



Research note

New and noteworthy waterfowl records at artificial wetlands from Baja California Sur, Mexico

Registros nuevos y sobresalientes de anátidos en humedales artificiales de Baja California Sur, México

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Abstract. We present 9 recent records of rare waterfowls in Baja California Sur, all of them in artificial wetlands: 3 freshwater sites and 1 concentration area for a saltworks. We present the first records of the Ross's Goose in the state. The remaining 8 species are: Black-bellied Whistling-Duck (breeding), Fulvous Whistling-Duck, Greater White-fronted Goose, Snow Goose, Cackling Goose, Tundra Swan, Mallard and Hooded Merganser. To this list we added an historical compilation of the records of these species in artificial sites of the state. The artificial wetlands are no replacement for their natural counterparts, they are nevertheless an important part of the region's landscape mosaic. As the records of the present work exemplify, this man-made habitat increases the regional species richness, and should be considered as important areas that need to be protected.

Key words: waterfowls, artificial wetlands, Baja California Peninsula.

Resumen. Presentamos registros recientes de 9 especies de anátidos raros en Baja California Sur, todos ellos realizados en humedales creados por el hombre: 3 sitios dulceacuícolas y 1 área de concentración para la producción de sal. Se incluyen los primeros registros del ganso de Ross (*Chen rossii*) para el estado. Las 8 especies restantes son: *Dendrocygna autumnalis* (anidación), *D. bicolor*, *Anser albifrons*, *Chen caerulescens*, *Branta hutchinsii*, *Cygnus columbianus*, *Anas platyrhynchos* y *Lophodytes cucullatus*. A la lista, agregamos una recopilación histórica de los registros de estas especies en humedales artificiales del estado. Aunque estos sitios no deben sustituir a sus contrapartes naturales, actualmente forman parte del mosaico paisajístico que ofrece la región; adicionalmente, incrementan la riqueza de especies de la región, por lo que es necesario brindarles protección.

Palabras clave: Anatidae, humedales artificiales, península de Baja California.

Even though the avifauna of the Baja California Peninsula is well documented (Wilbur, 1987; Erickson et al., 2001), new records continue to accumulate, especially of migratory species. Most of the peninsula has a dry climate therefore freshwater bodies are scarce (Guzmán et al., 1994). Consequently, there are few studies on the waterfowl species that use freshwater habitats, particularly as compared with the research made in coastal and marine environments.

Recent increase in human population has entailed a

reduction of adequate habitat for waterfowl, because these habitats have been used by man to develop agricultural, industrial, or tourist activities (Erwin et al., 1986; Myers et al., 1987). This has caused the displacement and even eradication of the populations of some birds (Llinas and Jiménez, 1997). In contrast, some human modifications of the landscape have benefitted bird communities, compensating to a certain extent for the loss of natural wetlands (Zamora-Orozco et al., 2007).

In the Baja California Peninsula, the creation of artificial wetlands such as saltworks and freshwater bodies (e.g. Exportadora de Sal S.A. de C.V., oxidation ponds and a storage pond for residual waters), has increased

the diversity of birds. These environments function as human-made ecosystems, which provide food and shelter for a large number of migratory and resident birds. The effort to study the birds using these artificial water bodies has increased in the last 10 years (Castillo-Guerrero and Carmona, 2001; Danemann et al., 2002; Carmona et al., 2006; Zamora-Orozco et al., 2007).

Important observations of uncommon waterfowls have been carried out in the area, such as: Greater White-fronted Goose (*Anser albifrons*), Common Goldeneye (*Bucephala clangula*), Muscovy Duck (*Cairina moschata*), Black-bellied Whistling Duck (*Dendrocygna autumnalis*) and its first breeding record, and Greater Scaup (*Aythya marila*; e.g. Carmona et al., 1999; Erickson et al., 2006).

In this paper, we present records of 9 notable species

of waterfowls that use different artificial wetlands of Baja California Sur. Eight of these species are catalogued as uncommon winter visitors (Table I), and 1 is a new record (Ross's Goose, *Chen rossii*) for Baja California Sur. The data presented, added to information from previous studies, suggest the necessity to preserve these places.

