

November 16, 2012

Report: Little Bay Birds

To: Keith Barrett, Aransas County Navigation District

Tom Staley, City of Rockport

From: John Huckabee and Claudia Dorn

The attached report presents the results of observations, monitoring and management aimed at protecting and enhancing the colonial nesting waterbirds and migratory waterfowl of Little Bay and the adjoining Park at Rockport Beach, Rockport Texas from 1999 to 2012. Local volunteers have been documenting the numbers and the nesting success of Park birds annually and reporting the results to City and County officials and to the Coastal Bend Bays and Estuaries Program in Corpus Christi and to the Texas Colonial Nesting Waterbird Society.

The City of Rockport and the Aransas County Navigation District have implemented management practices and conservation and protection measures based on these observations that have preserved and enhanced the avifauna, especially the nesting around Little Bay. The success of these efforts is clearly appreciated by Park and Bay visitors.

This report is a compilation of what we have learned about this avifauna and comments on its future. It consists of a summary followed by the text, acknowledgments and end notes with specific information. It was our intention to present this information in a semi-technical style; that is, accessible to non-specialists. There is brief discussion of some statistical analyses, and data tabulated in simplified technical format, but most of the text is conventional narrative. Non-quantitative observations and comments about disturbance are based on our field notes.

Summary

Little Bay Birds: Status and Conservation

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- This report describes the status of Black Skimmers; herons, egrets, and Roseate Spoonbills; migratory waterfowl; and Laughing Gulls and terns at Little Bay and Rockport Beach Park, Rockport, Texas, from 1999 to 2012.
- The Little Bay – Beach Park colonial nesting waterbird rookeries are among the most important in the Coastal Bend, producing as many as 2500 new birds per year. There are ten species of colonial nesters around Little Bay; at least 12 species of over-wintering waterfowl; and 26 other species of birds that are resident at Little Bay for part of their life cycle. There are many other species of migrants moving through the Little Bay system.
- At least half of the 22 or so species (varies from year to year) of colonial nesting waterbirds that nest along the Texas coast are declining. Eight of the 10 species of colonial waterbirds nesting around Little Bay are declining in Texas.
- Annual monitoring of the Little Bay Black Skimmer colony began in 1999. The Little Bay colony is one of several constituting the Coastal Bend Black Skimmer population.
- The number of nesting pairs of Black Skimmers (average 103/yr.) and the number of fledglings produced (average 46/yr.) by the Little Bay colony has changed very little since 2001, but there is great year to year variability.
- The Little Bay Black Skimmer colony is currently stable, but it may be under-producing in respect to the rest of the Coastal Bend skimmer population.

- Threats to Black Skimmer productivity include weed growth in the nesting site, predation, road kill when chicks wander into the Park road and disturbance by Bay and Park visitors.
- Weed growth in the nesting site reduced skimmer nesting success but increased Laughing Gull nesting success and therefore gull predation, which resulted in low productivity in seven seasons since 1999.
- Raccoon predation was implicated along with gulls one season of low productivity since 1999.
- Road kill is estimated to be less important than weed growth and Laughing Gull predation to low Black Skimmer productivity, but closing the Park road near the nesting site when chicks are vulnerable could improve productivity.
- A vandalism event in 2010 destroyed 20% of the Black Skimmer chicks. A barrier had been emplaced to block car traffic on the road near the nesting site, but it was breached and at least 37 young Black Skimmers were killed. Nevertheless, the production was sufficient in 2010 to absorb this loss. 120 fledglings survived, making 2010 the best year since 1999.
- Frightening nesting birds off their nests exposes eggs and chicks to Laughing Gull predation, as well as over-heating by the sun. The frequency of such events observed in the Park suggests that disturbing nesting birds is a significant cause of egg and chick mortality.
- Annual monitoring of the herons, egrets, and Roseate Spoonbills nesting around Little Bay began in 2007. Heron, egret, and spoonbill nesting sites include the Little Bay cove, the Little Bay north island, and the pine-oak heronry on the north-west shore.
- The data for cove and island herons and egrets are insufficient to establish population trends partly because of losses by two dogs released on the island in 2008 and flooding of nesting sites by Hurricane Alex in 2010. Including these two events, the average number of nesting pairs of these

birds is 246/yr., and the average number of fledglings is 630/yr. These numbers are low and represent a minimum count.

- Nesting birds were harassed by boaters in the cove until a float line barrier was emplaced in 2008. Nesting birds on the island appear undisturbed by power boats operating at high speed. Kayaks operating too close to the shore of both cove and island are disruptive of nesting.
- Tricolored Herons nesting around Little Bay are probably not declining, averaging 500 fledglings per year. Reddish Egret and Roseate Spoonbill nesting is too erratic to estimate a trend at this time.
- The numbers of the other heron and egret nesters around the cove and on the island are too small to indicate a trend at this time. Data for the heronry in the pine-oak grove immediately north-west of Little Bay are sufficient only to show total number of nests, which is increasing annually; however most of the pine trees died and were removed in late 2012.
- Laughing Gulls are serious egg and chick predators of other birds. There were 5000 adults in the nesting area in April 2012. An average of 1275 fledglings is produced annually.
- Terns nest very infrequently around Little Bay; Royal Terns produced 18 fledglings in 2011.
- Regional factors are more important than local factors in determining the occurrence of migratory waterfowl on Little Bay. The relationship between seagrass and waterfowl use of Little Bay is not clear, and there are no water quality issues causing a detectable effect on waterfowl use of Little Bay.
- Protecting and maintaining the Little Bay avifauna will require continued monitoring, road closure and exclosures (fencing, float line) when necessary, emplacement of informational signs, and other public outreach to inform citizens of the conservation needs and requirements.

