

2014 BOBCAT MANAGEMENT GUIDELINES

KIAWAH ISLAND, SOUTH CAROLINA



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Introduction

Bobcats (*Lynx rufus*) are the top mammalian predator on Kiawah Island and are responsible for the population regulation of many prey species on Kiawah, including white-tailed deer (*Odocoileus virginianus*). The bobcat population on Kiawah Island has remained stable over the last 17 years with population estimates ranging from 26-35 animals. This population likely consists of 8-10 adult females, 4-5 dominant adult males, 2-3 transient adult males, with the remainder being juveniles of both sexes.

Bobcats serve as an ideal “umbrella species” for Kiawah Island. An umbrella species is a species that typically requires large amounts of habitat and the conservation of this species in turn benefits other species that utilize the same habitat areas. Therefore, if bobcats have enough habitat and resources to survive on Kiawah, then other island wildlife species will have the necessary space and resources as well. Over the past 17 years, 3 separate multi-year studies have focused on gaining a better understanding of bobcats and their habitat, as well as their resource requirements on Kiawah Island. Research is ongoing, and we continue to refine our understanding of the unique relationship between bobcats, habitat, and people. A full list of bobcat research projects can be found on Page 32.

Kiawah Island Bobcat Ecology

Habitat Requirements

Kiawah Island bobcats typically have home ranges of 650-1500 acres. Male bobcats tend to have home ranges about 1.5 to 2 times the size of females. Dominant male bobcats rarely have overlapping home ranges, while females often share portions of their home range with other females. Bobcats spend most of the daylight hours resting in isolated areas of dense cover, typically located in thick scrub/shrub habitat within secondary dunes and along marsh edges. Individual bobcat resting areas are generally scattered throughout their home range, although cats on the western end of island are typically found only on the edges of their home range during the day because of the lack of good daytime cover in the interior of their range.

Food Requirements

Bobcats on Kiawah feed extensively on small mammals (approximately 40% of their diet during all seasons), although there is a shift to deer fawns in the summer and birds during the winter. Research has shown that many bobcats actually select developed residential areas and road corridors during nighttime hours. These areas provide great habitat for small mammals and bobcats are likely able to hunt more efficiently in these areas due to the fragmented, often linear nature of the habitat. In addition to small mammals, white-tailed deer fawns make up a significant portion of summertime bobcat diets (May-July). During a 2002-2005 study, bobcats killed 70 of 124 fawns monitored, suggesting that bobcats routinely kill greater than 50% of fawns born each year on Kiawah. All studies suggest that there are ample food resources for bobcats on Kiawah Island and that it is not likely to be a limiting factor for the island's bobcat population.

Denning Requirements

Our studies on bobcats have shown that female bobcats generally locate den sites in undisturbed patches of cover greater than 5 acres in size (Figure 1). However, in the last 6-7 years, a number of bobcats have established dens in small patches of cover (1/2- 5 acres), including 2 dens located under houses or decks. It is encouraging to see female bobcats utilizing smaller patches of cover for den sites, although we do not know if kitten survival is as high in these areas. Further research is needed to gather more data on this issue.



Figure 1. Location of 38 Bobcat Den Sites on Kiawah Island between 2000-2013 (building footprints are outlined in yellow).

Challenges

Bobcats have successfully adapted to changing habitat conditions on Kiawah Island in the last 17 years and numbers have remained stable. At this time, bobcats are able to find all life requirements (food, cover, water, space) throughout all portions of the island. As development continues over the next 15-20 years, more and more stress will be placed on bobcats as the larger, isolated patches of habitat are lost. Bobcats on the western end of the island (Bobcat Management Units 1 and 2) are likely already experiencing this pressure.

Bobcats are a very important part of the Kiawah Island ecosystem and are crucial in helping to maintain the delicate balance of species on the island, particularly by helping to regulate deer and small mammal populations. If bobcat population levels decline significantly, deer and small mammal populations would likely increase in response. This would cause an imbalance in the Kiawah Island ecosystem, with possible cascading detrimental effects to both flora and fauna.

How Do We Maintain Bobcat Populations on Kiawah Island?

In order to focus management activities on Kiawah, we have divided the island into 5 Bobcat Management Units (BMU, Figure 2). The boundaries of these units approximate the general home range structure/size of bobcats on Kiawah Island. Preserving and enhancing suitable habitat for resting, denning, and foraging within each BMU will allow bobcats to continue to

inhabit all portions of the island into the future. We have identified Important Bobcat Areas (IBA, Figure 3) within each BMU based primarily on 2011-2013 bobcat GPS location data. IBA are areas of critical importance to bobcats and should be preserved and protected if possible. The list of IBA is not intended to represent all important bobcat habitats and efforts should also be made to preserve and enhance other areas of similar habitat (scrub-shrub, marsh edge, etc.)

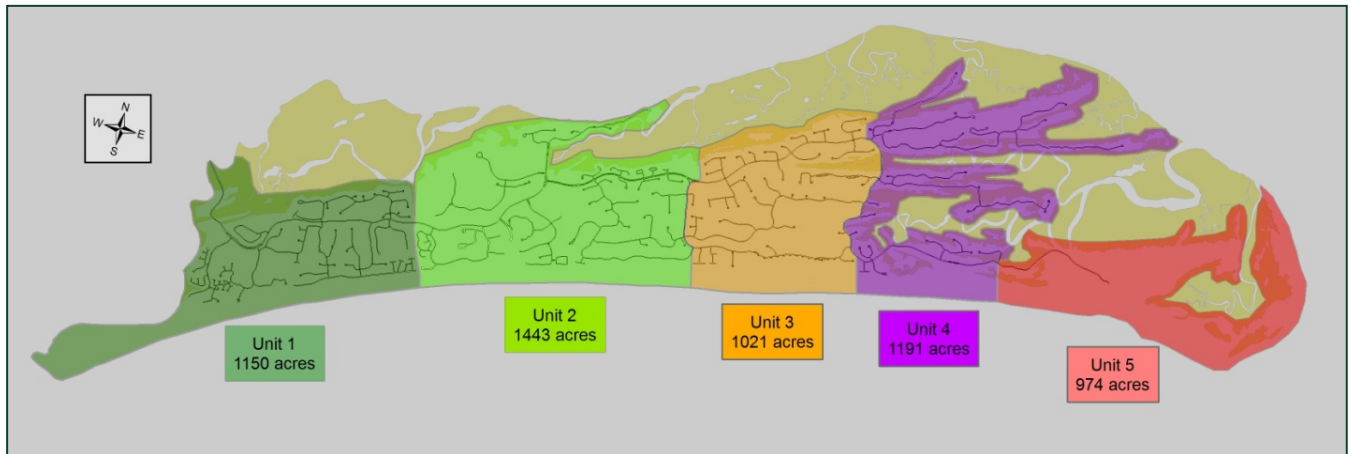


Figure 2. Location and size of 5 Bobcat Management Units on Kiawah Island, SC.



Figure 3. Map of Kiawah Island showing 59 Important Bobcat Areas in red and building locations in yellow.

Table 1. Details on development density within each BMU on Kiawah Island.

Unit	Developed Lots	Undeveloped Lots	Total Lots	Percent Developed	Percent Undeveloped
BMU 1	769	119	888	87%	13%
BMU 2	733	226	959	76%	24%
BMU 3	632	204	836	76%	24%
BMU 4	286	165	451	63%	37%
BMU 5	11	70	81	14%	86%
Entire Island	2431	784	3215	76%	24%

Bobcat Management Unit 1 (BMU 1, Figure 4)

Description and General Issues

- BMU 1 encompasses the western portion of Kiawah Island, from Captain Sam's inlet east to Sora Rail Rd.
- 87% of single family residential lots are currently developed
- Positive aspects: the currently undeveloped areas of Captain Sam's Spit, the larger tracts of land adjacent to Town Hall and Beachwalker County Park, the hammock islands near Mingo Point, and the marsh edge on the northern portion of the unit.
- Negative aspects: the high level/density of single family residential and multi-unit development, the lack of interior daytime resting and denning cover, extensive golf course areas, and the high level of human activity. Two new developments, The Pointe and Riverview, are currently being built in this BMU.