Our records are from 4 localities, 1 saltwater and 3 freshwater artificial wetlands: (1), the first concentration area (area 1) from the Guerrero Negro saltworks (Exportadora de Sal) was originally created by building a dike across a bay of the Ojo de Liebre Lagoon. There is a pumping station in the dike that pumps seawater from the lagoon more or less continuously. Therefore, this area has similar conditions to the lagoon with only slightly higher salinity, but there is no tidal influence (Fig. 1); (2,) Guerrero Negro Oxidation Ponds, (2 oxidation lagoons

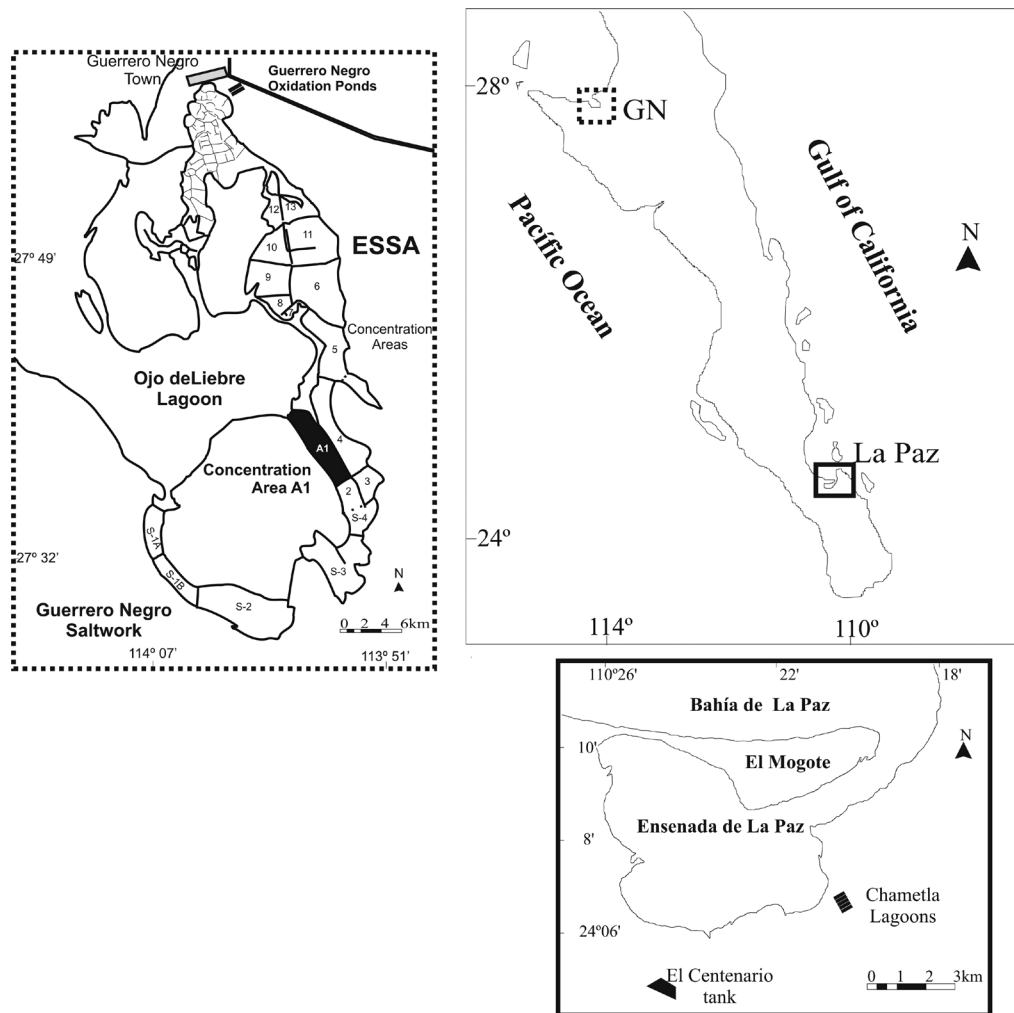


Figure 1. Study area. Artificial wetlands where all records were conducted.

