



## CHAPTER 6

### ORNITHOLOGY OF NORTHERN MYANMAR

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**ABSTRACT.**—Myanmar is a large, biodiverse country located between India and China in the west and east, and south of Tibet. Kachin State, situated in far northern Myanmar, is expected to be especially biodiverse because of its habitat and climatic diversity, ranging from lowland riparian areas to the high-elevation Himalayan Mountains. These areas of northern Myanmar are especially poorly known biologically, largely because of their difficult terrain, rugged mountains, and enormous rivers. We summarize the ornithological history of northern Myanmar and document the names, dates, and geographic areas (along with a bilingual gazetteer of names) of major ornithological expeditions. Because foreign naturalists made most of the bird collections, the resulting material is scattered around the world. We have compiled and organized information about past research and collections, and we suggest areas for future research investment. To date, few local areas within northern Myanmar have been surveyed, including the far northern region of Kachin State up to the last village of Tahawndam, the southeastern part of Kachin State around Laukkaung-Hpimaw, the southern part of Kachin around the town of Myitkyina, the northwestern area of Putao District, the northeastern part of Kachin around Taron and Thala Wang, and the central part of Kachin around the “Triangle,” which is the area between the May Hka River and Mali Hka River. Our analysis identifies several significant geographic areas where additional collection and documentation are needed, biodiversity is high, and local endemism is likely. These areas include the upper area of Chimili pass, the northeast portion of Kachin, the Kumon range, the central portion of Kachin, and the Hponkan Razi Wildlife Sanctuary.

Key words: bird, Burma, collection, expedition, Kachin, Myanmar, surveys.

#### Ornitología del Norte de Birmania

**RESUMEN.**—Birmania (Myanmar) es un país grande y con alta biodiversidad que se localiza entre India y China hacia el oeste y el este, y al sur de Tibet. Se espera que el estado de Kachin, situado en la parte norte de Birmania, sea especialmente diverso por su diversidad de hábitats y de climas, que varían desde áreas bajas ribereñas hasta las montañas de gran altitud del Himalaya. Estas áreas del norte de Birmania son especialmente poco conocidas en términos biológicos, en gran medida por las dificultades de su terreno, montañas escarpadas y grandes ríos. En este trabajo resumimos la historia ornitológica del norte de Birmania y documentamos los nombres, fechas y áreas geográficas (junto con un gacetero bilingüe de los nombres) de las principales expediciones ornitólogas. Debido a que naturalistas extranjeros hicieron la

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mayoría de las colecciones de aves, el material resultante se encuentra disperso por el mundo. Compilamos y organizamos la información sobre investigaciones y colecciones pasadas, y sugerimos áreas para investigaciones científicas futuras. Hasta el momento, pocas localidades en el norte de Birmania han sido muestreadas, incluyendo la región del estado de Kachin en el extremo norte de Birmania hasta el último poblado de Tahawndam, en la parte sur del estado de Kachin en las cercanías de Laukkaung-Hpimaw, en la parte sur de Kachin en las cercanías de del poblado de Myitkyina, en la parte noroeste del distrito Putaon, en la parte noreste de Kachin en las cercanías de Taron y Thala Wang y en la parte central de Kachin en las cercanías del "Triángulo," que es el área entre los ríos May Hka y Mali Hka. Nuestro análisis identifica varias áreas geográficas significativas donde aún se requieren colecciones y documentación adicional, en las que la biodiversidad es alta y el endemismo local es muy probable. Estas áreas incluyen la parte alta del paso Chimili, la porción norte de Kachin, la región de Kumon, la parte central de Kachin y el Santuario de Vida Silvestre de Hponkan Razi.

MYANMAR, FORMERLY KNOWN as Burma, has one of the richest avifaunas among countries its size (e.g., Smythies 1953, Renner et al. 2007). It is situated in Southeast Asia, ranging from sea level in coastal areas of the Bay of Bengal and the Andaman Sea to the snow-capped Hkakabo Razi, Southeast Asia's highest mountain (Smythies 1953, Tordoff et al. 2005). Northern Myanmar, and specifically Kachin State, is geographically and biologically very important because it is the source of the Ayeyarwady (or Irrawaddy), which is the major river flowing through the country, and it has high mountains, including Mt. Hkakabo Razi. Kachin State also hosts a rich endemic flora and fauna that attracted the famous botanist Kingdon-Ward, who launched numerous expeditions there in the early 1900s (Kingdon-Ward et al. 1932, Kingdon-Ward 1941, Yeinnwepar 2008).

Myanmar has a long but relatively sparse history of ornithological exploration and research, and knowledge of the avifauna of Kachin State remains incomplete. Starting in the mid-1800s, birders began surveying and collecting birds of Myanmar. Several foreign naturalists led important biological expeditions, and the resulting collections are scattered around the globe. Despite considerable gaps in our knowledge, significant data are now available, even for northern Myanmar.

The most thorough review of Myanmar ornithology can be found in Smythies (1953). Some recent field guides also have useful bibliographies; however, they do not review the literature thoroughly, nor do they focus solely on Myanmar (e.g., Robson 2000). In recent years, it has become possible for researchers anywhere in the world to instantly gain access to data from even obscure and disparate collections through online database searches using the Ornithological Information System (ORNIS) and Global Biodiversity Information Facility (GBIF) websites. This

has allowed us to include more localities and to find and comment on less accessible collections. Despite the fact that these new data sources are available online, many place names or other data are poorly researched, incompletely documented, misspelled, or otherwise in need of revision. We seek to remedy this by offering a more complete ornithological gazetteer with preferred names and spellings in English and Myanmar and with associated georeferences.

Below, we briefly review the ornithological history of Myanmar, with a special focus on the northern areas that include the eastern Himalayas. We include ornithological data based on museum records, collectors' names, published literature, and other sources. We additionally provide a georeferenced gazetteer of important Myanmar ornithological localities with both English and Myanmar locality names.

## METHODS

*Historical information.*—We searched for ornithological literature on Myanmar, focusing on northern Myanmar, using several online and hard-copy bibliographic databases (ISI Web of Knowledge, Zoological Record, PubMed, Google Scholar); searched records of major museums using ORNIS and GBIF databases (GBIF 2010, 2009; ORNIS 2010); distributed queries; and contacted museum curators and collections. H.K.M.M.T. formerly worked in the Nature and Wildlife Conservation Division (NWCD), Forest Department (FD) in Myanmar, and she was familiar with recent work and department reports written in Myanmar and kept in government libraries. From these records, we extracted information about surveys and expeditions to Myanmar, including information about collectors, dates, localities, and the museums that now store the remaining

specimens. This information typically led us to museum publications or published expedition reports if any existed. In our summary of the history, we attempt to cite all major references related to ornithological expeditions in Kachin State, northern Myanmar.

*Gazetteer.*—Important ornithological place names were collected from several sources, including ornithological literature (expedition reports, species descriptions, avifaunal guides, etc.), museum catalogue data, and GBIF and ORNIS searches (GBIF 2010, ORNIS 2010). All place names were tabulated as spelled in these various sources, and synonyms and Myanmar names were also compiled from the same sources.

Because so many synonymous place names or alternative spellings have been perpetuated in the literature, it becomes important to standardize names to reduce confusion and to facilitate electronic searching. In choosing the preferred place names, first we attempted to use place names that are officially and commonly used in Myanmar. When there were competing names, we chose the name that most closely resembled the accepted Myanmar spelling in the native tongue, and we preferred spellings that included geographic information (details given below). In the gazetteer, synonyms are listed and they reference the preferred place names. In some cases, locality names remain unclear because they originated from local ethnic languages such as Rawang or Lisu. In these cases, we adopt the form most commonly used in the ornithological literature, and we provide an equivalent name in English or Myanmar (Burmese). In cases with no obvious most common name, we selected the name from older maps (Surveyor General of India maps of Burma, dated 1921, 1943, 1944).

It is difficult to find accurate maps that contain detailed latitude and longitude and both English and Myanmar names. Most maps commonly used in Myanmar lack detailed latitude and longitude, they have confusing and inconsistent spellings (even in Myanmar), and most lack the northern localities or remote areas that are of greatest interest to today's biologists. We used maps and georeferenced data from multiple sources, including Google.com, Maplandia.com, GeoNames, BioGeomancer, Union of Myanmar: State and Division Maps (Anonymous 2004), Surveyor General of India maps of Burma (1921, 1943, 1944), Hkakabo Razi National Park map (Wildlife Conservation Society [No year]), field

maps provided by the Wildlife Conservation Society (WCS), and expedition itinerary maps collected from published references (Kingdon-Ward et al. 1932, Stanford and Ticehurst 1938, Kingdon-Ward 1939, Smythies 1953, Rabinowitz and Khaing 1998, Klieger 2003b, Renner et al. 2007, Yeinnwepar 2008). We also contacted colleagues from the Myanmar Forest Department and WCS who have worked in northern Myanmar to get clear information about spellings and pronunciation commonly used in-country.

*Transcriptions of local names into English.*—Locality names from collection records are often confusing, because most locality names were recorded phonetically by Westerners. Many recorded names are only rough estimations of local pronunciation and spelling. Likewise, in Kachin State most places have local ethnic names that cannot be pronounced or written exactly even in the Myanmar language. Although Myanmar is the official language of the entire country, transliteration from local ethnic languages can lead to misspelling and mispronunciation in Myanmar, with additional changes from Myanmar to English or any other language. In addition, some sites are named after inhabiting groups of native people (H.K.M.M.T. unpubl. data). This practice creates confusion if the group is traditionally nomadic or migratory, as in the case of the Rawang, one of the major ethnic groups of the region (H.K.M.M.T. pers. obs.). When this situation occurs, a name can become associated with more than one locality. In addition, localities shown on historical maps may have changed names or disappeared completely.

#### BACKGROUND INFORMATION

In the early and mid-19th century, the British colonized southern Myanmar ("Lower Burma"). Three Anglo-Burmese wars were fought to control the various independent or autonomous states that today are known as Myanmar, or Burma: (1) 1823 to 1826, (2) 1852 to 1853, and (3) 1885 to 1886. During this process, the British annexed portions of Myanmar into British India step by step from south to north—first Arakan (now known as Rakhine State) and Tenasserim (Tantharyi Division), then the Pegu region (Bago), and finally the entire country. The country was thence designated as a state of British India (The Geographer 1966, Albertini 1982, Goldstein 1992, Bryant 1994).

