

**Cyanotech Corporation Conservation Plan for  
Hawaiian Stilt (*Himantopus mexicanus knudseni*)  
Annual Report for 2006**



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## **Abstract**

This annual report covers data collected September 2005 to August 2006 for the Conservation Plan for Hawaiian Stilt (*Himantopus mexicanus knudseni*) at Cyanotech Aquaculture Facility. The nesting habitat and Ducks Unlimited raceway continued to be maintained in a manner unusable to the stilts. Cleaning the *Spirulina* production raceways reduced the invertebrate food source. The total amount of Hawaiian Stilt incidental take at Cyanotech was one. Cyanotech currently is working with the wildlife agencies to amend the conservation plan and to extend incidental take permits for ten years. There were no nests at the Cyanotech facility or in the lava field of Keahole International Airport.

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## **Management Actions**

- Maintained the deterrents of the 0.69 hectare (ha) nesting habitat and former Ducks Unlimited (DU) raceway to exclude stilts from utilizing these areas to nest;
- Maintained a hazing program utilizing laser, pyrotechnics, Mylar tape, driving roads of facility, and other means of deterrents to discourage stilts from frequenting the facility and nesting;
- Monitored the facility daily for nesting activity, take, and possible entanglement of birds in netting and Mylar tape deterrents;
- Maintained staffing needed to provide daily coverage of hazing and deterrent maintenance.

## **Facility Management**

### **Nesting Habitat**

Netting erected over the nesting habitat in February 2003 to provide physical exclusion to the 0.69-ha man-made nesting habitat is still in place (Exhibit 1). The netting has sustained severe wind damage and now only covers a portion of the habitat. Noting that there have been no instances of stilts returning to the habitat no action has been taken to repair the netting, only additional Mylar deterrents have been placed in the habitat. Three 90-watt floodlights are above the nesting habitat and illuminate the habitat at night. The floodlights were positioned on the North side of the habitat and operated by a photocell switch turning the lights on at sunset and off at sunrise. Netting was monitored daily to check for entangled birds. To date, there have been no entangled birds in the netting.

### **Production Area**

In 1998, a production raceway was converted into a stilt-nesting habitat and became known as the “DU raceway”. The raceway was managed for stilt nesting in 1998 and 1999, but management was discontinued in 2000 due to the inability of the habitat to maintain a self-sustaining invertebrate prey base for stilts. In 2001 and 2002, the raceway was used to test the effectiveness of Mylar tape as a deterrent. In 2003, the former DU raceway was netted as per recommendation of the 2002 annual report (Exhibit 2). The netting was monitored daily to check for entangled birds. To date, there have been no entangled birds in the netting. There was no nesting at the Cyanotech facility.

### **Predator Control**

Predator control utilizing bait stations around production areas was contracted out to a local pest management company. 35 bait stations were monitored and maintained twice per month. Additionally, four Havahart live traps were deployed in May. Through the end of August 33 feral cats (*Felis catus*) and 9 Mongooses (*Herpestes auropunctatus*) were trapped and taken to the West Hawaii Humane Society.

## **Reduction of Attractants and Hazing**

### **Safflower Oiling**

The primary invertebrate food source has been the Brine fly (*Ephydra sp.*) and the Water Boatman (*Trichocorixa sp.*). A program using Safflower oil and a backpack sprayer to spray and suffocate the Brine fly was continued. Efforts to eradicate the Water Boatman were successful. After each *Spirulina* production raceway harvest, seven and one half liters of Safflower oil were added by pouring into each raceway. The oil dispersed across the surface of the raceway and it is suspected that it then adheres to the Water Boatman's exoskeleton when it surfaces, giving it additional buoyancy. The Water Boatman then concentrates its energy on maintaining its position in the water column and not its position within the raceway. With the Water Boatman floating on the surface they are more easily removed utilizing mesh slant screens positioned in the raceway. The slant screens are 1.22 x 1.52 m of 14-mesh stainless steel screen that are positioned in the raceways to catch the floating Water Boatman (Exhibit 3). One slant screen was used per raceway and was moved between raceways as needed. In addition to removing debris and insects the use of slant screens provides an additional opportunity to recover any dead or injured stilts. Safflower oil is used so the company can operate within their quality parameter that requires the use of non-genetically modified ingredients in the production of its products. The cost is \$20.20 per oil dose with an average of eight *Spirulina* production raceway oiled each day. Oiling has been discontinued with no Water Boatman being observed at the facility. Backpack spraying of the Brine fly continues as does the use of the slant screens to remove the brine flies.

