

# 03

## 2017臺灣兩棲類 紅皮書名錄

The Red List of  
Amphibians of Taiwan, 2017



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*Hylarana taipehensis*  
臺北赤蛙 Taipei Grass Frog  
EN B2ab (ii,iii,iv)c(ii,iii)  
林春富 / 攝

## 目錄照片 /

*Babina okinavana*  
豎琴蛙 Harpist Frog  
CR B1ab (iii)  
林春富 / 攝

## 2017 臺灣兩棲類紅皮書名錄

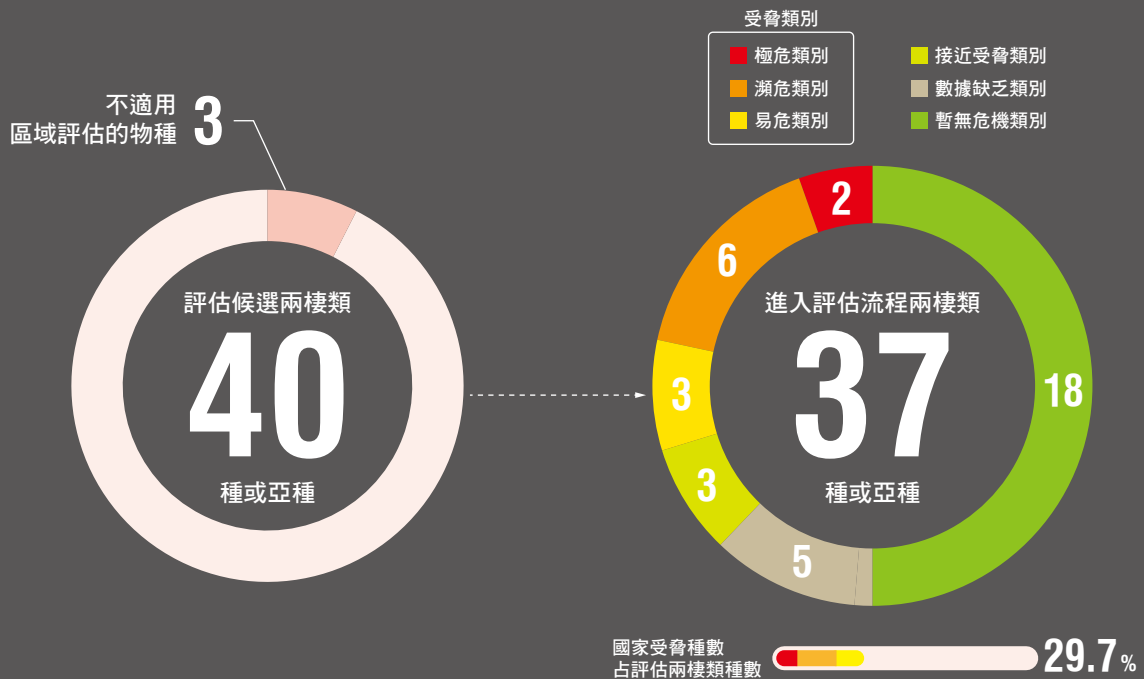
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### 摘要

為瞭解臺灣兩棲類物種目前的受脅狀況，本研究依據國際自然保育聯盟 (International Union for Conservation of Nature) 所建議的類別與準則，評估了臺灣兩棲類紅皮書名錄。報告中納入評估候選的兩棲類共有 40 種，因其中 3 種屬於不適用 (Not Applicable) 區域評估的物種，所以計有 37 種兩棲類進入評估流程，並進行初步的評估。結果顯示屬於臺灣極危 (Critical Endangered) 類別者有 2 種，臺灣瀕危 (Endangered) 類別者有 6 種，臺灣易危 (Vulnerable) 類別者有 3 種，以上 11 種受脅 (Threatened) 物種占本次所有評估兩棲類種數的 29.7%。其餘 26 種兩棲類中，有 3 種屬於臺灣接近受脅 (Near-threatened) 類別，有 5 種屬於數據缺乏 (Data Deficient)，另有 18 種屬於臺灣暫無危機 (Least Concern) 類別。





