

**Findings and Recommendations
for Issuance of an Incidental Take Permit (TE-051040-0)
in association with Cyanotech Corporation's
Habitat Conservation Plan
for the Hawaiian Stilt,
Keahole Point, Kona, Hawaii**

I. Description of Proposal

Cyanotech Corporation (Cyanotech) has applied to the U.S. Fish and Wildlife Service (Service) for a 3-year permit to authorize incidental take of the federally listed endangered Hawaiian stilt (*Himantopus mexicanus knudseni*; stilt) pursuant to section 10(a)(1)(B) of the Endangered Species Act of 1973, as amended (16 U.S.C. 1531-1544) (Act). To minimize and mitigate impacts to the species, the Applicant has prepared the Cyanotech Habitat Conservation Plan (HCP). The Service also prepared a Biological Opinion (BO) and an Environmental Action Statement (EAS) concerning the proposed action of the Service's issuing the permit. The HCP, BO, and EAS are herein incorporated by reference.

The project site lies within the Natural Energy Lab of Hawaii (NELHA), a marine research and development area set aside by the State of Hawaii on the Kona coast, approximately 8 miles north of the town of Kailua-Kona on the island of Hawaii. The Cyanotech aquaculture facility is located at Keahole Point below Makako Bay, west of the Kona International Airport and adjacent to other NELHA aquaculture facilities.

Cyanotech cultivates and harvests microalgae for commercial sale. The Cyanotech facility currently occupies approximately 90 acres of land and includes a series of man-made ponds or "raceway ponds" where the microalgae is grown, and office, maintenance, laboratory, research and processing buildings. The nutrient-rich ponds support high-density invertebrate populations, a primary food source for the endangered stilt. Stilts are attracted to and nest within and adjacent to the aquaculture facility. Stilt chicks that hatch at the facility are led by parent stilts to the raceway ponds to feed where they die either by drowning in the rapidly flowing waters or from adverse physiological reactions (e.g., acute dehydration) associated with ingesting the hypersaline, high-alkaline alga medium required for microalgae production. Cyanotech's aquaculture operation thus inadvertently attracts stilts to a man-made habitat that is unsuitable for successful stilt reproduction.

Cyanotech is seeking an incidental take permit for (1) operation and maintenance of the microalgae facility, (2) implementation of bird deterrence measures designed to eliminate stilt foraging and nesting at Cyanotech, and (3) monitoring and compliance with the incidental take permit and HCP.

The proposed HCP is a short-term plan to reduce and offset the incidental take of stilt eggs and chicks while long-term strategies to exclude the population of stilts at Cyanotech can be evaluated. Cyanotech proposes a variety of measures to avoid, minimize and mitigate impacts to the stilt. Avoidance and minimization measures, and compensatory mitigation will occur on-site.

Minimization measures are designed to eliminate stilt foraging and nesting in hazardous, unprotected areas at Cyanotech. Cyanotech will mitigate for incidental take of stilt eggs and chicks by managing a 1.7-acre settling basin (Lake) for stilt nesting on-site. These measures are expected to increase 1) stilt reproductive success, 2) recruitment of fledged birds into the overall population, and 3) that the Cyanotech facility does not become a reproductive sink for stilts.

Cyanotech has implemented interim measures to minimize incidental take over the last four stilt breeding seasons (1998 to 2001). The initial plan was to provide suitable nesting habitat for stilts on-site so they would not nest near the raceways. To do this, Cyanotech attempted to convert a raceway pond (DU Pond) into suitable nesting habitat by taking it out of alga production, flooding it to a shallow depth and placing crushed lava and microalgae sludge to mimic conditions favorable for stilts.

A second measure was to manage water levels in a 1.7-acre settling basin (Lake) to provide stilt nesting habitat. Water levels were managed to provide shallow water foraging habitat and conditions favorable for the invertebrate food source. Two nesting islands were created and reconfigured to maximize nesting habitat in close proximity to shallow water areas. The 15-foot high, steep-sided walls may also serve as a barrier that restricts access by predators such as mongoose and cats. While this was successful at attracting most of the birds and producing fledglings, it didn't eliminate take. As a result, Cyanotech decided to develop an HCP and apply for an incidental take permit.

For four breeding seasons (1998 to 2001), Cyanotech has implemented interim measures to minimize incidental take of stilts while the HCP was being developed. These measures include: 1) modifying raceway berms, 2) increasing human activity adjacent to raceway ponds, 3) placing visual bird deterrence devices near raceway ponds, and 4) managing an artificial, predator-free nesting site (Lake) away from raceway ponds in order to attract stilts away from the raceway ponds where incidental take is inevitable.

In addition, Cyanotech has monitored stilt breeding activity at the facility and adjacent lava fields, and conducted monthly surveys of nearby wetland areas that are known to support stilts. During the 4 breeding seasons, 194 stilts fledged as a result of this management. This increase in birds indicates that the number of stilts along the Kona coast continues to rise, with a mean of 145 (SD +/- 44) adult and subadult stilts observed during the 1998 to 2001 survey period.

Minimization Measures

- 1) Cyanotech will aggressively explore options and pursue solutions to reduce or eliminate the invertebrate food source from its ponds in order to limit the number of stilts attracted to the site. Cyanotech will implement a 3-year action plan to evaluate bird deterrent measures at the Cyanotech raceway ponds (See Appendix 4 of the HCP).
- 2) During the first year, Cyanotech will reconfigure the raceway ponds to steepen the outer slopes and eliminate the level surface lip of individual raceway ponds where stilt nesting occurs. This measure will reduce the gravel area adjacent to raceway ponds

where stilts are capable of constructing nests and promote abandonment of sites where nest site fidelity has been established near specific raceway ponds.

3) Cyanotech employees will use bird deterrents to keep adult stilts from raceway ponds. The bird deterrent measures used will be limited to driving or walking on raceway roads several random times per day to increase the level of human activity, and placing preventative devices (e.g., Mylar tape) in areas where nest building activities are observed.