### **Raceway Cleaning**

The alternative method of removing the invertebrate food source was to drain the production raceways, allow them to dry, and sweep out the sediment and invertebrates. Draining and cleaning the raceways is part of the normal operation and maintenance of *Spirulina* Production. Raceways have been cleaned on average of once every 12 months. Cyanotech has implemented an on going cleaning schedule for the *Spirulina* production raceways that will have each raceway cleaned a minimum of twice per year. Raceway cleaning is based upon visual inspection of each raceway. Raceways with the most invertebrates are taken out of production for cleaning. The goal for this project is to clean one to two raceways per week.

### **Hazing**

The hazing program was continued to increase the amount of activity in the production areas to make these areas less desirable for nesting. Methods included the driving of all the roads in the facility, the use of Mylar tape as a visual deterrent. Driving the roads (six kilometers) via a golf cart has continued four to six times daily from the 2002-nesting season, in an effort to keep stilts from roosting and nesting in these areas. Mylar tape was again utilized through out the facility, at the beginning of the nesting season, but its use was discontinued with the lack of stilts frequenting the facility making it unnecessary. Beginning in 2003, laser and pyrotechnics devices were also utilized to aid the hazing efforts. An "Avian Dissuader", a laser deterrent device, manufactured by Sea

Technology Inc., was effectively used as a hazing aid (Exhibit 4). The laser is a pistol type design and operates on the “point and shoot” basis. The laser beam is aimed at the ground or embankments of raceways close to the stilts or the stilts’ body and the red dot of light frightens the stilts and causes them to move from the area. The beam is adjustable from 3 to 30 cm and has a manufacturer’s claimed effective range of 500 m. According to manufacturer’s directions, the laser is most effective at sunrise and sunset. The laser was never directed at individuals, automobiles, boats, aircraft or the airport.

Pyrotechnics were also effectively utilized as a hazing aid (Exhibit 5). Two types of shells were used, “Screamer Sirens” and “Bird Bangers”. The Screamer Siren shells, according to the manufacture, travel 50 to 75 m making a siren-like sound as it flies. The Bird Banger shells travel 35 to 50 m down range before exploding. The use of pyrotechnics causes the stilts to take flight, while the laser is used to single out individuals and keep them from returning to the raceways.

Morning surveys of stilts on the facility were taken one half hour before sunrise and then hazing using the laser would begin if stilts were present at the facility (Figure 1). Morning surveys were conducted each day of the week with the exception of Sundays. A survey of stilts was also conducted one half hour before sunset and hazing would begin if stilts were present at the facility (Figure 2). Evening surveys were conducted every Tuesday and Friday.

Hazing efforts have been successful in reducing the numbers of stilts frequenting the facility and also resulted in no nesting at the facility. The stilts have become conditioned to the point that merely driving in their vicinity is enough to have them leave the facility with minimal if any use of either the laser or the pyrotechnics.

### **Property Outside of Cyanotech Boundaries (Lava Field of Keahole International Airport)**

The lava field adjacent to the Cyanotech facility, where stilts had nested in previous years, was monitored weekly for nesting activity. Surveys were conducted every Saturday during the nesting season. A Nikon 20 x 60 Fieldscope and Zeiss 10 x 40 binoculars were used to survey the lava field. In addition to weekly surveys daily observations of stilt movements at and around the facility helped determine if stilts were frequenting the lava field. There were no instances of stilts being observed in the lava field.

### **Stilt Counts, Nesting, and Incidental Take**

#### **Stilt Counts**

Stilt counts are conducted weekly throughout the year (Figure 3). There were no stilts observed during any of the weekly surveys during the nesting season 2006 (March-August). Stilts were observed only on one day during the weekly surveys of the non-nesting season (September 2005-February 2006). The count was 11 accounting for a mean of 0.42 (Standard Error =  $\pm 0.42$ ).

### **Nesting**

There were no nests at the Cyanotech facility or in the lava field of Keahole International Airport.

### **Incidental Take**

As per the Conservation Plan, surveying for incidental take was conducted twice per week during the nesting season and once per week during non-nesting season. However, monitoring for injured or dead stilts was conducted daily as part of normal operations of the production raceways. Surveying the raceways for debris was conducted daily in an effort to protect the mechanical and harvest systems of the production raceways. Surveying the raceways visually first thing in the morning before the paddlewheels were turned on has proven to be the most effective method of identifying and recovering debris and stilts from the raceways. Visual observations were also made while the driving the production area to deter stilts from utilizing the facility to nest or roost.

There was one stilt recovered from a Spirulina raceway on February 1, 2006. The stilt was in poor condition. The remains were bagged, labeled, put in a freezer and the Wildlife Agencies were notified. The total amount of incidental take at Cyanotech for 2006 was one.

