Amphibians and Reptiles in the Vicinity of Bulusan Lake, Bulusan Volcano Natural Park, Sorsogon, Philippines

Jake Wilson B. Binaday¹,* , Ace Kevin S. Amarga², Ernesto S. Barrameda Jr.³, and Bobet Jan M. Bonagua⁴

¹Community Environment and Natural Resources Office, San Jacinto, Masbate 5417 Philippines
²Institute of Weed Science, Entomology, and Plant Pathology, College of Agriculture and Food Science, University of the Philippines, Los Baños, Laguna, Philippines
³Science Department, Polangui Comprehensive High School, Polangui, Albay
⁴Quinale, Tabaco City, Albay 4511 Philippines

A preliminary inventory of amphibians and reptiles from the vicinity of Bulusan Lake, Bulusan Volcano Natural Park is presented. So far, there is no existing account documenting the herpetofauna of this unique protected area. With this report, the researchers aim to provide baseline data on the identities of species of amphibians and reptiles existing in the natural park. A survey was conducted by employing visual encounter surveys. Specimens were identified in situ and were recorded by photographic documentation. The study resulted in the documentation of 26 species belonging to 24 genera in 14 families. This includes eight species of frogs, ten lizards, and eight snakes. The survey provides the first record of Aplopeltura boa (Blunthead Slug-eating Snake) from Luzon Island, and clarifies a previous point of confusion regarding species identification and use of the names Boiga drapiezii (White-spotted Cat Snake) and Boiga angulata (Philippine Blunt-headed Cat Snake) on Luzon. A novel account of a white-iris Tropidolaemus subannulatus (Northern Temple Pit Viper) is also presented. Considering the limited time and the confined area where the survey was conducted, a significant increase in this species list is expected as more surveys are conducted in the natural park focusing on different elevations and microhabitats. If future studies are permitted by the protected area managers, there is a high possibility of discovering several novel and endemic species.

Key words: amphibians, Aplopeltura boa, Boiga drapiezii, Bulusan Volcano, reptiles, white iris

INTRODUCTION

Recent herpetological surveys conducted in Northern and Central Luzon have revealed a startlingly rich diversity array of amphibians and reptiles (McLeod et al. 2011; Siler et al. 2011, 2012; Brown et al. 2012; Devan-Song & Brown 2012; Brown et al. 2013b). Among the hypothesized contributors to this diversity is the isolation of Luzon’s precursor paleoislands in recent geological past and their eventual accretion to form Luzon’s conglomerate landscape of today (Adams & Prat 1911; Rutland 1968; Hashimoto 1981; Auffenberg 1988; Brown et al. 1996; Brown & Diesmos 2009; Yumul et al. 2009; Brown et al. 2013b). In addition, recent studies have also considered geography, atmospheric variation, and Pleistocene climate change cycles as additional factors (Brown & Diesmos 2009; Brown et al. 2012), which may have contributed to evolutionary processes of diversification.

*Corresponding author: jakewilsonbinaday@yahoo.com
Southern Luzon’s Bicol Region contains species that are distinct from the rest of this large island. Biogeographers previously have recognized the Bicol faunal sub-region, as a distinct sub-center of endemism. This faunal sub-region covers mainland Bicol and the islands of Alabat, Rapurapu, Catanduanes, Marinduque, and Polillo (Welton et al. 2014). Several herpetofaunal studies have been conducted in Bicol and have resulted in the discovery of several new species and new geographic distribution records (e.g., Brown & Gonzalez 2007; Siler et al. 2010a, 2010b, 2011; Linkem et al. 2013; Binaday & Lobos 2016; Sy & Binaday 2016; Siler et al. 2017). However, most of these studies were from Northern and Central Bicol. The southern tip of Bicol remains to be explored in terms of its herpetological diversity.

Within Southern Bicol is an active volcano located in the province of Sorsogon – Bulusan Volcano (Figure 1). Most of the mountain has been declared as a protected area (PA; the Bulusan Volcano Natural Park). The PA includes a total area of 3,673.29 ha and includes parts of the municipalities of Bulusan, Irosin, Juban, Barcelona, and Casiguran. This remaining intact forest provides humans food, resources, protection from harsh weather and flood, and provide

![Figure 1](image_url)

**Figure 1.** (A) Bulusan Volcano is an active volcano located in southern Luzon within the Bicol Faunal Sub-region. The surrounding forest of Bulusan Volcano Natural Park covers 3,673.29 ha. Study site indicated with red circle (Bulusan Lake and the road going to it). (B) Close up of the study site. Bulusan Lake road is about 1.7 km and leads to the lake. The lake itself is surrounded by dense forest vegetation.
a large amount of freshwater for irrigation and human
consumption (Dudgeon 1992; Ratner 2000; Thapa 2001;
Pattanayak 2004; McLeod et al. 2011). Part of the natural
park includes Bulusan Lake. Located in the municipality
of Bulusan, it is one of three large lakes in area and is
identified as a popular tourist attraction. Because of this
designation as a tourist destination, the local government
has maintained most of the natural appearance of the lake
and its surrounding area with minimal disturbance.