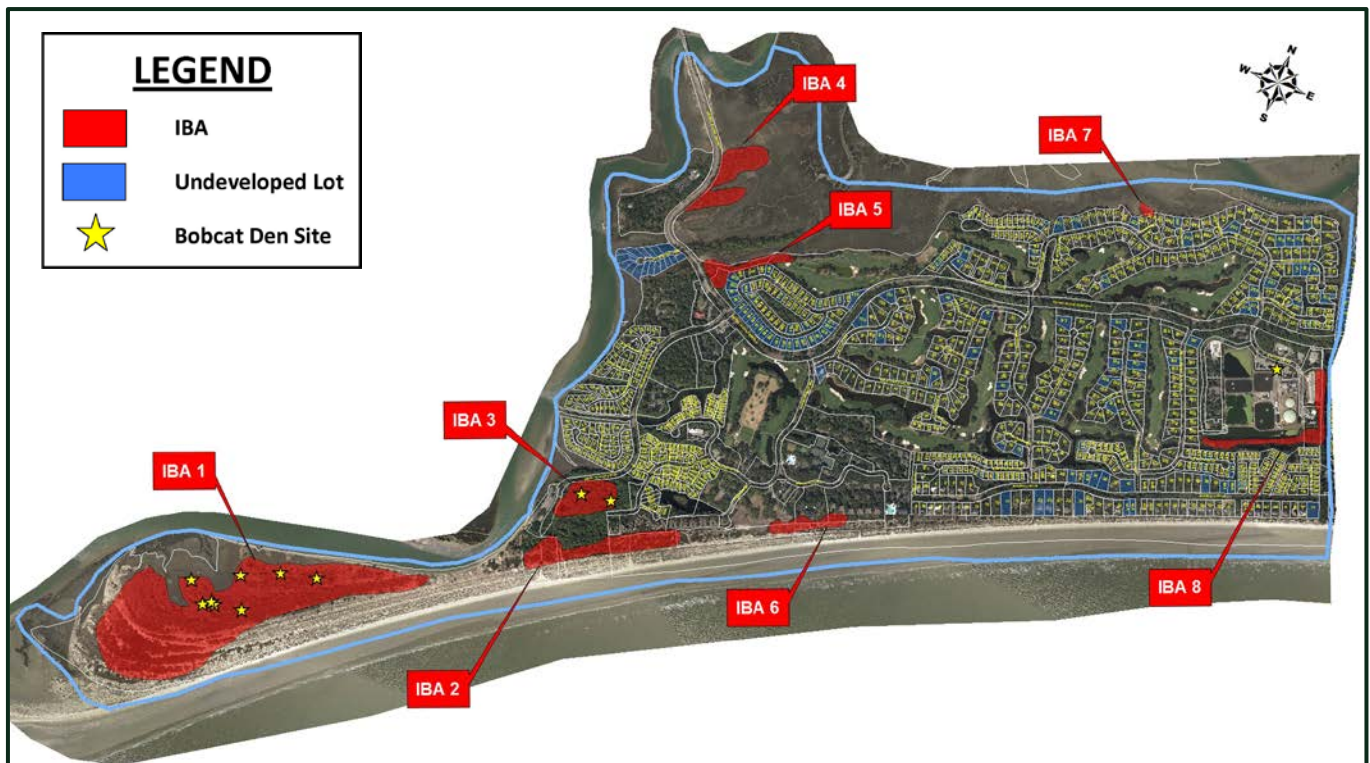


Figure 4. Map of BMU 1 showing the location of 8 Important Bobcat Areas.

Detailed IBA Maps and Descriptions for BMU 1 (Blue points indicate bobcat GPS locations)



IBA 1 – Captain Sam’s Spit (60.45 acres) – This area is composed of secondary and tertiary dunes consisting primarily of scrub/shrub type habitat. This is the most important IBA on the island and is a crucial area for bobcat denning, daytime resting cover, and hunting cover. This area is currently zoned as single family residential (R1).



IBA 2 – Beachwalker Dunes (8.54 acres) – This area is composed of secondary dunes, scrub/shrub, and a small amount of mature maritime forest. It is utilized frequently as daytime resting cover.

IBA 3 – Beachwalker Pine Interior (5.58 acres) – This area is composed of mature maritime forest, and has served as denning and daytime resting cover for multiple bobcats in the past 10 years.



IBA 4 – Parkway Hammocks (6.79 acres) – This area is composed of 2 small hammock islands consisting of marsh edge and scrub/shrub habitats. It is an important daytime resting area.

IBA 5 – Oyster Rake (3.46 acres) – This area is composed of marsh edge, forest, and scrub/shrub habitats. It is an important daytime resting area and is adjacent to several developed homesites.



IBA 6 – West Beach Dunes (2.98 acres) - This area is composed of secondary and tertiary dunes consisting of dense scrub/shrub habitat. It is adjacent to Shipwatch and Seascape Villas and includes a portion of the Old Kiawah Inn site. It is an important daytime resting area that has been used by both male and female bobcats over the last 3 years.



IBA 7 – 224/225 Sea Myrtle (0.44 acres) - This small area is composed of high marsh and marsh edge habitats and is located immediately behind 2 developed lots. This is one of only a handful of spots used by bobcats as daytime resting cover in close proximity to development within BMU 1.



IBA 8 – Kiawah Island Utility (4.90 acres) - This area is composed of forest, pond edge, open field, and scrub/shrub habitats. It has been used as a daytime resting area but it also serves as a very important travel corridor. It provides bobcats an easy travel route around the Kiawah Island Utility Compound.

Bobcat Management Unit 2 (BMU 2, Figure 5)

Description and General Issues

- BMU 2 encompasses the west-central portion of Kiawah Island, from Sora Rail Road east to Flyway Drive.
- 76% of single family residential lots are currently developed.
- Positive aspects of BMU 2 include: extensive secondary dunes, the marsh edge on the northern boundary, and the currently undeveloped areas west of the Sanctuary Hotel and adjacent to the Vanderhorst Plantation site.
- Negative aspects of BMU 2 include: the high density of golf course development, the high density of multi-unit and single family residential development, the high level of human activity, and the limited amount of interior daytime resting and denning cover. Two new developments, Cypress Pointe and Indigo Park, have recently been built in this BMU.