## 1. 前言

由國際自然保育聯盟 (International Union for Conservation of Nature, IUCN) 物種存續委員會 (Species Survival Commission) 所執行的 IUCN 紅皮書名錄 (IUCN Red List of Threatened Species) 作業流程，自 1964 年開始發布以來，已逐步成為評估全球物種保育狀況與變化趨勢的最重要參考依據 (Rodrigues et al. 2006; IUCN, 2016)；其後續發布的 IUCN 紅皮書名錄地區及國家級評估準則應用指南，也成為許多國家評估其境內受脅物種名錄的重要遵循標準 (Townsend et al. 2007; IUCN 2012a)，該項評估的結果，不僅有助於了解地區及國家級的物種受脅狀況，也讓全球紅皮書所涵蓋的物種更加地完整 (Rodrigues et al. 2006)。

兩棲類動物對生態環境的擾動非常敏感，是了解環境變化的重要指標。2004 年 IUCN 首次完成了全球兩棲類動物紅皮書的評估，之後隨著物種資料的持續增加，分別在 2006 與 2008 年進行了兩次較大規模的紅皮書名錄更新。至今約有超過 60 個國家近 650 位專家學者陸續參與此評估作業，為全球兩棲類族群下降與保育行動上提供了基礎的背景資料。由 2008 年 IUCN 彙整的兩棲類紅皮書名錄中顯示：全世界將近三分之一 (32%) 的兩棲類物種已被列為受脅 (包含極危、瀕危與易危類別) 或滅絕的物種，43% 為非受脅物種，而 25% 則無完整的資料來確定其受脅類別；而在所有兩棲類物種中，有將近 42% 族群正逐漸下降中，亦即未來預期會有越來越多物種成為受脅物種；相反



**Rhacophorus arvalis**  
諸羅樹蛙 Farmland Treefrog  
EN B1ab(i,iii,iv)c(iii)  
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地，只有少於 1% 的物種族群有逐漸上升的趨勢 (IUCN 2016)。

至於與臺灣兩棲類物種有關的紅皮書評估作業，首推 2004 年時由呂光洋老師 (時任職於師範大學) 與周文豪研究員 (國立自然科學博物館) 參與 IUCN 之 SSC 兩棲類專家群時，協同國外專家學者以全球的尺度評估了 31 種有分布於臺灣的兩棲類，之後在 2008、2009 與 2016 年則陸續有國外專家學者以全球的層級再度評估了與臺灣有關的部分物種。然而近年來，由於臺灣生態環境的快速變化，再加上新種的發表與物種學名的轉變，亟需再以臺灣的層級對所有兩棲類動物的滅絕風險，進行重新的檢視與評估。



*Babina okinavana*  
豎琴蛙 Harpist Frog  
CR B1ab(iii)  
林春富 / 攝

*Hynobius arisanensis*  
阿里山山椒魚 Arisan Salamander  
VU B2ab(iii)  
林春富 / 攝





**Rhacophorus aurantiventris**  
橙腹樹蛙 Orange Belly Treefrog  
EN B2ab(iii)  
林春富 / 攝

## 2. 評估流程

本報告採用的評估準則 (criteria) 與類別 (categories) 係依據 IUCN 紅皮書名錄類別與標準：3.1 版 (IUCN 2012b)，並參照 IUCN 紅皮書名錄地區及國家級評估標準應用指南 (IUCN 2012a)，考慮了原生或外來種的問題，對臺灣兩棲類紅皮書進行初步評估，並於報告中列出同一分類單元在臺灣的族群占全球族群的比例等資料，以顯示不同層級的滅絕風險。其評估流程與方法簡述如下：

