

Coyote Predation of Marine Bird Populations on Isla Garza and Isla Pelicano in Laguna San Ignacio, Baja California Sur, Mexico; February 2010

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Abstract

Isla Garza and Isla Pelicano in Laguna San Ignacio, Baja California Sur, Mexico historically served as roosting and nesting sites for numerous marine bird species that made their nests either in the Islands' sparse, low vegetation or directly on the ground. At times, these colonies of ground-nesting birds contained as many as several thousand individuals. Inspection of the Islands' avian rookeries in February and March 2010 revealed complete reproductive failure of all ground-nesting birds and evidence of coyote intrusion and predation at many nest sites. The authors strongly suspect that the islands no longer provide secure reproductive habitat for these avian populations, and that predation by coyotes in recent years may be a primary cause of this decline .

The collapse of the Islands breeding populations represents a significant loss of breeding habitat and resources for all of the avian species that reside in the Laguna San Ignacio and Baja California Sur region. Mitigation measures and protection from predation should be considered to restore the quality of the breeding habitat for the birds and to encourage re-colonization of these unique areas. Management actions directed at restoring the integrity of the islands as an avian breeding habitat need to be undertaken in harmony with the goals, objectives, and regulations of the Vizcaino Biosphere Reserve which the lagoon and its islands are a part, and should reflect the needs and requirements of all the involved species, predator and prey alike, as well as the ecological balance of the Laguna San Ignacio ecosystem. Thus, any predation management program needs to consider management actions taken elsewhere in comparable situations that have been successful in addressing similar issues-.

We recommend that a group of experts convene to: (1) evaluate the specific conditions on Isla Garza and Isla Pelicano fundamental to this recent decline; (2) identify and evaluate management actions that would mitigate predation and restore the avian nesting and roosting habitat over the long-term; and (3), establish a monitoring program to evaluate the success of any management actions undertaken.

Introduction

Laguna San Ignacio has long attracted world-wide attention for the winter aggregations of gray whales that annually assemble there (Jones and Swartz 1984). The twenty kilometer long coastal lagoon lies in the heart of Mexico's El Vizcaino Biosphere Reserve and is a UNESCO World Heritage Site (Wildcoast 2006). The lagoon is a federally established marine protected whale sanctuary that supports local fishing and eco-tourism (Urban et al. 2002). Two small islands, Isla Garza (0.4 km²) and Isla Pelicano (1.5 km²), are located in the northern-most portion of the lagoon furthest from the ocean (Fig. 1). The islands are separated from the mainland shore by shallow tidal channels on their eastern side that on the

year's lowest tides provide separation from the mainland of less than one kilometer (Fig. 2). The islands are similar to the surrounding desert in that they sustain only a sparse cover of low shrubs (e.g., *Lysium spp.*, *Idria spp.*) and cacti (e.g., *Pachycereus pringlei*, *Lophocereus schottii*, *Stenocereus gummosus*).

Historically, numerous species of marine birds roosted and nested on the islands, sometimes numbering in the thousands (Danemann and Guzman-Poo 1992). These islands are unique in that virtually all avian nesting activity takes place on the ground, or in low shrubs within a meter or less of the ground (Fig. 3). The exceptions are a small number of Osprey (*Pandion haliaetus*) which nest in or on clumps of cactus (Fig. 4) and Peregrine Falcon (*Falco peregrines*) that nest in cavities on the face of the islands' low bluffs.

In February 2010, S. Swartz and J. Urban R., Co-Directors of the Laguna San Ignacio Ecosystem Science Program (LSIESP, www.lsiecosystem.org), sponsored a site visit to Laguna San Ignacio by three ornithologists, B. Reitherman and J. Storrer from Santa Barbara, California, and P. Spitzer, Ph.D. from Trapp, Maryland, to update information on status of the bird populations known to nest on the Lagoon's two islands. The intended goal for this visit was to initiate, as part of the LSIESP, a resumption of systematic monitoring and research on the resident and migratory birds that utilize these islands and the lagoon as a refuge and breeding sites. Reitherman and Storrer (1981) and Danemann and Guzman-Poo (1992) conducted baseline studies in the 1980's that documented remarkably dense concentrations of avian species on the islands (Appendix I).

Because the islands are located within the Laguna San Ignacio Federal Marine Reserve, access is restricted and controlled. The authors arranged two site visits in advance with the local warden of the islands and resident of La Laguna, Sr. Francisco Mayoral: Spitzer, Reitherman, and Storrer visited the islands on 22-23 February 2010, and Spitzer, Urban, and Swartz visited the islands again on 3 March 2010. These site visits were timed to correspond to the period during which many of the most notable resident and seasonal species were observed in previous years to be nesting in great numbers on the islands (see Appendix I).

In contrast, the authors found little evidence of active nesting by the most conspicuous avian residents (e.g., Brown Pelicans, Cormorants, and Ospreys) known from previous studies (Reitherman and Storrer 1981, Danemann and Guzman-Poo 1992), and they observed recent evidence of active predation on birds by coyotes (*Canis latrans*).

The unexpected 2010 observations raised questions about the causes of the avian breeding collapse, and began a process to identify possible predation mitigation and other management measures and

options that would restore the former nesting habitat and encourage avian populations to resume successful breeding on the Islands.