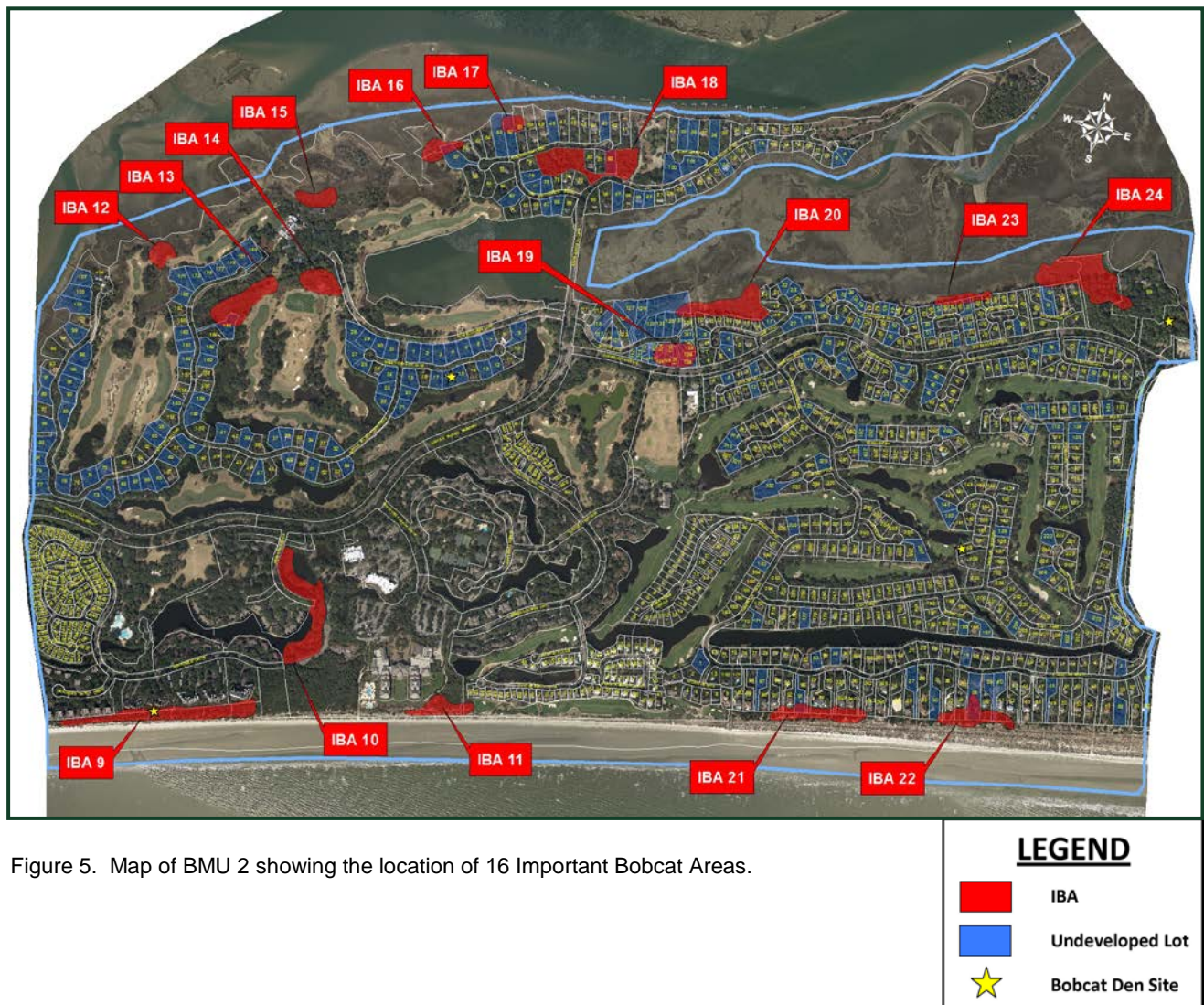


Figure 5. Map of BMU 2 showing the location of 16 Important Bobcat Areas.

Detailed IBA Maps and Descriptions for BMU 2 (Blue points indicate bobcat GPS locations)



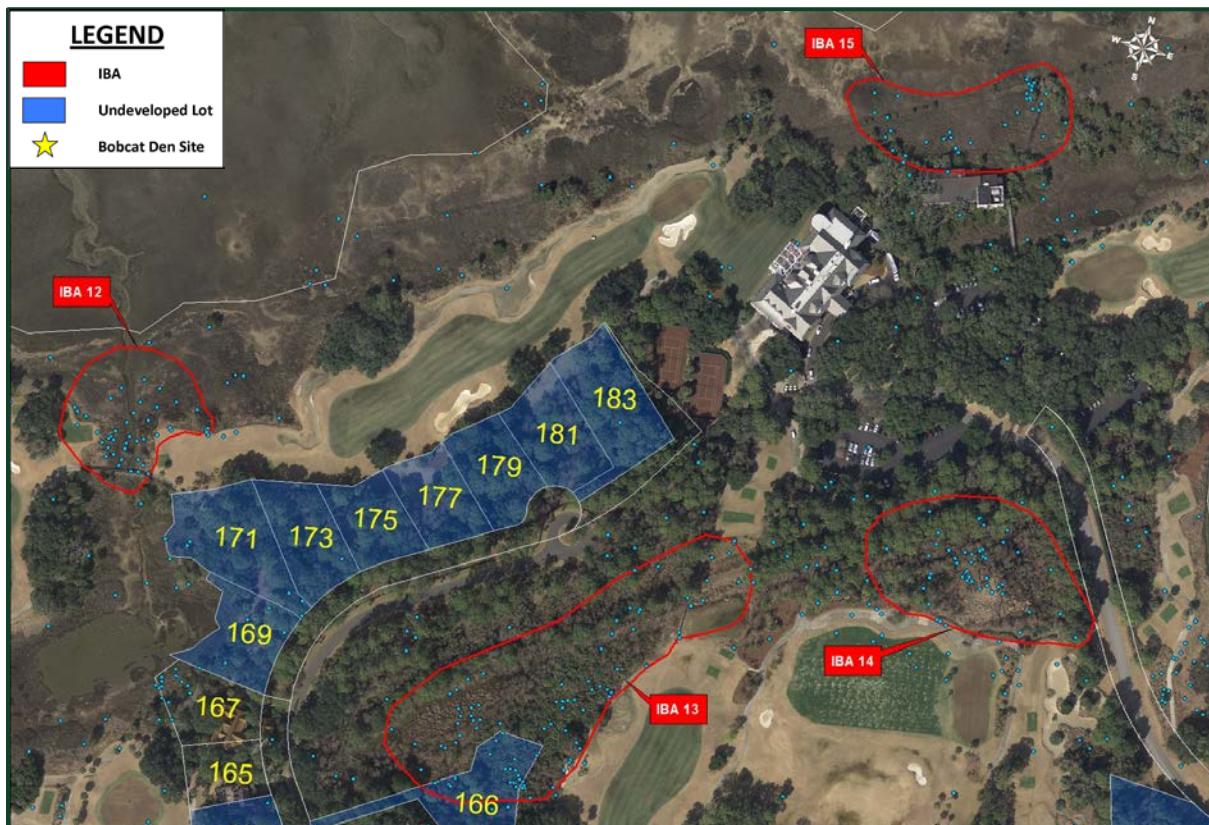
IBA 9 – Mariner’s Watch/Windswept Dunes (4.82 acres) – This area is composed of dense secondary dunes and is an important patch of daytime resting cover. It was also the site of Bobcat 700’s den in 2013.



IBA 10 – Sanctuary Wetlands (5.15 acres) – This area is composed of forest, freshwater marsh, pond edge, and scrub/shrub habitat. It has been very heavily utilized as daytime resting cover by many different bobcats over the last 3 years. It is currently protected from development as a wetland mitigation site and will remain undeveloped. Tallow Trees were controlled in this area in 2013.



IBA 11 – Sanctuary Dunes (1.76 acres) – This area is adjacent to the Sanctuary Hotel in the secondary dunes. It is composed mainly of salt-pruned wax myrtle, yaupon holly, and live oaks. It is an important daytime resting area.



IBA 12 – River Course West Marsh (1.08 acres) – This area is composed mainly of high marsh and marsh edge habitats. It is an important daytime resting area.

IBA 13 – River Course Wetland West (3.33 acres) – This area is composed of scrub-shrub, forest, and interior marsh. It is an important daytime resting area. Tallow Trees were treated and killed in this area in 2013 but Common Reed (*Phragmites australis*) is an emerging threat that needs to be addressed.

IBA 14 – River Course Wetland East (1.88 acres) – This area is composed of scrub-shrub and interior marsh. It is an important daytime resting area. Tallow Trees were treated and killed in this IBA in 2013 which should help improve this area's habitat.

IBA 15 – River Course Clubhouse Marsh (1.32 acres) – This area is composed primarily of high marsh and marsh edge. There are scattered scrub-shrub patches on higher ground. It is an important daytime resting area.



IBA 16 – 56/57 River Marsh (1.33 acres) – This area is composed of high marsh, marsh edge and scrub/shrub habitats and is an important daytime resting area.

IBA 17 – 51/52/53 River Marsh (0.75 acres) – This area is composed of high marsh, marsh edge and scrub/shrub habitats and is an important daytime resting area. It is within a developed lot with a dock and 2 currently undeveloped lots.

IBA 18 – Rhett's Bluff Wetland (4.72 acres) – This area is composed of freshwater marsh, scrub/shrub, and forest habitats. It has been utilized as daytime resting cover and a 2013 Tallow Tree treatment program should provide an increase in scrub/shrub habitat. A female and kittens have been observed in this area several times, suggesting that there has been a den site in the area.



IBA 19 – Indigo Park (1.96 acres) – This area is composed of a small opening and forest with dense understory vegetation. It is an important daytime resting area and was also heavily utilized by female Bobcat 700 and her kitten during 2013. Even numbered lots 112 - 140 Halona Lane are considered "conservation lots" by Kiawah Island Real Estate and are being sold with deed restrictions that limit development. This IBA should remain in its current state with the potential for habitat renovation in disturbed areas.

IBA 20 – Airy Hall Marsh (3.81 acres) – This area is composed of high marsh, marsh edge and scrub/shrub habitats. It is an important daytime resting and nighttime hunting area. It is adjacent to the Indigo Park development which is currently being cleared for building.



IBA 21 – Clay Hall/Dungannon Marsh (1.09 acres) – This narrow area is composed primarily of high marsh and marsh edge habitats adjacent to several developed homesites. It is an important daytime resting area and nighttime hunting corridor.

IBA 22 – Vanderhorst Plantation Marsh (5.98 acres) – This area is composed of high marsh, marsh edge, forest, and scrub/shrub habitats. It is an important daytime resting area. It includes a portion of the larger Vanderhorst tract, which has been used as a den site.