The study presents the results of a preliminary inventory
of amphibians and reptiles in the vicinity of Bulusan
Lake. However, because it is a federally protected area,
the government strictly regulates research in the PA. Due
to this restriction, no specimens could be collected during
the course of this study. However, whenever possible,
photographic documentation for all species encountered
was performed. The tentative identification of species was
provided based on high resolution images. This survey
provides the first report of amphibians and reptiles of
the natural park, intended to increase the understanding
of local and regional microendemism as well as the
distribution of Luzon’s herpetological diversity. The short
survey revealed new geographical distribution records and
natural history observations.

METHODS

This survey was based on the several visits during May-
Sep 2015 (26-29 May, 4-6 Jun, 20-22 Jun, 18-19 Jul,
21-23 Aug, 19-21 Sep, and 25-28 Sep) and 14-15 Feb
2016. Visual encounters were employed to document
and assess herpetological diversity at the site. Areas such
as forest trails, lake vicinity, and the road going to the
lake were surveyed for one to two hours by two to three
biologists during the day (9:00am-3:00pm) and night
(7:00pm-12:00pm). Specimens were identified in situ and
were photo-documented, except for eight species (i.e.,
Rhinella marina, Bronchocela marmorata, Gekko cf.
mindorensis, Pseudogekko cf. compressicorpus, Lipinia
pulchella pulchella, Tropidophorus grayi, Oligodon
ancorus, and Hemibungarus calligaster calligaster) which
escaped upon approach of researchers or otherwise alluded
attempts to secure high quality images. No voucher
specimens were collected but images representing each
species have been deposited at the digital archive of the
Lee Kong Chian Natural History Museum, National
University of Singapore and are permanently cataloged
(catalog numbers presented in Figures 3 and 4).

Bulusan Volcano at the southern end of the island of Luzon
is a stratovolcano with an elevation of 1,565 m above sea
level and a base diameter of 15 km. It is one of the most
active volcanos in the Philippines. Bulusan Lake (Figures
1 and 2) is located in the southeastern side of Mt. Bulusan
(12.7542°N, 124.09409°E) and is approximately 400 m
above sea level. The area surveyed is characterized by
secondary growth forest (Figure 2A & B) with large vines
dangling from the canopy (C), and large boulders that
serve as attachment for several epiphytes like giant ferns
(D) – the most common vegetation in the park. Decaying
logs are fairly abundant in the area. Many of the rocks and
boulders are covered with moss. Leaf litter is fairly thick
along forest edges and within the forest. Large vines hang
from trees extending down to the ground. The understory
is dense with tree saplings in many areas. A tourist lounge
is situated on the southeast side of the lake. Furthermore,
the lake is encircled by a concrete path (E) and dense forest
vegetation. The road leading to the lake is also surrounded
by dense forest vegetation (F) with several shallow cliffs;
a very small stream is located at the entrance to the PA.

Figure 2. Habitats in Bulusan Volcano Natural Park. Bulusan Lake
(A and B) is surrounded mostly by second-growth forest
(C), and large boulders that serve as attachment for many
epiphytes (D). A concrete path also surrounds the lake
(E). Bulusan Lake road (F), which leads to the lake, is
also characterized by the same habitats.
RESULTS

A total of 26 species, belonging to 24 genera, representing 14 families were documented. This includes eight species of frogs, 10 lizards, and eight snakes (Figure 3 and 4). Information on the natural history, endemism, distribution, and conservation status of these species (Brown et al. 2012, 2013a; Diesmos et al. 2015; Sanguila et al. 2016; IUCN 2015, The Reptile-Database) are indicated in Tables 1 and 2.

Table 1. Current distribution of anurans accounted in the vicinity of Bulusan Lake, Bulusan Volcano Natural Park, Sorsogon, Philippines and their conservation status (PAIC- Pleistocene Aggregate Island Complexes).