Little Bay Birds: Status and Conservation

November 16, 2012

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We have been studying and monitoring variously the colonial nesting waterbirds and migratory waterfowl of Little Bay since 1997 (formal studies began in 1999). The purpose of this report is to describe the status of these populations – are they going up, down, or staying the same - and the threats they face, based upon what we have learned.

Little Bay and the adjacent Rockport Beach are the site of what is by any measure a highly successful urban park. All year long Park visitors enjoy fishing, jet skiing, water skiing, tubing, kayaking, picnicking, wading, beach walking, sunning, kite flying, bird watching, and feeding the gulls.

Laughing Gulls are abundant in the Beach Park, perhaps in part because of visitor hand-outs. But this is bad news for other birds; Laughing Gulls are relentless predators of the eggs and young chicks of all but the largest species. More gulls mean less of almost everything else, especially if it nests on the ground in colonies.

And this is an issue because the Little Bay system is home to one of the most important colonial nesting waterbird rookeries in the Coastal Bend (see Table 1). There are at least 10 species of colonial nesters around Little Bay, at least 12 species of over-wintering migratory waterfowl, and there are at least 26 other species that spend all or part of their life-cycles here.

Waterbirds are of especial concern because of the 22 to 25 or so species nesting along the Texas coast, at least 12 are declining (Note 1). Only two of the 10 species nesting around Little Bay have stable populations on the Texas coast. Little Bay waterbird populations fall into four main natural groups, facilitating discussion: Black Skimmers; herons, egrets and spoonbills; gulls and terns; and

migratory waterfowl, which we will discuss in turn. Others, such as Mottled Ducks and Willets are present in small numbers. Many migrants pass through tarrying briefly, while a few remain a bit longer but experience little duress.

Table 1. Colonial Waterbirds Nesting around Little Bay and Status on Texas Coast (Note 1)

Great Blue Heron, <i>Ardea herodias</i>	Decreasing
Great Egret, <i>Ardea alba</i>	Decreasing
Snowy Egret, <i>Egretta thula</i>	Decreasing
Tricolored Heron, <i>Egretta tricolor</i>	Decreasing
Reddish Egret, <i>Egretta rufescens</i>	Decreasing
Black-crowned Night Heron, <i>Nycticorax nycticorax</i>	Decreasing
Roseate Spoonbill, <i>Platalea ajaja</i>	Decreasing
Laughing Gull, <i>Larus atricilla</i>	Increasing
Royal Tern, <i>Sterna maxima</i>	Increasing
Black Skimmer, <i>Ryncops niger</i>	Decreasing

Black Skimmers

The Black Skimmer colony in Rockport Beach Park has been active annually since 1997 when investigations began (skimmers did not nest in the Park in 2004 for reasons explained below). Nesting skimmers were also documented in the Park between 1975 and 1979, but nesting success was not reported (Note 2).

Laughing Gulls may be the most obvious and familiar birds to Park visitors, but Black Skimmers are surely the Park’s signature species. Skimmers are declining over their entire North American range which includes most of the Atlantic seaboard and the Gulf coast; there are a few colonies in southern California.

Skimmers can live for 20 years (the average is half that), and well established colonies can last for decades.

Skimmers are the only Park birds that appear mostly black when they are on the ground, and nest in closely spaced groups in sparse vegetation or clean sand. They are thus quite visible and obvious, and for whatever reasons, in the Park they nest in close proximity to the road. During the nesting season, cars stop all day long adjacent to the colony as visitors photograph and watch.

This may be one of the most accessible skimmer colonies anywhere, and the birds are thoroughly habituated to humans. But not too habituated: every day in season people stop 15 feet (plus or minus) from the nesting birds, but instead of photographing from the window, they open the door and get out. Which means, of course, no picture because no skimmers; they were scared away when the door opened. And this is where the gulls come in, but more about that a little later.

Black Skimmer Monitoring Program. Anecdotal reports of decline of the Park skimmer colony prompted investigation in 1997, and a formal monitoring program was initiated in 1999. We have collected information each year since, amassing more data on skimmers than on any of the other Little Bay bird populations. At least once a week during the nesting season we count the number of pairs of nesting skimmers, and count chicks and fledglings when they appear. Over the years we have made several public presentations and published a technical paper (Note 3) on the results of this monitoring.

Skimmers arrive on the nesting site and commence preparation of nesting “scrapes” (pits or depressions in which they deposit eggs) in mid to late April, usually produce eggs by about May 1, and chicks hatch about 21 days later. The chicks mature into fledglings in about four weeks, and leave the nesting site usually by about August 1. Many factors influence the exact timing of these milestones.

Table 2 shows the Black Skimmer nesting success expressed as the number of fledglings per nest (f/p) for 14 years, 1999 – 2012; as can be seen, there is great

Table 2. Black Skimmer Nesting Success in Rockport Beach Park, Rockport, Texas, 1999 – 2012. Fldg = fledglings; f/p = fledglings per nesting pair of adults.

	<u>Pairs</u>	<u>Fldg</u>	<u>f/p</u>
1999	0	0	0
2000	0	0	0
2001	216	108	.5
2002	102	82	.8
2003	160	16	.1
2004*	0	0	0
2005	77	50	.65
2006	80	16	.2
2007	90	90	1.0
2008	0	0	0
2009	88	53	.6
2010	220	120	.5
2011	180	35	.2
2012	130	21	.2
Average	103	46	.4

*No nesting attempt; skimmers were driven from the Park. 2004 is therefore not included in productivity calculations. See text under The Beach, p 10.

variability in the number of fledglings from year to year. The average f/p (calculated from the f/p column in Table 2) is 0.4, which may not be adequate to supply new birds to cover annual losses. Black Skimmer biologists, based on

cumulative experience, informally consider 0.5 f/p a bench mark for adequate Black Skimmer reproductive performance.

