

**CAPE HATTERAS NATIONAL SEASHORE
AMERICAN OYSTERCATCHER (*HAEMATOPUS PALLIATUS*)
2010 REPORT**



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ABSTRACT

This report contains a summary of the efforts of Cape Hatteras National Seashore (CAHA) to monitor the breeding success of American oystercatchers (AMOY) in the park for 2010. It also contains information about nesting AMOY and brood success in CAHA, since some levels of AMOY monitoring began in 1998. The monitoring effort has not been consistent because of differing staff levels and mandates throughout the years resulting in different monitoring efforts between years. Consistency has improved over the past few years as staffing levels have stabilized. Much of the available data from the early years was provided by researchers from North Carolina State University (NCSU), who operated under an NPS permit to conduct AMOY research, as well as banding and monitoring of AMOY adults and chicks.

In 2010 there were 23 pairs of AMOY that attempted to nest at CAHA. Nests, including re-nests by pairs with failed attempts, totaled 28. Of these nests, 21 (75%) hatched and produced chicks, for a total of 48 chicks. Fifteen pairs of AMOY were successful in fledging chicks (65.2%). CAHA fledged 30 AMOY chicks, which represents a 1.3 fledge rate per pair, the highest fledge rate recorded since monitoring efforts began at CAHA.

The Consent Decree (CD) states that for AMOY, in lieu of providing an annual report, NPS shall provide the data collected on AMOY breeding activity. This report has been prepared to include not only a summary of the data collected as required by the CD, but also additional species-related information.

INTRODUCTION

The AMOY is a ground-nesting shorebird native to North Carolina. As with many shorebirds, oystercatcher numbers have been in sharp decline over the past 20 years. With only an estimated 10,000 individuals (or 3,500 breeding pairs), the AMOY has been designated Significantly Rare by the U.S. Fish and Wildlife Service (USFWS), and is a Species of Special Concern in North Carolina (but is not currently characterized as a threatened & endangered species). Habitat loss and fragmentation due to beach development has resulted in nesting attempts in marginal habitat. Nesting attempts in marginal habitat is thought to lead to an increased number of unsuccessful breeding attempts. Off-road-vehicle (ORV) use on the beach can lead to direct mortality of chicks and eggs and pedestrian disturbance can indirectly cause loss of nests or chicks. The main cause of direct mortality of chicks and eggs is believed to be mammalian predators, but studies suggest that there is also an interaction between human presence and predation events by mammalian mesopredators (McGowan 2004) (McGowan and Simons 2006).

As a result of the CD approved by the U.S. District Court on April 30, 2008, the mid-breeding season of 2008 marked a change in CAHA's species management protocols from the Interim Protected Species Management Strategy (Interim Strategy) that had been implemented during the 2007 breeding season to modified measures prescribed by the CD from May 2008 onward. The CD modified the triggers for when closures were installed, required a minimum buffer of 150 meters around AMOY breeding behavior, nests, and scrapes and a minimum buffer of 200 meters around AMOY chicks, and established a night driving restriction.

Breeding attempts, nest outcomes and brood success are summarized by district, and discussed in the *Results and Discussion* section of this document. A summary of the ongoing banding effort which allows for the identification of individuals is also presented there.

METHODS

CAHA employs a number of methods in the monitoring and protection of breeding AMOY. These include protection of back-shore habitat; installing pre-nesting closures for birds exhibiting territorial behavior; monitoring of breeding pairs, nests and chicks; assisting North Carolina State University (NCSU) in the banding of adult and juvenile AMOY; removing predators; and adaptively moving closure boundaries to comply with the required buffers of the CD for nests and chicks. Chick movements were monitored closely to ensure they were adequately protected by the established buffers.

Breeding behavior is defined as territorial behavior, courtship, mating, scraping or other nest-building activities by birds setting up in new or previously established territories. Under the CD, AMOY nests and scrapes received 150 meter buffers to reduce possible disturbance to courting or incubating adults. Once the nests hatched, 200 meter buffers were maintained around the chicks. Larger buffers could be used if individual birds were observed to be disturbed at that distance.