<table>
<thead>
<tr>
<th>Taxon</th>
<th>Endemicity</th>
<th>Distribution in Philippines</th>
<th>Conservation Status</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Bufonidae</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rhinella marina</td>
<td>Introduced</td>
<td>All major islands except the Sulu Archipelago</td>
<td>Least Concern</td>
</tr>
<tr>
<td><strong>Ceratobatrachidae</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Platymantis corrugatus</td>
<td>Endemic</td>
<td>All major islands except the Batanes, the Palawan PAIC, and the Sulu Archipelago</td>
<td>Least Concern</td>
</tr>
<tr>
<td>Platymantis dorsalis</td>
<td>Endemic</td>
<td>Luzon and Western Visayas PAICs</td>
<td>Least Concern</td>
</tr>
<tr>
<td>Platymantis luzonensis</td>
<td>Endemic</td>
<td>Central and Southern Luzon</td>
<td>Near Threatened</td>
</tr>
<tr>
<td><strong>Dicroglossidae</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Limnonectes woodworthi</td>
<td>Endemic</td>
<td>Luzon PAIC</td>
<td>Least Concern</td>
</tr>
<tr>
<td><strong>Ranidae</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pulchrana similis</td>
<td>Endemic</td>
<td>Luzon PAIC</td>
<td>Near Threatened</td>
</tr>
<tr>
<td>Sanguirana luzonensis</td>
<td>Endemic</td>
<td>Luzon PAIC</td>
<td>Least Concern</td>
</tr>
<tr>
<td><strong>Rhacophoridae</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Polypedates leucomystax</td>
<td>Native</td>
<td>All major islands</td>
<td>Least Concern</td>
</tr>
</tbody>
</table>
Table 2. Current distribution of reptiles accounted along the vicinity of Bulusan Lake, Bulusan Volcano Natural Park, Sorsogon, Philippines and their conservation status (PAIC- Pleistocene Aggregate Island Complexes; * first account for the island of Luzon).

<table>
<thead>
<tr>
<th>Taxon</th>
<th>Endemicity</th>
<th>Distribution in Philippines</th>
<th>Conservation Status</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Agamidae</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Bronchocela marmorata</em></td>
<td>Endemic</td>
<td>Luzon PAIC, Mindoro and Sibuyan islands</td>
<td>Least Concern</td>
</tr>
<tr>
<td><em>Draco spilopterus</em></td>
<td>Native</td>
<td>Luzon and Western Visayas PAICs</td>
<td>Least Concern</td>
</tr>
<tr>
<td><em>Gonocephalus cf. sophiae</em></td>
<td>Endemic</td>
<td>Luzon PAIC</td>
<td>Data Deficient</td>
</tr>
<tr>
<td><strong>Gekkonidae</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Cyrtodactylus philippinicus</em></td>
<td>Native</td>
<td>Luzon and Western Visayas PAICs, Mindoro islands</td>
<td>Least Concern</td>
</tr>
<tr>
<td><em>Gekko cf. mindorensis</em></td>
<td>Endemic</td>
<td>Luzon, Mindanao, and Western Visayas PAICs</td>
<td>Data Deficient</td>
</tr>
<tr>
<td><em>Pseudogekko cf. compressicorpus</em></td>
<td>Endemic</td>
<td>Luzon and Mindanao PAICs, Leyte, Tablas, and Masbate islands</td>
<td>Least Concern</td>
</tr>
<tr>
<td><strong>Scincidae</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Lipinia pulchella pulchella</em></td>
<td>Endemic</td>
<td>Southern Luzon, Mindanao PAICs, and Polillo island</td>
<td>Least Concern</td>
</tr>
<tr>
<td><em>Pinoyscincus cf. jagori jagori</em></td>
<td>Endemic</td>
<td>Luzon and Mindanao PAICs</td>
<td>Least Concern</td>
</tr>
<tr>
<td><em>Tropidophorus grayi</em></td>
<td>Endemic</td>
<td>Luzon and Western Visayas PAICs, East Visayas faunal sub-region of the Mindanao PAIC</td>
<td>Least Concern</td>
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<tr>
<td><strong>Varanidae</strong></td>
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<td></td>
<td></td>
</tr>
<tr>
<td><em>Varanus dalubhasa</em></td>
<td>Endemic</td>
<td>Bicol faunal sub-region of Luzon PAIC</td>
<td>No Status Yet</td>
</tr>
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<td><strong>Colubridae</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Ahaetulla prasina preocularis</em></td>
<td>Subspecies</td>
<td>Most major islands</td>
<td>Least Concern</td>
</tr>
<tr>
<td><em>Boiga drapiezii</em></td>
<td>Native</td>
<td>Species name previously applied only in southern Philippines (Sulu Arciphelago)</td>
<td>Least Concern</td>
</tr>
<tr>
<td><em>Oligodon ancorus</em></td>
<td>Endemic</td>
<td>Luzon and Mindoro PAICs</td>
<td>Near Threatened</td>
</tr>
<tr>
<td><strong>Elapidae</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Hemibungarus calligaster</em></td>
<td>Endemic</td>
<td>Luzon and Mindoro PAICs</td>
<td>Least Concern</td>
</tr>
<tr>
<td><strong>Lamphrophiidae</strong></td>
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<td></td>
<td></td>
</tr>
<tr>
<td><em>Psammodynastes pulverulentus</em></td>
<td>Native</td>
<td>Most major islands in the country</td>
<td>Least Concern</td>
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<tr>
<td><strong>Pareidae</strong></td>
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<td></td>
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<tr>
<td><em>Aplopeltura boa</em></td>
<td>Native</td>
<td>Previously recorded in the islands of Balabac, Basilan, Samar, Bohol, Mindanao, and Palawan</td>
<td>Least Concern</td>
</tr>
<tr>
<td><strong>Viperidae</strong></td>
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<td></td>
<td></td>
</tr>
<tr>
<td><em>Trimeresurus flavomaculatus</em></td>
<td>Endemic</td>
<td>Luzon, Mindanao, and Western Visayas PAICs, Mindoro island</td>
<td>Least Concern</td>
</tr>
<tr>
<td><em>Tropidolaemus subannulatus</em></td>
<td>Native</td>
<td>Luzon and Western Visayas PAICs, East Visayas faunal sub-region of the Mindanao PAIC</td>
<td>Least Concern</td>
</tr>
</tbody>
</table>
Annotated Species List