The nesting site problems experienced by the skimmers changed over time. Weed-caused site abandonment resulting in zero performance in 1999, 2000, and 2008 made precise statistical analysis complicated, but it was clear the colony would never flourish if such conditions prevailed. However, such conditions did not prevail, and weedless (or nearly so) conditions prevailed every year but 2008 since 2001.

A statistical technique called regression analysis of the non-weed years showed that the numbers of nesting pairs of Black Skimmers and numbers of fledglings produced were stable. In the absence of weeds, the colony was holding its own.

Any one colony is not the whole story. The Coastal Bend Black Skimmer population consists of several colonies; any season, one might do well and another poorly. It is the long-term average of all of them that matters. New birds do not remain in the natal colony, they disperse and join others. In-breeding is one of the worst things that can happen to an animal population, so evolution has long since provided adaptations to prevent it.

Theoretically, inadequate productivity of one colony can be made up for by another. But still, the Rockport colony experiences a range of threats and stresses that suppresses productivity, discussed below.

Weeds. Prior to 1997 it had been noted that the skimmers commenced nesting, produced eggs, and hatched chicks; then they abandoned the site, eggs, chicks and all. Why? Predators, road kill, disturbance, bad weather? None of the above: it was weeds. The skimmers had long since been driven off their preferred habitat, the beach, and selected a second-best site closer to Little Bay. However, that site supported upland-type vegetation; sunflowers, other large forbs and the like. Black Skimmers will not nest in thick vegetation they cannot see over, and skimmers aren't very tall.

Why were they there in the first place? They were tricked (that's what it amounted to). At that time, Park management practice had that particular site

mowed during the winter. Then when the skimmers showed up in April, they found very short vegetation, and commenced nesting. In years when it rained in April and May, the weeds began to grow. When the weeds got high enough, the skimmers departed, leaving eggs and chicks. This is what happened in 1999 and 2000.

It seemed the most reasonable solution was to control the vegetation; then we would have a successful colony. This was easier said than done, to say the least.

There then followed a several-year management experiment, 1998 through 2003, in which we attempted to control weed growth with substrate creation (crushed limestone), weed suppression with landscape fabric, and application of herbicides, mainly Roundup™. (There is a very large technical literature to which the reader is referred on Roundup™ use showing very few reports of harm to non-target organisms when Roundup™ is used according to directions on the label [Note 4]).

None of this worked for the simple reason that once the birds occupied the site, no further manipulation was possible. If it didn't rain, no weeds grew and they produced fledglings; if it did rain, weeds grew and they didn't. Not as many, anyway.

Not mowing and allowing weeds to grow all winter and spring would have in some years – when it rained - prevented the skimmers from choosing this site, but there was great concern that they might abandon the Park altogether, rather than choose a less over-grown spot. This fear was to be realized.

The Beach. The weed control experiment was terminated by another experiment: the creation of an artificial beach at Rockport Beach Park completed in early 2004. In the spring of '04 when the skimmers arrived for the nesting season, they chose the beach, which was in fact predicted. According to federal law, the birds had to be protected once the first egg appeared. That would mean closing off 200 yards of the clean new beach.

This the City government was reluctant to do, and there was an option. The birds could be hazed off the beach legally before egg-laying commenced. A plan was

developed with the U.S. Fish and Wildlife Service and implemented beginning in April '04. The plan, or the hope, was that the dissuaded skimmers would move to the old place or with luck another spot less weedy. But no, they left the Park; 2004 was another zero year. Since there was no nesting attempt, 2004 was not included in calculations of colony productivity.

Several days after the skimmers left the Park in 2004 a colony of Black Skimmers was discovered on a spoil island in Aransas Bay not far from Goose Island State Park. The numbers and the timing suggest this may have been the Rockport flock. At any rate, that colony was successful, producing many fledglings.

We were afraid it was over for Black Skimmers in Rockport, but in 2005 they returned to the Park, settling in an area in the center of the traffic circle in the north-west corner right on Little Bay. They returned to this site each year until 2008, when weed growth plus the Laughing Gulls the weeds attracted drove the skimmers to abandon the nesting attempt, resulting in the third year of complete nesting failure and the fourth year (including 2004) of zero production. In 2009 they shifted 100 yards north and occupied a weedless site at the edge of the circle, immediately adjacent to the road, returning there each year since.

Predation. The most common causes of Black Skimmer nesting failure in North America are site flooding and predation, not weeds. Since 1997, the Rockport colony has never experienced losses by high water, but the persistent gull depredations, which are natural and normal for skimmer colonies, have taken a toll.

Predation is a limiting factor for the Rockport colony, just as it is for all skimmer colonies; they are adapted to it, it's a simple fact of their lives. It becomes a problem when the limits are exceeded. The gulls may have over-done it in four of the six years when productivity was low. But the explanation isn't that easy. It is not just gulls; it's weed growth facilitating gulls. Opposite of Black Skimmers, Laughing Gulls prefer moderate vegetation and will tolerate tall vegetation in their nest sites. They are not that particular.

Thus, when the weeds grow, the number of nesting gulls does too. In 2011, a low skimmer productivity year, the gulls had some competition. As soon as the last skimmer left the nesting site, we examined the area and found raccoon tracks. So much for blaming the gulls for a bad year, at least exclusively.

Laughing Gulls are opportunistic predators, taking advantage of any situation that exposes prey. They are much bolder than most other species, and are not as frightened by close approach. Every time Black Skimmers are flushed off of eggs or chicks by intruders such as photographers or other pedestrians, the gulls swoop in immediately and make off with the spoils. This is a common, persistent and probably significant depression of skimmer reproductive success for the Rockport colony.