Much early ornithological work was performed by British political or military officers posted in Myanmar who explored new areas and produced ornithological collections. These officers followed paths that were of military and trade importance as British influence spread. For example, Richard Tickell (1811–1875), who collected several new species, was a British army officer and civilian administrator. In 1847 he was promoted as a captain and moved to Tenasserim (today's Tanintharyi) in southern Myanmar. He had an avid interest in birds and was a prolific and gifted bird artist who capitalized on service in India and Myanmar to pursue ornithological interests. Arthur Purves Phayre (1812–1885), whose name was commemorated in the names of a number of animals, including the Phayre's (or Eared) Pitta (*Pitta phayrei*), was a soldier and author. In 1846 he was made assistant to the commissioner of the province of Tenasserim (today's Tanintharyi); in 1849 he became commissioner of Arakan (Rakhine State); and in 1852, after the Second Anglo-Burmese War, commissioner of Pegu (Bago). Finally, he served as chief commissioner of Burma from 1862 to 1867. Robert George Wardlaw-Ramsay (1852–1921) was an army officer and naturalist who served with the army in India, Afghanistan, and Myanmar. John Keith Stanford (1892–1971) was an officer of the Indian Civil Service and an ornithologist who played an active role in gathering ornithological information in Kachin State, largely by enlisting the help of numerous officers of the Burma Military Police and Burma Frontier Service. Some early naturalists came as Christian missionaries and explored and documented the Myanmar flora and fauna of remote areas even before 1850 (i.e., before occupation of the central and northern parts of Myanmar). Francis Mason (1799–1874) was among the pioneers who came to Myanmar in 1830 with the American Baptist Missionary Union. He was stationed in Tavoy (Dawei), Tanintharyi, and his book and notes cover botany, zoology including birds and mammals, and even minerals. His book is a valuable historical record and is remarkably useful for our purpose in that both plant and animal species were presented in both English and native languages (Mason 1850). Apart from the British, there were some explorers from the United States, Germany, Sweden, and France as well.

After Myanmar gained independence on 4 January 1948, ornithological expeditions conducted by foreigners declined, and most continuing work

has been performed by Myanmar foresters involved in wildlife conservation, basic monitoring, and surveys. Their records of birds and field observations can be found in some Burmese Forester Journals, maintained in the FD Library, currently housed in Nay Pyi Taw. Most of this work has been based on bird observations without vouchered collections, and the work was performed primarily to support commercial-timber-associated forest surveys. Myanmar naturalists who were involved in birds include U Tun Yin, U Maung Maung Lay (Lay, U. M. M. 1950), Colonel Hla Aung, and U Saw Han. They contributed their knowledge of Myanmar birds in government reports, papers, and published books (unfortunately, these are hardly available outside Myanmar).

At present, Myanmar's government agencies pursue limited ornithological work. In the early 1980s, the United Nations Development Program and Food and Agriculture Organization helped the Ministry of Agriculture and Forests (now split into two ministries: the Ministry of Forestry, which is responsible for timber extraction, plantation, and wildlife conservation, and the Ministry of Agriculture and Irrigation) to establish the Nature Conservation and National Parks Project (NCNPP). Outcomes of this project were documented as species lists (Lwin et al. 1982; Salter and Sayer 1983; Sayer 1983a, b; Sayer and Han 1983; Thet Tun and Sayer 1983). The NCNPP was to function as a natural resources conservation agency, including working on international conservation policies. Later NCNPP became the NWCD, which collaborated with international institutions and organizations in the 1990s to conduct wildlife surveys. The renaming of ministries and divisions has added further confusion of names and responsibilities.

Myanmar currently has no central repository for natural-history collections. There are three small museums that exhibit taxidermied birds (listed in the Appendix). Another formerly existed in Taunggyi, but this appears to be closed, and the fate of the specimens is unknown. All these small museums own and exhibit only taxidermy mounts without further scientific information. A fourth small museum called "The Biodiversity Museum" in Hlawga Park, Yangon (not to be confused with The Bird Museum, also in Hlawga Park), has some scientifically collected specimens of avifauna collected by the NWCD and the Smithsonian Institution (SI). The SI has shared significant bird collections with the

NWCD over the past 16 years of work in the country. The Biodiversity Museum has ~500 skin specimens representing more than 150 species from various parts of the country—mainly Chatthin, Alaungdaw Kathapa, Taunggyi, and Hkakabo Razi. Those specimens collected by the SI and the California Academy of Sciences (CAS) (herpetofauna) are the only important scientific collections possessed by Myanmar. Unfortunately, part of the collection is damaged because the museum lacks appropriate facilities such as storage cabinets, a sufficient insect control system, and a curator, and because the public lacks knowledge of the value of museum collections. Recently, the FD established a Forest Museum, which mostly exhibited forestry materials, in a former FD compound in Gyogone, Yangon. That museum closed when the FD moved to the new national capital, Nay Pyi Taw, but it should be reopened soon in Nay Pyi Taw.

#### REVIEW OF MAJOR ORNITHOLOGICAL EXPEDITIONS IN MYANMAR

The first scientific collections of Myanmar birds were made in the 1870s, beginning in southern Myanmar, especially Tanintharyi Division, which was the first area to be occupied by the British Empire. Since then, collection of Myanmar birds has included Rakhine State, Mon State, Bago Division, Shan State, Mandalay Division, Kayin State (Karen), Kayah State (Karenni), Sagaing Division, as well as further collecting in the Tanintharyi Division.

According to the earliest collection dates from online data sources (including GBIF and ORNIS), Charles Thomas Bingham made one of the first bird collections for Myanmar while doing field work near Tanintharyi around 1870. He continued collecting specimens through to 1881, and many of his specimens reside in the U.S. National Museum of Natural History (NMNH; Smithsonian Institution). John Anderson made a collection in Mergui Archipelago (Myeik Kyun Su or Myeik Archipelago) for the Indian Museum, Calcutta, from the end of 1881 to early 1882. During 1898 and 1904, William Louis Abbott, an independent physician and associate of the Smithsonian Institution also made several journeys to the Mergui Archipelago using his personal yacht. An extensive collection of vertebrates was donated to the Smithsonian, as well as his extensive correspondence (Smythies 1953, GBIF 2010, ORNIS 2010, Blumgart 2010).

Anderson, Eugene Oates, Wardlaw-Ramsay, William Ruxton Davison, the Tweeddale Collection of Colonel Arthur Hay, Ninth Marquess of Tweeddale (also Lord Arthur Hay or Viscount Walden, referenced as “Walden” in taxonomic literature [Wardlaw-Ramsay 1881]), Allan Hume, J. Darling, and Abbott were involved in the first wave as well. Hume (1829–1912) sponsored major collections of birds throughout the British empire in South and Southeast Asia. Hume’s extraordinary organizational ability, energy, intellect, and willingness to personally fund these ventures resulted in the largest ornithological collection ever made in the Indian Empire under the British, and the eventual acquisition by the British Museum of 82,000 ornithological specimens.

Other important early ornithological collectors include J. C. Hopwood, Gerd Heinrich, Herbert Cecil Smith (Smith 1943), Alexander Mears, Francis Esmond Wingate Venning, Arthur S. Vernay, Peter Fawcitt Garthwaite, J. K. Stanford, and Bertram Evelyn (Bill) Smythies. Table 1 shows collecting dates, major collecting localities (Myanmar states), and where the specimens are currently deposited.

By the early 1900s, ornithologists began to penetrate the northern areas of Myanmar. One of the most prolific ornithological collectors was Smith, who collected 2,300 bird skins in Myanmar. His major collections were from Shwebo (1928–1929, 1931–1932, 1933–1934) and Katha, Maymyo Hills (1936), Mt. Byingye (1938, 1940), Thandaung, Nattaungm (Nattaung), Sittang (Sittaung) valley, Rangoon (Yangon) (1938–1942), Tharrawaddy (Tharyarwady) District (1919–1920, 1933), and mudflats of Sittang (Sittaung) estuary. He was a birder and initially an egg collector only, but developed his skills to prepare skin specimens. He was a supervisor and friend of Smythies, who used Smith’s notes for his book *The Birds of Burma*. Smith participated in expeditions with Smythies and Garthwaite in 1939 and 1940. All his notes are archived in the Natural History Museum at Tring, United Kingdom. In 1937 and 1938, Heinrich, a German collector, collected birds from Mt. Victoria (now Natmataung National Park), which is known for its bird species of restricted range, including the endemic White-browed Nuthatch (*Sitta victoriae*; Stattersfield et al. 1998) and endemic rhododendrons and wild orchids. Part of Heinrich’s collection is stored in the Naturalhistorische Sammlung Wien. Oliver Milton collected in Shan State, Kachin State, Sagaing Division, and areas of southern Myanmar during 1958–1960.

TABLE 1. Major ornithological expeditions in Myanmar with proven specimen holdings. All collections for Kachin State are listed in Table 3. Abbreviations: NMN = Naturalis, National Museum of Natural History; BMNH = British Museum of Natural History; NMNH = National Museum of Natural History, Smithsonian Institution; ROM = Royal Ontario Museum; MCZ = Museum of Comparative Zoology, Harvard University; YPM = Yale University Peabody Museum; MVZ = Museum of Vertebrate Zoology; UMMZ = University of Michigan Museum of Zoology; ZMB = Zoologisches Museum der Humboldt Universität; MIZPAN = Museum and Institute of Zoology, Polish Academy of Science; NMW = Naturhistorisches Museum Wien (Vienna); and CAS = California Academy of Sciences.

Dates	Collectors	Localities	Museums with holdings	References and information
1870–1881	Bingham, C.	Tanintharyi Division, Mon State	NMNH, NMN, BMNH	GBIF 2010, ORNIS 2010, NMNH, NMN, BMNH
1872–1895	Oates, E. W.	Shan State, Bago Division, Tanintharyi Division	BMNH, NMN, NMNH, ROM	GBIF 2010, BMNH, NMN, NMNH, ROM
1873–1878	Wardlaw-Ramsay, R. G.	Kayah State, Yangon Division, Bago Division, Tanintharyi Division	BMNH	BMNH
1874–1883	Davidson, J. <sup>a</sup>	Tanintharyi Division	BMNH	BMNH
1873–1881	Davidson, W. <sup>a</sup>	Tanintharyi Division, Mon State, Kayin State: which is now probably in Mon State	ROM, MCZ	GBIF 2010, ROM, MCZ
1877	Tweeddale College	Tanintharyi Division	BMNH	BMNH
1877–1878	Hume	Kayin: probably now in Mon State	ROM	GBIF 2010, ROM
1878–1879	Darling, J.	Tanintharyi Division	MCZ, YPM, BMNH	GBIF 2010, ORNIS 2010, MCZ, MCZ, YPM, BMNH
1870s	Davison, W. R. <sup>a</sup>	Tanintharyi Division, Mon State, and Kayah State	ROM, MCZ, BMNH	GBIF 2010, ROM, MCZ, BMNH
1878–1879	Darling, J., Jr.	Tanintharyi Division, Yangon Division, Kayin State: which is now probably in Mon State.	ROM, MCZ	GBIF 2010, ROM, MCZ
1881–1882	Anderson, J.	Mergui Archipelago (Myeik Kyun Su or Myeik Archipelago)	Indian Museum, Calcutta	Duncan et al. 1889
1897–1906 1898, 1904	Rippon, G. Abbott, W.	Kachin State, Shan State, Chin State Tanintharyi and Mergui archipelagos (now known as Myeik Kyun Su or Myeik archipelagos)	BMNH, YPM, MCZ NMNH	GBIF 2010, BMNH, YPM, MCZ Smythies 1953, GBIF 2010, ORNIS 2010
1900–1902	Thompson, H. N. Craddock, W. H.	Shan State	BMNH	BMNH
1900–1952	Smith, H. C.	Mainly in Mandalay Division, Akyab (now known as Sittwe), Sagaing Division, Rakhine State, Shan State, Bago Division, Karenni (now known as Kayah State)	NMNH, BMNH	GBIF 2010, ORNIS 2010, NMNH, BMNH
1903–1905	Mears, A.	Sagaing Division, Upper and Lower Chindwin	ROM, BMNH	GBIF 2010, BMNH, ROM

TABLE 1. Continued.

