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The American Oystercatcher (*Haematopus palliatus*) Working Group: 15 Years of Collaborative Focal Species Research and Management

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Abstract.—The American Oystercatcher (*Haematopus palliatus*) Working Group formed spontaneously in 2001 as coastal waterbird biologists recognized the potential for American Oystercatchers to serve as focal species for collaborative research and management. Accomplishments over the past 15 years include the establishment of rangewide surveys, color-banding protocols, mark-resight studies, a revision of the Birds of North America species account, and new mechanisms for sharing ideas and data. Collaborations among State, Federal, and private sector scientists, natural resource managers, and dedicated volunteers have provided insights into the biology and conservation of American Oystercatchers in the United States and abroad that would not have been possible without the relationships formed through the Working Group. These accomplishments illustrate how broad collaborative approaches and the engagement of the public are key elements of effective shorebird conservation programs. *Received 5 December 2015, accepted 20 March 2016.*

Key words.—American Oystercatcher, demographic model, *Haematopus palliatus*, Working Group.

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DISTRIBUTION AND TAXONOMY OF WESTERN HEMISPHERE OYSTERCATCHERS

Oystercatchers (family Haematopodidae) are found in coastal habitats throughout the Western Hemisphere (Fig. 1). Their habitats are diverse, but unlike oystercatchers in other parts of the world that regularly inhabit riverine and upland habitats, Western Hemisphere oystercatchers are closely tied to marine environments. Four species of oystercatcher are currently recognized in the Western Hemisphere. The Black Oystercatcher (*Haematopus bachmani*) occurs from the Baja California Peninsula, Mexico, north to central Alaska, USA, while its counterpart, the Blackish Oystercatcher (*H. ater*), occurs from southern Peru on the Pacific Coast to central Argentina on the Atlantic Coast. A third species, the Magellanic Oystercatcher (*H. leucopodus*), is found in southern Chile and Argentina. The fourth species, the American Oystercatcher (*H. palliatus*), occurs as five recognized subspecies from southern California, USA, to central Chile and the Galapagos, Ecuador, on the Pacific Coast, and from Nova Scotia, Canada, to southern Argentina on the Atlantic Coast. *H. p. palliatus* occurs on Atlantic and Caribbean coastlines of North America, Central America, and South America to southern Brazil, the West Indies and the Pacific Coast of Central America. *H. p. durnfordi* occurs in Argentina and perhaps Uruguay. On the Pacific Coast, *H. p. pitanay* is found from Ecuador to Chiloe Island, Chile. *H. p. frazari* occurs in western Mexico, while *H. p. galapagensis* is restricted to the Galapagos Islands, Ecuador. The *palliatus* subspecies regularly hybridize with Black Oystercatcher (Wehtje 2005), and hybrids with Blackish Oystercatcher have been reported (Jehl 1978). Abundance estimates outside of the United States are limited. The most recent estimate of 21,326 individuals for all *H. p. palliatus* subspecies (Clay *et al.* 2014) (Table 1) is in-