IBA 23 – West Surfsong Dunes (2.64 acres) – This area is composed of secondary dunes and patchy scrub/shrub habitat.

IBA 24 – East Surfsong Dunes (2.60 acres) – This area is composed of secondary dunes and patchy scrub/shrub habitat.

These 2 sites are part of the extensive secondary dune system that runs the length of Surfsong Road. They are heavily used as daytime resting cover by multiple bobcats. The biggest potential threat to these areas is manipulation or pruning of the vegetation located on privately owned lots or on Kiawah Island Community Association (KICA) property.

Bobcat Management Unit 3 (BMU 3, Figure 6)

Description and General Issues

- BMU 3 encompasses the central portion of Kiawah Island, from Flyway Drive east to the start of the Preserve/Falcon Point areas.
- 76% of single family residential lots are currently developed
- Positive aspects of BMU 3 include: the expansive secondary dunes, the marsh edge along the northern boundary, the absence of multi-unit development, and Marsh Island Park.
- Negative aspects of BMU 3 include: the lack of large protected interior areas, the relatively high single family residential development density, and the extensive golf course areas.

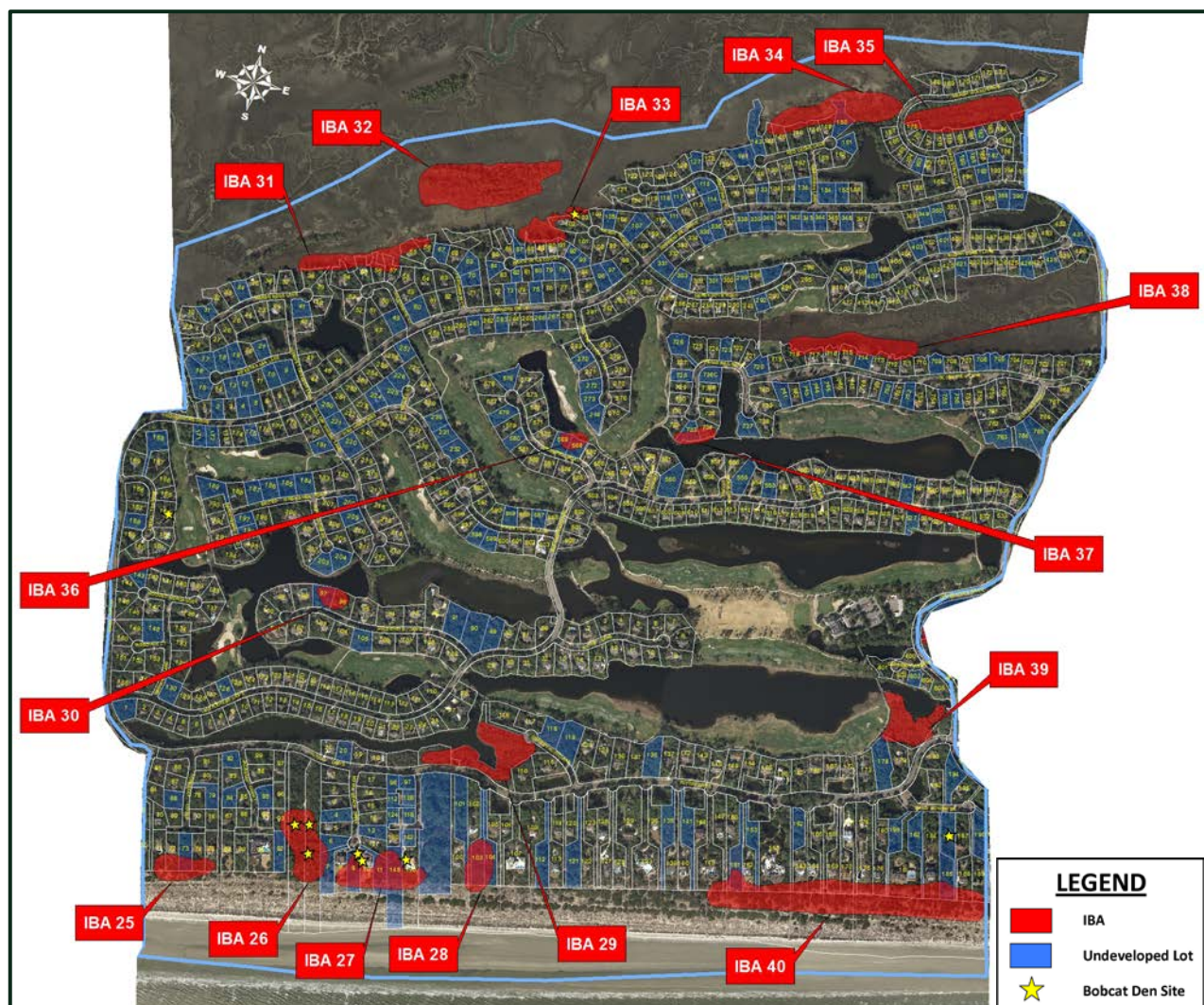


Figure 6. Map of BMU 3 showing the location of 16 Important Bobcat Areas.

Detailed IBA Maps and Descriptions for BMU 3 (Blue points indicate bobcat GPS locations)

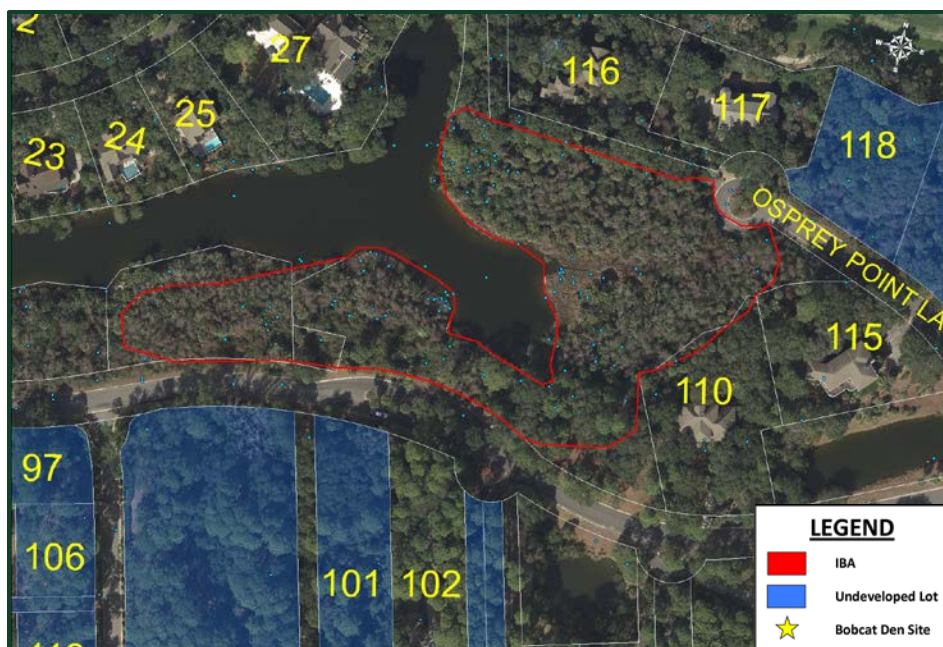


IBA 25 – 71-75 Forestay Court (1.69 acres) – This area is composed of secondary dunes and patchy scrub-shrub habitat. It is an important daytime resting area.

