methods (*e.g.,* pesticides) are inadequate at a landscape scale, and may be problematic for other non-target state and federally protected invertebrate species including Hawaiian picture-wing flies (*Drosophila* spp.), damselflies (*Megalagrion* spp.), yellow-faced bees (*Hylaeus* spp.) and anchialine pond shrimps (*Vetericaris chaceorum* and *Procaris hawaiana*). Current efforts to control mosquito-vectored disease outbreaks are limited to reducing mosquito breeding site locations and localized applications of various larvicides and adulticides.

On September 6-7, 2016, local, national, and international experts gathered in Hawaii to discuss how to mitigate mosquito-borne diseases. The strategy deemed most favorable in terms of its effectiveness, technical readiness, and safety was *Wolbachia*-based cytoplasmic incompatibility. Cytoplasmic incompatibility results from the presence of a bacterium, *Wolbachia*, in the cells of the mosquito. Many arthropod species, including several native species here in Hawaii, naturally contain strains of *Wolbachia.* Bacteria in the genus *Wolbachia* are a type of arthropod endosymbiont that do not occur in humans or other vertebrates. Approximately 50% of insect species naturally have the bacteria, although many of these insects can survive without *Wolbachia*. Conversely, *Wolbachia*

cannot persist outside of insect cells, as it is an obligate endosymbiont. The largest effect of *Wolbachia* is on mating compatibility between individual insects that carry the bacteria. However, there are secondary effects that are being studied by many labs. These include altered host insect lifespan and reduced vector competence.

In nature, *Wolbachia* are passed from females to their offspring. Different strains of *Wolbachia* have also been introduced into insects in laboratories. If a male mosquito with one type of *Wolbachia* mates with a female mosquito that has a different strain of *Wolbachia* the resulting offspring can be inviable and not develop into mosquito larvae because of a mismatch of cellular signals (loss of the male parental chromosomes) originating from *Wolbachia*. If sufficient numbers, on the order to 10 times the wild population size, of male mosquitoes of a different *Wolbachia* type are released, wild females are more likely to mate with males of a different *Wolbachia* type and are predicted to have far fewer viable offspring. With subsequent releases, this process can significantly suppress the wild population numbers of mosquitoes over the following generations over a geographic area. *Wolbachia* male-based insect control programs have been highly successful for reducing local mosquito populations around the world. Results of initial trials in Fresno, California showed decrease of biting *Ae. aegypti* females by 68%, 95%, and 84% during the peak mosquito seasons in 2017, 2018, and 2019 respectively. *Wolbachia* cannot be spread by the released males, because *Wolbachia* are only passed from mother to offspring. It is also worth noting that male mosquitoes do not bite or vector disease.

One way to generate mosquitoes with a different *Wolbachia* type, is by clearing the naturally-occurring *Wolbachia* strain from the mosquitoes using the antibiotic tetracycline. Then *Wolbachia* can be harvested from cells of another insect species (this can be another mosquito or a non-mosquito species) and introduced into the cleared mosquitoes via microinjection. Another method to establish new *Wolbachia* strains is to mate a *Wolbachia*-carrying female insect to males that have been cleared of their naturally-occurring *Wolbachia* via antibiotic treatment. Because *Wolbachia* are maternally inherited (described above), this cross results in all of the offspring inheriting whichever *Wolbachia* strain is contained in the female parent. Incompatible Wolbachia strains can also be naturally present in populations of mosquitoes.

The first shipper listed within this import application, MosquitoMate Inc., holds the US patent, Patent No.: US 7,868,222 B1, for the method of producing an artificial infection in Culicidae species.
(https://patentimages.storage.googleapis.com/55/da/ae/d7cb8b9cb44599/US7868222.pdf)
Additionally, MosquitoMate Inc. offers a commercially available, *Wolbachia* infected male mosquito product for purchase to suppress *Aedes albopictus* mosquito populations via cytoplasmic incompatibility. This product, ZAP Males®, has been reviewed and registered under the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA). ZAP Males® are a labeled pesticide product with the EPA registration number 89668-4. This product currently has a restriction that only allows for its application in specific states, which does not currently include Hawaii.

(https://www3.epa.gov/pesticides/chem_search/ppls/089668-00004-20171103.pdf)

The second shipper listed is Verily Life Sciences, a CA based company which is in the process of working with a different incompatible *Culex quinquefasciatus*. This company is initiating consultations with the EPA relating to this different *Wolbachia* mosquito and will provide additional information directly to HDOA as needed.

Aedes albopictus, Aedes aegypti, and *Culex quinquefasciatus* mosquito eggs originating from Hawaii stock (aka collected from field sites in Hawaii) have been provided to MosquitoMate and Verily for development and testing of cytoplasmic incompatibility. These mosquitoes have been crossed with female mosquitoes carrying a different *Wolbachia* species as outlined above. These mosquitoes have then been backcrossed with a separate population of mosquitoes originating from Hawaii stock over at least seven generations to ensure Hawaii's wild mosquito genetics are >99% contained within a commercially available product to be applied within Hawaii.

Generations	HI Mosquito Genetics	Crossed MosquitoMate Genetics
0	100.00%	100.00%
1	50.00%	50.00%
2	75.00%	25.00%
3	87.50%	12.50%
4	93.75%	6.25%
5	96.88%	3.13%
6	98.44%	1.56%
7	99.22%	0.78%
8	99.61%	0.39%
9	99.80%	0.20%
10	99.90%	0.10%

On January 17, 2017, the Hawaii Invasive Species Council, an inter-departmental collaboration of the Departments of Land and Natural Resources (DLNR), Agriculture (HDOA), Health (HDOH), Transportation (DOT), Business, Economic Development & Tourism (DBEDT), and the University of Hawaii (UH) passed resolution17-2, specifically pertaining to mosquitoes. Resolution 17-2, entitled, "Supporting Evaluation and Implementation of Technologies For Landscape-Scale Control of Mosquitoes, With a Focus On Mitigating Both Human and Wildlife Health Risks," recognizes that mosquitoes in the State of Hawaii are non-native and an important pest species to control. The resolution supports the implementation of evaluated technologies that are scientifically demonstrated as safe, effective control measures for mosquitoes. (https://dlnr.hawaii.gov/hisc/files/2013/02/HISC-Reso-17-2-signed.pdf).

House Resolution (HR) 297 passed the Hawaii State House in 2019 and further directed "DOA to review the *Aedes aegypti* mosquito with *Wolbachia* bacteria, including *Aedes aegypti* mosquitoes originating from Hawaii stock that could be imported for landscape

scale mosquito control, and render a determination to place it on the appropriate animal import list. Requires DOA, DOH, and DLNR to collaborate on a report to the Legislature with recommendations for appropriate vector control programs." (https://www.capitol.hawaii.gov/session2019/bills/HB297_SD1_.htm)

Additionally, House Resolution (HR) 95 passed the Hawaii State House in 2021 urging DLNR, DOA, DOH and UH to implement a mosquito control program using *Wolbachia* to reduce mosquito population levels throughout the state. (https://www.capitol.hawaii.gov/session2021/bills/HR95_HD1_.htm)

Per Hawaii Revised Statutes §26-13, the Department of Health "shall administer programs designed to protect, preserve, care for, and improve the physical and mental health of the people of the State." Furthermore, Hawaii Administrative Rules (HAR), Title 11, Chapter 26, Subchapter 7 insures that "as a last resort, direct control services may be provided by the Department in special situations due to an imminent vector hazard." The Department is submitting this application to add these three mosquito species to the HDOA List of Restricted Animals Part A to facilitate the importation of these mosquitoes in the event of an imminent vector hazard as outlined within HAR Title 11, Chapter 26. It should be noted that this project has been developed and pursued in close coordination with the Department of Land and Natural Resources. DLNR staff have expertise relating to disease transmission in native wildlife, and their strong support indicates that the use of this approach is not expected to have negative impacts, and in fact is anticipated to benefit rare, threatened and endangered wildlife.

Proposed Required Conditions for Importation via HDOA List of Restricted Animals Part A

Included are proposed conditions, suggested by the HDOH ,Vector Control Branch, that could be required for importation if these three mosquito species are added to the HDOA List of Restricted Animals Part A to ensure any future imports meet safeguards to preserve public health, the environment, and the long-term efficiency of the IIT tool. All of the following suggested requirements would need to be met to obtain importation permitting.

Aedes albopictus, *Aedes aegypti* and *Culex quinquefasciatus*

1. Only mosquitoes originating from a Hawaii stock are allowed for importation.
2. Only mosquitoes containing the same wild-type bacteria as is already present in Hawaii, or a sexually incompatible *Wolbachia* bacteria compared against Hawaii's wild mosquito populations are allowed for importation.
3. Only male mosquitoes are allowed for importation.
4. Only individuals or organizations who have conducted work for EPA registration trials for mosquito biopesticide products and who can provide data on rearing and sorting methodologies are allowed to ship these mosquitoes to Hawaii.
5. Only individuals or organizations listed on the import application are allowed to import/receive these mosquitoes.
6. Only islands with established or incipient wild mosquito populations, as

determined by the Hawaii Department of Health's Vector Control Branch, are allowed to import these mosquitoes.

7. All environmental review processes, including potential Environmental Impact Statements, Environmental Assessments, or other environmental compliance requirements as outlined by State Law and OEQC, must be completed or cited prior to importation.

Specific details for importation
This is an application for:

- A permit to import three separate male, mosquito species: *Aedes albopictus*, *Aedes aegypti*, and *Culex quinquefasciatus*.

- The listing of these mosquito species on the Hawaii Department of Agriculture's (HDOA) List of Restricted Animals Part A given that specific conditions, as outlined and enforced by HDOA, are met at the time of importation. Suggested conditions for importation are included within this application.

Differing *Wolbachia* species will be artificially included within these three mosquito species to facilitate the sexual incompatibility with the wild mosquito species. Within *Aedes albopictus,* the strain of bacterium will be *Wolbachia wPip.* Within *Aedes aegypti,* the strain of bacterium will be *Wolbachia wAlbB.* Within *Culex quinquefasciatus*, the strain of bacterium will be *Wolbachia wAlbA, Wolbachia wAlbB,* or *Wolbachia wPip4.* These *Wolbachia* bacterium are not present within the corresponding species of Hawaii's established mosquito population. The presence of this bacterium will make these males sexually incompatible with the wild, established female mosquitoes. Existing wild-type bacteria strain that may be imported is *wPipV*, which is already found on all of the main Hawaiian islands. Once imported, the male, sexually incompatible males will be released according to EPA and HDOA guidance to suppress the population of the established mosquito populations. Based on the prior use of this technology in California, Florida, and Kentucky, we do not expect releases of these male mosquitoes to have a negative impact on agriculture, the environment, or public health and safety. Existing wild-type bacteria strain that may be imported is *wPipV Culex quinquefasciatus*, and *WAlbA and WAlbB* for *Aedes albopictus* which are already found on all of the main Hawaiian islands.

Persons Responsible

HDOH Director, Elizabeth A. Char, M.D.
1250 Punchbowl Street
Honolulu, Hawaii 96813

Vector Control Manager, Gracelda Simmons
Hawaii Department of Health Vector Control Branch - Oahu
99-945 Halawa Valley St Aiea, HI, 96701, (808) 586-4708

Norberto Dumo & Chris Jacobsen
Hawaii Department of Health Vector Control Branch - Hilo
75 Aupuni Street #201, Hilo, HI, 96720, (808) 933-0917

Norberto Dumo & Chris Jacobsen
Hawaii Department of Health Vector Control Branch - Kona
79-1015 Haukapila Street Kealakekua, HI, 96750, (808) 322-1507

Donald Taketa
Hawaii Department of Health Vector Control Branch - Maui
54 South High Street Rm. #301, Wailuku, Maui, HI, 96793, (808) 984-8230

Alan Takenaka
Hawaii Department of Health Vector Control Branch - Kauai
3040 Umi Street, Lihue, HI, 96766, (808) 241-3323

Locations and Safeguards

All mosquitoes for import will originate from Hawaii biotypes collected from Hawaii. All mosquitoes will be backcrossed for at least 7 generations to ensure >99% Hawaii genetics are contained within the commercially available products to be applied within Hawaii. This backcrossing will also mitigate the risks of infections microorganisms and parasites to the mosquitoes via vertical transmission – thus lowering the risk of the mosquitoes accidentally introducing a new parasite or pathogen. In order for these mosquitoes to acquire and vector a disease, an adult female must blood feed from a disease infected vertebrate, and the pathogen must survive in the mosquito and be injected into another vertebrate during a subsequent blood feeding. As the intended importation of these mosquitoes only includes the importation of male mosquitoes that do not bite or feed on blood, the unintended importation of an acquired pathogen is eliminated. Verification of Hawaii biotypes and *Wolbachia* strains will be conducted on initial shipments of each of the three male mosquito species to verify requirements have been met, in collaboration with University of Hawaii.

These mosquitoes will be imported into Hawaii through the use of commercial cargo flights. Upon reception to Hawaii, the male mosquitoes will be directly released into the laboratory for quality control testing, and into the environment for the purpose of suppressing the wild mosquito populations. These releases will be performed by individuals or organizations certified to apply these mosquito pesticide products to ensure that the product will be applied properly according to the recommended guidelines.

MosquitoMate and Verily will regularly sample release containers by releasing the contents into lab cages and then examining mosquito sex and number. There is an EPA reviewed value of 1 female release per 250,000 males with the MosquitoMate product. A similar value is likely to be estimated for *Culex quinquefasciatus* given that similar automation, engineering and machine learning technology is being applied to sex sorting. However, MosquitoMate and Verily have not previously identified a single female in a release container during the course of the Puerto Rico or Fresno projects. In another example, a published study estimates the probability at less than 1 female per 200 million males (Crawford JE, Clarke DW, Criswell V, Desnoyer M, Cornel D, Deegan B, et al. Efficient production of male Wolbachia-infected *Aedes aegypti* mosquitoes enables large-scale suppression of wild populations. Nat Biotechnol. 2020;38(4):482-92.) To date, PCR monitoring of mosquitoes collected from release field sites have not identified any ZAP infected females.

At least once per year, MosquitoMate and Verily will also conduct longevity and competitiveness studies, comparing the mosquitoes proposed for releases and wild type males. Data from previous trials demonstrate ZAP mosquito longevity and competitiveness to be at least equal to Wild Type males. In addition to Hawaii's import requirements, the shipper and/or receiver will obtain additional permits as required by federal or state agencies.

Wolbachia is an obligate endosymbiont and cannot survive outside of the host invertebrate. *Wolbachia* strains already exist in Hawaii in a range of invertebrates in the wild, including mosquitoes. The presence of Wolbachia endosymbionts is the normal state for 40% to 60% of Arthropods and does not represent an unusual or pathogenic bacterial infection. Wolbachia are not capable of infecting human cells. MosquitoMate and Verily will perform PCR testing on the mosquitoes to confirm the presence of the correct *Wolbachia* bacterium within the shipment lineage to ensure cytoplasmic incompatibility.

The likelihood that introduced strains of *Wolbachia* would become the dominant strains in the environment is highly unlikely. Replacing the dominant *Wolbachia* strain has been done purposefully in the environment for projects that are separate from the approach we are proposing (such as by the World Mosquito Program in Australia and other nations). To clarify, HDOH is NOT proposing a World Mosquito Program type project where the goal is to intentionally force a different dominant *Wolbachia* strain into the wild mosquitoes in the environment and change vector competence of the wild population. However, in these types of programs, they have to release 4 million mixed male AND female mosquitoes in a given location to force a new *Wolbachia* strain to become the dominate strain over an area of 66 km^2. Given the aforementioned EPA reviewed value of 1 female release per 250,000 males with the MosquitoMate product, such an outcome is not expected to occur.

If, somehow population replacement were to occur (despite the estimated 1 female release per 250,000 males) HDOH would cease releases as the released males would

then be able to mate with the wild females with the established *Wolbachia* species. The outcome of this would be that the mosquito species that already exists in Hawaii would continue to exist in the wild, just with a different *Wolbachia* bacteria. We do not anticipate a different *Wolbachia* bacteria having any new or negative effects on human health or the environment.

HDOH approves of this approach being applied at both a very small scale (in remote forest habitat as proposed by DLNR) or at a very large scale (across urban areas and island wide) so long as recommended application guidelines are followed. Compared to conventional chemical pesticides, this approach has zero anticipated non-target impacts on human health or the environment. The scale and scope of applications will likely vary depending on the target mosquito species, proposed area of application, the funding available and mosquito prevalence. As with any pesticide product, if you do not eradicate the species of concern, they will rebound if you stop using the pesticide product. However, we view this as a beneficial aspect of the project as we also know we can stop the process at any time should the Vector Control Branch determine a different approach is preferable to achieve mosquito control objectives.

Data collection will occur during releases using State general funds as well as potential federal funds from partner agencies (CDC or NIH). As the application of the pesticide product is intended to either control or eradicate one of the three target mosquito species, monitoring will include extensive mosquito population surveillance by Vector Control Branch staff and partners following releases to ensure that populations are reduced. HDOH already conducts this type of surveillance monitoring across the state, and would deploy staff and resources as necessary to carry out a pre- and post-monitoring if undertaking a control project for the benefit of public health. Depending on the length of the project, *Wolbachia* genetic monitoring will also occur.

In addition to Hawaii's import requirements, the shipper and/or receiver will obtain additional permits as required by federal or state agencies.

Method of Disposition
Any dead imported mosquitoes will be disposed of as municipal waste.

Abstraction of Organism
Culicidae species are sexually reproducing species. Minimum generation times vary but are approximately three weeks. Mature adults are up to approximately a centimeter in length and can live for a month to a few months. Adult mosquitoes range from 2.0 to 10.0 mm in size with males being smaller than females on average. Mosquito life cycles are well understood for most species, including all those established in Hawaii.

Larvae feed on organic material found in pools of water. Both adult males and females feed on water that contains carbohydrates (water with sap or nectar). Only mature females of certain species seek out and feed on vertebrate blood prior to egg laying. This blood feeding process allows for the transmission of pathogens and parasites.

These species rely on pools of water with organic material for the growth of larvae. Only adult females bite, as they require blood meals from vertebrate hosts to develop their eggs.

Potential Impact to the Environment
These three species are already well established in the wild on all of the main islands in Hawaii. *Aedes albopictus* and *Culex quinquefasciatus* are established statewide and *Aedes aegypti* is well establish on Hawaii's Big Island. An additional three other "biting" non-native mosquito species have also become established: *Ae. japonicus*, *Wyeomyia mitchelli*, and *Ae. vexans*.

Wolbachia are not infectious to humans and are vertically transmitted through the eggs from one generation to another. The *Wolbachia* bacteria are obligate endosymbionts and can only survive inside the insect host's cytoplasm. A mosquito transinfected with a different strain of *Wolbachia* that results in cytoplasmic incompatibility would not be able to successfully reproduce with a wild mosquito due to cytoplasmic incompatibility. Therefore, if individual mosquitoes did become temporarily established, then they will quickly die off over the following generations because of cytoplasmic incompatibility with wild mosquitoes of the same species, with which they would be expected to encounter and mate.

Through the importation we intend to only import male mosquitoes. The sex separation can be performed in a variety of manners including through computer recognition and separation of males and females or through pupal sorting of males and females. However, if both sexes of transinfected mosquito were to be accidently released, they are unlikely to maintain a breeding population of a transinfected mosquito. *Wolbachia* invasions into populations require a critical threshold frequency of infection that needs to be overcome before a novel *Wolbachia* infection can spread into a population. The *Wolbachia* infection rate must exceed 20-45% before it can spread and become established. This is evident in large scale releases such as in Cairns, Australia, where millions of transinfected mosquitoes (both sexes) with *Wolbachia* are released into the environment to control disease transmission, yet they do not easily reach fixation in the wild. If transinfected mosquitoes were to become established, the establishment is likely to be spatially localized due to incompatibility with neighboring mosquito populations.

Potential Impacts of Importation
Pro: Importation of male mosquitoes will allow the implementation of an evaluated technology that has been scientifically demonstrated as a safe and effective control method for mosquitoes on a landscape-scale. These are mosquitoes that are widespread in Hawaii and which have negative impacts to humans, wildlife, and pets. This implementation could be a valuable future resource for mosquito management applications, including eradicating incipient mosquito infestations on neighbor islands, and preventing human disease outbreaks. This would have a wide range of positive effects on human health, the economy, and tourism in Hawaii. Additionally, the application of traditional chemical controls for mosquitoes in both urban and natural

areas is impractical and causes unacceptable non-target impacts, whereas IIT carries no non-target risks to native species, humans or the environment. Furthermore, mosquitoes were first introduced to the Hawaiian Islands in the 1800s, and while they are used opportunistically as prey items, no species native to Hawai'i are dependent on their presence for survival. The control of mosquito populations in urban or natural area-interfaces would thus cause no negative impacts on Hawaiian species.

Con: It is hard to imagine any negative effects since the species is already established in Hawaii. Importing these organisms will not have any foreseeable beneficial effect to this mosquito species already found in Hawaii. The introduction of, for example, increased genetic variation within the mosquito species will be minimized by crossing the lines to mosquitoes originating from Hawaii.

The presence of unintended accompanying microbiota is minimized by the sterile laboratory rearing conditions used. These mosquitoes have been maintained for many generations in the lab environment and have not had the opportunity to obtain pathogens from the wild from blood feeding. The presence of intended microbiota, the *Wolbachia,* potentially has very positive effects on the societal health, the suppression of human disease vectored by mosquitoes, the environment, via population suppression of mosquitoes that vector avian pathogens, and the economy, through the potential increased tourism and lessened disease burden.

This mosquito species is already well established in Hawaii, as are many different strains of *Wolbachia*. MosquitoMate and Verily have a demonstrated track record of success utilizing sex-sorting methods which are highly effective. In the event that technical difficulties did occur during sex-sorting methods, because of cytoplasmic incompatibility, the escape of female mosquitoes carrying a new *Wolbachia* strain is not expected to be stable over the following generations. Laboratory reared females outcrossing to locally established wild male mosquitoes will result in cytoplasmic incompatibility and the failure of offspring to develop.

There is an extensive body of literature surrounding this mosquito species, its impact upon Hawaii, and Wolbachia-mediated cytoplasmic incompatibility.

Information on *Wolbachia,* with a focus on cytoplasmic incompatibility within mosquitoes:

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Subcommittee on Entomology *Attachment B*
G. Simmons & L. Wells – Hawaii Department of Health
D. Smith & C. King – Hawaii Department of Land and Natural Resources

https://hdoa.hawaii.gov/wp-content/uploads/2019/08/Plant-and-Non-Domestic-Animal-Quarantine-Non-Domestic-Animal-Import-Rules.pdf

Date:4/1/2022

To:
Advisory Subcommittee on Entomology

From:
Suzanne Case
Department of Land and Natural Resources
1151 Punchbowl Street, Honolulu, HI 96813

David G. Smith
Hawaii Department of Land and Natural Resources, Division of Forestry and Wildlife
1151 Punchbowl Street, Room 325, Honolulu, HI 96813

Cynthia King
Hawaii Department of Land and Natural Resources, Division of Forestry and Wildlife
1151 Punchbowl Street, Room 325, Honolulu, HI 96813

Summary Description of the Requests
In accordance with the provisions of Chapter 150A, Hawaii Revised Statutes, we are requesting to import the following animal commodities:

Commodity	Scientific Name	Quantity
Southern House Mosquitoes (Male Adults)	*Culex quinquefasciatus*	Continued shipments for immediate release.

Additionally, we are requesting the listing of *Culex quinquefasciatus* mosquito species on the Hawaii Department of Agriculture's (HDOA) List of Restricted Animals Part A given that specific conditions, as outlined and enforced by HDOA, are met at the time of importation. Suggested conditions for importation are included within this application.

Reason for importation:
For immediate field release applications to suppress mosquito populations in areas where Hawaii fauna are at risk of disease transmission due to the presence of these mosquitoes.

Shippers:
1) Stephen Dobson, MosquitoMate, Inc.
   2520 Regency Rd., Lexington, KY, 40503

2) Verily Life Sciences
   269 E Grand Ave, South San Francisco, CA 94080

Subcommittee on Entomology *Attachment B*
G. Simmons & L. Wells – Hawaii Department of Health
D. Smith & C. King – Hawaii Department of Land and Natural Resources

Importers:

1) DLNR Waimano Baseyard – Hawaii Invertebrate Program - Oahu
   2680 Waimano Home Road, Pearl City, HI 96782, (808) 266-7989
2) Kaua'i Branch, Division of Forestry & Wildlife, 3060 Eiwa Street Rm. 306, Lihue, HI 96766. (808) 274-3433
3) O'ahu Branch, Division of Forestry & Wildlife, 2135 Makiki Heights Drive, Honolulu, HI 96822. (808) 973-9778
4) Maui (& Moloka'i) Branch, Division of Forestry & Wildlife, 1955 Main Street, Room 301, Wailuku, HI 96793. (808) 984-8100
5) Hawai'i Branch, Division of Forestry & Wildlife, 19 E. Kawili Street, Hilo, HI 96720. (808) 974-4221

Project:
This is an application for:

- A permit to import male *Culex quinquefasciatus* mosquito species.
- The listing of *Culex quinquefasciatus* mosquito species on the Hawaii Department of Agriculture's (HDOA) List of Restricted Animals Part A given that specific conditions, as outlined and enforced by HDOA, are met at the time of importation. Suggested conditions for importation are included within this application.

As outlined in the suggested conditions for importation, these mosquitoes will either contain the same wild type bacterium (*Wolbachia* spp.) which is already endemic in *Culex quinquefasciatus* mosquitoes in Hawaii, or will be inoculated with an incompatible bacterium (*Wolbachia* spp.) that is not native to the wild mosquito's current internal fauna. The presence of this different strain of bacteria within the male mosquito's reproductive system will render the imported male mosquitoes unable to successfully mate with wild females found within Hawaii, a process called cytoplasmic incompatibility. Cytoplasmic incompatibility has been used with much success in other parts of the world to reduce mosquito populations and thus reduce the potential of transmission of mosquito vectored diseases. We intend to import male, sexually incompatible mosquitoes for direct release onto the environment. This process uses cytoplasmic incompatibility to reduce current populations of this pest mosquito species, which are vectors for pathogens to Hawaii's fauna, including pathogens such as avian malaria, and which can vector West Nile virus, and lymphatic filariasis to humans. Importing Hawaii lineage mosquitoes which contain the wild type bacterium, will ensure that we can conduct genetic analysis to confirm that the wild *Culex quinquefasciatus* is the wild type originally provided to the collaborators, and that the inoculated mosquitoes are indeed incompatible.

Culex quinquefasciatus is an invasive, disease-spreading mosquito that has dispersed across the Hawaiian islands since its accidental introduction in the 1800s. The species is present on Hawaii, Maui, Molokai, Lanai, Kahoolawe, Oahu, Kauai, and the northwest

Hawaiian islands. *Culex quinquefasciatus* can thrive at sea-level to 4800ft in elevation. In Hawaii, the mosquito is able to transmit pathogens to native forest birds. The spread of avian malaria, in particular, has contributed to the extinction of more than half of Hawaii's endemic honeycreepers and continues to pose a risk to the remaining species. *Culex quinquefasciatus* is also known to transmit dog heartworm within pets found throughout Hawaii, and is a concern to human health given its ability to vector West Nile virus on the US mainland and lymphatic filariasis in other Pacific nations.

Efforts to suppress *Culex quinquefasciatus* through utilization of traditional vector control methods (*e.g.,* pesticides) are inadequate at a landscape scale, and may be problematic for other non-target state and federally protected invertebrate species including Hawaiian picture-wing flies (*Drosophila* spp.), damselflies (*Megalagrion* spp.), yellow-faced bees (*Hylaeus* spp.) and anchialine pond shrimps (*Vetericaris chaceorum* and *Procaris hawaiana*). Current efforts to control mosquito-vectored disease outbreaks are limited to reducing mosquito breeding site locations and localized applications of various larvicides and adulticides.

On September 6-7, 2016, local, national, and international experts gathered in Hawaii to discuss how to mitigate mosquito-borne diseases. The strategy deemed most favorable in terms of its effectiveness, technical readiness, and safety was *Wolbachia*-based cytoplasmic incompatibility. Cytoplasmic incompatibility results from the presence of a bacterium, *Wolbachia*, in the cells of the mosquito. Many arthropod species, including several native species here in Hawaii, naturally contain strains of *Wolbachia.* Bacteria in the genus *Wolbachia* are a type of arthropod endosymbiont that do not occur in humans orother vertebrates. Approximately 50% of insect species naturally have the bacteria, although many of these insects can survive without *Wolbachia*. Conversely, *Wolbachia* cannot persist outside of insect cells, as it is an obligate endosymbiont. The largest effect of *Wolbachia* is on mating compatibility between individual insects that carry the bacteria. However, there are secondary effects that are being studied by many labs. These include altered host insect lifespan and reduced vector competence.

In nature, *Wolbachia* are passed from females to their offspring. Different strains of *Wolbachia* have also been introduced into insects in laboratories. If a male mosquito with one type of *Wolbachia* mates with a female mosquito that has a different strain of *Wolbachia* the resulting offspring can be inviable and not develop into mosquito larvae because of a mismatch of cellular signals (loss of the male parental chromosomes) originating from *Wolbachia*. If sufficient numbers, on the order to 10 times the wild population size, of male mosquitoes of a different *Wolbachia* type are released, wild females are more likely to mate with males of a different *Wolbachia* type and are predicted to have far fewer viable offspring. With subsequent releases, this process can significantly suppress the wild population numbers of mosquitoes over the following generations over a geographic area. *Wolbachia* male-based insect control programs have beenhighly successful for reducing local mosquito populations around the world. Results of initial trials in Fresno, California showed decrease of biting *Ae. aegypti* females by 68%, 95%, and 84% during the peak mosquito seasons in 2017, 2018, and

2019 respectively. *Wolbachia* cannot be spread by the released males, because *Wolbachia* are only passed from mother to offspring. It is also worth noting that male mosquitoes do not bite or vector disease.

One way to generate mosquitoes with a different *Wolbachia* type, is by clearing the naturally-occurring *Wolbachia* strain from the mosquitoes using the antibiotic tetracycline. Then *Wolbachia* can be harvested from cells of another insect species (this can be another mosquito or a non-mosquito species) and introduced into the cleared mosquitoes via microinjection. Another method to establish new *Wolbachia* strains is to mate a *Wolbachia*-carrying female insect to males that have been cleared of their naturally-occurring *Wolbachia* via antibiotic treatment. Because *Wolbachia* are maternally inherited (described above), this cross results in all of the offspring inheriting whichever *Wolbachia* strain is contained in the female parent. Incompatible Wolbachia strains can also be naturally present in populations of mosquitoes.

The first shipper listed within this import application, MosquitoMate Inc., holds the US patent, Patent No.: US 7,868,222 B1, for the method of producing an artificial infection in Culicidae species.
(https://patentimages.storage.googleapis.com/55/da/ae/d7cb8b9cb44599/US7868222.pdf)
Additionally, MosquitoMate Inc. offers a commercially available, *Wolbachia* infected male mosquito product for purchase to suppress *Aedes albopictus* mosquito populations via cytoplasmic incompatibility. This product, ZAP Males®, has been reviewed and registered under the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA). ZAP Males® are a labeled pesticide product with the EPA registration number 89668-4. This product currently has a restriction that only allows for its application in specific states, which does not currently include Hawaii. We reference this, as it is the only registrant in the US currently with a *Wolbachia* mosquito product currently in process of registration with the EPA.
(https://www3.epa.gov/pesticides/chem_search/ppls/089668-00004-20171103.pdf)

The second shipper listed is Verily Life Sciences, a CA based company which is in the process of working with a different incompatible *Culex quinquefasciatus*. This company is initiating consultations with the EPA relating to this different *Wolbachia* mosquito and will provide additional information directly to HDOA as needed.

Culex quinquefasciatus mosquito eggs originating from Hawaii stock (aka collected from field sites in Hawaii) have been provided to MosquitoMate and Verily for development and testing of cytoplasmic incompatibility. These mosquitoes have been crossed with female mosquitoes carrying a different *Wolbachia* species as outlined above. These mosquitoes have then been backcrossed with a separate population of mosquitoes originating from Hawaii stock over at least seven generations to ensure Hawaii's wild mosquito genetics are >99% contained within a commercially available product to be applied within Hawaii.

Generations	HI Mosquito Genetics	Crossed MosquitoMate Genetics
0	100.00%	100.00%
1	50.00%	50.00%
2	75.00%	25.00%
3	87.50%	12.50%
4	93.75%	6.25%
5	96.88%	3.13%
6	98.44%	1.56%
7	99.22%	0.78%
8	99.61%	0.39%
9	99.80%	0.20%
10	99.90%	0.10%

On January 17, 2017, the Hawaii Invasive Species Council, an inter-departmental collaboration of the Departments of Land and Natural Resources (DLNR), Agriculture (HDOA), Health (HDOH), Transportation (DOT), Business, Economic Development & Tourism (DBEDT), and the University of Hawaii (UH) passed resolution17-2, specifically pertaining to mosquitoes. Resolution 17-2, entitled, "Supporting Evaluation and Implementation of Technologies For Landscape-Scale Control of Mosquitoes, With a Focus On Mitigating Both Human and Wildlife Health Risks," recognizes that mosquitoes in the State of Hawaii are non-native and an important pest species to control. The resolution supports the implementation of evaluated technologies that are scientifically demonstrated as safe, effective control measures for mosquitoes. (https://dlnr.hawaii.gov/hisc/files/2013/02/HISC-Reso-17-2-signed.pdf).

House Resolution (HR) 297 passed the Hawaii State House in 2019 and further directed "DOA to review the *Aedes aegypti* mosquito with *Wolbachia* bacteria, including *Aedes aegypti* mosquitoes originating from Hawaii stock that could be imported for landscape scale mosquito control, and render a determination to place it on the appropriate animal import list. Requires DOA, DOH, and DLNR to collaborate on a report to the Legislature with recommendations for appropriate vector control programs." (https://www.capitol.hawaii.gov/session2019/bills/HB297_SD1_.htm)

Additionally, House Resolution (HR) 95 passed the Hawaii State House in 2021 urging DLNR, DOA, DOH and UH to implement a mosquito control program using *Wolbachia* to reduce mosquito population levels throughout the state. (https://www.capitol.hawaii.gov/session2021/bills/HR95_HD1_.htm)

It should be noted that this project has been developed with the full support of, and will be implemented in close coordination with, the Hawaii Department of Health Vector Control Branch. Per Hawaii Revised Statutes §26-13, the Department of Health "shall administer programs designed to protect, preserve, care for, and improve the physical and mental health of the people of the State." DOH has the authority in Hawaii relating to mosquitoes and public health, and their staff have decades of expertise to implement

mosquito surveillance, control and abatement programs.

Proposed Required Conditions for Importation via HDOA List of Restricted Animals Part A

Included are proposed conditions, suggested in collaboration with the HDOH Vector Control Branch, that could be required for importation if *Culex quinquefasciatus* mosquitoes are added to the HDOA List of Restricted Animals Part A to ensure any future imports meet safeguards to preserve public health, the environment, and the long-term efficiency of the IIT tool. All of the following suggested requirements would need to be met to obtain importation permitting.

Culex quinquefasciatus

1. Only mosquitoes originating from a Hawaii stock are allowed for importation.
2. Only mosquitoes containing the same wild-type bacteria as is already present in Hawaii, or a sexually incompatible *Wolbachia* bacteria compared against Hawaii's wild mosquito populations are allowed for importation.
3. Only adult male mosquitoes are allowed for importation.
4. Only individuals or organizations who have conducted work for EPA registration trials for mosquito biopesticide products and who can provide data on rearing and sorting methodologies are allowed to ship these mosquitoes to Hawaii.
5. Only individuals or organizations listed on the import application are allowed to import/receive these mosquitoes.
6. Only islands with established or incipient wild mosquito populations, as determined by the Hawaii Department of Health's Vector Control Branch, are allowed to import these mosquitoes.
7. All environmental review processes, including potential Environmental Impact Statements, Environmental Assessments, or other environmental compliance requirements as outlined by State Law and OEQC, must be completed or cited prior to importation.

Specific details for importation
This is an application for:

- A permit to import male, mosquito species: *Culex quinquefasciatus*.
- The listing of these mosquito species on the Hawaii Department of Agriculture's (HDOA) List of Restricted Animals Part A given that specific conditions, as outlined and enforced by HDOA, are met at the time of importation. Suggested conditions for importation are included within this application.

Within *Culex quinquefasciatus*, the strain of incompatible bacterium will be *Wolbachia wAlbA, Wolbachia wAlbB,* or *Wolbachia wPip4.* These *Wolbachia* bacterium are not present within the corresponding species of Hawaii's established mosquito population. The presence of this bacterium will make these males sexually incompatible with the

wild, established female mosquitoes. Once imported, the male, sexually incompatible males will be released according to EPA and HDOA label directions to suppress the population of the established mosquito populations. Based on the prior use of this technology in California, Florida, and Kentucky, there are no data to suggest releases of these male mosquitoes to have a negative impact on agriculture, the environment, or public health and safety. Existing wild-type bacteria strain that may be imported is wPipV, which is already found on all of the main Hawaiian islands.

Persons Responsible

DLNR Chairperson, Suzanne Case
DOFAW Administrator, David Smith
DOFAW Entomologist, Cynthia King
Department of Land and Natural Resources – Oahu
1151 Punchbowl Street, Honolulu, HI 96813

DLNR-DOFAW, Hawaii Invertebrate Program Captive Propagation Facility - Oahu
779 Ulukahiki Street, Kailua, Honolulu, HI 96813, (808) 266-7989

DLNR Waimano Baseyard – Oahu
2680 Waimano Home Road, Pearl City, HI 96782, (808) 266-7989

Kaua'i Branch Manager, Sheri Mann, Division of Forestry & Wildlife, 3060 Eiwa Street Rm. 306, Lihue, HI 96766. (808) 274-3433

O'ahu Branch, Division of Forestry & Wildlife, 2135 Makiki Heights Drive, Honolulu, HI 96822. (808) 973-9778

Maui (& Moloka'i) Branch, Division of Forestry & Wildlife, 1955 Main Street, Room 301, Wailuku, HI 96793. (808) 984-8100

Hawai'i Branch, Division of Forestry & Wildlife, 19 E. Kawili Street, Hilo, HI 96720. (808) 974-4221

Locations and Safeguards

All mosquitoes for import will originate from Hawaii biotypes collected from Hawaii. All mosquitoes will be backcrossed for at least 7 generations to ensure >99% Hawaii genetics are contained within the commercially available products to be applied within Hawaii. This backcrossing will also mitigate the risks of infections microorganisms and parasites to the mosquitoes via vertical transmission – thus lowering the risk of the mosquitoes accidentally introducing a new parasite or pathogen. In order for these mosquitoes to acquire and vector a disease, an adult female must blood feed from a disease infected vertebrate, and the pathogen must survive in the mosquito and be

injected into another vertebrate during a subsequent blood feeding. As the intended importation of these mosquitoes only includes the importation of male mosquitoes that do not bite or feed on blood, the unintended importation of an acquired pathogen is eliminated. Verification of Hawaii biotypes and *Wolbachia* strains will be conducted on initial shipments of male mosquitoes to verify requirements have been met, in collaboration with University of Hawaii and Department of Health.

These mosquitoes will be imported into Hawaii through the use of commercial cargo flights. Upon reception to Hawaii, the male mosquitoes will be directly released into the laboratory for quality control testing, and into the environment for the purpose of suppressing the wild mosquito populations. These releases will be performed by individuals or organizations certified to apply these mosquito pesticide products to ensures that the product will be applied properly according to the recommended guidelines.

MosquitoMate and Verily will regularly sample release containers by releasing the contents into lab cages and then examining mosquito sex and number. There is an EPA reviewed value of 1 female release per 250,000 males with the MosquitoMate product. A similar value is likely to be estimated for *Culex quinquefasciatus* given that similar automation, engineering and machine learning technology is being applied to sex sorting. MosquitoMate and Verily have not previously identified a female in a single release container during the course of the Puerto Rico or Fresno projects. In another example, a published study estimates the probability at less than 1 female per 200 million males (Crawford JE, Clarke DW, Criswell V, Desnoyer M, Cornel D, Deegan B, et al. Efficient production of male Wolbachia-infected *Aedes aegypti* mosquitoes enables large-scale suppression of wild populations. Nat Biotechnol. 2020;38(4):482-92.) To date, PCR monitoring of mosquitoes collected from release field sites have not identified any ZAP infected females.

At least once per year, MosquitoMate and Verily will also conduct longevity and competitiveness studies, comparing the mosquitoes proposed for releases and wild type males. Data from previous trials demonstrate ZAP mosquito longevity and competitiveness to be at least equal to Wild Type males. In addition to Hawaii's import requirements, the shipper and/or receiver will obtain additional permits as required by federal or state agencies.

Wolbachia is an obligate endosymbiont and cannot survive outside of the host invertebrate. *Wolbachia* strains already exist in Hawaii in a range of invertebrates in the wild, including mosquitoes. The presence of *Wolbachia* endosymbionts is the normal

state for 40% to 60% of Arthropods and does not represent an unusual or pathogenic bacterial infection. *Wolbachia* are not capable of infecting human cells. MosquitoMate and Verily will perform PCR testing on the mosquitoes to confirm the presence of the correct *Wolbachia* bacterium within the shipment lineage to ensure cytoplasmic incompatibility.

The likelihood that introduced strains of *Wolbachia* would become the dominant strains in the environment is highly unlikely. Replacing the dominant *Wolbachia* strain has been done purposefully in the environment for projects that are separate from the approach we are proposing (such as by the World Mosquito Program in Australia and other nations). To clarify, DLNR is NOT proposing a World Mosquito Program type project where the goal is to intentionally force a different dominant *Wolbachia* strain into the wild mosquitoes in the environment and change vector competence of the wild population. However, in these types of programs, they have to release 4 million mixed male AND female mosquitoes in a given location to force a new *Wolbachia* strain to become the dominate strain over an area of 66 km^2. Given the aforementioned EPA reviewed value of 1 female release per 250,000 males with the MosquitoMate product, such an outcome is not expected to occur.

If, somehow population replacement were to occur (despite the estimated 1 female release per 250,000 males) DLNR would cease releases as the released males would then be able to mate with the wild females with the established *Wolbachia* species. The outcome of this would be that the mosquito species that already exists in Hawaii would continue to exist in the wild, just with a different *Wolbachia* bacteria. We do not anticipate a different *Wolbachia* bacteria having any new or negative effects on the environment.

DLNR and DOH feel comfortable utilizing these mosquitoes at a very small scale (in remote forest habitat) or at a very large scale (across urban areas and island wide) so long as recommended application guidelines are followed. The scale and scope of the project will likely vary across time based on the funding available and mosquito prevalence. As with any pesticide product, if you do not eradicate the species of concern, they will rebound if you stop using the pesticide product. However, we view this as a beneficial aspect of the project as we also know we can stop the process at any time. Unfortunately, due to the critical nature of the declines of Hawaiian forest birds, we anticipate mosquito control becoming a long-term management action to be performed (similar to rat control and invasive weed control) annually.

Data collection will occur during releases using the State general funds as well as federal funds from partner agencies (USFWS, USGS, NPS), depending on who is performing the releases. As the application of the pesticide product is intended for the reduction of *Culex quinquefasciatus* mosquito populations, this monitoring will include extensive mosquito population surveillance following releases to ensure that populations are reduced. DLNR is already conducting this type of monitoring in preparation for incompatible mosquito releases. *Wolbachia* genetic monitoring will also occur, likely in partnership with USGS, throughout the release program.

In addition to Hawaii's import requirements, the shipper and/or receiver will obtain additional permits as required by federal or state agencies.

Method of Disposition
Any dead imported mosquitoes will be disposed of as municipal waste.

Abstraction of Organism
Culicidae species are sexually reproducing species. Minimum generation times vary but are approximately three weeks. Mature adults are up to approximately a centimeter in length and can live for a month to a few months. Adult mosquitoes range from 2.0 to 10.0 mm in size with males being smaller than females on average. Mosquito life cycles are well understood for most species, including all those established in Hawaii.

Larvae feed on organic material found in pools of water. Both adult males and females feed on water that contains carbohydrates (water with sap or nectar). Only mature females of certain species seek out and feed on vertebrate blood prior to egg laying. This blood feeding process allows for the transmission of pathogens and parasites.

Culex quinquefasciatus rely on pools of water with organic material for the growth of larvae. Only adult females bite, as they require blood meals from vertebrate hosts to develop their eggs.

Potential Impact to the Environment
Culex quinquefasciatus are already well established in the wild on all of the main islands in Hawaii from sea-level to ~6,000 feet in elevation. and *Culex quinquefasciatus* are established statewide and is well establish on Hawaii's Big Island. An additional five other "biting" non-native mosquito species have also become established: *Ae. albopictus, Ae. aegypti Ae. japonicus*, *Ae. vexans*, and *Wyeomyia mitchelli.*

Wolbachia are not infectious to humans and are vertically transmitted through the eggs

from one generation to another. The *Wolbachia* bacteria are obligate endosymbionts and can only survive inside the insect host's cytoplasm. A mosquito transinfected with a different strain of *Wolbachia* that results in cytoplasmic incompatibility would not be able to successfully reproduce with a wild mosquito due to cytoplasmic incompatibility. Therefore, if individual mosquitoes did become temporarily established, then they will quickly die off over the following generations because of cytoplasmic incompatibility with wild mosquitoes of the same species, with which they would be expected to encounter and mate.

Through the importation we intend to only import male mosquitoes. The sex separation can be performed in a variety of manners including through computer recognition and separation of males and females or through pupal sorting of males and females. However, if both sexes of transinfected mosquito were to be accidently released, they are unlikely to maintain a breeding population of a transinfected mosquito. *Wolbachia* invasions into populations require a critical threshold frequency of infection that needs to be overcome before a novel *Wolbachia* infection can spread into a population. The *Wolbachia* infection rate must exceed 20-45% before it can spread and become established. This is evident in large scale releases such as in Cairns, Australia, where millions of transinfected mosquitoes (both sexes) with *Wolbachia* are released into the environment to control disease transmission, yet they do not easily reach fixation in the wild. If transinfected mosquitoes were to become established, the establishment is likely to be spatially localized due to incompatibility with neighboring mosquito populations.

Potential Impacts of Importation

pro: Importation of male mosquitoes will allow the implementation of an evaluated technology that has been scientifically demonstrated as a safe and effective control method for mosquitoes on a landscape-scale. These are mosquitoes that are widespread in Hawaii and which have negative impacts to humans, wildlife, and pets, and are causing the extinction of native forest birds. Thirty species of main Hawaiian forest birds have become extinct since European contact, and another 11 of the 21 remaining species are federally listed as threatened or endangered. The remaining 21 forest bird species remain at great risk as a result of avian pox and avian malaria. Four honeycreeper species (Akikiki, *Oreomystis bairdi*; Akekee, *Loxops caeruleirostris*; Kiwikiu, *Pseudonestor xanthophrys* and Akohekohe, *Palmeria dolei*) are of particular concern – each are federally endangered, single-island endemics with highly restricted ranges, number fewer than 1,800 individuals, and display recent alarming population declines. DLNR and USFWS have previously attempted to address these declines through bold conservation actions, such as translocations and establishment of captive

populations; however agencies have met with only limited success due to rapidly changing disease-transmission conditions on the landscape. There is an urgent need to develop new conservation tools, including landscape-level mosquito control in order to prevent further extinctions.

The application of traditional chemical controls for mosquitoes in both natural areas is impractical and causes unacceptable non-target impacts, whereas IIT carries no non-target risks to native species, humans or the environment. Furthermore, mosquitoes were first introduced to the Hawaiian Islands in the 1800s, and while they are used opportunistically as prey items, no species native to Hawai'i are dependent on their presence for survival. The control of mosquito populations in Hawaiian forests would thus cause no negative impacts on Hawaiian species.

Demonstrated application of this approach in Hawaii would have also have a wide range of potential positive effects in that it may facilitate the incompatible insect technique approach being used for human health.

con: It is hard to imagine any negative effects since the species is already established in Hawaii. Importing these organisms will not have any foreseeable beneficial effect to this mosquito species already found in Hawaii. The introduction of, for example, increased genetic variation within the mosquito species will be minimized by crossing the lines to mosquitoes originating from Hawaii.

The presence of unintended accompanying microbiota is minimized by the sterile laboratory rearing conditions used. These mosquitoes have been maintained for many generations in the lab environment and have not had the opportunity to obtain pathogens from the wild from blood feeding. The presence of intended microbiota, the *Wolbachia,* potentially has very positive effects on the societal health, the suppression of human disease vectored by mosquitoes, the environment, via population suppression of mosquitoes that vector avian pathogens, and the economy, through the potential increased tourism and lessened disease burden.

This mosquito species is already well established in Hawaii, as are many different strains of *Wolbachia*. MosquitoMate and Verily have a demonstrated track record of success utilizing sex-sorting methods which are highly effective. In the event that technical difficulties did occur during sex-sorting methods, because of cytoplasmic incompatibility, the escape of female mosquitoes carrying a new *Wolbachia* strain is not expected to be stable over the following generations. Laboratory reared females outcrossing to locally established wild male mosquitoes will result in cytoplasmic

incompatibility and the failure of offspring to develop.

There is an extensive body of literature surrounding this mosquito species, its impact upon Hawaii, and Wolbachia-mediated cytoplasmic incompatibility.

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Stouthamer, R., Breeuwer, J. A., & Hurst, G. D. (1999). Wolbachia pipientis: microbial manipulator of arthropod reproduction. *Annual Reviews in Microbiology*,*53*(1), 71-102.
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Hawai`i Board of Agriculture Action on Proposal to Add Three Mosquito Species to List of Restricted Animals

NR22-05
May 10, 2022

HONOLULU – On May 9, 2022, the Hawai`i Board of Agriculture preliminarily approved the addition of the Asian tiger mosquito (Aedes albopictus), the yellow fever mosquito (Aedes aegypti), and the southern house mosquito (Culex quinquefasciatus) to the List of Restricted Animals (Part A). The rule change will allow for inoculated male mosquitoes to be imported to help decrease mosquito populations and mosquito-transmitted diseases.