Table 1. Observations of 9 species of waterfowl at artificial wetlands of Baja California Sur. Date(s), observation locality, and source of the observations are indicated. Within each date, the number of observed birds is indicated in parenthesis, except when only 1 individual was observed

<i>Species and date (s)</i>	<i>Locality</i>	<i>Source</i>
Black-bellied Whistling-Duck		
2007 - 18/Aug (2 Adults, 2 chicks)	Chametla Lagoons	Present paper
Fulvous Whistling-Duck		
2005 - 1-2/Dec, 17/Dec (3))	Chametla Lagoons	Present paper
White-Fronted Goose		
2009 - 27-28/Nov, 1/Dic	Chametla Lagoons	Present paper
Snow Goose		
1998 - 24/Oct (3), 22/Dec	Chametla Lagoons	Zamora et al., 2007
1998 - 22/Dec (2)	El Centenario tank	Castillo Guerrero and Carmona, 2001
2004 - 30/Sep (2), 6/Oct (2)	Chametla Lagoons	Present paper
2007 - 7/Feb (18)		
Ross's Goose		
2004 - 8/Nov, 10/Nov, 23/Nov	Chametla Lagoons	Present paper
2006 - 4-5/Nov, 18/Nov, 3/Dec, 4/Dec (2)		
2007 - 7/Feb (2)		
2006 - 15/Dec	Guerrero Negro Oxidation Ponds	Present paper
Cackling Goose		
1995 - 20/Nov	Chametla Lagoons	Erickson et al., 2001
2001 - 30/Oct, 2/Nov, 8/Nov, 12/Nov, 26/Nov, 8/Dec, 17/Dec	Chametla Lagoons	Present paper
2002 - 5/Mar, 26/Mar, 22/Jun, 29/Jul, 5/Aug, 7/Aug, 22/Aug, 3/Sep, 7/Oct, 18/Oct, 1/Nov.		
2006 - 18/Nov (2), 28/Nov (2), 4/Dec (2)		
2009 - 21-22/Dec	Guerrero Negro Oxidation Ponds	Present paper
Tundra Swan		
2009 - 21-24/Dec	Guerrero Negro Oxidation Ponds	Present paper
Mallard		
1998 - 24/Oct (4)	El Centenario tank	Castillo Guerrero and Carmona, 2001
2006 - 2/Nov	Guerrero Negro Oxidation Ponds	Present paper
Hooded Merganser		
2009 - 14-15/Dec	Guerrero Negro Saltworks Exportadora de Sal,	Present paper

of 0.5 km² each one) located southeast of Guerrero Negro town (Fig.1); (3), The Chametla Lagoons (5 oxidation lagoons of 5 hectares each), located southeast of La Paz (Fig.1), where the constant flooding of the adjacent areas has favored the development of grazing lands (*c.a.* 17 ha) in which different species of birds are seen, and (4), El Centenario tank is located at the south west of La Paz (Fig. 1); this is a pond of waste water storage of El Centenario Town. This tank stores the originating water of the treatment plant that is distributed to the different cultivated fields of the zone and has a capacity of 500 000 m³.

As part of a research program on the utilization of the Ensenada de La Paz and Guerrero Negro by aquatic birds, we performed continuous surveys at these sites. During all surveys we identified the birds using binoculars (10x) and telescopes (15-60x), at a maximum distance of 100 m. The order of the presentation of bird records is based on that proposed by the AOU (1998). With the exception of the Snow Goose, we have photographic evidence for all the other species.

Black-bellied Whistling-Duck (*Dendrocygna autumnalis*). The Black-bellied Whistling-Duck ranges from the southern United States to northwestern Peru, occupying lakes and shallow freshwater marshes in the tropical and subtropical zones (AOU, 1998). Although the species is generally nonmigratory, the Baja California Peninsula is not part of the Black-bellied Whistling-Duck's historical range (Grinnell, 1928; Wilbur, 1987), although Howell and Webb (1995) reported 1 at San José del Cabo (June, 1999). Since 1999 this species has been sighted several times at the Chametla Lagoons (oxidation ponds; Carmona et al., 1999; Erickson et al., 2001). In September 2004, Sauma et al. (2005) reported the first breeding record of this species in the Chametla lagoons (2 adults and 3 chicks). We observed a second breeding record of this species in the same place in August 2007 (Table I), with the presence of 2 adults and 2 chicks that were swimming together.