4) Bird deterrent measures will be introduced to only a limited number of raceway ponds at a time such that the entire population of stilts currently sustained by the raceway ponds is not affected by a loss of adequate foraging habitat.

5) Cyanotech will immediately halt use of any bird deterrent or hazing method that results in the incidental take of an adult or subadult stilt until an evaluation of the incident can be conducted by the Service and Cyanotech is advised on how to proceed.

6) The former DU Pond will either be returned to an active microalgae production pond or used as a test site for a deterrent measure (e.g., netting) in order to force stilts to abandon this former breeding site.

7) The Lake will be managed in accordance with recommendations from a biologist knowledgeable of the wetland habitat conditions required for optimum stilt breeding habitat. The Lake will be managed to lure birds away from the raceways and lava fields into a protected breeding site in accordance with the guidelines in section 3.3.2 of the HCP.

8) The biological monitor will use their best professional judgment when determining whether to access the Lake during the breeding season to collect data necessary to determine reproductive success. Due to adverse effects of monitoring suspected from crowded conditions within the Lake, monitoring activities will be limited to observations that can be determined with a spotting scope, once per week.

9) Cyanotech employees conducting emergency maintenance (e.g., waterline repair, trash retrieval during high winds) in the Lake during the breeding season will be instructed to take extra precautions to prevent accidental crushing of eggs or chicks and to limit time spent within the interior of the Lake to the shortest duration possible. The frequency of emergency maintenance work of this nature is anticipated to be no more than once per breeding season.

10) Aside from conducting normal operations, employees will be instructed to keep activities adjacent to the Lake to a minimum during the breeding season (e.g., no social gatherings or unnecessary activities along the Lake bank in view of breeding birds).

- 11) Cyanotech will continue to educate its employees on the continuing activities to protect and conserve endangered stilts at the facility and on the behavioral cues for breeding stilts. Employees will be advised to continue aquaculture activities with caution if stilts are exhibiting these behaviors and to provide the biological monitor with any nest, egg, or chick sighting data within 3 days of any observations.
- 12) Any additional raceways constructed by Cyanotech will incorporate bird deterrent measures and designs that will eliminate factors drawing stilts to the facility. Future expansion of the Cyanotech facility is contingent upon market conditions, financial resources, and environmental resources. There are no immediate plans for development.
- 13) Cyanotech will work with the Service on identifying additional bird deterrents that may be used as a long-term strategy for reducing incidental take of stilts at Cyanotech and other future aquaculture facilities planned within NELHA. If a bird deterrent technique requires special training, Cyanotech personnel will obtain that training prior to use.

Mitigation Measures

- 1) Cyanotech will conduct maintenance of aggressive weeds in the Lake to maximize available nesting mudflats and foraging shallows. Additional pipelines will be installed to production ponds to allow for alternate discharge sites (other than the Lake) and to prevent inundation of active nests. All maintenance will be conducted during the nonbreeding season to avoid unnecessary activities in the protected breeding area.
- 2) Cyanotech will conduct maintenance of aggressive weeds in the Lake to maximize available nesting mudflats and foraging shallows. Additional pipelines will be installed to production ponds to allow for alternate discharge sites (other than the Lake) and to prevent inundation of active nests. All maintenance will be conducted during the nonbreeding season to avoid unnecessary activities in the protected breeding area.
- 3) Prior to the breeding season (mid-January), the Lake will be flooded. Cyanotech will manage water levels in the Lake to provide optimum stilt nesting habitat. The Lake will be managed to lure birds away from the raceways and lava fields into a protected breeding site. The Lake will be managed until all stilt chicks within the Lake have fledged.
- 4) During the breeding season of the stilt, the Lake will be managed in accordance with recommendations from a biologist knowledgeable of the wetland habitat conditions required for optimum stilt breeding habitat and to attain the biological goals set forth in section 3.2 of the HCP. Once initiated, management of the Lake as a stilt breeding area will not be discontinued prior to the end of the current breeding season.
- 5) After the breeding season (approximately August), the Lake will be drained and maintained with no standing water to encourage stilt dispersal to other wetlands and islands. The Lake will remain dry throughout the nonbreeding season.

6) To the extent possible, Cyanotech will strive to maintain the aquaculture facility predator-free by disallowing free-roaming cats and dogs at the site. Office and other building and construction areas will be kept free of litter and debris that provides shelter or food for rats, mongooses, and feral dogs and cats. A predator control program will be implemented for the Lake using traps and/or diphacinone bait stations, if the biological monitor determines that predator control is necessary to prevent chick mortality (i.e., the biological monitor documents loss of eggs/chicks in the Lake due to mongooses and/or rats).

7) Management of the Lake as a stilt breeding area may be discontinued prior to the end of the 3-year permit term, after Year 1 or after Year 2, if Cyanotech fledges more stilts than are incidentally taken during the permit term, and bird deterrents are found to be effective. For example, if the total number of fledglings produced in Year 1 is greater than the sum of the incidental take in Year 1 plus the incidental take anticipated in Years 2 and 3, then management of the Lake as a stilt nesting habitat may be discontinued upon approval of the Service. The amount of take anticipated may be estimated using either of two methods presented in the intra-Service Biological Opinion, and is relative to the effectiveness of bird deterrence in reducing stilt foraging and nesting in the vicinity of the raceways.

Monitoring and Reporting

- 1) The stilt population will be surveyed at Cyanotech at least once a month during the non-breeding season. Number of adult and subadult stilts at Cyanotech will be documented and band combinations recorded, where possible.
- 2) Stilt nesting activity will be monitored at Cyanotech at least once per week beginning no later than February of each year and will continue through the breeding season until all stilt chicks have fledged. Hatching and fledging success of stilts at Cyanotech will be determined, if possible. If crowded conditions at the Lake make it impossible to accurately census nests, at a minimum, the number of fledged birds will be reported. Band combinations of all nesting birds will be documented, where possible.
- 3) Surveys for incidental take of stilts will be conducted at least twice per week during the breeding season, and once per week or as needed during the non-breeding season. Efforts will be made to determine nest and chick fates through monitoring and thorough searches of the adjacent areas. To determine the amount of incidental take, and the number of eggs and chicks lost due to natural causes (predation, abandoned, added, flooded, infertile), the bio-monitor will record:

Nest building activity, estimated incubation period, number of eggs laid, date eggs were laid, hatching date, number of hatchlings, fate or suspected fate of eggs and chicks.