## **Recommendations and Requests**

Continue to work cooperatively with Wildlife Agencies to secure amendment to existing conservation plan allowing for an extension of 10 years.

Continue to modify and improve current deterrent measures as well as identify and research new deterrent measures for the facility.

Continue to modify and improve methods of reducing the invertebrate food source in the production raceways.

It is recommended that Cyanotech operate at 100% of production capacity during the stilt-nesting season (March-August). If this is not possible, idle raceways should be filled with seawater to prevent stilts from nesting in the idle raceways.

Cyanotech requests that the Wildlife Agencies continue to work cooperatively with the Cyanotech staff to provide technical assistance on policy and conservation issues, as well as biological expertise (e.g., permit compliance, adaptive management, bird deterrents, etc.).

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**Acknowledgements**

U.S. Fish and Wildlife Service  
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Natural Energy Laboratory of Hawaii Authority  
West Hawaii Humane Society  
Cyanotech Corporation

### **Exhibit 1 Netted Nesting Habitat**



### **Exhibit 2 Netted Ducks Unlimited Raceway**



### **Exhibit 3 Slant Screen for Insect Removal**



### **Exhibit 4 Avian Dissuader Laser**



## Exhibit 5 Pyrotechnic System



Figure 1

Cyanotech Pre-Dawn and Kona Coast Monthly Hawaiian Stilt Counts Comparison Mar. 2003-Aug.2006

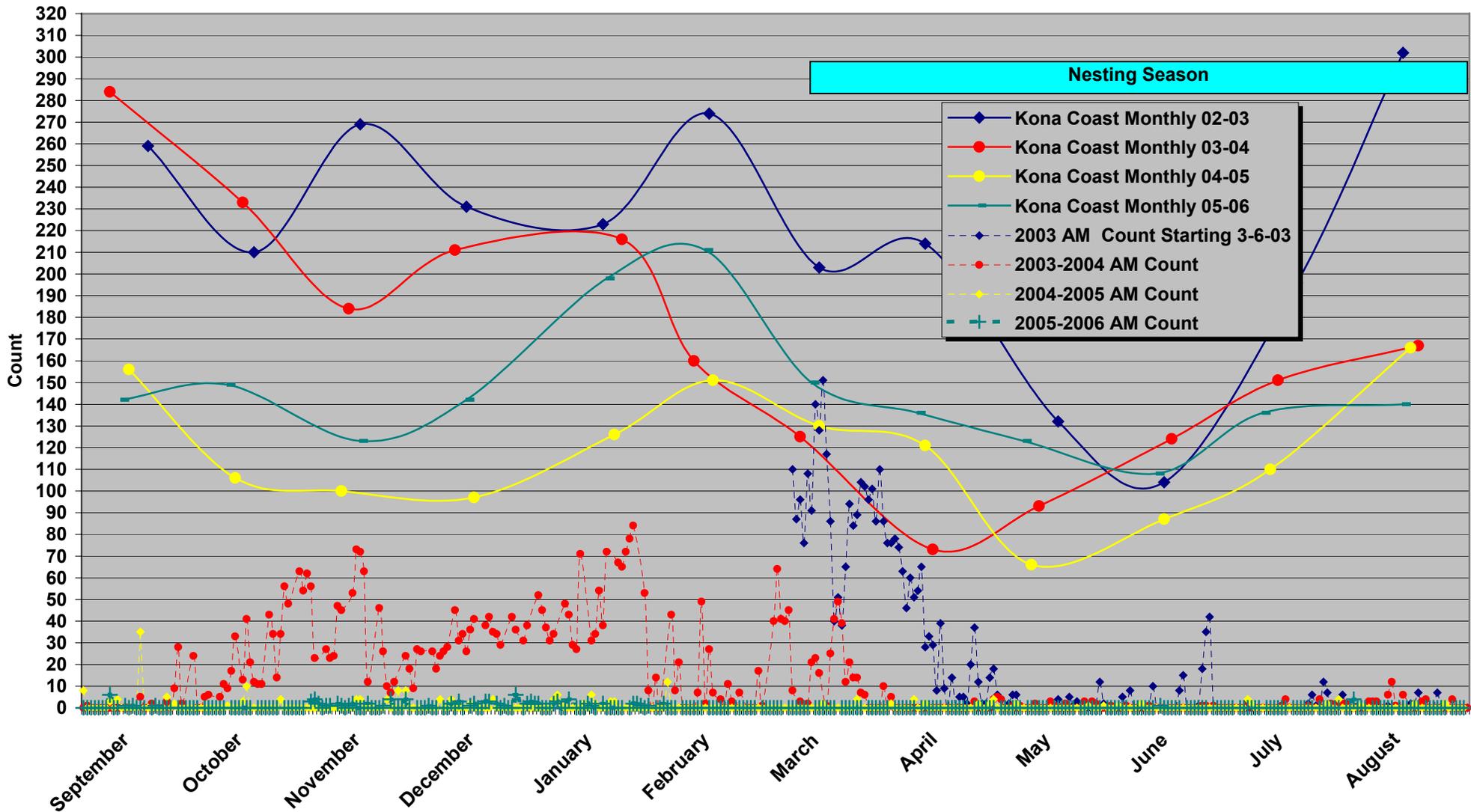


Figure 2

Cyanotech Pre-Sunset and Kona Coast Monthly Hawaiian Stilt Counts Comparison Mar. 2003-Aug.2006