The proposed order and proposed rule changes may be viewed online at:
https://hdoa.hawaii.gov/blog/main/proposed-administrative-rules/

A printed copy of the proposed order and proposed rule changes will be mailed to any interested person who requests a copy upon advance payment of costs for photocopying, preparing, and mailing the copy. To inspect a copy of the proposed order and the proposed exact changes, or to pick up a copy (with full payment) please go to:

Hawai`i Department of Agriculture
Plant Quarantine Branch
1849 Auiki Street
Honolulu, Hawai`i 96819
Phone: (808) 832-0566

During the next 30 days, the Hawai`i Department of Agriculture, Plant Quarantine Branch, will be soliciting comments regarding the proposed addition of the Asian tiger mosquito (Aedes albopictus), yellow fever mosquito (Aedes aegypti), and the southern house mosquito (Culex quinquefasciatus) to the List of Restricted Animals (Part A). Comments may be sent to
Mr. Jonathan Ho, Inspection and Compliance Section Chief via:

Email: Jonathan.K.Ho@hawaii.gov
Fax: (808) 832-0584
Mail: 1849 Auiki Street, Honolulu, Hawaii 96819

The proposed order will be discussed by both the Advisory Committee on Plants and Animals and the Hawai`i Board of Agriculture at scheduled virtual meetings, with a physical site located at 1428 South King Street, Honolulu, HI 96814. If you would like to be notified of the dates and times of the meetings, please contact Mr. Ho above.

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actions protected, or oppose action prohibited, by 40 C.F.R. Parts 5 and 7, or for the purpose of interfering with such rights.

If you have any questions about this notice or any of the Department's non-discrimination programs, policies, or procedures, or believe that you have been discriminated against with respect to a Department of Agriculture program or activity, you may contact:

Morris Atta, Acting Non-Discrimination Coordinator
Hawai'i Department of Agriculture, 1428 S. King Street, Honolulu, HI 96814,
(808) 973-9553, hdoa.titlevi@hawaii.gov

State of Hawaii
Department of Agriculture

(Insert Date)

Board of Agriculture
Honolulu, Hawaii

Subject: Proposed Board Order

The Board of Agriculture met at a duly noticed meeting on (Insert Date) and by a vote of XX to XX, approved the addition of the Asian Tiger Mosquito, *Aedes albopictus*, Yellow Fever Mosquito, *Aedes aegypti,* and the Southern House Mosquito, *Culex quinquefasciatus* to the List of Restricted Animals (Part A).

Pursuant to Section 4-71-4.2, Hawaii Administrative Rules, the Board of Agriculture hereby orders that the List of Restricted Animals (Part A) be amended as set forth in Attachment A.

SCIENTIFIC NAME	COMMON NAME
CLASS Insecta	
ORDER Coleoptera	
FAMILY Apionidae	
Apion scutellare	biocontrol agent, gorse
FAMILY Buprestidae	
Lius poseidon	biocontrol agent, clidemia
FAMILY Chrysomelidae	
Chlamisus gibbosa	biocontrol agent, blackberry
FAMILY Coccinellidae	
Delphastus pusillus	predator, spiraling whitefly
Hippodamia convergens	beetle, convergent lady
Nephaspis oculatus	predator, spiraling whitefly
Nephaspis bicolor	predator, spiraling whitefly
Stethorus nigripes	predator, spider mites
Stethorus picipes	predator, spider mites
FAMILY Curculionidae	
Acythopeus sp. 1	biocontrol agent, ivy gourd
Acythopeus sp. 2	biocontrol agent, ivy gourd
Acythopeus sp. 3	biocontrol agent, ivy gourd
Auletobius convexifrons	biocontrol agent, firetree
Gymnaetron tetrum	biocontrol agent, common mullein
FAMILY Scarabaeidae	
Euoniticellus intermedius	predator, hornfly
Onitis vanderkelleni	predator, horn fly
ORDER Diptera	
FAMILY Chamaemyiidae	
Leucopis (all species in subgenus)	predator
FAMILY Culicidae	
//Aedes aegypti	mosquito, yellow fever //
//Aedes albopictus	mosquito, Asian tiger //
//Culex quinquefasciatus	mosquito, southern house //
FAMILY Drosophilidae	
Drosophila (all species in genus)	flies, pomace
Zapriothrica sp.	biocontrol agent, banana poka

EXACT CHANGES - Underline indicates addition.

Ho, Jonathan K

From: Lenley Lewis <[redacted]>
Sent: Tuesday, May 10, 2022 10:15 PM
To: Ho, Jonathan K
Subject: [EXTERNAL] Mosquito reduction

Mr Ho,

I applaud the efforts to reduce the mosquito population that has proliferated throughout Hawaii. We live next to a gulch in Waipunalei on the Hamakua Coast where standing water pools and mosquitoes breed. We would welcome a big reduction! We also hope a reduction in numbers of mosquitoes will also reduce a major threat to endangered bird populations, such as the pallia.

Lenley Lewis

Sent from my iPhone

Ho, Jonathan K

From: Frances Rieha <[redacted]>
Sent: Tuesday, May 10, 2022 6:26 PM
To: Ho, Jonathan K
Subject: [EXTERNAL] inoculated male mosquito plan

Sir, Thank you for this! The science behind this project can and does work. This can potentially save many from blood-borne diseases in a safe, non-polluting way. I'm sure you will receive many NIMBYs' (not in my back yard) comments complaining. Please don't let foolish ones' voices drown out the voice of science and reason. Thank you again.
Sincerely,
Frances Rieha
Hawi, North Kohala

Ho, Jonathan K

From: Jennifer Meyers <[redacted]>
Sent: Tuesday, May 17, 2022 7:42 AM
To: Ho, Jonathan K
Subject: [EXTERNAL] Mosquito eratication

Aloha
My name is Jennifer Meyers @[redacted]
I support this bill to eradicate mosquitoes in Hawaii.

NR22-05

May 10, 2022

HONOLULU On May 9, 2022, the Hawai`i Board of Agriculture preliminarily approved the addition of the Asian tiger mosquito (*Aedes albopictus)*, the yellow fever mosquito (*Aedes aegypti),* and the southern house mosquito (*Culex quinquefasciatus)* to the List of Restricted Animals (Part A). The rule change will allow for inoculated male mosquitoes to be imported to help decrease mosquito populations and mosquito transmitted diseases.

Mahalo

Ho, Jonathan K

From: Kaleiheana-a-Pohaku Stormcrow <[redacted]>
Sent: Wednesday, May 18, 2022 8:19 AM
To: Ho, Jonathan K
Subject: [EXTERNAL] Mosquitoes

Aloha kāua,

I am writing in support of adding Asian Tiger Mosquito, Aedes albopictus, Yellow Fever Mosquito, Aedes aegypti, and the Southern House Mosquito, Culex quinquefasciatus to the List of Restricted Animals (Part A). Allowing these mosquitos to be imported to try to eradicate the Avian Malaria carrying mosquito population is necessary in order for the survival of our forest birds, who will surely go extinct if we don't take this action. Mahalo for your consideration.

Me ka ha'a ha'a,

Kalei

Me ka ha'a ha'a,

Kalei

Ho, Jonathan K

From: Keris Escott <[redacted]>
Sent: Saturday, May 21, 2022 3:07 PM
To: Ho, Jonathan K
Subject: [EXTERNAL] mosquitos

Aloha
I am in favor of the plan and methods proposed to suppress the mosquito population in Hawaii. Minimizing the probability of disease transmission to bird populations or to humans is an attractive proposition especially given that no new mosquitos or bacteria will be introduced in the process. I look forward to the release of the inoculated mosquitos on the Big Island and the likelihood it will create a more comfortable outdoor experience.

Sincerely,
Suzan Escott

Ho, Jonathan K

From: Ronda L. <[redacted]>
Sent: Monday, May 23, 2022 6:19 AM
To: Ho, Jonathan K
Subject: [EXTERNAL] Mosquito

Hello,
We have a home in the Haiku area and we very much support the suppression of mosquitos with the Wolbachia bacterium!

Thank you,
Ronda Leonhardy

Ho, Jonathan K

From: Hob Osterlund <[redacted]>
Sent: Tuesday, May 17, 2022 6:17 AM
To: Ho, Jonathan K
Subject: [EXTERNAL] please restrict mosquitoes

Aloha Mr Ho,
We urge you to support the proposed addition of the Asian tiger mosquito (*Aedes albopictus)*, yellow fever mosquito (*Aedes aegypti)*, and the southern house mosquito (*Culex quinquefasciatus*) to the List of Restricted Animals (Part A).
Our native birds are dying fast, and need all the help they can get!
Mahalo,

Hob Osterlund, APRN
Senior Fellow, Safina Center
Founder and Bird Guide, Kaua'i Albatross Network
Author, Holy Mōlī: Albatross and Other Ancestors (4th printing, 2019)
Producer, Telly Award-winning "Kalama's Journey"
Photographer, Audubon Top 100, 2019

Ho, Jonathan K

From: Alison C. Cohan <acohan@TNC.ORG>
Sent: Monday, May 23, 2022 2:57 PM
To: Ho, Jonathan K
Cc: Anthony Ching
Subject: [EXTERNAL] Hawai`i Board of Agriculture Action on Proposal to Add Three Mosquito Species to List of Restricted Animals
Attachments: 2022.05.23 TNC Support for Mosquitoes to List of Restricted Animals.pdf

Aloha,

Please find attached written testimony from The Nature Conservancy, Hawai'i and Palmyra Chapter, in support of the proposal to add three mosquito species to the List of Restricted Animals.

Mahalo for the opportunity to comment.

Alison Cohan
Hawai'i Terrestrial Director
acohan@tnc.org
(808) 283-7368

The Nature Conservancy
Hawai'i and Palmyra
923 Nu'uanu Avenue
Honolulu, HI 96817
nature.org/hawaii

Protecting Land. Water. Life.

The Nature Conservancy
Hawai'i and Palmyra

The Nature Conservancy - Hawai'i and Palmyra
923 Nu'uanu Avenue
Honolulu, HI 96817

Tel (808) 537-4508
Fax (808) 545-2019
nature.org/hawaii

May 23, 2022

Hawai'i Department of Agriculture
Plant Quarantine Branch
Jonathan Ho
1849 Auiki Street
Honolulu, Hawai'i 96819

RE: Comments on proposed rule change to include three species of mosquito to the List of Restricted Animals

The Nature Conservancy (TNC) is a global non-profit organization dedicated to the preservation of the lands and waters upon which all life depends. TNC has helped protect more than 200,000 acres of natural lands in Hawai'i, including the Waikamoi Preserve on the slopes of Haleakalā, where three federally listed bird species still survive. Two of them are in imminent danger of extinction within the next six to ten years. There is even less time left for Kaua'i forest birds, one of which is predicted to be extinct in the wild within the next two years without immediate intervention.

The Nature Conservancy in Hawai'i strongly supports the proposed rule change to add the *Aedes aegypti*, *Aedes albopictus* and *Culex quinquefasciatus* mosquitoes to the List of Restricted Animals (Part A). *Culex quinquefasciatus,* in particular, has been documented moving higher in elevation and is a vector for *Plasmodium relictum*, the parasite that causes avian malaria. This listing is an essential step to implement mosquito suppression activities that will offer our endangered forest birds a fighting chance against avian malaria, which threatens them with imminent extinction.

TNC and partners are collaborating on a project to control the spread of avian malaria involving the direct release of male *Aedes* and *Culex* mosquitos under an incompatible insect technique (IIT) integrated pest management program. Adding these species to the Restricted Part A list will allow for the establishment of permit conditions for importation of *Aedes* and *Culex* mosquitoes in support of this project. Evidence has shown that mosquito control utilizing IIT can be very effective and safe for humans, and there is growing consensus that it is the most promising approach for saving Hawai'i's native birds.

Partners in Hawai'i's conservation community and beyond are working feverishly to stop the loss of our native forest birds. The proposed rule change is an essential step towards suppressing invasive and destructive mosquitoes in Hawai'i's natural areas, for the benefit of Hawai'i's forests, people, and culture. Mahalo for the opportunity to share our comments.

Ho, Jonathan K

From: tim0neill0 <[redacted]>
Sent: Monday, May 30, 2022 10:09 AM
To: Ho, Jonathan K
Subject: [EXTERNAL] Mosquitoes

I am FOR the release of GM mosquitoes, to attempt to control the infestation of disease carrying pests.

Tim ONeill
Kailua Kona resident

Sent from my Verizon, Samsung Galaxy smartphone

Ho, Jonathan K

From: Rachel Laderman <[redacted]>
Sent: Sunday, May 29, 2022 8:08 PM
To: Ho, Jonathan K
Subject: [EXTERNAL] In favor - HI BOA Action on Proposal to Add Three Mosquito Species to List of Restricted Animals

I support the Hawai‘i Board of Agriculture Action on Proposal to Add Three Mosquito Species to List of Restricted Animals. I am very concerned about avian malaria and the loss of even more of Hawaii's endemic birds. The disease has been creeping up in elevation and the birds are running out of mountain to retreat to! I have been told by forest rangers that by the time high school kids today are in their 40s and 50s, the `i`iwi will be extinct.

The approach of using Wolbachia bacteria as a form of mosquito birth control provides hope to this tragic situation, and must be acted on carefully but in a timely manner. I am acutely aware that many community members are confusing Wolbachia with genetically modified mosquitoes, and think "oh no, they want to release GMO mosquitoes!" This confusion is based on misinformation and a lack of scientific understanding. I hope that your office can help spread the accurate information that Wolbachia is a naturally occurring bacteria and, when a male and female carrying different strains mate, the females' eggs won't hatch. We do not need to be worried that this is genetic modification that could affect other species, or spread in the wild, or make people or other animals sick. Every day, insects with Wolbachia are living and dying around us - it is a normal part of the environment.

Please approve the listing of the three mosquitoes so they can be used for this incredibly important application.

Rachel Laderman
Kulike Farm
[redacted]

Ho, Jonathan K

From: Sharon Pollock <[redacted]>
Sent: Saturday, May 28, 2022 3:19 PM
To: Ho, Jonathan K
Subject: [EXTERNAL] Hawai`i Board of Agriculture Action on Proposal to Add Three Mosquito Species to List of Restricted Animals

Aloha Mr. Ho,

When I first hiked the Alaka'i Swamp trail in Kauai, native forest birds could be seen and heard everywhere. Now, the skies are empty and the air is silent. There has been a precipitous decline in the numbers of these unique birds, caused largely by the proliferation of avian-malaria carrying mosquitoes. Their last refuge has been the highest elevation forests where previously the mosquitos did not reach. However, now, with climate change, the mosquitoes are invading even this last refuge. Time is very short: for some of these birds it has already run out, for others there is very little time left. The Wolbachia solution has been proven elsewhere, has no negative impacts, and could dramatically and immediately improve the outlook for these precious birds. I therefore humbly beseech you to approve the request for this special import permit – the birds do not have time to lose.

Mahalo,
Sharon Pollock
Santa Rosa, CA

Ho, Jonathan K

From: Keith Evans <[redacted]>
Sent: Friday, May 27, 2022 7:22 PM
To: Ho, Jonathan K
Subject: [EXTERNAL] RE: Hawai`i Board of Agriculture Action on Proposal to Add Three Mosquito Species to List of Restricted Animals

Aloha Mr. Ho,

When I first hiked the Alaka'i Swamp trail in Kauai, native forest birds could be seen and heard everywhere. Now, the skies are empty and the air is silent. There has been a precipitous decline in the numbers of these unique birds, caused largely by the proliferation of avian-malaria carrying mosquitoes. Their last refuge has been the highest elevation forests where previously the mosquitos did not reach. However, now, with climate change, the mosquitoes are invading even this last refuge. Time is very short, for some of these birds it has already run out, for others there is very little time left. The Wolbachia solution has been proven elsewhere, has no negative impacts, and could dramatically and immediately improve the outlook for these precious birds. I therefore humbly beseech you to approve the request for this special import permit – the birds do not have time to lose.

Mahalo,
Keith Evans
Santa Rosa, CA

Ho, Jonathan K

From: Sharman O'Shea <[redacted]>
Sent: Tuesday, May 31, 2022 9:21 AM
To: Ho, Jonathan K
Subject: [EXTERNAL] NO to GMO Mosquitos

This is an assault on our being ... thank you for saying no to this intrusion ...

Mahalo,
Sharman

Ho, Jonathan K

From: MG <[redacted]>
Sent: Tuesday, May 31, 2022 5:15 AM
To: Ho, Jonathan K
Subject: [EXTERNAL] NO to Releasing of GE Mosquitos!

Dear Sir
I am a mom and resident of Hawai'i.
I am writing to speak against any release of GE mosquitos! It is a violation of public health to release these bugs. We the people should not be subjected to an experiment. The EPA has not been transparent about the analysis of the key environmental assessments.

1. If too many of the population is infected with Wolbachia, the technique will no longer be effective. How is this being funded and where are the targeted areas?
2. There is no way to measure the impact on public health without present infections and a way to trace transmission.

PATHOGENS AND GLOBAL HEALTH
2021, VOL. 115, NO. 6, 365–376 https://doi.org/10.1080/20477724.2021.1919378

https://clicks.aweber.com/y/ct/?l=PVz_e&m=3bTNwD.e3iX887a&b=CK4dke6zh6_wSkzsHexM0A

"Arthropods present complex and misunderstood ecological relationships, and alternations in reproductive parameters of non target species can generate ecological disturbances."

https://clicks.aweber.com/y/ct/?l=PVz_e&m=3bTNwD.e3iX887a&b=4ufJIesPI6YotoIUVNeSCA

Please say NO to GE mosquitoes being released in Hawai'i.
Sincerely,
Michelle Galarza
MA,MTCM

Sent from my iPhone with love Chelle

Ho, Jonathan K

From: Loomis Read <[redacted]>
Sent: Monday, May 30, 2022 4:11 PM
To: Ho, Jonathan K
Subject: [EXTERNAL] NO to Gene Drive Mosquito Control

Dear Jonathon,

This Genetically Modified mosquito program is a great danger to the Hawaiian archipelago and it must be stopped! Gene-drive mosquito control is a high risk and we must say NO! If too much of the population is infected with Wolbachia, the technique will no longer be effective.There is no way to measure the impact on public health without present infections and a way to trace transmission.
https://urldefense.com/v3/__https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8592615/__;!!LIYSdFfckKA!yVpPNzOFwwy3PxstxElV1MPc4T3n89jNyINpwJ2N-nfYzOzYPGuNKYzltx-CYQR1kJSBJNTfCi1-tEBGS2x0sx8$

The Risks of Wolbachia Mosquito Control:
"Arthropods present complex and misunderstood ecological relationships, and alternations in reproductive parameters of non target species can generate ecological disturbances"

https://urldefense.com/v3/__https://www.science.org/doi/10.1126/science.351.6279.1273-b__;!!LIYSdFfckKA!yVpPNzOFwwy3PxstxElV1MPc4T3n89jNyINpwJ2N-nfYzOzYPGuNKYzltx-CYQR1kJSBJNTfCi1-tEBGChuFASU$

Releasing GE Mosquitoes in the Wild Is Terrible Idea. Residents are right to be concerned about the release of GE insects in their backyard, as the outcome of this reckless experiment remains completely unknown, and the EPA has been less than transparent about its analysis of the data. According to Sustainable Pulse:29

The EPA did not publicly share its entire public health analysis, and data about allergenicity and toxicity were redacted from public documents. EPA's key environmental assessments were also insufficient and did not mandate scientific tests using caged trials ahead of environmental release."

https://urldefense.com/v3/__https://conservativeplaylist.com/2022/05/28/billions-of-ge-mosquitoes-released-health-risks-ignored/__;!!LIYSdFfckKA!yVpPNzOFwwy3PxstxElV1MPc4T3n89jNyINpwJ2N-nfYzOzYPGuNKYzltx-CYQR1kJSBJNTfCi1-tEBG2ct8nCs$

How is this being funded and where are the targeted areas? Whose pockets are being lined to push this program through?

NO to this program.

Aloha,
Loomis Read

Ho, Jonathan K

From: Kat C <[redacted]>
Sent: Monday, May 30, 2022 2:32 PM
To: Ho, Jonathan K
Subject: [EXTERNAL] NO to GE Mosquitoes

Aloha Mr. Ho,

Please do not damage our health and environment by releasing gmo mosquitoes in Hawai'i. Too many times we have seen the failure and damage of introducing non native species.

I hope you follow your conscience.

Mahalo
Kat Culin

Ho, Jonathan K

From: magonmaui <[redacted]>
Sent: Monday, May 30, 2022 1:55 PM
To: Ho, Jonathan K
Subject: [EXTERNAL] NO! to GE Mosquitos in Hawai'i

Dear Mr. Ho,

I am writing to let you know that I STRONGLY OPPOSE the release of genetically engineered mosquitos in Hawaii.

The consequences of this action on our native species is unpredictable and potentially dangerous. Anthropods present complex and little understood ecological relationships with one another, and alterations in reproductive parameters of non-target species can generate ecological disturbances. The potential negative impact of these Wolbachia bacteria on our pristine Hawai'i environment is NOT WORTH THE RISK.

I too am concerned for the personal health of the people of Hawai'i. How will this effect us? Where are the safely studies??? Unfortunately the EPA seems to have lost its direction:

"We should all be very concerned about an EPA that forgets its middle name, protection, with this approval. Our public trust is abused by Oxitec's lack of scientific transparency and no independent scientific investigation from EPA to show this experimental insect will not create infinitely more problems than it will solve ... It is ethically repugnant to release these mosquitoes." -Barry Wray of Florida Keys Environmental Coalition.

I am extremely concerned about the release of GE insects in my backyard, as the outcome of this reckless experiment remains completely unknown, and the EPA has been less than transparent about its analysis of the data.

Regarding the release of GE mosquitos in Florida:

"Unfortunately, the EPA did not publicly share its entire public health analysis, and data about allergenicity and toxicity were redacted from public documents. EPA's key environmental assessments were also insufficient and did not mandate scientific tests using caged trials ahead of environmental release." - Sustainable Pulse

How will this affect me? Can you speak to the safety of this tactic?

The prioritization of corporate interests over public health has gone too far!

"Poorly done, secretive science and lack of transparency is once again being rewarded with a free pass by government officials who are ignoring the voices of concerned scientists and those most impacted. First in Brazil, and now in Florida, government agencies have missed the mark and promoted the interests of a private corporation over public health and ecosystem protection." -Dana Perls, Friends of the Earth

Please do not let this happen in Hawai'i!!!!!

There are many effective ways to deal with mosquitos that do no harm to our precious environment or our personal health. How about spend some money and time focusing on and educating people on that??

Please let's put the ecosystem and the people of Hawai'i first and abandon this potentially harmful plan!

Sincerely,
Maggie Costigan
Hā'iku, Maui

Ho, Jonathan K

From: Linda Jenson [redacted] >
Sent: Monday, May 30, 2022 12:56 PM
To: Ho, Jonathan K
Subject: [EXTERNAL] NO to Releasing of GE Mosquitoes!

Please consider the voice of the people...
And the possible consequences.
NO release of modified experimental mosquitoes!
Sincerely, Linda Jenson

Ho, Jonathan K

From: Juhl Rayne <[redacted]>
Sent: Monday, May 30, 2022 11:26 AM
To: Ho, Jonathan K
Subject: [EXTERNAL] NO to Releasing of GE Mosquitoes!

1. aloha,
2. if Hawaii should have learned ANYTHING from its past mistakes (bringing in mongoose to get rid of rats, cochi frogs, fire ants, etc... it should know to NOT upset the eco-balance of nature... we DO NOT want any more GE species or crops or anything that is not made by GOD....
3. If too much of the population is infected with Wolbachia, the technique will no longer be effective. How is this being funded and where are the targeted areas?
4. There is no way to measure the impact on public health without present infections and a way to trace transmission.

https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8592615/

The Risks of Wolbachia Mosquito Control

"Arthropods present complex and misunderstood ecological relationships, and alternations in reproductive parameters of non target species can generate ecological disturbances"

https://www.science.org/doi/10.1126/science.351.6279.1273-b

i hope you are not sold out to these monstrosity corporations and crazy tech overlords...
please... do NOT do this... there is NO going back... it will be the biggest mistake and you will be responsible for it.
thank you,
please respond
Juhl Rayne

Ho, Jonathan K

From: Gary Zamber <[redacted]>
Sent: Monday, May 30, 2022 11:21 AM
To: Ho, Jonathan K
Subject: [EXTERNAL] No gmo mosquitos!

Vote No to idea for gmo mosquitos in Hawaii!
This is not a good idea.
Sent from my iPhone

Ho, Jonathan K

From: Chase Uwaine <[redacted]>
Sent: Monday, May 30, 2022 9:52 AM
To: Ho, Jonathan K
Subject: [EXTERNAL] NO to Releasing of GE Mosquitoes!

Dear Mr. Ho,

Being a resident of Hawaii, born and raised, for more than 49 years, I can say one thing; has anything we have done before to control our environment worked? And how can I feel confident that this next idea will work? In fact I'm petrified to think of the possible consequences that could stem from genetically modified mosquitoes. At least the mongoose keep to their own, the toads are a nuisance but not going to kill us. The consequences of our past failed experiments to control our environment/nature still pester us to this day. But a genetically modified biting insect??? As a citizen of the State of Hawaii, I do not consent to this proposal.

Please think about the Hawaii you want to leave for your children.

Chase Uwaine

Get Outlook for iOS

Ho, Jonathan K

From: Robert Ward [redacted] >
Sent: Monday, May 30, 2022 8:52 AM
To: Ho, Jonathan K
Subject: [EXTERNAL] NO to Releasing of GE Mosquitoes!

Dear DOA Inspection Chief Ho
I am writing about the proposed experimental introduction of a genetically engineered or modified mosquito into environments and ecosystems of Hawaii with the HOPE of a desired effect of affecting current mosquito populations!!!
A hope and a speculation is absolutely not the grounds for an appropriate and responsible action to again ponder yet another potentially catastrophic and disastrous introduction of a species into Hawaii's delicate Eco system.
How many previous reckless failed introductions have there already been that have wreaked havoc on the flora and fauna and people of Hawaii.???
Demand the due diligent responsible Scientific research that your position as inspector requires and demands for the aina and the people of Hawaii.
I emphatically say NO to such a reckless plan, without adequate data to back up this idea.
NO TO THE RELEASING OF GE MOSQUITOS IN HAWAII.!!!!!
How Would you personally like an adverse reaction to a mosquito bite/sting with unknown side effects from a genetically engineered mosquito? or your family or children or relatives or friends or dog or cat, etc etc???
Really sir, contemplate this thoughtless and unpredictable plan with proper environmental protection agency research first !!
Can you not see that it's easier to do the proper steps first than to have made the wrong decision and then what??- what other introduction would be necessary to counter yet another failed and idiotic move?
Do the right thing. Contemplate your office and your station as to whether you want such recklessness and unknown ramifications to be on your conscience and name from here and now forward for this careless, foolhardy, and ill-advised action.
Thank you for doing the right thing for Hawaii Nei!
Aloha🤜🌸
Robert Ward
Captain Cook, Hawaii

Sent from my iPhone

Ho, Jonathan K

From: Faith Yamakawa [redacted] >
Sent: Monday, May 30, 2022 8:07 AM
To: Ho, Jonathan K
Subject: [EXTERNAL] NO to Releasing of GE Mosquitoes!

Good morning Jonathan,

Please no to releasing mosquitoes

Sincerely,

Faith Yamakawa

Sent from my iPhone

Ho, Jonathan K

From: Madhava Shakti Moe <[redacted]com>
Sent: Monday, May 30, 2022 6:44 AM
To: Ho, Jonathan K
Subject: [EXTERNAL] Release of Mosquitoes

Aloha Jonathan,

I just heard about the possible release of 3 other species of mosquitoes on the Hawaii island. Are these altered in their DNA?
Introducing other species to the island is dangerous and needs special very special consideration.
I have a few questions for you: Who is funding this project ? and where is this projected to be done? and when? If this happens, it will certainly affect the whole island and everyone including me and my loved ones and I DO NOT CONSENT to such experiment.

Why play with something that could potentially and most likely generate ecological disturbance.

These experiments are unstable, complex and imperfect.

What if something goes really wrong? Where are the studies that shows that is 100% safe for birds and all animals, including us.

I ask that you DO NOT move forward to such risky and possible disastrous experiment.
Please connect to your higher source. This is NON SENSE and it needs to stop!

Mādhava Shakti Moe

Ho, Jonathan K

From: Vernelle Oku <[redacted]>
Sent: Monday, May 30, 2022 1:05 AM
To: Ho, Jonathan K
Subject: [EXTERNAL] NO to Releasing of GE Mosquitoes!

Dear Compliance Chief Jonathan Ho,
I respectfully request that GE mosquitoes not be released in Hawaii ever. We have a very fragile eco system in Hawaii with many unique and endangered species and they are always paying the price for decisions we make which forever alter our lies and our ecosystem.
Thank you for your attention to my concerns.
Kind Regards,
Vernelle Oku
A Concerned Hawaii Citizen

Sent from my iPhone

Ho, Jonathan K

From: Apurvo Sutherland <[redacted]>
Sent: Sunday, May 29, 2022 7:54 PM
To: Ho, Jonathan K
Subject: [EXTERNAL] NO to Releasing of GE Mosquitoes!

hello,
this is completely untested and experimental….this is yet another crime against humanity and i strongly urge you to consider the potential dire consepuences of what you are proposing to expose the island and aina to….

i urge you to please wake up to the destruction this could cause as we don't know the effects this could have on all life here!
please do your job FOR the people and the land and not against it!

taryn sutherland

Ho, Jonathan K

From: Halina Ngo <[redacted]>
Sent: Sunday, May 29, 2022 7:46 PM
To: Ho, Jonathan K
Subject: [EXTERNAL] NO to Releasing of GE Mosquitoes!

This is a bad idea, especially for our delicate ecosystems in Hawaii. We are concerned residents as I am sure you are, too and won't do anything that is that risky just to satisfy someone's ambitions!

You are called for such a time and having this tremendous responsibility, we implore you to reject the idea.

We have every reason to be concerned about the release of GE insects in our lives backyard, as the outcome of this reckless experiment remains completely unknown, and the EPA has been less than transparent about its analysis of the data. According to Sustainable Pulse:[29]

> *Unfortunately, the EPA did not publicly share its entire public health analysis, and data about allergenicity and toxicity were redacted from public documents. EPA's key environmental assessments were also insufficient and did not mandate scientific tests using caged trials ahead of environmental release."*

https://conservativeplaylist.com/2022/05/28/billions-of-ge-mosquitoes-released-health-risks-ignored/

Thank you!

Ho, Jonathan K

From: Jeannie <[redacted]>
Sent: Sunday, May 29, 2022 7:37 PM
To: Ho, Jonathan K
Subject: [EXTERNAL] NO to Releasing of GE Mosquitoes!

I say NO..Everyone I know says NO.....

To GE Mosquitoes!

Stop the Insanity.....enough is enough...

fruit flies galore destroying our fruits..vegetables..

..little fire ants fallen from fruit trees.

.big red ant

.mongoose killing chickens...

....Cokeos and more...

No to GE Mosquitoes

Please enough.!!

:give us
traps..supplies to kill all these fruit fly..

Ho, Jonathan K

From: Rhaya <[redacted]>
Sent: Sunday, May 29, 2022 5:21 PM
To: Ho, Jonathan K
Subject: [EXTERNAL] NO to Releasing of GE Mosquitoes!

Please DO NOT release GE mosquitos into the wild.
Any time humans tamper with nature without plenty of long term research, the results are bad.
Besides, there is not enough public information to justify such a dangerous experiment.
Leave nature alone.

Helping humans strengthen their immune systems in a natural way (such as eating organic foods) is a much better solution to fighting off all diseases.

I've had hundreds or thousands of mosquito bites here in Hawaii over many years and never got sick with a severe disease. It's because of a strong natural immune system in my body.

Alisen Celestyne

Ho, Jonathan K

From: Christy Ann Ceraso <[redacted]>
Sent: Sunday, May 29, 2022 5:08 PM
To: Ho, Jonathan K
Subject: [EXTERNAL] GMO Mosquitoes

Dear Mr. Ho,

I am shocked and appalled that the release of GMO mosquitoes is even being considered for our islands. This kind of reckless experimentation and interference with nature is an abomination. The outcomes are unknown and potentially irreversibly harmful to life. The government has no authority to subject people and the rest of nature to this hazard. Do not proceed.

Hawaii resident,
Christy Ann Ceraso

Sent from ProtonMail mobile

Ho, Jonathan K

From: Nathan Patry <[redacted]>
Sent: Sunday, May 29, 2022 5:03 PM
To: Ho, Jonathan K
Subject: [EXTERNAL] NO to Releasing of GE Mosquitoes!

Aloha Mr. Ho,

I am writing in opposition to the release of genetically engineered mosquitos to our fragile ecosystem. I am an environmental scientist, and volunteer with several organizations to restore our native flora and fauna.

How many ecological issues are we already facing in the islands due to 'introduced species?' It is a substantial number, and the majority of them relate to endangerment and threats to native flora and fauna. If it did not get here on its own by wind, waves, or wings, then it will 100% have a negative impact on those species that did.

Our forests are inundated with invasive plants and animals. Our agriculture struggles from introduced pests. Our reefs are dying from invasive fish and microbiological organisms. Nothing good comes from introducing yet another invasive species. Do not let this ecological disaster be your legacy. Stop these efforts in their tracks.

One reason presented for these mosquitos is human illness. We can treat malaria. Dengue fever is an issue in other parts of the world. What other disease is worth introducing another species, from a lab no less, on an ecosystem unable to assimilate it?

Do what is pono, malama da aina, and respect what your elders know well - introducing species will be wrought with unintended consequences, and the native ecosystem will be the worse off for it.

Respectfully,
Nathan Patry
Lahaina

Ho, Jonathan K

From: Corinne Allain <[redacted]>
Sent: Sunday, May 29, 2022 4:28 PM
To: Ho, Jonathan K
Subject: [EXTERNAL] NO to Releasing of GE Mosquitoes!

Aloha Jonathan,

I'm writing in regards to the GMO mosquitoes being released in Hawaii.

I am AGAINST this idea because of the unknown ramifications that could happen to our birds and animals on the island. I am a farmer and have sheep.

There isn't conclusive evidence from science that shows the safety OR effectiveness of introducing these lab-made species into the environment.

Please DON"T ALLOW this to happen. The introduction of the mongoose idea was a disaster. They eat our chickens and eggs on our farm.

Thank you in advance for respecting my vote against GMO Mosquitoes being introduced.

Respectfully,
Corinne Allain

Ho, Jonathan K

From: Bart Smith <[redacted]>
Sent: Sunday, May 29, 2022 4:19 PM
To: Ho, Jonathan K
Subject: [EXTERNAL] NO to Releasing of GE Mosquitoes!

Dear Sir

Have we learned nothing from the mongeese, peacock groupers etc?

I can believe the outcome of releasing these GE Mosquitos into Hawaii has been adequately tested.
I hope that those of you making this decision are lible for any negative effects that will surely arise.
Doesn't it always happen when Man plays God?

I am totally and unequivocally against it.

Sincerely,
Dr. Robert B. Smith

Ho, Jonathan K

From: Alison Evan <[redacted]>
Sent: Sunday, May 29, 2022 3:55 PM
To: Ho, Jonathan K
Subject: [EXTERNAL] GMO mosquitos

Dear Sir,
Please consider this to be a hard NO!
We are such a small and delicate eco climate here in Hawaii.
The risks far outweigh the benefits of releasing these mosquitoes here.
It wasn't too long ago that we brought over mongoose- disaster that is still not resolved .
Then there were the frogs-

Please do NOT allow our beautiful aina to be infected and tested . There are no long term health and saftey reports that are proof positive we should proceed.

Please no!
We the people say no.
In the Hawaii Constitution there are many ways to address this if you members do not take a stand for our good.

Thank you
Alison Hamman

Sent from my iPhone

Ho, Jonathan K

From: Jennifer Macagnone <[redacted]>
Sent: Sunday, May 29, 2022 3:43 PM
To: Ho, Jonathan K
Subject: [EXTERNAL] NO to Releasing of GE Mosquitoes!

Aloha,

I am not in favor of the release of GMO mosquitos anywhere in Hawaii or the United States.

1. If too much of the population is infected with Wolbachia, the technique will no longer be effective. How is this being funded and where are the targeted areas?
2. There is no way to measure the impact on public health without present infections and a way to trace transmission.

https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8592615/

The Risks of Wolbachia Mosquito Control

"Arthropods present complex and misunderstood ecological relationships, and alternations in reproductive parameters of non target species can generate ecological disturbances"

https://www.science.org/doi/10.1126/science.351.6279.1273-b

Releasing GE Mosquitoes in the Wild Is a Bad Idea

Residents are right to be concerned about the release of GE insects in their backyard, as the outcome of this reckless experiment remains completely unknown, and the EPA has been less than transparent about its analysis of the data. According to Sustainable Pulse:[29]

Please make the right choice and DO NOT release any GMO mosquitos.

Thank you,

Jennifer Macagnone
Hairspray! Salon owner

Ho, Jonathan K

From: Rebecca Corby <[redacted]>
Sent: Sunday, May 29, 2022 3:23 PM
To: Ho, Jonathan K
Subject: [EXTERNAL] NO to Releasing of GE Mosquitoes!

This is a very reckless idea. Where are the the long term studies showing this a safe plan?
How do you know this won't cause un intended consequences causing more harm to people, animals and plants in hawaii currently ?

The public deserves to know more and vote on this!
thank you,
Rebecca Corby
Hawaii Island Resident

Ho, Jonathan K

From: Sarah Martins <[redacted]>
Sent: Sunday, May 29, 2022 2:23 PM
To: Ho, Jonathan K
Subject: [EXTERNAL] Against GMO Mosquitoes Being Released in Hawaii

Aloha,

Releasing mosquitoes in Hawaii without sufficient research does not sound like a good idea. Brazil did something similar and it did not go well. Please reconsider.

Mahalo,
Sarah Martins
Haiku, Maui

Ho, Jonathan K

From: Soleil Hawthorne <[redacted]>
Sent: Sunday, May 29, 2022 2:17 PM
To: Ho, Jonathan K
Subject: [EXTERNAL] NO to Releasing of GE Mosquitoes!

Aloha Mr. Ho,

Please do not allow approval for the releasing of these mosquitoes into our unique Hawaiian environment. It is so naive for scientists to assume that we can understand all the complex long term effects that this introduction could pose to the delicate ecosystem in the islands.

How will these modified mosquitoes evolve over time? What dangers could they become to humans over time? No matter how much money is being offered for this please don't be bribed into allowing this to happen here. This is irreversible and should not be allowed. Thank you for your consideration.

Mahalo,

Soleil Hawthorne

PS. Please review the below links for more information.

Oxitec and MosquitoMate in the United States: lessons for the future of gene drive mosquito control

Key points for consideration:

1. If too much of the population is infected with Wolbachia, the technique will no longer be effective. How is this being funded and where are the targeted areas?
2. There is no way to measure the impact on public health without present infections and a way to trace transmission.

https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8592615/

The Risks of Wolbachia Mosquito Control

"Arthropods present complex and misunderstood ecological relationships, and alternations in reproductive parameters of non target species can generate ecological disturbances"

https://www.science.org/doi/10.1126/science.351.6279.1273-b

Ho, Jonathan K

From: Tina Lia <[redacted]>
Sent: Sunday, May 29, 2022 1:57 PM
To: Ho, Jonathan K
Subject: [EXTERNAL] Opposition to the Release of GMO Mosquitoes

RE: Testimony Against GMO Mosquitoes Being Released In Hawaii

Attn.: Jonathan Ho, Inspection and Compliance Section Chief, Hawaii Department of Agriculture

I am opposed to the release of GMO mosquitoes in the State of Hawaii. The health effects on the people, animals, and environment of these islands are unknown. There could be catastrophic health and environmental consequences to these proposed science experiments, and we may not know the extent of these consequences for years to come. The informed consent of the human subject is absolutely essential. It is against the laws and codes of this nation and of the State of Hawaii to experiment on the people without our informed consent.

This proposed experiment violates the Nuremberg Code and is totally unacceptable. Please reverse course and do not proceed with the release of GMO mosquitoes in the State of Hawaii.

Aloha,
Tina Lia
[redacted]

Ho, Jonathan K

From: Brenda Nelson <[redacted]>
Sent: Sunday, May 29, 2022 1:44 PM
To: Ho, Jonathan K
Subject: [EXTERNAL] NO to Releasing of GE Mosquitoes!

This is insane. No to releasing a GE mosquitoes in Hawaii.

Brenda Nelson
Kailua Kona, HI

Sent from my iPhone

Ho, Jonathan K

From: Golde Wallingford <[redacted]
Sent: Sunday, May 29, 2022 1:26 PM
To: Ho, Jonathan K
Subject: [EXTERNAL] NO to Releasing of GE Mosquitoes!

We do not want to be another experiment of the US government. Keep your GMO mosquitos in your lab....not in our backyards.
Golde Wallingford
Laupahoehoe, Hawaii

Ho, Jonathan K

From: Nicole Busto <[redacted]>
Sent: Sunday, May 29, 2022 1:15 PM
To: Ho, Jonathan K
Subject: [EXTERNAL] Genetically Engineered Mosquitos

Aloha Jonathan,

Look, this basically comes down to "just because you can, doesn't mean you should".
Releasing genetically engineered creatures into the wild is absolutely insane!!!
You have to ask yourself, what is the possibility of a very bad outcome?
Seriously, my immediate question is: what could go wrong?
A LOT!!!!
How many times does science interfering with Nature end up making things worse?
Please do NOT support the release of genetically engineered mosquitoes!!!

Regards,
Nicole Busto

Maui Nutritional Therapy
Nicole Busto NTP, CGP
[redacted]

Ho, Jonathan K

From: Peace Kanuna Mano <[redacted]>
Sent: Sunday, May 29, 2022 1:10 PM
To: Ho, Jonathan K
Subject: [EXTERNAL] NO to Releasing of GE Mosquitoes!

What is wrong with you guys? Why in the world would you want to release genetically modified mosquitoes into the public? Do you just hate humanity? How would you feel if your family came down with a disease that is incurable or even deadly? I guess CV-19 wasn't enough being unleashed by our federal government. I guess it didn't kill enough people that this is your next attempt. We're really getting sick and tired of you guys trying to poison us! You're all truly sick individuals.

Ho, Jonathan K

From: Michelle Melendez <[redacted]>
Sent: Sunday, May 29, 2022 12:56 PM
To: Ho, Jonathan K
Subject: [EXTERNAL] NO to Releasing of GE Mosquitoes!

Jonathan,

I'm appalled that your department would even consider this!

There are been invasive plants and animals that have change these islands FOREVER!

You want to add a new one?

Not only are there NO long-term studies on the environment but what about people. These insects bite people and you want to release them into the general public.

I say, ABSOLUTELY NOT!

You have a responsibility to the Aina and ALL Ohana who live in Hawaii. This is a man-made insect NOT from God and should NOT be released in Hawaii or ANYWHERE!

Concerned Citizen,
Michelle Melendez
[redacted]
--

Michelle Melendez
Fitness and Wellness Expert Since 1996
Author Of The Best Selling and 4x Award Winning Book,
End Dieting Hell: How to find peace in your body and release the weight
Phone: [redacted]
https://blossominnerwellness.com/
Order your copy of End Dieting Hell Click Here

Ho, Jonathan K

From: sharkgss <[redacted]>
Sent: Saturday, May 28, 2022 5:05 PM
To: Ho, Jonathan K
Subject: [EXTERNAL] Re: Comments regarding Mosquito Species To Be Listed As Restricted Animals

Aloha Jonathan,

I would like to submit additional testimony with documentation for you to present to the Advisory Committee on Plants and Animals and Board of Agriculture at future meetings. I strongly oppose this experiment since there is not enough solid data this is ecologically safe. Furthermore the public should be fully on board and aware. There has been strong opposition in CA and FL for good reason.

Oxitec and MosquitoMate in the United States: lessons for the future of gene drive mosquito control

Key points for consideration:

1. If too much of the population is infected with Wolbachia, the technique will no longer be effective. How is this being funded and where are the targeted areas?
2. There is no way to measure the impact on public health without present infections and a way to trace transmission.

Wolbachia bacteria are naturally occurring in other species of insects, how they create reproductive incompatibility is not fully understood [9,10]. In addition, the effectiveness and environmental impact of these systems cannot be ascertained fully before open release. Lab and cage trials can offer some insight into dynamics such as mating rates in the presence of competition, characteristics of offspring, and fitness costs of lab-bred mosquitoes, but the conditions of containment, including artificial feeding and a limited mating pool, are known to impact these measurements [11–13]. Additionally, without present infections and a way to trace transmission, the impact of these systems on public health cannot be fully evaluated.

https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8592615/

The Risks of Wolbachia Mosquito Control

"Arthropods present complex and misunderstood ecological relationships, and alternations in reproductive parameters of non target species can generate ecological disturbances"

https://www.science.org/doi/10.1126/science.351.6279.1273-b

Releasing GE Mosquitoes in the Wild Is a Bad Idea

Residents are right to be concerned about the release of GE insects in their backyard, as the outcome of this reckless experiment remains completely unknown, and the EPA has been less than transparent about its analysis of the data. According to Sustainable Pulse:[29]

> *Unfortunately, the EPA did not publicly share its entire public health analysis, and data about allergenicity and toxicity were redacted from public documents. EPA's key environmental assessments were also insufficient and did not mandate scientific tests using caged trials ahead of environmental release."*

Dana Perls, emerging technology program manager at Friends of the Earth, expressed further dismay at the EPA's prioritization of corporate interests over public health:[30]

> *"Poorly done, secretive science and lack of transparency is once again being rewarded with a free pass by government officials who are ignoring the voices of concerned scientists and those most impacted. First in Brazil, and now in Florida, government agencies have missed the mark and promoted the interests of a private corporation over public health and ecosystem protection."*

https://conservativeplaylist.com/2022/05/28/billions-of-ge-mosquitoes-released-health-risks-ignored/

Thank you,
Donna Thompson
Kamuela, HI

------- Original Message -------
On Monday, May 16th, 2022 at 5:03 PM, sharkgss <sharkgss@protonmail.com> wrote:

> Aloha Jonathan,
>
> I am writing as a very concerned citizen and investigator of 30 years regarding the intention of the State of Hawaii's plans to introduce genetically modified mosquitos containing the Wolbachia bacterium in order to reduce mosquito populations and thus "reduce the potential of transmission of mosquito vectored diseases."
> https://www.bigislandvideonews.com/2022/05/10/mosquito-species-to-be-listed-as-restricted-animals/
>
> What level of assurance can the public have that this idea won't make things worse on the islands?
>
> There is a great deal of documented evidence and scientific papers that are showing Genetically Modified Organisms (GMO's) have no place in the order of nature. We have no idea how this will effect the local bird population, food chain, and transmissible disease could get worse due to gene edited mosquitoes passing on their genes to native insects, fueling concerns they may create a more robust hybrid species. https://www.livescience.com/genetically-modified-mosquitoes-create-hybrids.html
>
> https://www.nature.com/articles/s41598-019-49660-6
>
> Honestly such an idea is reckless and was not well received in California and Florida when introduced last year. The public has the right to know who is funding this and the results of other areas such as Brazil that have had similar experiments conducted to negative effect, including an increase in outbreak of the Zika virus.
>
> https://www.rt.com/news/330728-gmo-mosquitoes-zika-virus/
>
> https://naturalnews.com/2021-05-04-florida-set-to-release-genetically-engineered-mosquitoes.html
>
> Once these organisms are released there is no way to stop mutation or negative side effects. The evidence I am looking at doesn't show any gain, but a lot more risk. We have also learned from Covid plandemic that there are layers of information withheld from the public while data was highly censored to include side effects from the mRNA vaccines during testing phase on animals from companies such as Pfizer (which is now becoming public).
>
> GMO's are being outlawed in other countries and right here in Hawaii for good reason since these practices have had devastating effect on our soils making them inert and de-mineralized for decades along with numerous side effects, including cancer, on all life. https://naturalsociety.com/win-monsanto-gmo-ground-zero/

Over the last 2 years the public has lost a lot of trust in government organizations. We have learned thru intense research that our world leaders have been schooled since the 1970's by the World Economic Forum, to include having influence over our local politicians. Such a decision to release any genetically modified organism should be seriously considered and the public should be well informed of all supporting documentation.

We do not need another health or economic impact on the population.

I appreciate your service and welcome an open discussion on this matter.

Regards,
Donna Thompson
Kamuela, HI

Ho, Jonathan K

From: Mihoko Fichefeux <[redacted]>
Sent: Tuesday, May 31, 2022 11:34 AM
To: Ho, Jonathan K
Subject: [EXTERNAL] Fwd: NO to Gene Drive Mosquito Control

Dear Jonathon,

I am also NO to GM mosquito program. Please stop it.

This Genetically Modified mosquito program is a great danger to the Hawaiian archipelago and it must be stopped! Gene-drive mosquito control is a high risk and we must say NO! If too much of the population is infected with Wolbachia, the technique will no longer be effective.There is no way to measure the impact on public health without present infections and a way to trace transmission.
https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8592615/

The Risks of Wolbachia Mosquito Control:
"Arthropods present complex and misunderstood ecological relationships, and alternations in reproductive parameters of non target species can generate ecological disturbances"

https://www.science.org/doi/10.1126/science.351.6279.1273-b

Releasing GE Mosquitoes in the Wild Is Terrible Idea. Residents are right to be concerned about the release of GE insects in their backyard, as the outcome of this reckless experiment remains completely unknown, and the EPA has been less than transparent about its analysis of the data. According to Sustainable Pulse:29

The EPA did not publicly share its entire public health analysis, and data about allergenicity and toxicity were redacted from public documents. EPA's key environmental assessments were also insufficient and did not mandate scientific tests using caged trials ahead of environmental release."

https://conservativeplaylist.com/2022/05/28/billions-of-ge-mosquitoes-released-health-risks-ignored/

How is this being funded and where are the targeted areas? Whose pockets are being lined to push this program through?

NO to this program.

Aloha,
Miho Aoki

Ho, Jonathan K

From: Unity Nguyen <[redacted]>
Sent: Tuesday, May 31, 2022 2:07 PM
To: Ho, Jonathan K
Subject: [EXTERNAL] NO to gmo mosquito release

Hello Me. Ho,

I am a family medicine physician practicing on Hawaii Island. I do not consent to the release of GMO mosquitoes. Their impact on our ecology and on humans is unknown.