Anurans

Bufonidae

*Rhinella marina* (Linnaeus, 1758)

*Common Name:* Cane Toad

This species was first introduced on Negros Island during the industrial revolution to control pests in sugar cane plantations (Diesmos et al. 2006; Brown et al. 2013a). Since then, it has spread throughout the country and can be found in high numbers in lowland agricultural areas (e.g., foot hills of mountains), and up to elevations of 1200 masl in a few areas (Brown et al. 2012; 2013a; Diesmos et al. 2015). Only one individual was encountered at the entrance to Bulusan Lake road. Additionally, a few calls were heard around the same area.

Ceratobatrachidae

*Platymantis corrugatus* (Duméril, 1853)

*Common Name:* Rough-backed Forest Frog

*Platymantis corrugatus* has been found throughout the Philippines except in Palawan PAIC and Sulu Archipelago islands (Diesmos et al. 2015). An endemic, it is characterized by a dark facial mask, elongate tubercular ridges across its dorsal surface, and a medium body size (Brown et al. 2013a). Individuals were usually observed either hidden under thick vegetation or hidden in leaf litter. Four color morphs were observed at the site. These were yellow-orange, maroon, brown, and grayish brown.

*Platymantis dorsalis* (Duméril, 1853)

*Common Name:* Common Forest Frog

This endemic species is widespread throughout Luzon and Western Visayas (Diesmos et al. 2015). It was the most commonly encountered species at Bulusan Lake and was usually seen on the forest floor on top of leaf litter both day and night. Numerous vocalizing males were observed perched on top of rocks. Several morphs were observed including individuals with shades of brown, red, or orange as their dominant color, individuals with no stripes, one thin or thick middorsal stripe, and individuals with two dorsal stripes.

*Platymantis luzonensis* Brown, Alcala, Diesmos, and Alcala, 1997

*Common Name:* Luzon Forest Frog

An arboreal species, *Platymantis luzonensis* has been recorded in Central and Southern Luzon (McLeod et al. 2011; Diesmos et al. 2015). This species can usually be found on vines, leaves, branches, and trunks of trees. Three individuals were encountered during the survey, but calls of the species were heard almost every night. Two color morphs were encountered. One was dark brown in color while two were golden brown. All three individuals had dorsolateral stripes and transverse bars on the dorsal surface of their legs. Two were encountered inside a dead hollow trunk during the day. Another was observed perched on top of a fern at night. All three individuals had a white iris above their pupil which contrasts with the dark brown body coloration.

Dicroglossidae

*Limnonectes woodworthi* (Taylor, 1923)

*Common Name:* Woodworth’s Frog

*Limnonectes woodworthi* has been observed all throughout Luzon and some nearby islands (Diesmos et al. 2015). This fanged frog species is more commonly encountered in riparian habitats in southern Bicol and lives sympatrically with *L. macrocephalus* (McLeod et al. 2011; Brown et al. 2013a). It can be differentiated from the latter species by its smaller size, dorsal and dorsolateral folds, and dark tympanic region (McLeod et al. 2011). Only very few individuals were encountered along the lake shore and forest floor; both large adults and smaller juveniles were encountered during the survey.