Here we describe current conditions on Isla Garza and Isla Pelicano based on the February and March 2010 site visits, review historical trends of avian use of these islands for breeding and roosting, discuss possible causes for recent changes in the use of the islands by birds, and suggest options as starting points for discussion of the Islands' future as a breeding habitat for avian species.

Background of Avian Abundance on Isla Garza and Isla Pelicano

Laguna San Ignacio is remote, difficult to detect using the naked eye from offshore, and surrounded by desert inhospitable to humans for many miles. As a result, historical human visitation to the Lagoon before the mid-1900s was very limited. Missionaries may have passed through the area during the early 1700s but if so likely left no records of their own observations about the lagoon, nor did they chronicle those of the Native Americans that may they encountered. The first relevant observations were probably the made by the crews of whaling vessels that frequented this and Ojo de Liebre (Scammon's) Lagoon in the 1840s (Henderson 1984). Unpublished field notes or ships logs from this era may contain information about breeding birds in Laguna San Ignacio, but we know of no efforts to search out or examine documents of this kind.

Field notes made during a scientific bird-collecting visit to the islands by Laurence M. Huey (1927) contain reference to the presence of several avian species now common on the Islands, but make no mention of nesting Ospreys despite detailed observations made of Osprey foraging around the mangrove estuaries in the eastern portion of the lagoon. As the nests and attendant parents of Ospreys and other ground-nesters are conspicuous, it can be concluded that ground-nesters were not abundant on the islands at that time.

Observations made by local residents F. Mayoral (personal communications) and his son R. Mayoral (personal communications) suggest that Ospreys were present in considerable numbers on the islands from the 1960s onwards. By 1977 Jones and Swartz (1984) began research on Eastern North Pacific gray whales (*Eschrichtius robustus*) that occupied the lagoon in the winter, and they reported a sizable population of Osprey on the islands, along with numerous other marine avian species nesting there as well.

Reitherman and Storrer (1981) conducted a five-year series of observations on the islands beginning in December 1979, and described 130 nesting Osprey pairs, many Reddish Egrets (*Dichromanassa rufescens rufescens*) along with small numbers of Brown Pelicans (*Pelecanus occidentalis*) and Double-crested Cormorants (*Phalacrocorax auritus*) nesting on the Islands. They documented additional bird species roosting and/or nesting on the islands including: Great Blue Heron (*Ardea herodias*), Snowy Egret (*Leucophoyx thula thula*), Peregrine Falcon (*Falco peregrines*), Snowy Plover (*Charadrius alexandrines tenuirostris*), American Oystercatcher (*Haematopus bachmani*), Western Gull (*Larus occidentalis*), Caspian Tern (*Sterna caspia*), Loggerhead Shrike (*Lanius ludovicianus*), Northern Mockingbird (*Mimus polyglottos*), Savannah Sparrow (*Passerculus sandwichensis*), Raven (*Corvus corax*) and others (Appendix I).

Between 1988 and 1989 G. Danemann documented 52 avian species on the islands (Danemann and Guzman-Poo 1992) and reported numerous breeding birds, most notably, Brown Pelicans (1,100 pairs), Double-crested Cormorants (500 pairs), Reddish Egrets (95 pairs), American Oystercatcher (7 pairs), Western gulls (40 pairs), Caspian Terns (93 pairs), and Osprey (143 pairs).

Henny et al. (2008) conducted aircraft surveys over the length of Baja California and reported that the ground nesting Osprey population was not present on the two islands in Laguna San Ignacio in 2006, but an estimated 175 Osprey pairs to the north and south of the lagoon nesting on alternative platforms including electrical power poles, and other artificial structures in nearby towns in the region. They cite an observation by R. Cormona of three occupied Osprey nests on the islands in 2006. In contrast, one author (Swartz) observed 20-30 individual Osprey that appeared to be defending nesting sites along the shores of Isla Garza and Isla Pelicano in February 2006 and 2007, but he did not land on the islands to inspect the nests. More recent observations by Laguna San Ignacio resident R. Mayoral (personal communication) suggest that the numbers of ospreys nesting on the Islands leveled off in the early 1990s, while Brown Pelicans and Double-crested Cormorants increased to a maximum numbers between 2005 and 2006. Subsequently Mayoral noted sharp declines in all the island's ground-nesting species, and evidence of coyote predation on the islands in 2008-2009. From that time to the present, all ground-nesting species on the islands have apparently experienced virtually no reproductive success.

The authors' February 2010 visit to the islands found 10 Osprey nests on Isla Garza and 34 Osprey

nests on Isla Pelicano that showed some level of activity (e.g., pairs of adult birds roosting near and/or "defending" the nest, nests containing fresh nesting material), but only one nest contained a single egg during the February visit. The broken remains of this egg was found during the subsequent March visit to the nest by the authors, along with fresh coyote tracks around the nest site.

The available historical data suggest that the populations of birds nesting on Isla Garza and Isla Pelicano have fluctuated in the past, but were generally robust and predator free during the 1980's and into the 1990's. However, recent observations, including ours during February and March 2010, indicate a complete collapse of ground-nesting species has occurred on the islands of San Ignacio Lagoon, and confirm evidence of coyote predation on the islands. The collapse of these breeding populations represents the loss of a significant breeding habitat and resource for all of the avian species that reside in the Laguna San Ignacio wetlands complex and the Baja California Sur region.