Sincerely,

Tuyngoc Nguyen, MD, LAc
Sent from my iPhone
[redacted]

Ho, Jonathan K

From: Maria Owl <[redacted]>
Sent: Tuesday, May 31, 2022 8:29 PM
To: Ho, Jonathan K
Subject: [EXTERNAL] Ban GMO Mosquitoes in Hawaiian Islands

To Jonathan K. Ho, Dept. of Agriculture,

There is no reason to allow genetically modified mosquitoes into our very fragile ecosystem. There is no way we can know the long term impact. We are already living with the impacts of other invasive insect species such as the tiny red fire ants, which the state intended to control but realized in the end the situation was out of their control and left it to the land owners to deal with individually.

It is 100% immoral to unilaterally decide to change the Hawaiian ecosystem without the people's vote on it. The people need to know :

1. Why were they created?
2. What is the benefit to the Hawaiian ecosystems where they'll be released?
3. What is the long term impact on people and natural food chain?
4. Who is in line to make tons of money from this?
5. By allowing the people and nature of Hawaii to be guinea pigs in this experiment, for that is what it is, who will benefit the most?
6. Is it necessary? Is it wise?

Oxitec and MosquitoMate in the United States: lessons for the future of gene drive mosquito control

Key points for consideration:

1. If too much of the population is infected with Wolbachia, the technique will no longer be effective. How is this being funded and where are the targeted areas?
2. There is no way to measure the impact on public health without present infections and a way to trace transmission.

https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8592615/

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Releasing GE Mosquitoes in the Wild Is a Bad Idea

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> *Unfortunately, the EPA did not publicly share its entire public health analysis, and data about allergenicity and toxicity were redacted from public documents. EPA's key environmental assessments were also insufficient and did not mandate scientific tests using caged trials ahead of environmental release."*

https://conservativeplaylist.com/2022/05/28/billions-of-ge-mosquitoes-released-health-risks-ignored/

Mr. Ho, do not allow this to happen to our beautiful state.

Maria Owl

Captain Cook, Hawaii Island

Ho, Jonathan K

From: Anthony Booker <[redacted]>
Sent: Tuesday, May 31, 2022 8:34 PM
To: Ho, Jonathan K
Subject: [EXTERNAL] GMO mosquitoes

I disapprove to have these insects releases in Hawaii. Especially on the Big Island.

Sincerely,

Anthony

Sent from Yahoo Mail on Android

Ho, Jonathan K

From: devalotus <[redacted]>
Sent: Tuesday, May 31, 2022 11:46 PM
To: Ho, Jonathan K
Subject: [EXTERNAL] NO to Releasing of GE Mosquitoes!

Greetings Mr Ho!

Please say NO to Releasing of GE Mosquitoes in Hawaii !

Key points for consideration:

1. If too much of the population is infected with Wolbachia, the technique will no longer be effective. How is this being funded and where are the targeted areas?
2. There is no way to measure the impact on public health without present infections and a way to trace transmission.

https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8592615/

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https://conservativeplaylist.com/2022/05/28/billions-of-ge-mosquitoes-released-health-risks-ignored/

THANK YOU for your URGENT attention to this!

Dale Ann Chappell

Haiku, Maui

Ho, Jonathan K

From: Rhianna Mercier <[redacted]
Sent: Wednesday, June 1, 2022 8:04 AM
To: Ho, Jonathan K
Subject: [EXTERNAL] Mahalo for listening to us.

Aloha Mr.Ho,

I am a Pahoa, Hawaii resident and I do not support the release of GMO mosquitos onto the islands of Hawaii specifically Big Island.
I feel, after much research, this is a dangerous tampering with Mother Nature and I do not consent or approve the release upon my Ohana.
Many other residents feel the same.
Please do not endanger our environment or bodies here in Hawaii by moving forward.

Mahalo,
Rhianna Mercier
Pahoa, Hawaii resident
[redacted]

Sent from my iPhone

Ho, Jonathan K

From: Staci Wolff <[redacted]>
Sent: Wednesday, June 1, 2022 9:26 AM
To: Ho, Jonathan K
Subject: [EXTERNAL] NO to GMO mosiquito release in Hawaii

Dear Mr. Ho,

I want to voice my concern over the impending release of GMO mosquitos in the state of Hawaii. As a resident and tax payer, I do not consent to have this genetically altered species released in my home. Please help stop this madness.

-Staci Wolff

Ho, Jonathan K

From: ruby2sd <[redacted]>
Sent: Wednesday, June 1, 2022 3:40 PM
To: Ho, Jonathan K
Subject: [EXTERNAL] Gmo misquitos

Oh my God please the cans of worms we have opened on this planet are just too dystopian. Please please please do not do this to us. We have enough headaches what is anyone thinking to unleash this nightmare.

Kathleen Cardella
[redacted]

Sent from my Verizon, Samsung Galaxy smartphone

Ho, Jonathan K

From: George Chyz <[redacted]>
Sent: Wednesday, June 1, 2022 8:29 PM
To: Ho, Jonathan K
Subject: [EXTERNAL] Regarding Mosquito Release

Dear Jonathan Ho,

These mosquitoes appear to be the same type that have already been released in Florida. This is a Genetically Engineered mosquito that has not been extensively tested to see what effects it has on the ecosystem let alone human beings. Since billions have already been released in Florida, that program will be an extensive field test that ought to be monitored for a several years before releasing the new type here in Hawaii.

Invasive species have caused all sorts of damage to the unique flora snd fauna of old Hawaii. I have seen the breathtaking beauty that remains in some remote valleys. Although nature is a powerful force tiny perturbations can cause a domino effect that ends up causing unpredictable damage.

Please use the precautionary principle and wait to see what happens in Florida before moving ahead with this project. The damage to the environment and humanity could be much worse than the problem.

Thank you for being scientific rather than trigger happy.

Aloha,

George Chyz
[redacted]

Ho, Jonathan K

From: Briana Delos Santos [redacted] >
Sent: Wednesday, June 1, 2022 11:46 PM
To: Ho, Jonathan K
Subject: [EXTERNAL] NO to Releasing of GE Mosquitoes!

I object to GMO mosquitoes.

Ho, Jonathan K

From: zachary Cappelletti <[redacted]>
Sent: Thursday, June 2, 2022 3:57 AM
To: Ho, Jonathan K
Subject: [EXTERNAL] NO to Releasing of GE Mosquitoes!

This is an act of bioterrorism you should be tried for treason for even considering this demonic action and fired immediately. You are an enemy of the people and deserve to be treated accordingly.
-Zach

Ho, Jonathan K

From: Kaliko Trusdell <[redacted]>
Sent: Thursday, June 2, 2022 8:06 AM
To: Ho, Jonathan K
Subject: [EXTERNAL] GMO MOSQUITO

With everything that has happened in the World the last two years, all of the bold WEF and WHO predictions and responses, I cannot imagine why you would even consider releasing a potential plague on the people of Hawaii utilizing GMO MOSQUITOES. Do Not allow the use of these unproved practices the results will be catastrophic, the likes of the coqui frog and the mongoose

Sent from my iPhone

Ho, Jonathan K

From: Heidi Howard [redacted] >
Sent: Thursday, June 2, 2022 1:54 PM
To: Ho, Jonathan K
Subject: [EXTERNAL] NO to Releasing of GE Mosquitoes!

I'm a concerned Haiku citizen. This sounds like a bad idea please dont allow it .
Thanks

Ho, Jonathan K

From: sharkgss <[redacted]>
Sent: Monday, May 16, 2022 5:03 PM
To: Ho, Jonathan K
Subject: [EXTERNAL] Comments regarding Mosquito Species To Be Listed As Restricted Animals

Aloha Jonathan,

I am writing as a very concerned citizen and investigator of 30 years regarding the intention of the State of Hawaii's plans to introduce genetically modified mosquitos containing the Wolbachia bacterium in order to reduce mosquito populations and thus "reduce the potential of transmission of mosquito vectored diseases." https://www.bigislandvideonews.com/2022/05/10/mosquito-species-to-be-listed-as-restricted-animals/

What level of assurance can the public have that this idea won't make things worse on the islands?

There is a great deal of documented evidence and scientific papers that are showing Genetically Modified Organisms (GMO's) have no place in the order of nature. We have no idea how this will effect the local bird population, food chain, and transmissible disease could get worse due to gene edited mosquitoes passing on their genes to native insects, fueling concerns they may create a more robust hybrid species. https://www.livescience.com/genetically-modified-mosquitoes-create-hybrids.html

https://www.nature.com/articles/s41598-019-49660-6

Honestly such an idea is reckless and was not well received in California and Florida when introduced last year. The public has the right to know who is funding this and the results of other areas such as Brazil that have had similar experiments conducted to negative effect, including an increase in outbreak of the Zika virus.

https://www.rt.com/news/330728-gmo-mosquitoes-zika-virus/

https://naturalnews.com/2021-05-04-florida-set-to-release-genetically-engineered-mosquitoes.html

Once these organisms are released there is no way to stop mutation or negative side effects. The evidence I am looking at doesn't show any gain, but a lot more risk. We have also learned from Covid plandemic that there are layers of information withheld from the public while data was highly censored to include side effects from the mRNA vaccines during testing phase on animals from companies such as Pfizer (which is now becoming public).

GMO's are being outlawed in other countries and right here in Hawaii for good reason since these practices have had devastating effect on our soils making them inert and de-mineralized for decades along with numerous side effects, including cancer, on all life. https://naturalsociety.com/win-monsanto-gmo-ground-zero/

Over the last 2 years the public has lost a lot of trust in government organizations. We have learned thru intense research that our world leaders have been schooled since the 1970's by the World Economic Forum, to include having influence over our local politicians. Such a decision to release any genetically modified organism should be seriously considered and the public should be well informed of all supporting documentation.

We do not need another health or economic impact on the population.

I appreciate your service and welcome an open discussion on this matter.

Regards,
Donna Thompson
Kamuela, HI

Sent with ProtonMail secure email.

Ho, Jonathan K

From: Phil <[redacted]>
Sent: Friday, June 3, 2022 3:22 PM
To: Ho, Jonathan K
Subject: [EXTERNAL]

Aloha Mr. Ho,

Releasing GE Mosquitoes here is pure insanity!

There is absolutely no way of knowing the long term consequences of this action.

We do not understand the interrelationship of all the organisms in the natural world. What if Wolbachia somehow transfers to other species? What if bees are affected? Who will be pollinating our fruit? What if this ends up resulting in a more robust mosquito?

When has bringing an animal species to the islands ever been beneficial? The mongoose? the Chital deer?

Please protect the islands. Say No! to the mosquitos.

Mahalo,

Phil

Phil De Ricco
[redacted]

Ho, Jonathan K

From: Alicia <[redacted]>
Sent: Sunday, May 29, 2022 3:20 PM
To: Ho, Jonathan K
Subject: [EXTERNAL] Please no!

What on earth are people thinking to release mosquitoes on us please tell me you're not part of this plan?

Sent from my iPhone

Ho, Jonathan K

From: Terri Yoshinaga <[redacted]>
Sent: Monday, May 30, 2022 6:22 PM
To: Ho, Jonathan K
Subject: [EXTERNAL] Mosquito mate

NO!
Get Outlook for iOS

Ho, Jonathan K

From: Cindy Ogata <[redacted]>
Sent: Tuesday, May 31, 2022 7:46 PM
To: Ho, Jonathan K
Subject: [EXTERNAL] No to releasing mosquitoes

Jonathan,

Imagine we put you in the lab room with all these mosquitoes buzzing around in your ear for a week. Imagine all our native birds and endangered species which have no defense against these insects. Imagine the damage it can do to our crops that our economic flourishes upon to sustain our people.

We can not bring in a foreign insect without considering the consequences to our endangered plants and animals here in our islands. Please understand there are unknown consequences to bringing this insect to our precious islands.

Sincerely,
Cindy Ogata

Ho, Jonathan K

From: Eric Apaka <[redacted]>
Sent: Wednesday, June 1, 2022 9:53 PM
To: Ho, Jonathan K
Subject: [EXTERNAL]

DO NOT release those mosquitos! We don't need that introduced here!

Ho, Jonathan K

From: corrina carnes <[redacted]>
Sent: Saturday, June 4, 2022 5:36 AM
To: Ho, Jonathan K
Subject: [EXTERNAL] Hawai'i Board of Agriculture Action on Proposal to Add 3 Mosquito Species to List of Restricted Animals

Aloha Mr. Ho,

I am writing to express my support for adding the proposed 3 mosquito species to Restricted Species List A, in order to allow scientists & government agencies to move forward with applying for an import permit for wolbachia-incompatible male mosquitoes.

Landscape-level mosquito control, and especially the highly promising "mosquito birth control" method, is crucial to saving our critically endangered hawaiian honeycreepers, which hold cultural value and provide numerous ecological benefits.

Thank you for your time & consideration.

Corrina Carnes
Waialua, Hawai'i

Ho, Jonathan K

From: Irene Newhouse <[redacted]>
Sent: Saturday, June 4, 2022 7:54 AM
To: Ho, Jonathan K
Subject: [EXTERNAL] Birds not mosquitos

I'm fully in support of being able to control the mosquito population using Wolbachia, thereby reducing if not eliminating invasive avian malaria. As climate change permits mosquito survival at higher elevations, this will be crucial for the continued survival of Hawaii's unique birds.

Irene Newhouse
[redacted]

Ho, Jonathan K

From: [redacted]
Sent: Saturday, June 4, 2022 4:09 PM
To: Ho, Jonathan K
Subject: [EXTERNAL] Restricted Species List

Hello Mr. Jonathan Ho,

I am writing to express my opinion on the proposed plan to list the Southern house mosquito, Asian tiger mosquito, and the Yellow fever mosquito on the Restricted Species List. I support the decision to list the three species of mosquitos as a restricted species. Landscape control of mosquitos is an urgent issue due to the mosquitos being invasive and potential disease vectors to humans and animals. The Asian tiger mosquito and the Yellow fever mosquito are well known carriers of the Zika virus, dengue virus, yellow fever virus, and chikungunya virus. Likewise, the Southern house mosquito is a carrier of Avian malaria which threatens Hawai'i's fauna with extinction.

The endemic bird species 'Akohekohe, also called the crested honeycreeper is at a great risk of going extinct due to Avian malaria, which is carried by invasive mosquitos. Avian malaria is a disease which has contributed to the extinction of more than half of Hawai'i's endemic honeycreepers and still continues to pose a risk to the remaining species. The Hawaiian honeycreepers are found nowhere else in the world, and need an urgent conservation plan. The honeycreepers would benefit from mosquito control efforts like the state plan to release mosquitos containing the Wolbachia bacterium to reduce the mosquito population.

Sincerely,
Audrie Deleon

Ho, Jonathan K

From: Diana Miller <[redacted]>
Sent: Sunday, June 5, 2022 4:25 AM
To: Ho, Jonathan K
Subject: [EXTERNAL] Help save Hawaii's native birds

Aloha Mr. Ho
I am writing you to voice my support for the efforts to reduce non-native mosquito populations in Hawaii through an introduced bio-control that affects the reproduction capability of the male mosquito. We have already lost too many of Hawaii's bird species and we must take every effort to save those that still exist. Please support these efforts to control mosquitos.

thank you,
Diana Miller
[redacted]

Sent from my iPhone

Ho, Jonathan K

From: lindsaymr112 <[redacted]>
Sent: Sunday, June 5, 2022 8:50 AM
To: Ho, Jonathan K
Subject: [EXTERNAL] Hawaii Board of Agriculture action on proposal to add 3 mosquito species to list of restricted animals
Attachments: Screenshot_20220605-084801_Chrome.jpg; Screenshot_20220605-084740_Chrome.jpg

Mr. Ho,
Please consider this action. Our native bird species are dying out quickly due to Avian malaria and climate change. These Hawaiian Honeycreepers are not found anywhere else in the world and their population is miniscule and must be protected. This action will help the BNM partnership use mosquito birth control to keep them from overpopulatng in higher elevations where these special birds can live without interference and disease. This technique is being used in 15 countries successfully and we must take action to use it as well. I have attached some pictures of our native Hawaiian honeycreepers if you have never seen them. They are so beautiful and unique. Please Kokua!

Mahalo,
Lindsay Ranieri
Hawaii Wildlife Discovery Center

Sent from my Verizon, Samsung Galaxy smartphone

Ho, Jonathan K

From: Joanna Weber <[redacted]>
Sent: Monday, June 6, 2022 2:06 PM
To: Ho, Jonathan K
Subject: [EXTERNAL] NO to Releasing of GE Mosquitoes!

ALOHA JONATHAN HO

Re.: NO to Releasing of GE Mosquitoes!

Here are the reasons to consider why to oppose the release of genetically engineered mosquitoes in Hawaii:

- Residents are right to be concerned about the release of GE insects in their backyard, as the outcome of this reckless experiment remains completely unknown, and the EPA has been less than transparent about its analysis of the data. According to Sustainable Pulse:[29]
- *"Unfortunately, the EPA did not publicly share its entire public health analysis, and data about allergenicity and toxicity were redacted from public documents. EPA's key environmental assessments were also insufficient and did not mandate scientific tests using caged trials ahead of environmental release."*
- Oxitec's trial does not reveal whether the release of GE mosquitoes suppresses wild mosquito populations, or, importantly, whether it reduces transmission of diseases carried by A. aegypti
- The health and environmental effects of this reckless experiment remain completely unknown, and the EPA continues to prioritize corporate interests over public health
- If too much of the population is infected with Wolbachia, the technique will no longer be effective. How is this being funded and where are the targeted areas?
- There is no way to measure the impact on public health without present infections and a way to trace transmission.

Here is an abstract by National Library of Medicine:
https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8592615/
Published online 2021 Jul 27. doi: 10.1080/20477724.2021.1919378

Oxitec and MosquitoMate in the United States: lessons for the future of gene drive mosquito control

ABSTRACT

In response to growing concerns regarding mosquito-borne diseases, scientists are developing novel systems of vector control. Early examples include Oxitec's OX513A genetically-engineered mosquito and MosquitoMate's *Wolbachia*-infected mosquito,

and systems using 'gene-drive' are in development. Systems based on genetic engineering are controversial and institutions around the world are grappling with the question of who should have a say in how such technologies are field-tested and used. Based on media coverage and public records, we created comparative timelines of the efforts of Oxitec and MosquitoMate to navigate federal and local governance and bring their products to market in the United States. We analyze these timelines with particular attention to the role of public input in technology governance. These cases illustrate how governance of technology in the US is diverse, complex, and opaque. Further, the public response to proposed field trials of the Oxitec product highlights inconsistencies between public expectations for governance and actual practice. As gene-drive mosquito control products develop, both federal and local agencies will find their legitimacy tested without a better procedure for transparently integrating public input

I appreciate your earnest consideration.

MAHALO AND ALOHA,

JOANNA WEBER, KAILUA-KONA HAWAII 96740

Ho, Jonathan K

From: Carolina Visser <[redacted]>
Sent: Saturday, June 4, 2022 9:41 AM
To: Ho, Jonathan K
Subject: [EXTERNAL] Please don't

GMO Mosquitos releasing in Hawaii? That would be a disaster. We are fine. We don't need that which can possibly ruin our eco system. What we need is more food growers. We can be sustainable in Hawaii. But not with anything GMO God help us. Carolina Visser

Sent from my iPhone

Ho, Jonathan K

From: Jana Bogs <[redacted]>
Sent: Saturday, June 4, 2022 2:18 PM
To: Ho, Jonathan K
Subject: [EXTERNAL] about genetically-engineered means for mosquito control

Hello Jonathan, Using genetically-engineered (GE) means for mosquito control is dangerous. Once released into the environment, they cannot be removed.

Genetic engineering in its various applications has been damaging to humans and animals.

Please do what you can to protect the people of Hawaii from this wreckless "science". There are better ways to address the problems.

Thank you!

Aloha

Jana D. Bogs, MS, PhD [redacted]
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- FREE video mini-course-- *"Creating Health from the Soil Up!"*

www.BeyondOrganicConsulting.com

Ho, Jonathan K

From: Ma'ata Tukuafu <[redacted]>
Sent: Monday, June 6, 2022 10:24 AM
To: Ho, Jonathan K
Subject: [EXTERNAL] NO to Releasing of GE Mosquitoes!

Aloha Jonathan,
I'm writing to submit testimony AGAINST this very bad idea of releasing the GMO mosquitos. Once again the Hawaiian population is used as a trial for something these Scientists know nothing about. We are in the middle of the Pacific, we get sick, it's a small population to decimate without the greater Land (mainland) around. Here's just one of many links for more information:

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Unfortunately, the EPA did not publicly share its entire public health analysis, and data about allergenicity and toxicity were redacted from public documents. EPA's key environmental assessments were also insufficient and did not mandate scientific tests using caged trials ahead of environmental release."

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Q e-exe$Xyoyejy$<4<1<=91;<=:$

Ho, Jonathan K

From: Golde Wallingford <[redacted]>
Sent: Monday, June 6, 2022 10:32 AM
To: Ho, Jonathan K
Subject: [EXTERNAL] NO to Releasing of GE Mosquitoes!

We do not need to be dumping more toxic experiments onto our beautiful islands. STOP EXPERIMENTING ON HAWAII.....stop spreading unknown toxins on our island.Are you crazy?
Golde Wallingford
LAUPAHOEHOE
HAWAII
[redacted]

Ho, Jonathan K

From: Esther Felix <[redacted]>
Sent: Monday, June 6, 2022 10:45 AM
To: Ho, Jonathan K
Subject: [EXTERNAL] NO to Releasing of GE Mosquitoes!

We don’t want this.
Mahalo for respecting
Esther

Ho, Jonathan K

From: Amara Karuna <[redacted]>
Sent: Monday, June 6, 2022 10:45 AM
To: Ho, Jonathan K
Subject: [EXTERNAL] NO to Releasing of GE Mosquitoes!

I am deeply concerned about this poorly understood experiment. Please vote No.
Amara Karuna

Sent from a small magical device

Ho, Jonathan K

From: C.J Bros <[redacted]>
Sent: Monday, June 6, 2022 11:40 AM
To: Ho, Jonathan K
Subject: [EXTERNAL] GMO Mosquito's are a bad idea

Dear Jonathan,
I have yet to witness the introduction of species into an environment, to reduce or eliminate another species, that did not have negative impact. Introducing mosquitoes that are genetically modified is a terrible idea. We have no idea of the unintended consequences to native animals or even the long term impact it will have on the natural mosquito population. Things could go very very wrong. Please reconsider moving forward on this project. Do not release GMO mosquitoes.

Dawn Poiani
Honolulu, HI 96813

Ho, Jonathan K

From: Michelle Melendez <[redacted]>
Sent: Monday, June 6, 2022 11:58 AM
To: Ho, Jonathan K
Subject: [EXTERNAL] NO to Releasing of GE Mosquitoes! (Local here)

Aloha Jonathan,

I'm asking again to please honor the aina and people's right to NOT be a science experiment!

We don't know the long-term effects of these mosquitoes! To release them in the public should be a crime since you're exposing people to possible danger. These bugs bite and that is not ok!

Please honor your station and do not release these man-made insects!

Mahalo,
Michelle
--

Michelle Melendez
Fitness and Wellness Expert Since 1996
Author Of The Best Selling and 4x Award Winning Book,
End Dieting Hell: How to find peace in your body and release the weight
Phone: [redacted]
https://blossominnerwellness.com/
Order your copy of End Dieting Hell Click Here

Ho, Jonathan K

From: Julia Wurst <[redacted]>
Sent: Monday, June 6, 2022 12:22 PM
To: Ho, Jonathan K
Subject: [EXTERNAL] No to the release of GE Mosquitos

To Whom it May Concern,

I am a resident of Hawaii and a concerned citizen. I would like to state that I am against the release of GE mosquitoes in Hawaii. This is a science experiment that poses a direct threat to Hawaii's unique environment. We have no way to measure the impact to public health and no way to trace transmission. For the future of our land, the animals and our keiki please reconsider experimenting with GE mosquitoes.

Mahalo for taking the time to read my email.

Julia Wurst
Makawao, HI

Ho, Jonathan K

From: Franz Weber <[redacted]>
Sent: Monday, June 6, 2022 1:22 PM
To: Ho, Jonathan K
Subject: [EXTERNAL] Testimony Against GMO Mosquitoes Being Released In Hawaii A Second Time!

Arthropods present complex and misunderstood ecological relationships, and alternations in reproductive parameters of non-target species can generate ecological disturbances.

It is nearly impossible to measure the impact on public health without a way to trace transmissions.

Unfortunately, the EPA did not publicly share its entire public health analysis, and data about allergenicity and toxicity were redacted from public documents. EPA's key environmental assessments were also insufficient and did not mandate scientific tests using caged trials ahead of environmental release.

The outcome of the experiment is completely unknown, and there are plenty of examples from the past, how any releases of modified species into the open has created long-term problems that can't be made undone.

Franz Weber

[redacted]

Ho, Jonathan K

From: Scott <[redacted]>
Sent: Monday, June 6, 2022 1:34 PM
To: Ho, Jonathan K
Subject: [EXTERNAL] GE Mosquitos are you crazy?!!

I don't know how much they are paying you, or what they could possibly have sold you to convince you that this is even a slightly good idea, or whether you even care if it is a good idea at all, and have ulterior motives... but anyway you look at it, spreading genetically modified insects into nature is a horrible idea. It's like asking for doomsday - what are you possibly thinking? You want to justify a reason to trace infections of people as part of some New World Health Organization plan to digitize and police our very biological functions? And you've already done this once and gotten away with it? Shame on you. Why don't you just leave things alone if you want them to remain normal? Of course, if you interfere with nature in the most fantastical ways, you will cause problems. That's all you are, a problem-causer.

Scott Erickson, M.A., CCC-SLP
Speech-Language Pathologist

t: [redacted]
e: [redacted]

Ho, Jonathan K

From: Alicia <[redacted]>
Sent: Monday, June 6, 2022 1:44 PM
To: Ho, Jonathan K
Subject: [EXTERNAL] No mosquito release!

Mr Ho please do not release GMO ANYTHING on Hawaii!!!

Sent from my iPhone

Ho, Jonathan K

From: jerne willis [redacted] >
Sent: Monday, June 6, 2022 4:36 PM
To: Ho, Jonathan K
Subject: [EXTERNAL] Genetically engineered mosquito

Aloha Mr. Ho,

My name is Jerné. I am a mother, keiki o ka aina and a Big Island resident. To keep it brief I would like to have my comment reviewed/heard regarding the release of gmo mosquitos in Hawaii. I personally believe man playing God and manipulating our food, animals, or anything biological, is never good. Nor do I support it unless absolutely necessary.

I have heard over the years about these experiments taking place on the mainland, but am disturbed & disheartened to hear it is being proposed here in Hawai'i. I do not in any way support this choice of efforts to control/combat any mosquito problem. I do however support something a little more "natural", not completely toxic or genetically manipulated. I know there are many educated people who have solutions. Hawai'i has such an important, unique, rare ecosystem, we see what happens and how devistating it is when strange, new things are introduced here. Why risk it? I personally would prefer not to participate in this involuntary public and ecological experiment.

In the year 2022, when we are so advanced we have the ability for man to play God in a lab, impregnate a male or create designer test tube babies & fly rockets to outer space, I am confident we have the ability to come up with a better solution for the mosquito dilemma. Thank you for taking the time to read this email and really hope you do not proceed with these efforts. Take care, aloha.

Ho, Jonathan K

From: Heidi Hirsh <[redacted]>
Sent: Monday, June 6, 2022 4:42 PM
To: Ho, Jonathan K
Subject: [EXTERNAL] Do Not Allow GMO Mosquitoes To Be Released In Hawaii

Aloha Mr. Ho,
I beg of you to not allow the release of GMO Mosquitos in Hawaii. The potential adverse effects are immense and we will be destroying our own environment without doing the extended research that must be done to make an informed decision.

I worked on Guam for 11 years to combat the introduction of several species that went array, like tangin tangin or as its called in Hawaii, Koa hale, and adversely affected the entire island-wide ecosystems. Introducing GMO bred mosquitos would be a huge mistake for Hawaii.

Here are a couple of more points and justification citations:

"Arthropods present complex and misunderstood ecological relationships, and alternations in reproductive parameters of non target species can generate ecological disturbances" https://www.science.org/doi/10.1126/science.351.6279.1273-b

Residents are right to be concerned about the release of GE insects in their backyard, as the outcome of this reckless experiment remains completely unknown, and the EPA has been less than transparent about its analysis of the data. According to Sustainable Pulse:[29]

> ***Unfortunately, the EPA did not publicly share its entire public health analysis, and data about allergenicity and toxicity were redacted from public documents. EPA's key environmental assessments were also insufficient and did not mandate scientific tests using caged trials ahead of environmental release."***

https://conservativeplaylist.com/2022/05/28/billions-of-ge-mosquitoes-released-health-risks-ignored/

Thank you for your consideration,

Heidi Hirsh

Ho, Jonathan K

From: Colleen L <[redacted]>
Sent: Monday, June 6, 2022 5:27 PM
To: Ho, Jonathan K
Subject: [EXTERNAL] NO to Releasing of GE Mosquitoes!

Greetings Jonathan Ho Sir:

I oppose gmo Mosquitoes in Hawaii!! More info below:

The Risks of Wolbachia Mosquito Control

"Arthropods present complex and misunderstood ecological relationships, and alternations in reproductive parameters of non target species can generate ecological disturbances"

https://www.science.org/doi/10.1126/science.351.6279.1273-b

Oxitec and MosquitoMate in the United States: lessons for the future of gene drive mosquito control

Key points for consideration:

1. If too much of the population is infected with Wolbachia, the technique will no longer be effective. How is this being funded and where are the targeted areas?
2. There is no way to measure the impact on public health without present infections and a way to trace transmission.

https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8592615/

Releasing GE Mosquitoes in the Wild Is a Bad Idea

Residents are right to be concerned about the release of GE insects in their backyard, as the outcome of this reckless experiment remains completely unknown, and the EPA has been less than transparent about its analysis of the data. According to Sustainable Pulse:[29]

Unfortunately, the EPA did not publicly share its entire public health analysis, and data about allergenicity and toxicity were redacted from public documents. EPA's key environmental assessments were also insufficient and did not mandate scientific tests using caged trials ahead of environmental release."

https://conservativeplaylist.com/2022/05/28/billions-of-ge-mosquitoes-released-health-risks-ignored/

Thank you for your urgent attention to this matter.

Kind Regards,

--

Colleen Lisowski

Colleen's Cleaning
"Where Quality Counts"
www.colleenscleaning.com
[redacted]

Ho, Jonathan K

From: Paulo Burns <[redacted]>
Sent: Monday, June 6, 2022 5:56 PM
To: Ho, Jonathan K
Subject: [EXTERNAL] NO to Releasing of GE Mosquitoes!

Aloha
Please do not allow GE mosquito to be released in Hawaii. If there is no guarantee of safety than don't chance risking our paradise. Our children depend on you maki f the right choice to protect us.
Mahalo nui

Ho, Jonathan K

From: Dan Thomas <[redacted]>
Sent: Tuesday, June 7, 2022 7:44 AM
To: Ho, Jonathan K
Subject: [EXTERNAL] No to mosquito release

This a bad idea , all creatures are related , this could effect other life as we know it , these control methods have failed in the past , do the right thing to protect our wonderful place on earth PLEASE

Sent from my iPhone

Ho, Jonathan K

From: Mary Zuiderveen <[redacted]>
Sent: Tuesday, June 7, 2022 9:50 AM
To: Ho, Jonathan K
Subject: [EXTERNAL] Mosquitoes

Mr. Ho,
Please consider the adverse consequences of introducing the Wolbachia mosquito here in Hawaii. As it is not thoroughly tested/vetted and can not be trusted, it is a serious danger to our health.
Do not allow this to happen here in Hawai'i!!
We need advocates who will protect the people. Our children's lives and health are at stake.
Please stop this experiment!
Mahalo
Mary Zuiderveen

Ho, Jonathan K

From: karen shimabukuro <[redacted]>
Sent: Wednesday, June 8, 2022 7:03 AM
To: Ho, Jonathan K
Subject: [EXTERNAL] NO to Releasing of GE Mosquitoes!

Dear Mr. Ho - **"The State plans to introduce mosquitos containing the Wolbachia bacterium in order to reduce mosquito populations and thus "reduce the potential of transmission of mosquito vectored diseases."**
I am writing to say I am opposed to messing with mosquitoes and releasing them into the public. There is no way to monitor this and how it will affect our environment and society. I don't think we should be doing anything with mosquitoes because of "what if" in the future. Please don't let Hawaii be an experiment.
Thank you,
Karen Shimabukuro

Ho, Jonathan K

From: Eugene Elmer [redacted] >
Sent: Monday, June 6, 2022 7:36 PM
To: Ho, Jonathan K
Subject: [EXTERNAL] NO to Releasing of GE Mosquitoes!

Aloha Jonathan Ho,

I am vehemently opposed to the release of GE mosquitos for the most obvious reason, this action could have a catastrophic effect on our ecosystem and environment.
In Hawaii, the mongoose is a classic example of what happens when long term testing is not performed before a major decision is made.
Please pass this letter on to those that will be responsible, should they choose to make this decision.
The public will know who you are and you will not be welcome on these islands by the masses.
Mahalo for considering how your decisions can affect our future, and more importantly, if you look at it that way, your future.

Sincerely,

Eugene Elmer

Ho, Jonathan K

From: Chelleigh Starfish <[redacted]>
Sent: Monday, June 6, 2022 9:05 PM
To: Ho, Jonathan K
Subject: [EXTERNAL] NO to Releasing of GE Mosquitoes!

Aloha,

As a concerned citizen, I would like to submit testimony against releasing these modified mosquitoes in Hawaii. Because we as Hawaii residents will most likely have direct contact through our blood with these GE mosquitoes, it is concerning to say the least when the effects on humans of such an experiment are unknown. It is also unknown what other ecological disturbances this experiment will cause.

Please protect our people and environment and reject this experiment being carried out on our islands until more is known about it's safety, or an alternative solution is found.

Mahalo for your consideration,
Emily Gambino

Ho, Jonathan K

From: Rhaya <[redacted]>
Sent: Monday, June 6, 2022 9:43 PM
To: Ho, Jonathan K
Subject: [EXTERNAL] NO to Releasing of GE Mosquitoes!

Absolutely No GMO mosquitos released in Hawaii!!!

Please protect the people of Hawai'i from dangerous experiments, not the other way around. Mahalo

Sincerely,
Allsen Celestyne, Kaua'i

Ho, Jonathan K

From: L. Lamb <[redacted]>
Sent: Tuesday, June 7, 2022 5:55 AM
To: Ho, Jonathan K
Subject: [EXTERNAL] NO to Releasing of GE Mosquitoes!

AS a person in such a responsible position, please be responsible for the welfare of your neighbors and friends, the people who live around you in Hawaii nei.

"You will give account and be rewarded for all the good you do, and, all the evil." "Make no mistake, God is true to His Word for He is not a man that He should lie."

Thank you, while on earth for this short period, be an addition to people, not a subtraction, an asset on earth, not adding to the destruction the Globalists want to have a 93% Depopulation. See "Georgia Guidestones" where they talk about their Depopulation - in granite.

Do well Mr. HO and thank you for your service!

Ho, Jonathan K

From: Dea Rackley <[redacted]>
Sent: Tuesday, June 7, 2022 8:40 AM
To: Ho, Jonathan K
Subject: [EXTERNAL] No to Frankenstein Mosquitos.

Please Do not give your authorization to this disaster waiting to happen. Can you assure this doesn't disrupt the eco balance of our environment. No you cannot.
Don't be influenced by these corrupt bad decisions I'll take a bite any day than destroy our natural balance of Nature. Stop this!
From concern citizen from Moku Keawe. Big Island Dephlia Rackley

Sent from my iPhone

Ho, Jonathan K

From: Didi Leong <[redacted]>
Sent: Tuesday, June 7, 2022 10:52 AM
To: Ho, Jonathan K
Subject: [EXTERNAL] NO to Releasing of GMO Mosquitoes!

Mr. Jonathan Ho,$

I am strongly AGAINST the releasing of GMO Mosquitoes in Hawaii. $

Below are examples of why this is a bad, bad idea!$

Didi Leong

Oxitec and MosquitoMate in the United States: lessons for the future of gene drive mosquito control$

Key points for consideration:$

52 **If too much of the population is infected with Wolbachia, the technique will no longer be effective. How is this being funded and where are the targeted areas?**$
62 **There is no way to measure the impact on public health without present infections and a way to trace transmission.**$

https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8592615/$

$

The Risks of Wolbachia Mosquito Control $

"Arthropods present complex and misunderstood ecological relationships, and alternations in reproductive parameters of non target species can generate ecological disturbances"$

https://www.science.org/doi/10.1126/science.351.6279.1273-b$

$

Releasing GE Mosquitoes in the Wild Is a Bad Idea$

Residents are right to be concerned about the release of GE insects in their backyard, as the outcome of this reckless experiment remains completely unknown, and the EPA has been less than transparent about its analysis of the data. According to Sustainable Pulse:[29]$

> ***Unfortunately, the EPA did not publicly share its entire public health analysis, and data about allergenicity and toxicity were redacted from public documents. EPA's key environmental assessments were also insufficient and did not mandate scientific tests using caged trials ahead of environmental release."***$

https://conservativeplaylist.com/2022/05/28/billions-of-ge-mosquitoes-released-health-risks-ignored/$

Ho, Jonathan K

From: Marie Sorce <[redacted]>
Sent: Tuesday, June 7, 2022 2:08 PM
To: Ho, Jonathan K
Subject: [EXTERNAL] GMO

Please don’t bring these mosquitoes to the island!
Marie Sorce

Sent from my iPhone

Ho, Jonathan K

From: PriyaJessica [redacted] >
Sent: Tuesday, June 7, 2022 7:42 PM
To: Ho, Jonathan K
Subject: [EXTERNAL] Testimony Against GMO Mosquitoes

Aloha,

As a citizen and resident of Hawaii this is beyond alarming. I'm absolutely against any GMO Mosquitos being released. This was done in Florida and now I'm seeing it on our islands. This is wrong. This is not a solution to the issues of even doing this. So it leaves me to ask who is funding this? Who pockets the money?

We have nothing tangible to the harms this may cause to the public. Why release anything so far from unnatural? This is against the creation.

I join my brothers and sisters and share this information:

"Arthropods present complex and misunderstood ecological relationships, and alternations in reproductive parameters of non target species can generate ecological disturbances"
https://www.science.org/doi/10.1126/science.351.6279.1273-b
Releasing GE Mosquitoes in the Wild Is a Bad Idea
Residents are right to be concerned about the release of GE insects in their backyard, as the outcome of this reckless experiment remains completely unknown, and the EPA has been less than transparent about its analysis of the data. According to Sustainable Pulse:29
Enough. Cease and desist.

-Jessica Priya

Sent from ProtonMail for iOS

Ho, Jonathan K

From: Shari Nishida <[redacted]>
Sent: Wednesday, June 8, 2022 6:53 AM
To: Ho, Jonathan K
Subject: [EXTERNAL] Re: GMO

I don't understand why you would allow that to happen. A lot of people are going to get sick. Especially, those who are allergic. These people could die. And you would be held accountable. Wouldn't you feel bad?

Ho, Jonathan K

From: Lauren Paer [redacted] >
Sent: Wednesday, June 8, 2022 7:00 AM
To: Ho, Jonathan K
Subject: [EXTERNAL] Testimony for Board of Agriculture
Attachments: Department of Agriculture Board Testimony.docx

Hi Jonathan,

I've attached my testimony. Please let me know if it is addressed correctly (I wrote it to the Department of Agriculture Advisory Subcommittee) or if there is anything else need to do.

Thank you,
Lauren

Dear Department of Agriculture Board Advisory Subcommittee,

I **strongly oppose** the attempts to gain approval to bring in bacterially sterilized mosquitos (or any other animal) into Hawaii. I oppose this for 3 primary reasons:

1) **Introducing Wolbachia into mosquitos is an experimental process that we don't understand well, would likely to impossible to monitor and can quickly spread to distantly-related species** (even more concerning when you consider point 3 – that there is no current demonstrated need). This according to NIH and science.

   "Though *Wolbachia* bacteria are naturally occurring in other species of insects, **how they create reproductive incompatibility is not fully understood** [9,10]. In addition, the effectiveness and environmental impact of these systems cannot be ascertained fully before open release…Additionally, **without present infections and a way to trace transmission, the impact of these systems on public health cannot be fully evaluated**."
   https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8592615/

   "Few have focused on the probability of Wolbachia strains being transferred to other insects and the **potential environmental and economic impacts of a host shift. Wolbachia strains are capable of transferring horizontally among distantly related arthropods in short evolutionary time**. **Moreover, some parasites are able to carry Wolbachia strains to other species**."
   https://www.science.org/doi/10.1126/science.351.6279.1273-b

   Taken together, this is pretty scary. Especially when you think about all of the unintended consequences that can happen when you mess with an ecosystem. There are domino effects that are hard to predict. But it's not hard to foresee these are very possible to happen.

   Have high-quality, long-term, randomized controlled trials been done on the impact to the environment and human health after releasing these bacteria-infected mosquitos into the wild?

   To an average citizen like myself, it feels like DOA and DOH are basically interested in running experiments on us with very limited upside and potentially very large downsides.

2) **Using Wolbachia mosquitos could easily become ineffective given infected males and females can successfully mate.**

   I was shocked to read that male and female Wolbachia-infected mosquitos can create viable offspring.

"Such a system of mosquito control relies on the ability to reliably sort infected males from infected females before release **because infected males and females can successfully reproduce *Wolbachia*-infected offspring. If too much of the wild population of mosquitoes is infected with *Wolbachia* the technique will no longer be effective.** Therefore, the major technical challenge of *Wolbachia* systems is reliably sorting lab-raised mosquitoes at scale."
https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8592615/

Do we have good data on the Wolbachia rates of our current mosquitos? If not, how can we even be considering this?

And how weird this bacteria doesn't really sterilize mosquitos (since an infected male and female can mate successfully), but makes them incompatible with non-infected mosquitos.

This gives me even less confidence in this plan and makes me not want

3) **No demonstrated need.**

I was born in Hawaii almost 40 years ago and have never heard of someone here contracting a serious mosquito-borne disease. When I called the Department of Agriculture and asked, they said that it was not so much for a current disease, but a future one. This is not reassuring to me.

This sounds like we're introducing a sterilizing bacteria that can easily traverse species whose effects are not well-understood in humans or the ecosystem into our beautiful islands with no compelling reason. It sends shivers down my spine. I do not want to be experimented on.

I have been bitten by mosquitos here on island my whole life. I don't like mosquitoes, but I'm not scared of them. I am, however, scared of being bitten by female mosquito who has mated with a male mosquito who was sent to some biolab on the mainland been to get some exotic sterilizing bacteria injected into them after wiping out their natural bacteria. This feels very wrong.

It also feels like absolutely the wrong moment. We are still living through a pandemic that many scientists now believe came from a lab ostensibly researching how to prevent pandemics. Yet this research may have very well caused the pandemic and did not provide useful tools to address it.

Many of us in the public would like to see more humility and less experimentation in the name of stopping some theoretical future disease. I would love to see more money instead going to programs to get people active and interacting with each other more.

These things boost our immune systems naturally, making us better prepared for any disease that comes our way.

I hope the Board recognizes how actions like this cannot be reversed. Once you let this horse out of the barn, it's gone.

I also hope the Board realizes that they will be responsible for any negative impact these bacterially sterilized mosquitos have on our environment or the health of the public and peoples of Hawaii. Not knowing will not be an excuse as my testimony and others highlight that we know we don't know. It is clear at this point in time that there could be serious unintended consequences. The Board will rightly be held responsible for any negative impacts on Hawaii and those that call these beautiful islands home.

Given the fact this is all in service of a hypothetical mosquito-borne disease on an island who has not have any serious problems with mosquito-borne diseases for decades, the risks inherent in these policies feel very hard to justify. This is why I strongly oppose allowing bodies to import these bacteria-altered mosquitos. I hope the Board will look out for the wellbeing of the people of Hawaii and not subject us to unnecessary risks.

Sincerely,
Lauren Paer

Ho, Jonathan K

From: hawaii727 [redacted] >
Sent: Wednesday, June 8, 2022 7:47 AM
To: Ho, Jonathan K
Subject: [EXTERNAL] GE mosquitos

Dear Sir,
I am against the release of GE mosquitos in Hawaii. Once they are released, it's done. We cannot recapture them, we cannot undo any potential damage.

Without understanding the full ramifications of the impact on the ecosystem, this one decision could destroy Hawaii's entire ecology.

This reminds me of the release of mongoose in Hawaii years ago to take care of the rat problem.

We love living in Hawaii and want our kids and grandkids to have the option to continue living here, as well. The mosquito has a part of the fragile ecological system of Hawaii. Messing with it is dangerous.

Respectfully ,
Lisa Nakamura

Sent from my T-Mobile 4G LTE Device

Ho, Jonathan K

From: D W <[redacted]>
Sent: Wednesday, June 8, 2022 7:57 AM
To: Ho, Jonathan K
Subject: [EXTERNAL] NO to the GMO mosquito

NO NO NO to the GMO mosquito

Ho, Jonathan K

From: adriane fowler truluck <[redacted]>
Sent: Monday, June 6, 2022 8:26 PM
To: Ho, Jonathan K
Subject: [EXTERNAL] Please approve step towards mosquito eradication to save our birds

Aloha Mr. Ho,

Aloha Mr. Jonathan Ho,
I am writing today to express strong support for the listing of three mosquito species on the list of restricted species. My ohana are very worried about our native birds and have been following this issue very closely. Hawaii desperately needs this action to eradicate invasive mosquitoes and give our highly endangered native birds a fighting chance at survival.
This action will allow for the critical import of male mosquitoes for use in the incompatible male technique. This method of mosquito control which has been used for decades all across the world is critical for saving over a dozen of our imperiled native birds, uses naturally occurring bacteria already found in Hawai‘i, and does not require the application of pesticide or genetic modification.
All mosquitoes in Hawai‘i are non-native or invasive and controlling their populations in this way will have no non-target effects and will only positively affect native wildlife and our communities.
Mahalo nui for your time and support of this critical action. This is an important step for returning to a mosquito free Hawai‘i.

With warm aloha,

Adriane Truluck and Ohana
Honolulu HI

Ho, Jonathan K

From: Aloha P <[redacted]>
Sent: Monday, June 6, 2022 8:43 PM
To: Ho, Jonathan K
Subject: [EXTERNAL] Support Addition of 3 Mosquito Species

Aloha Mr. Jonathan Ho,

I am writing today to express strong support for the listing of three mosquito species on the list of restricted species.

This action will allow for the critical import of male mosquitoes for use in the incompatible male technique. This method of mosquito control which has been used for decades all across the world is critical for saving over a dozen of our imperiled native birds, uses naturally occurring bacteria already found in Hawai‘i, and does not require the application of pesticide or genetic modification. Sadly, a lot of the people in Hawai’i have been ill-informed on pesticides and GMOs, leading to the misunderstanding in what this effort is trying to do.

All mosquitoes in Hawai‘i are non-native or invasive and controlling their populations in this way will have no non-target effects and will only positively affect native wildlife and our communities. With many of our native species on the endangered list, if we act now with this effort, I hope we can see a Hawai’i with one less animal ending up on the endangered list or one less extinct.

Mahalo nui for your time and support of this critical action. This is an important step for returning to a mosquito free Hawai‘i.

Mahalo,
Aloha Paakaula

Ho, Jonathan K

From: Kellen Apuna <[redacted]>
Sent: Monday, June 6, 2022 8:46 PM
To: Ho, Jonathan K
Subject: [EXTERNAL] SUPPORT for the listing of mosquitos to the list of restricted animals

Aloha Mr. Jonathan Ho,

I am Kellen Apuna, and I am writing to express **support** for the decision to add three species of mosquito to the list of restricted animals. Mosquitos and the diseases that they vector are dangerous to public health, and have ravaged native forest bird populations. Several species of endemic forest bird, like the Akikiki (*Oreomystis bairdi*) and Kiwikiu *(Pseudonestor xanthophrys*), are at an extremely high risk of becoming extinct in the coming years, should nothing be done to address mosquitos on a landscape level.

By allowing for the importation of these mosquito species, we can implement the incompatible male male technique, a method which relies on the use of Wolbachia bacteria to suppress mosquito populations. This video excellently demonstrates the process: (3) How Wolbachia Can Save Forest Birds - YouTube.

Some have expressed concern about GMO mosquitos. Genetic modification will not be involved, in any way, in the release of these mosquitos. Wolbachia is a primary goal of this process. Allowing for the importation of these mosquitos will be a critical step in making Hawaii mosquito-free.

Mahalo,
Kellen A

Ho, Jonathan K

From: Noel Shaw <[redacted]>
Sent: Monday, June 6, 2022 8:58 PM
To: Ho, Jonathan K
Subject: [EXTERNAL] Protect Hawai'i's Native Birds

Aloha Mr. Jonathan Ho,

I am writing today to express strong support for the listing of three mosquito species on the list of restricted species.

This action will allow for the critical import of male mosquitoes for use in the incompatible male technique. This method of mosquito control which has been used for decades all across the world is critical for saving over a dozen of our imperiled native birds, uses naturally occurring bacteria already found in Hawai'i, and does not require the application of pesticide or genetic modification.

All mosquitoes in Hawai'i are non-native or invasive and controlling their populations in this way will have no non-target effects and will only positively affect native wildlife and our communities.

Mahalo nui for your time and support of this critical action. This is an important step for returning to a mosquito free Hawai'i.

Noel Shaw
--
Noel Kaleikalaunuoka'oia'i'o Shaw

[redacted]

Ho, Jonathan K

From: Jacqueline Thomas [redacted]
Sent: Monday, June 6, 2022 9:22 PM
To: Ho, Jonathan K
Subject: [EXTERNAL] Please save our native birds ♡🏠

Hello Mr. Jonathan Ho,
My name is Jacqueline Thomas and I am from O'ahu. I will never forget going on my 4th grade Big Island trip and learning about and seeing our precious native birds. They are so special and must be protected. I am writing today to express strong support for the listing of three mosquito species on the list of restricted species. This action will allow for the critical import of male mosquitoes for use in the incompatible male technique. This method of mosquito control which has been used for decades all across the world is critical for saving over a dozen of our imperiled native birds, uses naturally occurring bacteria already found in Hawai'i, and does not require the application of pesticide or genetic modification.
All mosquitoes in Hawai'i are non-native or invasive and controlling their populations in this way will have no non-target effects and will only positively affect native wildlife and our communities.
Mahalo nui for your time and support of this critical action. This is an important step for returning to a mosquito free Hawai'i.