4) Cyanotech maintenance and operations staff will assist with the monitoring on a daily basis. Injured stilts and carcasses will be brought to the attention of the biological monitor right away. The bio- monitor will record:

Date, time and location of collection; suspected origin; suspected cause of death;
Age of bird; other pertinent data.

5) Incidental take will be reported to the Service in accordance with the terms and conditions of the permit (TE-051040-0). Fresh stilt remains will be collected and submitted to the Service or National Wildlife Health Research Center for necropsy and/or scientific preservation. Cause of mortality will be determined if possible. The biological monitor will be responsible for the proper handling, storage, and shipment protocols for all biological material collected on the facility.

6) If at anytime, the biological monitor determines that the minimization measures, as described in section 3.3.1, are resulting in an increasing number of stilts attempting to nest in the lava fields, the biological monitor will inform the Service. The biological monitor will notify the Service and the Kona Airport Manager if stilt breeding activity is detected adjacent to the airport runway.

Reporting

1) An annual report will be submitted to the Service within 60 days of the end of the breeding season. The report will include information on the:

- a) management actions taken by Cyanotech during the stilt breeding season;
- b) reproductive success of stilts at Cyanotech;
- c) observed nesting attempts at established lava-field nesting sites;
- d) the amount of any incidental take associated with operations and maintenance of the aquaculture facility throughout the entire year, and the suspected causes of the incidental take;
- e) average monthly stilt counts at Cyanotech during breeding and non-breeding seasons;
- f) a description of the deterrent methods evaluated including the number of raceway ponds tested and an assessment of the effectiveness of each deterrent; and
- g) a plan of action for the upcoming breeding season, including recommendations for changes based on monitoring results.

- 2) Consultation between Cyanotech and the Service will be ongoing throughout the year during the course of the permit term. A consultation and review, between Cyanotech and the Service, will take place at a minimum of once per year to evaluate the fulfillment of the mitigation and minimization requirements and success of the HCP (e.g., success of deterrents, adaptive management) and to set priorities for the upcoming year.
- 3) The results of the annual monitoring reports will be evaluated by the Service to determine if the bird deterrents are effective to the point that incidental take of stilt eggs, chicks, subadults, and adults is no longer an issue, and to determine whether management of the Lake can be discontinued.
- 4) With reasonable advance notification Cyanotech will allow access to the facilities by the Service for the purposes of ensuring compliance and providing technical assistance with this HCP.

Adaptive Management

- 1) If after the second year of the permit term, bird deterrents are determined by the Service to be unsuccessful (e.g. stilt nesting adjacent to the raceways is not significantly reduced or eliminated), consultation between Cyanotech and the Service will be initiated to plan an alternative course of action (e.g., extend the permit, investigate other mitigation) prior to the end of the permit term.
- 2) Mitigation requirements may be discontinued before the permit expires if take has been adequately mitigated for and deterrents are effective at deterring stilts from nesting at the facility.
- 3) If the results of the biological monitoring indicate that the bird deterrent measures are not producing the desired effect (reducing the number of stilts at Cyanotech), the conservation strategy may be changed to investigate more rigorous hazing methods.
- 4) If the results of the biological monitoring indicate that reducing the foraging habitat provided by Cyanotech is having a greater overall negative effect on the stilt population than the anticipated level of take observed at the facility in past years, Cyanotech will reconsider the goals of the HCP in accordance with the assurances provided in chapter 5 of the HCP.

II. Analysis of Effects

The Service's biological opinion concludes that the HCP's conservation strategy is adequate to address the adverse effects of the operation of the microalgae facility and implementation of bird deterrence measures on the stilt. This conclusion is based on the conservation strategy that provides net reproductive success through the on-site mitigation (number of fledged birds is greater than eggs or chicks injured or killed over the permit term), while minimization measures

are implemented to address the issue of principal concern, elimination of stilt use of the Cyanotech facility over the long-term.

The lack of suitable habitat appears to be a key factor limiting the recovery of stilts, and the current amount of wetland habitat is not enough to achieve recovery goals. The 1.7-acre settling pond (Lake) managed as mitigation for incidental take at Cyanotech provides a nesting site for a large number of breeding birds that may not have otherwise located suitable nesting habitat or successfully reproduced on other islands within the chain. If the stilts nesting in the Lake are not able to locate suitable breeding habitat elsewhere, then the birds fledged at Cyanotech have added to the overall population numbers of the subspecies. The reproductive success achieved to date at Cyanotech (194 fledglings over 4 years) demonstrates that Cyanotech can be managed to offset incidental take and increase overall stilt population numbers.

As discussed in the biological opinion, the stilts are likely to exist as a metapopulation or set of metapopulations among islands. Similarly, stilts are very opportunistic and have demonstrated the ability of intra- and inter-island dispersal. Stilts fledged and/or deterred from Cyanotech are expected to disperse to other suitable wetland areas on the island of Hawaii or statewide.

The HCP includes identification and implementation of non-lethal bird deterrent measures to reduce and eliminate stilt foraging and nesting at the facility. The HCP is expected to eventually eliminate the incidental take of stilts at Cyanotech by eliminating the "attractive nuisance" problem created by the expanse of open-water ponds, invertebrate food resources, and remote nesting areas, which inadvertently attract stilts to the Cyanotech facility. In addition, the HCP includes an adaptive mitigation strategy to create a protected and managed nesting area on-site during the breeding season in order to ensure some reproductive success for the birds attracted to Cyanotech.