Possible Causes of Avian Breeding Decline

Historical information suggests that avian breeding populations on Isla Garza and Isla Pelicano in Laguna San Ignacio have undergone large fluctuations in recent decades. It is striking to note that few if any ground-nesting birds used the islands in the 1920s (Huey 1927), and it is a matter of conjecture what may have caused the islands to become attractive to such impressive numbers of ground-nesting birds during most of the ensuing years of the 1900s.

It is possible that the narrow tidal channels isolating the islands along their eastern shore (Fig. 2) from the surrounding mainland may have changed depth over the years, thereby providing access for predators to the islands across shallow tidal mudflats exposed during minus-spring tides, and thus fluctuating levels of isolation for ground-nesting avian species and loss of protection from predation by coyotes, feral dogs and cats, etc.

Evidence of coyote activity on the islands includes fresh coyote tracks widespread in the soft surface soil around avian nesting sites, and several recent and well established coyote "patrol" paths are present along the islands' perimeters (Fig.5). Bird carcasses (Fig. 6), crushed egg shells (Fig 7.), and coyote scats containing bird feathers and bones (Fig. 8) suggest that coyotes are capable of preying on night-roosting birds on the islands. As these species are difficult to approach during the daylight hours, their remains suggest the value of the islands as a nighttime roosting habitat for diverse bird species has been

significantly reduced both within and outside the avian breeding season. During one of the site visits a single coyote was flushed from a patch of vegetation on Isla Pelicano.

While it cannot be ruled out that additional factors may have influenced avian nesting success on the islands (e.g., periodic human visitation, predation by ravens and gulls, decrease in availability of prey, ecological collapse within the lagoon's marine environment), we suspect that the presence of coyotes on the islands is likely the primary contributor to the most recent failure of avian nesting and reproduction. Coyote presence in the Laguna San Ignacio region has likely increased in recent years, and could be attributed to the increase in human habitation at the lagoon during the past two decades, as has been described for other urban areas (Gorpper 2002).

Throughout the 1980s and 1990s seasonal fishing for shellfish and finfish increased dramatically in Laguna San Ignacio and resulted in the establishment of fishing camps along the southern shores of the lagoon. The permanent fishing village of El Cardon is located 11 km from the lagoon and is now the permanent residence for 100 or more families. The decade-long practice of disposing of fisheries waste along the shores of the lagoon resulted in massive shell-piles and fish waste deposits covering acres of shoreline which represented potential food resources for coyotes (Fig. 9).

During the 1990s whale-watching based eco-tourism developed at Laguna San Ignacio and continues to the present. Eco-tourism companies established several permanent tourist camps along the southern shore of the lagoon within 5 km of the islands. These eco-tourism camps are visited by thousands of tourists during the winter months when the gray whales are present in the lagoon. During this period a new community of Ejido Luis Echeverria was established approximately 8 km from the lagoon and serves as the primary residence for approximate 400 residents that are employees of the eco-tourism companies and local fishing cooperatives. This community includes a primary and secondary school for approximately 100 students, a church, community store and other support businesses. It is the general consensus of the residents of the area that with the increase in human development the coyote population has also increased as the result of more opportunities and resources to support the growth of the local coyote population (Fig. 10).

Consideration of Management Options

Any management actions directed at restoring the integrity of the islands as an avian breeding habitat

need to be undertaken in harmony with the goals, objectives, and regulations of the Vizcaino Biosphere Reserve of which Laguna San Ignacio and its islands are a part. The guiding philosophy for island predator and avian management needs to reflect the needs and requirements of all the involved species, predator and prey alike, as well as the impact of specific management actions on the entire Laguna San Ignacio ecosystem. Thus, a management program for the islands needs to be based on knowledge gained from successful programs in other regions that addressed similar issues and conditions that exist in Laguna San Ignacio and on its islands.

Although Isla Garza and Isla Pelicano are located within the Laguna San Ignacio Biological Reserve, they are not currently serving as a nesting and roosting refuge for the avian populations that reside within Laguna San Ignacio, and they are presently not offering a safe habitat for any night-roosting bird species vulnerable to coyote predation. All of the avian species known to utilize Isla Garza and Isla Pelicano continue to be present in the Laguna San Ignacio wetlands complex, and if the conditions were favorable they would presumably resume utilizing these islands for nesting and roosting. This assumption is supported by evidence of recent nesting attempts by Osprey, Brown Pelicans, and Double-crested Cormorants, observed during the February and March 2010 site visits to the islands. In addition, Henny et al. (2008) suggest and one author (P. Spitzer) observed, that the regional abundance of osprey has not changed significantly, rather that the birds have sought and now occupy alternate nesting sites in the surrounding areas, utilizing in some instances artificial nesting platforms (e.g., telephone and power poles, human built nesting platforms). Examples of such nesting behavior is seen nearby in the town of Punta Abrejos and near the fishing village of Delgadito where pairs of Osprey have successfully nested on electrical utility poles and other elevated man-made structures. The Kuyimita eco-tourism camp on the southern shore of the lagoon installed two artificial nesting platforms which were occupied by osprey pairs within two years of their placement (Fig. 11). Another approach to protect ground nesting species (e.g., Brown Pelicans, Double-crested Cormorants, and Reddish Egrets) might be to isolate principal nesting areas by erecting physical barriers (e.g., wire fences above and below ground) in easily accessible areas of the islands. If successful, additional avian species are likely to resume utilizing the islands for breeding and roosting.