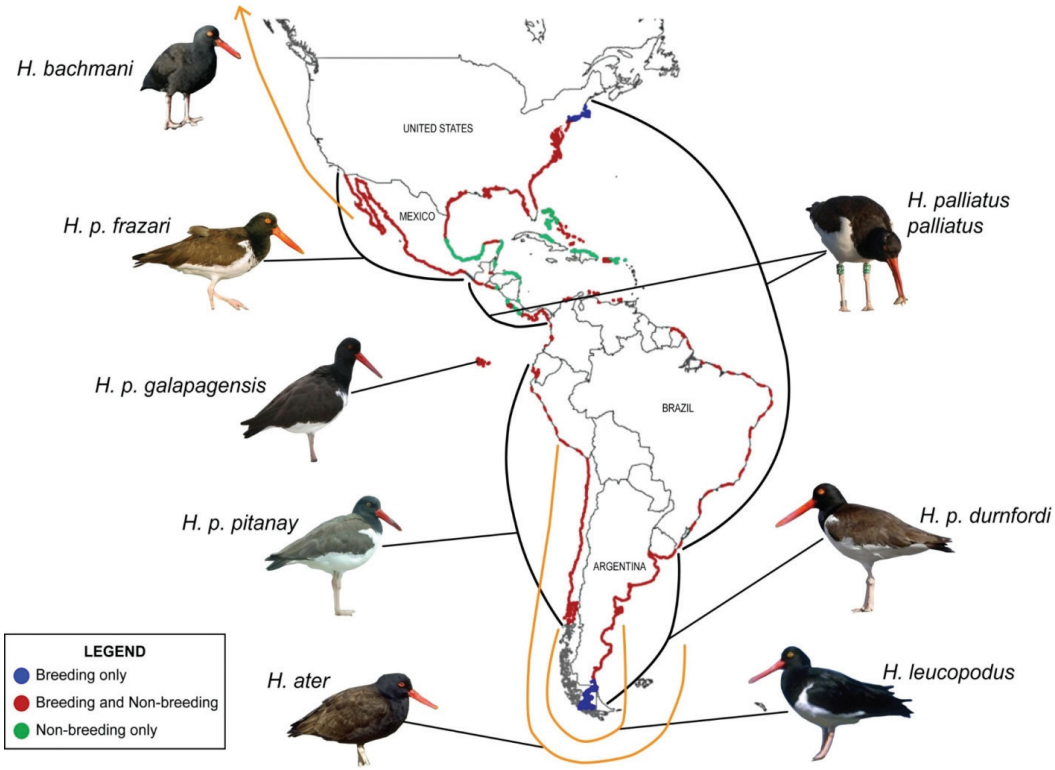

Figure 1. Distribution of Western Hemisphere oystercatchers include five subspecies of *Haematopus palliatus* (ranges in black) and three closely related species (ranges in orange).

complete, but nevertheless confirms that the birds occur at relatively low densities across their extensive range.

By the beginning of the 20th century, the range of the American Oystercatcher in the United States was compressed into remnant populations between Florida and Virginia. Over the past century, populations in the United States have reclaimed much of their former breeding range and now nest from Maine to the Mexican border (American Oystercatcher Working Group *et al.* 2012).

History of the American Oystercatcher Working Group

Pioneering research on American Oystercatchers was conducted in Virginia in the early 1980s (Nol 1984). The work was

Table 1. Population estimates for *Haematopus palliatus* (Clay *et al.* 2014).

Distribution	Season	Individuals
Atlantic and Gulf of Mexico Coasts, USA	Non-breeding	11,000
Mexico	Breeding	500
Caribbean	Breeding	550
	Non-breeding	550
Central America	Breeding	1,751-2,450
	Non-breeding	275-600
North and South America	Breeding	200
Brazil	Breeding	6,500
Total	—	21,326-22,350

summarized in the original Birds of North America account published in 1994 (Nol and Humphrey 1994). New research began on the Outer Banks of North Carolina in 1995 (Novick 1996) and in Georgia and South Carolina in 2000 (Sanders *et al.* 2008).

The American Oystercatcher Working Group emerged spontaneously as waterbird biologists along the Atlantic and Gulf of Mexico Coasts of the United States recognized the potential for the American Oystercatcher to serve as a focal species for collaborative research and management. Although relatively rare, the birds are widespread along the Atlantic and Gulf of Mexico Coasts. Their biology and habitat requirements make them sensitive to a variety of factors affecting coastal resources including habitat loss from coastal development, and pressure from human recreation, pollution, and non-native predators. These large, charismatic birds are easily identified and appreciated by the public, and their size and life history attributes made them ideal candidates for the long-term mark-resight studies necessary for monitoring rangewide patterns of distribution, abundance, fecundity, and survival. Interested biologists met at the Waterbird Society meeting in 2001 and agreed to create an informal working group. Additional studies began in Virginia in 2002 and in Massachusetts and New Jersey in 2004, and today over 30 institutions and organizations participate in Working Group activities (Table 2). Working Group meetings have been held annually since 2001 at study sites between Maine and Texas. To date, Working Group members have produced at least 25 peer-reviewed journal articles, 12 M.S. theses, four Ph.D. dissertations, and scores of technical reports. The working group organized a symposium on the "Ecology and Conservation of American Oystercatchers" at the 2015 Waterbird Society annual meet-