Pre-Nesting Closures

Pre-nesting closures were established by March 15, 2010 at the points and spits containing potential nesting habitat for Piping Plovers (PIPL). Pre-nesting closures were installed at Bodie Island Spit, Cape Point, South Beach, Hatteras Overwashes, Hatteras Inlet Spit, North Ocracoke Spit, and South Point. Other nesting shorebirds such as AMOY, least tern (*Sterna albifrons*), common tern (*S. hirundo*), gull-billed tern (*S. nilotica*), and black skimmer (*Rhinchops niger*) may also benefit from these early closures. Nesting by combinations of some or all of these bird species has occurred historically and in recent years at all the spits and Cape Point/South Beach. In 2010, 39% of all AMOY breeding pairs (9 of 23 pairs) and 39% of all AMOY nesting attempts (11 of 28) occurred inside the pre-nesting closures (Appendix A; Maps 1-6).

Monitoring

Breeding pairs of AMOY were located by surveying potential habitat including all ocean-side beaches and sound-side beaches. Some additional undocumented nesting may occur on inaccessible, remote sound-side beaches. The presence of birds that are observed near the same location on a regular basis, or birds giving any kind of territorial or breeding display were watched carefully for signs that they were nesting. Territorial displays include alarm-calling, head-down and tail-up running displays, fighting with neighboring pairs, and scraping, whereas breeding displays include copulation. Once a territory has been established, AMOY may also be observed “false brooding,” which is a distraction display. Pairs were watched closely, to see if they were incubating a nest. If no nesting behavior was observed, observers looked for “scrapes,” or possible nest sites created by the birds directly in the sand. Observers transected potential nesting habitat by foot.

If nests or scrapes were found, observers marked the location with a handheld GPS unit. Staff installed a resource closure around the active nest or scrape based on the required buffer distances. New closures were installed within 6 daylight hours and closure expansions were installed within 8 daylight hours.

In 2010, in an attempt to get improved information on nest predation events, nests were observed from a distance daily to check for incubation. In some cases, because of the nest location, an incubating adult may have been bumped off of the nest due to that daily check, but efforts were made to minimize the disturbance; by observing from as far away as the topography would allow, and by limiting the observation to just long enough to determine incubation. If an incubating bird was not observed on the nest, the nest scrape would be checked for the presence of eggs and, if the eggs were missing, the area would be inspected for signs of predators. Once chicks hatched, staff attempted to observe each chick daily barring severe weather. A few of the nests were also monitored by trail cameras which were checked weekly for signs of predators or predation.

Chick Movement

After hatching, AMOY chicks may be moved by the adults to safer or more suitable habitat. Chicks have been observed to move as much as 100 meters on the first day after hatching and up to 500 meters or more within the first week after hatching. Nests were monitored closely, and checked daily near expected hatch dates, calculated from an average nest incubation period for AMOY as 27 days from first egg laid, 24 days from last egg laid (Baicich and Harrison 1997).

When the adult AMOY moved their chicks away from the nest site, they were monitored closely, and an approximate GPS point was taken for their new location and the closures were expanded to ensure adequate buffers. During observations closures were approached from the accessible (i.e. open) sides to minimize disturbance to the birds inside the closure.

The expanded closures provided a minimum buffer of 200 meters on each side of the AMOY brood but may have been larger based on the brood's documented movement patterns. This type of intensive management ensured that the flightless chick(s) were properly buffered from vehicle and pedestrian traffic per the CD requirements.

Predator Control

Because mammalian predation is a major factor in AMOY nest loss and chick mortality (McGowan 2004), predator control by trapping was conducted to target predators near nests and chicks in 2010. Trapping was conducted in all districts. When technicians walked through areas they documented and reported any signs (prints, scat, etc) of predators they observed. If predator sign was found in a closure, trapping efforts were increased in that area. Traps were installed in the vicinity of the closure with the intent of targeting the specific predator in that area.

Banding

In addition to carrying out actions required by the CD, CAHA biological technicians worked closely with NCSU to band AMOY chicks and adults, in order to keep track of survival of individuals, breeding success of individual pairs, movement of young birds to other areas, and breeding site fidelity. Being able to identify individual birds has also allowed NCSU and CAHA

staff to coordinate data with scientists from other states to examine genetics, migration patterns, and long-term survival rates of the AMOY population. Banding birds made data collection simpler and added certainty to observations.