The authors propose that the goal of any management actions should be to achieve the following outcome: *the restoration the island's unique qualities as a wildlife sanctuary and avian breeding refuge for the benefit of the numerous avian species that reside in and frequent Laguna San Ignacio that would*

be consistent with the purpose and mission of the Laguna San Ignacio Marine Protected Area and the larger El Vizcaino Biosphere Reserve.

Even while restoration of islands' function as avian breeding and roosting areas should be a primary goal, simply removing the coyotes that presently reside on the islands is not a long-term solution because they would likely be replaced by recruitment from the larger coyote population that resides around the lagoon's adjacent human communities. Coyote and other predator control is not a new wildlife challenge. It has been addressed in many wildlife areas where habitat loss, degradation, or alteration (including enrichment), altered predator communities or altered predator-prey ratios, wildlife losses due to predation become increasingly significance (Reynolds and Tapper 1996, Shivik and Crabtree 1995). Guidance for considering appropriate actions to control coyote access to the islands in Laguna San Ignacio should be obtained from the study of other similar predation situations in other regions, and carefully evaluated for their practicality and any ecological implications for the Laguna San Ignacio ecosystem. To these ends, we propose the following actions:

Proposed Action # 1: Assemble an advisory committee of individuals from academic, government and non-government organizations and agencies that: (1) represent local (i.e., Laguna San Ignacio), state (i.e., Baja California Sur), and national (i.e., Mexico and the United States) interests; (2) are expert in avian biology and natural history particularly on islands; (3) are familiar with and have experience with predator control in sensitive wildlife areas such as reserves; and (4) are responsible for the management of protected areas similar to Laguna San Ignacio in Baja California Sur, Mexico. These experts should be charged with reviewing relevant information on the status of the avian habitats in Laguna San Ignacio, identifying the primary conservation goals with regard to the bird populations, and developing management recommendations to restore and maintain the principal avian breeding habitats.

Proposed Action #2: Management of coyote predation and population control needs to be researched from published accounts and advice obtained from wildlife managers with experience in the control and management of coyotes in similar protected areas and islands. From this research, management actions that appear appropriate for Islas Garza and Pelicano should be identified and, as appropriate, implemented and monitored to restore the long-term functional value of the islands as a refuge for avian populations that utilize these islands.

Proposed Action #3: Evaluate the effectiveness of establishing a series of pole mounted artificial nesting platforms for osprey on the islands, and the installation of fences and other appropriate barriers around select areas of vegetation to protect ground nests and ground nesting avian species from predation. Establishment of a monitoring program to document the utilization of areas protected by these artificial structures by birds and to evaluate their reproductive success compared to nesting areas that are not similarly protected.

Conclusions

The stated goal of the Vizcaino Biosphere Reserve with regard to the Laguna San Ignacio Wetlands Complex is to protect and maintain this unique marine area for the benefit of the wildlife that utilize the habitat and its resources, and to encourage low impact economic development that poses minimal threats to the environment (e.g., eco-tourism and fishing) for the benefit of the human residents of the Laguna San Ignacio region. We suggest that implicit in this goal would be the restoration and re-establishment of the avian breeding habitat on Isla Garzas and Isla Pelicano in Laguna San Ignacio.

Should the local community and regional resource managers determine that actions to restore the avian populations' use of the islands is desirable, careful thought and investigation to identify appropriate actions should be pursued through a consensus building process involving local stake holders (i.e., community members and local business operators), responsible local, state and federal officials, with the assistance of academic experts. Once specific management actions are identified, a concerted effort will need to be made to contact potential funding sources to obtain adequate resources for implementing those management actions, and should include organizations and agencies both within and external to government, and within Mexico and internationally.

Re-establishment of the avian breeding colonies on the islands in Laguna San Ignacio will restore a significant breeding and roosting resource for numerous avian species that feed and breed in the lagoon, and will help to insure the future of Laguna San Ignacio as a world-class marine protected area and a resource for wildlife for years to come.

Acknowledgements

We acknowledge the support of the many local individuals whose willingness to share their information and observations of the Laguna San Ignacio and its unique wildlife that made this investigation possible, and whose continuing dedication to the conservation of this unique marine protected area will provide effective stewardship in the years to come. Special thanks go to Sr. Francisco Mayoral, warden of Isla Garza and Isla Pelicano; Sr. Ranulfo Mayoral, Baja Expeditions Naturalist and resident of La Laguna; and Dr. Gustavo Danemann, Pronatura Noreste A.C. James Tate, Ph.D. reviewed the manuscript and suggested changes that improved the text.

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Figure 1. Location of Laguna San Ignacio within the El Vizcaino Biosphere Reserve in Baja California Sur, Mexico showing the location of Isla Garza and Isla Pelicano.