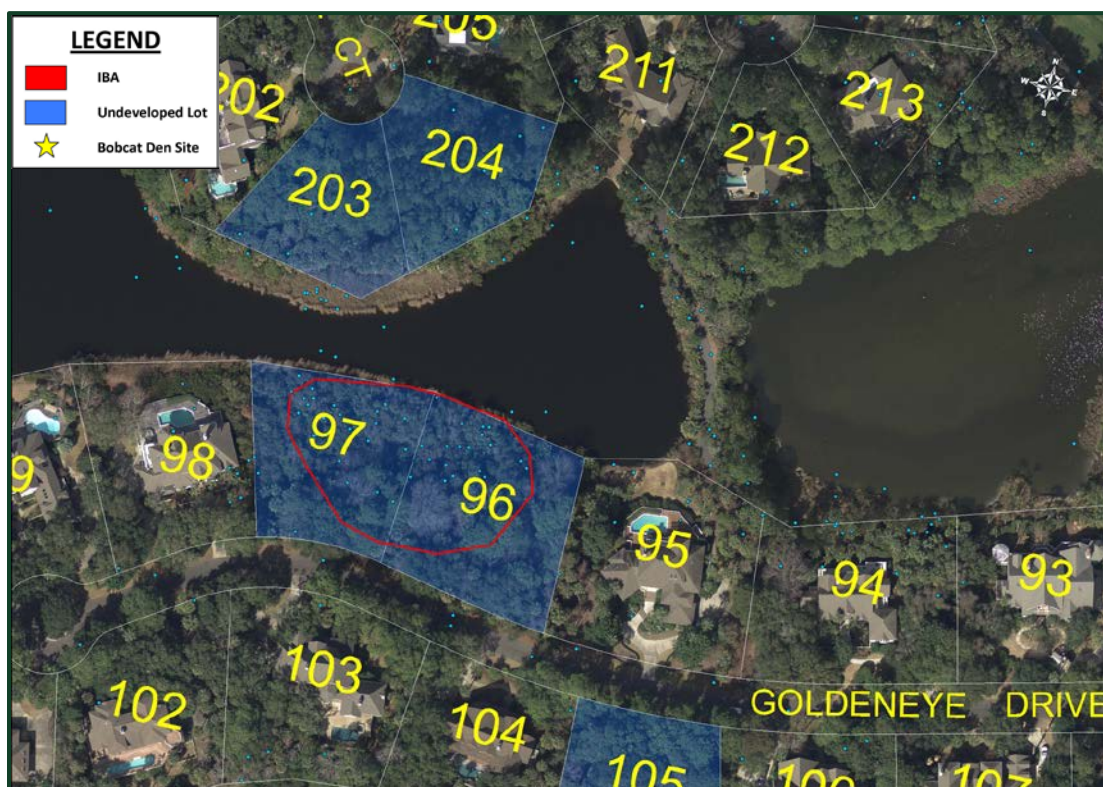
IBA 26 – Royal Beach West (3.23 acres) – This area is composed of maritime forest, scrub/shrub, and secondary dunes. There have been 3 primary den sites in this area (2004, 2007, 2010). This important parcel will likely be developed.

IBA 27 – Royal Beach East (3.07 acres) – This area is composed of patchy forest, scrub-shrub, and secondary dunes. There have been 3 primary den sites in this area (1 in 2004, 2 in 2005). In addition, this IBA was used extensively by Female 220 during 2010 as a 2nd and 3rd den site location. This entire IBA is on R1 zoned lots and 3 of the 6 lots are currently developed.

IBA 28 – 100-104 Flyway (1.69 acres) – This area is composed of forest, scrub-shrub, and secondary dunes. It is an important daytime resting area for several bobcats. Most of this IBA is on R1 lots and will likely be developed.



IBA 29 – Osprey Point Lane (3.85 acres) – This area is composed of pond edge, marsh, an open field, and maritime forest. It has been used for daytime resting cover and is also a very important bobcat travel and hunting corridor. Tallow Trees were treated and killed in this IBA in 2013 which should help improve this area's habitat.



IBA 30 – 96-97 Goldeneye (0.72 acres) – This area is composed of forest and pond edge. It is an important daytime resting area and has been used by at least 3 different bobcats in the last 3 years.



IBA 31 – Goldenrod/Persimmon Marsh (2.79 acres) – This area is composed of high marsh, marsh edge and scrub/shrub habitats. It is an important daytime resting cover area. This entire IBA is bordered by developed lots.

IBA 32 – Marsh Island Park (7.01 acres) – This area is composed of marsh edge and scrub/shrub habitats. It is an important daytime resting area and nighttime hunting area. This area is a designated park and is not likely to be developed.

IBA 33 – Marsh Elder/Wax Myrtle marsh (1.69 acres) – This area is composed primarily of high marsh and marsh edge habitats adjacent to developed homesites. It is an important daytime resting area and was also the site of Bobcat 350's den in 2012. The den site was located in a dense patch of palmettos within the property boundary of 103 Marsh Elder.



IBA 34 – Red Cedar Lane Marsh (4.61 acres) – This area is composed of high marsh, marsh edge, and patchy scrub-shrub hammocks. It is an important daytime resting area and was used by a female for denning during 2010, although the specific den site was never found.

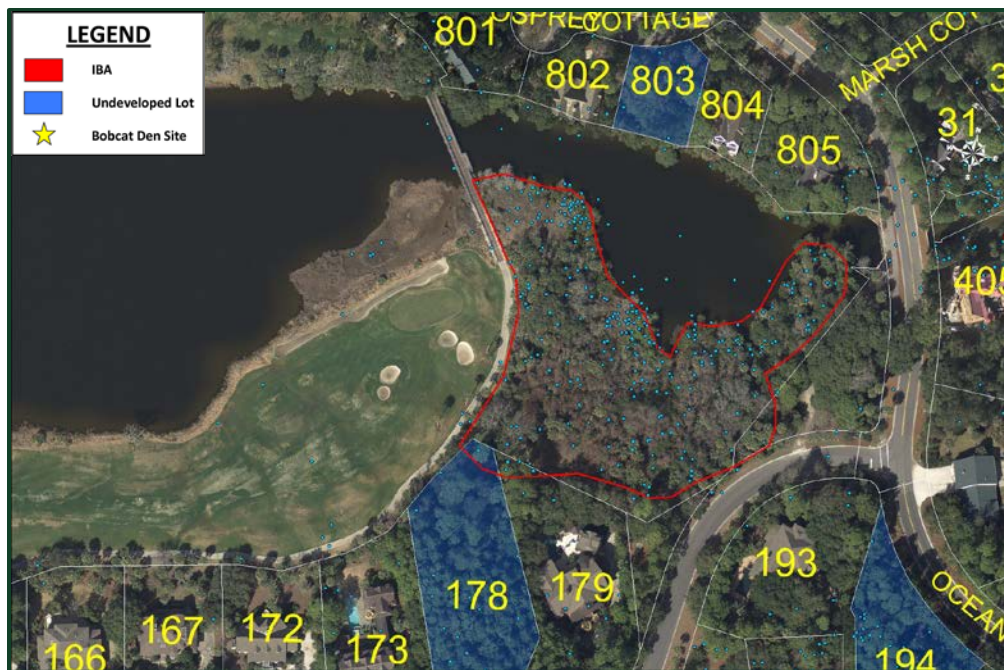
IBA 35 - Marsh Island Drive (3.93 acres) – This area is composed of high marsh, marsh edge and scrub/shrub habitats. It is a very important daytime resting cover location. In addition, it was likely a secondary den site location during 2008, although we were unable to physically locate a den.



IBA 36 – 568/569 Whimbrell (0.54 acres) – This area is composed of forest and pond edge. It is an important daytime resting area and is surrounded on either side by developed lots.

IBA 37 – 733-734 Virginia Rail (0.72 acres) – This area is composed mainly of forest and pond edge. Despite the fact that it is between 2 developed lots, it is an important daytime resting area.

IBA 38 – Glossy Ibis Marsh (3.19 acres) – This area is composed of high marsh, marsh edge, and scrub-shrub habitats. It is very heavily used as a daytime resting area by several bobcats. Most locations are within a narrow band of black needlerush at the edge of the uplands. The land within most of this IBA is owned by Osprey Point Golf Course and is not likely to be developed. Most of the lots adjacent to this IBA are developed.



IBA 39 – Canvasback Pond (2.44 acres) – This area is composed of forest and pond edge with a dense understory. It is heavily used as a daytime resting area by several bobcats. This IBA is adjacent to the KICA Canvasback Pond Fishing Dock and most of the land is owned by Osprey Point Golf Course.



IBA 40 – East Flyway Dunes (11.71 acres) – This area is composed of secondary dunes and patchy scrub/shrub habitat. It is part of the extensive secondary dune system that runs the length of Flyway Drive. It is very heavily used as daytime resting cover by a number of different bobcats. The biggest potential threat to this area is manipulation or pruning of the vegetation located on privately owned lots or on Kiawah Island Community Association (KICA) property.

Bobcat Management Unit 4 (BMU 4, Figure 7)

Description and General Issues

- BMU 4 encompasses the eastern central portion of Kiawah Island, including the Preserve, Falcon Point, and Ocean Course Drive east to Bass Creek Lane.
- 63% of single family residential lots are currently developed.
- Positive aspects of BMU 4 include: an abundance of marsh edge cover, the extensive secondary dunes, the generally larger lot sizes, larger buffer strips, the current abundance of undeveloped property, and the relatively low level of human activity.
- Negative aspects of BMU 4 include: the future loss of large amounts of interior habitat patches to development and the relatively small amount of upland area compared to other BMU's.