Ranidae

*Polypedates similis* (Günther, 1873)

*Common name:* None

Previously under the genus *Hylarana*, this species of tree frog is widespread throughout Luzon (Diesmos et al. 2015). It is abundant in pristine rivers and streams in mid- and high-elevation forests (McLeod et al. 2011; Brown et al. 2012, 2013a), but can also be found in semi-disturbed streams and even in subterranean rivers. Several individuals were encountered on the shores of Bulusan Lake, after dark, either on the forest floor or perched on a rock, branch, leaf, or a vine.

*Sanguirana luzonensis* (Boulenger, 1896)

*Common Name:* Luzon Frog

This stream frog has been recorded throughout Luzon and some nearby islands (Diesmos et al. 2015). Its habitat preference range from heavily disturbed to pristine riparian systems, but it is more common in mid- to high-elevation forests (Brown et al. 2013a). This species varies greatly in dorsal coloration, ranging from shades of green and brown, to mottled (McLeod et al. 2011). Two juveniles were encountered perched on leaves of shrubs at night and were considered noteworthy, given that the nearest stream is approximately 1.5 km away.

Rhacophoridae

*Polypedates leucomystax* (Gravenhorst, 1829)

*Common Name:* Common Tree Frog

A non-endemic species, it is widespread throughout the country (Diesmos et al. 2015) and is often found around temporary pools of water in disturbed and residential areas (McLeod et al. 2011). It is an arboreal species and is locally known as “palakang saging” or “banana frog” (Siler et al. 2012) since it is commonly found around banana plantations. Only one individual was encountered on the outskirts of the road to the lake. However, several calls
were heard from time to time during the survey in the vicinity of the observed individual.

**Reptiles**

**Lizards**

**Agamidae**

*Bronchocela marmorata* Gray, 1845

**Common Name:** Marbled Bloodsucker

This species is widely distributed in Luzon. It is usually encountered in the morning perched on exposed tree trunks and shrubs while basking in the sun. This species possesses the ability to change dorsal coloration from green to brown, and the researchers assume that its tendency to remain motionless contributes to its impressive camouflage abilities (Lagat 2011). One juvenile was seen basking on a giant fern frond in the early morning.

*Draco spilopterus* (Wiegmann, 1834)

**Common Name:** Philippine Flying Dragon

This species is widespread throughout Luzon and Western Visayas and is commonly observed on trunks and canopies of coconut palms in plantations where it feeds on ants and termites (McGuire & Alcala 2000; McLeod et al. 2011; Siler et al. 2012). A few individuals of this flying lizard were seen sleeping horizontally at night on vines and branches of small herbaceous plants. During the day, they have been seen gliding among trees in forests surrounding the lake.

*Gonocephalus cf. sophiae* (Gray, 1845)

**Common Name:** Luzon Forest Dragon

*Gonocephalus sophiae* is thought to occur throughout Luzon and nearby islands. However, recent undergoing taxonomic work reveals that 12 major lineages exist in the Philippines and that two are native to the Bicol peninsula (Welton et al. 2016). These two lineages were from Mt. Isarog and Mt. Malinao in northern and central Bicol, respectively. The researchers consider it likely that the Mt. Bulusan population may form an additional distinct lineage. This species is very secretive in nature and is well camouflaged (Lagat 2011). Several individuals were observed sleeping vertically or diagonally from the ground, on vines and branches at night.

**Gekkonidae**

*Cyrtodactylus philippinicus* (Steindachner, 1867)

**Common Name:** Philippine Bow-fingered Gecko

The species is possibly the most common gecko in northern Philippines (Brown et al. 2013a), and is usually encountered in low- and mid-elevation forests (Brown et al. 1996, 2000; Diesmos et al. 2005; Siler et al. 2011; Brown et al. 2012, 2013a). Philippine members of the genus *Cyrtodactylus* can easily be distinguished from other gekkonid lizards by their bent toes. This species has been documented retreating to tree holes and rotten logs during the day (Lagat 2011). Several individuals were seen clinging to branches, vines, trunks, and boulders at night.

*Gekko cf. mindorensis* (Taylor, 1919)

**Common Name:** Mindoro Narrow-disked Gecko

This gecko is widespread throughout the Philippines (McLeod et al. 2011; Siler et al. 2011). However, recent phylogenetic work on this species revealed eight deeply divergent clades (Siler et al. 2014), one of which is the Bicol population. This species has been known to prefer microhabitats, such as boulders, tree trunks, shrubs, and other similar structures in riparian habitats (Lagat 2011). They have also been seen in cave entrances. One individual was encountered inside a hollow trunk by the lake.

*Pseudogekko cf. compressicorpus* (Taylor, 1915)

**Common Name:** Philippine False Gecko

The *Pseudogekko compressicorpus* Complex is widely distributed throughout the Philippines, extending from Mindanao, through the eastern island arc (Leyte-Samar), and Luzon (Siler et al. 2010c; Brown et al. 2013a). This gecko can be encountered perched on large leaves, between shrub- and understory layer vegetation, at low- to mid-elevation forests, especially after heavy rains (Brown et al. 2013a). Only two individuals were encountered crawling on the same tree trunk at night by the lake.