RESULTS

In 2010 there were 23 pairs of AMOY that attempted to breed. There were a total of 28 nests of which 21 nests (75%) hatched. The first nest of the season was found on April 15, 2010 and the last nest was found on June 21, 2010. The average time to hatch for the 19 nests with known incubation was 29.3 days. The average time to fledge for the 10 nests that fledged young was 37.5 days (Green Island nests were excluded). The youngest chick to fledge was 31 days old. The latest fledge (for the first chick of a brood) was 42 days. This average does not include separate dates for individuals within a brood but is based on the date of the first chick to fledge from all of the broods. The productivity for 2010 was 30 chicks fledged for a fledge rate of 1.3 chicks per pair. (Table 1)

Table 1. AMOY 2010 Breeding Season at CAHA.

Nest #	Pair #	Location	Date Found	Date of 1st egg ¹	Hatch Date	Days from 1st egg to hatch	Fledge Date	Days to 1st Fledge	# Fledged
BI01	BIAM01	Bodie Is Spit	4/23/10	4/23/10					
BI02A	BIAM01	Bodie Is Spit	5/11/10	5/11/10					
BI02B	BIAM01	Bodie Is Spit	5/13/10	5/13/10					
BI02C	BIAM01	Bodie Is Spit	5/16/10	5/16/10	6/11/10	26 days			
BH01	BHAM01	R27-R30	4/17/10	~4/15/10 (4/17/10-2 eggs)	5/15/10	30 days	1 on 6/21/10, 2 on 6/25/10	38 days	3
BH02	BHAM02	R27-R30	4/22/10	4/22/10	5/20/10	28 days			
BH03	BHAM03	R27-R30	4/26/10	4/26/10	5/26/10	30 days	7/3/10	39 days	1
BH04	BHAM04	R27-R30	4/27/10	4/27/10					
BH05	BHAM04	R27-R30	5/27/10	5/27/10	6/26/10	30 days	8/4/10	40 days	1
GI01	GIAM01	Green Is	4/16/10	UNK					
GI02	GIAM02	Green Is	5/20/10	UNK	~6/9/10	UNK	~7/27/2010	(~49 days)	2
GI03	GIAM03	Green Is	5/20/10	UNK	~6/1/10	UNK	~7/15/2010	(~45 days)	2
HI01	HIAM01	Sandy Bay	4/15/10	4/15/10	5/15/10	30 days	6/14/10	31 days	3
HI02	HIAM02	R38	4/15/10	~4/13/10 (4/15/10-2 eggs)	5/12/10	29 days	6/14/10	34 days	3
HI03	HIAM03	Hatteras Inlet	4/19/10	4/19/10	5/17/10	28 days			
HI04	HIAM04	Cape Pt	4/21/10	4/21/10	5/19/10	29 days	6/24/10	37 days	2
HI05	HIAM05	Cape Pt	4/25/10	4/25/10	5/23/10	29 days	2 on 7/3, 1 on 7/7	42 days	3
HI06	HIAM06	South Beach	4/27/10	4/27/10	5/25/10	29 days	6/30/10	37 days	2

Nest #	Pair #	Location	Date Found	Date of 1st egg ¹	Hatch Date	Days from 1st egg to hatch	Fledge Date	Days to 1st Fledge	# Fledged
HI07	HIAM07	South Beach	4/28/10	4/28/10	5/27/10	30 days	6/30/10	35 days	2
HI08	HIAM08	South Beach	5/3/10	5/3/10					
HI09	HIAM09	Cape Pt	5/5/10	5/5/10	6/3/10	30 days	7/14/10	42 days	3
HI10	HIAM10	R30-R34	5/11/10	~5/9/10 (5/11/10- 2 eggs)					
HI11	HIAM11	Cape Pt	5/17/10	NA					
HI12	HIAM03	Hatteras Inlet	6/1/10	6/1/10	6/29/10	29 days			
OI01	OIAM01	R68-R70	4/16/10	4/16/10					
OI01A	OIAM01	R68-R70	4/21/10	~4/16/2010 (4/21/10- 3 eggs)	5/17/10	32 days			
OI02	OIAM02	R59-R67	4/26/10	~4/24/10 (4/26/20- 2 eggs)	5/25/10	32 days	7/4/10		1
OI03	OIAM03	South Pt	4/29/10	4/29/10					
OI03A	OIAM03	South Pt	5/1/10	5/1/10					
OI03B	OIAM03	South Pt	5/6/10	~5/4/10 (5/6/10- 2 eggs)		N/A			
OI04	OIAM04	North Ocracoke Spit	5/4/10	~4/30/10 (5/4/10- 3 eggs)	5/28/10	29 days	7/13/10		1
OI05	OIAM01	R68-R70	5/30/10	5/30/10	6/29/10	31 days			
OI06	OIAM03	South Pt	6/21/10	6/21/10	7/16/10	26 days	8/23/10		1
						Avg.	29.3 days	Avg.	37.5 days

¹Date of first egg was calculated based on eggs being laid every other day for nests which were discovered with two or more eggs.