Dates	Collectors	Localities	Museums with holdings	References and information
1912–1915	Venning, F. E. W.	S Shan States	BMNH	BMNH
1913–1931	Ticehurst, C. B.	Bago Division, Prome (Pyay District)	BMNH	BMNH
1916–1919	Hopwood, J. C.	Tanintharyi Division	ROM, YPM, MCZ, MVZ, NMNH	GBIF 2010, ORNIS 2010, ROM, YPM, MCZ, MVZ, NMNH
1923–1924	Vernay, A. S.	Tanintharyi Division	BMNH	BMNH
1928–1939	Garthwaite, P. F. Smith, P.	Bago Division, Sagaing Division, Magwe Division	BMNH	BMNH
1929–1939	Stanford, J. K.	Sagaing Division, Katha District, Rakhine State, Kachin State)	BMNH	BMNH
1932–1940	Garthwaite, P. F.	Sagaing Division, Mandalay Division, Shan State, Kachin State	BMNH	BMNH
1937–1938	Heinrich, G.	Mandalay Division, Magwe Division, Chin State, Mt. Victoria (now recognized as Natmataung National Park)	UMMZ, MCZ, ZMB, MIZPAN, NMW, BMNH	GBIF 2010, ORNIS 2010, UMMZ, MCZ, ZMB, MIZPAN, NMW, BMNH
1938–1940	Smythies, B. E.	Kayah State, Magwe Division, Bago Division	BMNH	BMNH
1952–1955	Payne, R.	Shan State around Taunggyi–Inle–Yawnghwe (now known as Nyaung Shwe)	NMNH	NMNH, GBIF 2010
1955	Payne, R. Maung Hla Sein Maung Aye	Shan State, Yawnghwe State (now Nyaung Shwe township)	NMNH	NMNH, GBIF 2010
1958–1960	Oliver, M.	Shan State, Kachin State, Sagaing Division and Tanintharyi Division	YPM	YPM, GBIF 2010
1994	Rasmussen, P. C.	Bago Division and Sagaing Division	NMNH	NMNH, GBIF 2010
1994	Rasmussen, P. C. Anderton, J.	Sagaing Division	NMNH	NMNH, GBIF 2010
1994	Anderton, J.	Bago Division	NMNH	NMNH, GBIF 2010
1994–2001	Rappole, J. H.	Bago Division, Sagaing Division and Kachin State	NMNH	NMNH, GBIF 2010
1995	Rasmussen, P. C. Shein Gay Ngai Sein Aun Min	Chin State	NMNH	GBIF 2010, ORNIS 2010, NMNH
2001	Htum Win	Ayeyarwadi Division, Bago Division, Kachin State	CAS	GBIF 2010, CAS

<sup>a</sup> Although Davidson and Davison are clearly distinguishable in BMNH labels, it remains an open question whether W. Davison is the same person as W. R. Davison.

Another set of ornithologists conducted field surveys but did not document their work with voucher specimens. This procedure may be adequate for some purposes in well-known areas and in modern times, but these records cannot be verified and are not adequate for documentation of new taxa or even to properly document proposed range extensions. Nonetheless, these surveys are valuable for documenting faunal changes and for verifying the presence of rare species in particular areas or proposed reserves. We summarize and cite the most important of these surveys, including other wildlife surveys, in Table 2. We note, too, that more unvouchered data are becoming available as amateur birders and local naturalists are able to blog field notes or upload observations to citizen-science databases. We expect that such data will be a valuable contribution to our knowledge of Myanmar avifauna in the future.

From the 1990s to the present, international researchers have helped increase ornithological knowledge and have fostered the growth of ornithology in Myanmar. Ornithologists from the SI, the CAS, the Wild Bird Society of Japan, and BirdLife International have worked closely with NWCD. BirdLife International and NWCD have worked closely with a local Myanmar nongovernmental organization called Biodiversity and Nature Conservation Association. Together, they have organized several field-oriented projects, including training courses, field surveys, and ornithological collections in the country, including in Kachin State. International scientists from the SI have taught courses in ornithological survey methods, including specimen preparation and curation, to the NWCD staff. During and after these training courses, they collected specimens.

Myanmar still has few in-country ornithologists, for a variety of reasons. First, there is a lack of funds for field equipment (binoculars, telescopes, and field guides) as well as for field expeditions. Second, Myanmar still needs a comprehensive field guide written in the Myanmar language, and we feel that this would help foster ornithology in the country. Although an inexpensive and useful bird book, titled *Birds of Myanmar* (Lwin and Thwin 2003), was recently published in English and Myanmar, it is focused on common birds and is not an exhaustive field guide.

As of 2009, only ~6,200 databased bird specimens were documented from Myanmar (GBIF 2010, ORNIS 2010), including the holdings of

CAS, the Field Museum of Natural History (FMNH), the Los Angeles County Museum of Natural History (LACM), the Museum of Comparative Zoology, the Royal Ontario Museum (ROM), the Santa Barbara Museum of Natural History (SBMNH), NMNH, the Yale University Peabody Museum (YPM), the American Museum of Natural History (AMNH), and other museums with small collections. However, the total number of specimens from Myanmar is much higher. The British Museum of Natural History (BMNH) holds ~20,000 Myanmar specimens (estimate by S.C.R.), and the Bombay Natural History Society has an additional 26,000 specimens from northern Myanmar and northeast India (P. Rasmussen pers. comm.).

#### ORNITHOLOGICAL EXPEDITIONS IN KACHIN STATE, NORTHERN MYANMAR

Kachin State remains the most remote and most poorly studied region of the country. Only a handful of expeditions have gone there, and the number of specimens collected is estimated to be ~1,500 catalogued specimens (GBIF 2010, ORNIS 2010, BMNH). In many places, Kachin is mountainous, rugged, and difficult to reach; roads are few and often seasonally washed out, and other transportation is unreliable. In some areas, the people are semi-autonomous, and it is difficult for foreigners to travel there. Nonetheless, there have been some expeditions that have collected and documented the avifauna of the eastern Himalayas in northern Myanmar; we document the major work in Table 3.

John Anderson was among the first natural-history explorers who traveled between India and China through Myanmar. In 1868–1869 and 1874–1875, Anderson participated as a naturalist and medical officer in two separate expeditions; the first was led by Colonel E. B. Sladen and the second by Colonel Horace Browne, to upper Myanmar and from there toward Yunnan Province, China. His expeditions covered the area from Mandalay, Bhamo, and the route along the Tapeng River (or Taping River, which originates in north China and joins the Ayeyarwady near Bhamo), to Yunnan (Anderson 1871a, b, 1878; Anderson and Sladen 1876).

In 1908 and 1909, H. H. Harington, who wrote a book entitled *The Birds of Burma* (Harington 1909), collected >300 specimens around Bhamo, stored at the AMNH (from AMNH catalogs)



TABLE 2. List of surveys without vouchered bird collections (BANCA = Biodiversity and Nature Conservation Association).

Dates	Field leaders	Localities surveyed	Taxa surveyed	References
1944–1945	Smythies, B. E.	Adung valley in the north, including Ahkyang and Taron valleys	Birds	Smythies 1949
1979	King, B. F.	Rangoon (now known as Yangon), Mandalay and Shan State	Birds	GBIF 2010
1981	Sayer, J. A.	Hlawga Wildlife Park	Wildlife	Lwin et al. 1982
1982	Salter, R. E. Sayer, J. A.	Kyatthin Wildlife Sanctuary	Wildlife	Salter and Sayer 1983
1983	U Thet Tun Sayer, J. A.	Inle Lake and adjacent areas of the Shan plateau	Wildlife	Thet Tun and Sayer 1983
1982	Sayer, J. A. U Saw Han	Inle and Mong Pai Lake (Moe Bye dam), Southern Shan State	Birds	Sayer and Han 1983
1982	Sayer, J. A.	Southern Arakan Yoma (Rakhine Yoma)	Wildlife	Sayer and Han 1983
1998, 1999	King, B. F.	Hphorakan Razi	Birds	King et al. 2001
1999–2002	WCS	Throughout the country	Tigers, including other mammals; birds observed	Rabinowitz and Khaing 1998, Rabinowitz 2001, Lynam and Khaing 2005
1996–2006	Latt/ICF	Ayeyarwady Division, Bago Division, Kachin State, Shan State, Rakhine State and Yangon Division	Sarus Crane	International Crane Foundation 2008, pers. comm.
2000–2004	WBSJ	Wetlands throughout the country	Wetland associated birds	Davies et al. 2004
2003–2005	BANCA, BirdLife	Tanintharyi Division	Gurney's Pitta	Eames et al. 2005, Donald et al. 2009
2003–2005	BANCA, BirdLife	Ayeyarwady (Irrawaddy) river between Myitkyina and Sinbo, Bhamo and surrounding wetlands (lowland wetlands)	Birds: mostly water birds	Tordoff et al. 2007, 2008
2006	BANCA, BirdLife	Mount Imawbun area	Birds	Eames 2006, 2007
2006–2007	BANCA, BirdLife	Shan, Kachin, Chin State and Sagaing Division	Vulture	BANCA 2007

TABLE 3. Ornithological expeditions in Kachin State. Abbreviations: NMNH = National Museum of Natural History, Smithsonian Institution; BMNH = British Museum of Natural History; AMNH = American Museum of Natural History; FMNH = Field Museum of Natural History; LACM = Los Angeles County Museum of Natural History; YPM = Yale University Peabody Museum; and CAS = California Academy of Sciences.

Dates	Collectors/leaders	Localities	Museums	References
1908–1912	Harington, H. H.	Around Bhamo	BMNH, AMNH	—
1910–1919	Beebe, W. C.	Around Sadon	AMNH	Beebe 1911
1931	Lord Cranbrook	Adung Valley	FMNH, BMNH	Kinnear 1934, Kingdon-Ward 1939
1932–1936	Stanford, J. K.	Around Myitkyina	BMNH	Stanford and Ticehurst 1938
1934	Malaise, R.	Around Kambaiti area	Stockholm Museum	—
1935	Vernay-Hopwood	Naga Hills, Chin territory (now Chin State), upper Chindwin	AMNH	Mayr 1938, Carter 1943
	Chindwin Expedition	in Sagaing Division and a few areas in lowland Kachin State		
1933–1939	Garthwaite, P. F.	Bhamo and Myitkyina	BMNH	—
1938–1939	Vernay-Cutting Expedition	Hpinaw, Htaungaw, Laukkaung	AMNH	Stanford and Mayr 1940, 1941a, b, c, d; Kingdon-Ward 1941 Ticehurst 1939
1938–1939	Kaulback, R.	Tamai valley	BMNH	—
1944–1945	Stager, K. E.	Around Shingbuiyang	LACM, NMNH	—
1948	Smythies, B. E.	Around Htaungaw, Yunnan frontier	BMNH	BMNH
1959	Oliver, M.	Western part of Putao	YPM	Oliver and Estes 1963
2001	Rappole, J. H. Renner, S. C.	Putao via Naung Mung to Tahawndam	NMNH	Renner et al. 2007
2001	Long, D. J.	Naung Mung and Machanbaw	CAS	—
	Flannery, M.	township		
2004	Rappole, J. H. Renner, S. C.	West of Naung Mung	NMNH	Rappole et al. 2005, 2008; Renner et al. 2007
2005	Renner, S. C.	Naung Mung and Nam Ti Resthouse	Half at Hlawga Park, half exported to the NMNH	—
2006	Rappole, J. H. Myint Aung	Naung Mung, U Ring Ga	Currently Hlawga Park (to be exported to the NMNH)	Chapter 2, present volume
2006	Renner, S. C. Milensky, C. M. Rasmussen, P. C.	Naung Mung	Currently Hlawga Park (to be exported to the NMNH)	Chapter 2, present volume

TABLE 4. Kingdon-Ward's Myanmar expeditions.