Table 2. American Oystercatcher monitoring efforts along the Atlantic and Gulf of Mexico Coasts, USA.

State	# Pairs	# Birds Banded	# Nests Monitored Annually	Genetic Data	Winter Surveys	Source
Nova Scotia	4	—	—	No	No	S. Abbot, pers. commun.[1]
Maine	6	—	—	No	No	American Oystercatcher Working Group 2014
New Hampshire	0	—	—	No	No	
Massachusetts	200	507	50-200	Yes	No	Melvin 2012
Rhode Island	27	3	—	No	No	American Oystercatcher Working Group 2011
Connecticut	55	—	—	No	No	American Oystercatcher Working Group 2014
New York	76	43	—	No	Yes	S. Elbin, pers. commun.[1]
New Jersey	400	350	75-150	No	Yes	T. Pover, pers. commun.[1]
Delaware	15	24	—	No	Yes	American Oystercatcher Working Group 2014
Maryland	108	2	—	No	Yes	Traut *et al.* 2006
Virginia	730	909	100-400	No	Yes	Wilke *et al.* 2007; A. L. Wilke, pers. commun.[1]
North Carolina	325	982	50-100	No	Yes	S. Schweitzer, pers. commun.[1]
South Carolina	400	457	20-40	Yes	Yes	Sanders *et al.* 2008; F. J. Sanders, pers. commun.[1]
Georgia	120	503	10-50	Yes	Yes	T. Keyes, pers. commun.[1]
Florida	272	119	120-280	No	Yes	J. Brush, pers. commun.[1]
Alabama	15	—	—	No	Yes	Zdravkovic *et al.* 2006
Mississippi	25	—	—	No	Yes	Zdravkovic *et al.* 2006
Louisiana	120	46	—	No	Yes	E. Johnson, pers. commun.[1]
Texas	170	320	50-90	No	Yes	S. Heath, pers. commun.[1]
Total	3,068	4,265				

[1]2015 estimate.

ing in Bar Harbor, Maine, USA. The symposium highlighted 17 presentations by Working Group members from the Atlantic and Gulf Coasts of the United States, and from colleagues studying American Oystercatchers in Tamaulipas, Sinaloa, and Baja California, Mexico. This Special Publication of Waterbirds represents a compilation of that research.

WORKING GROUP GOALS

The primary goal of the American Oystercatcher Working Group is to conduct research and management activities that contribute to the conservation of American Oystercatchers and their habitats. To this end, the group has developed rangewide management objectives in a science-based, adaptive management framework. Work involves mapping the distribution and abundance of breeding and wintering populations and identifying threats to remaining habitats. An important objective is to monitor population trends at local, regional, and continental scales. Key components of this monitoring are the development of reliable estimates of demographic parameters and the identification of factors that affect these estimates to understand how variations in demographic parameters influence rangewide population viability. These findings will ultimately inform an understanding of rangewide metapopulation dynamics and help prioritize management actions.