### 2.1 界定納入評估之分類單元

本報告評估的範圍為臺灣本島的兩棲類物種，其分類標準與其學名主要參照美國國家歷史博物館 (American Museum of Natural History) 中的世界兩棲類物種 (Amphibian Species of the World, ASW) 為依據 (Frost 2015)。所有納入評估候選的兩棲類共 40 種，其中美洲牛蛙 (*Lithobates catesbeianus*)、花狹口蛙 (*Kaloula pulchra*) 與斑腿樹蛙 (*Polypedates megacephalus*) 等 3 種因屬於入侵臺灣本島的外來種，屬不適用 (Not Applicable) 區域評估的分類單元，因此計有 37 種兩棲類進入評估流程。

## 2.2 資訊蒐集與初步評估

完成評估對象篩選後，依據 IUCN 評估標準 (IUCN 2012b) 製作每一受評估分類單元的資料表，然後就所需資訊，盡量蒐集既有學術報告、研究報告、資料庫及相關專家意見等，填列數據並進行必要之說明。

每一受評分類單元均依照 IUCN 紅皮書名錄類別 (圖 1) 與標準使用指南:12 版進行評估 (IUCN Standards and Petitions Subcommittee 2016)。評估的項目包括：A. 快速族群下降 (Rapid population reduction)、B. 分布侷限、碎裂化，同時存在族群下降或嚴重波動 (Small range and fragmented, declining, or extreme fluctuations)、C. 小族群且持

續下降 (Small population and declining)、D. 非常小的族群 (Very small population)，以及 E. 量化分析 (Quantitative analysis) 等五大標準及對應之次標準 (Sub-criterion) 及資格限制 (Qualifiers) 所構成之決策樹 (logic tree) 進行評估 (表 1)。每個分類單元都會依所有標準進行評估，只要符合任一條標準者，即列入受脅物種的類別，並在文件報告中列出符合類別的標準及對應之次標準。至於若無法符合極危 (Critical Endangered, CR)、瀕危 (Endangered, EN) 及易危 (Vulnerable, VU) 的類別，但已很接近或未來可能達到易危類別時，則列入接近受脅 (Near-threatened, NT) 類別。