III. Public Comment

The Service published a "Notice of Availability of an EAS and Receipt of an Application for an issuance of an Incidental Take Permit and HCP for Cyanotech Corporation in the *Federal Register* on January 2, 2002. Publication of the Notice initiated a 30-day comment period. Copies of the HCP and EAS were mailed on request. Four requests were received. Written comments were received from four entities. The comment letters are addressed in Attachment 1 to these Findings.

IV. Incidental Take Permit Criteria – Analysis and Findings

1. The taking will be incidental.

The taking of the stilt would be incidental to the otherwise lawful activities that would occur as a result of the operation and maintenance of the Cyanotech aquaculture facility. These activities include maintenance of raceway ponds, microalgae harvesting, management of the on-site

mitigation site, environmental monitoring and compliance. The HCP also describes certain minimization measures (e.g. hazing, netting, predator calls, increased human activity) designed to minimize injury and mortality of stilt eggs and chicks by discouraging nesting and eliminating nest site fidelity in unprotected areas. These are actions that may be construed as deliberate take, however, actions which may be conducted under an incidental take permit if the take results from mitigation measures specifically intended to minimize more serious forms of take, such as the mortality of stilt eggs and chicks anticipated if nesting is allowed to occur (HCP Handbook, Page 7-2).

2. The Applicant will, to the maximum extent practicable, minimize and mitigate the impacts of the taking.

The HCP contains and describes measures that will be implemented to minimize and mitigate the impacts of take of stilts to the maximum extent practicable under the permit. These measures were also summarized earlier in this document. As described below, the Service analyzed the impacts expected to occur and the mitigation and minimization measures to be provided under the HCP.

The measures contained in the HCP are based on the 4 years of monitoring and adaptive management performed by Cyanotech with the assistance of Ducks Unlimited. For four breeding seasons (1998 to 2001), Cyanotech has implemented interim measures to minimize incidental take of stilts while the HCP was being developed. In addition, Cyanotech has monitored stilt breeding activity at the facility and adjacent lava fields, and conducted monthly surveys of nearby wetland areas that are known to support stilts.

During the 4 breeding seasons, 194 stilts fledged as a result of this management. The reproductive success achieved at the Cyanotech Lake equals or surpasses levels observed at managed wetlands statewide and demonstrates that Cyanotech can be managed to offset incidental take and increase overall stilt population numbers.

A comparison of the overall population numbers of stilts along the Kona coast over the past four breeding seasons with the estimated number of nesting pairs at Cyanotech during the same period suggests that birds fledged from Cyanotech have added to the overall stilt population. Due to the lack of suitable stilt nesting habitat statewide, it is very likely that the large number of breeding birds on the Kona Coast may not have otherwise located suitable nesting habitat or successfully reproduced. Alternatively, if the stilts nesting in the Cyanotech Lake were not able to locate suitable breeding habitat elsewhere, then the birds fledged at Cyanotech represent a net gain for the subspecies.

Results of monitoring show it is not possible to accommodate stilt nesting at Cyanotech under the existing operating conditions without incidentally taking stilt chicks. Implementation of bird deterrent measures during the breeding season is expected to reduce and eventually eliminate nesting in unprotected areas and discourage nest site fidelity, thereby minimizing the injury and

mortality of eggs and chicks. Bird deterrence during the non-breeding season is expected to reduce and eventually eliminate stilt foraging and encourage the dispersal of adult stilts to other wetland sites.

Monitoring of breeding activity, management of the artificial nesting site, and development of effective bird deterrent measures at Cyanotech may provide additional benefits by helping to determine the ability of the proposed measures to address the issue of wildlife attracted to man-made sites (e.g. wastewater treatment facilities, aquaculture facilities, landfills, settling ponds). Determination of this information is important in light of the occurrence of wildlife at these sites and the increasing likelihood that other landowners will desire to make similar efforts in the future.

Five alternatives to the proposed minimization and mitigation measures were considered and discussed in greater detail in the draft HCP and this document (see Findings V. Alternatives analyzed). The alternatives considered are: 1) No Action, 2) Long-term Management Off Site, 3) Haze/Fee, 4) Integrated Management Approach, and 5) Conservation Plan - Adaptive Management On Site. The Conservation Plan - Adaptive Management On Site alternative was selected as the preferred conservation strategy.

The applicant felt that maintenance of the Lake for 3 years without the option to discontinue management if bird deterrent measures are determined to be effective and net reproductive success over the permit term is ensured, was not practical in light of the perceived potential wildlife hazard and the biological goal to eliminate incidental take at the facility. In addition, continuation of the on-site mitigation, once bird deterrence measures are determined to be effective and once the number of stilts fledged will ensure net reproductive success over the permit term, is considered to be above and beyond the mitigation measures required of the applicant.

After consideration of all the above factors, the Service finds that: (a) the mitigation is commensurate with the impacts, (b) the HCP is consistent with the long-term survival and recovery of the stilt, and (c) the HCP minimizes and mitigates the effects of take to the maximum extent practicable. These findings are based on the fact that impacts will be low or minimal, and that benefits to the species will be significant, especially compared to existing conditions or those conditions expected to occur absent the HCP.

3. The Applicant will ensure adequate funding for the HCP and procedures to deal with unforeseen circumstances will be provided.

Cyanotech has allocated personnel and funding for the proposed mitigation, monitoring and initial minimization measures over the past 4 years. Development and implementation of effective bird deterrence measures represent actions that are in addition to ongoing stilt management at Cyanotech. Cyanotech warrants that it has, and will expend such funds as may be necessary to fulfill its obligations under the HCP. In addition, Cyanotech maintains a biologist

on staff whose duties include implementing minimization and mitigation measures, and monitoring stilt activity and incidental take at Cyanotech.

Sections 4 and 5 of the HCP describe procedures to deal with unforeseen circumstances and changed circumstances. Unforeseen circumstances are changes in circumstances affecting a species or geographic area covered by a conservation plan that could not reasonably have been anticipated by plan developers and the Service at the time of the conservation plan's negotiation and development, and that result in a substantial and adverse change in the status of the stilt. In these circumstances, the Service agrees to not seek mitigation from Cyanotech Corporation related to the stilt except as described in the terms and conditions of the HCP.