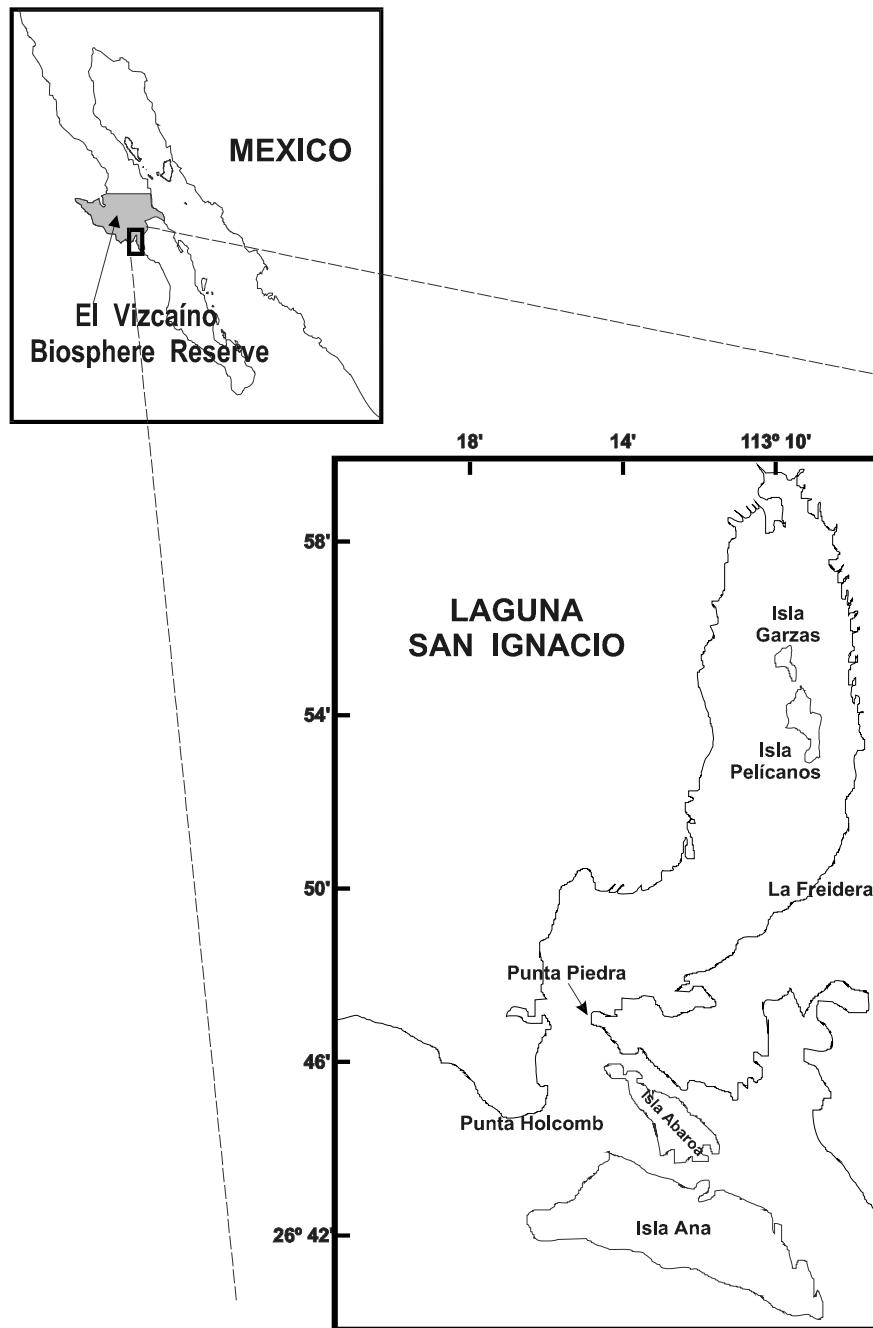


Figure 2. Batymetry of the northern-most half of Laguna San Ignacio showing the location of Isla Garza and Isla Pelicano and the shallow areas between the islands' eastern shores and the shoreline of the lagoon. During extremely low spring tides, the water depth in these areas can be one meter or less, allowing a bridge between the islands and the lagoon's eastern shore.