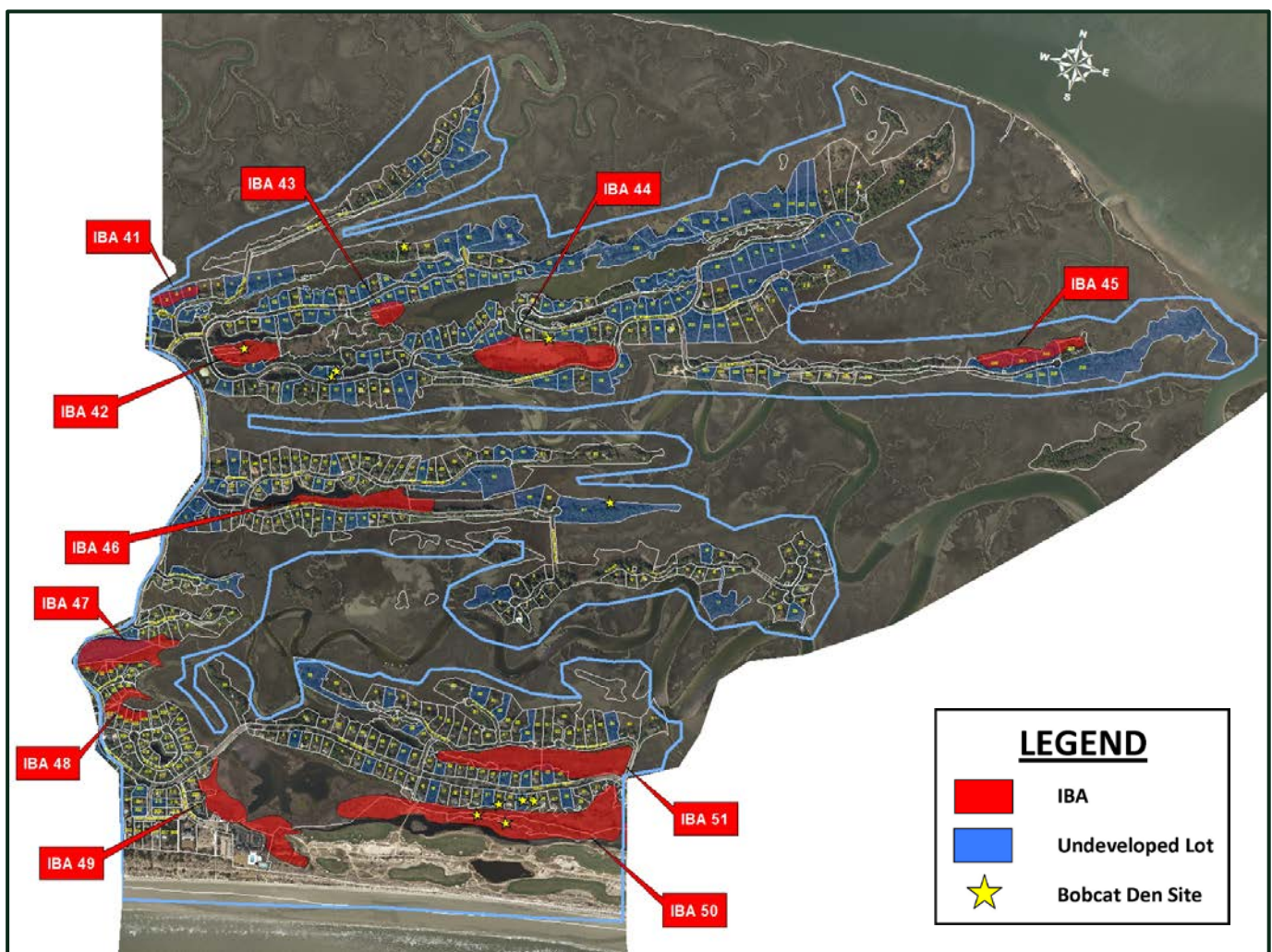


Figure 7. Map of BMU 4 showing the location of 11 Important Bobcat Areas.

Detailed IBA Maps and Descriptions for BMU 4 (Blue points indicate bobcat GPS locations)



IBA 41 – Oyster Shell Road (1.47 acres) – This area is composed of forest, scrub-shrub, and marsh edge habitats. It is an important daytime resting area. This entire IBA is platted and will likely be developed in the future.

IBA 42 – Preserve 1 (3.60 acres) – This area is composed of forest, scrub/shrub, marsh, and marsh edge habitats. Bobcat 190 located her den within this IBA during 2010. It has also been used by several other bobcats for daytime cover. This IBA is currently undeveloped and will likely remain that way.

IBA 43 – Preserve 2 (1.82 acres) - This area is composed of forest, scrub/shrub, marsh edge and high marsh. It is an important daytime resting area. This IBA was also used by Bobcat 190 during 2010 as a secondary den site and kitten rearing area.



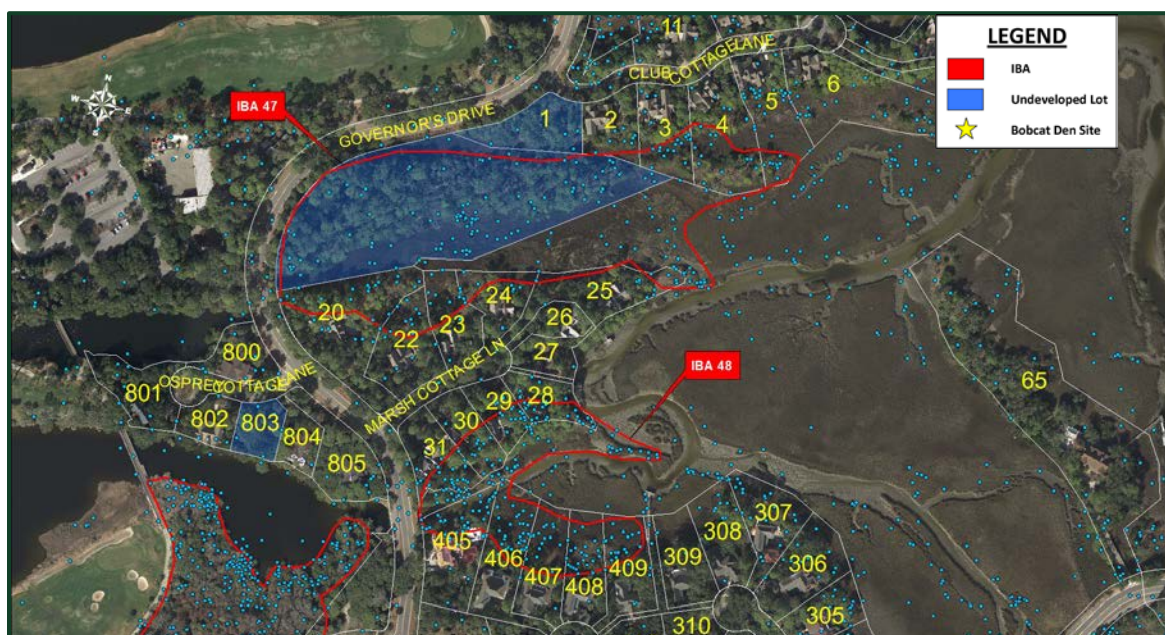
IBA 44 – Bull Thistle (10.34 acres) – This area is composed of forest, marsh, marsh edge, and scrub/shrub habitats. It is an important daytime resting area. Tallow trees were controlled in this IBA in 2013 which should improve habitat quality.



IBA 45 – Eagle Point (4.21 acres) – This area is composed of forest, scrub/shrub, high marsh, and marsh edge habitats. Most of this IBA is located on 4 platted lots, one of which is currently developed. It is an important daytime resting area and was also used by Female 248 during 2007 when her kittens were 6-8 weeks old.