圖 1. IUCN 國家或區域紅皮書類別。

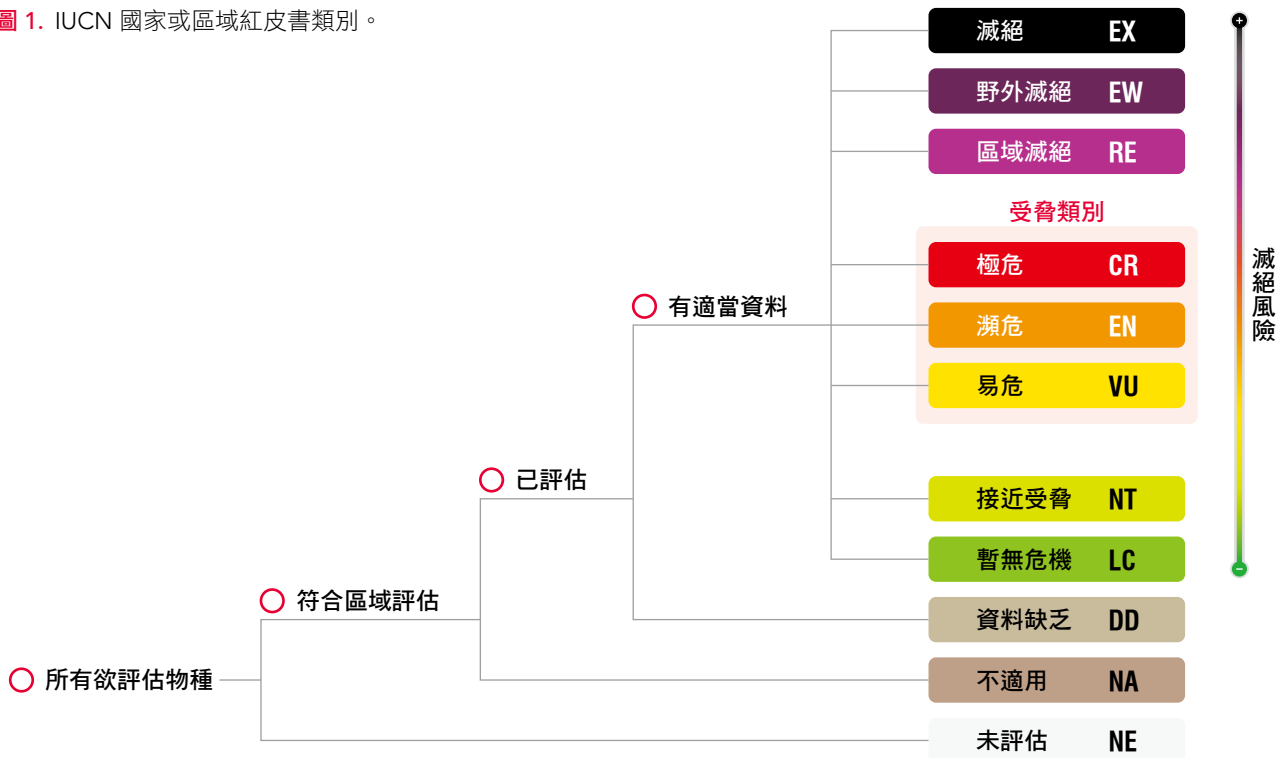




表 1. IUCN 紅皮書受脅 (極危、瀕危、易危) 及接近受脅類別評估標準簡要內容。修正自 IUCN Standards and Petitions Subcommittee (2016)

物種紅皮書受脅類別判定標準	極危 (CR)	瀕危 (EN)	易危 (VU)	接近受脅 (NT)
<b>A. 族群量下降 (時間區間為 10 年或 3 個世代，以較長者為優先)</b>				
A1	≥ 90%	≥ 70%	≥ 50%	≥ 30%
A2, A3 & A4	≥ 80%	≥ 50%	≥ 30%	≥ 20%

- A1. 經由以下列舉任何方式所觀察、推估、推測或懷疑物種族群下降已經發生，而造成下降的原因明顯是可逆的且原因已知並且停止：
- 直接觀察。 [A3 除外]
  - 適合該分類群的物種豐度指數。
  - 分布範圍、占有面積或棲地品質減少或下降。
  - 實際或潛在的開發破壞。
  - 直接觀察受外來種、雜交種、病原、污染源、競爭者或寄生物之影響。
- A2. 經由 A1 所列舉任何方式所觀察、推估、推測或懷疑物種族群降低已經發生，但造成降低的原因仍未停止、不明或不可逆。
- A3. 經由 A1 所列舉任何方式所預估、推測或懷疑物種族群未來近期內會降低。(時間最長為 100 年)
- A4. 經由 A1 所列舉任何方式所觀察、推估、推測或懷疑物種族群未來任何一段時間會降低，造成降低的原因仍未停止、不明或不可逆。



**Hylarana taipehensis**  
臺北赤蛙 Taipei Grass Frog  
EN B2ab(ii,iii,iv)c(ii,iii)  
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物種紅皮書受脅類別判定標準	極危 (CR)	瀕危 (EN)	易危 (VU)	接近受脅 (NT)
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### B. 分布範圍之判定標準 (至少具備 B1 或 B2 其中之一的條件)

B1. 分布範圍 (EOO)	< 100 平方公里	< 5,000 平方公里	< 20,000 平方公里	<20,000 平方公里
B2. 占有面積 (AOO)	< 10 平方公里	< 500 平方公里	< 2,000 平方公里	< 2,000 平方公里

且族群需遭遇以下至少兩種情況 (至少一種狀況適用於 NT 類別)

(a) 嚴重破碎化或居留區數目為右項數值者	= 1	≤ 5	≤ 10	≤ 10
(b) 經由觀察、推估、推測或預估，下列各項情況之一的數值仍持續下降者：(i) 分布範圍；(ii) 占有面積；(iii) 棲地之區域、實際面積或品質；(iv) 生長地點或亞族群之數目；(v) 能繁殖之成熟個體數				
(c) 下列各項情況其中之一的數值呈現劇烈變動時：(i) 分布範圍；(ii) 占有面積；(iii) 生長地點或亞族群之數目；(iv) 能繁殖之成熟個體數				