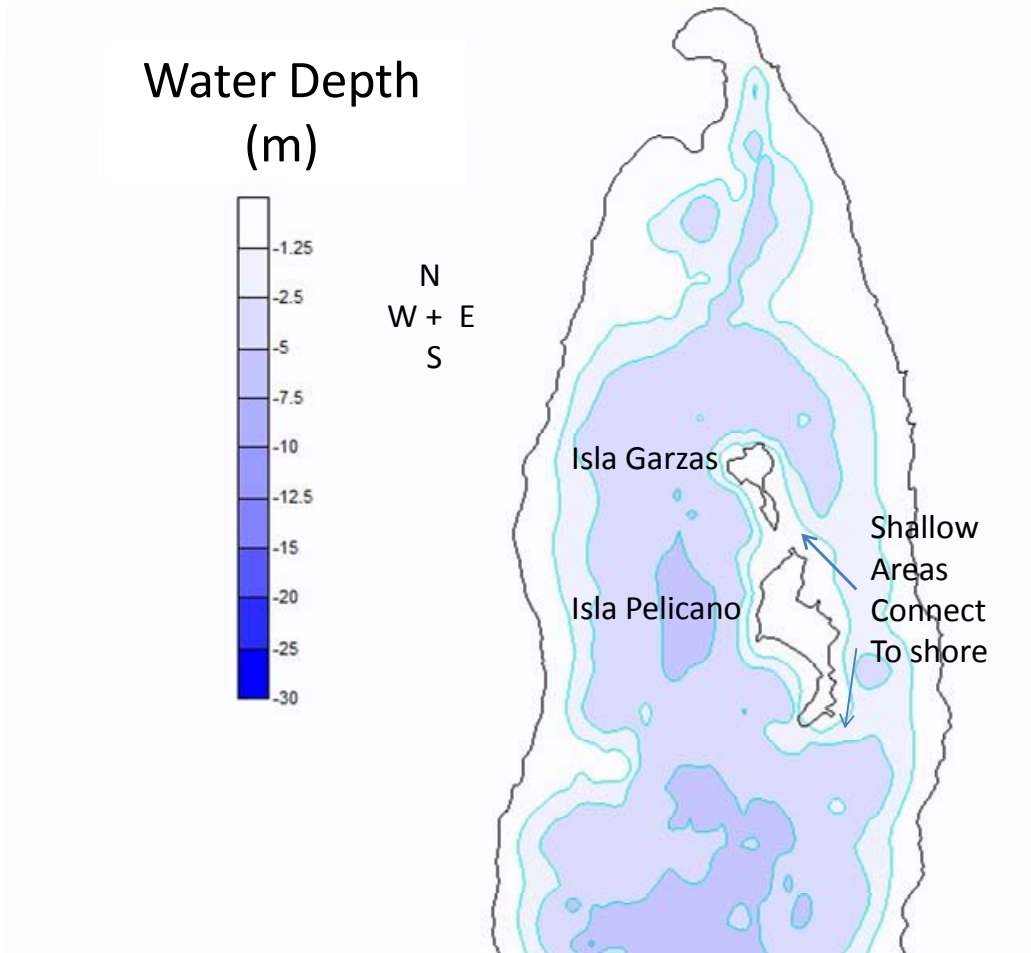


Figure 3. Typical ground level nesting location for Brown Pelicans and Double-crested Cormorants on Isla Garza and Isla Pelicano photographed during the February 2010 survey.



Figure 4. Example of a near-ground Osprey nest built on clumps of low cactus on Isla Garza. Similar nests in various clumps of vegetation were also found on Isla Pelicano during the February and March 2010 surveys.



Figure 5. A well established coyote patrol path along the shore of Isla Garza near avian nesting locations. Similar coyote paths were found on Isla Pelicano to the south of Isla Garza during the February and March 2010 surveys.



Figure 6. A recent Brown Pelican kill found on Isla Garza during the February 2010 island survey in an area frequented by coyotes. Because such species are difficult to approach during daytime, such kills suggest that coyotes are preying on birds roosting on the islands during the nighttime hours.



Figure 7. Broken Double-crested Cormorant or Brown Pelican eggs in a ground-level nest discovered on Isla Garza during the February 2010 island survey.



Figure 8. Fresh coyote scat containing avian bones and feathers discovered next to a group of Double-crested Cormorant nests on ground-level on Isla Garza during the March 2010 island survey. The scat was approximately 12-cm long and 3-cm wide. Additional scats were found on both islands during the February and March 2010 surveys.



Figure 9. Piles of empty bay scallop and other bivalve shells dumped along the south-eastern shore of Laguna San Ignacio by fishermen during the fishing boom of the 1980s to 1990s. Local fishermen harvest these and other species of bivalves along with several species of finfish whose processed carcasses are also disposed of along the lagoon's shores.



Figure 10. A coyote patrolling the eco-tourist campground at Kuyimita Eco-Tourism camp on the southern shore of Laguna San Ignacio photographed in February 2010 during the day. The local coyotes are seen frequently near the eco-tourism camps and they show little fear or avoidance of humans during the daytime. Groups of coyotes may frequently be heard calling during the nights along the south-eastern shore of lagoon.



Figure 10. One of two artificial nesting platforms erected at the Kuyimita Eco-Tourism campground along the southern shore of Laguna San Ignacio. Both platforms were occupied by breeding pairs of Osprey within two years of their placement next to the campground..



Appendix I: Bird List for Laguna San Ignacio including records of birds sighted on the islands of Isla Garza and Isla Pelicano.

SAN IGNACIO IAGOON - BIRD LIST

Bird List for Laguna San Ignacio, Baja California Sur, Mexico - Updated June 2010																
SEASONALITY (ABUNDANCE): 1 - Common; 2 - Fairly Common; 3 - Uncommon; 4 - Rare to very rare; 5 - Accidental; 6 - Sporadic; 7 - Extirpated; 8 - Single occurrence or <10 records total.	SEASONALITY						HABITAT									
	WINTER	SPRING	SUMMER	FALL	RESIDENT	NESTING	OUTER WATERS	OUTER SHORE	LAGOON WATERS	LAGOON SHORE	MANGROVES	ISLA GARZA	ISLA PELICANO	SALTFLATS	DESERT PERIMTR	DESERT FOOTHILLS
ANSERIFORMES																
ANATIDAE																
Greater White-fronted Goose		8							X							
Ross's Goose		8							X							
Brant	1								X	X	X	X	X			
American Wigeon	8										X					
Mallard	3										X					
Blue-winged Teal	3										X					
Cinnamon Teal	8										X					
Northern Shoveler	6										X					
Northern Pintail	6										X					
Redhead	3										X					
Ring-necked Duck	3										X					
Lesser Scaup	2									X	X					
Surf Scoter	1						X		X							
Bufflehead	1						X		X							
Common Goldeneye	2								X							
Red-breasted Merganser	2								X		X					
Ruddy Duck	1								X		X					
GALLIFORMES																
ODONTOPHORIDAE																
California Quail					1	#									X	X
PODICIPEDIFORMES																
PODICIPEDIDAE																
Least Grebe	3								X		X					
Pied-billed Grebe	3								X							
Horned Grebe	4								X							
Red-necked Grebe	8								X							
Eared Grebe	1								X		X					
Western Grebe	2								X		X					
Clark's Grebe	2								X		X					
GAVIIFORMES																
GAVIIDAE																
Red-throated Loon	2								X		X					
Pacific Loon	1								X		X					
Common Loon	1								X		X					
PROCELLARIIFORMES																
PROCELLARIIDAE																
Northern Fulmar				2			X									
Sooty Shearwater				2			X									
Pink-footed Shearwater				2			X									
Black-vented Shearwater				2			X									
HYDROBATIDAE																
Leach's Storm-Petrel					2		X									
Black Storm-Petrel					2		X									
Least Storm-Petrel					2		X									
PELECANIFORMES																
PHAETHONTIDAE																
Red-billed Tropicbird	4		3				X									
SULIDAE																
Brown Booby					5				X							