We have noted other instances of predation over the 14 years, but it did not cause a bad year. 2011 was the only raccoon observation. In 2002, black rats established a colony very near or in the Black Skimmer site, and are probably responsible for depressing a very good year into a merely good one. Great Horned Owls nest in the pine trees just west of Little Bay and fly across to the Park and take gulls (we frequently see remains, mainly wings) and no doubt other birds including skimmers from time to time.

Disturbance. But that's not the whole story, either. In addition to predation, high water, and weed growth, the Rockport skimmers are threatened by a gamut of intrusions and assaults categorized simply as disturbance.

Disturbance: close approach by fishermen, photographers, joggers and other pedestrians (as mentioned above), minor vandalism (throwing cans and bottles into the colony), major vandalism, kite flying, and wind-blown beach toys and other debris to list some examples. Our field notes over the years contain a litany of human impact on the nesting skimmers. We believe that little of this is vandalism, that is, willful malevolence; rather it is mostly ignorance of the bird's limits and needs.

But vandalism there is, and the worst and best-known example was the 2010 breaching of the circle road barricade and road-kill of at least 37 Black Skimmer

chicks on the night of July 1st. High water from Hurricane Alex had flooded much of the nesting habitat around the Little Bay cove, the indentation at the north-east corner of the bay just south across the road from the Salt Water Pavilion, and many birds of various species had sought refuge on the dry (higher) pavement.

The urgency of this situation was realized, and the City acted quickly, emplacing a temporary barricade of stanchions lashed together with cord to stop vehicular traffic around the circle, now crowded with birds, including skimmer chicks (even though their adjacent nest site was not flooded). That night, during heavy rainfall, vandals tore down the barricade and drove around the circle, killing the skimmer chicks.

Suspects were reportedly identified, but absence of physical evidence and unreliable eye-witness reports precluded arrests. This event resulted in the development of protective infrastructure and protocols by several cooperating agencies including the Aransas County Navigation District, the City of Rockport, and the U.S. Fish and Wildlife Service; protection of the birds is mandatory under federal and state laws.

Astonishingly, 2010 was still the best year Black Skimmers have had in the Park since monitoring began in 1999. Even though 37 (at least) were killed, 120 new birds flew away at the end of the season, more than any other year.

Low-level Stress. There is another aspect to disturbance, much more subtle and persistent. The effects of constant low-level stress to many species (including humans) are often cumulative, and can become detrimental. Individuals resistant to infrequent stressful events can be adversely affected by unremitting or very frequent stress, which can result in poorer health and lowered performance, including reproductive.

We have no evidence of any such effects on the Rockport Black Skimmers; it would require intensive long-term studies to obtain unambiguous results. The near-continual exposure of the birds to Park visitor activities suggests that such effects should be considered. It seems prudent in any case to insulate the nesting birds from such potential problems.

The white plastic fence erected around the nesting colony each season is one such step; another is the informational and warning signs concerning the skimmers and other birds around the Park. A more ambitious step is the on-going attempt to lure the skimmers to a near-by site much less exposed to traffic, but still quite visible and accessible to visitors.

The Coastal Bend Bays and Estuaries Program (CBBEP) in Corpus Christi, a non-profit conservation organization, proposed an experiment along with the American Bird Conservancy (ABC) in 2012 to lure the Beach Park skimmers away from the vulnerable site they have occupied since 2009 to a more protected site a couple of hundred yards to the south.

Skimmer decoys were arrayed at the beginning of the 2012 nesting season in the proposed site, and a recording of nesting Black Skimmers was played all day during the early pre-nesting activity. Surveyors tape was strung throughout the vulnerable site to discourage the skimmers from reoccupying. Many birds, but not Laughing Gulls, are afraid of the tape.

The experiment was negative; the skimmers could not be persuaded to move to the more protected site. Refinements of management techniques may yield better results in coming years.

The Fireworks. Every Fourth of July a major fireworks display is fired from the circle section of the Park, 100 yards or less from the Black Skimmer colony. How could you design and implement a more effective anti-skimmer campaign, to say nothing of all the other birds nesting on the Little Bay island and around the cove?

The numbers inform us otherwise. We counted skimmer chicks just before and just after July Fourth five different years, once with federal and state wardens. Incredibly, there was no consistent effect: two years the numbers dropped; two years the numbers increased; one year there was no change. It cannot be claimed that the fireworks have had a detrimental effect on Black Skimmers nesting in the Park.

Road Kill. The cause of mortality to Black Skimmer and Laughing Gull chicks that has elicited more public comment than any other is road kill, for the simple

reason it is the most obvious. It is not easy to estimate very accurately the impact of this mortality because carcasses are removed quickly by Park maintenance staff or scavengers. We have broadly estimated that Black Skimmer road kill losses are about 10% to 20% of chick production annually, but this varies considerably from year to year. The vandalism event of 2010 was discussed above.

This is one source of mortality that can be controlled. After the 2010 vandalism, steps were taken as mentioned above to exclude motorized traffic from the area where chicks tend to accumulate in the road. In 2011 and 2012, the chain closing the road was fastened when it was clear chicks would be on the pavement shortly. As soon as the last chick fledged, that is, when they became capable of flight and left the nesting area, the road was reopened. In 2011 and 2012 there was no Black Skimmer road kill.

Wire, String, and Monofilament. There are a couple of other factors that result in skimmer and other bird losses in the Park as well. The over-head power line running right down the length of the peninsula, even though it is partially marked with devices to enhance visibility to birds, causes collision deaths. Over the years we have found dead birds below the wires, and sometimes actually entangled in the wires, of several species including skimmers. These losses are comparatively minor, but they are quite obvious.