Jacqueline Thomas

Ho, Jonathan K

From: Isaiah Halemanu [redacted] >
Sent: Monday, June 6, 2022 9:45 PM
To: Ho, Jonathan K
Subject: [EXTERNAL] Hawaiian wildlife bird protection

Aloha Jonathan I have seen your videos on social media platforms protecting our sacred birds Tjank you! Aanything I can help with, please let me know. My last name Halemanu HAS..and…WILL always advocate to my extent to protect the Hawaiian culture of bird protection. 🤙🏽

Ho, Jonathan K

From: Mickey Johnson <[redacted]>
Sent: Monday, June 6, 2022 9:57 PM
To: Ho, Jonathan K
Subject: [EXTERNAL] In Support of Mosquito Species Being Restricted

Aloha Mr. Jonathan Ho,

I am writing today to express strong support for the listing of three mosquito species on the list of restricted species.

This action will allow for the critical import of male mosquitoes for use in the incompatible male technique. This method of mosquito control which has been used for decades all across the world is critical for saving over a dozen of our imperiled native birds, uses naturally occurring bacteria already found in Hawai‘i, and does not require the application of pesticide or genetic modification.

All mosquitoes in Hawai‘i are non-native or invasive and controlling their populations in this way will have no non-target effects and will only positively affect native wildlife and our communities.

Mahalo nui for your time and support of this critical action. This is an important step for returning to a mosquito free Hawai‘i.

Michaela Johnson

Ho, Jonathan K

From: Lorraine "Mamo" Waianuhea <[redacted]>
Sent: Monday, June 6, 2022 9:59 PM
To: Ho, Jonathan K
Subject: [EXTERNAL] SUPPORT: Hawaii Board of Agriculture Action on Proposal to Add Three Mosquito Species to List of Restricted Animals

Aloha Mr. Ho,

My name is Lorraine Waianuhea, and I am writing in strong SUPPORT of the Hawai'i Board of Agriculture proposal to add three mosquito species to the List of Restricted Animals.

I am a biologist who has worked with our native Hawaiian honeycreepers and I am also a graduate student at UH Mānoa. My research is focused on *Culex quinquefasciatus*, the mosquito responsible for spreading avian malaria in Hawai'i. I urge the Hawai'i Department of Agriculture to approve the proposed actions because they would allow for mosquitoes modified with the bacteria, Wolbachia, to be imported for use in a mosquito-suppression program to curb the spread of avian malaria and hopefully save our birds from extinction. Our birds, who are found nowhere else in the world, are in an extremely dire situation and quickly running out of time. They desperately need landscape-scale mosquito control as soon as possible to help curb the spread of avian malaria.

Wolbachia is a naturally occurring bacteria found in mosquitoes, and many other types of invertebrates. The mosquito suppression method using Wolbachia has been used around the world to prevent the spread of mosquito-vectored diseases which afflict humans, such as dengue. Using Wolbachia bacteria in this way is not a form of genetic modification.

As a native Hawaiian, I would also like to share that our native ecosystems, plants and animals are an extremely important part of Hawaiian culture. Our birds are messengers, protectors, elders and ancestors. To lose them and their connections to the natural world forever would be more than devastating.

Please support the proposal so that our birds may live and future generations will be able to learn from them.
Mahalo for your time and service,
Lorraine Waianuhea

--

Lorraine "Mamo" Waianuhea

Graduate Student in Zoology

University of Hawai'i at Mānoa

Email: [redacted]

Ho, Jonathan K

From: Jean Campbell [redacted] >
Sent: Monday, June 6, 2022 9:59 PM
To: Ho, Jonathan K
Subject: [EXTERNAL] Support for mosquito control introduction

Mr. Ho,

I am writing in support of the proposed introduction of 3 types of male mosquitoes for control purposes. All mosquitoes in Hawaii and should be eliminated. This would not only allow our native species to thrive disease free but also eliminate the nuisance and disease spreading pest that affects humans as well.

Thank you.

Aloha,
Jean Campbell
Volcano, Hawaii

Sent from my iPhone

Ho, Jonathan K

From: Rosalind Y <[redacted]>
Sent: Monday, June 6, 2022 10:08 PM
To: Ho, Jonathan K
Subject: [EXTERNAL] Support for the Listing of Three Mosquito Species on the List of Restricted Species

Mr. Johnathan Ho
Inspection and Compliance Section Chief

Dear Mr. Ho:

I am writing today to express strong support for the listing of three mosquito species on the list of restricted species.

This action will allow for the critical import of male mosquitoes for use in the incompatible male technique. This method of mosquito control that has been used for decades in many parts of the world, is critical for saving over a dozen of our imperiled native Hawaiian birds, uses naturally occurring bacteria already found in Hawaii, and does not require the application of pesticide or genetic modification.

All mosquitoes in Hawaii are non-native or invasive. Controlling their populations in this way will have no non-target effects and has great potential to positively affect native wildlife and our communities.

Thank you for your time and support of this critical action. This is an important step towards reducing the mosquito population in Hawaii in time to save the I'iwi and other birds, as well as rid our forests of insect pests that could potentially spread diseases to humans in future.

Sincerely,

Ms. Rosalind J. Young
Mililani, HI 96789
Email: [redacted]

Ho, Jonathan K

From: Jolie Wanger [redacted] >
Sent: Monday, June 6, 2022 10:10 PM
To: Ho, Jonathan K
Subject: [EXTERNAL] Support for adding mosquitos to list of restricted species

Aloha Mr. Jonathan Ho,
I am writing today to express strong support for the listing of three mosquito species on the list of restricted species.
This action will allow for the critical import of male mosquitoes for use in the incompatible male technique. This method of mosquito control which has been used for decades all across the world is critical for saving over a dozen of our imperiled native birds, uses naturally occurring bacteria already found in Hawai‘i, and does not require the application of pesticide or genetic modification.
All mosquitoes in Hawai‘i are non-native or invasive and controlling their populations in this way will have no non-target effects and will only positively affect native wildlife and our communities.
Mahalo nui for your time and support of this critical action. This is an important step for returning to a mosquito free Hawai‘i.

Jolie Wanger

Ho, Jonathan K

From: Shayna Podlewski [redacted] >
Sent: Monday, June 6, 2022 10:27 PM
To: Ho, Jonathan K
Subject: [EXTERNAL] Mosquito Control Method

Aloha e Mr. Jonathan Ho,

I am writing today to express strong support for the listing of three mosquito species on the list of restricted species.

This action will allow for the critical import of male mosquitoes for use in the incompatible male technique. This method of mosquito control which has been used for decades all across the world is critical for saving over a dozen of our imperiled native birds, uses naturally occurring bacteria already found in Hawai‘i, and does not require the application of pesticide or genetic modification.

All mosquitoes in Hawai‘i are non-native or invasive and controlling their populations in this way will have no non-target effects and will only positively affect native wildlife and our communities.

Mahalo nui for your time and support of this critical action. This is an important step for returning to a mosquito free Hawai‘i.

Me ka mahalo,

Shayna Kau'i Podlewski

Ho, Jonathan K

From: kaira resch <[redacted]>
Sent: Monday, June 6, 2022 10:35 PM
To: Ho, Jonathan K
Subject: [EXTERNAL] Mosquito testimony

Aloha Mr. Jonathan Ho,
I am writing today to express strong support for the listing of three mosquito species on the list of restricted species.
This action will allow for the critical import of male mosquitoes for use in the incompatible male technique. This method of mosquito control which has been used for decades all across the world is critical for saving over a dozen of our imperiled native birds, uses naturally occurring bacteria already found in Hawai‘i, and does not require the application of pesticide or genetic modification.
All mosquitoes in Hawai‘i are non-native or invasive and controlling their populations in this way will have no non-target effects and will only positively affect native wildlife and our communities.
Mahalo nui for your time and support of this critical action. This is an important step for returning to a mosquito free Hawai‘i.

Kaira

Ho, Jonathan K

From: Alika Maikau Tengan <[redacted]>
Sent: Monday, June 6, 2022 10:47 PM
To: Ho, Jonathan K
Subject: [EXTERNAL] Native bird protection

Aloha Mr. Jonathan Ho,

My name is Alika Tengan, born and raised here, and am writing today to express strong support for the listing of three mosquito species on the list of restricted species.

This action will allow for the critical import of male mosquitoes for use in the incompatible male technique. This method of mosquito control which has been used for decades all across the world is critical for saving over a dozen of our imperiled native birds, uses naturally occurring bacteria already found in Hawai‘i, and does not require the application of pesticide or genetic modification.

All mosquitoes in Hawai‘i are non-native or invasive and controlling their populations in this way will have no non-target effects and will only positively affect native wildlife and our communities.

Mahalo nui for your time and support of this critical action. This is an important step for returning to a mosquito free Hawai‘i.

Me ke aloha,
Alika

Ho, Jonathan K

From: Karla Cook [redacted] >
Sent: Monday, June 6, 2022 11:09 PM
To: Ho, Jonathan K
Subject: [EXTERNAL] mosquito species petition

Aloha Mr. Jonathan Ho,

I am writing today to express strong support for the listing of three mosquito species on the list of restricted species.

This action will allow for the critical import of male mosquitoes for use in the incompatible male technique. This method of mosquito control which has been used for decades all across the world is critical for saving over a dozen of our imperiled native birds, uses naturally occurring bacteria already found in Hawai‘i, and does not require the application of pesticide or genetic modification.

All mosquitoes in Hawai‘i are non-native or invasive and controlling their populations in this way will have no non-target effects and will only positively affect native wildlife and our communities.

Mahalo nui for your time and support of this critical action. This is an important step for returning to a mosquito free Hawai‘i.

Karla Cook

Ho, Jonathan K

From: Backup Kahaku <[redacted]>
Sent: Monday, June 6, 2022 11:43 PM
To: Ho, Jonathan K
Subject: [EXTERNAL] Testimony

Aloha Mr. Jonathan Ho,
I am writing today to express strong support for the listing of three mosquito species on the list of restricted species.
This action will allow for the critical import of male mosquitoes for use in the incompatible male technique. This method of mosquito control which has been used for decades all across the world is critical for saving over a dozen of our imperiled native birds, uses naturally occurring bacteria already found in Hawai‘i, and does not require the application of pesticide or genetic modification.
All mosquitoes in Hawai‘i are non-native or invasive and controlling their populations in this way will have no non-target effects and will only positively affect native wildlife and our communities.
Mahalo nui for your time and support of this critical action. This is an important step for returning to a mosquito free Hawai‘i.

Ho, Jonathan K

From: Hal Archosauria <[redacted]>
Sent: Tuesday, June 7, 2022 1:14 AM
To: Ho, Jonathan K
Subject: [EXTERNAL] Mosquito Testimony

Aloha Mr. Jonathan Ho,

I am writing today to express strong support for the listing of three mosquito species on the list of restricted species.

This action will allow for the critical import of male mosquitoes for use in the incompatible male technique. This method of mosquito control which has been used for decades all across the world is critical for saving over a dozen of our imperiled native birds, uses naturally occurring bacteria already found in Hawai‘i, and does not require the application of pesticide or genetic modification.

All mosquitoes in Hawai‘i are non-native or invasive and controlling their populations in this way will have no non-target effects and will only positively affect native wildlife and our communities.

Mahalo nui for your time and support of this critical action. This is an important step for returning to a mosquito free Hawai‘i.

Ho, Jonathan K

From: Timon Skinner [redacted] >
Sent: Tuesday, June 7, 2022 2:07 AM
To: Ho, Jonathan K
Subject: [EXTERNAL] Wolbachia Mosquito Control

Aloha Mr. Jonathan Ho,

I am writing today to express strong support for the listing of three mosquito species on the list of restricted species.

This action will allow for the critical import of male mosquitoes for use in the incompatible male technique. This method of mosquito control which has been used for decades all across the world is critical for saving over a dozen of our imperiled native birds, uses naturally occurring bacteria already found in Hawai‘i, and does not require the application of pesticide or genetic modification.

If you wish to learn more, the CDC has an article on the practices and efficacy of this type of mosquito control: https://www.cdc.gov/mosquitoes/mosquito-control/community/sit/wolbachia.html

All mosquitoes in Hawai‘i are non-native or invasive and controlling their populations in this way will have no non-target effects and will only positively affect native wildlife and our communities.

Mahalo nui for your time and support of this critical action. This is an important step for returning to a mosquito free Hawai‘i.

--

Timon Salimbag Skinner
UH Hilo Undergraduate Student: B.S. Biology: Ecology, Evolution, and Conservation
UH Hilo Listening Observatory for Hawaiian Ecosystems (LOHE) Bioacoustics Lab - Research Assistant
[redacted]

Ho, Jonathan K

From: meredith miller <[redacted]>
Sent: Tuesday, June 7, 2022 2:12 AM
To: Ho, Jonathan K
Subject: [EXTERNAL] Mosquito Legislation

Aloha Mr. Jonathan Ho,
I am writing today to express strong support for the listing of three mosquito species on the list of restricted species.
This action will allow for the critical import of male mosquitoes for use in the incompatible male technique. This method of mosquito control which has been used for decades all across the world is critical for saving over a dozen of our imperiled native birds, uses naturally occurring bacteria already found in Hawai‘i, and does not require the application of pesticide or genetic modification.
All mosquitoes in Hawai‘i are non-native or invasive and controlling their populations in this way will have no non-target effects and will only positively affect native wildlife and our communities.
Mahalo nui for your time and support of this critical action. This is an important step for returning to a mosquito free Hawai‘i.

Meredith Miller, M.A.

Ho, Jonathan K

From: Wendy Roberts <[redacted]>
Sent: Tuesday, June 7, 2022 3:47 AM
To: Ho, Jonathan K
Subject: [EXTERNAL] Mosquitoes need to be eradicated from Hawai'i...

Aloha e Mr. Jonathan Ho,
I am writing today because I deeply care about the unique Hawaiian eco system. As a repeat donor to the anti-mosquito research fund at UH Manoa, and an oil painter who paints many depictions of native birds, I want to do what is needed to widen their chances for survival.

Eradicating mosquitos has many upsides and they are not part of the native island eco system. They spread disease through many species, including humans and birds. I am in favor of an aggressive a program of mosquito eradication. It will benefit humans, birds, and even likely forest plants with the return of pollinators. It has only one negative consideration: cost, which can be balanced to get the most effect for the most efficient cost.

I would like to echo three paragraphs from Bret Nainoa Mossman, a bird conservation scientist, below in the hope that we can embark on mosquito control now while it will help the most.

"I would like to express strong support for the listing of three mosquito species on the list of restricted species. This action will allow for the critical import of male mosquitoes for use in the incompatible male technique. This method of mosquito control which has been used for decades all across the world is critical for saving over a dozen of our imperiled native birds, uses naturally occurring bacteria already found in Hawai'i, and does not require the application of pesticide or genetic modification.
All mosquitoes in Hawai'i are non-native or invasive and controlling their populations in this way will have no non-target effects and will only positively affect native wildlife and our communities."

I agree with his suggestions wholeheartedly in the realm of mosquitos, and hope for a mosquito-free Hawai'i someday. The sooner, the better!
Thank you so much!
Wendy Roberts

Ho, Jonathan K

From: Kevin Gavagan <[redacted]>
Sent: Tuesday, June 7, 2022 7:01 AM
To: Ho, Jonathan K
Subject: [EXTERNAL] Please support native bird remnant populations

Please support bills that restrict exotic mosquito species from thriving to the displacement of our rare native bird populations

Sent from my iPhone

Ho, Jonathan K

From: Sarah Starr <[redacted]>
Sent: Tuesday, June 7, 2022 7:01 AM
To: Ho, Jonathan K
Subject: [EXTERNAL] Save endangered birds of Hawaii!

Dear Mr. Ho,

I am a Honolulu resident and special education teacher in the district. Please save Native Hawaiian birds by including more mosquitos on the restricted list so that efforts can be made to control these mosquitos! They are endangering these rare birds and driving them to extinction. I want all the children I teach and the children of Hawaii to grow up able to actually see these birds and to know that their government did all it could to protect them.

Thank you very much,
Sarah Starr
Pre-K SPED teacher
Honolulu HI

Ho, Jonathan K

From: Elizabeth Elkjer <[redacted]>
Sent: Tuesday, June 7, 2022 7:32 AM
To: Ho, Jonathan K
Subject: [EXTERNAL] Support for Mosquito Importation

Aloha Mr. Jonathan Ho,
I am a resident of the Kaloko cloud forest on Hawaii Island. Native forest birds are a part of my daily life and are incredibly important to our native forest ecosystems.

I am writing today to express strong support for the listing of three mosquito species on the list of restricted species.

This action will allow for the critical import of male mosquitoes for use in the incompatible male technique. This method of mosquito control which has been used for decades all across the world is critical for saving over a dozen of our imperiled native birds, uses naturally occurring bacteria already found in Hawai‘i, and does not require the application of pesticide or genetic modification.

All mosquitoes in Hawai‘i are non-native or invasive and controlling their populations in this way will have no non-target effects and will only positively affect native wildlife and our communities.

Mahalo nui for your time and support of this critical action. This is an important step for returning to a mosquito free Hawai‘i.

Sincerely,
Elizabeth Elkjer
[redacted]

Ho, Jonathan K

From: andrea charuk <[redacted]>
Sent: Tuesday, June 7, 2022 7:37 AM
To: Ho, Jonathan K
Subject: [EXTERNAL] Mosquito

Aloha e Mr. Jonathan Ho,

I am writing today to express **strong support** for the listing of three mosquito species on the list of restricted species.

This action will allow for the critical import of male mosquitoes for use in the incompatible male technique. This method of mosquito control which has been used for decades all across the world is critical for saving over a dozen of our imperiled native birds, uses naturally occurring bacteria already found in Hawai‘i, and does not require the application of pesticide or genetic modification.

All mosquitoes in Hawai‘i are non-native or invasive and controlling their populations in this way will have no non-target effects and will only positively affect native wildlife and our communities.

Mahalo nui for your time and support of this critical action. This is an important step for returning to a mosquito free Hawai‘i.

For the birds,
Andi

Ho, Jonathan K

From: Karie Smart <[redacted]>
Sent: Tuesday, June 7, 2022 8:02 AM
To: Ho, Jonathan K
Subject: [EXTERNAL] Approval of three mosquitos to be added to list of restricted animals

Aloha Mr. Jonathan Ho,
I am writing today to express strong support for the listing of three mosquito species on the list of restricted species.
This action will allow for the critical import of male mosquitoes for use in the incompatible male technique. This method of mosquito control which has been used for decades all across the world is critical for saving over a dozen of our imperiled native birds, uses naturally occurring bacteria already found in Hawai‘i, and does not require the application of pesticide or genetic modification.
All mosquitoes in Hawai‘i are non-native or invasive and controlling their populations in this way will have no non-target effects and will only positively affect native wildlife and our communities.
Mahalo nui for your time and support of this critical action. This is an important step for returning to a mosquito free Hawai‘i.

~~ Karie Wakat
Resident, Kailua Kona, HI 96740
~~ Sent from my iPhone

Ho, Jonathan K

From: Clemens Mayer <[redacted]>
Sent: Tuesday, June 7, 2022 8:42 AM
To: Ho, Jonathan K
Subject: [EXTERNAL] Hawai'i Board of Agriculture Action on Proposal to Add Three Mosquito Species to List of Restricted Animals

Aloha e Mr. Jonathan Ho,
I am writing today to express strong support for the listing of three mosquito species on the list of restricted species.
This action will allow for the critical import of male mosquitoes for use in the incompatible male technique. This method of mosquito control which has been used for decades all across the world is critical for saving over a dozen of our imperiled native birds, uses naturally occurring bacteria already found in Hawai‘i, and does not require the application of pesticide or genetic modification.
All mosquitoes in Hawai‘i are non-native or invasive and controlling their populations in this way will have no non-target effects and will only positively affect native wildlife and our communities.
Mahalo nui for your time and support of this critical action. This is an important step for returning to a mosquito free Hawai‘i.

Clemens Mayer

Ho, Jonathan K

From: Shawndrea Wise <[redacted]>
Sent: Tuesday, June 7, 2022 9:17 AM
To: Ho, Jonathan K
Subject: [EXTERNAL] Testimony in favor of mosquito control

Greetings Mr. Jonathan Ho,

I am writing today to testify my strong support for the listing of three mosquito species on the list of restricted species.

This action will allow for the critical import of male mosquitoes for use in the incompatible male technique. This method of mosquito control which has been used for decades all across the world is critical for saving over a dozen of our endangered and critically imperiled native birds. This method uses naturally occurring bacteria already found in Hawai‘i, and does not require the application of pesticide or genetic modification. It is a method heavily supported by our Hawai'i scientists who work tirelessly out in the field to study and protect our native birds and the ecosystem that sustains them.

All mosquitoes in Hawai‘i are non-native or invasive and controlling their populations in this way will have no non-target effects and will only positively affect native wildlife and our communities. Benefitting local residents, tourists, and our native fauna! How great is that! Win-win-win for the community, the economy, and the environment.

Mahalo nui for your time and support of this critical action. This is an important step for returning to a mosquito free Hawai‘i.

Sincerely,
Shawndrea Wise

Ho, Jonathan K

From: chris jones <[redacted]>
Sent: Tuesday, June 7, 2022 9:24 AM
To: Ho, Jonathan K
Subject: [EXTERNAL] Mosquito species and birds

Dear Mr. Ho,

Thank you in advance for your time.

Recently I visited Hawai'i for the first time as a tourist. The Big Island. What I loved so much about it, is that it's different – unique. I plan on visiting again to take in more of that uniqueness (my wife and I are outdoorsy people). The landscape, the flora and fauna… that's what makes the trip worthwhile for us.

Upon my return home, I've continued to learn about Hawai'i though books and online. Once source for me is the Instagram account birds_hawaii_pastpresent. Today that account asks it followers to contact you, and to request that you approve the addition of three mosquito species to the list of restricted animals. If this would help your native bird species, please do it.

Thank you for all the good work that I'm sure you're already doing. Keep Hawai'i unique and wonderful!

Mahalo,
Christopher Jones
Pittsburgh, PA

Ho, Jonathan K

From: Jessica Middleton [redacted] >
Sent: Tuesday, June 7, 2022 9:40 AM
To: Ho, Jonathan K
Subject: [EXTERNAL] Please add three more mosquito species

Aloha,
I would humbly like to ask that you please approve the addition of three mosquito species to the list of restricted animals. This is the only shot our native birds have at avoiding extinction.
Thank you in advance,
Jessica Middleton
Kamuela, HI

Sent from my iPhone

Ho, Jonathan K

From: Katherine Wolfenden <[redacted]>
Sent: Tuesday, June 7, 2022 10:02 AM
To: Ho, Jonathan K
Subject: [EXTERNAL] Protecting the ʻiʻwii

Aloha Mr. Jonathan Ho,

I am writing today to express strong support for the listing of three mosquito species on the list of restricted species.

This action will allow for the critical import of male mosquitoes for use in the incompatible male technique. This method of mosquito control which has been used for decades all across the world is critical for saving over a dozen of our imperiled native birds, uses naturally occurring bacteria already found in Hawaiʻi, and does not require the application of pesticide or genetic modification.

All mosquitoes in Hawaiʻi are non-native or invasive and controlling their populations in this way will have no non-target effects and will only positively affect native wildlife and our communities.

Mahalo nui for your time and support of this critical action. This is an important step for returning to a mosquito free Hawaiʻi.

Thank you for all that you do to protect the environment of our beautiful country and the amazing state of Hawaii! I have loved visiting Kauai as a birdwatching tourist and as someone with family on the island, and look forward to my next visit - I hope we can protect the birds and the natural ecosystems that make Hawaii so special.

Best,
Katherine Wolfenden

Sent from my iPhone

Ho, Jonathan K

From: Justin Grimball [redacted] >
Sent: Tuesday, June 7, 2022 10:08 AM
To: Ho, Jonathan K
Subject: [EXTERNAL] Native bird protection

Hello.

Please approve the addition of three mosquito species to the list of restricted animals. This will protect native birds, like the ‘i’wii, from extinction.

Thank you,
Justin Grimball

Ho, Jonathan K

From: Jill Lippert [redacted] >
Sent: Tuesday, June 7, 2022 10:22 AM
To: Ho, Jonathan K
Subject: [EXTERNAL] Native birds

Aloha Mr. Ho.
Please approve the addition of 3 mosquito species to the list of restricted animals to allow for permitting process to bring in mosquito birth control and take major steps toward protecting our native birds.

We are running out of time.
Mahalo
Jill Lippert

Sent from my iPhone

Ho, Jonathan K

From: Carl Berg [redacted] >
Sent: Tuesday, June 7, 2022 10:40 AM
To: Ho, Jonathan K
Subject: [EXTERNAL] Action on Proposal to Add Three Mosquito Species to List of Restricted Animals

Aloha,

I am writing in support of the proposed action to list three species of mosquitoes on the Restricted Species List A. Listing the mosquitoes will allow Birds, Not Mosquitoes partners to proceed with applying for an import permit for the incompatible-male mosquitoes. Although all three mosquito species are already present in Hawai'i - importing mosquitoes is not allowed. *Thus, listing the mosquitoes will allow BNM to proceed with getting an import permit.*

I am writing this letter of support as a professional ecologist for over 50 years and the owner of Hawaiian Wildlife Tours through which I used to lead birding eco-tours on the island of Kauai. Having birded on Kauai for 32 years, I saw first hand the decline in populations and the extinction of species. Time has long run out to eradicate the mosquito vectors.

Mahalo,

Carl J. Berg, Ph.D.
Hawaiian Wildlife Tours

Ho, Jonathan K

From: Cozette Romero <[redacted]>
Sent: Tuesday, June 7, 2022 11:24 AM
To: Ho, Jonathan K
Subject: [EXTERNAL] Hawai'i Board of Agriculture Action on Proposal to Add Three Mosquito Species to List of Restricted Animals

Aloha,

My name is Ashley Romero and I am writing in strong support of the proposed action to list three species of mosquitoes on the Restricted Species List A. Listing these species is a critical action necessary to save our rapidly declining species of Hawaiian forest birds. The Hawaiian Islands are home to some of the most unique species of birds in the world. Many of which are rapidly declining due to the mosquito transmitted avian malaria. These islands have also earned the name of "the extinction capital of the world" due to 95 out of 142 species of endemic birds having gone extinct already. We must put an end to this tragic trend and do our best to save the birds that remain. We are already set to have one of our native species, the ʻAkikiki, go extinct in the wild within the next two years. The only way this species and many more stand a chance is if we rid ourselves of the mosquitoes transmitting avian malaria.

Listing these three mosquito species will allow for techniques such as the sterile insect wolbachia technique to be implemented and give our native birds a fighting chance to continue surviving. Mosquitoes are also not native to these islands and unnecessary for ecological function. It is from human actions that this disease has reached our forests and decimated these populations, therefore it is our responsibility to put an end to it. Please allow for these mosquitoes to be listed so that we can implement mosquito birth control and save the remaining forest birds from extinction.

Please feel free to contact me at this email if you have any further questions.

Mahalo,
Ashley

Ho, Jonathan K

From: Wendy Higashino [redacted] >
Sent: Tuesday, June 7, 2022 12:04 PM
To: Ho, Jonathan K
Subject: [EXTERNAL] Mosquito listing

Aloha Mr. Ho,

I am writing today to express strong support for the listing of three mosquito species on the list of restricted species.

This action will allow for the critical import of MALE mosquitoes, (which do not bite), for use in the incompatible male technique. This method of mosquito control which has been used for decades all across the world is critical for saving over a dozen of our imperiled native birds. It uses naturally occurring bacteria already found in Hawai‘i, and does not require the application of pesticide or genetic modification.

All mosquitoes in Hawai‘i are non-native or invasive. Controlling their populations in this way will have no non-target effects and will only positively affect native wildlife and our communities.

Mahalo, mahalo for your time and support of this critical action. This is an important step for returning to a amazing mosquito free Hawai‘i.

Aloha,

Wendy Kuhns-Higashino
Tommy Higashino

Ho, Jonathan K

From: Dawn Kawahara <[redacted]>
Sent: Tuesday, June 7, 2022 12:09 PM
To: Ho, Jonathan K
Cc: Delano Kawahara
Subject: [EXTERNAL] Hawai`i Board of Agriculture Action on Proposal to Add Three Mosquito Species to the Restricted Animals List

Dear Mr. Ho,

We are writing to you as the State Inspection and Compliance Section Chief to state our position on the danger the mosquitoes present on Kaua`i and throughout Hawai`i at this time are bringing to our forest "jewels," the endangered birds. We trust that you will bring our position on the issue forward at the June 9th meeting when it is to be decided--a most important date, if our honeycreepers are to survive beyond the projected 2023 extinction date.

These are the points we know to be true as gathered by the Kaua`i Forest BIrd Recovery Project leaders. We also have become fully aware from our own experience of decades seeing the decline of the native forest birds in our Koke`e forests. Our temperatures have warmed quite definitely and allowed mosquitoes to invade the last bastion over 3000 feet in our highlands.

---------- POINTS UNDER DISCUSSION----------

- **Important Hawaiian honeycreepers: Found nowhere else in the world.** Our honeycreepers are integral components of healthy forests, serving as pollinators, seed dispersers, and insect predators. Their beauty, mannerisms, and spiritual connotations are woven into mele, hula, and ʻōlelo noʻeau, and materials created through featherwork. These birds also serve as sentinels of the overall ecosystem health of our native forests, and can indicate threats to our other native plants and animals.
- **Landscape-control of mosquitoes is the most urgent conservation problem in Hawaiʻi.** A recent US Department of Interior report (Paxton et al. 2022) estimated ʻakikiki on Kauaʻi are likely to go extinct in 2023, and the ʻākohekohe, kiwikiu, and ʻakekeʻe soon after that. The extinction of the Hawaiian honeycreepers is being driven by exposure to avian diseases transmitted by non-native mosquitoes. Climate change is allowing non-native, disease-carrying mosquitoes to invade higher elevation forests, which was previously the last disease-free habitat where the honeycreepers were safe. [Recent DLNR press release on DOI report]
- **We have hope: mosquito birth control.** The BNM partnership aims to use *Wolbachia*-incompatible male mosquitoes, a.k.a mosquito birth control, to suppress mosquito populations. This mosquito birth control approach is being safely used in 15 different countries, including the continental U.S. The BNM partnership is guided by the State's top scientists and researchers, who have many decades of experience studying Hawaiʻi's forest birds and mosquitoes. We need these species to be listed so that importation of the *Wolbachia*-incompatible male mosquitoes can commence.
- **Not a genetically -modified organism – different technique involved.** The proposed technique does not modify the genes of mosquitoes or *Wolbachia*. It is similar process to taking anti-biotics then eating pro-biotics to replace the existing community of bacteria with a different community within your stomach.

Because we are in complete alignment with the above, we favor a YES vote by The Plant and Animal Advisory Committee when submitting their recommendation to the Board of Agriculture for its decision. Again, we believe that adding the three mosquito species in Hawai`i to the Restricted Animals List is essential so that the next saving step of allowing BNM to proceed with getting an import permit can be put into place. We highly favor the next suggested step of using Wolbachia-incompatible male mosquitoes so that the mosquito "birth control" will, in time, lead to the saving of as many of our remaining endangered birds as possible.

Mahalo for your time and attention to our strong opinion in this crucial matter,

Dawn F. Kawahara, Poet/Writer/Columnist & Pres. Ka `Imi Na`auao O Hawai`i Nei Institute

Delano H. Kawahara, Retired Biology Teacher

[redacted]

-

Ho, Jonathan K

From: mano billi <[redacted]>
Sent: Tuesday, June 7, 2022 12:27 PM
To: Ho, Jonathan K
Subject: [EXTERNAL] Regarding mosquitoes

Aloha Mr. Jonathan Ho,

I am writing today to express strong support for the listing of three mosquito species on the list of restricted species.

This action will allow for the critical import of male mosquitoes for use in the incompatible male technique. This method of mosquito control which has been used for decades all across the world is critical for saving over a dozen of our imperiled native birds, uses naturally occurring bacteria already found in Hawai‘i, and does not require the application of pesticide or genetic modification.

All mosquitoes in Hawai‘i are non-native or invasive and controlling their populations in this way will have no non-target effects and will only positively affect native wildlife and our communities.

Mahalo nui for your time and support of this critical action. This is an important step for returning to a mosquito free Hawai‘i.

Sincerely, Mahnoor Haseeb

Ho, Jonathan K

From: Janice Glennie <[redacted]>
Sent: Tuesday, June 7, 2022 12:36 PM
To: Ho, Jonathan K
Subject: [EXTERNAL] Support for Mosquito program

Importance: High

Aloha,

It seems that I and several other residents have received erroneous information regarding the bird protection program that involves the release of mosquitos. My apologies for the mistake.

I'd like to say that I have great faith in the work that's been done on this program's and that I support it as a crucial attempt to help save our severely threatened native bird population.

Mahalo and sincerely,

Janice Palma-Glennie
Keauhou Gardens and Irrigation
[redacted]

Tel#[redacted]
Cell#[redacted]

www.keauhougardens.net

Ho, Jonathan K

From: Karina Ramirez [redacted] >
Sent: Tuesday, June 7, 2022 1:18 PM
To: Ho, Jonathan K
Subject: [EXTERNAL] Please save the Hawaiian birds.

Aloha Mr. Jonathan Ho, I am writing today to express strong support for the listing of three mosquito species on the list of restricted species., This action will allow for the critical import of male mosquitoes for use in the incompatible male technique. This method of mosquito control which has been used for decades all across the world is critical for saving over a dozen of our imperiled native birds, uses naturally occurring bacteria already found in Hawai‘i, and does not require the application of pesticide or genetic modification., All mosquitoes in Hawai‘i are non-native or invasive and controlling their populations in this way will have no non-target effects and will only positively affect native wildlife and our communities., Mahalo nui for your time and support of this critical action. This is an important step for returning to a mosquito free Hawai‘i.

Sincerely Karina Ramirez.

Sent from my iPhone

Sent from my iPhone

Ho, Jonathan K

From: J Rothe <[redacted]>
Sent: Tuesday, June 7, 2022 1:19 PM
To: Ho, Jonathan K
Subject: [EXTERNAL] Hawai'i Board of Agriculture Action on Proposal to Add Three Mosquito Species to List of Restricted Animals

Mr. Jonathan Ho,

I'm writing to express my strong support for the addition of the three species of mosquito to the Restricted Species List A such that they may be imported to the state of Hawai'i, for release onto the landscape.

The extreme remoteness of these islands gave rise to an incredibly unique, incredibly special group of avifauna that are found literally nowhere else on earth. Their diversity easily rivals Darwin's famed Galapagos finches, and thousands of birders visit this state just for the chance to see our rare avian gems. But beyond the birds' economic impact, they also played an important role in the cultural history of these islands: they are specifically named in He Kumolipo, the people incorporated them into their mele and hula, and their feathers decorated the shoulders of the ali'i. The very forests of Hawai'i are perpetuated in part by these pollinators and seed dispersers. In myriad ways, the Hawaiian honeycreepers *are* Hawai'i.

But island species are a vulnerable class. In our own islands, numerous human-introduced threats have already wiped out dozens of our native species from the face of the earth, and several are currently poised at that very brink. Kaua'i's own 'akikiki in particular has undergone precipitous population drops even over the last few years. Having had the privilege of observing these endearing birds in the wild, traveling in pairs and quietly chattering to each other all day, it is an understatement to say it's heartbreaking hearing the increasingly bleak news from my friends working on the forest bird project.

We already knew mosquito-borne diseases were a problem for our native forest birds decades ago and they are easily the biggest threat facing our birds today. It is well past time to act. This is absolutely a dire emergency, and right now we have the scientific tools available to us to finally start curbing the mosquito populations on the landscape through *naturally occurring, non-GMO methods*.

Our patient is essentially bleeding out on the floor here. Time to get the ambulance going with its sirens: list the mosquitoes.

Respectfully,
Jen Rothe, Eleele Kaua'i

Ho, Jonathan K

From: Leah Chowenhill [redacted]
Sent: Tuesday, June 7, 2022 1:47 PM
To: Ho, Jonathan K
Subject: [EXTERNAL] Save native birds!

Aloha Mr. Jonathan Ho,

I am writing today to express strong support for the listing of three mosquito species on the list of restricted species.

This action will allow for the critical import of male mosquitoes for use in the incompatible male technique. This method of mosquito control which has been used for decades all across the world is critical for saving over a dozen of our imperiled native birds, uses naturally occurring bacteria already found in Hawai'i, and does not require the application of pesticide or genetic modification.

All mosquitoes in Hawai'i are non-native or invasive and controlling their populations in this way will have no non-target effects and will only positively affect native wildlife and our communities.

Mahalo nui for your time and support of this critical action. This is an important step for returning to a mosquito free Hawai'i.

Best regards,
Leah

Leah Chowenhill
Graduate Student
The Department of ECE and E&TIM
Carnegie Mellon University
[redacted]

Ho, Jonathan K

From: Adele Dawson <[redacted]>
Sent: Tuesday, June 7, 2022 2:06 PM
To: Ho, Jonathan K
Subject: [EXTERNAL] Help Hawaii's Native Birds

Aloha Mr. Jonathan Ho,
I am writing today to express strong support for the listing of three mosquito species on the list of restricted species.
This action will allow for the critical import of male mosquitoes for use in the incompatible male technique. This method of mosquito control which has been used for decades all across the world is critical for saving over a dozen of our imperiled native birds, uses naturally occurring bacteria already found in Hawai‘i, and does not require the application of pesticide or genetic modification.
All mosquitoes in Hawai‘i are non-native or invasive and controlling their populations in this way will have no non-target effects and will only positively affect native wildlife and our communities.
Mahalo nui for your time and support of this critical action. This is an important step for returning to a mosquito free Hawai‘i.

I don’t live in Hawaii but have visited Kauai many times. It’s so much harder to see I'iwi than when I first visited in the 1980's. I can’t stand the thought of them blinking out in my lifetime!

Adele Dawson
[redacted]

Ho, Jonathan K

From: Caroline Thow <[redacted]>
Sent: Tuesday, June 7, 2022 2:35 PM
To: Ho, Jonathan K
Subject: [EXTERNAL] Hawai'i Board of Agriculture Action on Proposal to Add Three Mosquito Species to List of Restricted Animals

Aloha Mr. Jonathan Ho,
I am writing today to express strong support for the listing of three mosquito species on the list of restricted species.
This is a critical step towards ensuring our communities health and the conservation of our unique native wildlife. Allowing for the importation of male mosquitoes for use in the incompatible male technique provides a means to safely control invasive mosquito populations. This method of mosquito control which has been used for decades all across the world uses naturally occurring bacteria already found in Hawai'i, and does not require the application of pesticide or genetic modification.

Thank you for your time and support of this action. This is an important step for returning to a mosquito free Hawai'i, and ensuring our keiki can enjoy the beautiful native birds their ancestors had close relationships with.
Mahalo, Cara

Ho, Jonathan K

From: Becky Ostertag <[redacted]>
Sent: Tuesday, June 7, 2022 3:05 PM
To: Ho, Jonathan K
Subject: [EXTERNAL] public comment on List of Restricted Animals (Part A)

Aloha Mr. Ho,

I am writing today to express strong support for the listing of three mosquito species on the list of restricted species.

This action will allow for the critical import of male mosquitoes for use in the incompatible male technique. This method of mosquito control which has been used for decades all across the world is critical for saving over a dozen of our imperiled native birds, uses naturally occurring bacteria already found in Hawai‘i, and does not require the application of pesticide or genetic modification.

As a biologist working in Hawaii for 25 years, I have witnessed the decline and extinction of Hawwaiian birds. This is a loss of our biological and cultural heritage--it is tragic. All mosquitoes in Hawai‘i are non-native or invasive and controlling their populations in this way will have no non-target effects and will only positively affect native wildlife and our communities.

Mahalo nui for your time and support of this critical action. This is an important step for returning to a mosquito free Hawai‘i--and our wildlife and our culture depend on it.

Regards,
Rebecca Ostertag

Ho, Jonathan K

From: aleiha wayman [redacted] >
Sent: Tuesday, June 7, 2022 4:32 PM
To: Ho, Jonathan K; Marcela Brimhall
Subject: [EXTERNAL] Hawai'i Board of Agriculture Action on Proposal to Add Three Mosquito Species to List of Restricted Animals

Aloha Jonathan, I am emailing you today to express my support for adding Yellow Fever Mosquito, Aedes aegypti, Asian Tiger Mosquito, Aedes albopictus, and Southern House Mosquito, Culex quinquefasciatus to the the List of Restricted Animals (Part A) to support eradication efforts with the use of sterile males. These creatures are a non-native nuisance to humans and are having a devastating effect on the native bird populations. I would even support GMO technology to eradicate them, but the sterile males solution is a good start.
Thanks for your time,
Aleiha Wayman
[redacted]

Ho, Jonathan K

From: Erin Wilichowski [redacted] >
Sent: Tuesday, June 7, 2022 5:06 PM
To: Ho, Jonathan K
Subject: [EXTERNAL] Please restrict mosquitoes and protect native species

Aloha Mr. Jonathan Ho,
I am writing today to express strong support for the listing of three mosquito species on the list of restricted species.
This action will allow for the critical import of male mosquitoes for use in the incompatible male technique. This method of mosquito control which has been used for decades all across the world is critical for saving over a dozen of our imperiled native birds, uses naturally occurring bacteria already found in Hawai‘i, and does not require the application of pesticide or genetic modification.
All mosquitoes in Hawai‘i are non-native or invasive and controlling their populations in this way will have no non-target effects and will only positively affect native wildlife and our communities.
Mahalo nui for your time and support of this critical action. This is an important step for returning to a mosquito free Hawai‘i.
Erin

Ho, Jonathan K

From: helen raine [redacted] >
Sent: Tuesday, June 7, 2022 5:08 PM
To: Ho, Jonathan K
Subject: [EXTERNAL] Please approve mosquito project

Dear Mr. Ho

I would like to express my strong support for the proposal to control mosquitoes to protect endangered Hawaiian native birds that are on the verge of extinction

I run an ecological consultation g company and an regularly in the mountains of Kauai. I hsve see. The forest birds numbers there fall precipitously with my own eyes. It's heartbreaking that we will soon lose them unless this mosquito project is approved. I provide some further information below About the birds and this project. Thank you for your consideration

Helen Raine

- **Important Hawaiian honeycreepers: Found nowhere else in the world.** Our honeycreepers are integral components of healthy forests, serving as pollinators, seed dispersers, and insect predators. Their beauty, mannerisms, and spiritual connotations are woven into mele, hula, and ʻōlelo noʻeau, and materials created through featherwork. These birds also serve as sentinels of the overall ecosystem health of our native forests, and can indicate threats to our other native plants and animals.
- **Landscape-control of mosquitoes is the most urgent conservation problem in Hawaiʻi.** A recent US Department of Interior report (Paxton et al. 2022) estimated ʻakikiki on Kauaʻi are likely to go extinct in 2023, and the ʻākohekohe, kiwikiu, and ʻakekeʻe soon after that. The extinction of the Hawaiian honeycreepers is being driven by exposure to avian diseases transmitted by non-native mosquitoes. Climate change is allowing non-native, disease-carrying mosquitoes to invade higher elevation forests, which was previously the last disease-free habitat where the honeycreepers were safe. [Recent DLNR press release on DOI report]
- **We have hope: mosquito birth control.** The BNM partnership aims to use *Wolbachia*-incompatible male mosquitoes, a.k.a mosquito birth control, to suppress mosquito populations. This mosquito birth control approach is being safely used in 15 different countries, including the continental U.S. The BNM partnership is guided by the State's top scientists and researchers, who have many decades of experience studying Hawaiʻi's forest birds and mosquitoes. We need these species to be listed so that importation of the *Wolbachia*-incompatible male mosquitoes can commence.
- **Not a genetically -modified organism – different technique involved.** The proposed technique does not modify the genes of mosquitoes or*Wolbachia*. It is similar process to taking anti-biotics then eating pro-biotics to replace the existing community of bacteria with a different community within your stomach.

Sent from my iPhone

Ho, Jonathan K

From: Sasidhar [redacted] >
Sent: Tuesday, June 7, 2022 5:31 PM
To: Ho, Jonathan K
Subject: [EXTERNAL] Petition for saving endangered bird species from avian malaria threats

Hello Mr. Ho,

As someone who recently came to Maui for birdwatching and photographing the honeycreepers on Haleakala National Park, I humbly ask for your support in protecting the endemic species of your island, to defend your fauna - which would not only be a cause to be proud of, but also a big eco-tourism boost.

Birdwatching, in all of eco-tourism is a $4B industry just in the US that is expected to grow to $80 over the next few years.
https://www.responsibletravel.org/wp-content/uploads/sites/213/2021/03/market-analysis-bird-based-tourism.pdf

Thanks for your support in environmental causes and economic growth!

Thanks,
Sasi

Ho, Jonathan K

From: Katelyn Schmisseur [redacted] >
Sent: Tuesday, June 7, 2022 6:55 PM
To: Ho, Jonathan K
Subject: [EXTERNAL] Testimony in favor of "mosquito birth control"

Dear Mr. Ho,
My name is Katelyn Haruko Schmisseur and I grew up on Oahu. As a kid, I was bullied and isolated from my peers. My affinity for our Honeycreepers began during that time, I found solice sitting in Lyon Arboretum, or tantalus, or the Kailua wetlands, and watching our birds in their natural habitats. now, as a 21 year old college student, I sit devastated in my California home because I fear the loss of the birds that I have grown up loving. Please consider approving the addition of the three mosquito species to the list of restricted animals, it would mean a lot to me.
Sincerely,
Katelyn

Ho, Jonathan K

From: Noah Gomes [redacted] >
Sent: Wednesday, June 8, 2022 8:11 AM
To: Ho, Jonathan K
Subject: [EXTERNAL] Hawai'i Board of Agriculture Action on Proposal to Add Three Mosquito Species to List of Restricted Animals

To Whom It May Concern,

This is a letter of support for the proposed action to list three species of mosquitoes on the Restricted Species List A. Please consider the following as you make your decision:

1. **Our birds are unique.** Hawai'is native biodiversity is famous throughout the world both for its extraordinary level of endemism and its absurd rate of extinction. The native forest birds of Hawai'i continue to be lost to extinction. There are many causes, but the greatest today is foreign disease carried by foreign mosquitoes. We will lose between 4 and 12 species of our remaining forest birds within my lifetime if nothing is done. The 'Akikiki in particular will probably go extinct this year or next year.

2. **Mosquitoes are a huge issue.** There are few options to control mosquitoes and disease in Hawai'i and the problem is getting worse. Every year mosquitoes and the diseases they carry encroach further and further into the last remaining habitat of these birds. The only solutions that might work are landscape-level control of mosquitoes. *The use of* Wolbachia *bacteria is our only non-GMO option.*

3. **Our native birds have purpose.** The loss of our native birds has been a severe detriment to the stability of Hawai'is ecosystems and culture. Native Hawaiian featherwork practices have been fundamentally altered and severely limited by the loss of our native birds. Native Hawaiian bird hunting practices are virtually extinct due to the loss of native birds to factors such as disease. With the loss of these practices goes unrecoverable knowledge of how our ecosystems function and a way of living that cannot be replaced. In addition the loss of birds also means a loss of their free and valuable services as pollinators, seed-dispersers, pest controllers, fertilizing agents, and as a food source for humans. Many of our native birds have not been able to serve some or all of these functions for a worrying amount of time due to factors such as mosquitoes.

Please support landscape-level mosquito control in Hawai'i.

Mahalo,

Noah Gomes

Ho, Jonathan K

From: Lukanicole Zavas <[redacted]>
Sent: Thursday, June 9, 2022 8:55 AM
To: Ho, Jonathan K; HDOA.PQ.TESTIMONY
Cc: Tammie Kotani
Subject: [EXTERNAL] Testimony - Hawai`i Board of Agriculture Action on Proposal to Add Three Mosquito Species to List of Restricted Animals
Attachments: Testimony in Support - Senator Inouye.pdf

Aloha mai e Jonathan,

I was informed that the testimony that was submitted on the behalf of Senator Inouye was not transmitted due to an error in the link provided. Her testimony is in SUPPORT of the listing, importation, and establishing permit conditions for field release for the three species of mosquitoes during today's Advisory Committee on Plants and Animals meeting.

With that being said, If you are able to accept it today – I've attached it for your reference.

Na'u me ke aloha (*By me with regards),*
Lukanicole Zavas
Outreach Associate | Birds, Not Mosquitoes
[redacted]

Aloha Section Chief Jonathan Ho and Members of the Plant and Animal Advisory Committee:

I, Senator Lorraine R. Inouye, **strongly support the critical and important step of listing, allowing importation, and establishing permit conditions for field release** of southern house mosquito (*Culex quinquefasciatus*), Asian tiger mosquito (*Aedes albopictus*), and yellow fever mosquito (*Aedes aegypti*). Placing the mosquitoes on the List of Restricted Animals (Part A), allowing for importation of lab-reared strains inoculated with *Wolbachia*, and establishing permit conditions for the import and field release of the lab-reared strains of *Wolbachia*-inoculated mosquitoes are **all critically needed for saving Hawaiian birds**.

Avian diseases transmitted by non-native mosquitoes pose the greatest threat to the survival of Hawaiian honeycreepers. Rising global temperatures are allowing these mosquitoes to invade the last forested strongholds for our honeycreepers. The Critically Endangered ʻakekeʻe and ʻakikiki, on Kauaʻi, are experiencing declines of 90 percent or more and could quickly become extinct without urgent action. On East Maui, the kiwikiu and ʻākohekohe face comparable threats of extinction**. Landscape-control of mosquitoes is the most urgent conservation problem in Hawaiʻi**, and if the disease cycle is not broken many other honeycreeper species will follow these four into extinction, irreparably losing crucial parts of Hawaiʻi's biological diversity and cultural richness.