Nesting Summary by Island and Year

Of the 23 pairs of AMOY at CAHA during the 2010 breeding season, one pair was found on Bodie Island, 15 were found on Hatteras, four were found on Ocracoke, and three were found on Green Island. Altogether, these birds produced a total of 28 nests, including re-nesting attempts.

Compared to the 10-year (2000-2009) average, there were 5.2 fewer breeding pairs of AMOY at CAHA in 2010 (Table 2). This is consistent with the overall total population decline in AMOY numbers. Total nest numbers are also lower (Table 3) which can be attributed partially to lower re-nesting attempts because more of the initial nesting attempts were successful. The decrease in the number of nest attempts could be attributed to efforts to remove nest predators and perhaps favorable weather as well as the fact that there are fewer pairs.

Table 2. Breeding Pairs by Year and Island.

Year	Bodie	Hatteras	Ocracoke	Green	Total
2000	2	23	12		37
2001	2	24	13		39
2002	2	17	12		31
2003	5	16	8		29
2004	3	15	9	2	29
2005	2	16	5	2	25
2006	2	14	5	2	23
2007	2	15	4	2	23
2008	3	15	3	2	23
2009	4	13	4	2	23 ¹
2010	1	11	4	4	23

10-Year Average (2000-2009) 28.2

2010 Comparison -5.2

¹Twenty-three is a conservative interpretation of the pair numbers. One breeding adult lost its mate and re-paired with another bird and nested, but it is only counted as one pair rather than two pair.

Table 3. Total Nests by Year and Island.

Year	Bodie	Hatteras	Ocracoke	Green	Total
2000	3	29	17		49
2001	3	28	15		46
2002	5	25	18		48
2003	5	23	12		40
2004	7	18	11	3	39
2005	3	23	10	3	39
2006	2	19	8	2	31
2007	2	21	10	2	35
2008	5	20	3	4	32
2009	4	19	6	2	31
2010	2	17	6	3	28

10-Year Average (2000-2009) 39

2010 Comparison -11

Recruitment

AMOY begin breeding 3-5 years after their hatch year. CAHA has begun to see some recruitment into the breeding population. Of the 15 chicks banded at CAHA in 2004, four chicks returned to nest in their third year and three returned to nest in their fourth year. Of the nine chicks banded at CAHA in 2005, only one (GrH3) has returned to nest and another fledgling

(GrH2), its sibling from 2005 is paired up (with GrU5) and was observed scraping in 2009, and nested in 2010. This pair’s first and only nest attempt was not successful.

Productivity

Although there were fewer nests documented in 2010, more of the nests hatched (Table 4) and there were 6.3 more successful pairs in 2010 compared to the 10-year average (Table 5). In 2010, CAHA fledged 17 more chicks than the 10-year average of 13 chicks fledged (Table 6). Although the chicks fledged per breeding pair appears to be cyclical, there is a generally increasing trend in productivity (Figure 1).

Table 4. Nests Hatched by Year and Island.

Year	Bodie	Hatteras	Ocracoke	Green	Total
2000	0	10	6		16
2001	1	10	11		22
2002	1	3	6		10
2003	1	10	4		15
2004	0	14	7	2	23
2005	1	12	3	2	18
2006	1	11	5	2	19
2007	1	10	3	1	15
2008	2	9	1	1	13
2009	1	11	2	1	15
2010	1	13	5	2	21
10-Year Average (2000-2009)					16.6
2010 Comparison					+4.4

Table 5. Successful Pairs (at Least 1 Chick Fledged) by Year and Island.

Year	Bodie	Hatteras	Ocracoke	Green	Total
2000	0	2	5		7
2001	1	6	8		15
2002	1	3	3		7
2003	0	5	1		6
2004	0	6	5	1	12
2005	0	6	1	unknown	7
2006	0	4	1	2	7
2007	0	6	1	1	8
2008	2	6	1	1	10
2009	1	6	0	1	8
2010	0	10	3	2	15
10-Year Average (2000-2009)					8.7
2010 Comparison					+6.3

Table 6. Number of Chicks Fledged by Year and Island.