**Scincidae**

*Lipinia pulchella pulchella* (Gray, 1845)

**Common Name:** Yellow-striped Slender Tree Skink

This endemic skink is easily distinguished by its small size and a bright, yellow mid-vertebral stripe, running from snout to tail, bordered laterally by black lines. This subspecies has been known to occur in southern Luzon, Polillo Islands, Leyte, Samar, and Mindanao (Brown & Alcala 1980; Sanguila et al. 2016). A few individuals of this species were seen crawling on trunks of trees and on paved walls.

*Pinoscyincus cf. jagori jagori* (Brown and Alcala, 1980)

**Common Name:** Jagor’s Common Ground Skink

*Pinoscyinscus jagori jagori* co-occurs with *Pinoscyincus abdictus aquilonius* within Mt. Isarog in Northern Bicol (Linkem et al. 2010). It is likely that the latter also occurs in Bulusan Volcano Natural Park. But, because to date, only *P. jagori jagori* has been documented on Mt. Bulusan, individuals in the study were tentatively identified as *P. jagori jagori*. This species was the most ubiquitous reptile in the area. Many individuals, ranging from juvenile to adult, were seen on the forest floor during the day. Most of which were seen basking on sunspots, especially at morning.

*Tropidophorus graji* Günther, 1861

**Common Name:** Spiny Waterside Skink

This endemic species occurs on several major islands from Luzon down to Cebu (Brown et al. 2009). Several
individuals were seen during daylight hiding in crevices of overhanging rocks on the shores of Bulusan Lake and the road going to it.

Varanidae
Varanus dalabahsa Welton, Travers, Siler, and Brown, 2014
Common Name: Enteng’s Monitor Lizard
This water monitor species is almost morphologically indistinguishable to Varanus marmoratus with which it was previously confused. However, phylogenetic studies showed that this cryptic species is more closely related to the Visayan lineage, Varanus mulsalis (Welton et al. 2014). Three individuals of this recently described Bicol endemic water monitor was observed during this study. One was seen along the road during midday and another was observed rushing along the trail in early afternoon. A third, the largest of the three, was encountered as it attempted to scavenge on discarded food waste, just behind the tourist lounge kitchen near the lake; this individual was captured, photographed, and subsequently released.

Snakes
Colubridae
Ahaetulla prasina preocularis (Taylor, 1922)
Common Name: Asian Vine Snake
This vine snake species is widely distributed across the country (Leviton 1967). It is usually encountered resting in branches of saplings and bushes in residential areas, edges of agroforests, disturbed and pristine second-growth forests, and logged primary growth (Brown et al. 2013a). This species has several color variation including green, yellow, and blue-green morphs (Oliveros et al. 2011). A few green morphs were encountered sleeping in branches of saplings at night. A juvenile was seen basking on a fern in the morning. One blue morph of the species was also encountered foraging along the trail around the lake.

Boiga drapiezii (Boie, 1827)
Common Name: White-spotted Cat Snake
The White-spotted cat snake has been reported from Sulu Archipelago, the southernmost extent of the Philippines (Gaulke 1994; Leong et al. 2009). However, numerous records of Boiga angulata (a species occuring on Luzon, Polillo, Catanduanes, Mindoro, Lubang, Samar, Leyte, Bohol, Panay, Negros, Cebu, and Mindanao) and Boiga schultzei (considered endemic to the Palawan PAIC landmasses) are morphologically indistinguishable from Boiga drapiezii, which presents a challenge when differentiating the three (Gaulke 2001; Brown et al. 2009).

Leviton (1968) has examined specimens of B. drapiezii from Sarawak, Borneo and compared it with specimens of B. angulata from various localities in the Philippines. His observation showed that there are at least two forms of B. drapiezii that exist in northern Borneo. One has a series of uniform light and dark crossbars and a solid white middorsal stripe, and the other has a series of saddled-shape light brown blotches separated by dark brown crossbars which widen on the sides on the dorsum. This latter form are exemplified by B. angulata from the Philippines.

Leviton (1968) demonstrated that ventral scale counts of the blotched B. drapiezii from northern Borneo and those of B. angulata were not that different from each other, suggesting that if adequate samples were obtained, the union of the two taxa might be inevitable. He also emphasized a difficulty differentiating B. schultzei from B. drapiezii (the two differing primarily in color pattern). In support of Leviton’s observations, the researchers predict that populations of B. angulata (Taylor 1917, 1922a,b; Leviton 1963; 1970; Ferner et al. 2000; Gaulke 2001, 2011) and B. schultzei (Taylor 1923; Leviton 1963, 1968; Alcala 1986), which are morphologically similar to B. drapiezii, may actually best be referred to B. drapiezii in future analyses (sensu Leviton 1968; contra Peters 1861; Taylor 1923).