Far less obvious, and probably more important, are discarded fishing line and kite string. We found four dead adult skimmers entangled in one length (40 or 50 feet) of monofilament line in the nesting site, which probably resulted in the starvation of their chicks. We found a dead Roseate Spoonbill adult on the Little Bay island with kite string wrapped tightly around its beak at a nest with three dead chicks, which starved after it starved. Lost or abandoned line is commonly found around shore line areas of the Coastal Bend.

It all adds up.

Assessment

The Black Skimmers nesting at Little Bay are one colony of several in the Coastal Bend population; little detailed information is available on the other colonies mainly because they are on small islands in the several bays and estuaries. The fate and condition of the Rockport colony would be better known with more information on the rest of the population of which they are an integral part.

The total number of adult birds in the Rockport colony varies from year to year. The number of fledglings produced varies greatly from year to year, but statistical analysis (called regression analysis) indicates that the number of nesting pairs and the number of new birds produced has remained stable.

However, the average productivity of the Rockport colony (expressed as fledglings per nest, f/p), although stable, may be too low, resulting in an insufficient contribution to the Coastal Bend population. This short fall can be made up if the other colonies do well enough. There are insufficient data to address this point for the Coastal Bend.

The negative impacts of individual factors on the productivity of the Rockport Black Skimmers cannot be known with absolute certainty because so many factors are involved. We have identified some obviously important factors – weed growth, Laughing Gull predation, road kill and disturbance – to which we can address attention.

There have been seven years since 1999 (1999, 2000, 2003, 2006, 2008, 2011, and 2012) when skimmer productivity expressed as fledglings per nest, f/p , was below 0.5, presumably an insufficient contribution to maintain the Coastal Bend population.

This low productivity is completely explained by colony abandonment in response to weed growth in 1999, 2000, and 2008. Low productivity in 2003 may have been caused by weeds, gulls and road kill. Low productivity in 2006 may have been caused by weeds and road kill. Low productivity in 2011 may have been

caused by gulls plus a raccoon. Low productivity in 2012 may have been caused by gulls.

The relative impact of gulls and the raccoon cannot be assessed for lack of direct observation: gulls work mostly in the day (they are also crepuscular, the technical term for the low light conditions of twilight and dawn), raccoons mostly at night.

Gulls take eggs and chicks when Black Skimmers are flushed off the nesting site by intruding Park visitors.

Road kill of skimmer chicks has been about 10% to rarely 20% of the fledglings annually. Although 20% of the chicks were run over in the vandalism of 2010, f/p that year was 0.5. There were no road kills in 2011 and 2012 because the road was closed according to the anti-vandalism protocols of 2010, but productivity was very low anyway. Closing the road when chicks are vulnerable could improve productivity.

Nevertheless, there is little we can do about weed growth and gull predation. It's pretty much up to the skimmers to select a weedless site.

Excluding 2004, the Rockport skimmer's f/p is 0.4. Excluding the zero productivity years '99, '00', '04, and '08 (as explained above) yields the intriguing result of 0.5. Regression analysis excluding the zero productivity years shows that the Rockport Black Skimmer colony is stable. This suggests that if they avoid weeds and gulls do not increase, and disturbance including road kill is minimized, the Rockport Black Skimmer colony will hold its own.

Herons, Egrets, and Spoonbills

Over the years, our Little Bay studies have been concentrated on Black Skimmers. In 2007, we expanded efforts to include herons, egrets, and spoonbills. The data set is much more extensive for the skimmers, but we have accumulated enough information on the long-legged waders to make comments and suggestions on their status and conservation.

Many of the threats to the well-being of the Black Skimmers are also threats to the long-legged waders, the herons and egrets, very familiar to coastal citizens. These birds have occurred and nested around Little Bay for as long as anyone can remember. However, as with the skimmers, there just doesn't seem to be any quantitative written information about their nesting success in Rockport.

We do have oral reports – anecdotal to be sure - from long-time residents, including retired biologists as to the origin of the Little Bay colonies. Up until the early 1960's there was a substantial marsh – wetland hosting many birds immediately east of what is now Little Bay. Today that marsh is the Key Allegro real estate development, and the colonies of Little Bay are the remnants.

Observations of harassment of nesting birds by boaters, particularly jet skiers and kayakers in the Little Bay cove as well as wade fishermen and bait casters, suggested a monitoring program of herons and egrets should be initiated. We began collecting data systematically in 2007, counting nesting pairs of adults and then chicks and fledglings at least twice a month.

Collecting these data is not as simple as with the skimmers. Most of these birds nest on the north island in Little Bay, but substantial numbers of especially Tricolored Herons also nest around the Little Bay cove. The cove nesters can be observed from the raised platform on the north-west side of the traffic circle, but the island counts require a boat, which has been available to us inconsistently.

Thus, the heron counts are less precise than the Black Skimmer counts, but they provide a lower limit to estimates of the population. There are at least as many as actually counted, and almost certainly more. This fact must be kept in mind when considering the status of these birds in Little Bay.

Table 3 shows the total counts of nesting pairs and fledglings of all the herons and egrets plus Roseate Spoonbills nesting around the cove and the island in Little Bay from 2007 to 2012.

Table 3. Nesting Herons, Egrets and Spoonbills in Little Bay, 2007 - 2012

	<u>2007†</u>	<u>2008‡</u>	<u>2009</u>	<u>2010≠</u>	<u>2011†</u>	<u>2012†</u>
Pairs	259	130	396	166	277	-
Fledglings	900	230	800	272	438	1137

†Boat availability limited; counts low

‡Dogs

≠Hurricane Alex

Although limited in precision, Table 3 makes it clear that substantial numbers of long-legged waders were produced from Little Bay during this study. Only counts for 2009 can be considered unambiguous for reasons shown in Table 3; all the other counts are low.

In 2008, two dogs appeared on the island and proved very hard to remove. In the meantime, they destroyed almost the entire nesting colony. In 2010, Hurricane Alex flooded the Little Bay marshes in late June and early July, and the losses of the nesting birds were impossible to quantify.