### C. 族群量小且下降之判定標準

族群內之成熟個體數	< 250	< 2,500	< 10,000	<20,000
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且具備 C1 或 C2 其中之一的條件

C1. 經由觀察、推估或預估物種族群成熟個體數持續下降。 (時間至少為未來 100 年)	3 年或下一代 下降 25%	5 年或下二代 下降 20%	10 年或下三代 下降 10%	10 年或下三代 下降 10%
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C2. 經由觀察、推估或預估，能繁殖之成熟個體數持續下降，而且其族群結構遭遇下列至少一種情況者：

a(i) 每個亞族群能繁殖之成熟個體數	≤ 50	≤ 250	≤ 1,000	≤ 1,000
a(ii) 成熟個體都生長在一個單獨的小族群內所占比例	90%	95%	100%	100%

(b) 成熟個體呈現劇烈變動

### D. 族群數量極少且分布侷限之判定標準

族群遭遇以下情況：

D. 成熟個體數	< 50	< 250	D1. < 1,000	D1. < 2,500
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與/或遭遇以下情況：

D2. 出現面積受限或位於居留區的物種族群在未來有可能會面臨威脅，使之受脅程度提升至極危或瀕危類別 (此準則只用於評估易危及接近受脅類別)。	NA	NA	D2. 占有面積 < 20km <sup>2</sup> 或分布地點 ≤ 5	D2. 占有面積 < 50km <sup>2</sup> 或分布地點 ≤ 10
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### E. 量化分析

在野外絕種之機率	10 年內或三個世代內 在野外絕種之機率 超過 50%	20 年內或五個世代內 在野外絕種之機率 超過 20%	100 年內在野外絕種之 機率超過 10%	100 年內在野外絕種之 機率超過 5%
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### 3. 臺灣兩棲類紅皮書名錄評估結果

結果顯示臺灣兩棲類中，有 2 種屬臺灣極危 (Critical Endangered) 類別，有 6 屬臺灣瀕危 (Endangered) 類別，有 3 種屬臺灣易危 (Vulnerable) 類別，以上 11 種受脅 (Threatened) 兩棲類占本次所有評估兩棲類種數的 29.7%。另

屬於臺灣接近受脅 (Near-threatened) 者有 3 種，數據不足 (Data Deficient) 者有 5 種，屬於臺灣暫無危機 (Least Concern) 者有 18 種。本報告所有兩棲類評估資料及結果可洽通訊作者索取。

#### 3.1 臺灣受脅兩棲類物種 (包含極危、瀕危與易危類別) 名錄


分類單元	臺灣紅皮書類別	全球紅皮書類別	臺灣占全球族群百分比 %
<i>Hynobius glacialis</i> Lai and Lue, 2008 南湖山椒魚	CR B1ab(iii)	—	100
<i>Babina okinavana</i> (Boettger, 1895) 豎琴蛙	CR B1ab(iii)	EN B1ab(iii,iv)+2ab(iii,iv)	30
<i>Hynobius formosanus</i> Maki, 1922 臺灣山椒魚	EN B1ab(iii)	EN B1ab(iii)+2ab(iii)	100
<i>Hynobius fuca</i> Lai and Lue, 2008 觀霧山椒魚	EN B1ab(ii,iii)	—	100