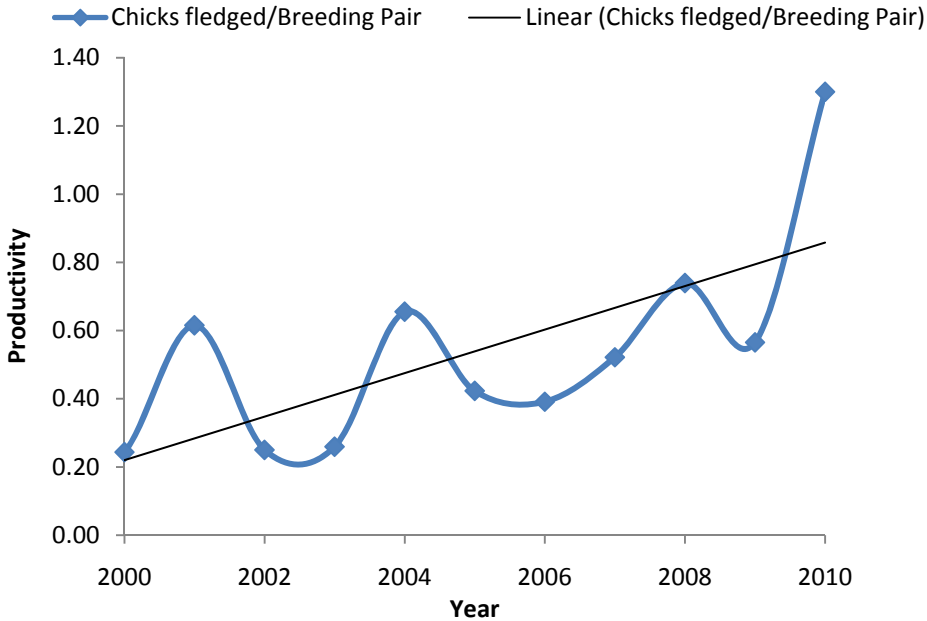
Year	Bodie	Hatteras	Ocracoke	Green	Total
2000	0	2	7		9
2001	1	6	17 (max)		24
2002	2	4	3		9
2003	0	6	1		7
2004	0	9	8	2	19
2005	0	8	1	unknown	11
2006	0	5	2	2	9
2007	0	9	1 ¹	2	12
2008	2	11 ²	2	2	17
2009	1	9	0	3	13
2010	0	23	3	4	30

10-Year Average (2000-2009) 13
2010 Comparison +17

¹ The AMOY chick that was believed fledged on Ocracoke Island in 2007 was found dead later and is no longer counted in the replacement population of AMOY.

² Of the chicks which fledged from Hatteras in 2008, one died after a car-strike post-fledge (at Sandy Bay), and another (also thought to be struck by a vehicle N of Buxton) was transferred to long-term care.

Figure 1. Fledge Rate and Trend for AMOY Breeding at CAHA 1998-2010.



Nesting Season

The first nest of the season was found on April 15 and the last nest was found on June 21. Table 7 shows the dates that mark the beginning and end of the breeding season, including important milestones in between.

Table 7. Annual AMOY Breeding Milestones for 2000-2010.

Year	Date First Nest Found	Date Last Nest Found	Date of Earliest Hatch	Date of Latest Hatch	Date of Latest Fledge
2000	21-Apr	5-Jul	20-May	11-Jul	28-Aug
2001	25-Apr	20-Jun	23-May	4-Jul	1-Aug
2002	18-Apr	13-Jun	14-May	13-Jul	22-Aug
2003	17-Apr	10-Jul	15-May	15-Jul	10-Aug
2004	18-Apr	8-Jul	10-May	6-Jul	10-Aug
2005	21-Apr	9-Jul	7-May	29-Jul	20-Aug
2006	12-Apr	18-Jun	14-May	30-Jun	6-Aug
2007	11-Apr	26-Jun	17-May	16-Jul	13-Aug
2008	22-Apr	20-Jun	21-May	6-Jul	12-Aug
2009	17-Apr	19-Jun	15-May	7-Jul	20-Aug
2010	15-Apr	21-Jun	12-May	16-Jul	23-Aug

Banded Breeding Pairs

In 2010, the park had one pair of unbanded breeding AMOY, down from three pairs in 2009. With banding efforts, more confidence in the identities of the pairs can be had, but over-counts of nesting pairs are still possible when both individuals of a pair are unbanded and nest loss occurs, or clutch continuation after a clutch reduction occurs in a new location. As shown below in Tables 8 and 9, pairs consisting of two unbanded birds were not frequently observed at CAHA in 2010.