Most of the birds enumerated in Table 3 are Tricolored Herons, but only the 2009 and 2012 data allowed a percentage to be calculated. Ninety-five percent were tricoloreds in '09, and 72% in '12. Reddish Egrets and considerably lesser numbers of Great Egrets, Snowy Egrets, Great Blue Herons and Roseate Spoonbills make up most of the rest.

Roseate Spoonbills nested on the island in 2007, '10, '11, and '12; we had noted but not quantified their presence in previous years. In 2011 and possibly 2012 spoonbills nested successfully on one of the artificial nesting platforms we had built on the island for Great Blue Herons; this was the first Texas record of spoonbills nesting on an artificial structure.

The dog event mentioned above was aberrant, and most heron species are too large for gulls to effectively predate. Unguarded eggs or very small chicks are taken opportunistically, but the main threat to nesting herons, egrets, and spoonbills is larger predators such as raccoons, which have been mostly absent in the Park since 1997.

The most important non-natural threat to the Little Bay cove and island herons and egrets is probably disturbance by Park visitors, mainly boaters. Flushing birds off their nests exposes eggs and chicks to gulls and to fatal over-heating in the sun, which can happen very quickly. The problem of jet skis and kayaks in the Little Bay cove was mentioned above, but a distinction must be made as to the nature of the disturbance. We have made many observations of power boats, particularly jet skis, passing at high speed 50 – 75 feet from the island crowded with herons and egrets, while the birds remained oblivious. They are habituated to craft passing by.

We have fewer observations of another vulnerability of the young of year as they congregate at the water's edge along the island shoreline, still weak flyers dependent upon their parents. Here, they are much closer to passing boats and may be more susceptible to disturbance, panic-flying away and getting lost and unable to find their way back.

The problem in the cove seemed to be operational, with jet skiers maneuvering sharply in the restricted water of the cove, actually over-running the marsh vegetation where the herons were nesting. Needless to say, this was disruptive.

Starting in 2008, a float line barrier was strung across the mouth of the cove to exclude boats from the nesting area. This barrier has been very effective; almost all boaters with the exception of some kayakers seem to respect it, to the benefit of the birds.

Kayakers and photographers are observed occasionally intruding the nesting areas around the cove and on the island, also. A slow moving kayak passing along the edge of the nesting marsh is very effective at driving birds from their nests.

In addition to the heron nesting sites on the island and around the cove, there is a third site located just across Little Bay from the island on the west shore. This rookery is in tall pine trees (most of which had died by 2012 and been removed) and adjacent live oaks between Broadway Street running along the shoreline and HW Business 35 on the west and is on private property with residential neighborhoods immediately to the north and south.

This colony is part of the Little Bay avifauna, but is difficult to access and observe, so the data we have collected from 2008 to 2012 are limited to recording the number of nesting pairs (Table 4). The pine plantation has rapidly declined in recent years in response to drought and consequent bark beetle infestation.

Table 4. Nesting Herons in the Little Bay North-West Shore Pine-Oak Rookery. GBH: Great Blue Heron; GE: Great Egret; BCNH: Black-crowned Night Heron.

	<u>2008</u>	<u>2009</u>	<u>2010</u>	<u>2011</u>	<u>2012</u>
GBH	56	69	67	65	54
GE	34	42	58	82	112
BCNH	62	41	36	26	14
Total Nests	152	152	161	173	180

Table 4 shows the number of nesting pairs of Great Blue Herons, Great Egrets, and Black-crowned Night Herons and the total number of nests each year from 2008 to 2012. In spite of the reduction of the pines, the number of Great Blue Herons has remained fairly stable; the Great Egrets have increased annually, while the night herons declined. The total number of nests has steadily increased since 2009.

The great blues adjusted by moving to the remaining pines, including dead ones and a few to the oaks and the Great Egrets by moving to the oaks. The night

herons apparently experienced a net loss of nesting habitat with the decline of the pines, but their losses were out-numbered by Great Egret gains.

In 2012, local residents noticed a number of Great Egret chick carcasses below the nests in the south side oak grove, and expressed concern for the welfare of the colony. Counter-intuitively, this did not necessarily indicate a problem. Great Egret nestlings practice siblicide, in which an older chick physically ejects a smaller younger one from the nest in order to corner the food supply; the parents ignore the ejected chick on the ground below. If there are more nests, as there were in 2012, it follows that there will be more chicks ejected. However, the net chick production may still be higher.

Assessment

Tricolored Herons are not threatened in the Park. Any development or destruction of the vegetation they nest in would reduce their numbers, as would greatly increased intrusion by Park visitors. They average at least 500 fledglings a year.

Reddish Egrets are listed as a Threatened Species in Texas, so they merit closer attention. 2012 was the best year Reddish Egrets have had since monitoring was started in 2007; they produced 133 fledglings, almost all on the island, which is about twice the number usually produced. About 40% of the Little Bay Reddish Egrets are the white morph.

Roseate Spoonbills are also of special concern because of their small numbers throughout their range. They have nested on the Little Bay island from time to time before the formal monitoring began in 2007 when they produced two fledglings, but were absent in 2008 and 2009. They returned in 2010, but the disruption of Hurricane Alex precluded a count of fledglings. They produced two fledglings in 2011 and 21 in 2012. They appear to have accepted the artificial platforms built for Great Blue Herons, nesting there in '11 and possibly '12.

Only small numbers of the other nesting species are produced in the Little Bay rookeries.

The possible effects of chronic low-level disturbance discussed under Black Skimmers also apply to the other nesting birds. Although the herons, egrets, and spoonbills are habituated to boat traffic, they are still vulnerable to losses caused by disturbance, be it accidental, careless, or malicious.