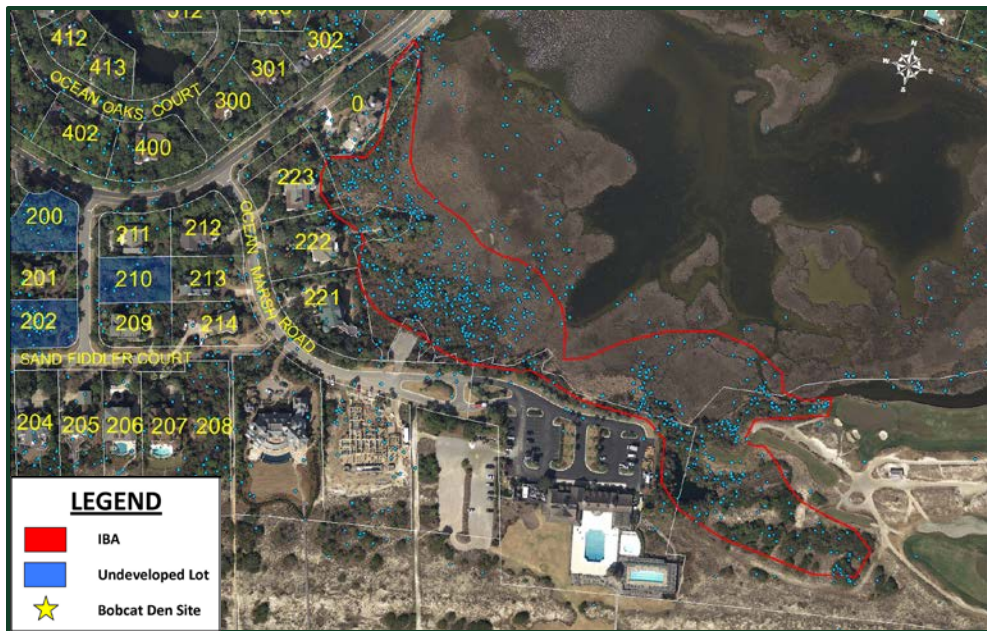


IBA 46 – Falcon Point Marsh (5.05 acres) - This area is composed of scrub/shrub and marsh edge habitat. It is an important daytime resting area. This IBA is protected under a conservation easement by the Kiawah Conservancy.



IBA 47 – Club Cottage (6.78 acres) - This area is composed of forest, scrub/shrub, marsh edge, and marsh adjacent to a number of developed home sites. It also includes a 3.7 acre undeveloped lot zoned R1. It is an important daytime resting area.

IBA 48 – Marsh Cottage (2.35 acres) - This area is composed of forest, scrub/shrub, marsh edge, and marsh adjacent to a number of developed home sites. It is an important daytime resting area.



IBA 49 – Ocean Marsh (7.86 acres) - This area is composed of scrub/shrub, marsh edge, and high marsh adjacent to Ibis Pond. This is a very important daytime resting area.



IBA 50 – Ocean Course 1 (19.61 acres) - This area is composed of forest, scrub/shrub, high marsh, marsh edge, and pond edge habitats. This is a very important daytime resting and denning area. It was used as a den site during 2010 and 2012. In addition, there have been 3 additional den sites (1 each in 2000-2002) on adjacent lots, all of which were undeveloped at the time. This area has been heavily pruned in the past to maintain ocean views and this should be minimized in the future if possible. Tallow trees are rapidly increasing in this area and need to be controlled.

IBA 51 – Ocean Course 2 (11.92 acres) - This area is composed of scrub/shrub, high marsh, and marsh edge habitats. It is an important daytime resting area. Tallow Trees were treated and killed in this IBA in 2013, which should help improve the area's habitat. The western half of this IBA is protected under a conservation easement with the Kiawah Conservancy.

Bobcat Management Unit 5 (BMU 5, Figure 8)

Description and General Issues

- BMU 5 encompasses the eastern portion of Kiawah Island, from Bass Creek Lane east to the end of the island, including both Cougar and Little Bear Islands.
- 14% of single family residential lots are currently developed.
- Half of Cougar Island (Ocean Park) has yet to be platted; this will change the dynamics of this BMU greatly.
- Positive aspects of BMU 5 include: very low development density, abundance of marsh edge throughout, large areas of currently undeveloped land, Little Bear Island (conservation easement), secondary dunes, very low level of human activity, and current lack of substantial vehicular traffic.
- Negative aspects of BMU 5 include: golf course areas and the ongoing development of Ocean Park on Cougar Island. A substantial portion of Cougar Island has been cleared for development in the last year.

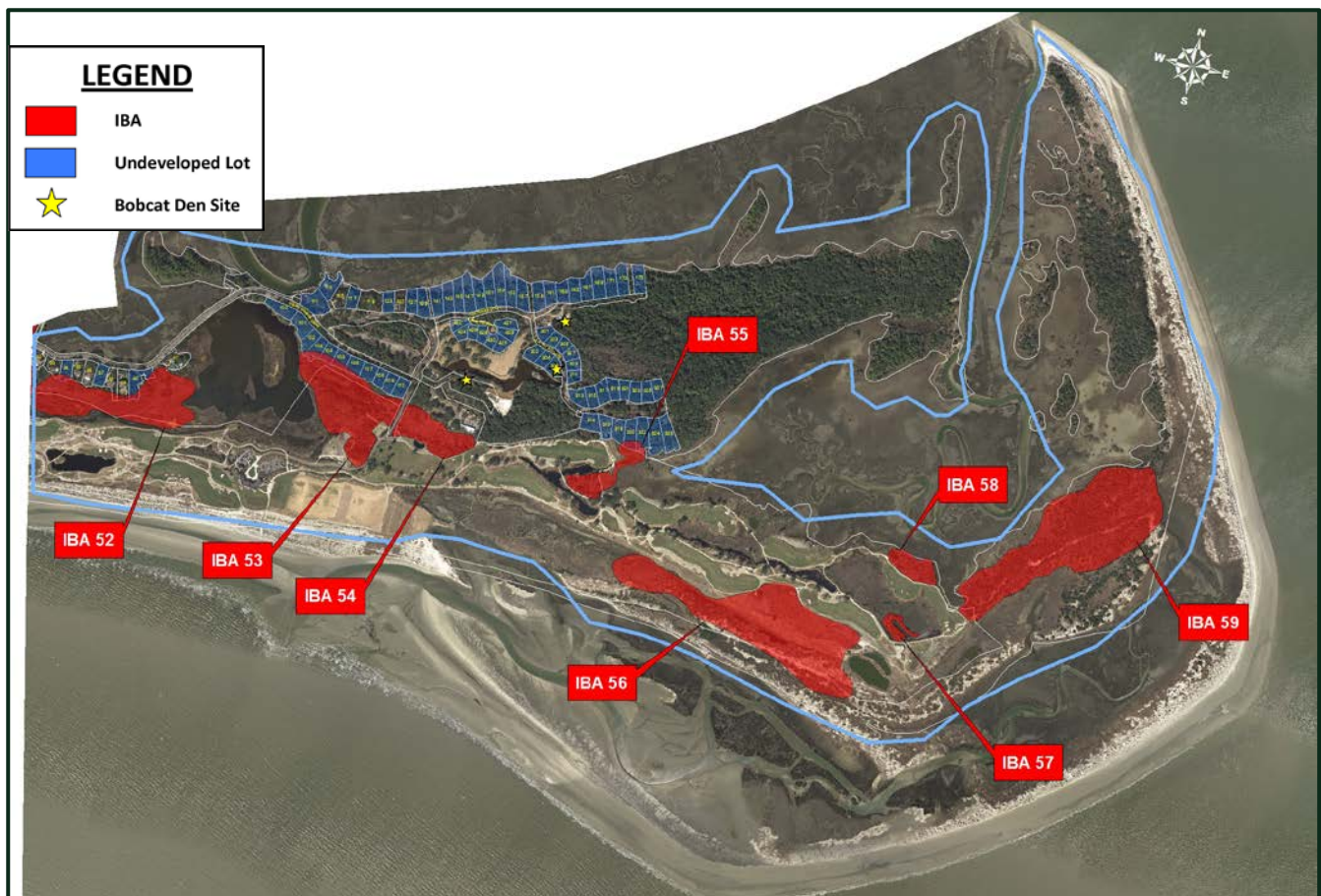


Figure 8. Map of BMU 5 showing the location of 8 Important Bobcat Areas.

Detailed IBA Maps and Descriptions for BMU 5 (Blue points indicate bobcat GPS locations)



IBA 52 – Ocean Course 3 (13.88 acres) – This area is composed of forest, scrub/shrub, high marsh, marsh edge, and pond edge habitats. This is a very important daytime resting area. Tallow trees are rapidly increasing in this area and need to be controlled.