Years	Localities of Kingdon-Ward's expeditions	References
1913	Myitkyina to Tengchung (China), Tibet to May Hka–Than Lwin divide	Kingdon-Ward 1923b
1914	Myitkyina, Hpimaw, Gawlang, Kangfang, Shingarup pass, Putao, Myitkyina	Kingdon-Ward 2005
1919	Hpimaw, Imawbum	Kingdon-Ward 1960, Yeinnwepar 2008
1921	Tengchong (China) to Bhamo Mountains	Kingdon-Ward 2005
1922	Bhamo to China, Tibet to Taron River, Nam Tamai River, Putao, Myitkyina	Kingdon-Ward 1924
1926	Myitkyina, Putao, Nam Tamai, Seinghku Wang to India	Kingdon-Ward 1930a, b
1929	Southern Shan State to Laos	Kingdon-Ward 1931
1931	Adung valley to Tibet	Kingdon-Ward 1938
1937	Myitkyina, Putao, Hkakabo Razi foothills, Tamai and Adung valley	Kingdon-Ward 1949
1938–1939	Myitkyina, Htagaw, Imawbum, Hpimaw, Panwa pass, Hpare pass	Kingdon-Ward 1941
1949	India to Naga hills	Kingdon-Ward 1960, Yeinnwepar 2008
1953	Myitkyina, Sumprabum, the area between Mali Hka River and May Hka River (the “Triangle”)	Kingdon-Ward 2007
1956	Mt. Victoria (Natmataung National Park), Chin hills	Kingdon-Ward 1959

and a small number at the BMNH. Most of Harrington's other specimens are probably stored at the Bombay Natural History Society's collection in Mumbai. Between 1910 and 1919, C. William Beebe, a curator at the Bronx Zoo in New York, collected around Sadon, Yunnan frontier, and his collections are stored at the AMNH. Beebe launched the “Kuser-Beebe pheasant expedition” in Asia, traveling through India, Java, Borneo, Kachin State (Myanmar), China, and Japan in 1910. Starting in Culcatta, India, Beebe's party went to Singapore, which they used as a base to travel via Yangon north to Myitkyina. The entire Myanmar adventure lasted less than 3 months (Beebe 1911).

Among the greatest explorers in the region, Francis Kingdon-Ward is in a category all his own. His numerous expeditions and publications have spawned tremendous interest in exploring and describing floral and faunal distribution in remote areas of Kachin State. From 1913 to 1953, he visited portions of Kachin State on multiple expeditions, covering primarily the extreme northern sections of Kachin (India, Tibet, China border areas and Adung valley, Tamai valley), the Myanmar–Yunnan frontier (Hpimaw, Htagaw, Imawbum, Bhamo Hills), and northeast of Kachin (Taron River) (Kingdon-Ward 1923a, b, 1924, 1933, 1938, 1939, 1941; Kingdon-Ward et al. 1932). Although he was primarily a botanist, he

collected specimens of birds and other organisms that supported his work. A complete list of his expeditions to Myanmar is given in Table 4.

George Forrest another botanical explorer, significantly added to our knowledge of birds from northern Myanmar, particularly Kachin State and bordering Yunnan Province. Between 1904 and 1931, Forrest collected large numbers of bird specimens during several expeditions to Yunnan (Rothschild 1926, Stanford and Ticehurst 1938, Smythies 1953). His routes are discussed in LeCroy and Dickinson (2001), and for Myanmar include primarily the areas along the Taron-Salween (Than Lwin) divide and the N'Mai-Salween divide (May Hka–Than Lwin divide), around the areas of Bhamo, Myitkyina, Southeast of Myitkyina, and along the border with Yunnan (Htagaw, Hpimaw, Chimili) (Forrest 1908, Rothschild 1926, Stanford and Ticehurst 1938, Smythies 1953, LeCroy and Dickison 2001). Most of his specimens were collected from Yunnan and sent to Lord Rothschild at Tring, and contributed to important papers about the regional eastern Himalayan avifauna (Rothschild 1926). There remain some questions, however, about whether some of his collections were from the Myanmar or Chinese side of the border. For example, those marked “Salween-Shweli divide” were taken generally in border country, without more specific localities (Rothschild 1926, Stanford and Ticehurst 1938,

Smythies 1953). Stanford commented that some of the birds collected by Forrest and recorded as collected from "hills of N.W of Tengyueh" by Rothschild (1926) in *Avifauna of Yunnan* were likely obtained in Myanmar, Myitkyina District, Kachin State (Stanford and Ticehurst 1938). Nonetheless, these important collections include many type specimens (LeCroy and Dickinson 2001) and some of the earliest records of the avifauna of this region.

Collections were also contributed by a number of military or political officers stationed in Kachin State. These include Eugene W. Oates, a civil engineer, who first wrote about birds of Myanmar before Harington and Smythies (Oates 1883, Oates and Blanford 1889–1898), as well as John Whitehead, Frank Currie (a civil engineer), and Captain Maxwell West (Stanford and Ticehurst 1938). Each made a modest but incremental contribution to our knowledge of northern Myanmar birds prior to Cranbrook and Kingdon-Ward's Adung valley expedition.

In 1931, Lord Cranbrook and Kingdon-Ward explored northeastern Myanmar, Adung valley, and spent approximately a year in the northernmost valleys of Kachin State (Kingdon-Ward et al. 1932, Kinnear 1934). They collected 152 bird skins (Smythies 1953) of 95 species (Stanford and Ticehurst 1938) that were reported by Kinnear (1934). This collection resulted in at least 30 new mountain species for Myanmar (Smythies 1953). The FMNH holds some specimens from Adung valley without mentioning the collector's name (GBIF 2010). However, we assume that these specimens were collected by Cranbrook, because the times collected from records match those of Cranbrook and Kingdon-Ward's expedition to the Adung valley. Cranbrook collected specimens and stored almost 200 of them in the BMNH; probably some of these were presented later to the FMNH, but the dispersal of Cranbrook's specimens is currently not very clear. However, according to the collection manager in the Bird Division of FMNH, those specimens were presented by C. Suydam Cutting of New York and were accessioned in February 1933 and catalogued in 1935. Cutting is one of the explorers of northern Myanmar birds (details below) and also served as an honorary member, a patron, a contributor, a corporate member, and an associate member of FMNH (Field Museum of Natural History 1933).

John K. Stanford was a military officer and writer who worked for the British Indian Civil Service

in Burma. He produced extensive collections of the birds of Kachin State and brought our knowledge of regional ornithology to a new level. From November 1932 to June 1936, Stanford collected at least 1,769 skins of 472 species while assigned to the Myitkyina District, and Ticehurst assisted in identifying the specimens (Stanford and Ticehurst 1938). Large portions of these collections are stored in the British Museum of Natural History in Tring. With this work, Stanford documented 40 new species for Myanmar. Stanford's collection covers mainly the area around Myitkyina but also extends along the road from Myitkyina north to Putao, as one of his assignments was to "pacify" the area north of Myitkyina.

In 1934, Rene Malaise from the Stockholm Museum, who is well known for his invention of insect traps, participated in the Swedish Expedition to Myanmar and British India. He and Willie H. Stubbs (Stanford's skinner, who also skinned for the Vernay-Hopwood Chindwin Expedition) made a small collection around the Kambaiti area (Stanford and Ticehurst 1938), in the southeastern part of Kachin State near the Chinese border. According to the Swedish Museum of Natural History's annual report for 1936 (kindly provided by the Stockholm Museum because there was no published report for the collection), Malaise and Stubbs collected at least 56 specimens.

From 1933 to 1936, Garthwaite, who contributed to *The Birds of Burma* first edition by Smythies (1940) and served as a forester in Myanmar, made a small collection around the Bhamo area, now housed at the BMNH.

In early 1935, the Vernay-Hopwood expedition to Chindwin headed by A. S. Vernay, a trustee of the AMNH, was conducted along the Chindwin River, including some areas of Naga Hills, Chin territory, Sagaing Division, and a few areas in lowland Kachin State (Mayr 1938, Carter 1943). During the 1935 trip, they collected 776 specimens of 222 species. We assume that many specimens without a collector's name, stored in the AMNH, are from this expedition, because the locality names and time match the expedition's route as reported by Mayr (1938). Some of the specimens without collector names and coordinates are also probably from Kachin State (i.e., locality name "Dalu").

In 1938 to 1939, Stanford returned to Myitkyina District (after retiring to England) and collected birds on the Vernay-Cutting expedition, which was led by Vernay and Suydam Cutting. The

expedition collected 1,505 specimens of 296 species from Laukkaung Subdivision and along the N'Mai Hka (currently known as May Hka) valley in the southeastern part of Kachin State, near the Chinese border (Smythies 1949, Smythies 1953). Most of the specimens from this expedition were sent to the AMNH (Stanford and Mayr 1940); however, a substantial portion went to the BMNH. The ornithological summaries were published by Stanford and Mayr (1940, 1941, a, b, c, d).

In 1938 to 1939, in the same years of the Vernay-Cutting expedition, Ronald Kaulback (sometimes erroneously spelled "Kaulbach") collected in the Tamai valley with his base camp in Pangnamdim. From Pangnamdim, Kaulback visited Taron, and then he returned by Thala Wang. He also visited the Triangle. Ticehurst briefly reported Kaulback's collection (Ticehurst 1939), to which no field notes were attached (Smythies 1953). Kaulback collected almost all specimens at elevations between 610 and 975 m, and his collection of 260 skins went to the BMNH (Ticehurst 1939).

In 1944 and 1945, K. E. Stager collected bird specimens around Shingbuiyang, in northwestern Kachin State adjacent to Sagaing Division, and around Myitkyina. Within his collections from 1944 to 1945, seven specimens from Shan State are intermingled. Stager's specimens are stored at the LACM and NMNH (GBIF 2010).

Bertram E. Smythies served as a forester in Myanmar from November 1934 until January 1948. In 1944 to 1945, he visited the Tamai and Adung valleys, and he traveled farther up the tributaries of the Ahkyang and Taron valleys, which extend toward the Yunnan frontier of China. Collections were not made because of the building insurgence and war (Smythies 1949, 1953). He also explored the Laukkaung area, which was previously explored by the Vernay-Cutting expedition in early 1948. Smythies intentionally revisited the same area during different seasons to document seasonal changes in species composition and to compare his findings with Stanford's findings from the Vernay-Cutting expedition (Smythies 1949). Smythies' specimens are now stored at the British Museum (Smythies 1949, 1953).