Changed circumstances are changes in circumstances affecting the stilt or geographic area covered by the HCP that can be reasonably anticipated and planned for in the HCP, such as the listing of a new species or a natural catastrophic event. Due to the short-term duration of the permit (3 years), the only changed circumstance identified in the HCP is avian botulism. In the event of an outbreak of avian botulism at the Cyanotech facility, the Service and Cyanotech will consult to develop an appropriate response that mitigates adverse effects to stilts.

4. The taking will not appreciably reduce the likelihood of the survival and recovery of the species in the wild.

After reviewing the current status of the stilt, the environmental baseline for the action area, the effects of the proposed action and the cumulative effects, the Service has issued an intra-Service Biological Opinion (attached and incorporated by reference) which concludes that issuance of the permit to Cyanotech would be consistent with the long-term survival of the stilt and would not jeopardize its continued existence or result in the destruction or adverse modification of designated critical habitat. In summary, the Biological Opinion states the following:

- The on-site mitigation will likely provide net reproductive success (number of fledged birds is greater than eggs or chicks injured or killed over the permit term).
- Stilts fledged at Cyanotech will add to the overall stilt population and represent a net gain for the subspecies. The 1.7-acre settling pond (Lake) managed as mitigation for incidental take at Cyanotech is expected to provide a nesting site for a large number of breeding birds that may not otherwise locate suitable nesting habitat or successfully reproduce at other wetlands on the island of Hawaii or other islands. The number of birds fledged at Cyanotech (194 fledglings over 4 years) demonstrates that Cyanotech can be managed to offset incidental take and increase overall stilt population numbers.
- Stilts fledged and/or deterred from Cyanotech are expected to disperse to other suitable wetland areas on the island of Hawaii or other islands. Stilts are very opportunistic and are expected to supplement other existing populations or colonize new wetland habitats on Hawaii and other islands. In addition, stilts are

capable of inter-island movements and appear to exist as a metapopulation or a set of metapopulations among islands.

- No critical habitat has been designated for the stilt, therefore, none will be impacted. There are no other listed species known to occur in the action area.

5. Other measures, as required by the Director of the Service, have been met.

The HCP and conditions of the permit incorporate all elements determined by the Service to be necessary for approval of the permit application and issuance of the permit.

6. The Director of the Service has received the necessary assurances that the plan will be implemented.

The Service believes the HCP and incidental take permit application have been submitted in good faith on the part of Cyanotech. Lack of adherence to the HCP and associated permit conditions could result in suspension or revocation of the permit.

V. Alternatives analyzed

The Service's Proposed Action consists of the issuance of an incidental take permit and implementation of the HCP, which includes measures to minimize the incidental take of stilt eggs, chicks, subadults, and adults, and measures to mitigate any incidental take of stilts eggs and chicks at the Cyanotech facility. The four alternatives to the proposed alternative considered in the HCP are: 1) No Action, 2) Long-term Management Off Site, 3) Haze/Fee, and 4) Integrated Management Approach.

Under the No Action Alternative, no permit would be issued. Cyanotech would continue its microalgae operation without an HCP to address take of the stilt. Cyanotech did not select this option as it would be in violation of section 9 of the Act.

Under the Long-term Management Off Site Alternative, Cyanotech would contribute funds to create, restore, or enhance habitat for stilt at an off-site location. This alternative would provide mitigation for take of the stilt; however, Cyanotech did not select this alternative due to the perpetuation of incidental take that would be caused by continued foraging and nesting of stilts at the Cyanotech facility.

Under the Haze/Fee Alternative, Cyanotech would haze stilts using non-lethal deterrents. This alternative may minimize take, however, Cyanotech did not select this alternative because hazing birds from a site has not proven effective as a long-term solution and would likely result in a long-term commitment of resources without reducing stilt numbers at the Cyanotech facility.

Under the Integrated Management Approach Alternative, Cyanotech would implement non-lethal bird deterrent measures, manage protected nesting habitat for 1 year only, and reallocate funds

from on-site management to an off-site mitigation fund in years 2 and 3. Cyanotech did not select this alternative due to the unconditional closure of the on-site protected habitat after 1 year and the desire for flexibility provided by adaptive management.

The proposed alternative is a short-term plan to reduce and offset the incidental take of stilt eggs and chicks while long-term strategies to exclude the population of stilts at Cyanotech can be evaluated. Avoidance and minimization measures, and compensatory mitigation will occur on-site. Cyanotech will implement non-lethal bird deterrent measures in order to eliminate stilt foraging, nesting, and any nest site fidelity of stilts in hazardous, unprotected areas. Cyanotech will mitigate for incidental take of stilt eggs and chicks by creating suitable nesting habitat on-site. The proposed alternative was selected based on a conservation strategy that is designed to ensure that the on-site mitigation provides net reproductive success (number of fledged birds is greater than eggs or chicks injured or killed over the permit term), while minimization measures are implemented to address the issue of principal concern, elimination of stilt use of the Cyanotech facility over the long-term.

VI. General Criteria and Disqualifying Factors - Analysis and Findings

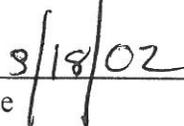
The Service has no evidence that the permit should be denied on the basis of the criteria and conditions set forth in 50 CFR 13.21 (b) and (c). The applicant has met the criteria for the issuance of the permit and to our knowledge does not have any disqualifying factors based upon review of data in the Service's Law Enforcement Management Information System (LEMIS) that would prevent the permit from being issued under current regulations.

VII. Recommendation on Permit Issuance

Based on our findings with respect to the permit application and the HCP, the Service recommends issuance of the section 10(a)(1)(B) incidental take permit TE-051040-0 to Cyanotech for incidental take of the federally listed stilt.