Documenting the dependence of American Oystercatchers on natural coastal habitats, such as undeveloped barrier island beaches, sandbars, shell rakes (deposits of oyster and other shells found along the edges of marshy islands), salt marsh islands, and shellfish flats, provides further justification for protecting these sensitive areas. Many of the factors affecting American Oystercatcher populations, including the loss of habitat from coastal development, disturbance from human recreational activities, elevated predation from predators associated with human activities, contamination of their primary food sources by pollution, and the effects of global climate change, are shared by many other coastal specialists; thus, conservation efforts for American Oystercatchers will undoubtedly benefit these species as well. Monitoring American Oystercatcher populations at the regional level can provide useful insight into the overall health of coastal ecosystems, and knowledge of population declines can alert land managers to changing habitat conditions. For instance, the relatively recent movement of breeding birds from natural habitats to human-created habitats, such as dredge spoil islands and rooftops, in some parts of the range may indicate that natural habitats are no longer suitable in those areas.

WORKING GROUP ACCOMPLISHMENTS

Since its formation in 2001, the Working Group has produced an impressive list of tangible accomplishments. An active list serve, created in 2002, promotes the exchange of information among approximately 150 active subscribers. A website (American Oystercatcher Working Group 2003) provides an up to date summary of Working Group member activities and contact information, access to the list serve, details about banding protocols and a portal to the banding-resight database, descriptions of field methods, data summaries, reports and presentations from Working Group meetings, and a literature database.

Studies of individually color-marked birds began in North Carolina in 1999 and over the next 5 years Working Group members cooperated with the U.S. Geological Survey Bird Banding Laboratory and the Pan American Shorebird Program to develop rangewide banding protocols and methods. Winter resights of birds banded during the breeding season indicate that northern birds make longer southerly movements. Birds breeding along the Atlantic Coast of the United States have now been reported wintering in Florida, Mexico, Honduras, Nicaragua, and Panama (Fig. 2). The longest reported movement to date is a bird banded as a nestling on Nantucket Island, Massachusetts in July 2014, that was resighted on Bahía