The data on Little Bay herons, egrets, and spoonbills are insufficient. We will need at least three to five more years of counting before we can detect statistically significant trends in these populations in Little Bay.

Low access and visibility of the pine-oak rookery on the north-west shore limit collection of data necessary to assess its status beyond establishing that it is significant to the Little Bay heron population, since it contains many more of the three species than the other sites combined. Great Blue Heron nests remained about the same from 2008 to 2012, Great Egret nests increased, and Black-crowned Night Heron nests declined. Total number of nests has increased each year since 2009. Death and removal of the pine trees will presumably have a negative effect.

Gulls and Terns

Laughing Gulls. We have been discussing Laughing Gulls in the context of nest predation, but it is clear to any visitor that they are the most approachable and probably the most enjoyed species in the Park. We have not monitored gulls as closely as the other species because they are not threatened anywhere.

They are also, because of sheer numbers and very active life style, difficult to count. Only at nesting sites are they sedentary enough to enumerate. However, they nest in vegetation – most of them do, at any rate – making them hard to see even if they are still. There were 5000 plus or minus 10% in the Park in late April 2012, the only year we have been able to take a reliable count of adults.

There is a trick, though, to counting Laughing Gull fledglings. It is highly dependent on timing, both time of day and stage of development. During a short period, perhaps no more than two weeks or less usually in mid-July the juvenile gulls accumulate for a couple of hours or so around noon each day in the cove

behind the float line. Here they can be easily counted with a spotting scope from the observation platform on the west side of the traffic circle. The few not in the water can then be quickly located by driving around the Park.

Thus, for the four years we counted, we know how many were produced (but not the f/p): '07, 1000; '08, 800; '11, 1700; '12, 1600. In agreement with many anecdotal accounts, the Laughing Gulls appear to be increasing.

Terns. Royal Terns, a very common species along the Texas Coast, nested one time, 2011, in Rockport Beach Park, producing 18 fledglings. Royals usually nest in large colonies on off-shore islands. Several species of terns occur in the Park year around, but they usually don't nest.

Least Terns, a declining species, nested in the Park in 1997, but not since. They produced several chicks, but the monitoring program was not organized at that time, so we have no record of their success. Least and Gull-billed Terns nested in the Park between 1975 and 1979 (Note 2).

Assessment

Laughing Gulls are natural and normal predators of the eggs and chicks of other birds. The impact of their predation will vary with their numbers. If gulls increase in the Park, prey species will probably decline. Feeding gulls is not necessary to maintain their population, and is detrimental to other birds.

Many species of terns use the Park and Little Bay year around, and are not noticeably impacted by Park visitor activities. Nesting of terns in the Park is very unusual.

Migratory Waterfowl

The Texas Coast is famous for its winter bird life, with migratory waterfowl among the most conspicuous. Long-time residents and visitors speak of the hundreds and even thousands of ducks that they remember years ago on Little Bay. In the winter of 2006 – 2007, waterfowl were almost completely absent from Little Bay,

prompting fears that the Bay had changed for the worse, and the ducks wanted nothing more to do with it.

There was concern at that time that seagrass had declined because the water quality of Little Bay had become so poor (especially because of nitrogen pollution, called eutrophication). Presumably then the deterioration of the seagrass beds favored by waterfowl made the Bay no longer attractive to them. This idea was anecdotal, because there was no quantitative historical information on waterfowl use of the Bay, or any measures of water quality.

We then initiated a three year project (2007 – 2010) to monitor over-wintering waterfowl on Little Bay and two reference areas, the waterfront off Shell Ridge Road in Rockport and Port Bay at Cape Velero. The purpose of that project was to document waterfowl numbers on Little Bay, and to identify trends in their distribution. We recorded the total number of each species present once a week from late December until the birds departed in the early spring.

The counts from all three winters were difficult to interpret. There was no correlation of waterfowl presence or absence with any identifiable factor, and no trends at any of the three sites. The results neither supported nor refuted the idea of deteriorated water quality causing the loss of seagrass in Little Bay. The questions remained, had waterfowl usage of local waters actually declined, and if so why.

The answer to these questions was not to be found at the local level. It is regional, in fact continental, factors that send more or fewer ducks to South Texas each winter, affecting local numbers. The mid-continent populations of waterfowl have remained more-less stable over the past two decades, but this is a statistical average. The production of new birds can vary drastically year to year, and the number of ducks then showing up on the Texas coast will vary accordingly.

Weather strongly affects migration. In warmer winters, migratory birds may remain farther north than in harsher winters. Water management and various conservation projects attractive to waterfowl along the migratory flyway stops the birds short of the Texas Coast in milder years. The harsh drought of 2011 –

2012 greatly reduced the available waterfowl habitat upstate, resulting in very large numbers of ducks on the Texas coast.

A gradually warming climate may be causing ducks to remain farther north in winter. Ecologists have documented the northward range extension of Mexican species into south Texas in response to average higher temperatures in recent years. Canadian biologists have documented that some waterfowl species are wintering farther north in recent years, while some species are not (Note 5).

Distribution of ducks on local water bodies will depend on the number of ducks that have arrived in the area. They fly about daily seeking food, fresh water, and shelter, and their presence or absence at any time on any given water, such as Little Bay, may depend simply on chance.

The question about eutrophication and decreased occurrence of waterbirds on Little Bay was answered in 2010 when the results of a two year study by the University of Texas Marine Science Institute were released (Note 6). This study addressed water and sediment quality and seagrass condition in Little Bay, but revealed no clear reason for seagrass decline.