IBA 53 – Willet Island (13.75 acres) – This area is composed of forest, scrub/shrub, marsh, and marsh edge habitats. It is an important daytime resting and nighttime hunting area. This area will likely be developed by the Kiawah Island Golf Resort in the future.

IBA 54 – Ocean Course Maintenance (5.31 acres) - This area is composed mainly of scrub/shrub, marsh, and marsh edge habitats. This is an important daytime resting area. Tallow Trees were treated and killed in this IBA in 2013, which should help improve the area's habitat.



IBA 55 – Ocean Course Hole 2 (3.66 acres) - This area is composed of forest, marsh, marsh edge, pond edge, and scrub/shrub habitats. It is an important daytime resting area and is likely to remain undeveloped as part of the already established Ocean Course Golf Course.



IBA 56 – Ocean Course Golf 1 (28.12 acres) - This area is composed of marsh, marsh edge and scrub/shrub habitats. It is an important daytime resting area and likely to remain undeveloped. This area is routinely disturbed and pruned to maintain ocean views from the golf course. Future pruning should be conducted in sections to increase habitat diversity. Tallow trees were treated and killed in this IBA in 2013, which should improve habitat quality.

IBA 57 – Ocean Course Golf 2 (1.09 acres) – This area is composed of marsh, marsh edge, pond edge, and scrub/shrub habitats. It is an isolated area surrounded by wetlands and an important daytime resting area.

IBA 58 – Ocean Course Golf 3 (2.47 acres) – This area is composed of marsh, marsh edge, and patchy scrub/shrub habitats. It is adjacent to Ocean Course Hole 4 and is surrounded by wetlands. It is an important daytime resting area.



IBA 59 – Little Bear Island (31.16 acres) – This area is composed of marsh, marsh edge, secondary dunes, and scrub/shrub habitats. This large undeveloped area is an important daytime resting and nighttime hunting area. It will become even more important as Cougar Island is developed. This property has been placed into a conservation easement with the Kiawah Conservancy and is protected from future development.

Summary and Conclusions

Land Preservation

In order to maintain current bobcat population levels, research suggests that Kiawah Island bobcats need multiple (4-6) scattered patches of daytime resting cover located within their home range boundaries. Ideally, these patches are 1-3 acres in size, relatively free of human intrusion, and consist of thick scrub/shrub habitat or high marsh. Additionally, and more importantly, these areas will also provide vital denning sites for female bobcats.

Habitat Management

Bobcat research on Kiawah Island has clearly shown the importance of densely vegetated understory habitat in areas such as: lot buffers, golf course edges, marsh and pond edges, and road corridors. These areas allow bobcats to move securely and hunt effectively throughout the fragmented developed areas of Kiawah Island. They also provide great cover for prey species such as white-tailed deer and rodents. The Kiawah Conservancy's Habitat Improvement Program (www.kiawahconservancy.org) is one way in which these important habitat areas are currently being promoted and improved. As development continues on Kiawah, these small, often linear patches of habitat will be crucial to the preservation of bobcats on the island.

In the future, the importance of active habitat manipulation and management should not be overlooked. Efforts to increase the amount of scrub/shrub habitat available on the island will have a beneficial impact on bobcats and many other species. One way to do this is to actively manage properties to promote native understory species. Many areas on the island could benefit from the removal of invasive plants, such as tallow tree, or the thinning of overstory species, both of which would promote the growth of native grasses and shrubs. Small efforts in this area could greatly increase the bobcat habitat suitability of individual parcels. In addition, dense native understory also provides valuable habitat for many other island species, including the painted bunting.

Current and future habitat improvement projects, partnered with the preservation of larger parcels (1-3 acres) of daytime cover, tied together with vegetated travel corridors will likely provide the elements necessary for bobcats to continue to live and reproduce on Kiawah Island as we approach island-wide build out.

Influencing Future Development

Although most of Kiawah Island has already been platted for development, two large tracts of land remain unplatted, Captain Sam's Spit and the eastern portion of Cougar Island. Bobcat location data confirms that these 2 areas are very heavily used by bobcats for denning, daytime resting, and nighttime hunting areas. Even within large tracts of land such as these, bobcats show a definite preference for certain portions of each area. It is important to continue to monitor bobcat use of these areas, identify the specific areas most used by bobcats, and to work closely with Kiawah Partners (KP) to influence future development plans in these areas.

Support for Research

The Town of Kiawah Island has actively supported and funded wildlife research on the island since 1997 in order to better understand the island's native species. In 2004, the Kiawah Conservancy first partnered with the Town on the Predator-Prey Project. Since that time, the Conservancy has been a strong supporter of each successive research project. Future studies would benefit from the support of other island entities, including the Kiawah Island Community Association, Kiawah Island Golf Resort, and Kiawah Partners. The involvement of other island entities will aid in designing future studies that address specific issues and areas of concern. It will also reinforce the concept that Kiawah Island is truly dedicated to maintaining and preserving the island's unique ecosystem.

Bobcat Research Summary

Deer Ecology Study (1997-1998) – University of Georgia Master's Thesis by James D. Jordan

The bobcat population of the island was estimated using scent station surveys and seasonal bobcat food habits were determined from scat samples.

Bobcat Ecology Study (2000-2001) – University of Georgia Master's Thesis by J.C. Griffin

Scent station surveys and food habit analyses were conducted following protocol from the Deer Ecology Study. Fourteen bobcats were fitted with VHF radio-collars and their movements were tracked for approximately 1 year. Data gathered from this project provided useful information on bobcat habitat use, reproductive success, home range size, food habits, and response to development.

Predator-Prey Ecology Study (2004-2005) – University of Georgia Dissertation by Shane B. Roberts

Researchers fitted 16 bobcats with VHF radio-collars and replicated the home range and habitat work conducted during the 2000 Bobcat Ecology Study. Data collected indicated that bobcats are continuing to adapt very well to residential and resort development. The study also clearly documented that bobcat predation of deer fawns was the primary factor in controlling deer numbers on Kiawah Island.

Bobcat GPS Study (2007-2014) – Town of Kiawah Island by James D. Jordan

The Town of Kiawah Island, in partnership with the Kiawah Conservancy, began this project in early 2007. Five bobcats were fitted with GPS collars to investigate the effectiveness of these collars in tracking very fine-scale movements of bobcats. The collars performed very well and large amount of useful location data was collected.

Based on the successful results of the pilot year of this study, it was continued in 2008 and is still ongoing. Biologists collared 8 bobcats in 2008, 10 in 2009, 6 in 2010, 8 in 2011, 9 in 2012, 6 in 2013, and 6 in 2014 (58 bobcats total). Data from this study allows biologists to determine much more detailed habitat use data and to identify habitat areas that are of critical importance to bobcats.

Future Research

With each successive bobcat study, techniques and technology have consistently improved and have allowed us to better understand the requirements of Kiawah Island's unique bobcat population. Continuous monitoring is now more than ever, vital to understanding current bobcat population dynamics and habitat usage as we move toward build out. Key research activities for the future include:

- Continue to monitor and identify important daytime resting and denning areas
- Determine female bobcat denning and movement patterns and the habitat requirements necessary for successful rearing of young
- Continue to look at changing bobcat behavior patterns in response to development
- Determine and compare survival rates of bobcat kittens from all portions of the island
- Monitor juvenile bobcat dispersal and survival rates
- Monitor adult bobcat survival rates
- Monitor current bobcat use of large undeveloped tracts of land

Supporting Data

This document was prepared by Jim Jordan, Town of Kiawah Island Wildlife Biologist, using bobcat location data collected solely on Kiawah Island. BMU boundaries were set based on historic bobcat home range data from the 2000 Bobcat Ecology Study, the 2004 Predator-Prey Study, and the 2007-2013 Bobcat GPS studies. IBA's were identified primarily using location data from 16 unique bobcats captured and fitted with GPS collars during 2011-2013. Two of these 16 bobcats were recaptured and monitored all 3 years of the study period. Two other bobcats were monitored 2 out of the 3 years. There were 23,367 individual bobcat locations within the boundaries of Kiawah Island collected during this 3 year period. All of these points were used in the IBA analysis.

This document will be updated periodically to incorporate new data and refine important habitat areas. Additional information on all of the studies mentioned above is available on the Town's Wildlife Website, www.wildlifeatkiawah.com and at Town Hall, 21 Beachwalker Drive, Kiawah Island, SC, 29455.