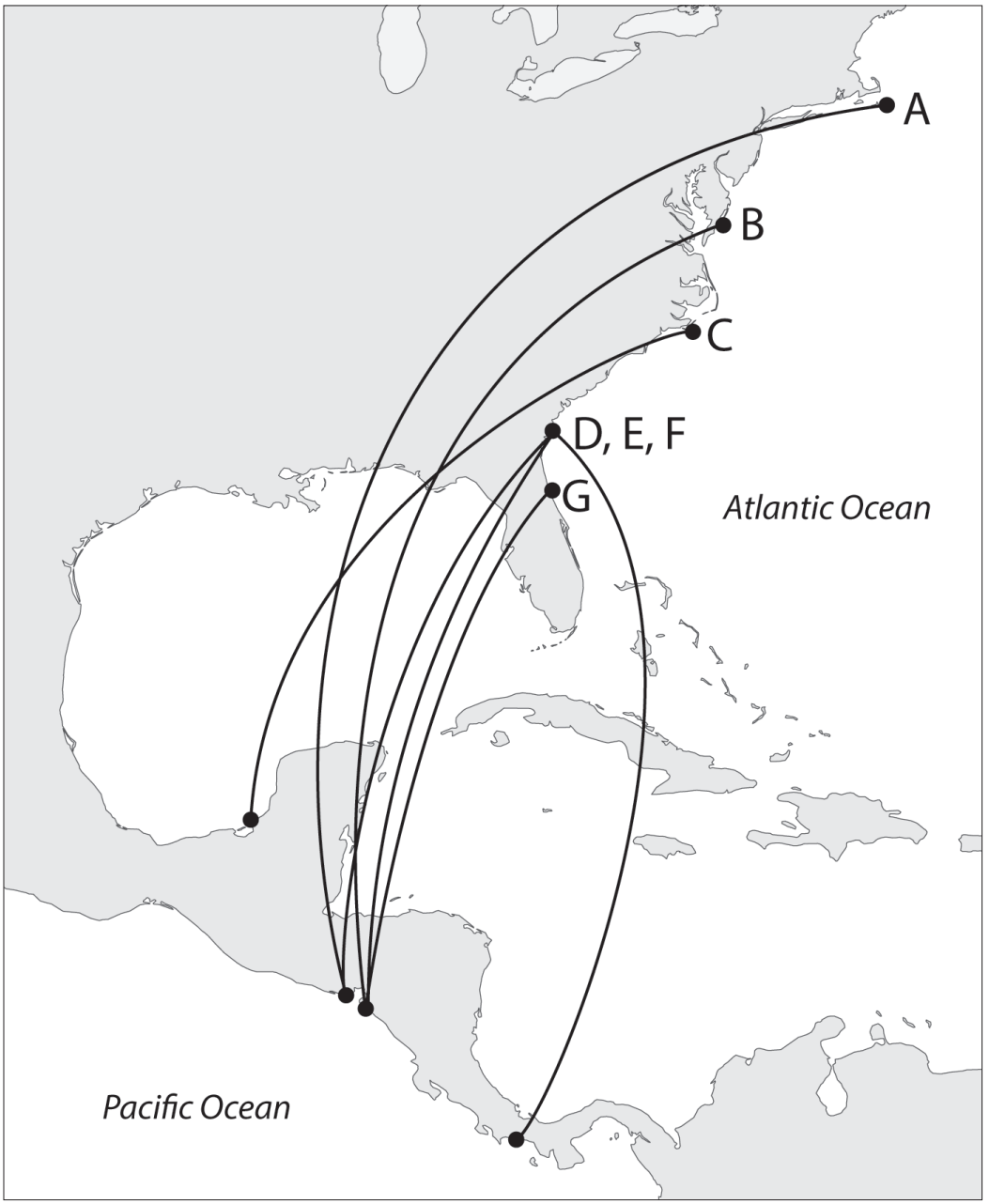

Figure 2. Resights of color-banded American Oystercatchers in Mexico and Central America. (A) Yellow AAR, banded as a chick on Nantucket Island, Massachusetts in July 2014, resighted on Bahía de San Lorenzo, Honduras winter 2015-2016. (B) Black 6F, banded as a chick on Metomkin Island, Virginia in May 2006, resighted on the Delta del Estero Real, Nicaragua in the winters of 2012, 2014, and 2016. (C) Green CHK, banded as a chick on Cape Lookout, North Carolina in July 2013, resighted in the fall and winter of 2013 and 2014 on Laguna de Terminos, Mexico. (D) Red CF, banded as a chick on Little Saint Simons Island, Georgia in June 2011, resighted in coastal Georgia in June 2014 and April 2015, resighted on Bahía de San Lorenzo, Honduras in February 2016. (E) Red F6, banded as an adult on Wolf Island, Georgia in September 2005, resighted as a breeder on Wolf Island in 2011, 2012, and 2014, resighted on the Delta del Estero Real, Nicaragua in January 2013. (F) Red AFR, banded as a chick near the north end of Cumberland Island, Georgia in June 2016, resighted on Isla Sevilla, Panama in September 2016. (G) Red 48, banded as a breeding adult on the Tolomato River, Florida in May 2016, resighted on the Delta del Estero Real, Nicaragua in February 2016, resighted back on the Tolomato River, Florida in April 2016.

de San Lorenzo, Honduras, over the winter 2015-2016, a minimum distance of over 4,000 km. Resights are confirming patterns found in other oystercatchers including strong mate and nest site fidelity, generally strong natal site fidelity for first-time breeders, and an age at first breeding between 3 and 5 years (American Oystercatcher Working Group *et al.* 2012).

In 2008, Working Group members cooperated to develop a 10-year business plan to promote the conservation of American Oystercatchers through a National Fish and Wildlife Foundation focal species initiative. The resulting program provided 5.0 million dollars in direct funding and 4.2 million dollars in matching funds to support dozens of research and management projects conducted by Working Group members along the Atlantic and Gulf of Mexico Coasts.

Working Group members collaborated to revise the Birds of North America American Oystercatcher species account in 2012 (American Oystercatcher Working Group *et al.* 2012). Twenty Working Group members representing 17 organizations contributed to the revised account.