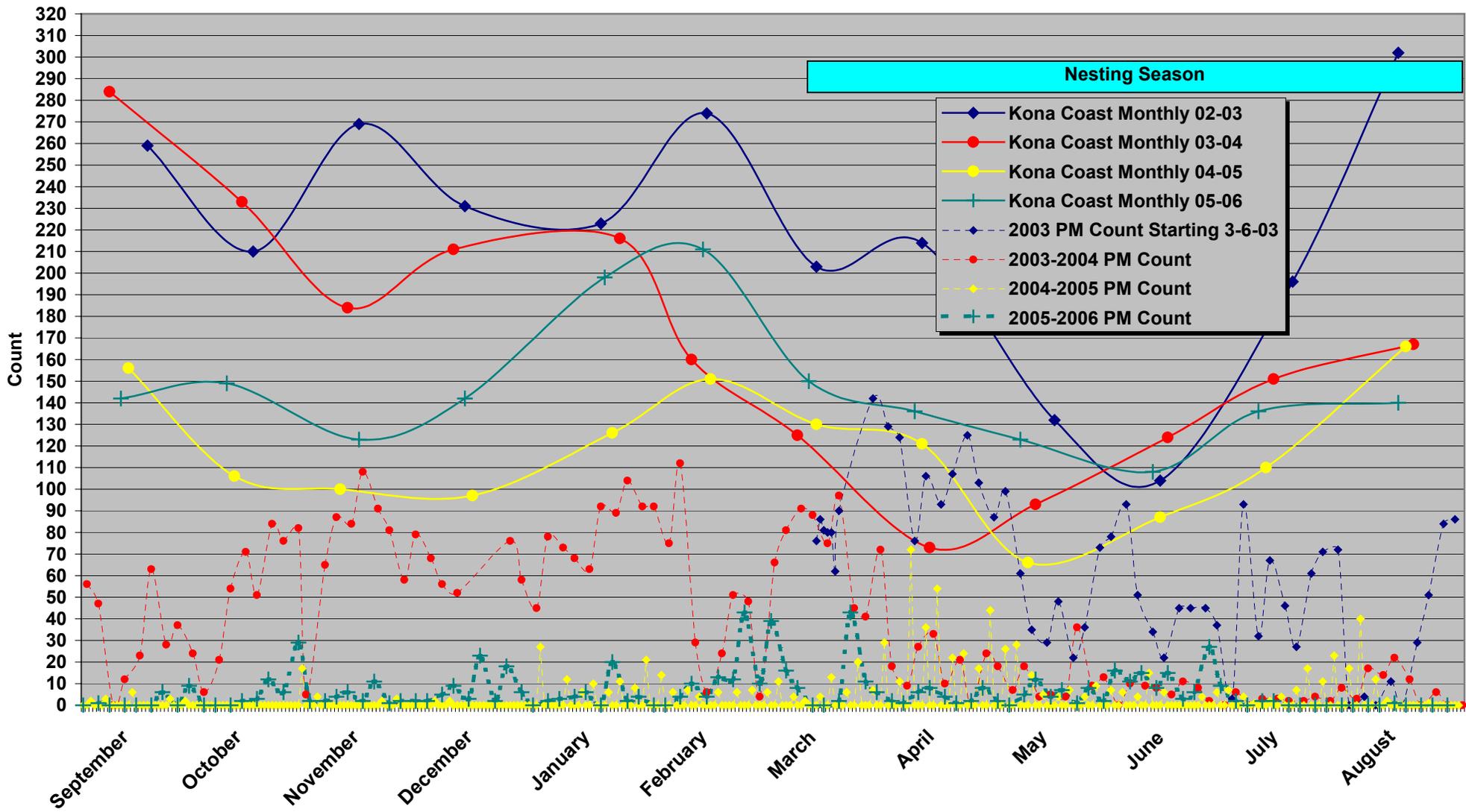


Figure 3

Cyanotech Weekly and Kona Coast Monthly Hawaiian Stilt Counts Comparison 2002-2006