Smythies was also instrumental in writing *The Birds of Burma*, first published in 1940. The "Birds of Burma" project was started in 1937 by H. C. Smith, who was to organize the illustrations, and J. K. Stanford, who was to write the text. World War II prevented Stanford from continuing the work, and Smythies was requested

to take it over. The first edition was published by Smythies and Garthwaite (1940), and Smythies updated later editions in 1948, 1953, 1986, 2001 to incorporate newer information and changes in taxonomy.

Milton Oliver collected in Shan State in 1958, the western part of Putao District, in Kachin State in 1959, and in Sagaing Division and Tanintharyi Division in 1960. He and Richard Estes detailed their travels in Myanmar (Oliver and Estes 1963), and Ripley reported on the collections (Ripley 1961). His collections from Sagaing Division and Tanintharyi Division are stored in the YPM. Other team members were U Maung Gale (leader), U Chit Ko Ko, U Aye, and Maung Saw Aung.

In early 2001, John H. Rappole and S.C.R. of the Smithsonian National Zoological Park explored the Hkakabo Razi National Park and Naung Mung Township. They made the first bird collection (178 specimens) in over seven decades, covering Tehaundam Village (Tahawndam) and its vicinity, Tezutu (Tashuhtu), Tezungdam (Tazungdam), Gawai, No Wah (Ngawa), Lon Nat (Lonnat), Pangnamdam (Pangnamdim), Shingshanku (Shinshanghku), Gow La (Gawlei), Tasahku, and around Naung Mung Township (Renner et al. 2007). Ninety-three specimens are at the Smithsonian National Museum; the remainder are stored in Hlawga Park, Yangon.

In late 2001, the CAS conducted an expedition around Naung Mung Township and Machambaw Township (Machanbaw). The expedition was led by the late Joseph Slowinski; Douglas J. Long and Maureen E. Flannery performed the ornithological surveys. Their collection of 105 specimens covered Alan Ga Village and Htanga Village (Htan Ga) in Machanbaw Township, and U-Rein Ga Village (U Ring Ga), Ba Baw Village, and Ra Baw Village (Ratbaw) in Naung Mung Township. The specimens from this trip are stored in CAS.

In 2004, again, Rappole, Renner, Nay Myo Shwe, Aung Khin, and Kwin Lin made an expedition to Kachin State. This time, they focused on Naung Mung town and immediate environments, especially the forests on the western side of the town (within 10 km of the town center). The complete collection of 169 specimens was exported to the NMNH, and the team found a new species of babbler, which they named the Naung Mung Scimitar-Babbler (*Jabouilleia naungmungensis*; Rappole et al. 2005; Chapters 2 and 8, present volume). The specimens are stored at the NMNH (Rappole et al. 2005, 2008).

Renner and U Myint Aung revisited Naung Mung and Nam Ti and collected 52 specimens in September 2005 (half of the specimens are permanently stored at Hlawga Park, and the remainder is due to be exported to the NMNH). In March 2006, Rappole, Renner, and Chris M. Milensky collected about 106 specimens from the Naung Mung area, including U Ring Ga (Chapter 2, present volume). During June to July 2006, Pamela Rasmussen collected 108 specimens from Naung Mung and Nam Ti (Chapters 2 and 5, present volume).

Finally, significant recent work has been done in Yunnan, China, along the Kachin State border, covering three areas in Gaoligong Mountain National Nature Reserve at the southern end of the Hungduan Mountains (Shilai et al. 1996; Lan and Dunbar 2000; Stotz et al. 2003; Chapter 3, present volume). These areas remain poorly surveyed, so data from these expeditions provide valuable new data on the avifauna of the Kachin border region.

#### DISCUSSION

Kachin State has little reliable infrastructure north of the state capital, Myitkyina. Myitkyina can be reached by highway, railway, and air. However, the gateway for the Hkakabo Razi and Naung Mung area is the town of Putao, which is accessible only by air from Myitkyina. Airplanes are frequently unable to land in Putao because of unpredictable local weather. In 2009, no flights were scheduled at all, because tourists were avoiding Myanmar (S. C. Renner pers. obs.). As recently as a couple years ago, a seasonal dirt road connected Myitkyina and Putao; however, the road was not suitable for regular travel, even for Myanmar travelers. According to recent newspaper reports, a new road now connects Myitkyina and Putao, and travelers can make the trip in a day.

Kachin State borders Tibet in the north and China in the north and east. There are a few jungle trails and roads used for cross-border trade. These roads are maintained largely for China's growing need for timber, but jade and illegal opium are also important trade items. Because this trade is semilegal and done with autonomous agents in Myanmar, these border towns are difficult places for foreigners to visit. Much of this trade has significant negative impacts on Myanmar's wildlife populations. In the northwest, Kachin State borders Assam and Arunachal Pradesh (India), and there were some old paths leading to India (Kingdon-Ward et al. 1932, Kaulback 1934,

Kingdon-Ward 1939). The native tribes such as Rawang and Lisu and the Tibetans have been using the trails for hundreds of years (Klieger 2003a), as they connect Assam, Arunachal Pradesh, Tibet, and Yunnan with Putao. The cross-border trade is small and mainly for natives to exchange forest products such as medicinal plants and wildlife products in exchange for food, salt, clothes, and medicine.

Few accessible tracks exist from Putao to the more remote villages, and the terrain is very steep and difficult, especially during the monsoon season. Usually explorers and naturalists arrive in Putao by air from Myitkyina and walk to Naung Mung or drive with ancient trucks if weather and road are favorable. Unpredictable torrential rains may occur any time and close roads, leaving foot travel with local porters as the only travel option.

Much ornithological work remains to be done in northern Myanmar, although some basic, partial surveys have been conducted for several key regions: northern Kachin State (extreme northern Myanmar), which covers Putao, Machanbaw, Naung Mung up to Tamai, Adung valley, and Tahawndam; northeast Kachin, which covers Taron and Thala Wang; central Kachin around the Triangle; southern Kachin, which covers the area around Myitkyina and Bhamo; southeastern Kachin, which covers Kambaiti, Laukkaung, the Hpimaw area, and the May Hka River. Some large gaps remain.

In conclusion, there are some areas in Kachin State (and Myanmar) that need more sampling to provide voucher specimens and diminish collection gaps: upper Chimili pass, along the May Hka, the northeastern part of Kachin State, the Bumpha Bum range, and the Kumon range lying southwest of Putao, the central part of Kachin State (cf. Fig. 1). Further spots to be revisited or visited for the first time, for exploration and to complement scientific collections, include Hponkan Razi Wildlife Sanctuary and the Triangle (Smythies 1953).

#### ORNITHOLOGICAL GAZETTEER

Localities were collected from published ornithological literature as well as specimen records from several museums and online databases, including GBIF and ORNIS. Most early records did not report geographic coordinates, but many modern collections reference latitude and longitude. We tabulated all locality names, synonyms,

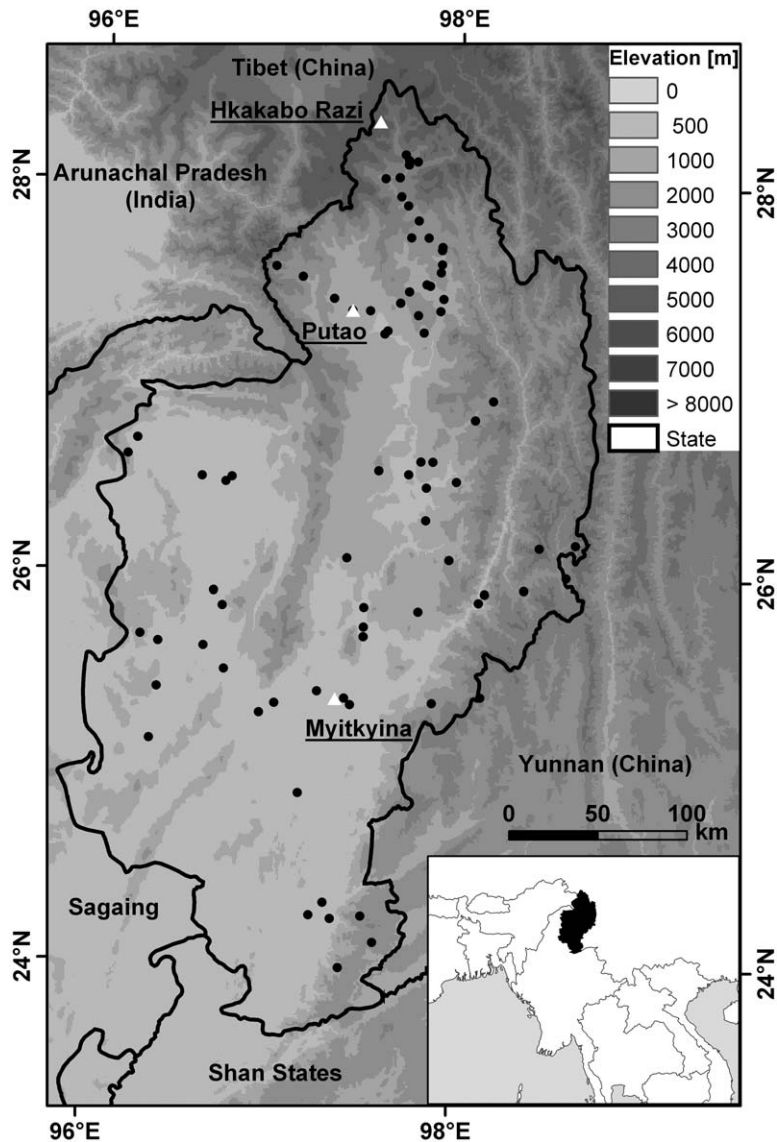


FIG. 1. Localities in Kachin State. Each dot represents a locality that was identified and georeferenced without doubt. Triangles indicate major towns or reserves mentioned in the text. The black area in the map inset represents Kachin State as located in Myanmar and neighboring countries.

Myanmar language names, latitude and longitude, and sources (Table 5).

In most cases, we follow the English spellings from older Burmese (i.e., Myanmar) maps that match closely with local meaning. Usually we could find no modern alternative, and these historical names are useful for tracing back through historical literature. However, if a different modern name is now widely used, accepted, and published, we

have deferred to modern usage. Examples include Ayeyarwady and May Hka (for N'Mai Hka). Other areas are too remote, and so there is no published common usage. Such places are little known and are recorded with various spellings. For these remote areas, we attempted to find historical English spellings either from maps or from early published expedition accounts (e.g., Shinshanghku and its synonyms).

TABLE 5. Ornithological Gazetteer of Kachin State. Names set in bold type are those we suggest for use in the future because we consider them the best fitting with the oldest spellings. All spellings are listed, from the English and Myanmar literature and from transcriptions of ethnic idioms. For reference, all spellings are also given in Myanmar. For further explanations, see the text. Abbreviations: CAS = California Academy of Sciences, and BMNH = British Museum of Natural History.