An online mark-resight banding database developed by Audubon North Carolina with funding from the National Fish and Wildlife Foundation and accessible through the American Oystercatcher Working Group (2003) website was launched in 2012. Unrestricted access is available for Working Group members, and reporting and viewing capabilities are available to the general public. To date, 41,000 recapture records for over 4,000 individually marked American Oystercatchers (Table 2) have been reported by 758 unique observers from Maine to Nicaragua. The database is secure and fully searchable, and it includes over 1,300 photos and Google Earth mapping capabilities. Linkages to U.S. Geological Survey Bird Banding Laboratory databases and a smartphone interface are under development.

Aerial winter roost surveys of American Oystercatchers, coordinated by the Manomet Center for Conservation Science, were conducted by Working Group members in the winters of 2003 and 2013. A stratified sampling design that incorporated estimates of detection probability (Brown *et al.* 2005) was used to survey wintering birds from New Jersey to Texas in 2003 and from New York to Texas in 2013 (S. Brown, pers. commun.). Population estimates from the two surveys were remarkably similar, indicating a population of approximately 11,000 birds along the Atlantic and Gulf of Mexico coasts of the United States.

Similar rangewide monitoring of breeding populations has been underway over the past 10 years. Surveys and monitoring from Maine to Texas indicate a United States breeding population of approximately 3,000 territorial pairs (Table 2). By applying insights from mark-resighting studies and demographic modeling to estimates from the winter roost surveys and breeding season surveys, the Working Group is beginning to demonstrate a rangewide perspective on American Oystercatcher population dynamics. For example, demographic modeling allows us to predict the number of breeding individuals in a wintering population of 11,000 wintering birds. We can use a generalized four-stage matrix model (Schulte 2012) to estimate the proportion of breeders in a population (Fig. 3). The model includes six demographic parameters: fecundity (F), juvenile survival (Sj), subadult 1 survival (S1), subadult 2 survival without transition (S2), subadult 2 survival with transition to adult (Ts2), and adult survival (Sa) (Table 3). Parameters (Table 3) are based on productivity monitoring, survival estimates and transition probabilities derived from the mark-resight database, and studies of the closely related Eurasian Oystercatcher (van de Pol 2006). The matrix projection generated in statistical program R (R Development Core Team 2015) predicts that the stable stage distribution (Caswell 2001) for a population of 11,000 American Oystercatchers would include 5,815 breeding adults (Fig. 4). Breeding season surveys (Table 2) can currently account for 3,064 pairs or 6,128 birds, which illustrates remarkable consistency between winter roost and breeding season population estimates. These results indicate that Working Group efforts over the past 15 years