Table 8. Band combinations for AMOY pairs found at CAHA in 2010.

Pair Type:	UNB/UNB	Banded/UNB	Banded/Banded
	(1 Pair, GI)	Gr11/UNB	GrC8/GL9
		GrC0/UNB	GrT4/Gr27
		Gr01/UNB	Gr50/Gr52
		GrC9/UNB	RdC9/GrL5
		GrAT/UNB ¹	GrH3/GrAW
		GrL4/UNB	GrA7/Gr07
		Gr54/UNB	GrA5/GrL6
		Gr87/UNB	GrR0/Gr12
		Gr07/UNB	GrF7/Gr57
			GrKX/GrKY
			GrH2/GrU5
			Gr14/GrL7
			Gr86/Gr76
Total:	1	9	13

¹GrAT (geo-locator on new band) was formerly banded as GrR6.

Nest Failures and Chick Mortality

The main cause of AMOY nest failures in 2010 was predation (Table 9). Of the seven nests that were lost in 2010, five nests (71.4%) were lost to predators, one nest (14.3%) was abandoned and one nest (14.3%) was lost to overwash from high tides and storms. Of the nests that were predated the identity of the predator could only be identified for two nests. A raccoon was responsible for one and a mink was responsible for the other.

It is sometimes difficult to attribute nest loss to the exact species if the predation is not directly observed. Determining cause of chick loss is even more difficult than determining cause of nest loss. Environmental conditions surrounding the nest site may obscure evidence of predation. Chicks can move large distances and it is sometimes difficult to locate them. Searches for missing chicks may be intentionally delayed since many different types of disturbances may cause the chicks to hide out of view from the observers. Some of the unknown cases of nest and chick depredation might be partially attributable to ghost crab predation. In an attempt to get a grasp on predation and the types of predators and times eggs were lost, resource staff placed cameras near nests in areas which have typically had clutch reductions and nest losses.

Nest and chick failures considered together show similar proportions of failure type (Table 10). In 2010 of 18 chick mortalities, one chick was lost to siblicide, eleven chick losses were attributed to unknown predators, one was lost to a coyote, two to a raccoon, two to avian predators and one to a mink. In 2010 there were seven complete brood failures and six partial brood failures.

Table 9. Percentage of Nests Lost and Nests Hatched from 2005-2010.

Year	Nests	Lost to Overwash	Lost to Predation	Abandoned	Number Nests Hatched / Percent
2005	41	12%	34%	29%	19 / 46%
2006	30	7%	27%	3%	19 / 63%
2007	35	16%	32%	10%	15 / 42%
2008	32	11%	34%	11%	14 / 44%
2009	31	6%	29%	13%	16 / 52%
2010	28	3.5%	18%	3.5%	21 / 75%

2005-2009 Avg. 17 / 49%

2010 Difference +4 / +26 %

Table 10. Percentage of Chicks Lost and Chicks Fledged from 2005-2010.

Year	Eggs Hatched	Other*	Lost to Predation	Number Chicks Fledged/Percent
2005	38	10%	61%	11 / 29%
2006	38	10%	66%	9 / 24%
2007	30	10	50%	12 / 40%
2008	25	10%	22%	17 / 68%
2009	31	0%	58%	13 / 42%
2010	48	2%	35%	30 / 63%

*Siblicide, Exposure, Human Interaction

2005-2009 Avg.

12 / 41%

2010 Difference

+18 / +22%

Banding Effort

Banding allows for the identification and monitoring of known breeding pairs and to eventually quantify recruitment – the number of chicks that hatched and return here to breed. In 2010, as part of a NCSU research project, J. Stocking and CAHA staff banded a total of 33 birds, consisting of two adults and 31 juveniles (Table 11 and 12). One banded juvenile, GrXK, was lost to unknown causes after being banded.