The actions requested by the Hawaiʻi Department of Land and Natural Resources and Hawaiʻi Department of Health are a critical step towards saving our endangered forest birds using *Wolbachia*-inoculated mosquitoes that will function as mosquito "birth control." This technique is **NOT** a genetic method and is **NOT** a genetically modified-organism (GMO). This approach, the Incompatible Insect Technique (IIT), is being safely used in 15 different countries, including the continental U.S., to suppress mosquito populations. *Wolbachia* is a very common bacteria in Hawaiʻi and worldwide, and a different strain is already widely present in Hawaiian mosquitoes. Only male mosquitoes will be released, so the released mosquitoes will not bite the birds (or humans), and cannot transfer the bacteria to any other species.

Mahalo for your support in protecting our treasured Hawaiian honeycreepers.

Ho, Jonathan K

From: Gracey Gomes <[redacted]>
Sent: Thursday, June 9, 2022 6:30 AM
To: Ho, Jonathan K
Subject: [EXTERNAL] "Hawai'i Plant and Animal Advisory Committee on Proposal to Add Three Mosquito Species to List of Restricted Animals"

Aloha mai e:

I cannot understand, DLNR, DOH, and scientists of the University of Hawaii wanting to import more species of mosquitoes to our Island Home, even if these species exist in our upland forests. If DLNR would properly protect or clear and clean the forests maybe our honeycreepers population wouldn't be in jeopardy.

If the species exist why bring in more mosquitoes to deplete the population with male mosquitoes.

I say "NO", "'A'OLE!" to the importation of mosquito species.

It's like the invasive species cycle starts up all over again and again. Today almost as many non-native plants as are native plants grow wild on the islands. Hundreds of alien species of insects, birds, mammals, and other animals have gained firm footholds. Some of these introductions were deliberate, when crop plants, ornamental flowering plants, and non-native songbirds were brought to the islands. Others were accidental, as when alien insects and animals traveled to Hawaii in cargo, ship holds, or even the wheel wells of airplanes.

DLNR allowed scientist to bring invasive species to control other species and so on and so on. Our island home is depicted as a testing zone for other places in the world.
Go to those districts to test your theories and leave our island home alone.

So for me and probably most of my 'ohana, we say "'A'ole!" to the proposal to add to the list of restricted animals and the importation of the like,

If the species already exists here, than use what we have instead of bringing more in, only for it to populate more in size than with the stock of what's here in our islands.

Mahalo for your time.

Gracey Gomes
Paukūkalo Hawaiian Homes

Ho, Jonathan K

From: Roy Morris <[redacted]>
Sent: Thursday, June 9, 2022 6:57 AM
To: Ho, Jonathan K
Subject: [EXTERNAL] Hawai`i Board of Agriculture Action on Proposal to Add Three Mosquito Species to List of Restricted Animals

Aloha Mr. Jonathan Ho,
I am writing today to express strong support for the listing of three mosquito species on the list of restricted species.
This action will allow for the critical import of male mosquitoes for use in the incompatible male technique. This method of mosquito control which has been used for decades all across the world is critical for saving over a dozen of our imperiled native birds, uses naturally occurring bacteria already found in Hawai‘i, and does not require the application of pesticide or genetic modification.
All mosquitoes in Hawai‘i are non-native or invasive and controlling their populations in this way will have no non-target effects and will only positively affect native wildlife and our communities. This is a much needed strategy for preserving these native species from extinction. This will also allow future generations a chance to observe and hear these charismatic species only found on the Hawaiian islands. The native Hawaiian bird species are truly a treasure worth protecting for future generations.
Mahalo nui for your time and support of this critical action. This is an important step for returning to a mosquito free Hawai‘i.

Roy Morris
[redacted]
http://www.flickr.com/photos/roylevimorris/

Ho, Jonathan K

From: Bagshaw, Jeff W
Sent: Thursday, June 9, 2022 8:06 AM
To: Ho, Jonathan K
Subject: In strong support of Hawai'i Plant and Animal Advisory Committee on Proposal to Add Three Mosquito Species to List of Restricted Animals

Aloha Mr Ho;
I am in strong support of adding three mosquito species to the list of restricted animals so that they may be imported with the incompatible Wolbachia bacteria to reduce mosquito populations in Hawaii, protecting our native birds and people.
Mahalo

Jeff Bagshaw
Communications and Outreach Specialist
State of Hawaii
DLNR/DOFAW Maui Nui Branch
Jeff.w.bagshaw@hawaii.gov
(808)264-7891c
(808)873-3986o

Ho, Jonathan K

From: Jane Galluzzi <[redacted]>
Sent: Wednesday, June 8, 2022 11:09 AM
To: Ho, Jonathan K
Subject: [EXTERNAL] Disapproval Mosquitoes

This is the most ridiculous idea I've ever heard. We're done being experimented on. Do NOT release mosquitoes in Hawaii! I do NOT approve and can't believe you would even consider this.

Let's look at history… remember when the Mongoose were brought here to kill the rats? That worked out horribly and now we have a problem with both! We do NOT want history to repeat itself.

Why don't we focus money and funds on problems that actually exist and NOT something that might potentially happen. There are plenty of noble causes. There are plenty of issues that are clearly happening and need our taxpayer dollars. This is NOT one of them.

Aloha,

Jane Galluzzi
Registered Voter in District 49

Sent from my iPhone

Ho, Jonathan K

From: Nathan Patry <[redacted]>
Sent: Wednesday, June 8, 2022 12:00 PM
To: Ho, Jonathan K
Subject: [EXTERNAL] Hawai'i Plant and Animal Advisory Committee on Proposal to Add Three Mosquito Species to List of Restricted Animals

Aloha,

I see a full misinformation campaign being waged in support of the release of yet more invasive species into our ecosystems. There is no safety study that is independent. All invasive impact native species negatively. DO NOT INTRODUCE MORE!

If native birds were really the rationale, then your efforts would be on removing feral cat populations from the islands. This would save our reefs, and our birds at the same time.

Mahalo for your time,

Nathan Patry
Lahaina

Ho, Jonathan K

From: Deirdre Madrid <[redacted]>
Sent: Wednesday, June 8, 2022 8:58 AM
To: Ho, Jonathan K
Subject: [EXTERNAL] Against release of GMO mosquitoes in Hawaii

Dear Mr. Ho,
I'm emailing you to oppose the release of GMO mosquitoes in Hawaii. The EPA has not been transparent enough about its public health analysis. It would be reckless of you to allow the release of these insects here.
Thank you,
Deirdre Madrid

Ho, Jonathan K

From: Leihaaheo Dias <[redacted]>
Sent: Wednesday, June 8, 2022 9:11 AM
To: Ho, Jonathan K
Subject: [EXTERNAL] NO to GE mosquitos

Oxitec and MosquitoMate in the United States: lessons for the future of gene drive mosquito control

Key points for consideration:

If too much of the population is infected with Wolbachia, the technique will no longer be effective.
How is this being funded and where are the targeted areas?
There is no way to measure the impact on public health without present infections and a way to trace transmission.
https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8592615/

The Risks of Wolbachia Mosquito Control

"Arthropods present complex and misunderstood ecological relationships, and alternations in reproductive parameters of non target species can generate ecological disturbances"
https://www.science.org/doi/10.1126/science.351.6279.1273-b

Releasing GE Mosquitoes in the Wild Is a Bad Idea

Residents are right to be concerned about the release of GE insects in their backyard, as the outcome of this reckless experiment remains completely unknown, and the EPA has been less than transparent about its analysis of the data. According to Sustainable Pulse:29
Unfortunately, the EPA did not publicly share its entire public health analysis, and data about allergenicity and toxicity were redacted from public documents. EPA's key environmental assessments were also insufficient and did not mandate scientific tests using caged trials ahead of environmental release."
https://conservativeplaylist.com/2022/05/28/billions-of-ge-mosquitoes-released-health-risks-ignored/

Sent from my iPhone

Ho, Jonathan K

From: May <[redacted]>
Sent: Wednesday, June 8, 2022 9:18 AM
To: Ho, Jonathan K

Food for thought

Dear Sir,

I am against the release of GE mosquitos in Hawaii. Once they are released, it's done. We cannot recapture them, we cannot undo any potential damage.

Without understanding the full ramifications of the impact on the ecosystem, this one decision could destroy Hawaii's entire ecology.

This reminds me of the release of mongoose in Hawaii years ago to take care of the rat problem.

We love living in Hawaii and want our kids and grandkids to have the option to continue living here, as well. The mosquito has a part of the fragile ecological system of Hawaii. Messing with it is dangerous.

Sent from my iPhone

Ho, Jonathan K

From: Loree Searcy <[redacted]>
Sent: Wednesday, June 8, 2022 9:49 AM
To: Ho, Jonathan K
Subject: [EXTERNAL] NO to Releasing of GE Mosquitoes!

I am highly opposed to GMO mosquitoes being released in Hawaii! This type of experiment is too risky when the long term effects have never been studied. When you intervene in the balance of nature man ultimately pays the price. This has been disastrous time and time again.
Do not release GMO mosquitos!
Mahalo,
Loree Searcy

Sent from my iPhone

Ho, Jonathan K

From: Karina Stephens <[redacted]>
Sent: Wednesday, June 8, 2022 1:45 PM
To: Ho, Jonathan K
Subject: [EXTERNAL] NO To GMO Mosquitoes In Hawaii!

Aloha Jonathan,

I am concerned about the release of GE insects in my backyard, as the outcome of this reckless experiment remains completely unknown, and the EPA has been less than transparent about its analysis of the data.

There is no way to measure the impact on public health without present infections and a way to trace transmission.

It is also concerning to me how this is being decided in secret without announcements to the local public. If this was something that will truly benefit our islands, why wouldn't it be publicly advertised?

I beg you to please say NO to GMO mosquitoes in our islands! We do not deserve to be part of this potentially dangerous experiment.

Mahalo,
Karina

Sent from my iPhone

Ho, Jonathan K

From: Andrea Rayne <[redacted]>
Sent: Wednesday, June 8, 2022 1:57 PM
To: Ho, Jonathan K
Subject: [EXTERNAL] NO to releasing GMO mosquitoes

Aloha,

Please consider reviewing the resources below and do not allow Hawaii to be a test ground for GMO mosquitoes. There are too many unknowns with these types of programs.

Oxitec and MosquitoMate in the United States: lessons for the future of gene drive mosquito control

Key points for consideration:

If too much of the population is infected with Wolbachia, the technique will no longer be effective.
How is this being funded and where are the targeted areas?
There is no way to measure the impact on public health without present infections and a way to trace transmission.
https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8592615/

The Risks of Wolbachia Mosquito Control

"Arthropods present complex and misunderstood ecological relationships, and alternations in reproductive parameters of non target species can generate ecological disturbances"
https://www.science.org/doi/10.1126/science.351.6279.1273-b

Releasing GE Mosquitoes in the Wild Is a Bad Idea

Residents are right to be concerned about the release of GE insects in their backyard, as the outcome of this reckless experiment remains completely unknown, and the EPA has been less than transparent about its analysis of the data. According to Sustainable Pulse:29
Unfortunately, the EPA did not publicly share its entire public health analysis, and data about allergenicity and toxicity were redacted from public documents. EPA's key environmental assessments were also insufficient and did not mandate scientific tests using caged trials ahead of environmental release."
https://conservativeplaylist.com/2022/05/28/billions-of-ge-mosquitoes-released-health-risks-ignored/

Mahalo Nui,
Andrea Rayne
Kalaheo, HI
Sent from my iPhone

Ho, Jonathan K

From: Courtney DeConto <[redacted]>
Sent: Wednesday, June 8, 2022 2:08 PM
To: Ho, Jonathan K
Subject: [EXTERNAL] Mosquito release

Dear Mr. Ho,
I am writing out of extreme concern regarding mosquito release in Hawaii. Arthropods present complex and misunderstood ecological relationships, and alternations in reproductive parameters of non target species can generate ecological disturbances.
As a concerned citizen, I respectfully ask you to not proceed with this proposal.
Sincerely,
Dr. Courtney DeConto

Sent from my iPhone

Ho, Jonathan K

From: donna grabow <[redacted]>
Sent: Wednesday, June 8, 2022 4:23 PM
To: Ho, Jonathan K
Subject: [EXTERNAL] say 'NO' to release of GMO mosquitoes in Hawai'i .

The mosquito problem is minor in Hawaii, and no one is getting malaria or Wolbachis or other diseases.

My question is, what kinds of funds will the State be awarded if state officials allow tax-payers money to buy genetically-modified mosquitos? Just like when officials were seduced by MONSANTO spray toxic chemicals in Kauai.

Please kokua, and don't be seduced by money incentives from corporation who present slick, polished advantages of GMO mosquitos.

How is this being funded and where are the targeted areas?https://www.science.org/doi/10.1126/science.351.6279.1273-b

Releasing GE Mosquitoes in the Wild Is a Bad Idea
Residents are right to be concerned about the release of GE insects in their backyard, as the outcome of this reckless experiment remains completely unknown, and the EPA has been less than transparent about its analysis of the data. According to Sustainable Pulse:29

Unfortunately, the EPA did not publicly share its entire public health analysis, and data about allergenicity and toxicity were redacted from public documents. EPA's key environmental assessments were also insufficient and did not mandate scientific tests using caged trials ahead of environmental release."
https://conservativeplaylist.com/2022/05/28/billions-of-ge-mosquitoes-released-health-risks-ignored/

Sincerely a concerned citizen,

Donna Grabow,
[redacted]

Ho, Jonathan K

From: Diga Kern <[redacted]>
Sent: Wednesday, June 8, 2022 8:54 AM
To: Ho, Jonathan K
Subject: [EXTERNAL] NO to Releasing of GE Mosquitoes!

Aloha,

In keeping with the precautionary principle, I believe it is in the best interests of our island population to implement rigorous, long-term safety studies before making irreversible decisions such as release of genetically-modified mosquitos.

Sincerely,

Geoffrey S. Kern

AMERICAN BIRD CONSERVANCY

Bringing back the birds

8 June 2022

Testimony of American Bird Conservancy to
Advisory Committee on Plants and Animals
Supporting the Listing, Import, and Permit Conditions of three species of mosquitoes
Thursday, June 9, 2022

Aloha Section Chief Jonathan Ho and Members of the Plant and Animal Advisory Committee:

American Bird Conservancy **strongly supports the listing, importation, and establishing permit conditions for field release** of southern house mosquito (*Culex quinquefasciatus*), Asian tiger mosquito (*Aedes albopictus*), and yellow fever mosquito (*Aedes aegypti*). Placing the mosquitoes on the List of Restricted Animals (Part A), allowing for importation of lab-reared strains inoculated with *Wolbachia*, and establishing permit conditions for the import and field release of the lab-reared strains of *Wolbachia*-inoculated mosquitoes are **all critically needed for saving Hawaiian birds**.

American Bird Conservancy (ABC) is a national non-profit organization dedicated to the conservation of wild native birds and their habitats throughout the Americas. ABC has had a strong and growing program in Hawai‘i for more than a decade, working with state, federal and private partners to protect, manage, and restore critical habitat for some of the most endangered birds in Hawai‘i. Our president and organization have identified halting bird extinctions in Hawai‘i as one of our highest priorities, and we are dedicated to working with our partners across the islands to accomplish this goal.

Avian diseases transmitted by non-native mosquitoes pose the greatest threat to the survival of Hawaiian honeycreepers. Rising global temperatures are allowing these mosquitoes to invade the last forested strongholds for our honeycreepers. On Kaua‘i, the collapse of six native songbird species has been linked to avian malaria, indicating that these long predicted impacts of climate change are occurring now. The Critically Endangered ‘akeke‘e and ‘akikiki are experiencing declines of 90 percent or more and could quickly become extinct without urgent action. On East Maui, the kiwikiu and ‘ākohekohe face comparable threats of extinction. A recent US Department of Interior report (Paxton et al. 2022) estimated ‘akikiki are likely to go extinct in 2023, and the other three species soon thereafter.

Landscape-control of mosquitoes is the most urgent conservation problem in Hawai‘i, and if the disease cycle is not broken many other honeycreeper species will follow these four into extinction, irreparably losing crucial parts of Hawai‘i’s biological diversity and cultural richness. They are integral components of our forests, indicating overall ecosystem health and serving as pollinators, seed dispersers, and predators. Their beauty, behaviors, and spiritual connotations are woven into mele, hula, and ‘ōlelo no‘eau, and iconic Hawaiian materials created through featherwork. These birds are found nowhere else in the world, and we have a kuleana to protect them.

The actions requested by the Hawai‘i Department of Land and Natural Resources and Hawai‘i Department of Health are a critical step towards saving our endangered forest birds using *Wolbachia*-inoculated mosquitoes that will function as mosquito “birth control.” This approach, the Incompatible Insect Technique (IIT), is being safely used in 15 different countries, including the continental U.S., to suppress mosquito populations. Only males will be released, so the released mosquitoes will not bite the birds (or humans), and cannot transfer the bacteria to any other species. *Wolbachia* is a very common bacteria in Hawai‘i and worldwide, and a different strain is already widely present in Hawaiian mosquitoes.

It is important to understand that using *Wolbachia* bacteria as mosquito birth control is **NOT** a genetic method and is **NOT** a genetically-modified organism (GMO). No genes are modified in the bacteria, mosquitoes, or during any other step of the process. One of the reasons the *Wolbachia* method was selected was because it does not involve any genetic manipulation or changes, and so would be the best solution for Hawai‘i’s conservation crisis. Because the mosquitoes cannot successfully reproduce, it is a self-limiting process. If releases are stopped, changes in the mosquito population will be reversed. Mosquitoes have been in Hawai‘i less than 200 years, so are not an integral part of the ecosystem so removing them will not have any detrimental effect to the food webs. Conversely, Hawaiian honeycreepers have been here 5-6 million years, and are core to the fiber of our islands.

Once these mosquito species are on the Restricted Animals (Part A) List, the next step is being able to import the *Wolbachia*-inoculated mosquitoes, and then deploy them in the field according to the permit conditions established. This series of three, connected actions has repeatedly been shown to safely suppress mosquito numbers and reduce disease transmission in the wild in other locations. Therefore, it is crucial that DLNR be able to import the large number of male mosquitoes needed to successfully implement mosquito suppression in the forests of Hawai‘i to protect our native birds.

A large multi-agency partnership called Birds, Not Mosquitoes, is working together to save our honeycreepers using *Wolbachia*-inoculated mosquitoes as mosquito “birth control”. The partnership includes over 20 organizations including three state agencies, four federal agencies, and four nonprofit groups, including ABC. This breadth of organizations emphasizes the wide-ranging support for this urgently needed management action.

Mahalo for your support in protecting our treasured Hawaiian birds,

Brad Keitt
bkeitt@abcbirds.org
Oceans & Islands Director
831-420-7115

Chris Farmer, Ph.D.
cfarmer@abcbirds.org
Hawai‘i Program Director
808-987-1779

Lukanicole Zavas
lzavas@abcbirds.org
Outreach Associate
808-330-3240

Ho, Jonathan K

From: Kim Rogers <[redacted]>
Sent: Wednesday, June 8, 2022 8:55 AM
To: Ho, Jonathan K
Subject: [EXTERNAL] Hawai'i Plant and Animal Advisory Committee on Proposal to Add Three Mosquito Species to List of Restricted Animals

Aloha,

I wholeheartedly support the listing of three mosquito species to the list of restricted animals.

It's imperative we take action to save Hawaii's native honeycreepers who are critical to Hawaii's ecological and cultural environments. Please do not delay the development of this landscape-scale control method to reduce disease-carrying mosquitoes.

Mahalo,
Kim

Kim Steutermann Rogers
Read: kimsrogers.com
Call: [redacted]
Social: @kimsrogers
Email: [redacted]

Ho, Jonathan K

From: Malia Alatasi <[redacted]>
Sent: Wednesday, June 8, 2022 9:14 AM
To: Ho, Jonathan K
Subject: [EXTERNAL] Help our Native Hawaiian Birds

Aloha Mr. Jonathan Ho,

I am writing today to express strong support for the listing of three mosquito species on the list of restricted species.

This action will allow for the critical import of male mosquitoes for use in the incompatible male technique. This method of mosquito control which has been used for decades all across the world is critical for saving over a dozen of our imperiled native birds, uses naturally occurring bacteria already found in Hawai‘i, and does not require the application of pesticide or genetic modification.

All mosquitoes in Hawai‘i are non-native or invasive and controlling their populations in this way will have no non-target effects and will only positively affect native wildlife and our communities.

Mahalo nui for your time and support of this critical action. This is an important step for returning to a mosquito free Hawai‘i.

Mahalo Nui,
Malia Alatasi

Ho, Jonathan K

From: Lee Altenberg <[redacted]>
Sent: Wednesday, June 8, 2022 9:28 AM
To: Ho, Jonathan K
Cc: Lee Altenberg
Subject: [EXTERNAL] Restricted Species Listing of 3 Mosquito Species

Regarding: **Hawai`i Board of Agriculture Action on Proposal to Add Three Mosquito Species to List of Restricted Animals**

Aloha Mr. Ho,

I am writing to offer my strong support to the plan to list the Asian tiger mosquito (Aedes albopictus), the yellow fever mosquito (Aedes aegypti), and the southern house mosquito (Culex quinquefasciatus) among the Restricted Animals (Part A). These alien pest insects threaten human health and have already driven many Hawaiian endemic bird species to extinction. If the method of releasing sterile males fails to protect Hawaii's endemic bird species, I support the investigation of the newer methods of mosquito control, including microbiome and gene drive methods.

Mahalo,

Prof. Lee Altenberg

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Lee Altenberg, Ph.D.
Adj Full Professor, Information and Computer Sciences, and Mathematics
Graduate Faculty in the Ecology, Evolution, and Conservation Biology Specialization
University of Hawai`i at Mānoa
Phone: [redacted]
E-mail: [redacted]
Web: https://dynamics.org/Altenberg/

_/

Ho, Jonathan K

From: Nikhil Narahari <[redacted]>
Sent: Wednesday, June 8, 2022 9:43 AM
To: Ho, Jonathan K
Subject: [EXTERNAL] Proposal to Add Three Mosquito Species to List of Restricted Animals

Aloha Mr. Ho,

I am writing to express my sincere and strong support for the listing of three mosquito species on the list of restricted species: the Asian tiger mosquito (Aedes albopictus), the yellow fever mosquito (Aedes aegypti), and the southern house mosquito (Culex quinquefasciatus).

Listing these species will enable the import of male mosquitoes for use in the incompatible male technique. This method of mosquito control which has been used for decades all across the world is essential for saving over a dozen of our imperiled native birds, uses naturally occurring bacteria already found in Hawai‘i, and does not require the application of pesticide or genetic modification. In other words, it is NOT a GMO-based approach.

As you know, all mosquitoes in Hawai‘i are non-native or invasive. Controlling their populations in this way will have no non-target effects and will only positively affect native wildlife and our communities in substantial ways.

Thank you so much for your time and support of this critical action. This is an important step for returning to a mosquito free Hawai‘i.

Kind Regards,

Nikhil

Ho, Jonathan K

From: Ann Kobsa <[redacted]>
Sent: Wednesday, June 8, 2022 10:04 AM
To: Ho, Jonathan K
Subject: [EXTERNAL] support for mosquito control in HI

Aloha Jonathan,

I am writing to voice my support for the Wolbachia-incompatibiliby-based mosquito control effort. I received an alarmist email from a friend who was saying the state is planning to release GMO mosquitoes. I let her know that these are not GMO and are utilizing species and strains already extant in Hawai'i. The native forest birds of the higher elevations desperately need some intervention to avoid extinction. I thank you for your efforts and hope for success in this endeavor.

Mahalo,
Ann

Ho, Jonathan K

From: Brendan Wang <[redacted]>
Sent: Wednesday, June 8, 2022 10:12 AM
To: Ho, Jonathan K
Subject: [EXTERNAL] Hawai'i Plant and Animal Advisory Committee on Proposal to Add Three Mosquito Species to List of Restricted Animals

Aloha,

I am writing to support the Birds, Not Mosquitos mission to implement mosquito birth control in Hawai'i's forests. Our unique honeycreeper species are in rapid decline, and this method is our best hope in slowing the avian malaria epidemic.

The misinformation from parties claiming this method is using modified genetics is just that, misinformation. We cannot wait to begin this process for others to want to become educated; the 'akikiki does not have time. The akeke'e does not have time. The mosquitos themselves are already introduced, the Wolbachia bacteria is already present, and the bird populations are tanking. We must take action now.

Mahalo,
Brendan Wang
Kaua'i Forest Bird Recovery Project

Ho, Jonathan K

From: Allison Cabrera <[redacted]>
Sent: Wednesday, June 8, 2022 10:34 AM
To: Ho, Jonathan K
Subject: [EXTERNAL] Hawai'i Board of Agriculture Action on Proposal to Add Three Mosquito Species to List of Restricted Animals

Aloha Mr. Ho,
I am writing in support of mosquito importation in order to save the few forest bird species that remain.

Landscape-control of mosquitoes is the most urgent conservation problem in Hawai'i. A recent US Department of Interior report (Paxton et al. 2022) estimated 'akikiki on Kaua'i are likely to go extinct in 2023, and the 'ākohekohe, kiwikiu, and 'akeke'e soon after that. The extinction of the Hawaiian honeycreepers is being driven by exposure to avian diseases transmitted by non-native mosquitoes. Climate change is allowing non-native, disease-carrying mosquitoes to invade higher elevation forests, which was previously the last disease-free habitat where the honeycreepers were safe.

This project is very important to me and the last option we have to save these animals. Wolbachia has been proven safe on both the mainland and around the world.

Please consider approving this import. Without it, these birds will die in the next few years.

Mahalo,
Allison Cabrera

Ho, Jonathan K

From: Ryan Plunkett <[redacted]>
Sent: Wednesday, June 8, 2022 10:45 AM
To: Ho, Jonathan K
Subject: [EXTERNAL] Hawai'i plant and animal advisory committee on proposal to add three mosquito species to list of restricted animals

Aloha kakahiaka,

Please put mosquitoes on the restricted animals list and to allow the use of wolbachia to control our invasive mosquito population and help save our endemic honeycreepers.

Mahalo!!
Ryan Plunkett of Kalaoa, Big island

Ho, Jonathan K

From: JoAnna <[redacted]>
Sent: Wednesday, June 8, 2022 10:50 AM
To: Ho, Jonathan K
Subject: [EXTERNAL] Mosquitoes in Hawai'i

Aloha e Mr. Ho,

I am writing to express my support of the proposed action to list 3 mosquito species on the Restricted Species List A. I feel strongly that this issue needs to be urgently addressed in light of the dire situation facing Hawai'i's native birds. Our native and endangered species should have a very high level of priority in our islands right now. I am extremely concerned that if action isn't taken immediately we risk losing our native forest birds completely. Listing these mosquito species will allow scientifically supported solutions, solutions based on evidence, to be put into use.

The data reports are very clear on the dire nature of this situation, the mosquito populations need to be mitigated to save the birds from extinction. Mosquitoes are not native and do not belong in Hawai'i. Additionally, no native species depend on them for food. They are, in fact, a plague on native wildlife. It is vital we fix this because the extinction of multiple species of birds, known only to exist here in Hawai'i, hinges on humans making the right decisions and doing the right things to correct the mistakes we ourselves have caused to this unique and fragile ecosystem we call home. We brought mosquitoes to Hawai'i and we have to be the ones to do the work to get rid of them.

We cannot dismiss the immediacy of this crisis. This is urgent. There is no recovery from extinction. Hawaiian honeycreepers are facing challenges from so many directions right now, including mosquito borne diseases. This is an area we can truly help have a positive impact for them. Do we really want to wake up one morning and hear the news that we have lost the last 'i'iwi? How would you feel if you could only describe them to your youngest family members and know they'll never see one for themselves because they are all gone? How would we feel knowing we didn't do everything in our power to save them?

These birds attract tourism dollars for our economy but more importantly, they are valuable to Hawaiian culture, Hawaiian history, and Hawaiian identity. We should celebrate them because they are precious and they only exist here in these magnificent islands. They need our help and we will surely regret not meeting these challenges with decisive action if they disappear forever.

Thank you sincerely for your time,
Joanna Maney

Ho, Jonathan K

From: Marcela Brimhall <[redacted]>
Sent: Wednesday, June 8, 2022 11:01 AM
To: Ho, Jonathan K
Subject: [EXTERNAL] Hawai'i Board of Agriculture Action on Proposal to Add Three Mosquito Species to List of Restricted Animals

Aloha Jonathan,

I am emailing you today to express my support for adding Yellow Fever Mosquito, Aedes aegypti, Asian Tiger Mosquito, Aedes albopictus, and Southern House Mosquito, Culex quinquefasciatus to the the List of Restricted Animals (Part A) to support eradication efforts with the use of sterile males. These creatures are a non-native nuisance to humans and are having a devastating effect on the native bird populations. I would even support GMO technology to eradicate them, but the sterile males solution is a good start.

Thanks for your time,
Marcela Brimhall
[redacted]

Ho, Jonathan K

From: Jonathan Clark <[redacted]>
Sent: Wednesday, June 8, 2022 12:01 PM
To: Ho, Jonathan K
Subject: [EXTERNAL] Listing of Mosquito Species as Restricted Species

Dear Mr. Jonathan Ho,

I am writing in strong support of the effort to list three mosquito species on the list of restricted species, in order to move forward with efforts to implement mosquito birth control. This effort would have a major effect in addressing our most vulnerable native Hawaiian honeycreeper species, many of which are in precarious situations.

The method of mosquito control being considered as part of the incompatible male technique has been well tested and can be implemented without genetic modification or pesticide. As all mosquitoes in Hawai'i are invasive, this effort to reduce their populations will be a vital step in the right direction towards mitigating the threats posed to our native bird populations. Without taking the necessary steps to protect these honeycreeper species now, their already alarming population declines due to the spread of avian malaria will only continue to worsen.

Mahalo nui for your time and support of this critical step in protecting the endemic species that make our natural ecosystems here in Hawai'i so special and unique.

Jonathan Clark

Ho, Jonathan K

From: Kelly Kingdon <[redacted]>
Sent: Wednesday, June 8, 2022 12:13 PM
To: Ho, Jonathan K
Subject: [EXTERNAL] Support for listing 3 incompatible -male mosquito species to Restricted Species List A

Hello,

I'm writing to say that I strongly approve of importing Wolbachia-incompatible male mosquitos for the protection of native hawaiian birds.

I worked at the Maui Bird Conservation Center with the 'akikiki, 'akeke'e, and kiwiku. As a biologist it was so special getting to work with such unique species found nowhere else in the world. Everyone at MBCC worked day and night caring for these birds to hopefully one day re-release them back to the wild. However, if nothing is done about the avian malaria devastating native bird populations that can never happen.

Incompatible-male mosquitos are currently being used in 15 different countries for population control, including the USA, with no harmful side effects to the local ecosystems. To not use a safe and successful method of mosquito control to save these incredible birds would waste decades of conservation work, and would be an irreversible loss to the culture of Hawai'i. I hope that you will choose to add these mosquitos to Restricted Species List A and help not just native birds, but all native Hawaiian wildlife.

Thank you

Ho, Jonathan K

From: Carly Cabrera <[redacted]>
Sent: Wednesday, June 8, 2022 12:14 PM
To: Ho, Jonathan K
Subject: [EXTERNAL] Hawai'i Board of Agriculture Action on Proposal to Add Three Mosquito Species to List of Restricted Animals

Dear Mr Ho,

I am writing in **strong support of the listing, importation, and establishing permit conditions for field release** of southern house mosquito (*Culex quinquefasciatus*), Asian tiger mosquito (*Aedes albopictus*), and yellow fever mosquito (*Aedes aegypti*). Placing the mosquitoes on the List of Restricted Animals, allowing for importation of lab-reared strains inoculated with *Wolbachia*, and establishing permit conditions for the import and field release of the lab-reared strains of *Wolbachia*-inoculated mosquitoes are **all critically needed for saving Hawaiian birds**.

Furthermore:

- **Important Hawaiian honeycreepers: Found nowhere else in the world.** Our honeycreepers are integral components of healthy forests, serving as pollinators, seed dispersers, and insect predators. Their beauty, mannerisms, and spiritual connotations are woven into mele, hula, and ʻōlelo noʻeau, and materials created through featherwork. These birds also serve as sentinels of the overall ecosystem health of our native forests, and can indicate threats to our other native plants and animals.
- **Landscape-control of mosquitoes is the most urgent conservation problem in Hawaiʻi.** A recent US Department of Interior report (Paxton et al. 2022) estimated ʻakikiki on Kauaʻi are likely to go extinct in 2023, and the ʻākohekohe, kiwikiu, and ʻakekeʻe soon after that. The extinction of the Hawaiian honeycreepers is being driven by exposure to avian diseases transmitted by non-native mosquitoes. Climate change is allowing non-native, disease-carrying mosquitoes to invade higher elevation forests, which was previously the last disease-free habitat where the honeycreepers were safe. [Recent DLNR press release on DOI report]
- **We have hope: mosquito birth control.** The BNM partnership aims to use *Wolbachia*-incompatible male mosquitoes, a.k.a mosquito birth control, to suppress mosquito populations. This mosquito birth control approach is being safely used in 15 different countries, including the continental U.S. The BNM partnership is guided by the State's top scientists and researchers, who have many decades of experience studying Hawai'i's forest birds and mosquitoes. We need these species to be listed so that importation of the *Wolbachia*-incompatible male mosquitoes can commence.
- **Not a genetically -modified organism – different technique involved.** The proposed technique does not modify the genes of mosquitoes or *Wolbachia*. It is similar process to taking anti-biotics then eating pro-biotics to replace the existing community of bacteria with a different community within your stomach.

In good faith,
Carly Cabrera

Ho, Jonathan K

From: Asta <[redacted]>
Sent: Wednesday, June 8, 2022 12:16 PM
To: Ho, Jonathan K
Subject: [EXTERNAL] Support for listing 3 species of mosquitoes on the Restricted Species List A

Aloha,

I am writing to express my strong support of the proposed action to list three species of mosquitoes on the Restricted Species List A.

Listing the mosquitoes will allow application for an import permit for the incompatible-male mosquitoes, which in turn will help eradicate carriers of the avian diseases that are taking such a huge toll on our native birds.

I have lived in Volcano Village, at 4,000' on Kīlauea Volcano for more than 30 years, and often walk to higher elevation on the slope of Mauna Loa in the National Park. It has been heartbreaking to observe how many fewer honeycreepers are around now then there used to be, even in the protected habitat of the National park.

Climate change is allowing non-native, disease-carrying mosquitoes to invade higher elevation forests, which were previously the last disease-free habitat where the honeycreepers were safe.

Our honeycreepers are integral components of healthy forests, serving as pollinators, seed dispersers, and insect predators. Their beauty, mannerisms, and spiritual connotations are woven into mele, hula, and ʻōlelo noʻeau, and materials created through featherwork.

The Wolbachia-incompatible male mosquitoes, a.k.a mosquito birth control, is our best, and currently, only hope to suppress mosquito populations.

This mosquito birth control approach is being safely used in 15 different countries, including the continental U.S.

Please support the efforts to bring these Wolbachia-incompatible male into Hawai'i.

Thank you,
Asta Miklius
[redacted]

Ho, Jonathan K

From: Ashely Northcutt <[redacted]>
Sent: Wednesday, June 8, 2022 12:49 PM
To: Ho, Jonathan K
Subject: [EXTERNAL] Hawaii Plant and Animal Advisory Committee On Proposal to Add Three Mosquito Species to the list of Restricted Animals

Please list the three species of mosquitos to the list of Restricted Animals. Mosquitos carrying avian malaria have decimated native Hawaiian bird populations and pose a contained threat to the continued survival of the tiny populations that remain. Mosquitos also carry human diseases in Hawai'i and should be controlled.

Thank you,
Elisabeth Northcutt

Ho, Jonathan K

From: Richelle-Ann Moskvichev <[redacted]>
Sent: Wednesday, June 8, 2022 1:28 PM
To: Ho, Jonathan K
Subject: [EXTERNAL] Mosquito Free Hawaii Please

Aloha Mr. Jonathan Ho,

I am writing today to express strong support for the listing of three mosquito species on the list of restricted species. I was born and raised on Oahu and now work to study our Earth and protect our species. I and my colleagues are so grateful for the truly unique species we harbor in only our islands.

This action will allow for the critical import of male mosquitoes for use in the incompatible male technique. This method of mosquito control which has been used for decades all across the world is critical for saving over a dozen of our imperiled native birds, uses naturally occurring bacteria already found in Hawai‘i, and does not require the application of pesticide or genetic modification.

All mosquitoes in Hawai‘i are non-native or invasive and controlling their populations in this way will have no non-target effects and will only positively affect native wildlife and our communities.

Mahalo nui for your time and support of this critical action. This is an important step for returning to a mosquito free Hawai‘i.

Sincerely,

Richelle

Ho, Jonathan K

From: Lindsay Wong <[redacted]>
Sent: Wednesday, June 8, 2022 1:46 PM
To: Ho, Jonathan K
Cc: HDOA.PQ.TESTIMONY
Subject: [EXTERNAL] Hawai'i Board of Agriculture Action on Proposal to Add Three Mosquito Species to List of Restricted Animals

Aloha,

My name is Ku'ulei Wong, I'm currently a Botany/Hawaiian studies student at UH Mānoa. I'm writing in favor of importing incompatible male mosquitos into Hawai'i.

Being that avian malaria is one of the primary threats to our native forests I feel that this solution is appropriate or at least a really good shot to protect and preserve our native bird population.

Why is saving our birds important? Our manu 'ōiwi (native birds) are found no where else on Earth. They have evolved perfectly to fit in our unique ecosystems in Hawai'i which is what makes them so rare. On that note, while the birds were evolving so were the plants; majority of our native flora have evolved to coexist with our manu, meaning without our birds we also lose our native plants. Our forests have a delicate balance and the introduction of avian malaria has posed negative effects and it's only getting worst.

On a personal note, as a Kanaka (native Hawaiian), our manu play such an important role in Hawaiian culture. They're held in such high regards that pre-westernization, our manu were seen as deities as they could touch the heavens so easily. In present day, one could say we lost a lot of our culture due to westernization but our native manu and plants still connects us to our deities, ancestors, and the religious side of our culture. When we lose them, we lose a piece of us.

Humans introduced mosquitos to Hawai'i and as humans we have a part to play in making our wrongs right. This why I strongly advise bringing in the incompatible male mosquitos to serve as a mosquito "birth control" so that our native forests have a chance at survival.

Me ke aloha,
Ku'ulei

Ho, Jonathan K

From: Peg Cabrera <[redacted]>
Sent: Wednesday, June 8, 2022 1:48 PM
To: Ho, Jonathan K
Subject: [EXTERNAL] Re: Hawai'i Board of Agriculture Action on Proposal to Add Three Mosquito Species to List of Restricted Animals

Dear Mr Ho,

I am writing in **strong support of the listing, importation, and establishing permit conditions for field release** of southern house mosquito (*Culex quinquefasciatus*), Asian tiger mosquito (*Aedes albopictus*), and yellow fever mosquito (*Aedes aegypti*). Placing the mosquitoes on the List of Restricted Animals, allowing for importation of lab-reared strains inoculated with *Wolbachia*, and establishing permit conditions for the import and field release of the lab-reared strains of *Wolbachia*-inoculated mosquitoes are **all critically needed for saving Hawaiian birds**.

Furthermore:

- **Important Hawaiian honeycreepers: Found nowhere else in the world.** Our honeycreepers are integral components of healthy forests, serving as pollinators, seed dispersers, and insect predators. Their beauty, mannerisms, and spiritual connotations are woven into mele, hula, and ʻōlelo noʻeau, and materials created through featherwork. These birds also serve as sentinels of the overall ecosystem health of our native forests, and can indicate threats to our other native plants and animals.
- **Landscape-control of mosquitoes is the most urgent conservation problem in Hawai'i.** A recent US Department of Interior report (Paxton et al. 2022) estimated ʻakikiki on Kauaʻi are likely to go extinct in 2023, and the ʻākohekohe, kiwikiu, and ʻakekeʻe soon after that. The extinction of the Hawaiian honeycreepers is being driven by exposure to avian diseases transmitted by non-native mosquitoes. Climate change is allowing non-native, disease-carrying mosquitoes to invade higher elevation forests, which was previously the last disease-free habitat where the honeycreepers were safe. [Recent DLNR press release on DOI report]
- **We have hope: mosquito birth control.** The BNM partnership aims to use *Wolbachia*-incompatible male mosquitoes, a.k.a mosquito birth control, to suppress mosquito populations. This mosquito birth control approach is being safely used in 15 different countries, including the continental U.S. The BNM partnership is guided by the State's top scientists and researchers, who have many decades of experience studying Hawai'i's forest birds and mosquitoes. We need these species to be listed so that importation of the *Wolbachia*-incompatible male mosquitoes can commence.
- **Not a genetically -modified organism – different technique involved.** The proposed technique does not modify the genes of mosquitoes or *Wolbachia*. It is similar process to taking anti-biotics then eating pro-biotics to replace the

existing community of bacteria with a different community within your stomach.

Sincerely,
Peg Cabrera

Ho, Jonathan K

From: Andrea Grabow <[redacted]>
Sent: Wednesday, June 8, 2022 2:21 PM
To: Ho, Jonathan K
Subject: [EXTERNAL] Invasive mosquito population support!!

Aloha Mr. Jonathan Ho,

I am writing today to express STRONG support for the listing of three mosquito species on the list of restricted species.

This action will allow for the critical import of male mosquitoes for use in the incompatible male technique. This method of mosquito control which has been used for decades all across the world is critical for saving over a dozen of our imperiled native birds, uses naturally occurring bacteria already found in Hawai‘i, and does not require the application of pesticide or genetic modification.

All mosquitoes in Hawai‘i are non-native or invasive and controlling their populations in this way will have no non-target effects and will only positively affect native wildlife and our communities.

Mahalo Piha for your time and support of this critical action. This is an important step for returning to a mosquito free Hawai‘i.

Andrea D Grabow

Ho, Jonathan K

From: Scarlett Howell <[redacted]>
Sent: Wednesday, June 8, 2022 2:23 PM
To: Ho, Jonathan K
Subject: [EXTERNAL] Hawai'i Plant and Animal Advisory Committee on Proposal to Add Three Mosquito Species to List of Restricted Animals

Aloha Mr. Jonathan Ho,
I am writing today to express strong support for the listing of three mosquito species on the list of restricted species.
This action will allow for the critical import of male mosquitoes for use in the incompatible male technique. This method of mosquito control which has been used for decades all across the world is critical for saving over a dozen of our imperiled native birds, uses naturally occurring bacteria already found in Hawai'i, and does not require the application of pesticide or genetic modification.

All mosquitoes in Hawai'i are non-native or invasive and controlling their populations in this way will have no non-target effects and will only positively affect native wildlife and our communities.
I have enjoyed visiting the Hawaiian Islands four times and have had the pleasure of seeing many of the native honeycreepers that are endangered and are predicted to go extinct within the next few years, if nothing is done to control the disease carrying mosquitoes. I ask you to please approve this measure, I have plans for many more trips to the Hawaiian Islands in my future.

Mahalo nui for your time and support of this critical action. This is an important step for returning to a mosquito free Hawai'i, and in turn, protecting Hawaii's amazing honeycreepers.

In gratitude,
Scarlett Howell
San Diego, CA

Ho, Jonathan K

From: Jonah F [redacted] >
Sent: Wednesday, June 8, 2022 2:35 PM
To: Ho, Jonathan K
Subject: [EXTERNAL]

Dear Mr. Jonathan Ho,
I'm writing to you about Mosquito birth control.
Currently, non-native mosquitoes on the Islands of Hawai'i are spreading Avian Malaria, and killing off Hawaii's precious native forest birds. One of them, the 'Akikiki of Kaua'i, is estimated to go extinct in 2023. We can't let this happen.
I'm asking you to approve the permit to give the Kaua'i Forest Bird Recovery Project, Birds, not Mosquitoes, and other conservation organizations to be able to create incompatible male mosquitoes to help save the Forest Birds.
There is false information going about that says that these have GMOs and GE organisms in them. This is NOT TRUE.
Please approve the permit so that we can save the Hawaiian Birds, for future generations to see and admire.
Thank You.

Ho, Jonathan K

From: Ryan Oyama <[redacted]>
Sent: Wednesday, June 8, 2022 3:42 PM
To: Ho, Jonathan K
Subject: [EXTERNAL] Hawai`i Board of Agriculture Action on Proposal to Add Three Mosquito Species to List of Restricted Animals

Dear Mr. Jonathan Ho:

I am writing in support of the proposal to add the Asian Tiger Mosquito, *Aedes albopictus*, Yellow Fever Mosquito, *Aedes aegypti*, and the Southern House Mosquito, *Culex quinquefasciatus* to the List of Restricted Animals (Part A). All mosquito species in Hawai'i are introduced and none have a role in our native ecosystems. Rather, these invasive pests are not only a nuisance to human health but also a major threat to the health of our native forests and the watersheds they represent. Specifically, these species are a significant factor in the decline of our endemic forest birds because they are a vector for diseases such as avian malaria. As such, this listing, and the corresponding effort to eradicate mosquitoes, are key steps in saving these endemic bird species, which have not only important ecological roles in our native forests but also cultural significance.

Sincerely,

Ryan Oyama
Kalāheo

Ho, Jonathan K

From: Saxony Charlot <[redacted]>
Sent: Wednesday, June 8, 2022 3:56 PM
To: Ho, Jonathan K
Subject: [EXTERNAL] Hawai'i Plant and Animal Advisory Committee on Proposal to Add Three Mosquito Species to List of Restricted Animals

Dear Mr. Jonathan Ho,

I am emailing in strong support of listing these three mosquito species as restricted species.

Native Hawaiian avifauna are imperiled and need fast and drastic action in order to prevent their extinction. Hawai'i is already the extinction capital of the world, with the most bird extinctions globally in the past 700 years. It is crucial to implement safe and effective mosquito control measures such as the importation of sterile males since avian malaria is of primary concern in native bird decline. This method of mosquito control is likely one of our last hopes for preventing more deaths and extinctions of culturally and ecologically important species.

Thank you for your support and understanding.

Aloha,
Saxony

Ho, Jonathan K

From: Jacob Medina <[redacted]>
Sent: Wednesday, June 8, 2022 12:32 AM
To: Ho, Jonathan K
Subject: [EXTERNAL] NO to Releasing of GE Mosquitoes!

I can't believe I am even having to email you about the idea of releasing GMO mosquitoes onto the island. It is beyond reckless. I do not consent to being part of this experiment. You people are playing with people's lives and it's getting really concerning at this point. DONT LET THEM OUT!!!!

--
Jacob Arthur Medina
www.jacobmedina.com
art@jacobmedina.com
[redacted]
Facebook.com/JacobArtMedina
Instagram.com/JacobArtMedina

Ho, Jonathan K

From: Alex Hayashi <[redacted]>
Sent: Monday, June 6, 2022 9:32 PM
To: Ho, Jonathan K
Subject: [EXTERNAL]

Aloha Mr. Jonathan Ho,

I am writing today to express strong support for the listing of three mosquito species on the list of restricted species.

This action will allow for the critical import of male mosquitoes for use in the incompatible male technique. This method of mosquito control which has been used for decades all across the world is critical for saving over a dozen of our imperiled native birds, uses naturally occurring bacteria already found in Hawai‘i, and does not require the application of pesticide or genetic modification.

All mosquitoes in Hawai‘i are non-native or invasive and controlling their populations in this way will have no non-target effects and will only positively affect native wildlife and our communities.egards

Mahalo nui for your time and support of this critical action. This is an important step for returning to a mosquito free Hawai‘i.

Best regards,
Alex Hayashi

HAWAIʻI INVASIVE SPECIES COUNCIL
1151 PUNCHBOWL ST, #325
HONOLULU, HAWAIʻI 96813

June 8, 2022

Advisory Committee on Plants and Animals
Hawaii Department of Agriculture
1849 Auiki Street
Honolulu, Hawaii 96819

Aloha Members of the Advisory Committee on Plants and Animals,

The Hawaiʻi Invasive Species Council would like to express our support for agenda item #1 and agenda item #2 regarding the submissions for a preliminarily review of the currently unlisted Yellow Fever Mosquito, *Aedes aegypti*, Asian Tiger Mosquito, *Aedes albopictus*, and Southern House Mosquito, *Culex quinquefasciatus* and their future placement on the list of Restricted Animals (Part A). The listing of the three species of mosquitoes onto the list of Restricted Animals will provide a regulatory pathway for researchers, that are part of the multi-agency partnership "Birds, Not Mosquitoes", to apply for import permits that would allow the importation of incompatible-male mosquitos that are the best tool for the large-scale reduction of mosquito populations that threaten human health and native species.

The Hawaii Invasive Species Council is a participating member of the Bird, Not Mosquitoes multi-agency partnership that aims to use incompatible-male mosquitoes to suppress their populations through the use of *Wolbachia*, a naturally occurring bacteria in many insects, including mosquitoes. This is basically a mosquito birth control approach that is being safely used in fifteen different countries, including the continental U.S. This tool can reduce mosquito populations that pose human health risks and is the closest solution to saving remaining populations of native Hawaiian forest birds from extinction.

The Hawaii Invasive Species Council is co-chaired by the Department of Land and Natural Resources and Hawaiʻi Department of Agriculture and members include representatives for the Hawaiʻi Department of Health, Transportation, Business, Economic Development and Tourism and the Univeristy of Hawaiʻi. The HISC was established in 2003 for the special purposed of providing policy level direction, coordination, and planning among state departments, federal agencies, and international and local initiatives for managing harmful invasive species thoughout the State. The Council's support for these submissions reflects our purpose of managing invasive species to protect human health and natural resources.

Mahalo for the opportunity to comment and your consideration for this request.

Sincerely,

Chelsea Arnott

Chelsea Arnott
HISC Program Support Staff

Ho, Jonathan K

From: Robbie Roosen [redacted] >
Sent: Saturday, June 4, 2022 9:15 AM
To: HDOA.PQ.TESTIMONY
Subject: [EXTERNAL] Testimony on proposed GMO mosquito release

Hi,
Remember the mongoose release that backfired?
That is the prototype of the present effort.
Please do not do this stupid thing.
It will only make our aina uglier and weaker.
Aloha,
Prof. Robert G. Roosen, PhD
Owner/Director
Rainbow Observatory

Representative David Tarnas
House District 7

Phone No.: (808) 586-8510
Email: reptarnas@capitol.hawaii.gov

HOUSE OF REPRESENTATIVES
STATE OF HAWAII
STATE CAPITOL, ROOM 316
415 SOUTH BERETANIA STREET
HONOLULU, HAWAII 96813

June 8, 2022

Section Chief Jonathan Ho
Members, Advisory Committee on Plants and Animals
Hawai‘i Department of Agriculture

Aloha,

As Chair of the Hawai‘i State House Committee on Water and Land, I am acutely aware of the extinction crisis facing our native Hawaiian birds. Among the most serious threats to these birds are the avian diseases they get from mosquitoes. We must protect these birds by implementing landscape scale mosquito population control. The best means for doing this is through the importation and release of mosquitoes that are inoculated with Wolbachia. I urge you to allow for the importation of these inoculated mosquitoes by placing them on the List of Restricted Animals Part A.