Individuals of B. drapiezii from Bulusan Lake and another in Catanduanes exhibited uniform light and dark crossbars but lack the solid white middorsal stipe. Another individual encountered in Mt. Labo (Camrines Norte Province) by JWB exhibited irregularly shaped and spaced, golden and dark brown blotches, leading to consideration that other forms of this highly polymorphic species exist within the country. This is the first account of this species, under the epithet B. drapiezii, which was deliberately used to include its suspected junior synonyms B. angulata from Luzon (Binaday & Lobos 2016) and B. schultzei from Palawan PAIC islands. This species may be common throughout its range but may rarely be seen, due to its elusive nature.

Oligodon ancorus (Girard, 1858)
Common Name: Northern Short-headed Snake
This species was reported from several sites on Luzon and Mindoro islands (Leviton 1962; Supsup 2016). One individual was seen on the ground along the trail surrounding the lake. The individual has a brown dorsum coloration.

Elapidae
Hemibungarus calligaster calligaster (Wiegmann, 1835)
Common Name: Philippine False Coral Snake
This rarely encountered false coral snake is widespread throughout the eastern seaboard of Luzon (Diesmos et al. 2005; Brown et al. 2012, 2013a). One juvenile of this species was encountered on the ground.

Lamprophiidae
Psammodynastes pulverulentus (Boie, 1827)
Common Name: Dark-spotted Mock Viper
Psammodynastes pulverulentus is a widespread species and has been documented throughout the archipelago (Leviton 1983; Brown et al. 2000; McLeod et al. 2011;
Siler et al. 2011; Brown et al. 2012, 2013a; Sanguila et al. 2016). Adults are usually encountered along the ground, while juveniles are usually seen on shrubs in secondary and primary growth forests (Brown et al. 2012). Several individuals were encountered nightly on ferns and other shrubs at the forest edge. Psammodynastes pulverulentus was the most common snake species encountered during the surveys. Three color morphs were encountered during the survey. One had a golden yellow dorsum, another was light- or dark-violet, while the other was brick-red. Most of the individuals observed were juveniles. Only two adults were observed: one female was crawling on the ground when encountered in the early afternoon and one male was coiled in dead vines when encountered at night.

**Pareidae**  
**Aplopletura boa** (Boie, 1828)  
**Common Name:** Blunthead Slug-eating Snake  
The Blunthead slug-eating snake is widespread but considered by some to be “uncommon” (David & Vogel 1996); others have documented it frequently by focusing search efforts after rain, when its preferred prey items (snails and slugs) are active (Sanguila et al. 2016). This species has been reported from Mindanao, Bohol, Basilan, Samar, Palawan, and Balabac islands (Boulenger 1894; Taylor 1922b; Grismer et al. 2012; Sanguila et al. 2016). One was seen coiled on a dead branch on the shore of Bulusan Lake; this provided the first geographic distribution record of this species for the island of Luzon (Sy & Binaday 2016). It seems to occur in many PAs, suggesting the importance of national and natural parks in retaining and protecting the biodiversity of the country.

**Viperidae**  
**Trimeresurus flavomaculatus** (Gray, 1842)  
**Common Name:** Philippine Pit Viper  
This Philippine pit viper occurs throughout the island of Luzon (Leviton 1964; Brown et al. 2012). Throughout its distribution, it is a highly polymorphic species in terms of coloration (McLeod et al. 2011; Siler et al. 2011). Two color morphs have been observed at Bulusan Lake. One was brick-red and was seen crawling on the ground. The other one was a green morph with maroon dorsal stripes and was seen on a branch about 3 m high.

**Tropidolaemus subannulatus** (Gray, 1842)  
**Common Name:** Northern Temple Pit Viper  
The Northern temple pit viper is encountered in the Luzon and Visayan regions and is common in forested areas between sea level and mid-elevation (Brown et al. 2013a). It has also been reported from Palawan and Mindanao regions (Alcala 1986; Vogel et al. 2007; Sanguila et al. 2016). This species seems to have great dorsal pattern variation (Vogel et al. 2007). Five individuals were encountered at night and one in the late afternoon, with three perched on vines and another on a woody shrub. One male possessed a notably white iris (Binaday 2017). Two juveniles were encountered foraging along in shrubs.