Deputy Regional Director



Date

References

- Cyanotech Corporation. 2001. Draft Habitat Conservation Plan for the Cyanotech Aquaculture Facility. 73 + pp.
- U.S. Fish and Wildlife Service. 2002. Biological Opinion on the Effects of the Issuance of an Incidental Take Permit to Cyanotech Corporation, Keahole Point, Hawaii. 18 + pp.
- U.S. Fish and Wildlife Service. 2002. Environmental Action Statement for Cyanotech Aquaculture Facility Habitat Conservation Plan. 6 pp.

Attachment 1. Summary of Public Comments

Comment 1: The U.S. Fish and Wildlife Service (Service) has forced Cyanotech to maintain and improve an on-site stilt breeding area.

Response: The Habitat Conservation Plan (HCP) is developed by the applicant, and the conservation strategy selected is at the complete discretion of the applicant, Cyanotech, not the Service. The Service cannot force the applicant to adopt a particular conservation strategy. When the Service was first contacted by Cyanotech, we suggested that they try to accommodate stilts at the facility rather than haze them away. However, Cyanotech has decided that they cannot continue to accommodate stilts and developed a conservation strategy to deter stilts from the facility.

Comment 2: The HCP cannot be categorically excluded as a low-effect HCP under the National Environmental Policy Act (NEPA). The effects of the HCP on the percentage of the entire stilt population residing on the Kona Coast, the amount of birds fledged at Cyanotech, and the anticipated incidental take does not justify a low-effect determination. The Service considers the activity to be "low-effect" activity, however, the HCP treats it otherwise.

Response: Low-effect HCPs are defined as those involving minor or negligible effects on federally listed and candidate species and their habitats, and minor or negligible effects on other environmental values or resources. The Service believes that the HCP and incidental take permit will have minor or negligible effects on the Hawaiian stilt. First, because Cyanotech's microalgae ponds are entirely artificial, impacts to Hawaiian stilts from operation and management of the aquaculture facility have not resulted from any alteration or loss of natural wetland habitat supporting Hawaiian stilt. Second, the HCP contains and describes measures that will be implemented to minimize and mitigate the impacts of take of stilts to the maximum extent practicable under the permit.

Third, minimization measures designed to reduce and eliminate stilt foraging and breeding at Cyanotech will have minor or negligible effects on the Hawaiian stilt population. Because stilts are very opportunistic, are capable of interisland movements, and appear to exist as a metapopulation or a set of metapopulations among islands, stilts discouraged from Cyanotech are expected to supplement other existing populations or colonize new wetland habitats on Hawaii and other islands that are being enhanced (e.g. Kealia Pond, Ohiapilo Pond, Opaeha Pond, Hamakua Marsh, Pouhala Marsh, Kawainui Marsh). Therefore, the effects of eliminating the man-made foraging and breeding opportunities temporarily provided by Cyanotech are minor and negligible.

Comment 3: The Draft HCP states that hazing stilts from Cyanotech will adversely impact the breeding success of the stilts.

Response: Hazing and other non-harmful bird deterrence are intended to reduce breeding (and foraging) opportunities at Cyanotech. These measures help to achieve the goal of reducing and eventually eliminating stilt use of Cyanotech, thereby significantly reducing incidental take.

Because stilts are very opportunistic, are capable of interisland movements, and appear to exist as a metapopulation or a set of metapopulations among islands, stilts discouraged from Cyanotech are expected to supplement other existing populations or colonize new wetland habitats on Hawaii and other islands that are being enhanced (e.g. Kealia Pond, Ohiapilo Pond, Opaulea Pond, Hamakua Marsh, Pouhala Marsh, Kawainui Marsh). In addition, the proposed conservation strategy requires Cyanotech to provide for the net reproductive success of stilts (number of fledged birds is greater than eggs or chicks injured or killed over the permit term) which will adequately mitigate for the impacts of the take (including hazing) authorized by the incidental take permit.

Comment 4: Cyanotech cannot be considered an “attractive nuisance.” The few chicks lost at Cyanotech represent background mortality, lost to incipient predation elsewhere, with the ubiquitous presence of rats, cats, and mongoose, and is outweighed by the number of chicks fledged at the “Lake.”

Response: Adult stilts are attracted to the aquaculture facility because the microalgae raceways have water and food. No stilts fledge at Cyanotech without maintenance of the Lake as a minimization and mitigation measure. No eggs or chicks adjacent to the raceways survive. Their deaths are caused either by the drowning/adverse physiological reactions in the microalgae raceways or by predation. Loss of stilt chicks due to the operation and maintenance of Cyanotech’s microalgae raceways represent incidental take of an endangered species under the Endangered Species Act (Act). Cyanotech is required to obtain an incidental take permit in accordance with section 10(a)(1)(B) of the Act for the incidental take of an endangered species. Cyanotech is not required to obtain a permit for stilts lost to incipient predation.

Comment 5: No on-site hazing of stilt breeding should occur until a suitable (off-site) mitigation site is established (Kealakehe Wastewater Treatment Plant (WTP)).

Response: The primary goal of the HCP is to reduce and eventually eliminate stilt use of Cyanotech in order to significantly reduce incidental take. Hazing and other non-harmful bird deterrence are important means by which nest site fidelity in hazardous areas is discouraged. Without hazing at the raceways and other unprotected areas, incidental take will continue and may increase. Therefore, implementation of hazing and other bird deterrence cannot be postponed until off-site mitigation is established. At this time, because Hawaii County has not obtained necessary approvals or secured funding, wetland construction at the Kealakehe WTP is not likely to occur within the next three years (the proposed term of the incidental take permit). The Service will continue to work toward improving the amount of suitable stilt habitat in other areas to benefit recovery of the Hawaiian stilt.

Section 10(a)(1)(B) of the Act does not require the applicant to perform a specific type of mitigation (e.g. off-site habitat), however, does require that the applicant will, to the maximum extent practicable, minimize and mitigate the impacts of the taking of the endangered species (see Response to Comment 7 and Finding IV.2.).

Comment 6: Development of off-site habitat would not take five to ten years to implement and this alternative would significantly reduce the bird attractant problem at Cyanotech.