There was no nitrogen pollution, and other water quality factors were normal compared to other bays and estuaries around the Coastal Bend, with the exception of lowered salinity caused by slugs of runoff water flowing into the Bay during heavy rain events (high levels of nitrogen were found in the sediment, but were considered natural, not pollution, and did not adversely affect the water quality during the study period). Seagrass does not flourish at low salinity, and the UT-MSI report states that this phenomenon may be the reason for reduced seagrass in Little Bay.

What can we say about the relationship between seagrass and waterfowl in Little Bay?

Some species of waterfowl, especially Red Head and Canvasback ducks feed on seagrass, but they also frequent waters where there is no seagrass. Other species, such as Lesser Scaup, do not as readily utilize seagrass, and their numbers on Little Bay during the study were essentially the same as the Red Heads.

Assessment

Waterfowl occurrence on Little Bay is explained by regional factors such as winter temperatures, drought, and habitat condition along the flyway. Water quality in Little Bay is not degraded by nitrogen pollution and water clarity is normal compared to other Coastal Bend bays; these factors thus have no influence on waterbirds in Little Bay. Excess freshwater flowing into the Bay following heavy rain events may be affecting seagrass health, but has no discernible effect on waterfowl.

Acknowledgments

The continuing presence of so many birds on and around Little Bay can be attributed substantially to the decisions and actions of officials representing both the City of Rockport and the Aransas County Navigation District. The City of Rockport managed the Beach Park for the duration of the work reported here until 2012, when this responsibility passed to the Navigation District.

Tom Staley, Director of the Parks and Leisure Time Department of the City aided us throughout, especially in the uncertain early days when we were struggling to develop a management plan. Park Superintendent Rick Martinez always supported us and conscientiously took initiative to further the technical and conservation goals. Mayor C.J. Wax quickly apprehended the situation during the 2010 vandalism crisis and made the decisions that protected the birds during that vulnerable time and led to the establishment of the Black Skimmer protection protocols.

Harbor Master Keith Barrett, who assumed Park responsibility in May 2012, involved himself early and effectively in the bird monitoring and protection program and has smoothly taken the management leadership role. Navigation District Commissioner Dr. Ron Outen has been a supporter of this work from the beginning, and has spoken effectively for the work in his official capacity. Navigation District Chairman Tommy Moore has acted and spoken decisively in support of conservation efforts in the Beach Park.

The Coastal Bend Bays and Estuaries Program in Corpus Christi headed by Ray Allen has been involved for several years in Little Bay conservation. CBBEP staff including David Newstead, Gene Blacklock (ret), and Owen Fitzsimmons has done projects benefiting Black Skimmers and the herons, egrets, and spoonbills, and has helped us with advice and aid throughout. All of our data have been reported to CBBEP.

The Aransas Bird and Nature Club in Rockport sponsored the early Black Skimmer habitat improvement and monitoring work. Many of their members contributed significant time and resources for the enhancement of the Little Bay avifauna, especially Peggy Holt, Francis Hicks, Ray Kirkwood, Fred and Linda Lanoue, Michael Tarachow, Merce Dostale, and Debra Corpora. David Durham participated in the bird counts and operated the boat; Dr. Ben Nelson also provided a boat for several counts.

Hilde Kaigler has been watching the birds at Little Bay and around the Coastal Bend for 40 years; she has been an invaluable resource, sharing knowledge and insights that have greatly facilitated our efforts and analyses.

The temporary protective fence placed around the nesting skimmers each year was donated by Audubon Texas. Black Skimmer interpretive signs were provided by Kacy Ray, American Bird Conservancy.

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Pat Clements, U.S. Fish and Wildlife Service, led us through the Black Skimmer protection crises of 2004 and 2010. Her guidance is in large measure responsible for the rescue of the Rockport skimmer colony.

Dr. Clay Green, Texas State University, advised us on the siblicide phenomenon in herons, especially Great Egrets.

Kevin Hartke, Waterfowl and Wetland Habitat Specialist with the Texas Parks and Wildlife Department, provided explanations and references necessary to understand the relationship between large scale and local waterfowl distribution.

Dr. Chris Wilson, University of Texas Marine Sciences Institute, provided detailed information on seagrass dynamics, and Dr. Mark Fisher, Texas Parks and Wildlife Department, helped us understand the distribution of forage fish utilized by fish-eating birds.

End Notes

1. Texas Colonial Waterbird Society, unpublished data.
2. Texas Colonial Waterbird Society, 1982. *An Atlas and Census of Texas Colonial Waterbird Colonies, 1973 – 1980.*
3. Huckabee, John W. *Black Skimmers at Rockport Beach Park, Rockport, Texas.* Bulletin of the Texas Ornithological Society 38(1): 2005.
4. The herbicide Roundup™ has been in use around the world since 1974. Early on, a component, the surfactant, was found to be toxic to animals and was replaced with a non-toxic. The active ingredient, glyphosate, has very low toxicity to mammals, birds, reptiles, and insects. It is toxic to amphibians and some zooplankton, as detailed by information on the label. Glyphosate binds avidly with soil molecules (and therefore is not readily transported in runoff water) and degrades rapidly under environmental conditions; less rapidly under cold conditions. Recent (2012) media reports on the toxic effects of Roundup™ were re-released old information, in which toxicity tests had been conducted under unrealistic environmental situations; such exposures would be extremely unlikely under field conditions.
5. Information on how climate change is affecting birds can be found in recent publications of the Gulf Coast Bird Observatory and the Long Point Waterfowl organization.

6. *An Assessment of Little Bay Water and Sediment Quality in Relation to Indices of Seagrass Condition*. Kenneth Dunton and Christopher Wilson, University of Texas at Austin Marine Science Institute. Technical Report TR/10-001. 30 November, 2010. Report Submitted to the City of Rockport, Aransas County Navigation District, and the Town of Fulton. The report can be accessed at:

http://www.missionaransas.org/science_library.html#technical