SAN IGNACIO IAGOON - BIRD LIST

SEASONALITY (ABUNDANCE): 1 - Common; 2 - Fairly Common; 3 - Uncommon; 4 - Rare to very rare; 5 - Accidental; 6 - Sporadic; 7 - Extirpated; 8 - Single occurrence or <10 records total.	SEASONALITY						HABITAT									
	WINTER	SPRING	SUMMER	FALL	RESIDENT	NESTING	OUTER WATERS	OUTER SHORE	LAGOON WATERS	LAGOON SHORE	MANGROVES	ISLA GARZA	ISLA PELICANO	SALTFLATS	DESERT PERIMTR	DESERT FOOTHILLS
PELECANIDAE																
American White Pelican	2									X						
Brown Pelican					1	#	X	X	X	X	X	X				
PHALACROCORACIDAE																
Brandt's Cormorant					1	#			X		X	X	X			
Double-crested Cormorant					1	#			X		X	X	X			
Pelagic Cormorant			3				X		X		X	X	X			
FREGATIDAE																
Magnificent Frigatebird	3	3	3	3			X		X							
CICONIIFORMES																
ARDEIDAE																
American Bittern					2	?										
Least Bittern					3	?										
Great Blue Heron					2	#			X	X	X	X				
Great Egret					2	#										
Snowy Egret					1	#			X	X	X	X				
Little Blue Heron					2	#			X	X						
Tricolored Heron					3	#			X	X						
Reddish Egret					1	#			X	X	X	X				
Cattle Egret	6								X		X					
Green Heron					2	#				X						
Black-crowned Night-Heron					2	#				X						
Yellow-crowned Night-Heron					2	#				X						
THRESKIORNITHIDAE																
White Ibis					2	#			X	X						
White-faced Ibis				8												
CATHARTIDAE																
Turkey Vulture					2				X	X	X	X		X	X	
FALCONIFORMES																
ACCIPITRIDAE																
Osprey					1	#	X	X	X	X	X	X		X		
White-tailed Kite																
Bald Eagle	8							X								
Northern Harrier					2	?			X	X	X	X		X		
Harris's Hawk					3											X
Red-tailed Hawk	3													X	X	
Golden Eagle														X	X	
FALCONIDAE																
Crested Caracara					3						X					X
American Kestrel					2	#					X	X		X	X	
Merlin	?															
Peregrine Falcon					2	#			X	X	X	X	X	X		
Prairie Falcon														X	X	
GRUIFORMES																
RALLIDAE																
Clapper Rail					2	#					X					
Virginia Rail					8						X					
Sora					8						X					
American Coot			3						X	X						

SAN IGNACIO IAGOON - BIRD LIST

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	WINTER	SPRING	SUMMER	FALL	RESIDENT	NESTING	OUTER WATERS	OUTER SHORE	LAGOON WATERS	LAGOON SHORE	MANGROVES	ISLA GARZA	ISLA PELICANO	SALTFLATS	DESERT PERIMTR	DESERT FOOTHILLS
CHARADRIIFORMES																
CHARADRIIDAE																
Black-bellied Plover					1	?			X							
Snowy Plover					1	#			X		X	X				
Wilson's Plover	3								X	X						
Semipalmated Plover									X							
Killdeer					3	#			X		X	X				
HAEMATOPODIDAE																
American Oystercatcher					1	#			X	X	X	X				
Black Oystercatcher	3								X							
RECURVIROSTRIDAE																
Black-necked Stilt	3								X	X						
American Avocet					3				X	X						
SCOLOPACIDAE																
Greater Yellowlegs	3								X							
Lesser Yellowlegs					2	?			X							
Willet					1	?			X							
Wandering Tattler									X							
Spotted Sandpiper					2	?			X							
Whimbrel					2	?			X							
Long-billed Curlew					2	?			X							
Marbled Godwit					1	?			X							
Ruddy Turnstone					2	?			X							
Black Turnstone									X							
Surfbird	3					?			X							
Red Knot	3					?			X							
Sanderling					2	?			X							
Semipalmated Sandpiper	8								X							
Western Sandpiper					2	?			X							
Least Sandpiper					2	?			X							
Dunlin	2					?			X							
Stilt Sandpiper									X							
Short-billed Dowitcher	4					?			X							
Long-billed Dowitcher	3								X							
Red-necked Phalarope					3				X							
Red Phalarope					2				X							
LARIDAE																
Pomarine Jaeger	2								X							
Parasitic Jaeger	2								X							
Long-tailed Jaeger	?								X							
Laughing Gull	3								X							
Franklin's Gull	3								X							
Bonaparte's Gull	3								X							
Heermann's Gull					1				X							
Mew Gull		8							X							
Ring-billed Gull					1	#			X							
California Gull					3				X							
Herring Gull					2	#			X							
Thayer's Gull	2								X							
Yellow-footed Gull					3				X							
Western Gull					1	#			X							
Glaucous-winged Gull	3								X							
Sabine's Gull	3								X							
Caspian Tern					1	#			X		X	X				
Royal Tern					1	#			X		X	X				