Fulvous Whistling-Duck (*Dendrocygna bicolor*). This species tends to prefer the tropical habitats at the center of the continent (Leopold, 1977; AOU, 1998). It winters on the Pacific coast from southern California (formerly) to Oaxaca, Mexico (Howell and Webb, 1995; AOU, 1998). The Fulvous Whistling-Duck uses shallow waters, swamps, lagoons, and crop fields (Howell and Webb, 1995; AOU, 1998). In the Baja California Peninsula, *D. bicolor* is a rare species (Howell and Webb, 1995) with no records reported in more than 80 years. Reported specimens were collected in southern Baja California Sur in 1928 (Erickson et al., 2001). We observed this

species 3 times at the Chametla Lagoons in December 2005 (Table I).

Greater White-fronted Goose (*Anser albifrons*). This species is considered a rare or uncommon winter visitor in the Baja California Peninsula (Wilbur, 1987; Howell y Webb, 1995). Its winter distribution range in Mexico is restricted to the coast of Sonora, Sinaloa, Nayarit, and Baja California (Wilbur, 1987; Howell y Webb, 1995), although some records exist for the Pacific coast of the Baja California Peninsula close to Bahía Magdalena (Howell y Webb, 1995). The first record from the southern portion of the peninsula was published by Carmona et al. (1999), and includes 4 records in La Ensenada de La Paz, 3 of them in the Chametla Lagoons. We observed 1 adult (November-December 2009) in the Chametla Lagoon roosting in the water body, and in the borders of this lagoon, and sometimes feeding in company of White-faced Ibis.

Snow Goose (*Chen caerulesens*). This species regularly winters in the United States and also in northwestern Mexico and Veracruz in eastern Mexico (AOU, 1998). Historically, its major winter abundance in Mexico was in the Colorado River delta, the interior lakes of Chihuahua and Durango, and the north coast of Tamaulipas (Leopold, 1977). It shows affinity for freshwater bodies, swamps, wetlands, cultivated fields, lakes, estuaries, and flooded fields (Howell and Webb, 1995). The Snow Goose was considered an uncommon winter visitor in Baja California Sur by Wilbur (1987). In Baja California Sur, there are 9 records between 1984 and 1999, 3 of them they in artificial wetlands, and most of them from autumn and winter. We added 3 records in the same type of habitats (Table I). In agreement with previous records, the Snow Goose was observed in autumn and winter.

Ross's Goose (*Chen rossii*). This species is considered rare along the Pacific coast of Mexico, including the Baja California Peninsula (AOU, 1998). The first record of the Ross's Goose on the peninsula was from the Mexicali Valley, where hunters collected some individuals in December 1950–January 1951 (Saunders and Saunders, 1981). We observed the first Ross's Goose in Baja California Sur at the Chametla lagoons in November 2004 (Table I). It was seen feeding in pastures near the Chametla lagoons along with some individuals of Cinnamon Teal ducks (*A. cyanoptera*). Between November 2006 and February 07, we recorded 6 visits of the Ross's Goose at the same location. In addition, we documented another record for the Ross's Goose in

Guerrero Negro, Baja California Sur, the bird was also using a man-made habitat (Table I).

Cackling Goose (*Branta hutchinsii*). This species predominantly winters on the western coast of the USA (Mowbray et al., 2002). Apparently some birds deviate towards the Baja California Peninsula (AOU, 1998). In Baja California Sur, only 3 previous records exist (Erickson et al., 2001). We observed a Cackling Goose at the Chametla Lagoons on 30 October 2001 to 17 December 2002. Another Cackling Goose was observed 3 months after in the same area. It is highly probable that it was the same goose that winters in the region. And again 3 months after this last record, 1 bird was observed after the breeding season. This bird remained all the winter season of this year in the same zone. Another 2 birds were recorded in the same artificial area during the winter of 2006 in company of 1 Ross's Goose. More recently we have 1 record from the Guerrero Negro oxidation ponds (December 2009), where we observed it in company of a Tundra Swan.

Tundra Swan (*Cygnus columbianus*). In general, in northern Mexico, the Tundra Swan is considered an uncommon winter visitor (Howell y Webb, 1995). In the Baja California Peninsula, this species is cataloged as a rare winter visitor, with only 1 record per locality in Guerrero Negro (1982), La Paz (1950), and San José del Cabo (1968; Wilbur, 1987). We observed an adult of the Tundra Swan in a small oxidation pond of the waste water treatment plant of the Exportadora de Sal in Guerrero Negro; the bird was present between 21 and 24 of December 2009.