Locality	Synonyms	Myanmar name	Remarks	Latitude	Longitude	References
<b>96 Ins</b>	Koe She Chauk In, Koe Se Chauk In	ငွေ အင်း	Wetland complex along Moe Le River	24.40000	97.33333	Tordoff et al. 2007
Adung Long	See Alungdung Valley	အွန်လောင် အွန်လောင်		28.11666	97.70000	BioGeomancer
<b>Adung Valley</b>	—	အွန်ချိုင်းဝမ်း အွန်ချိုင်းဝမ်း	Adung River is Upper Tamai River	28.13940	97.70000	
Ahtang Bum <b>Alan Ga</b> Village, Machanbaw Township	See Hkakabo Razi —	မိတာဘိုဂုဏ်၊ အထန်ဘွင် အလ်ဂါး အလန်ဂါး		27.34806	97.77000	Yeinnwepar 2008 CAS
<b>Alungdung</b> Valley (northernmost valley)	Along Dong, Alung Dung	—		28.16800	97.68100	Renner et al. 2007
An Ke <b>Anke</b>	See Anke An Ke	—		26.91667	98.20000	BMNH
Ayeyarwady River	Irrawaddy (spelling varies and includes also Ayyeyarwaddy)	ရေဝတီမြစ်	River, with spring in Hkakabo Razi area and delta southwest of Yangon (Rangoon), intersecting all of Myanmar			
Ayeyarwaddy	See Ayeyarwady River	—				
<b>Ba Baw</b>	Ba-wa, Bawa, Bat-wa, Babwa, Babaw	ဝါးပတ်	Between Ratbaw and U Ring Ga	27.37222	97.89472	GBIF 2010, Renner et al. 2007
Babaw	See Ba Baw	ဝါးပတ်				
Babwa	See Ba Baw	ဝါးပတ်				
Ban Maw	See Bhamo	မန်းမော်				
Bat-wa	See Ba Baw	ဝါးပတ်				



TABLE 5. Continued.

Locality	Synonyms	Myanmar name	Remarks	Latitude	Longitude	References
Bawa	See Ba Baw	ဘါပော့				
Ba-wa	See Ba Baw	ဘါပော့				
Bhamaw	See Bhamo	ဖမ်းမော်				
<b>Bhamo</b>	Bhamaw, Ban Maw	ဖမ်းမော်	A busy trade town near the China border	24.26667	97.23333	Maplandia.com
<b>Bumkataung</b>	—	—	Georeference is next located town (i.e., Sagon)	25.36667	97.88333	BMNH, Maplandia.com
Chi Pwi	See Chipwi	ချီပွ				
Chibwe	See Chipwi	ချီပွ				
<b>Chinkraung</b>	—	—	Myitkyina-Putao Road	Between 25.38333 and 27.36667	Between 97.40000 and 97.40000	BMNH, Maplandia.com
Chipwe	See Chipwi	ချီပွ				
<b>Chipwi</b>	Chibwe, Chi Pwi, Chipwe	ချီပွ				
Dalu	See Taro	တရီ				
Daping River	See Taping River	တပ်ပိုင်မြစ်				
Dazonden	See Tazungdam, Naung Mung Township	တန်ဖိုင်မင်း				
Ga Waing	See Gawai, Naung Mung Township	ဂေါ့				
Gaw Lei	Mung Township	မောင်လှိုင်				
Gawlei, Naung	See Gawlei, Naung Mung Township	မောင်လှိုင်				
Gawa	Mung Township	ဂေါ့				
<b>Gawai, Naung Mung Township</b>	Ga-we, Gawa, Ga Waing	ဂေါ့	Between Wangsi Wang and Tazungdam	27.95333	97.66084	GBIF 2010
Ga-we	See Gawai, Naung Mung Township	ဂေါ့				
Gawla	See Gawlei, Naung Mung Township	မောင်လှိုင်				
Gawlai	See Gawlei, Naung Mung Township	မောင်လှိုင်				
Gawle	See Gawlei, Naung Mung Township	မောင်လှိုင်				

(continued)

TABLE 5. Continued.

Locality	Synonyms	Myanmar name	Remarks	Latitude	Longitude	References
<b>Gawlei, Naung Mung Township</b> Gow La	Kole, Gawle, Gawla, Gaw Lei, Gawlai, Gow La <i>See</i> Gawlei, Naung Mung Township	ဂေါလဲ၊ ဂေါလဲ ဂေါလဲ၊ ဂေါလဲ	Between Pangandim and Naung Mung	27.61111	97.89833	Remner et al. 2007, GBIF 2010
<b>Hkakabo Razi</b>	Hkakaborazi, Khakaborazi, Ahtang Bum <i>See</i> Hkakabo Razi	ခိကာဘိုရဇီ၊ အထန်တွမ် ခိကာဘိုရဇီ၊ အထန်တွမ် ခရန်(မြစ်)	Known as Ahtang Bum by local tribes. Razi = mountain	28.33333	97.53334	BioGeomancer, Yeimnwepar 2008
Hkakaborazi <b>Hkrang Hka</b>	—	—	Small river flowing into Mali Hka from the East	26.46667	97.83333	BMNH, Duckworth and Hills 2008
Hpangram Bum	<i>See</i> Hpangran Bum, western Putao District	ဖန်ဂရမ်တွမ်				
Hpangram Wang, western Putao District	<i>See</i> Hpangran Wang, western Putao District	ဖန်ဂရမ်မြစ်				
<b>Hpangran Bum</b> , western Putao District	Hpangram Bum, Hpangran Madin <i>See</i> Hpangran Bum, western Putao District	ဖန်ဂရမ်တွမ်၊ ဖန်ဂရမ်ဘဏ်		27.5833333	96.96666	BioGeomancer
<b>Hpangran Wang</b> , western Putao District	Hpangram Wang, western Putao District	ဖန်ဂရမ်မြစ်	Georeference is given with nearest big town, Putao	27.36667	97.40000	Maplandia.com
Hpi Maw <b>Hpimaw</b>	<i>See</i> Hpimaw Hpi Maw, PhiMaw, Phimaw, Phi Maw	ဖိမော့ ဖိမော့	Some maps show Hpimaw on Chima side	26.01667	98.61667	Maplandia.com
Hpon Kan Razi <b>Hponkan Razi</b>	<i>See</i> Hponkan Razi Phonkan Razi, Hponkanrazi, Hpon Kan Razi	ဖန်ကန်ဂရမ် ဖန်ကန်ဂရမ်		27.53333	97.11667	BirdLife International 2009

TABLE 5. Continued.

Locality	Synonyms	Myanmar name	Remarks	Latitude	Longitude	References
Hponkanrazi <b>Hpunkataung</b>	<i>See</i> Hponkan Razi (= Bumkataung?)	ရွှေကန်တောင် —	Sadon-Myitkyina road, georeference is next located town (i.e. Sadon)	25.36667	97.88333	BMNH, Maplandia.com
<b>Htang Ga</b> , Machanbaw Township Htang Kha	Htang-Ka, Htang Kha, Htanga <i>See</i> Htang Ga, Machanbaw Township <i>See</i> Htang Ga, Machanbaw Township <i>See</i> Htang Ga, Machanbaw Township	အထန်ဂါး ထန်ဂါး အထန်ဂါး ထန်ဂါး အထန်ဂါး ထန်ဂါး အထန်ဂါး ထန်ဂါး အထန်ဂါး ထန်ဂါး		27.26000	97.80300	Renner et al. 2007
Htanga						
Htang-Ka						
<b>Htawgaw</b> Htawgow Hteinnan Htingnan Htisyenyang <b>Hukaung</b>	Htawgow <i>See</i> Htawgaw <i>See</i> Htingnan Hteinnan — Hukawng, Hukong, Hukwang <i>See</i> Hukaung <i>See</i> Hukaung <i>See</i> Hukaung <i>See</i> Imawbum Imawbun, Imaw Bum <i>See</i> Imawbum	တော့ခေါ် တော့ခေါ် ထန်နန် ထန်နန် — ဟူးကောင်း ဟူးကောင်း ဟူးကောင်း အီမော့ဘွမ်း အီမော့ဘွမ်း အင်းတော့ဖြူ အင်းရန်ယန် အင်းပွဲပွဲ —	Valley	25.95000	98.38333	Maplandia.com
<b>Hukawng</b> Hukong Hukwang Imaw Bum <b>Imawbum</b>				26.60000 26.81667 26.50000	97.86667 98.10000 96.58333	BMNH BMNH BMNH, GeoNames
Imawbun <b>Indawgyi</b> Iniyangyang Inzutzut Irrawaddy	<i>See</i> Imawbum — <i>See</i> N'changyang <i>See</i> N'sopzup <i>See</i> Ayeyarwady River —	အီမော့ဘွမ်း အင်းတော့ဖြူ အင်းရန်ယန် အင်းပွဲပွဲ —	Wildlife Sanctuary	26.16667	98.46666	BioGeomancer
<b>Kadak Bum</b>				25.15000	96.33333	Tordoff et al. 2007
				26.50000	96.75000	BMNH

(continued)

TABLE 5. Continued.

Locality	Synonyms	Myanmar name	Remarks	Latitude	Longitude	References
<b>Kalihthu</b>	(= Kajihthu?)	—		26.30000	97.83333	BMNH
<b>Kamaing</b>	—	ကော့မိင်း		25.51667	96.73333	Maplandia.com
<b>Kambaiti</b>	Kanpitieti	ကန်ပိုင်တီ	Near China border, Southeast Kachin State	25.40000	98.15000	Satsig.net
Kankiu	See Kankiu	—				
Kanpitieti	See Kambaiti	ကန်ပိုင်တီ				
<b>Kaukiu</b>	Kankiu	—		27.36666	97.50000	BMNH
<b>Kauri</b>	—	—	East of Bhamo, in Mansi Township	24.13333	97.58333	Maplandia.com
Khakaborazi	See Hkakabo Razi	ခဲတော့ရဲတီ၊ အထန်ဆွပ်				
Koe Se Chauk In	See 96 Ins	ဂွမ် အင်း				
Koe She Chauk In	See 96 Ins	ဂွမ် အင်း				
Kole	See Gawlei, Naung Mung Township	ဂေါ်လဲ၊ ဂေါ်လင်				
Lannet	See Lonnat, Naung Mung Township	လန်နတ်				
Lauhkaung	See Laukkaung	လော့ခေါင်း				
<b>Laukkaung</b>	Laukkaung, Lauhkaung	လော့ခေါင်း		25.92803	98.16686	Maplandia.com
Lawkkaung	See Laukkaung	လော့ခေါင်း				
<b>Likkyi</b>	—	—	Near Sadon, georeference is next located town (i.e., Sadon)	25.36667	97.88333	BMNH, Maplandia.com
Lon Nat	See Lonnat, Naung Mung Township	လန်နတ်				
Lonet	See Lonnat, Naung Mung Township	လန်နတ်				
<b>Lonkin</b>	—	လန်ခင်း		25.65000	96.36666	BioGeomancer
<b>Lonnat, Naung</b>	Lonet, Lannet, Lonnut, Lon Nat	လန်နတ်		27.74667	97.81973	GBIF 2010
Mung Township	—	—				
Lonnut	See Lonnat, Naung Mung Township	လန်နတ်				

TABLE 5. Continued.