I strongly recommend that your Committee approve the listing and allow the importation with permit conditions for field release of the southern house mosquito (*Culex quinquefasciatus*), Asian tiger mosquito (*Aedes albopictus*), and yellow fever mosquito (*Aedes aegypti*). In order to save Hawaiian native birds, your action is to place the mosquitoes on the List of Restricted Animals (Part A), allowing for importation of lab-reared strains inoculated with Wolbachia, and establishing permit conditions for the import and field release of the lab-reared strains of Wolbachia-inoculated mosquitoes.

Our Committee has been told that avian diseases transmitted by non-native mosquitoes pose the greatest threat to the survival of Hawaiian honeycreepers. Rising global temperatures allow these mosquitoes to invade the higher elevation forest habitats of these honeycreepers. The Critically Endangered ‘akeke‘e and ‘akikiki, on Kaua‘i, are experiencing declines of 90 percent or more and could quickly become extinct without urgent action. On East Maui, the kiwikiu and ‘ākohekohe face comparable threats of extinction. Landscape-control of mosquitoes is the most urgent action we can take in Hawai‘i to protect these birds. If the disease cycle is not broken many other honeycreeper species will follow these four into extinction, irreparably losing crucial parts of Hawai‘i’s biological diversity and cultural richness.

The actions requested by the Hawai‘i Department of Land and Natural Resources and Hawai‘i Department of Health are a critical step towards saving our endangered forest birds using Wolbachia-inoculated mosquitoes that will function as mosquito “birth control.” Contrary to what some may assert, this technique is not a genetically modified organism. Rather, this is called the Incompatible Insect Technique (IIT), and is being safely used in 15 different countries, including the continental U.S., to suppress mosquito populations. Wolbachia is a very common bacteria in Hawai‘i and a different strain is already widely present in Hawaiian mosquitoes. Only male mosquitoes will be released, so the released mosquitoes will not bite the birds or humans and cannot transfer the bacteria to any other species.

Please protect our Hawaiian honeycreepers and approve the request by DLNR and DOH.

Mahalo,

Representative David A. Tarnas

cgaps
STOP THE SILENT INVASION
COORDINATING GROUP ON ALIEN PEST SPECIES

Date: June 8, 2022

To: Advisory Committee on Plants and Animals

From: Christy Martin, Program manager, Coordinating Group on Alien Pest Species

RE: Testimony in support of Agenda items 1 and 2, the proposed listing of multiple mosquito species on the Restricted A list, etc.,

On behalf of the Coordinating Group on Alien Pest Species, please accept this letter in strong support of the listing of the Asian tiger mosquito (*Aedes albopictus*), yellow fever mosquito (*Aedes aegypti*), and the southern house mosquito (*Culex quinquefasciatus*) on the List of Restricted Animals (Part A) and the establishment of permit conditions for the importation of lab-reared species of the same that are inoculated with *Wolbachia* strains for the purpose of incompatible mating, and the field release of the same by agencies, if listed.

Invasive species has been described as "the single greatest threat to Hawai'i's economy, natural environment, and to the health and lifestyle of Hawai'i's people". Mosquitoes and the diseases they vector are a global public health issue. Hawai'i has been fortunate in its mosquito-free status until the 1800's, and responses to serious public health diseases such as dengue have been successful to-date. However, the increase in the number and types of mosquitoes AND mosquito-vectored diseases in Hawai'i is a tremendous risk to public health that would have repercussions to the visitor industry and every aspect of our daily lives. The use of male mosquitoes—with it's existing Wolbachia strain replaced with a different Wolbachia strain—is a responsible use of this non-chemical mosquito control tool that could be used to suppress mosquitoes more effectively across larger areas than the current door-to-door breeding site-reduction work.

In addition to public health impacts, birds in Hawai'i continue to be impacted by avian malaria and pox, diseases vectored by non-native mosquitoes. Widespread birds like non-native zebra doves and other common birds serve as a reservoir for these diseases, which are picked up by mosquitoes and spread to other birds. Many of these non-native birds are sickened by these diseases but can survive. In contrast, the native Hawaiian honeycreepers are much more susceptible and unable to survive these infections. This constant and heavy disease cycle is constantly occurring at low elevations where the climate is warm enough for these mosquitoes to breed, while higher elevation forests have served as a largely-mosquito and disease-free habitat for native Hawaiian honeycreepers in decades past. After several years of study, it has become clear that the warming climate has been making upper elevation forests warm enough for mosquitoes to breed, imperiling the last refuge for these birds, some of which are critically endangered. This is currently the ONLY available technology that can start protecting these birds.

The application to add these mosquito species to the Restricted A list is an important step in the work of multiple agencies and environmental conservation organizations to advance available and effective non-chemical methods that have been tested and proven worldwide for large-scale mosquito control. The listing of these species on the Restricted A list will provide a regulatory pathway for these agencies to apply for permits for the importation and release of these lab-reared male mosquitoes, inoculated with *Wolbachia* bacteria strains.

Thank you for the opportunity to submit this letter in strong support of these agenda items, which supports our Strategic Plan priorities, particularly Strategy 4, *Large-scale control of high-impact invasive species*.

Aloha,
Christy Martin, Program manager
Coordinating Group on Alien Pest Species
www.cgaps.org
christym@rocketmail.com
(808) 722-0995

DAVID Y. IGE
GOVERNOR OF HAWAII

SUZANNE D. CASE
CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT

ROBERT K. MASUDA
FIRST DEPUTY

M. KALEO MANUEL
DEPUTY DIRECTOR - WATER

AQUATIC RESOURCES
BOATING AND OCEAN RECREATION
BUREAU OF CONVEYANCES
COMMISSION ON WATER RESOURCE MANAGEMENT
CONSERVATION AND COASTAL LANDS
CONSERVATION AND RESOURCES ENFORCEMENT
ENGINEERING
FORESTRY AND WILDLIFE
HISTORIC PRESERVATION
KAHOOLAWE ISLAND RESERVE COMMISSION
LAND
STATE PARKS

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES

POST OFFICE BOX 621
HONOLULU, HAWAII 96809

June 8, 2022

TO: Advisory Committee on Plants and Animals

Division of Forestry and Wildlife
Department of Land and Natural Resources

SUBJECT: Support for preliminary review and approval of the requests from the Hawaii Department of Land and Natural Resources and Hawaii Department of Health to add the Asian Tiger Mosquito, *Aedes albopictus*, Yellow Fever Mosquito, *Aedes aegypti*, and the Southern House Mosquito, *Culex quinquefasciatus*, to the List of Restricted Animals, Part A, set permit conditions to allow the importation of the three mosquitoes inoculated with strains of *Wolbachia* bacteria, and establish permit conditions for immediate field release of incompatible male mosquitoes.

The Hawai‘i Department of Land and Natural Resources (Department) stands in strong support of the requests to add the Asian Tiger Mosquito, *Aedes albopictus*, Yellow Fever Mosquito, *Aedes aegypti*, and the Southern House Mosquito, *Culex quinquefasciatus*, to the List of Restricted Animals, Part A. Placing these species on the List of Restricted Animals, Part A is an integral step in advancing the review and eventual import of incompatible male mosquitoes into the state for the benefit of our native forest birds and public health. The functional extinction of multiple Hawaiian forest bird species is likely within the next two to five years if intervening measures of mosquito control are not taken. The approach of listing the mosquito species via Board order while working in collaboration with the Board and its advisory committees to draft appropriate permit conditions will save crucial time in what is a comprehensive and understandably time-consuming import process.

Mosquitoes are not native to Hawai‘i and spread diseases which threaten public health and native wildlife. Past and recent work has confirmed that the primary threat to native Hawaiian birds is avian malaria, transmitted by a non-native vector, the southern house mosquito (C*ulex quinquefasciatus*). Protection of our remaining native forest birds is one of the highest priorities for the Department. Federally endangered forest birds on Kaua‘i and statewide have rapidly declined in the last 20 years and have reached perilously low numbers in the last two years. Surveys on Kaua‘i in 2018 found only 454 ‘akikiki, and only 1162 ‘akeke‘e were estimated to still exist in the wild. On Maui, surveys estimated only 1,768 ‘ākohekohe and 152 kiwikiu remained in 2017.

Low temperatures at high elevations have historically limited the spread of mosquitoes and the reproduction of malaria, which has a strict thermal limit. However, climate conditions in Hawai‘i are changing rapidly due to global warming, allowing mosquitoes to move into areas which were formerly mosquito-free and malaria-free. Given these dire circumstances, the Department strongly supports using mosquitoes with *Wolbachia* bacteria for landscape-scale mosquito control in Hawai‘i to prevent extinction of Hawaiian forest birds. Such technology is already being applied elsewhere in the US and internationally to suppress populations of mosquitoes of public health concern. The Department has been working to facilitate planning, research, and development of the Incompatible Insect Technique (IIT) utilizing *Wolbachia* bacteria as a tool for landscape-scale control for *Culex quinquefasciatus* in Hawai‘i since 2016, and the urgency of this work is heightened every passing year as populations of our unique native species continue to plummet. It is notable that this IIT approach does not utilize genetic engineering or genetic modification of any kind, but instead relies on the mosquitoes existing relationship with a naturally occurring bacteria that is found in over 60% of terrestrial arthropods.

The application of traditional chemical controls for mosquitoes in natural areas is impractical and causes unacceptable non-target impacts, whereas IIT carries no non-target risks to native species, humans, or the environment. Furthermore, mosquitoes were first introduced to the Hawaiian Islands in the 1800s, and while they are used opportunistically as prey items, no species native to Hawai‘i are dependent on their presence for survival. The control of mosquito populations in Hawaiian forests would thus cause no negative impacts on native Hawaiian species.

The import of *Culex quinquefasciatus* into Hawai‘i would allow DLNR to advance research and development of the Incompatible Insect Technique to meet the requirements for regulatory approval and enable eventual application for the benefit of public health as well as for conservation in Hawai‘i. However, it is important to note that no releases will occur until DLNR and partners secure all appropriate Federal and State approvals from the U.S. Environmental Protection Agency (EPA) and Hawaii Department of Agriculture, and completing environmental compliance under the National Environmental Policy Act and Hawaii Environmental Policy Act. Additionally, the Department is actively involved in the multi-agency Birds not Mosquitoes Steering Committee, which is pursuing community engagement and public outreach as utilizing this tool appears increasingly possible.

Ho, Jonathan K

From: Lisa "Cali" Crampton <[redacted]>
Sent: Monday, June 6, 2022 10:57 PM
To: HDOA.PQ.TESTIMONY
Subject: [EXTERNAL] Hawai'i Board of Agriculture Action on Proposal to Add Three Mosquito Species to List of Restricted Animals

Aloha,

I am writing to express my strong support for this proposal. Listing the mosquitoes will allow Birds, Not Mosquitoes (BNM) partners to proceed with applying for an import permit for the incompatible-male mosquitoes. Although all three mosquito species are already present in Hawai'i - importing mosquitoes is not allowed. Importation of these mosquitoes to allow development and deployment of landscape-level mosquito control via the incompatible male technique is the best hope we have for saving the remaining Hawaiian honeycreeper species from extinction.

As you know, our Hawaiian honeycreepers are integral components of healthy forests, serving as pollinators, seed dispersers, and insect predators. Their beauty, mannerisms, and spiritual connotations are woven into mele, hula, and ʻōlelo noʻeau, and materials created through featherwork. These birds also serve as sentinels of the overall ecosystem health of our native forests, and can indicate threats to our other native plants and animals.

A recent US Department of Interior report (Paxton et al. 2022) estimated that ʻakikiki on Kauaʻi are likely to go extinct in 2023, and the ʻākohekohe, kiwikiu, and ʻakekeʻe soon after that. The extinction of the Hawaiian honeycreepers is being driven by exposure to avian diseases transmitted by non-native mosquitoes. Climate change is allowing non-native, disease-carrying mosquitoes to invade higher elevation forests, which was previously the last disease-free habitat where the honeycreepers were safe.

The BNM partnership aims to use *Wolbachia*-incompatible male mosquitoes, a.k.a mosquito birth control, to suppress mosquito populations. This mosquito birth control approach is being safely used in 15 different countries, including the continental U.S. The BNM partnership is guided by the State's top scientists and researchers, who have many decades of experience studying Hawaiʻi's forest birds and mosquitoes. We need these species to be listed so that importation of the*Wolbachia*-incompatible male mosquitoes can commence. The proposed technique does not modify the genes of mosquitoes or *Wolbachia*. It is a similar process to taking antibiotics then eating probiotics to replace the existing community of bacteria with a different community within your stomach.

Again, I urge you to pass this important measure to save Hawai'i's biodiversity and cultural heritage.

Sincerely,

Dr. Lisa Crampton
[redacted]

Ho, Jonathan K

From: Kalei Kailikini <[redacted]>
Sent: Tuesday, June 7, 2022 5:20 PM
To: HDOA.PQ.TESTIMONY
Subject: [EXTERNAL] STOP the Releasing of GMO Mosquitos in Hawaii

Please do not bring or release any or all GMO Mosquitos in Hawaii!! If, the State of Hawaii disregards the people of Hawaii and releases any of these GMO mosquitos. Since when are any mosquitoes safe? Mosquitos carry and transmit diseases because they are parasites feeding on our blood. I cannot believe I am emailing a government agency about GMO mosquitos they are planning on releasing in Hawaii! **Again, please do not release any or all GMO mosquitos in Hawaii!!** Dealing with COVID-19 should be dangerous enough, why are you adding more potential dangers to our population? Please send me your reasons for releasing GMO mosquitos in Hawaii via my email. If not, I will formally FOIA request your agency for all information regarding GMO mosquitos!!

Sincerely,

Fay Kalei Kailikini
Hawaii Island resident

Ho, Jonathan K

From: Alan And Kathy Hart <[redacted]>
Sent: Tuesday, June 7, 2022 5:49 AM
To: HDOA.PQ.TESTIMONY
Subject: [EXTERNAL] Supporting the importation of the southern house mosquito innoculated with a Foreign Wolbachia bacteria species

To Whom it May Concern:

I 'm a naturalist with extensive field experience involving native Hawaiian forest birds. I'm well aware of the ongoing threat to these birds by avian disease carrying mosquitos. I support the introduction of southern house mosquitos innoculated with a Foreign Wolbachia bacteria as a reasonably safe and effective means of reducing or possibly eliminating these disease carrying vectors. Thank you.

Regards,
Alan D. Hart

Alan And Kathy Hart
[redacted]

Ho, Jonathan K

From: Karl Magnacca <[redacted]>
Sent: Tuesday, June 7, 2022 8:51 AM
To: HDOA.PQ.TESTIMONY; Ho, Jonathan K
Subject: [EXTERNAL] Testimony: Submission for listing and importation of three mosquitos

Aloha,

I am a professional entomologist in Hawaii, and am writing in my personal capacity. I strongly support the submission for placing the three mosquito species on the list of restricted animals and allowing importation of Wolbachia-infected mosquitos for population control. These mosquitos have caused massive disruption to both natural and human ecosystems through disease transmission, and control of their populations is urgently needed to prevent extinction of many of the remaining native birds. Because the Wolbachia strains being used are already present in Hawaii, they do not present a threat to native insects. I urge you to support this as the first of many steps that will be needed to restore our natural systems.

Mahalo,
Karl Magnacca

Ho, Jonathan K

From: J Rothe <[redacted]>
Sent: Tuesday, June 7, 2022 1:22 PM
To: HDOA.PQ.TESTIMONY
Subject: [EXTERNAL] Hawai'i Board of Agriculture Action on Proposal to Add Three Mosquito Species to List of Restricted Animals

To Whom It May Concern:

I'm writing to express my strong support for the addition of the three species of mosquito to the Restricted Species List A such that they may be imported to the state of Hawai'i, for release onto the landscape.

The extreme remoteness of these islands gave rise to an incredibly unique, incredibly special group of avifauna that are found literally nowhere else on earth. Their diversity easily rivals Darwin's famed Galapagos finches, and thousands of birders visit this state just for the chance to see our rare avian gems. But beyond the birds' economic impact, they also played an important role in the cultural history of these islands: they are specifically named in He Kumolipo, the people incorporated them into their mele and hula, and their feathers decorated the shoulders of the ali'i. The very forests of Hawai'i are perpetuated in part by these pollinators and seed dispersers. In myriad ways, the Hawaiian honeycreepers *are* Hawai'i.

But island species are a vulnerable class. In our own islands, numerous human-introduced threats have already wiped out dozens of our native species from the face of the earth, and several are currently poised at that very brink. Kaua'i's own 'akikiki in particular has undergone precipitous population drops even over the last few years. Having had the privilege of observing these endearing birds in the wild, traveling in pairs and quietly chattering to each other all day, it is an understatement to say it's heartbreaking hearing the increasingly bleak news from my friends working on the forest bird project.

We already knew mosquito-borne diseases were a problem for our native forest birds decades ago and they are easily the biggest threat facing our birds today. It is well past time to act. This is absolutely a dire emergency, and right now we have the scientific tools available to us to finally start curbing the mosquito populations on the landscape through *naturally occurring, non-GMO methods*.

Our patient is essentially bleeding out on the floor here. Time to get the ambulance going with its sirens: list the mosquitoes.

Respectfully,
Jen Rothe, Eleele Kaua'i

Ho, Jonathan K

From: mike melzer <[redacted]>
Sent: Wednesday, June 8, 2022 11:53 AM
To: HDOA.PQ.TESTIMONY
Subject: [EXTERNAL] Hawai'i Board of Agriculture Action on Proposal to Add Three Mosquito Species to List of Restricted Animals

Dear Hawaii Board of Agriculture,

I am writing in support of any action that allows the introduction pest mosquito species that have altered genomics and/or microbiomes (including symbionts) for the purpose of controlling populations of these same species that are established in Hawaii. As a microbiology researcher who has worked on the metagenomics of plant and insect species in Hawaii for decades (but not specifically mosquitoes), I do not understand the controversy of these approaches, nor the merit of arguments (often based largely on emotion or a misunderstanding of the science involved) against these tools. In the specific case of introducing mosquitoes for the control of avian diseases, humans are responsible for the threat of extinction so many native birds face. It is past time we act on their behalf using scientifically-sound approaches and not cater to the "I don't know what it is, so I'm against it" argument. Our duty to act far outweighs any perceived risks.

Thank-you
Mike.

Ho, Jonathan K

From: Deanna Wentworth <[redacted]>
Sent: Wednesday, June 8, 2022 5:59 PM
To: Ho, Jonathan K
Subject: [EXTERNAL] Release of genetically manipulated mosquitos

Aloha Mr Ho.
I am writing to ask you to please consider with your team not releasing genetically modified mosquitoes.

I live in an agricultural area in lower Puna and I am not in support of any kind of release of foriegn and or genetically altered things into our precious atmosphere here in Hawaii.

Haven't we seen enough of introducing foreign species into our environment? I live and own a lovely piece of land for the last 35 years in lower Puna and I have watched so many invasive species overtake this area. Releasing GMO creatures into our environment is a betrayal of your duties.
Introduction of an experimentally genetically manipulated insect onto our 'aina ? This represents insanity. It surely must be yet another example of 'profits before common sense. "

This is yet another huge risk you and the Department of Health and Department of Ag are taking by considering such a risky experiment.

I just heard about this yesterday and no one in my neighborhood knows anything about it. You need to hear from the public before doing something so controversial.

We all feel when you all released those bees many years ago to get rid of Strawberry guava trees and instead they attacked other things(maybe Ohia) and never hurt the Strawberry Guava at all.

I reference this article about the Oxitec experimental release programs:
https://conservativeplaylist.com/2022/05/28/billions-of-ge-mosquitoes-released-health-risks-ignored/

Please read this as it provided important information on previous GMO Mosquito releases.
I would add that the same lack of infection in Hawaii will also make the findings of 'success' inconclusive. With no way to prove success the risks are even more unacceptable.

There are many reasons we have to oppose the release of GMO mosquitoes here in Hawaii. You and the entire State of Hawaii Government must bear liability should anything go wrong.

Please vote that there has not been sufficient consideration of the risk and that this must NOT proceed.

Mahalo nui
Deanna Wentworth
Homeowner in lower Puna since 1985
Mother of 4 and grandmother of 8
Licensed Teacher in Hawaii
[redacted]

Ho, Jonathan K

From: Emma Fujimoto <[redacted]>
Sent: Wednesday, June 8, 2022 9:42 PM
To: Ho, Jonathan K
Subject: [EXTERNAL] GMO Mosquitoes Being Released In Hawaii

Aloha,
I completely disagree with this action for these reasons below!
If too much of the population is infected with Wolbachia, the technique will no longer be effective.
How is this being funded and where are the targeted areas?
There is no way to measure the impact on public health without present infections and a way to trace transmission.
https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8592615/
The Risks of Wolbachia Mosquito Control
"Arthropods present complex and misunderstood ecological relationships, and alternations in reproductive parameters of non target species can generate ecological disturbances"
https://www.science.org/doi/10.1126/science.351.6279.1273-b
Releasing GE Mosquitoes in the Wild Is a Bad Idea
Residents are right to be concerned about the release of GE insects in their backyard, as the outcome of this reckless experiment remains completely unknown, and the EPA has been less than transparent about its analysis of the data. According to Sustainable Pulse:29
Unfortunately, the EPA did not publicly share its entire public health analysis, and data about allergenicity and toxicity were redacted from public documents. EPA's key environmental assessments were also insufficient and did not mandate scientific tests using caged trials ahead of environmental release."
https://conservativeplaylist.com/2022/05/28/billions-of-ge-mosquitoes-released-health-risks-ignored/
Mahalo,
Emma F

Ho, Jonathan K

From: Katherine McClure <[redacted]>
Sent: Wednesday, June 8, 2022 4:33 PM
To: Ho, Jonathan K
Subject: [EXTERNAL] Hawai'i Board of Agriculture Action on Proposal to Add Three Mosquito Species to List of Restricted Animals
Attachments: HDOA Plant and Animal Advisory Committee_Testimony in support of adding Culex to Restricted Species List A_McClure.docx

Testimony to
HDOA Plant and Animal Advisory Committee
In support of the Listing, Import, and Permit Conditions of three species of mosquitoes
Thursday, June 9, 2022

Aloha Members of the Plant and Animal Advisory Committee,

It is with a great sense of urgency that I write in **support** of the the listing, importation, and establishing permit conditions for field release of southern house mosquito (*Culex quinquefasciatus*), Asian tiger mosquito (*Aedes albopictus*), and yellow fever mosquito (*Aedes aegypti*). Avian malaria is the single most pressing threat to the persistence of native Hawaiian honeycreepers, and without the rapid implementation of southern house mosquito control techniques using *Wolbachia*-infected mosquitoes, threatened and endangered Hawaiian honeycreeper species will undoubtedly be lost to extinction in the decades to come. For the critically endangered ʻakikiki and ʻakekeʻe on Kauaʻi and the ʻākohekohe and kiwikiu on Maui, the time frames to extinction due to avian malaria are even shorter.

The actions requested by the Hawai'i Department of Land and Natural Resources and Hawai'i Department of Health are a key step towards saving our endangered forest birds using *Wolbachia*-inoculated mosquitoes that will function as mosquito "birth control." Once these species are on the Restricted Animals (Part A) List, the next step is being able to import the *Wolbachia*-inoculated mosquitoes, and then deploy them in the field according to the permit conditions established by the Board. With repeated mass releases of infected male mosquitoes in the wild, this landscape-level mosquito control method will suppress vector populations, greatly reducing avian malaria transmission in native bird communities at risk of disease, and allowing these endangered bird species to survive. This series of actions has repeatedly been shown to safely suppress mosquito numbers and reduce disease transmission in the wild in other locations. Therefore, it is crucial that DLNR be able to import the large number of male mosquitoes needed to successfully implement mosquito suppression in the forests of Hawai'i to protect our native birds.

I would like to highlight to the committee that using *Wolbachia*-infected mosquito releases to control disease-carrying mosquitoes in Hawaii is **both safe and would be effective.** Field trial releases of *Wolbachia*-transinfected *Aedes* and *Cx. quinquefasciatus* in other continental and oceanic island systems demonstrate the safety and efficacy of these methods. The proposed technique **does not modify the genes of mosquitoes or *Wolbachia***. It is similar process to taking anti-biotics then eating pro-biotics to replace the existing community of bacteria with a different community within your stomach.

We must address this conservation crisis before it is too late for this beloved group of culturally important Hawaiian birds found nowhere else in the world. I strongly **support** this request.

Mahalo for your time and consideration,

Katherine

Katherine McClure, Ph.D.

Postdoctoral Researcher
University of Hawai‘i at Hilo - Hawai‘i Cooperative Studies Unit and
U.S. Geological Survey - Pacific Island Ecosystems Research Center
[redacted] / [redacted]

Ho, Jonathan K

From: Christine Ahia <[redacted]>
Sent: Wednesday, June 8, 2022 4:57 PM
To: Ho, Jonathan K
Subject: [EXTERNAL] Three mosquito species to be listed
Attachments: Document.docx

Sent from my iPad

Aloha Mr. Jonathan Ho,

As an avid birdwatcher and volunteer conservationist, I'm extremely concerned with the amount of our native endemic birds dying due to avian malaria and avian pox. So I'm writing to express strong support for the listing of the Asian Tiger, Yellow Fever, and Southern House Mosquitos on the restricted speies list.

As our climate is warming, these mosquitos travel up to higher elevations, following our endemic birds to continue to bite and infect them. They also prevent the establishment of endemic species in lower elevations across our islands, and carry diseases that can infect humans as well. All Hawai'i mosquitos are non-native and controlling their populations will have a positive effect on native wildlife and our communities.

By placing these three mosquito species on the critical species list, this action will allow for the crucial import of male mosquitos for use in the incompatible male technique. This method of mosquito control has been used for decades worldwilde and is important to save over a dozen of our imperiled native birds, uses naturally occurring bacteria already found in Hawai'i, and does not require the application of pesticide or genetic modification. There will be no target effects for this method.

Mahalo nui for your time and your support of this very crucial action. It's an important step for returning to a mosquito-free Hawai'i, which will be enjoyed by everyone here.

Aloha a hui hou,
Christine Ahia

Ho, Jonathan K

From: Benjamin Ostrander <[redacted]>
Sent: Wednesday, June 8, 2022 5:11 PM
To: Ho, Jonathan K
Subject: [EXTERNAL] Mosquito

Aloha Mr. Jonathan Ho,

I am writing today to express strong support for the listing of three mosquito species on the list of restricted species.

This action will allow for the critical import of male mosquitoes for use in the incompatible male technique. This method of mosquito control which has been used for decades all across the world is critical for saving over a dozen of our imperiled native birds, uses naturally occurring bacteria already found in Hawai‘i, and does not require the application of pesticide or genetic modification.

All mosquitoes in Hawai‘i are non-native or invasive and controlling their populations in this way will have no non-target effects and will only positively affect native wildlife and our communities.

Mahalo nui for your time and support of this critical action. This is an important step for returning to a mosquito free Hawai‘i

-Benjamin Ostrander

Sent from my iPhone

Ho, Jonathan K

From: Bret Mossman <[redacted]>
Sent: Wednesday, June 8, 2022 7:44 PM
To: Ho, Jonathan K
Subject: [EXTERNAL]

Aloha Mr. Jonathan Ho,

I am writing today to express strong support for the listing of three mosquito species on the list of restricted species.

This action in an important step towards use of male mosquitoes in the incompatible male control technique. This method of mosquito control which has been used for decades all across the world for public health, is critical for saving over a dozen of our imperiled native birds, uses naturally occurring bacteria already found in Hawai‘i, and does not require the application of pesticide or genetic modification.

All mosquitoes in Hawai‘i are non-native or invasive and controlling their populations in this way will have no known non-target effects and will only positively affect native wildlife and our communities.

Mahalo nui for your time and support of this critical action. This is an important step for returning to a mosquito free Hawai‘i.

Mahalo nō,

Bret Nainoa Mossman

Ho, Jonathan K

From: [redacted]
Sent: Wednesday, June 8, 2022 5:50 PM
To: Ho, Jonathan K
Subject: [EXTERNAL] Release of GMO Mosquitoes

Hi Jonathan,
I'm very concerned about this experiment without the voters not being informed about the consequences and effects of this to our people and our islands.
Please vote against releasing these gmo mosquitoes! It's important to know what this experiment entails before decisions are made.
Aloha.
Maria Cecilia Stephens
Sent from my iPhone

Ho, Jonathan K

From: Steve Robertson <[redacted]>
Sent: Wednesday, June 8, 2022 9:03 PM
To: HDOA.PQ.TESTIMONY
Subject: [EXTERNAL] Birds / mosquitoes

I am writing to express my strong support for the project to control mosquitoes and there by reduce the existential threat to native birds in Hawaii.

Thank you for supporting this effort.

Steve Robertson
Kula

Sent from my iPhone

Ho, Jonathan K

From: Laurie Bauers <[redacted]>
Sent: Sunday, May 29, 2022 1:00 PM
To: Ho, Jonathan K
Subject: [EXTERNAL] No to GMO mosquitoes

Aloha Mr. Ho
I am writing to you as a concerned resident of Hawaii urging you to NOT ALLOW a genetically modified organism in the form of this mosquito to be released into nature. Humans are playing God and without sufficient studies on the subject it is extremely dangerous and reckless to be meddling in such business.
I will continue to monitor this agenda and inform my community that this is taking place.
Thank you for listening and doing the right thing. Being PONO with your actions is your first priority in your line of work.
Thank you.
Laurie Bauers

Ho, Jonathan K

From: Fran Copp [redacted] >
Sent: Wednesday, June 15, 2022 6:50 AM
To: Ho, Jonathan K
Subject: [EXTERNAL] NO to Releasing of GE Mosquitoes!

Please don't allow gmo mosquitoes to be released in Hawaii. This is a gross misrepresentation of Aloha and can only occur when greed and money supervise Aine.

Fran Copp

Ho, Jonathan K

From: Emma Stierhoff <[redacted]>
Sent: Monday, June 13, 2022 3:38 PM
To: Ho, Jonathan K
Subject: [EXTERNAL] Please help protect native birds

Aloha Mr. Ho,

It is my understanding that there has been legislation proposed to add three additional mosquito species to the list of restricted animals in Hawai'i. As someone who has witnessed the decline of native birds here in Hawai'i directly resulting from the spread of avian malaria, I cannot overstate the urgency with which we must act to protect our native birds. Restricting mosquito species will help prevent the spread of avian malaria, and enable conservation efforts that will protect native birds. We cannot continue watching our native birds die while we debate politics; we must act now. Please support the efforts to add the proposed mosquito species to the list of restricted animals.

Mahalo nui for your time,
Emma Stierhoff

--
Emma Stierhoff (she/her)
Graduate Assistant & Master of Science Student
Tropical Conservation Biology and Environmental Science
University of Hawai‘i at Hilo

Ho, Jonathan K

From: Philip Park <[redacted]>
Sent: Monday, June 13, 2022 10:46 AM
To: Ho, Jonathan K
Subject: [EXTERNAL] NO to Releasing of GE Mosquitoes!

Please do not release GMO mosquitos into our environment without more studies as to the safety of the plan. Thank you.

Dr. Philip D Park,DDS

Ho, Jonathan K

From: Davielynn Briones <[redacted]>
Sent: Monday, June 13, 2022 10:24 AM
To: Ho, Jonathan K
Subject: [EXTERNAL] Save our Native Birds- H.R.2773

Aloha,

I am writing to express my support of H.R.2773 - Recovering America's Wildlife Act. I feel strongly that our native and endangered species should have a very high level of priority in our islands right now. This act would provide funds for scientifically supported solutions, solutions based on evidence, to be implemented and furthered.
The data reports are very clear on the dire nature of the situation. It is vital we fund the work of conservation because the extinction of multiple species, known only to exist here in Hawai'i, hinges on humans making the tough decisions and doing the right things to protect this fragile ecosystem we call home. Hawai'i bears the ugly distinction of being, "The Extinction Capital of the World," which means we should, all the more, be leading the way in global conservation.

Do we really want to wake up one morning and hear the news that we have lost the last 'i'iwi? How would we feel if we could only describe monk seals and sea turtles to our youngest family members and know they'll never see one for themselves because they are all gone? How would we feel knowing we didn't do everything in our power to save them?

These animals attract tourism dollars for our economy but more importantly, they are valuable to Hawaiian culture, Hawaiian history, and Hawaiian identity. We should celebrate them because they are precious and many only exist here in these magnificent islands. They need our help and we will surely regret not meeting these challenges with decisive action if they disappear forever. Please vote in support!

Thank you sincerely for your time,

Ho, Jonathan K

From: Tara Rojas <[redacted]>
Sent: Sunday, June 12, 2022 12:06 PM
To: Ho, Jonathan K
Subject: [EXTERNAL] Protect our 'i'iwi

Aloha, e Jonathan,
Please protect our native birds like the 'i'iwi from extinction - help them to flourish, their, and grow in numbers. Bring in the mosquito birth control as well as adding the mosquito species to the list of restricted animals.

Mahalo nui on behalf of our bird people.
Mālama pono,
Tara Rojas

Ho, Jonathan K

From: Alice Abellanida [redacted] >
Sent: Sunday, June 12, 2022 8:33 AM
To: Ho, Jonathan K
Subject: [EXTERNAL] GMO Mosquitos

I am vehemently opposed to releasing GMO Mosquitos in Hawaii, or anywhere, for that matter! We do not know the long term side effects of affecting the ecological balance.
Do not experiment with nature.

Alice Abellanida
Waianae

Sent from my Verizon, Samsung Galaxy smartphone
Get Outlook for Android

Ho, Jonathan K

From: betty plevney.com <[redacted]>
Sent: Friday, June 10, 2022 11:47 AM
To: Ho, Jonathan K
Subject: [EXTERNAL] Please list three mosquito species on the Restricted Species List A

Aloha e Mr. Ho,

I am writing today to express strong support the listing of three mosquito species on the Restricted Species List A.

This action will allow for the critical import of three species of male mosquitoes, which are already present in Hawaii, for use in the incompatible male technique. This method of mosquito control which has been used for decades all across the world is critical for saving over a dozen of our imperiled native birds. It uses naturally occurring bacteria called Wolbachia that is incompatible with the strain of Wolbachia currently found in wild mosquitoes in Hawai'i. already found in Hawai'i, and does not require the application of pesticide or genetic modification. It will help stop the avian malaria that is killing our endangered Hawaiian honeycreeper species, some of which have fewer than 100 individuals alive in the wild and are expected to go extinct within two years.

All mosquitoes in Hawai'i are non-native or invasive and controlling their populations in this way will have no non-target affects and will only positively affect native wildlife and our communities.

Mahalo nui for your time and support of this critical action. This is an important step for returning to a mosquito free Hawai'i.

Na'u me ke mahalo,
na Elizabeth Plevney

Ho, Jonathan K

From: Claudia Rohr <[redacted]>
Sent: Friday, June 10, 2022 10:40 AM
To: Ho, Jonathan K
Subject: [EXTERNAL] Comments about release of GMO mosquitos. Did you submit an EA or EIS about Mosquito release? See attached case law

Aloha Jonathan- Did you submit an EA or EIS about Mosquito release and I missed it?Obviously the mosquitos will be using State land. If two laws can be given effect the courts will find you must do so. If See, Ohana Pale KE EO v Board of Agriculture:

Claudia Rohr
[redacted]

https://scholar.google.com/scholar_case?case=15367678969190578919&q=%E2%80%9C343-5(a)%E2%80%9D&hl=en&as_sdt=4,12

Sent from my iPad

Ho, Jonathan K

From: Lindsey Fritz <[redacted]>
Sent: Friday, June 10, 2022 10:09 AM
To: Ho, Jonathan K
Cc: birdshawaiipastpresent@gmail.com
Subject: [EXTERNAL] Please Approve Mosquitos as Restricted Animals

Aloha Mr. Ho,

I am writing in protection of native birds and asking that you please kokua and approve the addition of three mosquito species to the list of restricted animals. Please allow for a permitting process to bring in mosquito birth control and take major steps toward protecting our native birds like ʻiʻiwi from extinction.

My ʻohana loves the forest, we spend a lot of time in the mountains and the decline in native birds over the generations is heart breaking. Please support our native forest life.

Mahalo nui, Lindsey Noelani Fritz and ʻohana

Ho, Jonathan K

From: [redacted]
Sent: Thursday, June 9, 2022 11:08 PM
To: Ho, Jonathan K
Subject: [EXTERNAL] Comments on Action to Protect our Native Bird Species

Aloha Mr. Jonathan Ho,

I am writing today to express strong support for the listing of three mosquito species on the list of restricted species.

This action will allow for the critical import of male mosquitoes for use in the incompatible male technique. This method of mosquito control which has been used for decades all across the world is critical for saving over a dozen of our imperiled native birds, uses naturally occurring bacteria already found in Hawai‘i, and does not require the application of pesticide or genetic modification.

All mosquitoes in Hawai‘i are non-native or invasive and controlling their populations in this way will have no non-target effects and will only positively affect native wildlife and our communities.

Mahalo nui for your time and support of this critical action. This is an important step for returning to a mosquito free Hawai‘i.

Sincerely,
Saty

Ho, Jonathan K

From: Hanakekua Joao <[redacted]>
Sent: Thursday, June 9, 2022 6:15 PM
To: Ho, Jonathan K
Subject: [EXTERNAL] Please vote to preserve our native species!

Aloha Mr. Jonathan Ho,

I am writing today to express strong support for the listing of three mosquito species on the list of restricted species.

This action will allow for the critical import of male mosquitoes for use in the incompatible male technique. This method of mosquito control which has been used for decades all across the world is critical for saving over a dozen of our imperiled native birds, uses naturally occurring bacteria already found in Hawai‘i, and does not require the application of pesticide or genetic modification.

All mosquitoes in Hawai‘i are non-native or invasive and controlling their populations in this way will have no non-target effects and will only positively affect native wildlife and our communities.

Mahalo nui for your time and support of this critical action. This is an important step for returning to a mosquito free Hawai‘i.

Sincerely,
Hanakekua Joao

State of Hawaii
Department of Agriculture
Plant Industry Division
Plant Quarantine Branch
Honolulu, Hawaii

June 28, 2022

Board of Agriculture
Honolulu, Hawaii

Subject: (1) Provided the Southern House Mosquito, *Culex quinquefasciatus,* is Placed on the List of Restricted Animals, Part A, Allow the Importation of Lab-Reared Strains of the Mosquito, *Culex quinquefasciatus* (Diptera: Culicidae), Inoculated with Strains of *Wolbachia* Bacteria, by Permit, For Immediate Field Release to Suppress Wild Populations of *Culex quinquefasciatus*, by the Hawaii Department of Land and Natural Resources; and

(2) Provided the Southern House Mosquito, *Culex quinquefasciatus,* is Placed on the List of Restricted Animals, Part A, Establish Permit Conditions for the Importation and Immediate Field Release of Lab-Reared Strains of the Mosquito, *Culex quinquefasciatus* (Diptera: Culicidae), Inoculated with Strains of *Wolbachia* Bacteria to Suppress Wild Populations of *Culex quinquefasciatus,* by the Hawaii Department of Land and Natural Resources.

I. Summary Description of the Request

PQB NOTES: *The Plant Quarantine Branch (PQB) submittal for requests for import or possession permits, as revised, distinguishes information provided by the applicant, Suzanne Case, from procedural information and advisory comment and evaluation presented by PQB. With the exception of PQB notes, hereafter "PQB NOTES," the text shown below in section III from page 4 through page 18 of the submittal was taken directly from the applicant's application and subsequent written communications provided by the applicant. For instance, the statements on pages 13 through 15 regarding effects on the environment are the applicant's statements in response to standard PQB questions and are not PQB's statements. This approach for PQB submittals aims for greater applicant participation in presenting import requests in order to move these requests to the Board of Agriculture (Board) more quickly, while distinguishing applicant provided information from PQB information. The portion of the submittal prepared by PQB, including the procedural background, summary of proposed list additions, environmental assessment, proposed permit conditions and advisory*

review, are identified as sections II, IV, V, and VI of the submittal, which start at pages 3, 18, 19, and 24 respectively.

COMMODITY: Various Shipments of the Southern House Mosquito, *Culex quinquefasciatus* (Diptera: Culicidae), inoculated with Strains of *Wolbachia* Bacteria.

SHIPPERS: Stephen Dobson
MosquitoMate, Inc.
2520 Regency Road,
Lexington, Kentucky, 40503

Verily Life Sciences
269 E Grand Avenue,
South San Francisco, California 94080

IMPORTER: Suzanne Case, Chairperson
Hawaii Department of Land and Natural Resources
1151 Punchbowl Street, Honolulu, HI 96813

CATEGORY: *Culex quinquefasciatus* is currently an unlisted animal. Animals not found on any list are considered prohibited until placed on a list. Additionally, Chapter 4-71, Hawaii Administrative Rules (HAR), allows importation of unlisted animals into Hawaii under special permit for the purpose of remediating medical emergencies or ecological disasters, or conducting scientific research that is not detrimental to agriculture, the environment, or humans by special permit, on a case-by-case basis, as approved by the Board.

II. Procedural Background

DLNR has requested that one of the lists in Chapter 4-71, Hawaii Administrative Rules (HAR), be amended by Board Order to include the Southern House Mosquito, *Culex quinquefasciatus*. The species may be placed on the List of Conditionally Approved Animals, List of Restricted Animals (Part A or B), or the Prohibited List. Species on the Restricted and Conditionally Approved Lists may enter the State of Hawaii under permits with conditions approved by the Board. Until placement on a list, species are considered prohibited except as provided by Section 150A-6.2(c), Hawaii Revised Statutes (HRS).

Species on the List of Restricted Animals (Part A) are available for research by universities and government agencies, exhibition in municipal zoos and government-affiliated aquariums, and for other institutions for medical and scientific purposes as determined by the Board. All species listed for import require a permit for entry into the State.

Pursuant to HRS §150A-6.6, the Board has the authority to adopt administrative rules to make additions to or deletions from the lists required to be maintained under HRS §150A-6.1 through §150A-6.3, which include the List of Restricted Animals, Part A. Changes to the lists can be made without regard to the notice and public hearing requirements of HRS Chapter 91 provided that there is notice and opportunity for public input regarding additions or deletions to the lists.

HAR §4-71-4.2, "Public Input and Notification for Listing," details the specific process that the Board must follow to make a change to the lists maintained by PQB. It requires that, thirty days or more prior to the effective date of the Board order, the Hawaii Department of Agriculture (Department) issue a press release and mail a notice to the Office of Environmental Quality Control, now the Environmental Review Program, for publication and to all persons who have made a timely written request of the department for advance notice of the order or the Department's rulemaking proceedings.

Provided the Board acts favorably on this request for list placement by Board Order, the species will have been placed on a respective list and be eligible for import and/or possession. PQB can then process a permit application by having the Board approve the future importation and establishment of appropriate permit conditions for the organism and proposed purpose.

III. Information Provided by the Applicant in Support of the Application

Summary Description of the Requests
In accordance with the provisions of Chapter 150A, Hawaii Revised Statutes, we are requesting to import the following animal commodities:

Commodity	Scientific Name	Quantity
Southern House Mosquitoes (Male Adults)	*Culex quinquefasciatus*	Continued shipments for immediate release.

Additionally, we are requesting the listing of *Culex quinquefasciatus* mosquito species on the Hawaii Department of Agriculture's (HDOA) List of Restricted Animals Part A given that specific conditions, as outlined and enforced by HDOA, are met at the time of importation. Suggested conditions for importation are included within this application.

Reason for importation:

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For immediate field release applications to suppress mosquito populations in areas where Hawaii fauna are at risk of disease transmission due to the presence of these mosquitoes.

Shippers:

1) Stephen Dobson, MosquitoMate, Inc.
   2520 Regency Rd., Lexington, KY, 40503

2) Verily Life Sciences
   269 E Grand Ave, South San Francisco, CA 94080

Importers:

1) DLNR Waimano Baseyard – Hawaii Invertebrate Program - Oahu
   2680 Waimano Home Road, Pearl City, HI 96782, (808) 266-7989
2) Kaua'i Branch, Division of Forestry & Wildlife, 3060 Eiwa Street Rm. 306, Lihue, HI 96766. (808) 274-3433
3) O'ahu Branch, Division of Forestry & Wildlife, 2135 Makiki Heights Drive, Honolulu, HI 96822. (808) 973-9778
4) Maui (& Moloka'i) Branch, Division of Forestry & Wildlife, 1955 Main Street, Room 301, Wailuku, HI 96793. (808) 984-8100

5) Hawai'i Branch, Division of Forestry & Wildlife, 19 E. Kawili Street, Hilo, HI 96720. (808) 974-4221

Project:
This is an application for:

- A permit to import male *Culex quinquefasciatus* mosquito species.
- The listing of *Culex quinquefasciatus* mosquito species on the Hawaii Department of Agriculture's (HDOA) List of Restricted Animals Part A given that specific conditions, as outlined and enforced by HDOA, are met at the time of importation. Suggested conditions for importation are included within this application.

As outlined in the suggested conditions for importation, these mosquitoes will either contain the same wild type bacterium (*Wolbachia* spp.) which is already endemic in *Culex quinquefasciatus* mosquitoes in Hawaii, or will be inoculated with an incompatible bacterium (*Wolbachia* spp.) that is not native to the wild mosquito's current internal fauna. The presence of this different strain of bacteria within the male mosquito's reproductive system will render the imported male mosquitoes unable to successfully mate with wild females found within Hawaii, a process called cytoplasmic incompatibility. Cytoplasmic incompatibility has been used with much success in other parts of the world to reduce mosquito populations and thus reduce the potential of transmission of mosquito vectored diseases. We intend to import male, sexually

incompatible mosquitoes for direct release onto the environment. This process uses cytoplasmic incompatibility to reduce current populations of this pest mosquito species, which are vectors for pathogens to Hawaii's fauna, including pathogens such as avian malaria, and which can vector West Nile virus, and lymphatic filariasis to humans. Importing Hawaii lineage mosquitoes which contain the wild type bacterium, will ensure that we can conduct genetic analysis to confirm that the wild *Culex quinquefasciatus* is the wild type originally provided to the collaborators, and that the inoculated mosquitoes are indeed incompatible.

Culex quinquefasciatus is an invasive, disease-spreading mosquito that has dispersed across the Hawaiian islands since its accidental introduction in the 1800s. The species is present on Hawaii, Maui, Molokai, Lanai, Kahoolawe, Oahu, Kauai, and the northwest Hawaiian islands. *Culex quinquefasciatus* can thrive at sea-level to 4800ft in elevation. In Hawaii, the mosquito is able to transmit pathogens to native forest birds. The spread of avian malaria, in particular, has contributed to the extinction of more than half of Hawaii's endemic honeycreepers and continues to pose a risk to the remaining species. *Culex quinquefasciatus* is also known to transmit dog heartworm within pets found throughout Hawaii, and is a concern to human health given its ability to vector West Nile virus on the US mainland and lymphatic filariasis in other Pacific nations.

Efforts to suppress *Culex quinquefasciatus* through utilization of traditional vector

control methods (*e.g.,* pesticides) are inadequate at a landscape scale, and may be problematic for other non-target state and federally protected invertebrate species including Hawaiian picture-wing flies (*Drosophila* spp.), damselflies (*Megalagrion* spp.), yellow-faced bees (*Hylaeus* spp.) and anchialine pond shrimps (*Vetericaris chaceorum* and *Procaris hawaiana*). Current efforts to control mosquito-vectored disease outbreaks are limited to reducing mosquito breeding site locations and localized applications of various larvicides and adulticides.

On September 6-7, 2016, local, national, and international experts gathered in Hawaii to discuss how to mitigate mosquito-borne diseases. The strategy deemed most favorable in terms of its effectiveness, technical readiness, and safety was *Wolbachia*-based cytoplasmic incompatibility. Cytoplasmic incompatibility results from the presence of a bacterium, *Wolbachia*, in the cells of the mosquito. Many arthropod species, including several native species here in Hawaii, naturally contain strains of *Wolbachia.* Bacteria in the genus *Wolbachia* are a type of arthropod endosymbiont that do not occur in humans orother vertebrates. Approximately 50% of insect species naturally have the bacteria, although many of these insects can survive without *Wolbachia*. Conversely, *Wolbachia* cannot persist outside of insect cells, as it is an obligate endosymbiont. The largest effect of *Wolbachia* is on mating compatibility between individual insects that carry the bacteria. However, there are secondary effects that are being studied by many labs. These include altered host insect lifespan and reduced vector competence.

In nature, *Wolbachia* are passed from females to their offspring. Different strains of

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Wolbachia have also been introduced into insects in laboratories. If a male mosquito with one type of *Wolbachia* mates with a female mosquito that has a different strain of *Wolbachia* the resulting offspring can be inviable and not develop into mosquito larvae because of a mismatch of cellular signals (loss of the male parental chromosomes) originating from *Wolbachia*. If sufficient numbers, on the order to 10 times the wild population size, of male mosquitoes of a different *Wolbachia* type are released, wild females are more likely to mate with males of a different *Wolbachia* type and are predicted to have far fewer viable offspring. With subsequent releases, this process can significantly suppress the wild population numbers of mosquitoes over the following generations over a geographic area. *Wolbachia* male-based insect control programs have beenhighly successful for reducing local mosquito populations around the world. Results of initial trials in Fresno, California showed decrease of biting *Ae. aegypti* females by 68%, 95%, and 84% during the peak mosquito seasons in 2017, 2018, and 2019 respectively. *Wolbachia* cannot be spread by the released males, because *Wolbachia* are only passed from mother to offspring. It is also worth noting that male mosquitoes do not bite or vector disease.