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Elegant Tern					1	#			X							
Forster's Tern					1	#			X							
Least Tern			1			?			X							
Black Tern								X								
Black Skimmer	4															
ALCIDAE																
Xantus's Murrelet	4				2		X									
Cravieri's Murrelet				3			X									
COLUMBIFORMES																
COLUMBIDAE																
Rock Pigeon					8	#										X
White-winged Dove					2	#					X	X				X
Mourning Dove	6															X
Common Ground-Dove					2	#										X
CUCULIFORMES																
CUCULIDAE																
Greater Roadrunner					3	#										X
STRIGIFORMES																
TYTONIDAE																
Barn Owl					2	#										X
STRIGIDAE																X
Great Horned Owl	6					#				X	X	X				X
Burrowing Owl					2	#										X
Long-eared Owl	8															X
Short-eared Owl	4										X	X				X
CAPRIMULGIFORMES																
CAPRIMULGIDAE																
Lesser Nighthawk			2			#										X
APODIFORMES																
APODIDAE																
Vaux's Swift			3													X
White-throated Swift	3															X
TROCHILIDAE																
Xantus's Hummingbird					2	#										X
Black-chinned Hummingbird					3	#										X
Costa's Hummingbird					1	#					X	X				X
CORACIFORMES																
ALCEDINIDAE																
Belted Kingfisher					2	#				X	X	X				
PICIFORMES																
PICIDAE																
Gila Woodpecker					1	#					X	X				X
Ladder-backed Woodpecker					1	#					X					X
PASSERIFORMES																
TYRANNIDAE (New World Flycatchers)																
Say's Phoebe	8															X
Cassin's Kingbird			2													X
LANIIDAE (Shrikes)																
Loggerhead Shrike					2	#					X	X				X
Corvidae (Jays, Crows)																
Western Scrub-Jay					2	#										X
Common Raven					2	#					X	X				X
ALAUDIDAE (Larks)																

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Horned Lark					1	#						X	X		X	X
<i>HIRUNDINIDAE (Swallows)</i>																
Purple Martin			1												X	X
Tree Swallow			2												X	X
Violet-green Swallow					2										X	X
Bank Swallow			3												X	X
Cliff Swallow			2												X	X
Barn Swallow			2												X	X
<i>REMIZIDAE (Verdins)</i>																
Verdin					2	#						X			X	X
<i>TROGLODYTIDAE (Wrens)</i>																
Cactus Wren					1	#									X	X
Rock Wren					2	#									X	X
Canyon Wren					?											
Bewick's Wren					?											
Marsh Wren					?											
<i>SYLVIIDAE (Old World Warblers)</i>																
Blue-gray Gnatcatcher					2	#									X	X
California Gnatcatcher					2	#									X	X
<i>TURDIDAE (Thrushes and Allies)</i>																
Western Bluebird																X
<i>MIMIDAE (Mockingbirds, Thrashers)</i>																
Northern Mockingbird					2							X	X		X	X
Sage Thrasher					2											
Bendire's Thrasher															X	
Le Conte's Thrasher					2	#										
<i>MOTACILLIDAE (Wagtails and Pipits)</i>																
American Pipit					2				X		X	X				
<i>BOMBYCILLIDAE (Waxwings)</i>																
Phainopepla					1	#									X	X
<i>PARULIDAE (New World Warblers)</i>																
Orange-crowned Warbler	3			8						X						
Yellow Warbler					2					X						
Mangrove Warbler					1	#				X						
Yellow-rumped Warbler	2									X						
Townsend's Warbler				8						X						
Northern Waterthrush	4									X						
Common Yellowthroat	8									X						
<i>EMBERIZIDAE (Buntings, Seedeaters)</i>																
Brewer's Sparrow					3						X				X	
Black-chinned Sparrow					3											
Lark Sparrow					3											
Black-throated Sparrow					1	#										
Savannah Sparrow					1	#			X		X	X			X	
Song Sparrow					2											
White-crowned Sparrow					2							X				

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ICTERIDAE (Orioles, Blackbirds, etc.)																	
Western Meadowlark					2	?						X	X		X		
Yellow-headed Blackbird			2														
Brewer's Blackbird			2														
Great-tailed Grackle																	
Brown-headed Cowbird			2														
Hooded Oriole					1	#										X	
Scott's Oriole					1	#										X	
FRINGILLIDAE (Finches, Crossbills)																	
House Finch			2			#									X	X	
PASSERIDAE (Old World Sparrows)																	
House Sparrow			2			#											
CARDINALIDAE (Saltators, Cardinals)																	
Northern Cardinal					1	#											
Pyrrhuloxia					1	#										X	