Response: Development of off-site habitat alone would not significantly reduce the bird attractant problem at Cyanotech. Incidental take at Cyanotech would continue to occur and thus, require a long-term obligation for mitigation on the part of Cyanotech.

The section 10(a)(1)(B) of the Act does not require the applicant to perform a specific type of mitigation (e.g. off-site habitat), however, does require that the applicant will, to the maximum extent practicable, minimize and mitigate the impacts of the taking of the endangered species (see Response to Comment 7 and Finding IV.2.).

Comment 7: Mitigation could be accomplished at off-site locations (e.g. Opaepa Pond, Aimakapa Pond, Kealakehe WTP) which would also support recovery goals.

Response: The Service does not disagree with this statement. However, the applicant decides during the development of an HCP what minimization and mitigation measures to include in the HCP. The Service decides whether the mitigation program proposed by the applicant has satisfied the criteria for issuance of the incidental take permit. The Service believes this HCP contains and describes measures that will be implemented to minimize and mitigate the impacts of take of stilts to the maximum extent practicable under the permit.

Comment 8: Dissolution of the Lake as a breeding area is premature, especially if such a decision is based primarily on concerns for aircraft safety expressed by the Hawaii Department of Transportation (HDOT) and an incomplete Wildlife Hazard Assessment (WHA). Alternatively, the Lake is sufficient to limit aircraft exposure to the potential risk from stilts.

Response: The proposed conservation strategy requires Cyanotech to provide for the net reproductive success of stilts (number of fledged birds is greater than eggs or chicks injured or killed over the permit term) which will adequately mitigate for the impacts of the take authorized by the incidental take permit. It is at the discretion of Cyanotech to perform measures that are above and beyond the required minimization or mitigation. The Service believes the HCP contains and describes measures that will be implemented to minimize and mitigate the impacts of take of stilts to the maximum extent practicable under the permit (see Finding IV.2.).

Comment 9: The HCP does not state that the death of 3 adult stilts occurred after Cyanotech and Ducks Unlimited created ponds specifically intended to attract stilts to nest.

Response: Stilts nested in (alongside raceways) and adjacent (lava fields) to the Cyanotech facility before Cyanotech started managing areas as suitable stilt nesting sites. The monitoring data presented in the HCP documents breeding activity at each site in and adjacent to Cyanotech from 1998 to 2001 (see Figure 3 of the HCP). In addition, the occurrence (and eventual predation) of nine stilt nests on the lava field prior to the death of the adult stilts indicates that stilts were already utilizing the area in close proximity to the airport taxiways prior to management of the Lake for stilts.

Comment 10: The HCP does not recognize that the proposed management of the Lake for stilts may attract other waterfowl and shorebirds, such as ducks and geese. The HCP does not mention that ducks and other birds have been documented in the Lake. The presence of waterfowl presents a potential hazard to aircraft operations at the airport.

Response: The Lake is maintained dry during the non-breeding season (September to January) and managed for stilts during the breeding season (February to August). In addition, the aircraft taxiways at Keahole International Airport (KOA) are located approximately one-third to one-half mile from up to 60 acres of microalgae raceway ponds where Hawaiian stilt foraging and nesting has been observed. The 1.7-acre settling basin (Lake) is located on the opposite boundary of the Cyanotech facility and at a significantly greater distance away from the airport than the 60 acres of microalgae raceways. The Lake's small size in comparison with microalgae raceways, the abbreviated period for which it is maintained, and its significantly greater distance away from the airport than microalgae raceways prevents it from presenting any additional risk to aircraft operations.

Using data gathered from September 2000 to January 2001, the semi-annual report of the WHA concluded that KOA has a very low wildlife hazard (Attachment 2 of these Findings). The report did not identify the ducks or geese at Cyanotech as of great concern to aircraft safety. The greatest wildlife concerns appeared to be: (1) plovers that roost on the airfield, (2) the high numbers of birds at wetlands close to the airport (3) the flight path of the birds between these wetlands which crosses the approach departure airspace. The report identified five additional wetlands, four of which are natural, that are located within the approach/departure airspace, with the majority of birds at the Kealakehe WTP.

Comment 11: The HCP does not adequately consider the increased potential for bird aircraft strikes at the KOA due to continuation of the man-made stilt breeding site at the Cyanotech Lake. The on-site mitigation is too close to the airport. Management of the Cyanotech Lake has increased the risk of a bird/aircraft strike at KOA by increasing the number of stilts fledged at Cyanotech, and therefore the Lake should be discontinued immediately.

Response: The implementation of minimization and mitigation measures in the HCP is intended to reduce and ultimately eliminate use of the Cyanotech facility by Hawaiian stilts. Aircraft taxiways at KOA are located approximately one-third to one-half mile from up to 60 acres of microalgae raceway ponds where Hawaiian stilt foraging and nesting has been observed. The 1.7-acre settling basin (Lake) is located on the opposite boundary of the Cyanotech facility and at a greater distance away from the airport than the microalgae raceways. The Lake is managed to discourage stilt use of hazardous areas at the raceways which are adjacent to lava fields and airport taxiways.

Using data gathered from September 2000 to January 2001, the semi-annual report of the WHA concluded that KOA has a very low wildlife hazard (see Attachment 1). The report did not identify the ducks or geese at Cyanotech as of great concern to aircraft safety. The greatest wildlife concerns appear to be: (1) plovers that roost on the airfield, (2) the high numbers of birds at wetlands close to the airport, and (3) the flight path of the birds between these wetlands which

crosses the approach departure airspace. The report identified five additional wetlands, four of which are natural, that are located within the approach/departure airspace, with the majority of birds at the Kealakehe WTP. In addition, according to Todd Felix, the biologist conducting the WHA, there is much less movement between wetlands during the nesting season than at other times of the year (T. Felix, personal communication, 2001).

Comment 12: The problem of overcrowding at the Lake has led to birds nesting closer to the raceways and airport runway.