One way to generate mosquitoes with a different *Wolbachia* type, is by clearing the naturally-occurring *Wolbachia* strain from the mosquitoes using the antibiotic tetracycline. Then *Wolbachia* can be harvested from cells of another insect species (this can be another mosquito or a non-mosquito species) and introduced into the cleared

mosquitoes via microinjection. Another method to establish new *Wolbachia* strains is to mate a *Wolbachia*-carrying female insect to males that have been cleared of their naturally-occurring *Wolbachia* via antibiotic treatment. Because *Wolbachia* are maternally inherited (described above), this cross results in all of the offspring inheriting whichever *Wolbachia* strain is contained in the female parent. Incompatible Wolbachia strains can also be naturally present in populations of mosquitoes.

The first shipper listed within this import application, MosquitoMate Inc., holds the US patent, Patent No.: US 7,868,222 B1, for the method of producing an artificial infection in Culicidae species.
(https://patentimages.storage.googleapis.com/55/da/ae/d7cb8b9cb44599/US7868222.pdf)
Additionally, MosquitoMate Inc. offers a commercially available, *Wolbachia* infected male mosquito product for purchase to suppress *Aedes albopictus* mosquito populations via cytoplasmic incompatibility. This product, ZAP Males®, has been reviewed and registered under the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA). ZAP Males® are a labeled pesticide product with the EPA registration number 89668-4. This product currently has a restriction that only allows for its application in specific states, which does not currently include Hawaii. We reference this, as it is the only registrant in the US currently with a *Wolbachia* mosquito product currently in process of registration with the EPA.
(https://www3.epa.gov/pesticides/chem_search/ppls/089668-00004-20171103.pdf)

The second shipper listed is Verily Life Sciences, a CA based company which is in the process of working with a different incompatible *Culex quinquefasciatus*. This company is initiating consultations with the EPA relating to this different *Wolbachia* mosquito and will provide additional information directly to HDOA as needed.

Culex quinquefasciatus mosquito eggs originating from Hawaii stock (aka collected from field sites in Hawaii) have been provided to MosquitoMate and Verily for development and testing of cytoplasmic incompatibility. These mosquitoes have been crossed with female mosquitoes carrying a different *Wolbachia* species as outlined above. These mosquitoes have then been backcrossed with a separate population of mosquitoes originating from Hawaii stock over at least seven generations to ensure Hawaii's wild mosquito genetics are >99% contained within a commercially available product to be applied within Hawaii.

Generations	HI Mosquito Genetics	Crossed MosquitoMate Genetics
0	100.00%	100.00%
1	50.00%	50.00%
2	75.00%	25.00%
3	87.50%	12.50%
4	93.75%	6.25%
5	96.88%	3.13%
6	98.44%	1.56%
7	99.22%	0.78%
8	99.61%	0.39%
9	99.80%	0.20%
10	99.90%	0.10%

On January 17, 2017, the Hawaii Invasive Species Council, an inter-departmental collaboration of the Departments of Land and Natural Resources (DLNR), Agriculture (HDOA), Health (HDOH), Transportation (DOT), Business, Economic Development & Tourism (DBEDT), and the University of Hawaii (UH) passed resolution17-2, specifically pertaining to mosquitoes. Resolution 17-2, entitled, "Supporting Evaluation and Implementation of Technologies For Landscape-Scale Control of Mosquitoes, With a Focus On Mitigating Both Human and Wildlife Health Risks," recognizes that mosquitoes in the State of Hawaii are non-native and an important pest species to control. The resolution supports the implementation of evaluated technologies that are

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scientifically demonstrated as safe, effective control measures for mosquitoes. (https://dlnr.hawaii.gov/hisc/files/2013/02/HISC-Reso-17-2-signed.pdf).

House Resolution (HR) 297 passed the Hawaii State House in 2019 and further directed "DOA to review the *Aedes aegypti* mosquito with *Wolbachia* bacteria, including *Aedes aegypti* mosquitoes originating from Hawaii stock that could be imported for landscape scale mosquito control, and render a determination to place it on the appropriate animal import list. Requires DOA, DOH, and DLNR to collaborate on a report to the Legislature with recommendations for appropriate vector control programs." (https://www.capitol.hawaii.gov/session2019/bills/HB297_SD1_.htm)

Additionally, House Resolution (HR) 95 passed the Hawaii State House in 2021 urging DLNR, DOA, DOH and UH to implement a mosquito control program using *Wolbachia* to reduce mosquito population levels throughout the state. (https://www.capitol.hawaii.gov/session2021/bills/HR95_HD1_.htm)

It should be noted that this project has been developed with the full support of, and will be implemented in close coordination with, the Hawaii Department of Health Vector Control Branch. Per Hawaii Revised Statutes §26-13, the Department of Health "shall administer programs designed to protect, preserve, care for, and improve the physical and mental health of the people of the State." DOH has the authority in Hawaii relating

to mosquitoes and public health, and their staff have decades of expertise to implement mosquito surveillance, control and abatement programs.

Proposed Required Conditions for Importation via HDOA List of Restricted Animals Part A

Included are proposed conditions, suggested in collaboration with the HDOH Vector Control Branch, that could be required for importation if *Culex quinquefasciatus* mosquitoes are added to the HDOA List of Restricted Animals Part A to ensure any future imports meet safeguards to preserve public health, the environment, and the long-term efficiency of the IIT tool. All of the following suggested requirements would need to be met to obtain importation permitting.

Culex quinquefasciatus

1. Only mosquitoes originating from a Hawaii stock are allowed for importation.
2. Only mosquitoes containing the same wild-type bacteria as is already present in Hawaii, or a sexually incompatible *Wolbachia* bacteria compared against Hawaii's wild mosquito populations are allowed for importation.
3. Only adult male mosquitoes are allowed for importation.
4. Only individuals or organizations who have conducted work for EPA registration trials for mosquito biopesticide products and who can provide data on rearing and sorting methodologies are allowed to ship these mosquitoes to Hawaii.

5. Only individuals or organizations listed on the import application are allowed to import/receive these mosquitoes.
6. Only islands with established or incipient wild mosquito populations, as determined by the Hawaii Department of Health's Vector Control Branch, are allowed to import these mosquitoes.
7. All environmental review processes, including potential Environmental Impact Statements, Environmental Assessments, or other environmental compliance requirements as outlined by State Law and OEQC, must be completed or cited prior to importation.

PQB NOTES: *PQB has taken DLNR's proposed permit conditions and incorporated them into the conditions in section VI.*

Specific details for importation
This is an application for:

- A permit to import male, mosquito species: *Culex quinquefasciatus*.
- The listing of these mosquito species on the Hawaii Department of Agriculture's (HDOA) List of Restricted Animals Part A given that specific conditions, as outlined and enforced by HDOA, are met at the time of importation. Suggested conditions for importation are included within this application.

Within *Culex quinquefasciatus*, the strain of incompatible bacterium will be *Wolbachia wAlbA, Wolbachia wAlbB,* or *Wolbachia wPip4*. These *Wolbachia* bacterium are not present within the corresponding species of Hawaii's established mosquito population. The presence of this bacterium will make these males sexually incompatible with the wild, established female mosquitoes. Once imported, the male, sexually incompatible males will be released according to EPA and HDOA label directions to suppress the population of the established mosquito populations. Based on the prior use of this technology in California, Florida, and Kentucky, there are no data to suggest releases of these male mosquitoes to have a negative impact on agriculture, the environment, or public health and safety. Existing wild-type bacteria strain that may be imported is wPipV, which is already found on all of the main Hawaiian islands.

DISCUSSION:

1. <u>Persons Responsible:</u>

DLNR Chairperson, Suzanne Case
DOFAW Administrator, David Smith
DOFAW Entomologist, Cynthia King
Department of Land and Natural Resources – Oahu
1151 Punchbowl Street, Honolulu, HI 96813

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DLNR-DOFAW, Hawaii Invertebrate Program Captive Propagation Facility - Oahu
779 Ulukahiki Street, Kailua, Honolulu, HI 96813, (808) 266-7989

DLNR Waimano Baseyard – Oahu
2680 Waimano Home Road, Pearl City, HI 96782, (808) 266-7989

Kaua'i Branch Manager, Sheri Mann, Division of Forestry & Wildlife, 3060 Eiwa Street Rm. 306, Lihue, HI 96766. (808) 274-3433

O'ahu Branch, Division of Forestry & Wildlife, 2135 Makiki Heights Drive, Honolulu, HI 96822. (808) 973-9778

Maui (& Moloka'i) Branch, Division of Forestry & Wildlife, 1955 Main Street, Room 301, Wailuku, HI 96793. (808) 984-8100

Hawai'i Branch, Division of Forestry & Wildlife, 19 E. Kawili Street, Hilo, HI 96720. (808) 974-4221

2. <u>Locations and Safeguards:</u>

All mosquitoes for import will originate from Hawaii biotypes collected from

Hawaii. All mosquitoes will be backcrossed for at least 7 generations to ensure >99% Hawaii genetics are contained within the commercially available products to be applied within Hawaii. This backcrossing will also mitigate the risks of infections microorganisms and parasites to the mosquitoes via vertical transmission – thus lowering the risk of the mosquitoes accidentally introducing a new parasite or pathogen. In order for these mosquitoes to acquire and vector a disease, an adult female must blood feed from a disease infected vertebrate, and the pathogen must survive in the mosquito and be injected into another vertebrate during a subsequent blood feeding. As the intended importation of these mosquitoes only includes the importation of male mosquitoes that do not bite or feed on blood, the unintended importation of an acquired pathogen is eliminated. Verification of Hawaii biotypes and *Wolbachia* strains will be conducted on initial shipments of male mosquitoes to verify requirements have been met, in collaboration with University of Hawaii and Department of Health.

These mosquitoes will be imported into Hawaii through the use of commercial cargo flights. Upon reception to Hawaii, the male mosquitoes will be directly released into the laboratory for quality control testing, and into the environment for the purpose of suppressing the wild mosquito populations. These releases will be performed by individuals or organizations certified to apply these mosquito pesticide products to ensures that the product will be applied properly according to the recommended guidelines.

MosquitoMate and Verily will regularly sample release containers by releasing the contents into lab cages and then examining mosquito sex and number. There is an EPA reviewed value of 1 female release per 250,000 males with the MosquitoMate product. A similar value is likely to be estimated for *Culex quinquefasciatus* given that similar automation, engineering and machine learning technology is being applied to sex sorting. MosquitoMate and Verily have not previously identified a female in a single release container during the course of the Puerto Rico or Fresno projects. In another example, a published study estimates the probability at less than 1 female per 200 million males (Crawford JE, Clarke DW, Criswell V, Desnoyer M, Cornel D, Deegan B, et al. Efficient production of male Wolbachia-infected *Aedes aegypti* mosquitoes enables large-scale suppression of wild populations. Nat Biotechnol. 2020;38(4):482-92.) To date, PCR monitoring of mosquitoes collected from release field sites have not identified any ZAP infected females.

At least once per year, MosquitoMate and Verily will also conduct longevity and competitiveness studies, comparing the mosquitoes proposed for releases and wild type males. Data from previous trials demonstrate ZAP mosquito longevity and competitiveness to be at least equal to Wild Type males. In addition to Hawaii's import requirements, the shipper and/or receiver will obtain additional permits as required by federal or state agencies.

Wolbachia is an obligate endosymbiont and cannot survive outside of the host invertebrate. *Wolbachia* strains already exist in Hawaii in a range of invertebrates in the wild, including mosquitoes. The presence of *Wolbachia* endosymbionts is the normal state for 40% to 60% of Arthropods and does not represent an unusual or pathogenic bacterial infection. *Wolbachia* are not capable of infecting human cells. MosquitoMate and Verily will perform PCR testing on the mosquitoes to confirm the presence of the correct *Wolbachia* bacterium within the shipment lineage to ensure cytoplasmic incompatibility.

The likelihood that introduced strains of *Wolbachia* would become the dominant strains in the environment is highly unlikely. Replacing the dominant *Wolbachia* strain has been done purposefully in the environment for projects that are separate from the approach we are proposing (such as by the World Mosquito Program in Australia and other nations). To clarify, DLNR is NOT proposing a World Mosquito Program type project where the goal is to intentionally force a different dominant *Wolbachia* strain into the wild mosquitoes in the environment and change vector competence of the wild population. However, in these types of programs, they have to release 4 million mixed male AND female mosquitoes in a given location to force a new *Wolbachia* strain to become the dominate strain over an area of 66 km^2. Given the aforementioned EPA reviewed value of 1 female release per 250,000 males with the MosquitoMate product, such an outcome is not expected to occur.

If, somehow population replacement were to occur (despite the estimated 1 female release per 250,000 males) DLNR would cease releases as the released males would then be able to mate with the wild females with the established *Wolbachia* species. The outcome of this would be that the mosquito species that already exists in Hawaii would continue to exist in the wild, just with a different *Wolbachia* bacteria. We do not anticipate a different *Wolbachia* bacteria having any new or negative effects on the environment.

DLNR and DOH feel comfortable utilizing these mosquitoes at a very small scale (in remote forest habitat) or at a very large scale (across urban areas and island wide) so long as recommended application guidelines are followed. The scale and scope of the project will likely vary across time based on the funding available and mosquito prevalence. As with any pesticide product, if you do not eradicate the species of concern, they will rebound if you stop using the pesticide product. However, we view this as a beneficial aspect of the project as we also know we can stop the process at any time. Unfortunately, due to the critical nature of the declines of Hawaiian forest birds, we anticipate mosquito control becoming a long-term management action to be performed (similar to rat control and invasive weed control) annually.

Data collection will occur during releases using the State general funds as well as federal funds from partner agencies (USFWS, USGS, NPS), depending on who is performing the releases. As the application of the pesticide product is intended for the reduction of *Culex quinquefasciatus* mosquito populations, this monitoring will include extensive mosquito population surveillance following releases to ensure that populations are reduced. DLNR is already conducting this type of monitoring in preparation for incompatible mosquito releases. *Wolbachia* genetic monitoring will also occur, likely in partnership with USGS, throughout the release program.

In addition to Hawaii's import requirements, the shipper and/or receiver will obtain additional permits as required by federal or state agencies.

3. Method of Disposition

Any dead imported mosquitoes will be disposed of as municipal waste.

4. Abstract of Organism

Culicidae species are sexually reproducing species. Minimum generation times vary but are approximately three weeks. Mature adults are up to approximately a centimeter in length and can live for a month to a few months. Adult mosquitoes

range from 2.0 to 10.0 mm in size with males being smaller than females on average. Mosquito life cycles are well understood for most species, including all those established in Hawaii.

Larvae feed on organic material found in pools of water. Both adult males and females feed on water that contains carbohydrates (water with sap or nectar). Only mature females of certain species seek out and feed on vertebrate blood prior to egg laying. This blood feeding process allows for the transmission of pathogens and parasites.

Culex quinquefasciatus rely on pools of water with organic material for the growth of larvae. Only adult females bite, as they require blood meals from vertebrate hosts to develop their eggs.

5. Potential Impact to the Environment

Culex quinquefasciatus are already well established in the wild on all of the main islands in Hawaii from sea-level to ~6,000 feet in elevation. and *Culex quinquefasciatus* are established statewide and is well establish on Hawaii's Big Island. An additional five other "biting" non-native mosquito species have also become established: *Ae. albopictus, Ae. aegypti Ae. japonicus*, *Ae. vexans*, and *Wyeomyia mitchelli*.

Wolbachia are not infectious to humans and are vertically transmitted through the eggs from one generation to another. The *Wolbachia* bacteria are obligate endosymbionts and can only survive inside the insect host's cytoplasm. A mosquito transinfected with a different strain of *Wolbachia* that results in cytoplasmic incompatibility would not be able to successfully reproduce with a wild mosquito due to cytoplasmic incompatibility. Therefore, if individual mosquitoes did become temporarily established, then they will quickly die off over the following generations because of cytoplasmic incompatibility with wild mosquitoes of the same species, with which they would be expected to encounter and mate.

Through the importation we intend to only import male mosquitoes. The sex separation can be performed in a variety of manners including through computer recognition and separation of males and females or through pupal sorting of males and females. However, if both sexes of transinfected mosquito were to be accidently released, they are unlikely to maintain a breeding population of a transinfected mosquito. *Wolbachia* invasions into populations require a critical threshold frequency of infection that needs to be overcome before a novel *Wolbachia* infection can spread into a population. The *Wolbachia* infection rate must exceed 20-45% before it can spread and become established. This is evident in large scale releases such as in Cairns, Australia, where millions of transinfected mosquitoes (both sexes) with *Wolbachia* are released into the

environment to control disease transmission, yet they do not easily reach fixation in the wild. If transinfected mosquitoes were to become established, the establishment is likely to be spatially localized due to incompatibility with neighboring mosquito populations.

6. Potential Impacts of Importation

pro: Importation of male mosquitoes will allow the implementation of an evaluated technology that has been scientifically demonstrated as a safe and effective control method for mosquitoes on a landscape-scale. These are mosquitoes that are widespread in Hawaii and which have negative impacts to humans, wildlife, and pets, and are causing the extinction of native forest birds. Thirty species of main Hawaiian forest birds have become extinct since European contact, and another 11 of the 21 remaining species are federally listed as threatened or endangered. The remaining 21 forest bird species remain at great risk as a result of avian pox and avian malaria. Four honeycreeper species (Akikiki, *Oreomystis bairdi*; Akekee, *Loxops caeruleirostris*; Kiwikiu, *Pseudonestor xanthophrys* and Akohekohe, *Palmeria dolei*) are of particular concern – each are federally endangered, single-island endemics with highly restricted ranges, number fewer than 1,800 individuals, and display recent alarming population declines. DLNR and USFWS have previously attempted to address these declines through bold conservation actions, such as translocations

and establishment of captive populations; however agencies have met with only limited success due to rapidly changing disease-transmission conditions on the landscape. There is an urgent need to develop new conservation tools, including landscape-level mosquito control in order to prevent further extinctions.

The application of traditional chemical controls for mosquitoes in both natural areas is impractical and causes unacceptable non-target impacts, whereas IIT carries no non-target risks to native species, humans or the environment. Furthermore, mosquitoes were first introduced to the Hawaiian Islands in the 1800s, and while they are used opportunistically as prey items, no species native to Hawai'i are dependent on their presence for survival. The control of mosquito populations in Hawaiian forests would thus cause no negative impacts on Hawaiian species.

Demonstrated application of this approach in Hawaii would have also have a wide range of potential positive effects in that it may facilitate the incompatible insect technique approach being used for human health.

con: It is hard to imagine any negative effects since the species is already established in Hawaii. Importing these organisms will not have any foreseeable beneficial effect to this mosquito species already found in Hawaii. The introduction of, for example, increased genetic variation within the mosquito

species will be minimized by crossing the lines to mosquitoes originating from Hawaii.

The presence of unintended accompanying microbiota is minimized by the sterile laboratory rearing conditions used. These mosquitoes have been maintained for many generations in the lab environment and have not had the opportunity to obtain pathogens from the wild from blood feeding. The presence of intended microbiota, the *Wolbachia,* potentially has very positive effects on the societal health, the suppression of human disease vectored by mosquitoes, the environment, via population suppression of mosquitoes that vector avian pathogens, and the economy, through the potential increased tourism and lessened disease burden.

This mosquito species is already well established in Hawaii, as are many different strains of *Wolbachia*. MosquitoMate and Verily have a demonstrated track record of success utilizing sex-sorting methods which are highly effective. In the event that technical difficulties did occur during sex-sorting methods, because of cytoplasmic incompatibility, the escape of female mosquitoes carrying a new *Wolbachia* strain is not expected to be stable over the following generations. Laboratory reared females outcrossing to locally established wild male mosquitoes will result in cytoplasmic incompatibility and the failure of offspring to develop.

There is an extensive body of literature surrounding this mosquito species, its impact upon Hawaii, and Wolbachia-mediated cytoplasmic incompatibility.

References:

Information on *Wolbachia,* with a focus on cytoplasmic incompatibility within mosquitoes:

Atyame, C. M., Cattel, J., Lebon, C., Flores, O., Dehecq, J.-S., Weill, M., Gouagna, L. C. & Tortosa, P. (2015) Wolbachia-based population control strategy targeting*Culex quinquefasciatus* mosquitoes proves efficient under semi-field conditions. *PLoS ONE* 10, e0119288.

Atyame, C. M., Labbé, P., Lebon, C., Weill, M., Moretti, R., Marini, F., Gouagna, L.C., Calvitti, M. & Tortosa, P. (2016) Comparison of irradiation and Wolbachia based approaches for sterile-male strategies targeting *Aedes albopictus*. *PLoS ONE* 11, e0146834.

Barton, N. H., & Turelli, M. (2011). Spatial waves of advance with bistable dynamics:cytoplasmic and genetic analogues of Allee effects. The American Naturalist, 178(3), E48-E75.

Blagrove, M. S., Arias-Goeta, C., Failloux, A. B., & Sinkins, S. P. (2012). Wolbachia strain wMel induces cytoplasmic incompatibility and blocks

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IV. Environmental Assessment (EA):

Pursuant to a May 2008 Hawai'i Intermediate Court of Appeals decision ('Ohana Pale Ke Ao v. Board of Agriculture, 118 Haw. 247 (Haw. App. 2008), the Department of Agriculture's (Department's) import permit process is subject to the requirements of the Hawai'i Environmental Protection Act, chapter 343, Hawai'i Revised Statutes (HRS). Under this decision, the requirement for an EA as a condition of the import permit or related authorization applies in those circumstances where the underlying permit activity for the importation initiates a "program or project" and where the use of state or county funds or state or county lands is involved. When those circumstances are present, as they appear to be when a new organism is used in a new program or project located at a facility located at UHM or UHH (state lands), an EA is required to determine whether the proposed project or program is likely to have a significant impact on the environment. However, certain activities may be eligible for "exemption" under provisions established through the Environmental Advisory Council, provided that the project or program is determined to have little or no impact on the environment.

Analysis of Application re EA: Under the above-cited court decision, the EA requirement is triggered under certain circumstances, including when an applicant proposes an action on state lands that requires agency approval and is not specifically exempted under Chapter 343, HRS. That is the case here. The applicant's request in this instance involves the field-release of *Culex quinquefasciatus* for field release to suppress wild populations of *Culex quinquefasciatus* in the environment. So, agency approval is required for the applicant's proposed action/activity on state lands or sensitive habitats. As PQB understands the court's analysis in the 'Ohana Pale decision, the activity proposed under this permit application would initiate a project that may use state lands and/or sensitive habitats, initially triggering the EA requirement.

DLNR has provided an "Exemption Notice Regarding the preparation of an environmental assessment under the authority of Chapter 343, HRS and Section 11-200.1-17, HAR" and intend to conduct EA's to be completed at future dates.

V. Proposed Permit Conditions:

1. The restricted article(s), Hawaiian biotype Southern House Mosquito, *Culex quinquefasciatus* (Say, 1823), inoculated with a foreign *Wolbachia* bacteria species, shall be used for field-release for area-wide mosquito suppression, a purpose approved by the Board of Agriculture (Board). Live sale or transfer of the restricted article(s) is prohibited, except as approved by the Board. Transport to or release on any island that does not have a population of *Cu. quinquefasciatus* is prohibited.

2. Only male restricted article(s) shall be imported and released.

3. Only Hawaiian biotype *Cu. quinquefasciatus* that have been backcrossed with mosquitos collected in Hawaii for at least 7 generations or 100% Hawaii-collected *Cu. quinquefasciatus* and their progeny, shall be imported.

4. Only restricted article(s) inoculated with *Wolbachia pipientis* bacteria strains already occurring in Hawaii mosquitos or strains wAlbA, wAlbB, wPip4, and wPip5 shall be imported.

5. The permittee, Suzanne Case, Chairperson, State of Hawaii Department of Land and Natural Resources (DLNR), 1151 Punchbowl Street, Honolulu, Hawaii, 96813 shall be responsible and accountable for all restricted article(s) imported from the time of receipt until their final disposition.

6. The restricted article(s) shall be maintained by the responsible DLNR personnel, Suzanne Case, David Smith, or Cynthia King or by trained or certified personnel designated by the permittee. A list of trained or certified personnel shall be provided to the Plant Quarantine Branch (PQB).

PQB NOTES: *Condition 6 amended to reflect the Committee's desire to have a list of trained or certified DLNR personnel.*

7. The restricted article(s) shall be safeguarded at the following sites listed below, inspected and approved by the PQB prior to importation. Movement of the restricted article(s) to another site shall require a site inspection and approval by the PQB Chief prior to movement.

    a. DLNR Waimano Baseyard – Hawaii Invertebrate Program - Oahu 2680 Waimano Home Road, Pearl City, HI 96782, (808) 266-7989

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b. Kaua'i Branch, Division of Forestry & Wildlife, 3060 Eiwa Street Rm. 306, Lihue, HI 96766. (808) 274-3433

c. O'ahu Branch, Division of Forestry & Wildlife, 2135 Makiki Heights Drive, Honolulu, HI 96822. (808) 973-9778

d. Maui (& Moloka'i) Branch, Division of Forestry & Wildlife, 1955 Main Street, Room 301, Wailuku, HI 96793. (808) 984-8100

e. Hawai'i Branch, Division of Forestry & Wildlife, 19 E. Kawili Street, Hilo, HI 96720. (808) 974-4221

PQB NOTES: *Condition 7 amended to remove reference to progeny.*

8. The restricted article(s) shall be maintained by Suzanne Case, State of Hawaii Department of Land and Natural Resources (DLNR), 1151 Punchbowl Street, Honolulu, Hawaii, 96813, or by trained or certified personnel designated by the permittee.

PQB NOTES: *Condition 8 amended to remove reference to progeny.*

9. The permittee shall submit samples of the restricted article(s) prior to importation to the PQB upon request.

10. Prior to the arrival of each shipment containing the restricted article(s), the permittee shall provide to the PQB Chief the following information in writing:

    a. Expected arrival date;

    b. A copy of the shipping waybill or tracking numbers for each parcel;

    c. A copy of the invoice, packing list or other similar PQB approved document that states the quantity of the restricted article(s), the scientific and common name(s) of the restricted article(s), the shipper, and the consignee for the restricted article(s);

    d. The names and addresses of the shipper and permittee; and

    e. The total number of parcels.

11. The restricted article(s) shall be imported only through the port of Honolulu, except as designated by the Board. Entry into Hawaii through another port is prohibited unless designated by the Board.

12. At least four sides of each parcel containing the restricted article(s) shall be clearly labeled in plain view with "Live Animals" and "This Parcel May be Opened and Delayed for Agriculture Inspection", in ½" minimum-sized font.

13. The restricted article(s) shall be shipped in sturdy PQB-approved containers designed to be escape-proof and leak-proof.

14. Each shipment of the restricted article(s) shall be accompanied by a complete copy of the PQB permit with permit conditions for the restricted article(s), and an invoice, packing list or other similar PQB approved document listing the scientific and common names of the restricted article(s), the quantity of the restricted article(s), the shipper, and the permittee for the restricted article(s).

15. The permittee shall immediately notify the PQB Chief in writing under the following circumstances:

    a. If any escape, theft, accidental release, disease outbreaks, pest emergence and/or mass mortalities involving the restricted article(s), under this permit occurs. The department may confiscate or capture the restricted article(s) and any progeny that escapes or is found to be free from confinement at the expense of the owner, pursuant to the Hawaii Revised Statutes (HRS), §150A-7(c).

    b. If any changes are made to the approved sites, facilities or containers used to hold the restricted article(s).

    c. If a shipment of the restricted article(s) is delivered to the permittee without a PQB "Passed" stamp, tag or label affixed to the article, container or delivery order that indicates that the shipment has passed inspection and is allowed entry into the State. Under this circumstance, the permittee shall not open or tamper with the shipment. Additionally, the permittee shall secure all restricted article(s), shipping containers, shipping documents and packing materials for the PQB.

    d. If the permittee is found in violation of any municipal, state or federal policies, rules and/or laws, pertaining to the restricted article(s).

    e. If the permittee will no longer import and/or possess the restricted article(s) authorized under this permit. Under this circumstance, the permittee shall inform the PQB Chief of the final disposition for the restricted article(s) and the permit shall be canceled.

16. In the event that the restricted article(s) become parasitized or infected by disease, all restricted article(s) from which the parasitized or infected restricted

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article(s) originated shall be considered compromised and immediately subjected to a treatment(s) approved by the PQB Chief. All shipping containers, packing materials, equipment, and any other items used in conjunction with the compromised restricted article(s), shall also be subjected to a treatment(s) approved by the PQB Chief.

PQB NOTES: *Condition 16 amended to remove reference to progeny.*

17. Prior to interisland transport, all restricted article(s) shall be presented to the PQB for inspection. The permittee shall also follow Permit Conditions Nos. 12, 13, and 14 for each interisland shipment. The PQB inspector shall affix an interisland certificate of inspection to the shipment as verification of a completed inspection.

18. The permittee(s) shall submit an annual report to the PQB on the results of all research including post-release monitoring programs. The report shall be submitted by the 31st of January of each year and shall cover the prior 12-month period. Information reported shall include:

    a. Number of mosquito releases per site.

    b. Number of mosquitoes released per site.

    c. Impact on wild mosquito populations.

    d. Detections of introduced Wolbachia strains in wild mosquito populations,

    e. Impact of mosquito releases on native bird populations.

19. The permittee(s) shall adhere to the use, facility, equipment, procedures, and safeguards described in the permit application, and as approved by the Board and the PQB Chief.

20. Any approved site, restricted article(s), and records pertaining to the restricted article(s) under permit may be subject to post-entry inspections by the PQB, upon arrival at the permittee's facility. The permittee shall make the approved site, restricted article(s), and records pertaining to the restricted article(s) available for inspection upon request by a PQB Inspector.

21. The permittee shall have a biosecurity manual available for review and approval by the PQB, at the time of the initial site inspection and any subsequent post-entry inspections, which identifies the practices and procedures to be adhered to by the permittee, to minimize the risk of theft, escape, or accidental release of the restricted article(s), including minimizing the risk of introduction and spread of diseases and pests associated with the restricted article(s) to the environment.

The permittee shall adhere to all practices and procedures as stated in this biosecurity manual.

22. The permittee shall submit to the PQB Chief a copy of all valid licenses, permits, certificates, or other similar documents required by other agencies for the restricted article(s). The permittee shall immediately notify the PQB Chief in writing when any of the required documents are suspended, revoked, or terminated. This permit may be amended, suspended, or canceled by the PQB Chief in writing, upon suspension, revocation, or termination of any required license, permit, certificate or similar document for the restricted article(s).

23. It is the responsibility of the permittee to comply with any and all applicable requirements of municipal, state, or federal law pertaining to the restricted article(s).

24. The permittee shall be responsible for all costs, charges, or expenses incident to the inspection, treatment, or destruction of the restricted article(s) under this permit, as provided in Act 173, Session Laws of Hawaii 2010, Section 13, including, if applicable, charges for overtime wages, fixed charges for personnel services, and meals.

25. Any violation of the permit conditions may result in citation, permit cancelation, and enforcement of any or all of the penalties set forth in HRS §150A-14.

26. A canceled permit is invalid and upon written notification from the PQB Chief, all restricted article(s) listed on the permit shall not be imported. In the event of permit cancelation, any restricted article(s) imported, may be moved, seized, treated, quarantined, destroyed, or sent out of State at the discretion of the PQB Chief. Any expense or loss in connection therewith shall be borne by the permittee.

27. The permit conditions are subject to cancelation or amendment at any time due to changes in statute or administrative rules restricting or disallowing import of the restricted article(s) or due to Board action disallowing a previously permitted use of the restricted article(s).

28. These permit conditions are subject to amendment by the PQB Chief in the following circumstances:

    a. To require disease screening, quarantine measures, and/or to place restrictions on the intrastate movement of the restricted article(s), as appropriate, based on scientifically validated risks associated with the restricted article(s), as determined by the PQB Chief, to prevent the introduction or spread of diseases and/or pests associated with the restricted article(s).

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b. To conform to more recent Board approved permit conditions for the restricted article(s), as necessary to address scientifically validated risks associated with the restricted article(s).

29. The permittee shall agree in advance to defend and indemnify the State of Hawaii, its officers, agents, and employees for any and all claims against the State of Hawaii, its officers, agents, employees, or Board of Agriculture members that may arise from or be attributable to any of the restricted article(s) that are introduced under this permit. This permit condition shall not apply to a permittee that is a federal or State of Hawaii entity or employee, provided that the State or federal employee is a permittee in the employee's official capacity.

VI. Advisory Review

ADVISORY SUBCOMMITTEE REVIEW: This request was submitted to the Advisory Subcommittee on Entomology for its review and recommendation. Advisory Subcommittee recommendations and comments are as follows:

Provided *Culex quinquefasciatus* is placed on the list of Restricted Animals (Part A), I recommend approval____/____disapproval to allow the importation of lab-reared strains of the mosquito, *Culex quinquefasciatus* (Diptera: Culicidae), inoculated with strains of *Wolbachia* bacteria for immediate field release to suppress wild populations of *Culex quinquefasciatus* by the DLNR.

Dr. Daniel Rubinoff: Recommends Approval.

Ms. Janis Matsunaga: Recommends Approval.

Comments: "Provided *Culex quinquefasciatus* is placed on the list of Restricted Animals (Part A), I recommend approval to allow the importation of lab-reared strains of the mosquito, *C. quinquefasciatus* (Diptera: Culicidae), inoculated with strains of *Wolbachia* bacteria for immediate field release to suppress wild populations of *C. quinquefasciatus* by the DLNR given questions I provide in the word document are addressed."

Dr. Mark Wright: Recommends Approval.

Comments: "The applicants have provided documentation showing the stringent quality control systems they have in place to ensure that only male mosquitoes are released. There are data showing that this mosquito suppression method can be highly effective. There is enormous potential benefit of implementing this technology in Hawaii."

Provided *Culex quinquefasciatus* is placed on the list of Restricted Animals (Part A), I recommend approval____/____disapproval to establish permit conditions for the importation and immediate field release of lab-reared strains of the mosquito, *Culex quinquefasciatus* (Diptera: Culicidae) inoculated with strains of Wolbachia bacteria for immediate field release to suppress wild populations of *Culex quinquefasciatus* by the DLNR.

Dr. Daniel Rubinoff: Recommends Approval.

Comments: "This technology is low risk and should be fast tracked ASAP."

Ms. Janis Matsunaga: Recommends Approval.

Comments: "Provided *Culex quinquefasciatus* is placed on the list of Restricted Animals (Part A), I recommend approval to establish permit conditions for the importation and immediate release of lab-reared strains of the mosquito, *C. quinquefasciatus* (Diptera: Culicidae) inoculated with strains of *Wolbachia* bacteria for immediate field release to suppress wild populations of *C. quinquefasciatus* by the DLNR given the following questions are addressed:

What and where are these EPA and HDOA label directions?

What and where are the recommended guidelines for releasing these mosquitoes?

Will these Wolbachia inoculated mosquitoes be classified as a bio-pesticide product in Hawaii?

What quality control testing will be done in the laboratory in Hawaii just prior to release of the imported mosquitoes into the environment?
-How will the results be reported?
-How will the results affect releases into the environment?

Will there be routine monitoring of traps for incompatible adult females or larvae as proposed by Verily Life Sciences?

The applicant is applying for 1 million mosquitoes. How many mosquitoes will be in each shipment? What is the duration of time between shipments?

What is the plan and procedure for releases into the environment?

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-How will it be decided how many mosquitoes are leased at each time at each site?
-How will each site of release be determined?
-Is there a potential release site list available?"

PQB NOTES: *DLNR's answers to Subcommittee member Matsunaga's questions are listed below. For clarity, Subcommittee member Matsunaga's questions are italicized in blue. DLNR's responses are in black.*

What and where are these EPA and HDOA label directions for releasing the mosquitos?

DLNR response: "The EPA is currently reviewing the label for the tool as submitted by HDOA. Below are the DRAFT label criteria:

i. **Sites to be Treated:** State, Federal and Private wildlife conservation areas that contain *Cx. quinquefasciatus* mosquitoes throughout the State of Hawaii.
ii. **Method of Application:** Point releases by hand or aerial releases.
iii. **Rate of Application:** Initial absolute rates of release are pending a Mark Release Recapture in the proposed treatment area as this will establish baseline mosquito populations in the treatment area and ecology, field longevity and other factors used to estimate release rates (number of males/acre/week) sufficient to achieve and maintaining the "overflooding ratio" of ≥ 10:1 DQB males:wild type (WT) male *Cx. quinquefasciatus* in adult traps in the release area as described on the DQB label. If wild type populations are significantly suppressed release rates may be lowered while still achieving ≥ 10:1 overflooding DQB:WT males.
iv. **Maximum Number of Applications:** *156 applications per release site per year based on maximum of 3 releases per week.* At every treatment location release may be for up to a year, with the intention of having multiple releases per week. If strong suppression is achieved releases may be reduced in frequency at a given location with releases starting at a new location at the same cadence. Thus the total number of application days is up to 3x52 = 156 during the year. If the permit is extended then a similar rate of releases will occur
v. **Total Acreage to be Treated:** Up to 40,000 acres of State, Federal and Private wildlife conservation areas in the State of Hawaii.
vi. **Total Amount of Pesticide to be Used:**
Maximum amount of DQB Males to be applied per year: Up to 4,000,000 males per week = 208,000,000 males/year. Maximum amount of *Wolbachia pipientis*, wAlbB to be applied per year: Up to ~25g/week = 1300g/year"

What and where are the recommended guidelines for releasing these mosquitoes?

DLNR response: "See above DRAFT label criteria submitted by HDOA."

Will these Wolbachia inoculated mosquitoes be classified as a bio-pesticide product in Hawaii?

DLNR response: "Yes, they will be classified as a bio-pesticide by the EPA and HDOA."

What quality control testing will be done in the laboratory in Hawaii just prior to release of the imported mosquitoes into the environment?

-How will the results be reported?

DLNR response: "QA/QC will be conducted at the rearing facility in California and measurements of the number of dead IIT males will be estimated to inform and perfect the shipping mechanism prior to release. The results of QA/QC will be reported to HDoA/USFWS/DLNR releases. QA/QC of both the Wolbachia type and efficacy should be done outside of Hawaii to reduce any possibility of female releases (and thus lower the tools efficacy)."

-How will the results affect releases into the environment?

DLNR response: "If QA/QC is significantly reduced after shipping then this will lead to a reduced efficacy of the product, which will in turn lead to an increase in projected prevalence of the avian malaria vector *C. quinquefasciatus.* As *C. quinquefasciatus* is an invasive organism reducing its prevalence will not cause undo harm, and being ineffectual will result in no increased impact to native forest birds."

Will there be routine monitoring of traps for incompatible adult females or larvae as proposed by Verily Life Sciences?

DLNR response: "Yes, post release monitoring is essential to maintain the efficacy of the tool. Both female and male presence in traps will be monitored and assessed for Wolbachia type. "

The applicant is applying for 1 million mosquitoes. How many mosquitoes will be in each shipment? What is the duration of time between shipments?

DLNR response: "The applicant (HDoA) is applying for >1 million mosquitoes to be released per week. The number in each shipment as estimated using a 10:1 overflooding ratio and will be determined by the area treated. Shipments could be as often as be bi-weekly depending on wild-type densities upon initial product application."

What is the plan and procedure for releases into the environment?

DLNR response: "Releases into the environment will occur via pedestrian releases, pedestrian assisted aerial releases, and aerial releases. Each of the modes is being included in environmental assessments. Releases will follow aforementioned draft label criteria, as well as standard operating procedures relating to management actions and helicopter operations for DOFAW field staff."

-How will it be decided how many mosquitoes are released at each time at each site?

DLNR response: "This will be determined using a minimum overflooding ratio of 10:1, which has been shown to reduce mosquito prevalence by >90%."

-How will each site of release be determined?

DLNR response: "Sites that are of conservation based priority due to the presence of remaining populations of rare forest birds will be prioritized for release by state and federal agencies to maximize likelihood of species recovery."

-Is there a potential release site list available?

DLNR response: "As stated above the HDoA EPA permit application is for State, Federal and Private wildlife conservation areas that contain *C. quinquefasciatus* mosquitoes throughout the State of Hawaii. Initial releases will be conducted on priority Forest bird conservation sites on Maui, followed by Kauai and then the Big Island of Hawaii. Proposed project areas are to be specifically identified in environmental assessment documents. Initial public scoping for the Maui EA has been completed (in advance of publishing the draft EA) and information regarding East Maui project areas can be found here: file:///C:/Users/ckingcb/Downloads/HALE_ScopingNewsletter_12.7.21%20(3).pdf
Project areas on Kauai, Big Island have not yet been finalized. However, a statewide EA will be completed which will cover environmental compliance for all state and private lands across Hawaii."

Dr. Mark Wright: Recommends Approval.

Comments: "This application makes a strong case for these releases to be made. Environmental risks of taking this action are minimal."

ADVISORY COMMITTEE REVIEW:

This request was reviewed by the Committee on June 9, 2022. Based on the large number of written testimonies that were submitted Chairperson Darcy Oishi took oral testimony prior to hearing the submittals to ensure that we have received written testimony for both mosquito proposals being review by the committee today AND the Board order. He said because it is difficult to separate the two based upon how the written testimony was collected, all testimony would be considered together.

Mr. Chris Farmer, Hawaii Program Director for the American Bird Conservancy spoke in strong support for the recommendation to list the three mosquito species. He said

Hawaii is experiencing a conservation crisis and the *Wolbachia* method that DLNR and DOH have proposed is the best, safest solution to save these birds. He noted all three mosquitoes are found widely in the State and that the bacteria are here and is widely spread as well. He expressed concerned hearing there is opposition claiming the mosquitos are genetically modified because this is not a genetic modification technique. There is no GM modification. There is no manipulation of any of the genome. Mr. Farmer said the technique is reversable, so there is the ability to go very safely and slowly if needed. He said the technique is widely used, and safely used for human health around the globe and on the continent. He said this is the best option to save the Hawaiian honey creepers and our native birds. He urged a recommendation to approve the DOH and DLNR requests.

Ms. Christy Martin, Coordinating Group on Alien Pest Species, strongly supports both proposals. She reiterated Mr. Farmers' sentiment saying native birds are running out of time. She said this is the only available technique to try to save some of these birds. She noted the non-native zebra doves are the ones really infected with diseases such as avian malaria and avian pox and when the mosquitoes go and bite them, they can transfer the diseases to the native birds. She urged the Committee to recommend both submittals be approved.

Ms. Chelsea Arnott, Hawaii Invasive Species Council said they submitted written testimony in support of both submissions. She noted the importance of having large-scale tools developed and deployed to help prevent the spread of invasive species. She said climate change is exacerbating the extinction of native forest birds. She said this tool and technique is being deployed internationally and nationally to control and reduce large population of mosquitoes not only for human health but for natural resources. She said this is the best and safest tool for reducing mosquitoes, saving forest bird from extinction, and protecting human health.

Ms. Ulalia Woodside, Executive Director of the Nature Conservancy, said the Nature Conservancy strongly supports the DLNR and DOH applications regarding the mosquito species. She said these permits will allow Hawaii to take steps towards developing and implementing a mosquito control program that uses *Wolbachia* bacteria to reduce mosquito populations throughout the state which would have a positive impact on human health and the precarious state of native forest birds. She said the work with *Wolbachia* is not a genetically modified organism or any type of genetic engineering. She noted the expansion of mosquitos is causing arapid decline in native forest bird populations and if action isn't taken, there will be many more extinctions noting it may already be too late for some. She said this is the way to save Hawaii's native forest birds.

After the oral testimony, Mr. Christopher Kishimoto, PQB Entomologist, provided a summary of the request. During the summary, Mr. Kishimoto noted that Subcommittee member Janis Matsunaga brought up a number of questions in one of her responses.

He noted that DLNR's responses were not received before packet distribution to the Committee, so read DLNR's responses to each of Ms. Matsunaga's questions.

PQB NOTES: *DLNR's exact responses to Ms. Matsunaga's questions can be found on pages 26-28.*

Committee member Dr. Samuel Gon referred to a comment earlier in the testimony that this was a tool used for control of mosquitos in various locations internationally as well as in the United States. He noted that the DLNR proposal may be the very first proposal to use *Wolbachia* for the purpose of conserving natural resources as opposed to a human health purpose. He said it would be an exciting precedent for the use of this tool as a natural resource management tool.

Chairperson Darcy Oishi said Ms. Matsunaga's comments said got him thinking about transportation issues, noting permit condition 11 requires importation through the port of Honolulu and asked if DLNR had comments on any issues they might anticipate. He surmised transportation from U.S. mainland production sites to Hawaii are going to be significantly longer. He noted releases are on Maui and if everything has to go through the port of Honolulu, would this impact the efficacy of the program? He asked DLNR if this permit condition is too restrictive? He asked PQB if the intent is only for males to be introduced and released, is there a need to route everything through the port of Honolulu?

Mr. Kishimoto said usually, most imports of live animals already go through Honolulu as the first port of entry because it is where PQB has the most control over imports. He said Maui and Kauai ports are not considered full ports of entry and they can't receive things like this for inspection. Chairperson Oishi noted that a Board order could change that. Mr. Kishimoto said he wasn't sure if a Board order could change that, but said it definitely is a decision made by the Board. Chairperson Oishi asked how will these insects be moved? He assumed air freight, but could it be a parcel carrier like Fed Ex and UPS? Mr. Kishimoto said that is probably something that DLNR can best answer.

Committee member Cynthia King said she actual can't answer the question about the actual carriers because it has not been discussed. Referring to Mr. Oishi's comment about the additional time where mosquitos have to transit through the port of Honolulu to undergo inspection then move on to the neighbor islands does increase the time they are in less ideal conditions, putting them at a greater risk of higher mortality and lower survivorship or effectiveness in the field. She followed up that it's not to say that DLNR can't do it, but if there was a means by where the port of entry could be altered, DLNR would certainly be supportive of that.

Chairperson Oishi asked what the farthest distance Verily or MosquitoMate has moved mosquitos by air for release? He clarified he wasn't necessarily referring only to distance, but also the time from collection from the rearing facility to release to the field. Ms. King said the longest distance she is aware of is from California to Puerto Rico. She said the total time the mosquitos can be in transit is about 24 hours give or take, but less time in tiny, chilled containers is typically better.

Chairperson Oishi asked if adding on movement from Honolulu to any other island could potentially push transportation times beyond the 24-hour. Committee member Joshua Fisher answered that remains to be determined. He said for the Puerto Rico applications, Fed Ex worked. He said you want to do shipments within 24 hours, and there may be an upper limit to that. He said various delivery services will have to be looked at to best minimize the travel distance. He noted mosquitos coming from California will not be in transit as long versus shipments coming from the east coast, but that would need to be determined and all options are on the table.

Jonathan Ho, PQB Inspection and Compliance Section Chief, said the Board could determine another port of entry but that creates a logistical problem with regards to inspection, particularly because PQB does not have a lot of staff on the neighbor islands. He said the mode of entry plays a specific role. For example, FedEx only comes through the port of Honolulu and there is no direct flight to an outer island and if you are doing air cargo that would be different. He said that PQB deals with live animal shipments all the time and are all required to come through Honolulu, and they are all done well within 24 hours particularly now that many of the COVID restrictions are being loosened. He said an example could be a shipment that comes in through Hawaiian Cargo for Kauai would be presented for inspection on Oahu. As soon as the inspection is completed, the cargo is on the next plane going to that island. He said the duration would between one and three hours depending on the flight time but completing movement within 24 hours is all but guaranteed to occur provided that there is not some crazy shipping issue. He noted the port of entry issue is somewhat complicated.

Committee member Dr. Maria Haws noted as a minor point that there are two miss-spellings in the first two clauses related to the subject request and it looks like the second usage of the species name has been misspelled.

Committee member King noted the 24-hour time period isn't limited only to getting a parcel physically to the neighbor island but needs to include the time to get out into the field and then deployed, and that might entail hiking out on foot in some areas where the helicopter or other aerials deployment that remains to be seen that could be faster in some cases. She wanted to point out there is potentially additional transit time to get the mosquitos to remote field types where the last of our remaining forest birds take refuge.

C3X

Chairperson Oishi said there may some potential conflicts in the permit conditions. If only males are imported, references to "progeny" should be removed from permit conditions 8 and 16. Mr. Kishimoto said that can be done. Chairperson Oishi referenced permit condition 6 where it says maintenance by "trained or certified personnel designated by the permittee." He asked if it's PQB's intent to know who is certified and trained and if so, should the permit condition language be modified to reflect reporting, or is it going to be captured within the bio-security plan requirement? Mr. Kishimoto said it is nice to know who the trained staff is, and they can supply PQB with a list, but it doesn't necessarily have to be a list, it can be inside their reports as well. Chairperson Oishi said it would be cleaner to modify the permit condition language so the applicant knows the expectation. He asked if that would be a problem with DLNR? Chairperson Oishi said he saw Ms. King shake her head indicating "no".

Chairperson Oishi noted the submittal indicated DLNR will be doing an EA at a future date and heard during Mr. Kishimoto's presentation that partial EA was done for Maui. He asked what the timeline for completion of the EA was. Committee member King said the timeline for the draft EA to be released to the public is in September of this year for the East Maui area. She said there is a parallel process going on for the proposed Hawaii project area and then there will be a third EA to cover statewide, so a total of three EA's completed for this.

Chairperson Oishi said the abundance of written testimony against this proposal is tied to concerns over GMO or genetically engineering and assumed the EA will help address some of those concerns. Ms. King said the goal is to put it through the process and make it publicly available so that folks have the opportunity to learn about the project and express any concerns that they might have. I'm sorry I just checked my She corrected her previous statement noting the draft EA is actually supposed to be published in August, not September.

Chairperson Oishi thanked Ms. King for the clarification and asked if there be other outreach or education opportunities to get the word out that this is not using genetically modified organisms. He asked if DLNR has a plan to educate the general public about what this really is. Ms. King said DLNR is part of a multi-agency partnership called Birds Not Mosquitos and while DLNR doesn't specifically have outreach staff directed to this project at this time we are a partner in this consortium which has emphasized a great deal of outreach and education to the public as well as legislators and community members and it has been an emphasis for a long time. She said there is still a lot of work to do out there based on some of the testimonies that we saw today from concerned members of the public, but noted it was understandable. She said recently there was additional funding allocated towards implementing incompatible insect

techniques in Hawaii and a portion of those funds will certainly be going to continuing outreach.

Committee member Gon commented that DLNR's Dan Dennison released a news release that indicated that there were no GMOs or GEs involved in this particular proposal a couple of days ago and thought it's part of the ongoing multi-pronged outreach and public awareness efforts that going on in the Bird Not Mosquitos group. Ms. King thanked Dr. Gon and noted DLNR has issued other press releases at different stages as the interest in *Wolbachia* for forestry conservation has evolved.