**|** *Hynobius fuca*  
觀霧山椒魚 Taiwan Lesser Salamander  
EN B1ab(ii,iii)  
林春富 / 攝



## 3.1 臺灣受脅兩棲類物種 (包含極危、瀕危與易危類別) 名錄 (續)

分類單元	臺灣紅皮書類別	全球紅皮書類別	臺灣占全球族群百分比 %
<i>Hynobius sonani</i> (Maki, 1922) 楚南氏山椒魚	EN B1ab(iii)	EN B1ab(iii)+2ab(iii)	100
<i>Hylarana taipehensis</i> (Van Denburgh, 1909) 臺北赤蛙	EN B2ab(ii,iii,iv)c(ii,iii)	LC	1
<i>Rhacophorus arvalis</i> Lue, Lai, and Chen, 1995 諸羅樹蛙	EN B1ab(i,iii,iv)c(iii)	EN B1ab(iii)+2ab(iii)	100
<i>Rhacophorus aurantiventris</i> Lue, Lai, and Chen, 1994 橙腹樹蛙	EN B2ab(iii)	EN B1ab(v)+2ab(v); C2a(i)	100
<i>Hynobius arisanensis</i> Maki, 1922 阿里山山椒魚	VU B2ab(iii)	VU B1ab(iii)+2ab(iii)	100
<i>Micryletta steinegeri</i> (Boulenger, 1909) 史丹吉氏小雨蛙	VU B1b(i,iii)c(iii)	EN B1ab(iii)	100
<i>Rhacophorus taipeianus</i> Lin and Wang, 1978 臺北樹蛙	VU B1ab(i)	NT	100


  
**Hynobius sonani**  
 楚南氏山椒魚 Sonan's Salamander  
 EN B1ab(iii)  
 林春富 / 攝



### 3.2 臺灣接近受脅類別及數據不足之兩棲類物種名錄

分類單元	臺灣紅皮書類別	全球紅皮書類別	臺灣占全球族群百分比 %
<i>Pelophylax fukienensis</i> (Pope, 1929) 福建金線蛙	NT B1c(iii)	LC	10
<i>Rana longicrus</i> Stejneger, 1898 長腳赤蛙	NT B1b(iii)	VU B1ab(iii,v)	10
<i>Rhacophorus prasinatus</i> Mou, Risch, and Lue, 1983 翡翠樹蛙	NT B1b(iii)	NT	100
<i>Microhyla butleri</i> Boulenger, 1900 巴氏小雨蛙	DD	LC	1
<i>Kurixalus berylliniris</i> Wu, Huang, Tsai, Lin, Jhang, and Wu, 2016 碧眼樹蛙	DD	—	100
<i>Kurixalus eiffingeri</i> (Boettger, 1895) 艾氏樹蛙	DD	LC	50
<i>Kurixalus wangi</i> Wu, Huang, Tsai, Lin, Jhang, and Wu, 2016 王氏樹蛙	DD	—	100
<i>Fejervarya cancrivora</i> (Gravenhorst, 1829) 海蛙	DD	LC	1

| *Microhyla butleri*  
 巴氏小雨蛙 Butler's Narrow-mouthed Frog  
 DD  
 林春富 / 攝



## 3.3 臺灣暫無危機類別之兩棲類物種名錄

分類單元	臺灣紅皮書類別	全球紅皮書類別	臺灣占全球族群百分比 %
<i>Bufo bankorensis</i> Barbour, 1908 盤古蟾蜍	LC	LC	100
<i>Duttaphrynus melanostictus</i> (Schneider, 1799) 黑眶蟾蜍	LC	LC	1
<i>Fejervarya limnocharis</i> (Gravenhorst, 1829) 澤蛙	LC	LC	1
<i>Hoplobatrachus rugulosus</i> (Wiegmann, 1834) 虎皮蛙	LC	LC	1
<i>Limnonectes fujianensis</i> Ye and Fei, 1994 福建大頭蛙	LC	LC	10
<i>Hyla chinensis</i> Günther, 1858 中國樹蟾	LC	LC	1
<i>Microhyla fissipes</i> Boulenger, 1884 小雨蛙	LC	LC	1
<i>Microhyla heymonsi</i> Vogt, 1911 黑蒙西氏小雨蛙	LC	LC	1
<i>Babina adenopleura</i> (Boulenger, 1909) 腹斑蛙	LC	LC	10
<i>Hylarana guentheri</i> (Boulenger, 1882) 貢德氏赤蛙	LC	LC	1
<i>Hylarana latouchii</i> (Boulenger, 1899) 拉都希氏赤蛙	LC	LC	1
<i>Odorrana swinhoana</i> (Boulenger, 1903) 斯文豪氏赤蛙	LC	LC	100
<i>Rana sauteri</i> Boulenger, 1909 梭德氏赤蛙	LC	EN B1ab(iii)	100
<i>Buergeria japonica</i> (Hallowell, 1861) 日本樹蛙	LC	LC	40