Locality	Synonyms	Myanmar name	Remarks	Latitude	Longitude	References
<b>Lunghkang Ga</b> Ma Chan Baw	— <i>See</i> Machanbaw, Machanbaw Township	မရဲဒီးလော မရဲဒီးလော	East of Sumprabum	26.60000	97.80000	BMNH
Ma Sa	<i>See</i> Maza, west of Naung Mung	မာစာ				
Ma Za	<i>See</i> Maza, west of Naung Mung	မာစာ				
Machambaw	<i>See</i> Machanbaw, Machanbaw Township	မရဲဒီးလော မရဲဒီးလော				
<b>Machanbaw</b> , Machanbaw Township	Ma Chan Baw, Machambaw	မရဲဒီးလော မရဲဒီးလော		27.26667	97.60000	Maplandia.com
Mai Hka	<i>See</i> May Hka (river)	မေဟဲခဲ မေဟဲခဲ				
Mai Kha	<i>See</i> May Hka (river)	မေဟဲခဲ မေဟဲခဲ				
<b>Maitongkha</b>	—	မေဟဲခဲ မေဟဲခဲ	106th mile Myitkyina- Putao Road	26.92608	97.61961	BMNH, Google Earth
Maleekha	<i>See</i> Mali Hka	မလိခဲ မလိခဲ				
Mali Hka (river)	Malihka, Malikhka, Maleekha	မလိခဲ မလိခဲ	kha or hka = river	25.70000	97.50000	BioGeomancer
Malihka	<i>See</i> Mali Hka	မလိခဲ				
Malikha	<i>See</i> Mali Hka	မလိခဲ				
<b>Mantum</b>	—	မလိခဲ	18 miles northwest of Chipwi	26.10000	97.96667	BMNH
Masa	<i>See</i> Maza, west of Naung Mung	မာစာ				
Masá	<i>See</i> Maza, west of Naung Mung	မာစာ				
Masaa	<i>See</i> Maza, west of Naung Mung	မာစာ				
<b>Matsatap</b> <b>May Hka</b> (river)	— Mayhka, May-Hka, Maykha, May Kha, Mai Kha, N'Mai Hka, Mai Hka	မေဟဲခဲ မေဟဲခဲ	kha or hka = river	27.50000 25.70000	97.83333 97.50000	BMNH BioGeomancer
May Kha	<i>See</i> May Hka (river)	မေဟဲခဲ				

(continued)

TABLE 5. Continued.

Locality	Synonyms	Myanmar name	Remarks	Latitude	Longitude	References
Mayhka	<i>See</i> May Hka (river)	မေးမြစ်				
May-Hka	<i>See</i> May Hka (river)	မေးမြစ်				
Maykha	<i>See</i> May Hka (river)	မေးမြစ်				
Maza, West of Naung Mung	Ma Za, Masaa, Masa, Masá, Ma Sa	မာဇာ		27.46806	97.71667	GBIF 2010
Mo Gaung	<i>See</i> Mogaung	မိုးကောင်း				
Mogaung	Mo Gaung	မိုးကောင်း		25.30000	96.93333	Maplandia.com
Momaik	—	မိုးမာင်	Northeast of Bhamo	24.25000	97.35000	GeoNames
Myitkyina	—	မြစ်ကြီးနား	Capital of Kachin State	25.38333	97.40000	Maplandia.com
Myitkyina Airport	—	မြစ်ကြီးနား လေဆိပ်		25.38000	97.35000	
Nagwa	<i>See</i> Ngawa, Naung Mung Township	ငါ့				
Nam Lang River, northwestern Putao District	Nan Lam River	နမ်လန်မြစ်		27.25000	97.58333	BioGeomancer
Nam Tamai Valley	—	နမ်တဲပိုင်ချိုင်းမြစ်		27.70000	97.90000	BMNH
Nam Ti Rest House	Namti, compare Namti (2)	နမ်တီသိုတဲ	Both, Nam Ti and Namti are used commonly throughout Kachin State	27.41000	97.66800	Renner et al. 2007
Namti	<i>See</i> Nam Ti Rest House	နမ်တီသိုတဲ				
Namti (2)	Nam Ti, see also Nam Ti Rest House	နမ်တီ	Same name as Nam Ti Rest House, but different location near Mogaung	25.35000	97.01667	BioGeomancer
Nan Lam River	<i>See</i> Nam Lang River, Northwest Putao District	နမ်လန်မြစ်				
Nanyascik	—	နန်ရ်ငာဆိပ်	Near Mogaung	25.63333	96.61667	Mayr 1938

TABLE 5. Continued.

Locality	Synonyms	Myanmar name	Remarks	Latitude	Longitude	References
Naung Mung	See Naung Mung	နောင်မွန်	Township and town. Historically Nongmung, but now Naung Mung is commonly used	27.50639	97.81445	Rappole et al. 2005, Renner et al. 2007, GBIF 2010
Naung Mon	See Naung Mung	နောင်မွန်				
Naung Mong	See Naung Mung	နောင်မွန်				
<b>Naung Mung</b>	Naung Mong, Naung Mon, Naungmong, Nong Mong, Nongmung, Non Mung, Naun Mung, Nonmong	နောင်မွန်				
Naungmong	See Naung Mung	နောင်မွန်				
Nawa	See Ngawa, Naung Mung Township	ငါ				
Na-wa	See Ngawa, Naung Mung Township	ငါ				
<b>Nawng Kwin</b>	—	နောင်ခိုင်	Northeast of confluence (Myitson) of Mali and May Hka	25.41667	96.36667	Tordoff et al. 2008
<b>N'changyang</b>	Injiyangyang	အင်ချီယန်		25.83330	97.80000	BMNH
<b>Ngawa, Naung Mung</b>	Nagwa, Nawa, Na-wa, No Wah	ငါ		27.83194	97.76305	GBIF 2010
<b>Ninga</b>	—	—				
N'Mai Hka	See May Hka (river)	မေပြည်				
No Wah	See Ngawa, Naung Mung Township	ငါ		26.53333	97.73333	BMNH
Nogmung	See Naung Mung	နောင်မွန်	Historical name, but no longer used			
Non Mung	See Naung Mung	နောင်မွန်				
Nong Mong	See Naung Mung	နောင်မွန်				
Nonmong	See Naung Mung	နောင်မွန်				
Nsapsup	See N'sopzup	အင်ဆွပ်စွပ်				
Nsopzup	See N'sopzup	အင်ဆွပ်စွပ်				
<b>N'sopzup</b>	Inzutzut, Nsopzup, Nsapsup	အင်ဆွပ်စွပ်	42nd mile Myitkyina- Putao Road	25.85000	97.50000	BMNH, GeoNames

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TABLE 5. Continued.

Locality	Synonyms	Myanmar name	Remarks	Latitude	Longitude	References
Pagnamdin	<i>See</i> Pagnamdin, Naung Mung Township	ပန်နန်ဒမ်		27.74556	97.72250	GBIF 2010
Pangnamdam	<i>See</i> Pagnamdin, Naung Mung Township	ပန်နန်ဒမ်				
<b>Pangnamdin</b> , Naung Mung Township	Pannandin, Pagnamdin, Pagnamdin	ပန်နန်ဒမ်		27.74556	97.72250	GBIF 2010
Pannandin	<i>See</i> Pagnamdin, Naung Mung Township	ပန်နန်ဒမ်				
Panwa Pass	—	ပန်ဝဲတောင်ကြား	Near China border, southeastern Kachin State, georeference is given by nearest town (i.e., Kambaiti) In Chipwi Township	25.40000	98.15000	BMNH
<b>Pawahku</b> Phi Maw	— <i>See</i> Hpimaw	ဝဲပိရဲ မေဟ်		26.18333	98.66667	GeoNames
PhiMaw	<i>See</i> Hpimaw	မေဟ်				
Phimaw	<i>See</i> Hpimaw	မေဟ်				
Phonkan Razi	<i>See</i> Hponkan Razi	ဖန်ကန်ရာဇ်				
<b>Pidaung</b>	—	မိတောင်း		25.41667	97.25000	BioGeomancer
<b>Punlumbum</b>	—	ပန်လွမ်ပွမ်၊ ပန်လွမ်ပွမ်	Wildlife Sanctuary South of Sumprabum	26.10000	97.40000	BMNH
<b>Putao</b>	Putao-O	ပုတောက်		27.36667	97.40000	Maplandia.com
Putao-O	<i>See</i> Putao	ပုတောက်		27.33000	97.43000	
Putao Airport	—	ပုတောက် လေဆိပ်		25.92803	98.16686	BMNH, Maplandia.com
<b>Pyepat</b>	—	—	Near Laukkaung, georeference is given by nearest town (i.e., Laukkaung)			
Ra Baw	<i>See</i> Ratbaw, Naung Mung Township	ရပ်တော့				
Rangoon	<i>See</i> Yangon					
Rangun	<i>See</i> Yangon					



TABLE 5. Continued.

Locality	Synonyms	Myanmar name	Remarks	Latitude	Longitude	References
Rapbow	See Ratbaw, Naung Mung Township	ရပ်ဘော့				
Rat Baw	See Ratbaw, Naung Mung Township	ရပ်ဘော့				
<b>Ratbaw, Naung Mung</b> Township Ratbod	Rat Baw, Rapbow, Ratbod, Ra Baw	ရပ်ဘော့	Between Naung Mung and Ba Baw	27.43400	97.91100	Renner et al. 2007
Ratbaw, Naung Mung	See Ratbaw, Naung Mung Township	ရပ်ဘော့				
<b>Sadon</b>	—	ဆတ်	Between Myitkyina and Kambaiti, near China border	25.36667	97.88333	Maplandia.com
<b>Sangaung, Putao</b> District	Shangawng, Shangong	ဆန်ခေါင်း ချန်ခေါင်း	Transit village to and from Putao for Hponkan Razi	27.42490	97.29608	King et al. 2001
<b>Shaduzut</b> Shangawng	Sharduzut See Sangaung, Putao District	ရှာလူဇွတ် ဆန်ခေါင်း ချန်ခေါင်း				
Shangong	See Sangaung, Putao District	ဆန်ခေါင်း ချန်ခေါင်း				Maplandia.com
Sharduzut	See Sharduzut	ရှာလူဇွတ်				
Shenshin Ku	See Shinshanghku, old maps	ရှင်ဆောက္ကူး၊ ရှင်ရန်ခို				Klieger 2003a, b; Renner et al. 2007
Shin Bwe Yang	See Shingbwyiyang	ရှင်စွယ်သန်				
Shinbwyiyang	See Shingbwyiyang	ရှင်စွယ်သန်				
Shingbweyiyang	Shinbwyiyang, Shingbweyiyang, Shin Bwe Yang	ရှင်စွယ်သန်				
Shingshanku	See Shinshanghku (as on old maps)	ရှင်ဆောက္ကူး၊ ရှင်ရန်ခို	Located on Ledo Road (known as Stilwell Road during World War II)	26.68333	96.21667	Maplandia.com
Shinsaku	See Shinshanghku (as on old maps)	ရှင်ဆောက္ကူး၊ ရှင်ရန်ခို				Klieger 2003a, b; Renner et al. 2007
Shinsanku	See Shinshanghku (as on old maps)	ရှင်ဆောက္ကူး၊ ရှင်ရန်ခို				Klieger 2003a, b
Shinshan Gu	See Shinshanghku (as on old maps)	ရှင်ဆောက္ကူး၊ ရှင်ရန်ခို				Klieger 2003a, b; Renner et al. 2007

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TABLE 5. Continued.