Committee member Joshua Fisher said after reading throughout all the testimonies that were received, he was going to recommend to the communication group working on outreach that they are going to have to broaden to different audiences because it seemed there was a very large farming contingent, or farming community, that had submitted testimony. He felt that outreach could be extended to those audiences. Dr. Gon commented that it is interesting that the rise of anti-GMO sentiment in Hawaii was largely out of the farming and pesticides community, therefore, maybe it isn't that surprising.

Chairperson Oishi asked the Committee if the was any other points of discussion? Hearing none, he asked for a motion. Committee member Sam made a motion to approve this request with the corrections and modifications that Chair Oishi and Dr. Haws mentioned. Chairperson Oishi referenced the changes to permit condition 8 and 16 to eliminate the word "progeny" and permit condition 6 to specify the applicant is to provide a list of individuals that have received training, and the typographic errors in the title. Dr. Gon agreed. Committee member Haws seconded the motion.

Chairperson Oishi asked if there was any further discussion. Committee member King noted that the permit conditions refence quality control upon arrival at University of Hawaii. She believed that was a condition from the previous permit but didn't believe it was included in this request because of the direct release approach. She wanted to verify if it's on the application. She didn't have any concerns about it, but if it was a carryover, she would like to see it corrected.

After discussion it was determined that quality assurance at the University of Hawaii was not included, and Ms. King confirmed that it should not be part of the permit conditions because the University of Hawaii is not aware of any quality assurance requirements. Chairperson Oishi noted permit condition 7 also refers to progeny. Mr. Kishimoto understood.

Chairperson Oishi asked if there was any further discussion. Hearing none, he called for the vote.

C40

Culex quinquefasciatus
Field Release
Suzanne Case, DLNR

Board of Agriculture

Vote: Approved 7/0.

Motion carries.

STAFF RECOMMENDATION: Based on the favorable responses by the responding Advisory Subcommittee Members' responses and the Advisory Committee's unanimous (7-0) recommendation to approve this request, the Plant Quarantine Branch recommends approval of this request provided the Board has approved the placement of *Culex quinquefasciatus* on the List of Restricted Animals, Part A.

Respectfully Submitted,

BECKY AZAMA
Acting Manager, Plant Quarantine Branch

CONCURRED:

HELMUTH ROGG, Ph.D.
Administrator, Plant Industry Division

APPROVED FOR SUBMISSION:

PHYLLIS SHIMABUKURO-GEISER
Chairperson, Board of Agriculture

PQ-7 (01/04)

State of Hawaii
Department of Agriculture
PLANT QUARANTINE BRANCH
1849 Auiki Street, Honolulu, HI 96819 3100
Phone: (808) 832 0566, FAX: (808) 832 0584

For Office Use Only

Fee: $_____ Receipt No._____

☐ Approve Permit No._____ Date:_____

☐ Disapprove ☐ Other _____

Processed by:_____ Date:_____

PERMIT APPLICATION FOR RESTRICTED COMMODITIES INTO HAWAII

Date: *4/1/22*

In accordance with the provision of Chapter 4 71 , Hawaii Administrative Rules of the Division of Plant Industry, Department of Agriculture, a permit is requested for the following commodities:

Please type or print clearly.

Quantity	Commodity	Scientific Name
1,000,000	Southern House Mosquito	Culex quinquefascatius

Name and address of shipper: Department of Land and Natural Resources, Division of Forestry and Wildlife
1151 Punchbowl Street, Honolulu, HI 96813

(Mainland or Foreign address)

Approximate date of arrival: TBD

Mode of Shipment: ☑ Mail ☐ Air Freight ☐ Boat

Type of Permit:
- --- Import
  - ☐ one time only ☑ multi-shipments
- --- Intrastate shipment
  - ☐ one time only ☑ multi-shipments
- ☑ Possession

Object of importation:
- ☐ Kept caged at all time
- ☐ Used for propagation
- ☐ Imported for exhibition
- ☑ Imported for liberation
- ☐ Other purposes - specify _____

Please type or print clearly.

Applicant's Name Suzanne Case

Company Name Department of Land and Natural Resources
(if applicable)

Hawaii Mailing Address 1151 Punchbowl Street, Honolulu, HI 96813

Telephone number 808 587 0400

Facsimile number _____

Fee Amount Enclosed (cash, check or mail order) $ Journal Voucher

(complete reverse side)

PLEASE COMPLETE THE FOLLOWING INFORMATION (attach extra sheet if necessary)

1. State in detail the reasons for introduction (include use or purpose).

   See attached application for 1-5.

2. Person responsible for the organism (include name, address and phone number).

3. Location(s) where the organism will be kept and used (include address, contact and phone number).

4. Method of disposition.

5. Give an abstract of the organism with particular reference to potential impact on the environment of Hawaii (include impact to plants, animals and humans).

****

I request permission to import the articles as listed on the permit application and further, request that the articles be examined by an authorized agent of the Department of Agriculture upon arrival in Hawaii.

I agree that I, as the importer, will be responsible for all costs, charges or expenses incident to the inspection or treatment of the imported articles.

I further agree that damages or losses incident to the inspection or the fumigation, disinfection, quarantine, or destruction of the articles, by an authorized agent of the Department of Agriculture, shall not be the basis of a claim against the department or the inspectors for the damage or loss incurred.

Signature Sgame Q. Case **Date** Apr 1, 2022

(Applicant)

Subcommittee on Entomology
G. Simmons & L. Wells – Hawaii Department of Health
D. Smith & C. King – Hawaii Department of Land and Natural Resources

https://hdoa.hawaii.gov/wp-content/uploads/2019/08/Plant-and-Non-Domestic-Animal-Quarantine-Non-Domestic-Animal-Import-Rules.pdf

Date:4/1/2022

To:
Advisory Subcommittee on Entomology

From:
Suzanne Case
Department of Land and Natural Resources
1151 Punchbowl Street, Honolulu, HI 96813

David G. Smith
Hawaii Department of Land and Natural Resources, Division of Forestry and Wildlife
1151 Punchbowl Street, Room 325, Honolulu, HI 96813

Cynthia King
Hawaii Department of Land and Natural Resources, Division of Forestry and Wildlife
1151 Punchbowl Street, Room 325, Honolulu, HI 96813

Summary Description of the Requests
In accordance with the provisions of Chapter 150A, Hawaii Revised Statutes, we are requesting to import the following animal commodities:

Commodity	Scientific Name	Quantity
Southern House Mosquitoes (Male Adults)	*Culex quinquefasciatus*	Continued shipments for immediate release.

Additionally, we are requesting the listing of *Culex quinquefasciatus* mosquito species on the Hawaii Department of Agriculture's (HDOA) List of Restricted Animals Part A given that specific conditions, as outlined and enforced by HDOA, are met at the time of importation. Suggested conditions for importation are included within this application.

Reason for importation:
For immediate field release applications to suppress mosquito populations in areas where Hawaii fauna are at risk of disease transmission due to the presence of these mosquitoes.

Shippers:
1) Stephen Dobson, MosquitoMate, Inc.
   2520 Regency Rd., Lexington, KY, 40503

2) Verily Life Sciences
   269 E Grand Ave, South San Francisco, CA 94080

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D. Smith & C. King – Hawaii Department of Land and Natural Resources

Importers:

1) DLNR Waimano Baseyard – Hawaii Invertebrate Program - Oahu
   2680 Waimano Home Road, Pearl City, HI 96782, (808) 266-7989
2) Kaua'i Branch, Division of Forestry & Wildlife, 3060 Eiwa Street Rm. 306, Lihue, HI 96766. (808) 274-3433
3) O'ahu Branch, Division of Forestry & Wildlife, 2135 Makiki Heights Drive, Honolulu, HI 96822. (808) 973-9778
4) Maui (& Moloka'i) Branch, Division of Forestry & Wildlife, 1955 Main Street, Room 301, Wailuku, HI 96793. (808) 984-8100
5) Hawai'i Branch, Division of Forestry & Wildlife, 19 E. Kawili Street, Hilo, HI 96720. (808) 974-4221

Project:

This is an application for:

- A permit to import male *Culex quinquefasciatus* mosquito species.
- The listing of *Culex quinquefasciatus* mosquito species on the Hawaii Department of Agriculture's (HDOA) List of Restricted Animals Part A given that specific conditions, as outlined and enforced by HDOA, are met at the time of importation. Suggested conditions for importation are included within this application.

As outlined in the suggested conditions for importation, these mosquitoes will either contain the same wild type bacterium (*Wolbachia* spp.) which is already endemic in *Culex quinquefasciatus* mosquitoes in Hawaii, or will be inoculated with an incompatible bacterium (*Wolbachia* spp.) that is not native to the wild mosquito's current internal fauna. The presence of this different strain of bacteria within the male mosquito's reproductive system will render the imported male mosquitoes unable to successfully mate with wild females found within Hawaii, a process called cytoplasmic incompatibility. Cytoplasmic incompatibility has been used with much success in other parts of the world to reduce mosquito populations and thus reduce the potential of transmission of mosquito vectored diseases. We intend to import male, sexually incompatible mosquitoes for direct release onto the environment. This process uses cytoplasmic incompatibility to reduce current populations of this pest mosquito species, which are vectors for pathogens to Hawaii's fauna, including pathogens such as avian malaria, and which can vector West Nile virus, and lymphatic filariasis to humans. Importing Hawaii lineage mosquitoes which contain the wild type bacterium, will ensure that we can conduct genetic analysis to confirm that the wild *Culex quinquefasciatus* is the wild type originally provided to the collaborators, and that the inoculated mosquitoes are indeed incompatible.

Culex quinquefasciatus is an invasive, disease-spreading mosquito that has dispersed across the Hawaiian islands since its accidental introduction in the 1800s. The species is present on Hawaii, Maui, Molokai, Lanai, Kahoolawe, Oahu, Kauai, and the northwest

Hawaiian islands. *Culex quinquefasciatus* can thrive at sea-level to 4800ft in elevation. In Hawaii, the mosquito is able to transmit pathogens to native forest birds. The spread of avian malaria, in particular, has contributed to the extinction of more than half of Hawaii's endemic honeycreepers and continues to pose a risk to the remaining species. *Culex quinquefasciatus* is also known to transmit dog heartworm within pets found throughout Hawaii, and is a concern to human health given its ability to vector West Nile virus on the US mainland and lymphatic filariasis in other Pacific nations.

Efforts to suppress *Culex quinquefasciatus* through utilization of traditional vector control methods (*e.g.,* pesticides) are inadequate at a landscape scale, and may be problematic for other non-target state and federally protected invertebrate species including Hawaiian picture-wing flies (*Drosophila* spp.), damselflies (*Megalagrion* spp.), yellow-faced bees (*Hylaeus* spp.) and anchialine pond shrimps (*Vetericaris chaceorum* and *Procaris hawaiana*). Current efforts to control mosquito-vectored disease outbreaks are limited to reducing mosquito breeding site locations and localized applications of various larvicides and adulticides.

On September 6-7, 2016, local, national, and international experts gathered in Hawaii to discuss how to mitigate mosquito-borne diseases. The strategy deemed most favorable in terms of its effectiveness, technical readiness, and safety was *Wolbachia*-based cytoplasmic incompatibility. Cytoplasmic incompatibility results from the presence of a bacterium, *Wolbachia*, in the cells of the mosquito. Many arthropod species, including several native species here in Hawaii, naturally contain strains of *Wolbachia.* Bacteria in the genus *Wolbachia* are a type of arthropod endosymbiont that do not occur in humans orother vertebrates. Approximately 50% of insect species naturally have the bacteria, although many of these insects can survive without *Wolbachia*. Conversely, *Wolbachia* cannot persist outside of insect cells, as it is an obligate endosymbiont. The largest effect of *Wolbachia* is on mating compatibility between individual insects that carry the bacteria. However, there are secondary effects that are being studied by many labs. These include altered host insect lifespan and reduced vector competence.

In nature, *Wolbachia* are passed from females to their offspring. Different strains of *Wolbachia* have also been introduced into insects in laboratories. If a male mosquito with one type of *Wolbachia* mates with a female mosquito that has a different strain of *Wolbachia* the resulting offspring can be inviable and not develop into mosquito larvae because of a mismatch of cellular signals (loss of the male parental chromosomes) originating from *Wolbachia*. If sufficient numbers, on the order to 10 times the wild population size, of male mosquitoes of a different *Wolbachia* type are released, wild females are more likely to mate with males of a different *Wolbachia* type and are predicted to have far fewer viable offspring. With subsequent releases, this process can significantly suppress the wild population numbers of mosquitoes over the following generations over a geographic area. *Wolbachia* male-based insect control programs have beenhighly successful for reducing local mosquito populations around the world. Results of initial trials in Fresno, California showed decrease of biting *Ae. aegypti* females by 68%, 95%, and 84% during the peak mosquito seasons in 2017, 2018, and

2019 respectively. *Wolbachia* cannot be spread by the released males, because *Wolbachia* are only passed from mother to offspring. It is also worth noting that male mosquitoes do not bite or vector disease.

One way to generate mosquitoes with a different *Wolbachia* type, is by clearing the naturally-occurring *Wolbachia* strain from the mosquitoes using the antibiotic tetracycline. Then *Wolbachia* can be harvested from cells of another insect species (this can be another mosquito or a non-mosquito species) and introduced into the cleared mosquitoes via microinjection. Another method to establish new *Wolbachia* strains is to mate a *Wolbachia*-carrying female insect to males that have been cleared of their naturally-occurring *Wolbachia* via antibiotic treatment. Because *Wolbachia* are maternally inherited (described above), this cross results in all of the offspring inheriting whichever *Wolbachia* strain is contained in the female parent. Incompatible Wolbachia strains can also be naturally present in populations of mosquitoes.

The first shipper listed within this import application, MosquitoMate Inc., holds the US patent, Patent No.: US 7,868,222 B1, for the method of producing an artificial infection in Culicidae species.
(https://patentimages.storage.googleapis.com/55/da/ae/d7cb8b9cb44599/US7868222.pdf)
Additionally, MosquitoMate Inc. offers a commercially available, *Wolbachia* infected male mosquito product for purchase to suppress *Aedes albopictus* mosquito populations via cytoplasmic incompatibility. This product, ZAP Males®, has been reviewed and registered under the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA). ZAP Males® are a labeled pesticide product with the EPA registration number 89668-4. This product currently has a restriction that only allows for its application in specific states, which does not currently include Hawaii. We reference this, as it is the only registrant in the US currently with a *Wolbachia* mosquito product currently in process of registration with the EPA.
(https://www3.epa.gov/pesticides/chem_search/ppls/089668-00004-20171103.pdf)

The second shipper listed is Verily Life Sciences, a CA based company which is in the process of working with a different incompatible *Culex quinquefasciatus.* This company is initiating consultations with the EPA relating to this different *Wolbachia* mosquito and will provide additional information directly to HDOA as needed.

Culex quinquefasciatus mosquito eggs originating from Hawaii stock (aka collected from field sites in Hawaii) have been provided to MosquitoMate and Verily for development and testing of cytoplasmic incompatibility. These mosquitoes have been crossed with female mosquitoes carrying a different *Wolbachia* species as outlined above. These mosquitoes have then been backcrossed with a separate population of mosquitoes originating from Hawaii stock over at least seven generations to ensure Hawaii's wild mosquito genetics are >99% contained within a commercially available product to be applied within Hawaii.

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Generations	HI Mosquito Genetics	Crossed MosquitoMate Genetics
0	100.00%	100.00%
1	50.00%	50.00%
2	75.00%	25.00%
3	87.50%	12.50%
4	93.75%	6.25%
5	96.88%	3.13%
6	98.44%	1.56%
7	99.22%	0.78%
8	99.61%	0.39%
9	99.80%	0.20%
10	99.90%	0.10%

On January 17, 2017, the Hawaii Invasive Species Council, an inter-departmental collaboration of the Departments of Land and Natural Resources (DLNR), Agriculture (HDOA), Health (HDOH), Transportation (DOT), Business, Economic Development & Tourism (DBEDT), and the University of Hawaii (UH) passed resolution17-2, specifically pertaining to mosquitoes. Resolution 17-2, entitled, "Supporting Evaluation and Implementation of Technologies For Landscape-Scale Control of Mosquitoes, With a Focus On Mitigating Both Human and Wildlife Health Risks," recognizes that mosquitoes in the State of Hawaii are non-native and an important pest species to control. The resolution supports the implementation of evaluated technologies that are scientifically demonstrated as safe, effective control measures for mosquitoes. (https://dlnr.hawaii.gov/hisc/files/2013/02/HISC-Reso-17-2-signed.pdf).

House Resolution (HR) 297 passed the Hawaii State House in 2019 and further directed "DOA to review the *Aedes aegypti* mosquito with *Wolbachia* bacteria, including *Aedes aegypti* mosquitoes originating from Hawaii stock that could be imported for landscape scale mosquito control, and render a determination to place it on the appropriate animal import list. Requires DOA, DOH, and DLNR to collaborate on a report to the Legislature with recommendations for appropriate vector control programs." (https://www.capitol.hawaii.gov/session2019/bills/HB297_SD1_.htm)

Additionally, House Resolution (HR) 95 passed the Hawaii State House in 2021 urging DLNR, DOA, DOH and UH to implement a mosquito control program using *Wolbachia* to reduce mosquito population levels throughout the state. (https://www.capitol.hawaii.gov/session2021/bills/HR95_HD1_.htm)

It should be noted that this project has been developed with the full support of, and will be implemented in close coordination with, the Hawaii Department of Health Vector Control Branch. Per Hawaii Revised Statutes §26-13, the Department of Health "shall administer programs designed to protect, preserve, care for, and improve the physical and mental health of the people of the State." DOH has the authority in Hawaii relating to mosquitoes and public health, and their staff have decades of expertise to implement

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D. Smith & C. King – Hawaii Department of Land and Natural Resources

mosquito surveillance, control and abatement programs.

Proposed Required Conditions for Importation via HDOA List of Restricted Animals Part A

Included are proposed conditions, suggested in collaboration with the HDOH Vector Control Branch, that could be required for importation if *Culex quinquefasciatus* mosquitoes are added to the HDOA List of Restricted Animals Part A to ensure any future imports meet safeguards to preserve public health, the environment, and the long-term efficiency of the IIT tool. All of the following suggested requirements would need to be met to obtain importation permitting.

Culex quinquefasciatus

1. Only mosquitoes originating from a Hawaii stock are allowed for importation.
2. Only mosquitoes containing the same wild-type bacteria as is already present in Hawaii, or a sexually incompatible *Wolbachia* bacteria compared against Hawaii's wild mosquito populations are allowed for importation.
3. Only adult male mosquitoes are allowed for importation.
4. Only individuals or organizations who have conducted work for EPA registration trials for mosquito biopesticide products and who can provide data on rearing and sorting methodologies are allowed to ship these mosquitoes to Hawaii.
5. Only individuals or organizations listed on the import application are allowed to import/receive these mosquitoes.
6. Only islands with established or incipient wild mosquito populations, as determined by the Hawaii Department of Health's Vector Control Branch, are allowed to import these mosquitoes.
7. All environmental review processes, including potential Environmental Impact Statements, Environmental Assessments, or other environmental compliance requirements as outlined by State Law and OEQC, must be completed or cited prior to importation.

Specific details for importation
This is an application for:

- A permit to import male, mosquito species: *Culex quinquefasciatus*.
- The listing of these mosquito species on the Hawaii Department of Agriculture's (HDOA) List of Restricted Animals Part A given that specific conditions, as outlined and enforced by HDOA, are met at the time of importation. Suggested conditions for importation are included within this application.

Within *Culex quinquefasciatus*, the strain of incompatible bacterium will be *Wolbachia wAlbA, Wolbachia wAlbB,* or *Wolbachia wPip4.* These *Wolbachia* bacterium are not present within the corresponding species of Hawaii's established mosquito population. The presence of this bacterium will make these males sexually incompatible with the

wild, established female mosquitoes. Once imported, the male, sexually incompatible males will be released according to EPA and HDOA label directions to suppress the population of the established mosquito populations. Based on the prior use of this technology in California, Florida, and Kentucky, there are no data to suggest releases of these male mosquitoes to have a negative impact on agriculture, the environment, or public health and safety. Existing wild-type bacteria strain that may be imported is wPipV, which is already found on all of the main Hawaiian islands.

Persons Responsible

DLNR Chairperson, Suzanne Case
DOFAW Administrator, David Smith
DOFAW Entomologist, Cynthia King
Department of Land and Natural Resources – Oahu
1151 Punchbowl Street, Honolulu, HI 96813

DLNR-DOFAW, Hawaii Invertebrate Program Captive Propagation Facility - Oahu
779 Ulukahiki Street, Kailua, Honolulu, HI 96813, (808) 266-7989

DLNR Waimano Baseyard – Oahu
2680 Waimano Home Road, Pearl City, HI 96782, (808) 266-7989

Kaua'i Branch Manager, Sheri Mann, Division of Forestry & Wildlife, 3060 Eiwa Street Rm. 306, Lihue, HI 96766. (808) 274-3433

O'ahu Branch, Division of Forestry & Wildlife, 2135 Makiki Heights Drive, Honolulu, HI 96822. (808) 973-9778

Maui (& Moloka'i) Branch, Division of Forestry & Wildlife, 1955 Main Street, Room 301, Wailuku, HI 96793. (808) 984-8100

Hawai'i Branch, Division of Forestry & Wildlife, 19 E. Kawili Street, Hilo, HI 96720. (808) 974-4221

Locations and Safeguards

All mosquitoes for import will originate from Hawaii biotypes collected from Hawaii. All mosquitoes will be backcrossed for at least 7 generations to ensure >99% Hawaii genetics are contained within the commercially available products to be applied within Hawaii. This backcrossing will also mitigate the risks of infections microorganisms and parasites to the mosquitoes via vertical transmission – thus lowering the risk of the mosquitoes accidentally introducing a new parasite or pathogen. In order for these mosquitoes to acquire and vector a disease, an adult female must blood feed from a disease infected vertebrate, and the pathogen must survive in the mosquito and be

injected into another vertebrate during a subsequent blood feeding. As the intended importation of these mosquitoes only includes the importation of male mosquitoes that do not bite or feed on blood, the unintended importation of an acquired pathogen is eliminated. Verification of Hawaii biotypes and *Wolbachia* strains will be conducted on initial shipments of male mosquitoes to verify requirements have been met, in collaboration with University of Hawaii and Department of Health.

These mosquitoes will be imported into Hawaii through the use of commercial cargo flights. Upon reception to Hawaii, the male mosquitoes will be directly released into the laboratory for quality control testing, and into the environment for the purpose of suppressing the wild mosquito populations. These releases will be performed by individuals or organizations certified to apply these mosquito pesticide products to ensures that the product will be applied properly according to the recommended guidelines.

MosquitoMate and Verily will regularly sample release containers by releasing the contents into lab cages and then examining mosquito sex and number. There is an EPA reviewed value of 1 female release per 250,000 males with the MosquitoMate product. A similar value is likely to be estimated for *Culex quinquefasciatus* given that similar automation, engineering and machine learning technology is being applied to sex sorting. MosquitoMate and Verily have not previously identified a female in a single release container during the course of the Puerto Rico or Fresno projects. In another example, a published study estimates the probability at less than 1 female per 200 million males (Crawford JE, Clarke DW, Criswell V, Desnoyer M, Cornel D, Deegan B, et al. Efficient production of male Wolbachia-infected *Aedes aegypti* mosquitoes enables large-scale suppression of wild populations. Nat Biotechnol. 2020;38(4):482-92.) To date, PCR monitoring of mosquitoes collected from release field sites have not identified any ZAP infected females.

At least once per year, MosquitoMate and Verily will also conduct longevity and competitiveness studies, comparing the mosquitoes proposed for releases and wild type males. Data from previous trials demonstrate ZAP mosquito longevity and competitiveness to be at least equal to Wild Type males. In addition to Hawaii's import requirements, the shipper and/or receiver will obtain additional permits as required by federal or state agencies.

Wolbachia is an obligate endosymbiont and cannot survive outside of the host invertebrate. *Wolbachia* strains already exist in Hawaii in a range of invertebrates in the wild, including mosquitoes. The presence of *Wolbachia* endosymbionts is the normal

state for 40% to 60% of Arthropods and does not represent an unusual or pathogenic bacterial infection. *Wolbachia* are not capable of infecting human cells. MosquitoMate and Verily will perform PCR testing on the mosquitoes to confirm the presence of the correct *Wolbachia* bacterium within the shipment lineage to ensure cytoplasmic incompatibility.

The likelihood that introduced strains of *Wolbachia* would become the dominant strains in the environment is highly unlikely. Replacing the dominant *Wolbachia* strain has been done purposefully in the environment for projects that are separate from the approach we are proposing (such as by the World Mosquito Program in Australia and other nations). To clarify, DLNR is NOT proposing a World Mosquito Program type project where the goal is to intentionally force a different dominant *Wolbachia* strain into the wild mosquitoes in the environment and change vector competence of the wild population. However, in these types of programs, they have to release 4 million mixed male AND female mosquitoes in a given location to force a new *Wolbachia* strain to become the dominate strain over an area of 66 km^2. Given the aforementioned EPA reviewed value of 1 female release per 250,000 males with the MosquitoMate product, such an outcome is not expected to occur.

If, somehow population replacement were to occur (despite the estimated 1 female release per 250,000 males) DLNR would cease releases as the released males would then be able to mate with the wild females with the established *Wolbachia* species. The outcome of this would be that the mosquito species that already exists in Hawaii would continue to exist in the wild, just with a different *Wolbachia* bacteria. We do not anticipate a different *Wolbachia* bacteria having any new or negative effects on the environment.

DLNR and DOH feel comfortable utilizing these mosquitoes at a very small scale (in remote forest habitat) or at a very large scale (across urban areas and island wide) so long as recommended application guidelines are followed. The scale and scope of the project will likely vary across time based on the funding available and mosquito prevalence. As with any pesticide product, if you do not eradicate the species of concern, they will rebound if you stop using the pesticide product. However, we view this as a beneficial aspect of the project as we also know we can stop the process at any time. Unfortunately, due to the critical nature of the declines of Hawaiian forest birds, we anticipate mosquito control becoming a long-term management action to be performed (similar to rat control and invasive weed control) annually.

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Data collection will occur during releases using the State general funds as well as federal funds from partner agencies (USFWS, USGS, NPS), depending on who is performing the releases. As the application of the pesticide product is intended for the reduction of *Culex quinquefasciatus* mosquito populations, this monitoring will include extensive mosquito population surveillance following releases to ensure that populations are reduced. DLNR is already conducting this type of monitoring in preparation for incompatible mosquito releases. *Wolbachia* genetic monitoring will also occur, likely in partnership with USGS, throughout the release program.

In addition to Hawaii's import requirements, the shipper and/or receiver will obtain additional permits as required by federal or state agencies.

Method of Disposition
Any dead imported mosquitoes will be disposed of as municipal waste.

Abstraction of Organism
Culicidae species are sexually reproducing species. Minimum generation times vary but are approximately three weeks. Mature adults are up to approximately a centimeter in length and can live for a month to a few months. Adult mosquitoes range from 2.0 to 10.0 mm in size with males being smaller than females on average. Mosquito life cycles are well understood for most species, including all those established in Hawaii.

Larvae feed on organic material found in pools of water. Both adult males and females feed on water that contains carbohydrates (water with sap or nectar). Only mature females of certain species seek out and feed on vertebrate blood prior to egg laying. This blood feeding process allows for the transmission of pathogens and parasites.

Culex quinquefasciatus rely on pools of water with organic material for the growth of larvae. Only adult females bite, as they require blood meals from vertebrate hosts to develop their eggs.

Potential Impact to the Environment
Culex quinquefasciatus are already well established in the wild on all of the main islands in Hawaii from sea-level to ~6,000 feet in elevation. and *Culex quinquefasciatus* are established statewide and is well establish on Hawaii's Big Island. An additional five other "biting" non-native mosquito species have also become established: *Ae. albopictus, Ae. aegypti Ae. japonicus*, *Ae. vexans*, and *Wyeomyia mitchelli*.

Wolbachia are not infectious to humans and are vertically transmitted through the eggs

from one generation to another. The *Wolbachia* bacteria are obligate endosymbionts and can only survive inside the insect host's cytoplasm. A mosquito transinfected with a different strain of *Wolbachia* that results in cytoplasmic incompatibility would not be able to successfully reproduce with a wild mosquito due to cytoplasmic incompatibility. Therefore, if individual mosquitoes did become temporarily established, then they will quickly die off over the following generations because of cytoplasmic incompatibility with wild mosquitoes of the same species, with which they would be expected to encounter and mate.

Through the importation we intend to only import male mosquitoes. The sex separation can be performed in a variety of manners including through computer recognition and separation of males and females or through pupal sorting of males and females. However, if both sexes of transinfected mosquito were to be accidently released, they are unlikely to maintain a breeding population of a transinfected mosquito. *Wolbachia* invasions into populations require a critical threshold frequency of infection that needs to be overcome before a novel *Wolbachia* infection can spread into a population. The *Wolbachia* infection rate must exceed 20-45% before it can spread and become established. This is evident in large scale releases such as in Cairns, Australia, where millions of transinfected mosquitoes (both sexes) with *Wolbachia* are released into the environment to control disease transmission, yet they do not easily reach fixation in the wild. If transinfected mosquitoes were to become established, the establishment is likely to be spatially localized due to incompatibility with neighboring mosquito populations.

Potential Impacts of Importation

pro: Importation of male mosquitoes will allow the implementation of an evaluated technology that has been scientifically demonstrated as a safe and effective control method for mosquitoes on a landscape-scale. These are mosquitoes that are widespread in Hawaii and which have negative impacts to humans, wildlife, and pets, and are causing the extinction of native forest birds. Thirty species of main Hawaiian forest birds have become extinct since European contact, and another 11 of the 21 remaining species are federally listed as threatened or endangered. The remaining 21 forest bird species remain at great risk as a result of avian pox and avian malaria. Four honeycreeper species (Akikiki, *Oreomystis bairdi*; Akekee, *Loxops caeruleirostris*; Kiwikiu, *Pseudonestor xanthophrys* and Akohekohe, *Palmeria dolei*) are of particular concern – each are federally endangered, single-island endemics with highly restricted ranges, number fewer than 1,800 individuals, and display recent alarming population declines. DLNR and USFWS have previously attempted to address these declines through bold conservation actions, such as translocations and establishment of captive

populations; however agencies have met with only limited success due to rapidly changing disease-transmission conditions on the landscape. There is an urgent need to develop new conservation tools, including landscape-level mosquito control in order to prevent further extinctions.

The application of traditional chemical controls for mosquitoes in both natural areas is impractical and causes unacceptable non-target impacts, whereas IIT carries no non-target risks to native species, humans or the environment. Furthermore, mosquitoes were first introduced to the Hawaiian Islands in the 1800s, and while they are used opportunistically as prey items, no species native to Hawai‘i are dependent on their presence for survival. The control of mosquito populations in Hawaiian forests would thus cause no negative impacts on Hawaiian species.

Demonstrated application of this approach in Hawaii would have also have a wide range of potential positive effects in that it may facilitate the incompatible insect technique approach being used for human health.

con: It is hard to imagine any negative effects since the species is already established in Hawaii. Importing these organisms will not have any foreseeable beneficial effect to this mosquito species already found in Hawaii. The introduction of, for example, increased genetic variation within the mosquito species will be minimized by crossing the lines to mosquitoes originating from Hawaii.

The presence of unintended accompanying microbiota is minimized by the sterile laboratory rearing conditions used. These mosquitoes have been maintained for many generations in the lab environment and have not had the opportunity to obtain pathogens from the wild from blood feeding. The presence of intended microbiota, the *Wolbachia,* potentially has very positive effects on the societal health, the suppression of human disease vectored by mosquitoes, the environment, via population suppression of mosquitoes that vector avian pathogens, and the economy, through the potential increased tourism and lessened disease burden.

This mosquito species is already well established in Hawaii, as are many different strains of *Wolbachia*. MosquitoMate and Verily have a demonstrated track record of success utilizing sex-sorting methods which are highly effective. In the event that technical difficulties did occur during sex-sorting methods, because of cytoplasmic incompatibility, the escape of female mosquitoes carrying a new *Wolbachia* strain is not expected to be stable over the following generations. Laboratory reared females outcrossing to locally established wild male mosquitoes will result in cytoplasmic

incompatibility and the failure of offspring to develop.

There is an extensive body of literature surrounding this mosquito species, its impact upon Hawaii, and Wolbachia-mediated cytoplasmic incompatibility.

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G. Simmons & L. Wells – Hawaii Department of Health
D. Smith & C. King – Hawaii Department of Land and Natural Resources

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Questions from Hawaii Department of Agriculture on Incompatible Culex strain

The following information is being provided by Verily Life Sciences in response to questions from the Hawaiian Department of Agriculture (HI-DoA) about the *w*AlbB-strain *Culex quinquefasciatus* (incompatible i.e. conditionally sterile mosquitoes), which the US Fish and Wildlife Service, the Birds Not Mosquitoes (BNM) coalition and other collaborators wish to import into Hawaii for use in a mosquito control program that uses Sterile Insect Technique (or in this case, an incompatible insect technique). The objective of this program is to protect native Hawaiian birds against avian malaria, which is vectored by invasive *Cx quinquefasciatus* in Hawaiian bird reserves.

Background information:

Debug is a Verily Life Sciences (Verily) project aimed at developing technology to rear and release sterile or incompatible mosquitoes to reduce mosquito populations that transmit disease. Much of the Debug project's work has focused on developing tools for the mass rearing and effective release of male mosquitoes that are conditionally sterile against Wild Type (WT) mosquitoes due to cytoplasmic incompatibility (CI): whereby male insects infected with *Wolbachia* that mate with either females without *Wolbachia* or those infected with different *Wolbachia* strain, produce non-viable progeny, as embryonic development is halted. CI is the basis for the *Wolbachia* Sterile Insect Technique (SIT), also referred to as the Incompatible Insect Technique (IIT). Debug has successfully developed and deployed incompatible male *Aedes aegypti* mosquitoes in several large scale collaborative programs. For reference the following publications provide detail about the efficacy, general approach, rearing, sex sorting, release and field results of some of these projects:

- Crawford et al 2020, Fresno CA, USA (2017-2018)
- Beebe et al 2021, Innisfail QLD, Australia (2018), see also Australian CSIRO website on the Innisfail project.
- Ng et al, 2021, Singapore (2018-current), see also Singapore National Environment Agency website on Project *Wolbachia* Singapore

While there are no recent publications on field programs using incompatible *Cx. quniq*., there is a 1967 publication showing local elimination of *Culex pipiens* using release of incompatible *Wolbachia* males in Myanmar (Laven, H. Eradication of *Culex pipiens fatigans* through Cytoplasmic Incompatibility. Nature 216, 383–384 (1967). https://doi.org/10.1038/216383a0.), and incompatibility in *Cx. pipiens* is widely studied.

In Hawaii, Debug has been requested by Hawaiian conservation groups including the Birds Not Mosquitoes coalition, The Nature Conservancy and the US Fish and Wildlife Service, to participate in a project that attempts to protect native Hawaiian birds from the depredations of Avian Malaria vectored by the invasive *Cx. quniq*. mosquitoes. This project would release

incompatible male *Cx. quinq*. into forest reserves with the goal of reducing wild-type (WT) *Cx. quniq*. mosquitoes and hence reducing malaria infections in birds. These male mosquitoes have a short lifespan (days), can not bite or vector disease, and are conditionally sterile due to the presence of an incompatible strain of the endosymbiont *Wolbachia pipientis* already present in Hawaiian mosquitoes (*w*AlbB sourced from Hawaii.) As noted previously *Cx. quinquefasciatus* are widespread in Hawaii, *Wolbachia pipientis* is present in a majority of insect species, including many endemic to Hawaii, all *Culex* and *Aedes albopictus* mosquitoes in HI have Wolbachia pipientis, and thus there is a long history of human and ecological exposure.

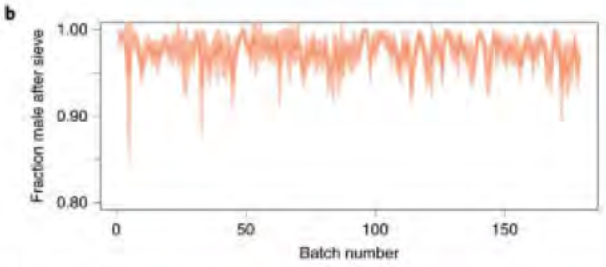
Verily's understanding is that the Hawaiian Department of Agriculture intends to submit an emergency application under FIFRA Section 18 to the EPA for temporary registration of the *w*AlbB in *Cx. quinq*. and that releases will be conducted under appropriate permits.

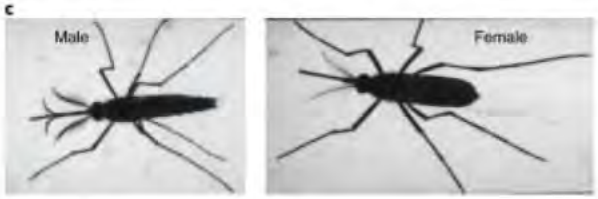
Questions from Christopher Kishimoto (Hawaii Department of Agriculture, Plant Quarantine Branch, Entomologist)

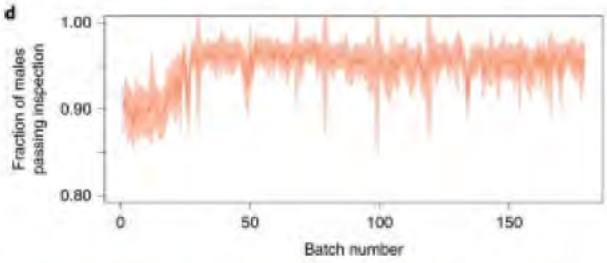
1. Could you please walk us through your procedures on how you eliminate female mosquitos from being released?

Verily's multi-stage mosquito sex sorting system removes females with extremely high accuracy, while retaining most males for release. As outlined in Crawford et al. 2020 the system comprises 3 stages: 1) sieving of pupae to remove the vast majority of females, as female pupae are larger than males, 2) adult sex sorting using a real-time industrial vision system that uses multiple images of every adult mosquito to identify and remove females, and finally 3) we submit all images of individuals labeled male by the industrial vision system for scoring by a machine learning classifier which acts as a quality control system with further human review to identify and enable removal of any potential females accepted by the adult industrial vision sorter. For *Aedes aegypti* the combined system is expected to release 1 female for every 900 million males with a 95% CI of 1:200 million to 1:26 billion (Crawford et al. 2020). We are currently adapting the Verily sex sorting pipeline to *Culex* mosquitoes but as the basic features used for sex sorting, particularly the adult morphology, are the similar between *Culex* and *Aedes* we hope for extremely high accuracy sorting. As we do for Aedes as a part of EPA permitted manufacturing, we will also perform regular QC assays to confirm absence of females in sample release batches prior to the beginning of shipments and importation into Hawaii. See diagram below from Crawford et al. 2020

Probability of a female contaminant (95% CI)	0.50 (–)	0.03 (0.00 – 0.08)	2.39×10^{-5} (1.30×10^{-5}) – (3.79×10^{-5})	1.82×10^{-3} (3.76×10^{-4}) – (4.38×10^{-3})	1.13×10^{-4} (3.08×10^{-9}) – (4.83×10^{-4})	1.13×10^{-6} (3.88×10^{-11}) – (4.44×10^{-6})







a, Illustration of the entire [*Aedes aegypti* mosquito] sex-sorting pipeline, including the mechanical pupal sieve, real-time adult visual inspection, cloud-based machine learning classifier, and [expert human] review. The probability of a female contaminant with 95% CIs for each step is shown along with the estimated overall female contamination rate for the entire pipeline in the final column. [note: the sorting process has been updated since 2018 to include both expert review and other algorithmic improvements] **b**, The fraction of mosquitoes imaged by the sex sorter after the pupal sieve that were male with s.d. intervals shaded for 179 production batches. **c**, Example images from the adult sex sorter (male on the left and female on the right) used by both the industrial vision system and machine learning classifier. **d**, The fraction of true males that were correctly labeled and accepted by the Industrial Vision system with s.d. interval shaded (n = mean of 96, range of 10–140 independent sex-sorter lane measurements per batch). After the industrial vision stage there are further QC inspection steps as noted above.

2. How often are quality control measures implemented?

Every single mosquito Verily provides for release goes through the above sex-sorting pipeline, with multiple stages of independent computer review of each adult mosquito, followed by additional human and computer quality control reviews.

Sieve performance is monitored in every single batch, and in addition as a part of the documented (and EPA reviewed) manufacturing process Verily regularly conducts a "female contamination" assay to ensure that adult sorting runs let through no females, validating that release batches are at <1:250:000 females:males according to Verily's calculations and EPA requirements.

3. How often will quality control checks be implemented in the future?

As noted above, production of *Cx. quinq*. would be under a similar EPA reviewed manufacturing process as used for Verily's *Aedes* manufacturing. Verily is regularly updating sex sorting algorithms and protocols to increase accuracy.

4. Have female mosquitos ever been found in batches of mosquitos destined for field release? If so, how often?
5. Have batches of mosquitos been halted for distribution because of the findings of any female mosquitos or other problems?
6. Have Verily female mosquitos ever been collected from the environment?
7. How often does Verily survey release sites for Verily female mosquitos?

We will provide answers to questions (4-7) together as they are all aimed at identifying the likelihood of *w*AlbB female releases and identification of this in field environments, which could potentially reduce the efficacy of incompatible male releases.

As a part of Verily's *Aedes* manufacturing process as documented in Crawford et al. 2020, a small number of females (~<1:250k) are found in batches *prior* to field release. As noted above a secondary quality control review identifies and removes these resulting in extremely low female contamination rate in released mosquitoes. In our Singapore collaboration we identified a very small number of released females in batches comprising several million males, and have since updated our protocols to reduce the likelihood of this recurring.

Regarding the environmental collection of Verily female mosquitoes: The incompatible *Aedes* programs undertaken by Verily and collaborators have Verily (or our partners) routinely monitor trap collections for incompatible adult females i.e. females positive for the released strain of *Wolbachia* as assessed by molecular assays, and we also test larvae from ovitraps for the presence of this *Wolbachia*. We propose that this be included as a part of any fieldwork and surveillance accompanying a release program of incompatible *Culex quinq*. males in Hawaii. We also note that *Wolbachia pipientis* is present in a majority of insect species, including many endemic to Hawaii and all *Culex* and *Aedes albopictus* mosquitoes in HI have *Wolbachia pipientis,* and thus there is a long history of human and ecological exposure.

ZAP (transfected *Ae. albopictus*) and WB1 are MosquitoMate products, and we are unaware of any Verily manufactured ZAP or WB1 females being discovered in the environment. As noted above (and as reported in Ng et al 2021) Verily discovered the accidental release along with field collection of a very small number of *Ae. aegypti* females in Singapore, which despite ongoing release programs have not spread. As noted in the Singapore paper, in response protocols for sex sorting and QC have been significantly improved.

Exact protocols (e.g. sampling rate, pooling, etc.) for field surveillance to identify incompatible Culex adult females and/or larvae in Hawaii will need to be agreed and finalized.

8. What are the overall results from field releases of Verily mosquitos so far?

As outlined above in the introduction there are several studies showing that incompatible (transfected) male *Ae. aegypti* can cause suppression of wild mosquito populations when operated using Verily's rearing and release systems.

- California (in collaboration with MosquitioMate and others) showed 95% (up to 99%) suppression in treatment areas relative to controls: Crawford, J.E., Clarke, D.W., Criswell, V. et al. Efficient production of male *Wolbachia*-infected *Aedes aegypti* mosquitoes enables large-scale suppression of wild populations. Nat Biotechnol 38, 482–492 (2020). https://doi.org/10.1038/s41587-020-0471-x
- Australia (in collaboration with the Australian CSIRO and others) showed >80% (up to 97%) suppression in treatment areas relative to controls: NW Beebe, D Pagendam, BJ Trewin, A Boomer, M Bradford, A Ford, et al. Releasing incompatible males drives strong suppression across populations of wild and *Wolbachia*-carrying *Aedes aegypti* in Australia. Proceedings of the National Academy of Sciences 118 (41). https://www.pnas.org/doi/full/10.1073/pnas.2106828118
- Singapore Ng. et al 2021 MedRxiv Preprint Paper in collaboration with Singapore National Environment Agency showed 98% suppression in treatment areas relative to controls.

In addition to recent *Aedes* field results there is a 1967 *Culex pipiens* paper showing local elimination (100% suppression) using release of incompatible males in Myanmar: Laven, H. Eradication of *Culex pipiens fatigans* through Cytoplasmic Incompatibility. Nature 216, 383–384 (1967). https://doi.org/10.1038/216383a0.

9. How long does it take for wild mosquito populations to get back to prerelease populations once Verily mosquitos have stopped being released?

It is unknown what would happen with *Cx. quinq*. in the proposed program areas after a successful suppression program, as it will depend on migration rates from outside the treatment area, natural fecundity of wild mosquitoes in the local ecology and a variety of other factors. Any release program would need to maintain an ongoing surveillance program to monitor this.

10. Does Verily have EPA approval to release its mosquitos in Hawaii?
11. Does Verily have Hawaii Department of Agriculture Pesticides Branch approval to release its mosquitos in Hawaii?

In answer to 10-11: As previously discussed with HI-DoA, Verily will support partners and HI-DoA in applying for EPA permits along with any state permits required to undertake this program.

12. How many Verily mosquitos would have to be released to achieve adequate population control in Hawaii's environments?

This will be determined by Verily and local partners based on the results of an initial Mark Release Recapture (MRR) trial, which would give information on wild-type population numbers

and the dispersion and survival of released incompatible males. In general most IIT programs aim to achieve a ratio of 1:10 Wild Type male:sterile male in field traps in the treatment area to ensure strong suppression in each generation.

13. What is the duration of time needed to achieve adequate mosquito population control once releases start?

This will depend on a number of factors including wild type population, release numbers, efficacy of dispersion etc, along with the efficacy of the surveillance program used to measure impact. *Aedes* incompatible male release programs and other SIT projects typically see measurable impact on hatch-rate within several weeks, though it may take months for significant wild-type population reduction. Laven 1967 saw initial reductions after several weeks with incompatible male *Cx. pipiens* releases though this was in a village setting.

14. How will Verily handle a request to specifically manufacture Hawaiian biotype mosquitos, especially if orders for those mosquitos may be inconsistent?

Verily will review with requesting partners as project plans develop.

15. Would Verily be able to show verifiable proof that only Hawaiian biotype mosquitos will be shipped to Hawaii?

Yes, Verily's manufacturing process maintains molecular assays and physical containment to ensure quality controls and biosecurity of shipped mosquitoes.

Sex-sorted male mosquitoes will be shipped to Hawaii from our rearing facility in California and produced using Verily's mosquito manufacturing process which will be reviewed as a part of a HI DoA submitted Section 18 permit application. Males will be transported in line with any issued label and permits.

STATE OF HAWAI'I
DEPARTMENT OF LAND AND NATURAL RESOURCES

POST OFFICE BOX 621
HONOLULU, HAWAI'I 96809

EXEMPTION NOTICE

Regarding the preparation of an environmental assessment under the authority of Chapter 343, HRS and Section 11-200.1-17, HAR

Project Title:	Mosquito Control Research Using *Wolbachia*-based Incompatible Insect Technique
Project Location:	Maui (2) 2-3-005:004: Waikamoi Preserve (2) 2-4-016:004: Waikamoi Preserve (2) 1-2-004:013: Hanawi Natural Area Reserve (2) 2-3-005:001: Haleakala National Park (2) 1-8-001:007: Haleakala National Park (2) 1-3-001:003: Haleakala National Park (2) 1-7-004:016: Haleakala National Park (2) 1-6-001:001: Haleakala National Park (2) 1-6-001:002: Haleakala National Park (2) 1-2-010:001: Haleakala National Park Kauai (4) 1-4-001:003: Alakai Wilderness Preserve (4) 1-4-001:013: Kokee State Park
Chapter 343 Trigger(s):	Use of State Funds and Lands
Project Description:	The main objective of this project is to initiate research to inform incompatible insect technique applications for the control of invasive *Culex quinquefasciatus* mosquitoes which are the primary vector of avian malaria. The disease threatens the survival of remaining endangered forest bird species where they persist in high elevation montane forest habitat on Maui and Kauai. Male mosquitoes which have been given an incompatible strain of *Wolbachia* bacteria are to be released on the landscape, and upon release those males will breed with wild female mosquitoes. As a result of those pairings, the wild female mosquitoes will lay eggs which will not hatch, and no offspring will be produced. When releases of incompatible male mosquitoes are completed consecutively, the approach results in the suppression of mosquito populations at a landscape-scale. If releases are halted, mosquito

	populations will gradually return to pre-release levels as wild female and male mosquitoes migrate back into the treated area from surrounding forest habitat. Initial research will contribute to EPA registration of male *Culex quinquefasciatus* mosquitoes with *Wolbachia* as a biopesticide, as well as determine the minimum number of male mosquitoes that must be released in each area to ensure population suppression. This project may be funded by Federal sources.
Consulted Parties:	U.S. Fish and Wildlife Service
Authorization:	November 13, 2015, Land Board submittal (C-6). Delegation of Authority to the Chairperson or their authorized representative to declare exempt from the preparation of an Environmental Assessment those Department actions which are included in the Department-wide exemption list when the Board of Land and Natural Resources has delegated the authority to conduct those actions.
Exemption Class & Description:	**Exemption Classes:** **General Exemption Type 5** *Basic data collection, research, experimental management, and resource and infrastructure testing and evaluation activities that do not result in a serious or major disturbance to an environmental resource.* PART 1 13. Research that the Department declares is designed specifically to monitor, conserve, or enhance native species or native species' habitat. 16. Research to identify, monitor, control, or eradicate introduced species. Date of Agency Exemption List: November 10, 2020.
Determination:	The Department of Land and Natural Resources declares that this project will likely have minimal or no significant impact on the environment and is therefore exempt from the preparation of an environmental assessment under the above exemption classes.

DLS Suzanne Q. Case Jun 17, 2022

Suzanne D. Case, Chairperson
Board of Land and Natural Resources

Date

Signature:

Email: david.g.smith@hawaii.gov