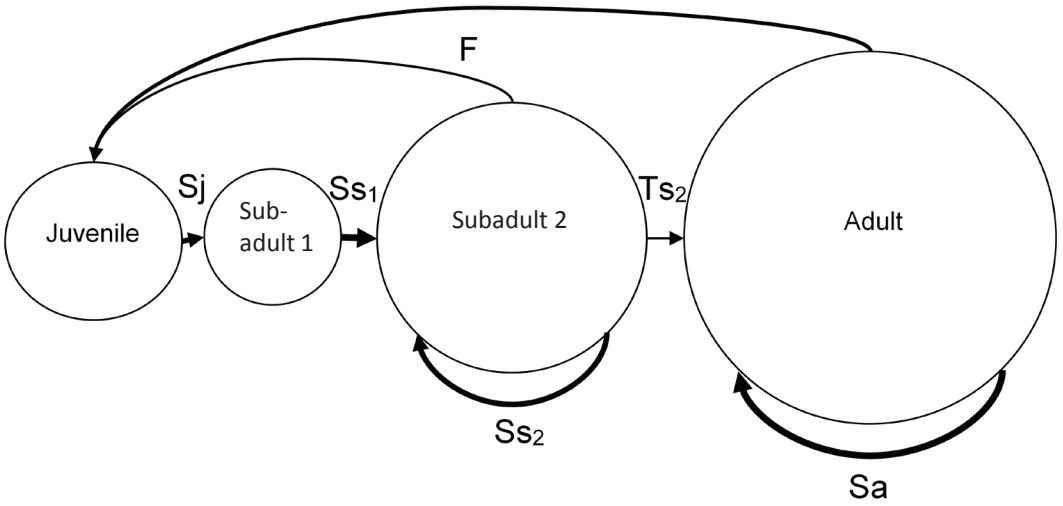

Figure 3. A conceptual stage-based model for an American Oystercatcher population (Schulte 2012). The size of each node represents the proportion of the population in that stage. Arrow width corresponds to parameter values. Stages include juvenile (post-fledging), subadult 1 (second year), subadult 2, and adult (breeding) stages. The model includes six demographic parameters: fecundity (F), juvenile survival (Sj), subadult 1 survival (S1), subadult 2 survival without transition (S2), subadult 2 survival with transition to adult (Ts2), and adult survival (Sa). See Table 3 for parameter values.

are beginning to generate estimates of demographic parameters that are sufficient to address rangewide management objectives.

FUTURE DIRECTIONS

Four Latin American colleagues participated in the 2015 Working Group meeting and symposium held at the Waterbird Society Annual Meeting in Bar Harbor, Maine, the first step in an anticipated expansion of Working Group conservation and research activities for oystercatchers across the hemisphere. Concurrent with this initiative are ongoing efforts to refine rangewide monitoring methods to reduce survey bias associated with variations in spatial and temporal sampling effort, and variations in detection probability. A recent pilot study (Hostetter *et al.* 2015) explored a less labor intensive breeding season survey method that holds potential for future standardized rangewide surveys. Nine Working Group members from eight different organizations contributed to the study. An expanded study across a broader geographic area is currently underway to further refine survey design and methodology. Future Working Group studies to measure rangewide changes in the distribution, abundance, and productivity of American Oystercatchers will seek to link American Oystercatcher metapopulation dynamics to changes in habitat use and availability.

LESSONS FROM THE AMERICAN OYSTERCATCHER WORKING GROUP EXPERIENCE

Most members view their experiences in the Working Group as remarkably productive and enjoyable. Many have remained active members for 10 or more years. Advances in digital information technologies that provide unprecedented opportunities to share, synthesize, and disseminate information,

Table 3. Demographic parameters assumed in the American Oystercatcher stage-based model. NC = North Carolina.

Fecundity (F) NC (1995-2013) n = 2,985 nests	Juvenile Survival (Sj)	Second Year Survival (S1)	Subadult Survival w/o Transition (S2)	Subadult Transition to Adult (Ts2)	Adult Survival (Sa)
0.20	0.70	0.92	0.77	0.15	0.92

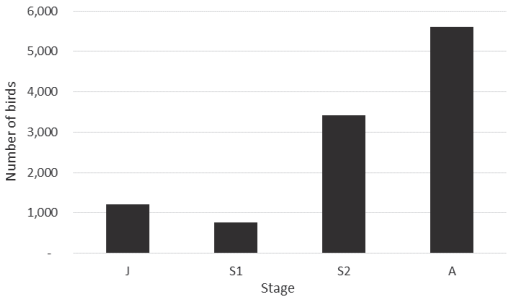

Figure 4. The projected stable stage distribution of a population of 11,000 American Oystercatchers includes 1,210 juveniles (J), 770 subadults 1 (S1), 3,470 subadults 2 (S2), and 5,815 adult birds (A).

and work at scales relevant to conservation and management goals, and a changing science culture that rewards collaborative research conducted at larger spatial scales, explain some of our success. Another key factor is the Working Group's bottom-up structure, which values information sharing, the identification of achievable objectives, opportunities for individual initiative, motivation inspired by respect, inclusion, peer pressure, and a legacy of shared accomplishments.

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