Response: As previously discussed, stilts began nesting in the lava fields adjacent to the airport runways before the Lake was managed for stilt nesting (see Response to Comment 9). The Lake is managed to attract birds away from the raceways and lava. Once the carrying capacity of the Lake is reached (20-25 pairs), birds nest in close proximity to the raceways where open water and the primary food source is located. Although, the number of nesting attempts away from the Lake (Raceways, DU Pond, Lava) may have increased, the percentage of nesting attempts in these areas has significantly decreased (40 percent in 2001 from 58 percent in 1998). The percentage of nesting attempts in these areas is expected to further decline as minimization measures to discourage stilt foraging and breeding, and nest site fidelity in hazardous areas at Cyanotech are implemented.

Comment 13: The HCP must include the goal of eliminating the potential for bird strikes to aircraft operating at KOA.

Response: Elimination of potential bird strikes at KOA is not the applicant's responsibility and it isn't within their control. However, the Service believes the primary goal as stated in the HCP to "eliminate incidental take by eliminating the attractive nuisance problem created by the expanse of open-water ponds, invertebrate food resources, and remote nesting areas" is in concert with the goal of eliminating the potential for bird strikes at KOA. By working toward eliminating stilt use of Cyanotech, significant progress is made toward eliminating the potential for bird strikes at KOA.

Furthermore, the WHA semi-annual report states that there is a low wildlife hazard at KOA. In addition, the HCP also includes monitoring and adaptive management to ensure that stilts do not become a wildlife hazard at KOA.

Comment 14: FAA and HDOT must be included in any consultations or decisions regarding Lake management or any changes to the HCP.

Response: The Service believes that FAA regulations at 14 CFR 139.337 adequately provide for addressing the issue of wildlife hazards to airport operations at KOA. In addition, during the development of the HCP, numerous meetings were held to recognize the concerns of the FAA, HDOT and the KOA. A WHA was conducted at the KOA by the HDOT pursuant to 14 CFR 139.337(b). The ecological study is the first of eight being conducted at airports in the Hawaiian Islands. The WHA is a 12-month ecological study designed to identify wildlife hazards to aircraft operations. According to FAA regulations at 14 CFR 139.337(c), "... at the completion

of the WHA, the FAA will determine if a Wildlife Hazard Management Plan is needed to address the wildlife hazards identified in the WHA.” If the FAA determines that a WHMP is needed, the certificate holder (KOA) must then formulate and implement a WHMP, using the WHA as the basis for the plan (14 CFR 139.337 [d]). The final report has not been made available, but the semi-annual report states that there is a low wildlife hazard at KOA. In addition, the HCP includes monitoring and adaptive management to ensure stilts do not become a wildlife hazard at KOA. If stilts become a problem at KOA, measures will be taken to eliminate the problem.

Comment 15: Aggressive hazing measures need to be implemented immediately in order to reduce the potential hazard to aircraft operations. Bird deterrent measures should be implemented in all raceway ponds and not only a limited number of ponds as recommended in the Draft HCP.

Response: As previously stated, the WHA semi-annual report states that there is a low wildlife hazard at KOA. As described in Appendix 4 of the HCP, bird deterrent measures will be applied on an incremental basis. Certain measures will be implemented immediately in all raceway ponds, while others require evaluation for their effectiveness prior to implementation throughout the entire facility.

Comment 16: Please note that the “lava fields adjacent to the airport” stated throughout the HCP is incorrect. The lava fields are within the boundaries of the airport and are in close proximity to the runway.

Response: In general, the lava fields are mentioned in the context of nest sites (e.g. raceways, Lake, DU Pond) and is not intended to mislead the reader as to proximity of the airport runways or taxiways. In addition, Page 43 states, “[t]he lava fields are the property of the Kona (International) Airport.”

Comment 17: The HCP does not consider the recommendations of the FAA Advisory Circular 150/5200-33.

Response: See Responses to Comments 11 and 14. The implementation of minimization and mitigation measures in the HCP is intended to reduce and ultimately eliminate use of the Cyanotech facility by Hawaiian stilts. The Service believes that FAA regulations at 14 CFR 139.337 adequately provide for addressing the issue of wildlife hazards to airport operations at KOA. The HCP includes monitoring and adaptive management to ensure stilts do not become a wildlife hazard at KOA. If stilts become a problem at KOA, measures will be taken to eliminate the problem.

Comment 18: The No Action Alternative should include the statement that the existing bird hazard would continue and increase the potential for bird/aircraft strikes.

Response: See Response to Comment 14. The Service believes that FAA regulations at 14 CFR 139.337 adequately provide for addressing the issue of wildlife hazards to airport operations at KOA.

Using data gathered from September 2000 to January 2001, the WHA semi-annual report concluded that KOA has a very low wildlife hazard (see Attachment 1). The report did not identify the ducks or geese at Cyanotech as of great concern to aircraft safety. The greatest wildlife concerns appeared to be: (1) plovers that roost on the airfield, (2) the high numbers of birds at wetlands close to the airport (3) the flight path of the birds between these wetlands which crosses the approach departure airspace. The report identified five additional wetlands, four of which are natural, that are located within the approach/departure airspace, with the majority of birds at the Kealakehe WTP.

Comment 19: Please clarify if "harass" includes acts that seem to be natural causes, e.g. adult stilts leading chicks away from the nest to the raceways where they die or adult stilts killing chicks that wander into "their territory."

Response: Harass is defined as "an intentional or negligent act or omission which creates the likelihood of injury to wildlife by annoying it to such an extent as to significantly disrupt normal behavioral patterns which include, but are not limited to, breeding, feeding, and sheltering" (50 CFR 17.3). If an action disrupts the normal behavioral patterns as described above, such an action would be considered harassment. For example, if human presence caused a chick to wander into another territory which resulted in it being attacked, that would be considered harassment. Otherwise, injury or mortality due to natural causes and behavioral patterns are not considered to be harassment.

Comment 20: In Appendix 1 of the HCP, the letter to Jim Frazier dated June 9, 1999 is missing the second page. Please include the second page.

Response: A complete copy of the letter will be included in the HCP.