The banding efforts allow for individual bird identification and helps answer questions about movement and connectivity within the population. It allows for identification of birds on their wintering grounds, enables us to calculate age at first breeding and yearly survival of breeding birds. It also helps determine familial relationships among birds breeding at CAHA.

Table 11. Breeding Adult AMOY Banded at CAHA in 2010.

Bands:	Paired with:	Capture Date:
GrKX	GrKY	5/19/2010
GrKY	GrKX	5/19/2010

Table 12. AMOY Chicks Banded at CAHA in 2010.

Bands:	Offspring of:	Capture Date:
GrRM	GR50, Gr52	7/21/2010
GrLT	GrC8, GrL9	6/9/2010
GrLY		6/10/2010
GrLN		6/11/2010
GrXW	Gr01, UNB	6/20/2010
GrLR	GrAT, UNB	6/10/2010
GrLU		
GrLW		
GrLA	RdC9, GrL5	6/5/2010
GrLC		
GrLE		
GrXT	GrH3, GrAW	6/13/2010
GrXU		
GrXA	GrA7, Gr07	6/16/2010
GrXC		
GrXX		
GrXH	GrRO, Gr12	6/20/2010
GrXJ		
GrXE	GrF7, Gr57	6/20/2010
GrXF		
GrXL	GrA5, GrL6	6/29/2010
GrXM		
GrXY		
GrXR	Gr54, UNB	6/18/2010
GrXP	Gr87, UNB	6/21/2010
GrXK ¹		6/21/2010
GrRN	Gr86, Gr76	8/11/2010
GrWW	Gr11, UNB	7/1/2010
GrWY		
GrXN	GrCO, UNB	7/1/2010
GrWX ²		7/6/2010

¹Indicates a bird is no longer alive. GrXK was lost to unknown causes 7/4/10.

²Indicates a bird that no longer has color bands. USFW band still on lower left leg.

DISCUSSION

The breeding population of AMOY has remained at 23 pairs for the past five breeding seasons and the decline in breeding pairs appears to have been halted. The lack of increased pair numbers in recent years can be partly attributed to the deaths of existing breeding birds and recruits to the population, replacing them, rather than increasing the number of breeding pairs. Since 2005 close to a dozen banded breeding birds have either shown up in the spring and

subsequently disappeared from their historical breeding territory, or have not shown up at all. At least two known, historic breeding pairs and another breeding adult have shown up and set up on their historic territories (or have been observed near their historic territory), but no nests have been found for them in the past four years. Even though these birds have been observed at CAHA and have nested here before, if a nest was not located, they are not included in the number of *breeding* pairs. Some of these birds may have attempted to nest on the offshore islands or remote stretches of the sound shoreline that are not monitored by NPS staff and occasionally “visited” CAHA throughout the breeding season.

Another factor influencing the lack of immediate increase of breeding pairs, even though productivity is trending upward, is the fact that juvenile AMOY may not establish territories or reproduce for three to five years, thus any productivity increases the population sees now, will not be realized as recruitment into the breeding population for at least another three to five years. During the 2010 breeding season (March to June) lone birds and pairs of birds, both unbanded and banded, unassociated with nests were observed at CAHA. The age of the banded birds is known and many were of age to nest in 2010, but did not, either due to their inability to find, establish and hold a territory, or their inability to find a mate of breeding age. Others of these observed birds will first come into breeding age in 2011.

It is critical that resource management is sufficiently staffed to install, modify, and maintain all the closures to protect these birds during breeding season. Field staff needs to be adequately trained to identify breeding behaviors associated with AMOY setting up territories to allow for the immediate protection of their territories. If CAHA hopes to see an increasing population of AMOY, especially close attention will need to be paid to birds with no breeding history at CAHA. Adequate protection from disturbance and a continuation of the predator control program should contribute towards the recovery and maintenance of a stable population of AMOY at CAHA.

APPENDICES

APPENDIX A: MAPS

Map 1: Bodie Island and Green Island AMOY Nesting Activity 2000-2010

Map 2: Bodie/Hatteras AMOY Nesting Activity 2000-2010

Map 3: North Hatteras AMOY Nesting Activity 2000-2010

Map 4: South Eastern Hatteras AMOY Nesting Activity 2000-2010

Map 5: South Western Hatteras AMOY Nesting Activity 2000-2010

Map 6: Ocracoke AMOY Nesting Activity 2000-2010

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