**DISCUSSION**

The southern volcanic mountains of Luzon have proved to be yet another haven for countless discoveries, in terms of biodiversity of amphibians and reptiles. The brief survey resulted in the documentation of eight amphibians and 18 reptiles and is the first account of the herpetofauna of Bulusan Volcano Natural Park. Survey effort was focused at low in elevation and limited only to the immediate vicinity of Bulusan Lake. As such, it provides only a glimpse of species diversity resident to Bulusan Volcano Natural Park. Nevertheless, the survey results demonstrate several interesting discoveries. These include a new geographic distribution record for *Aplopletura boa* which was only previously recorded on the islands of Mindanao, Basilan, Bohol, Samar, Palawan, and Balabac (Boulenger 1894; Taylor 1922b; Grismer et al. 2012; Sanguila et al. 2016). Such discoveries show that some of the species considered “rare” or restricted might be widespread but only undocumented due to their elusive nature.

The researchers have attempted to clarify that the numerous accounts and populations of *Boiga angulata* in Luzon actually refers to *B. drapiezii*, the name formerly applied only to records from the Sulu Archipelago (Gaulke 1994; Leong et al. 2009). In addition to these new distribution records, it was also observed that *Tropidolaemus subannulatus* was more common in the study area than *Trimeresurus flavomaculatus* in contrast to some areas, where the latter is more commonly encountered (Brown et al. 2012; Devan-Song & Brown 2012; Brown et al. 2013a). Moreover, the encounter of a white-iris *Tropidolaemus subannulatus* is a first account of this coloration possibly representing color pattern occurring at low frequency in the Southern Bicol population.

The purpose of this study is to provide preliminary data on the herpetological diversity of Bulusan Volcano Natural Park. Considering that the sampling area was limited, a more extensive survey that will cover more sites and habitats across several elevations will undoubtedly increase the number of species included in the species list, which may surpass the well-surveyed sites in Northern and Central Luzon (Brown et al. 2000; Diesmos et al. 2005; McLeod et al. 2011; Siler et al. 2011, 2012; Devan-Song & Brown 2012; Brown et al. 2012, 2013a). In previous studies, follow-up visits to pre-surveyed sites focusing on different habitats, forest communities, varying atmospheric conditions, and geological features of the landscapes, a significant increase in the herpetological diversity is possible.
diversity is often documented (Diesmos et al. 2005; Siler et al. 2011; Devan-Song & Brown 2012) highlighting the need for additional studies.

Among the amphibian and reptiles species that are expected to be encountered in Mt. Bulusan and surrounding areas as more surveys will be conducted include certain species of frog (Fejervarya moordiei, Fejervarya vititigera, Hoplobatrachus rugulosus, Limnonectes macrocephalus, Occidozyga laevis, Kaloula conjuncta, Kaloula kokacii, Kaloula picta, Philautus surdus, Rhacophorus bimaculatus, and Rhacophorus pardalis); lizard (Brachymeles boulengeri, Brachymeles brevidactylus, Brachymeles makosog, Eutropis multifasciata, Eutropis multicarinata borealis, and Lamprolepis smaragdina philippinica); snake (Boiga cynodon, Boiga dendrophila divergens, Calamaria gervaisii, Chrysopoea paradisi variabilis, Coelognathus erythrurus, Cyclocorusc lineatus, Dendrelaphis marenae, Dendrelaphis philippinensis, Gonyosoma oxycephalum, Lycodon capucinus, Lycodon muelleri, Malayopython reticulatus, Oxyrhadidium leporinum, Ptyas luzonensis), and Indotyphlops braminus; and turtle (Cuora amboinensis). This would be the case since most of these species are found consistently throughout the Luzon faunal region (Brown et al. 2000; Diesmos et al. 2005; McLeod et al. 2011; Siler et al. 2011, 2012; Devan-Song & Brown 2012; Brown et al. 2012, 2013a). In addition to these species, the researchers expect that there is a great possibility that several new species, especially of the genus Platymantis, may be discovered in this mountain and surrounding areas.

Amphibians and reptiles are important indicators of ecological health. They are sensitive to disturbance and are fragile which is excellent for indicating ecosystem function (Pechmann et al. 1991; Hager 1998; Welsch & Ollivier 1998; Lawler et al. 2003; McLeod et al. 2011). An ecological community that is both taxonomically and functionally diverse represents a healthy local community (Sodhi et al. 2008; Sodhi & Ehrlich 2010; McLeod et al. 2011). However, the herpetofauna of southern Luzon is facing several threats, both natural and manmade. They include climate change, habitat modification and destruction, natural disasters, wildlife and pet trade, and threats from invasive species. Never has there been a more important time to protect and conserve the country’s unique herpetological diversity—in particular, the distinct fauna of the southern tip of Luzon Island.

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