Locality	Synonyms	Myanmar name	Remarks	Latitude	Longitude	References
Shinshan Ku	<i>See</i> Shinshanghku (as on old maps)	ရှင်ဆာကူး၊ ရှင်ရှိုရှို				Klieger 2003a, b; Renner et al. 2007
<b>Shinshanghku</b> (as on old maps)	Shinshanku, Shinshan Ku, Shenshin Ku, Shinshan Gu, Shinsaku, Shinsanku, Shingshanku	ရှင်ဆာကူး၊ ရှင်ရှိုရှို	A rest house, historically spelled Shinshanghku but now spelled in various ways	27.68361	97.89722	Klieger 2003a, b
Shinshanku, Naung Mung Township	<i>See</i> Shinshanghku (as on old maps)	ရှင်ဆာကူး၊ ရှင်ရှိုရှို				Rabinowitz and Khaing 1998; Klieger 2003a, b
Simbo	<i>See</i> Sinbo	ဆင်ဘို				
<b>Sinbo</b>	Simbo	ဆင်ဘို		24.89167	97.15833	Tordoff et al. 2007
Sinlum kaba	<i>See</i> Sinlumkaba	စိန်လုံကဘာ				
<b>Sinlumkaba</b>	Sinlum kaba	စိန်လုံကဘာ		24.26667	97.51667	Maplandia.com
<b>Sumprabum</b>	—	ဆွမ်ပရာဗွမ်	North of Myitkyia	26.55000	97.56667	GeoNames
<b>Taga Hka</b>	—	တဂါဖဲ	~164 m	26.35000	96.15000	BMNH
Tahaundam	<i>See</i> Tahawndam, Naung Mung Township	တဟွန်သမ်၊ တဆောင်းသမ်				
<b>Tahawndam</b> , Naung Mung Township	Tahundam, Tahaundam, Tehaundam	တဟွန်သမ်၊ တဆောင်းသမ်	The northernmost village of northern Kachin, permanently inhabited by Tibetans	28.16778	97.68000	GBIF 2010
Tahaundam	<i>See</i> Tahawndam, Naung Mung Township	တဟွန်သမ်၊ တဆောင်းသမ်				
Tala Wang Valley	<i>See</i> Thala Wang Valley	သလာဘဝမ်ချိုင်းဂွမ်း				
<b>Tanai</b> (river)	—	တန်နိုင်းမြစ်		26.47500	96.71667	Tordoff et al. 2007
Tapeng (river)	<i>See</i> Taping river	တပင်မြစ်				
<b>Taping</b> (river)	Tapeng river, Daping river	တပင်မြစ်၊ တမ်နိုင်းမြစ်		24.33271	97.30797	GeoNames

TABLE 5. Continued.

Locality	Synonyms	Myanmar name	Remarks	Latitude	Longitude	References
<b>Tarigan</b>	Triangle; refers to the "Triangle" in Smythies' (1953) map	တြီဂန်း	Area between Mali Hka and May Hka rivers (Tarigan = Triangle)	26.50000	98.00000	Smythies 1953
<b>Taro</b>	Dalu	တရို	Rest house located between Naung Mung and Gawlei. No synonym, but compare Tashuhtu	26.60000	96.16667	Mayr 1938
<b>Tasahku Rest House, Naung Mung Township</b>	—	တဆာကူစိုင်းတဲး တဆာကူစိုင်းတဲး		27.57000	97.89306	GBIF 2010
<b>Tasaku</b>	See Tashuhtu, Naung Mung Township	—		28.05100	97.64900	Renner et al. 2007
<b>Tashuhtu, Naung Mung Township</b>	Tasutu, Tezutu, Tashutu, Tasaku, Tesuku, Tesaku	တဆူထု တရိုထု	Although recently spelled Tasuhtu, the old version, Tashuhtu, is more suitable. Located at confluence of Adung Wang and Tashu Wang	28.05139	97.64917	GBIF 2010, Yeinnwepar 2008
<b>Tashutu</b>	See Tashuhtu, Naung Mung Township	တဆူထု တရိုထု		28.05100	97.64900	Renner et al. 2007
<b>Tasuhtu</b>	See Tashuhtu, Naung Mung Township	တဆူထု တရိုထု		28.05139	97.64917	GBIF 2010
<b>Tawhmaw</b>	Tawmaw	တော့မော့	Located at confluence of Adung Wang and Tashu Wang	25.68333	96.26667	BioGeomancer
<b>Tawmaw</b>	See Tawhmaw	တော့မော့				
<b>Tazondam</b>	See Tazungdam, Naung Mung Township	တန့်န့်မင်း				
<b>Tazundam</b>	See Tazungdam, Naung Mung Township	တန့်န့်မင်း				
<b>Tazungdam, Naung Mung Township</b>	Dazonden, Tazondam, Tzungdane, Tazundam, Tezungdam	တန့်န့်မင်း	Located at confluence of Seinghku Wang, Nam Tamai and Adung Wang rivers	28.04417	97.57000	GBIF 2010

(continued)

TABLE 5. Continued.

Locality	Synonyms	Myanmar name	Remarks	Latitude	Longitude	References
Tehaundam	<i>See</i> Tahawndam, Naung Mung Township	တော့နွယ်ခဲ၊ တေဟာံသမ်				
Tesaku	<i>See</i> Tashuhtu, Naung Mung Township	—		28.05100	97.64900	Remmer et al. 2007
Tesuku	<i>See</i> Tashuhtu, Naung Mung Township	—		28.05100	97.64900	Remmer et al. 2007
Tezungdam	<i>See</i> Tazungdam, Naung Mung Township	တနွန်ခမ်				
Tezutu	<i>See</i> Tashuhtu, Naung Mung Township	တော့ထု တော့ထု				
<b>Thala Wang Valley</b>	Tala Wang Valley	ဝာလာဝမ်းနွန်ခမ်း				
<b>Tingpai</b>		တမ်းပ	94th mile, Myitkyina-Putao Road, ca. 607 m	28.13333	97.75000	BMNH
Triangle	<i>See</i> Tarigan	တြိဂံ				
<b>Tutuga</b>	—	—	Myitkyina-Putao Road, georeference is given by the nearest town, Sumprabum	26.55000	97.56667	BMNH, GeoNames
Tzungdane	<i>See</i> Tazungdam, Naung Mung Township	တနွန်ခမ်				
<b>U Ring Ca,</b> Naung Mung Township	U-Ring-Ga, U-Rein Ga, Uringa	ရွာလမ်း				
U-Rein Ga	<i>See</i> U Ring Ca, Naung Mung Township	ရွာလမ်း				
Uringa	<i>See</i> U Ring Ca, Naung Mung Township	ရွာလမ်း				
				27.41028	97.66778	GBIF 2010

TABLE 5. Continued.

Locality	Synonyms	Myanmar name	Remarks	Latitude	Longitude	References
U-Ring-Ga	See U Ring Ga, Naung Mung Township	ꦠꦺꦴꦶꦂꦶꦁꦭ꦳				
<b>Waingmaw</b> Wang She Wong	— See Wangsi Wang, Naung Mung Township	ꦶꦱꦺꦴꦠꦺꦴꦶꦂꦶꦁꦭ꦳ ꦶꦱꦺꦴꦠꦺꦴꦶꦂꦶꦁꦭ꦳		25.35000	97.43333	Maplandia.com
Wang-se-wan	See Wangsi Wang, Naung Mung Township	ꦶꦱꦺꦴꦠꦺꦴꦶꦂꦶꦁꦭ꦳				
Wangsewang	See Wangsi Wang, Naung Mung Township	ꦶꦱꦺꦴꦠꦺꦴꦶꦂꦶꦁꦭ꦳				
<b>Wangsi Wang</b> , Naung Mung Township	Wangsiwang, Wang-se-wan, Wangsewang, Wansewan, Wangsiwang, Wang She Wong	ꦶꦱꦺꦴꦠꦺꦴꦶꦂꦶꦁꦭ꦳	Between Gawai and Ngawa in Naung Mung Township	27.90806	97.70028	GBIF 2010
Wangsiwang	See Wangsi Wang, Naung Mung Township	ꦶꦱꦺꦴꦠꦺꦴꦶꦂꦶꦁꦭ꦳				
Wansewan	See Wangsi Wang, Naung Mung Township	ꦶꦱꦺꦴꦠꦺꦴꦶꦂꦶꦁꦭ꦳				
Wansiwang	See Wangsi Wang, Naung Mung Township	ꦶꦱꦺꦴꦠꦺꦴꦶꦂꦶꦁꦭ꦳				
<b>Wara Bum</b> Warabum	Warabum See Wara Bum	— —	East of Bhamo	24.00000	97.40000	BMNH, GeoNames
<b>Warazup</b> village <b>Weshi</b>	— —	ꦠꦺꦴꦱꦸꦥ —	33rd mile Myitkyina- Putao Road Largest city in country and former capital of Myanmar	25.84167 25.75000	96.71667 97.50000	Tordoff et al. 2007 BMNH, GeoNames
<b>Yangon</b>	Rangoon, Rangun	ꦶꦱꦺꦴꦠꦺꦴꦶꦂꦶꦁꦭ꦳		16.78333	96.45000	

Where there was ambiguity, we preferred English spellings that matched with the native tribes' meanings. According to Yeinnwepar (2008), names given by the tribes in the northern Kachin State often contain additional information that helps describe the locality (e.g., *hka* means river, *razi* means mountain, *htu* means a place where rivers or streams meet together, and *dam* means a place with flat areas in valleys; all translated and transcribed first from local idioms to Myanmar and subsequently into English). For example, Tashuhtu (synonym: Tasuhtu, 28.05139 N, 97.64919 E) is located at the confluence of Adung Wang River and Tashu Wang River. It is now commonly spelled "Tasuhtu," but "Tashuhtu" matches older maps and the latter spelling makes more grammatical sense. In addition, it can be traced back to find the location on the map easily by following the Tashu Wang River. Likewise, Tahawndam and Tazungdam are examples of villages' names using *dam* and are located in small flood plains in otherwise steep mountain sites (Yeinnwepar 2008).

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## APPENDIX. Museums in Myanmar.

Museum	Location	Contact
Bird Museum	Hlawga Park, Nature and Wildlife Conservation Division, Forest Department, Htauk Kyan, Yangon	Park Warden, Hlawga Park, Nature and Wildlife Conservation Division, Forest Department, Htauk Kyan, Yangon, phone: +95 1 600052
Biodiversity Museum	Hlawga Park, Nature and Wildlife Conservation Division, Forest Department, Htauk Kyan, Yangon	Park Warden, Hlawga Park, Nature and Wildlife Conservation Division, Forest Department, Htauk Kyan, Yangon, phone: +95 1 600052
Natural History Museum	Yangon Zoological Garden, Kan Yeikthar Street, Yangon	Park Warden, Yangon Zoological Garden, Kan Yeikthar Street, Yangon, phone: +95 1 374261
Forest Museum (Pyin Oo Lwin)	Forestry Training School, Pyin Oo Lwin, Mandalay Division	Principal, Forestry Training School, Pyin Oo Lwin, Mandalay Division