Mallard (*Anas platyrhynchos*). The Mallard is the most abundant duck species in North America (AOU, 1998). However, it was considered an uncommon winter visitor in Baja California Sur by Wilbur (1987) with only a few records for the region. These records include 1 in La Paz in 1972 (Wilbur, 1987), 1 female in San Ignacio in 1986 (Erickson et al., 2001), and 1 for El Centenario Tank in 2001 (Castillo-Guerrero and Carmona 2001). Here we added another record from Baja California Sur and the first record from Guerrero Negro (November 2006; Table I). The Mallard was observed in the Guerrero Negro Oxidation Ponds. It was a male adult that was in company with a group of Northern Pintail.

Hooded Merganser (*Lophodytes cucullatus*). The Hooded Merganser is the smallest of 3 North American mergansers and the only one restricted to this continent (Dugger et al., 2009). This is an uncommon and rare wintering visitor in the Baja California Peninsula and only a few have been seen in this region (Wilbur, 1987). These

records include 1 bird in San Jose del Cabo in February 1860 (Wilbur, 1987), 1 male in Mulegé in December 1992 and 1 female in the same area in February 1999. Here we present the first record in 1 concentration area from the Guerrero Negro Salt work (1 male), in company of a big flock of Lesser Scaup (December 2009; Table I).

The majority of the records we present here are from artificial freshwater wetlands. Because most of their natural equivalents are scarce in this region, and threatened by human activities, (Rodríguez-Estrella et al., 1997), the construction and permanence of artificial wetlands have been beneficial for bird communities. Artificial wetlands seem to have mitigated the loss or reduction of natural wetlands, and are human-made ecosystems used by large numbers of migratory and resident birds (Zamora-Orozco et al., 2007; Castillo-Guerrero and Carmona, 2001). At the moment they are part of the landscape mosaic that the region offers to birds (Castillo-Guerrero and Carmona, 2001), allowing an increase in the number of waterfowl species at the regional level.

Additionally, the artificial sites of Exportadora de Sal have an important role for the overall avian community, in particular for waterfowl species (Carmona and Danemann, 1998). The existence of these sites has led to the settlement of bird communities that have preferences for different halophilic wetland conditions that are hardly present in the natural wetlands of this region (Carmona y Danemann, 1998).

Our observations show that artificial wetlands can be important, at least locally, for waterfowl and landbirds. This man-made habitat is used for feeding and refuge. It is necessary to consider that this type of wetlands should not replace their natural counterparts (Schnack et al., 2000). However, there are cases like those presented here, where the artificial water bodies have a practical use for humans (water treatment and production of salt). Due to artificial wetlands can supply, in part, the functions, values and attributes that characterize the natural ones (Schnack et al., 2000), and can help to compensate for the loss of the natural sites, it is important to consider them as areas than need to be encouraged and protected.

We thank all facilities granted by the staff at the Residual Water Treatment Plant (La Paz), where Abigail Solano was especially helpful. Thanks to the staff of the Aquatic Birds Program at the Universidad Autónoma de Baja California Sur for their support. To Exportadora de Sal S.A. de C.V (ESSA) and all its staff, especially Edmundo Elorduy, Martín Domínguez, Martín García, Ramiro Zaragoza and Fabián Castillo for their logistic support both in the field and in their hosting facility. Reviews by Richard A. Erickson and Melania López Castro were greatly appreciated.

Literature cited

- American Ornithologists' Union (AOU). 1998. Check-list of North American Birds. Allen Press, Lawrence, Kansas. 829 p.
- Carmona, R. and G. Danemann. 1998. Distribución espaciotemporal de aves en la salina de Guerrero Negro, Baja California Sur, México. *Ciencias Marinas* 24:389-408.
- Carmona, R., J. A. Castillo-Guerrero and E. M. Zamora-Orozco. 1999. Registros nuevos del zambullidor menor (*Tachybaptus dominicus*) y diez especies de anátidos en las adyacencias de la Bahía de La Paz, Baja California Sur, México. *Anales del Instituto de Biología de la Universidad Nacional Autónoma de México, Serie Zoológica* 70:191-203.
- Carmona, R., V. Ayala-Pérez, N. Arce and L. Morales-Gopar. 2006. Use of saltworks by Red Knots at Guerrero Negro, Mexico. *Wader Study Group Bulletin*. 111:46-49.
- Castillo-Guerrero, J. A. and R. Carmona. 2001. Distribución de aves acuáticas y rapaces en un embalse dulceacuicola artificial de Baja California Sur, México. *Revista de Biología Tropical* 49: 1131-1142.
- Danemann, G. D., R. Carmona and G. Fernández. 2002. Migratory shorebirds in the Guerrero Negro saltworks, Baja California Sur, México. *Water Study Group Bulletin* 97:36-41.
- Dugger, B. D., K. M. Dugger and L. H. Fredrickson. 2009. Hooded Merganser (*Lophodytes cucullatus*). *In* The Birds of North America, A. Poole (ed.). University of Cornell, Ithaca. 30 p.
- Erickson, R. A., R. A. Hamilton and S. N. G. Howell. 2001. New information on migrant bird in northern and central portions of the Baja California Peninsula, including species new to Mexico. *In* Birds of the Baja California peninsula: status, distribution, and taxonomy, R. A. Erickson y S. N. G. Howell (eds.). *Monographs in Field Ornithology* 3. American Birding Association. Colorado Springs. p. 112-170.
- Erickson, R. A., R. A. Hamilton, R. Carmona and G. Ruiz Campos. 2006. Baja California Peninsula. *North American Birds* 60:143-146.
- Erwin, R. M., M. Coulter y C. Howard 1986. The use of Natural vs. Man-modified Wetlands by shorebirds and waterbirds. *Journal of the Colonial Waterbird Group*. 9:137-138.
- Grinnell, J., 1928. A distributional summation of the ornithology of lower California. University of California, Publication Zoology 32. 300 p.
- Guzmán, J., R. Carmona, E. Palacios and M. Bojórquez. 1994. Distribución temporal de aves acuáticas en el Estero de San José del Cabo, B.C.S., México. *Ciencias Marinas* 20:93-103.
- Howell, S. N. G. and S. Webb. 1995. A guide to the birds of Mexico and northern Central America. Oxford University Press. Oxford. 851 p.
- Leopold, A. S. 1977. Fauna silvestre de México. IMERNAR, México, D.F. 641 p.
- Llinas, J. and M. L. Jiménez. 1997. Recent records of the least grebe *Tachybaptus dominicus* in Baja California Sur, México. *Anales del Instituto de Biología de la Universidad Nacional Autónoma de México, Serie Zoológica* 68:187-191.
- Mowbray, T. N., C. R. Ely, J. S. Sedinger and R. E. Trost. 2002. Canada Goose (*Branta canadensis*). *In* The Birds of North America, A. Poole y F. Gill (eds.). The Birds of North America. Philadelphia. No. 682.
- Myers, J.P., R. I. G. Morrison, P. Z. Antas, B. A. Harrington, T. E. Lovejoy, M. Sallaberry, S. E. Senner and A. Tarak. 1987. Conservation strategy for migratory species. *American Science* 75:19-26.
- Rodríguez-Estrella, R. and L. Arriaga. 1997. Implicaciones ecológicas de las actividades humanas en la biota asociada a los oasis. *In* Los Oasis de la Península de Baja California, L. Arriaga and R. Rodríguez Estrella (eds.). SIMAC-CIB. La Paz, B. C. S. p. 285-292.
- Sauma, L., R. Carmona and G. Brabata, 2005. First nesting record of the Black-bellied Whistling-duck on the Baja California Peninsula, Mexico. *Western Birds* 36:317-321.
- Saunders, G. B. and D. C. Saunders. 1981. Waterfowl and their wintering grounds in Mexico, 1937-64. *United States Fish and Wildlife Service* 138:1-151.
- Schnack, J. A., F. O. De Francesco, U. R. Colado, M. L. Novoa and E. J. Scnack. 2000. Humedales antrópicos: su contribución para la conservación de la biodiversidad en los dominios subtropical y pampásico de la Argentina. *Ecología Austral* 10:63-80.
- Wilbur, S. R. 1987. *Birds of Baja California*. University of California. Berkeley. 253 p.
- Zamora-Orozco, E. M., R. Carmona and G. Brabata. 2007. Distribución de aves acuáticas en las lagunas de oxidación de la ciudad de La Paz, Baja California Sur, México. *Revista de Biología Tropical* 55:617-626.