### 3.3 臺灣暫無危機類別之兩棲類物種名錄 (續)

分類單元	臺灣紅皮書類別	全球紅皮書類別	臺灣占全球族群百分比 %
<i>Buergeria robusta</i> (Boulenger, 1909) 褐樹蛙	LC	LC	100
<i>Kurixalus idiotocus</i> (Kuramoto and Wang, 1987) 面天樹蛙	LC	LC	100
<i>Polypedates braueri</i> (Vogt, 1911) 布氏樹蛙	LC	—	5
<i>Rhacophorus moltrechti</i> Boulenger, 1908 莫氏樹蛙	LC	LC	100



■ *Buergeria japonica*  
日本樹蛙 Japanese Stream Treefrog  
LC  
林春富 / 攝



■ *Hoplobatrachus rugulosus*  
虎皮蛙 Chinese Bullfrog  
LC  
林春富 / 攝



■ *Hylarana latouchii*  
拉都希氏赤蛙 Latouche's Frog  
LC  
林春富 / 攝

## 4. 臺灣之全球受脅兩棲類名錄

本報告納入評估候選之 37 種兩棲類中，有 9 種為全球受脅兩棲類，其中 7 種屬臺灣受脅物種 ( 包含 CR, EN 及 VU 類別 )，1 種屬臺灣接近受脅，1 種屬臺灣暫無危機。

分類單元	臺灣紅皮書類別	全球紅皮書類別	臺灣占全球族群百分比 %
<i>Babina okinavana</i> (Boettger, 1895) 豎琴蛙	CR B1ab(iii)	EN B1ab(iii,iv)+2ab(iii,iv)	30
<i>Hynobius formosanus</i> Maki, 1922 臺灣山椒魚	EN B1ab(iii)	EN B1ab(iii)+2ab(iii)	100
<i>Hynobius sonani</i> (Maki, 1922) 楚南氏山椒魚	EN B1ab(iii)	EN B1ab(iii)+2ab(iii)	100
<i>Rhacophorus arvalis</i> Lue, Lai, and Chen, 1995 諸羅樹蛙	EN B1ab(i,iii,iv)c(iii)	EN B1ab(iii)+2ab(iii)	100
<i>Rhacophorus aurantiventris</i> Lue, Lai, and Chen, 1994 橙腹樹蛙	EN B2ab(iii)	EN B1ab(v)+2ab(v); C2a(i)	100
<i>Hynobius arisanensis</i> Maki, 1922 阿里山山椒魚	VU B2ab(iii)	VU B1ab(iii)+2ab(iii)	100
<i>Micryletta steinegeri</i> (Boulenger, 1909) 史丹吉氏小雨蛙	VU B1b(i,iii)c(iii)	EN B1ab(iii)	100
<i>Rana longicrus</i> Stejneger, 1898 長腳赤蛙	NT	VU B1ab(iii,v)	10
<i>Rana sauteri</i> Boulenger, 1909 梭德氏赤蛙	LC	EN B1ab(iii)	100

## 5. 謝誌

感謝陳元龍參與評估流程的討論並提供許多修正建議；葉大詮與陳歆協助評估資訊的蒐集及整理，以及其他學者與專家於評估過程中所提供的相關資訊與建議。感謝 Mark Bruce Wilkie 協助英文編輯。



**|** *Micryletta steinegeri*  
史丹吉氏小雨蛙 Steineger's Narrow-mouthed Frog  
VU B1b(i,iii)c(iii)  
林春富 / 攝

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# The Red List of Amphibians of Taiwan, 2017

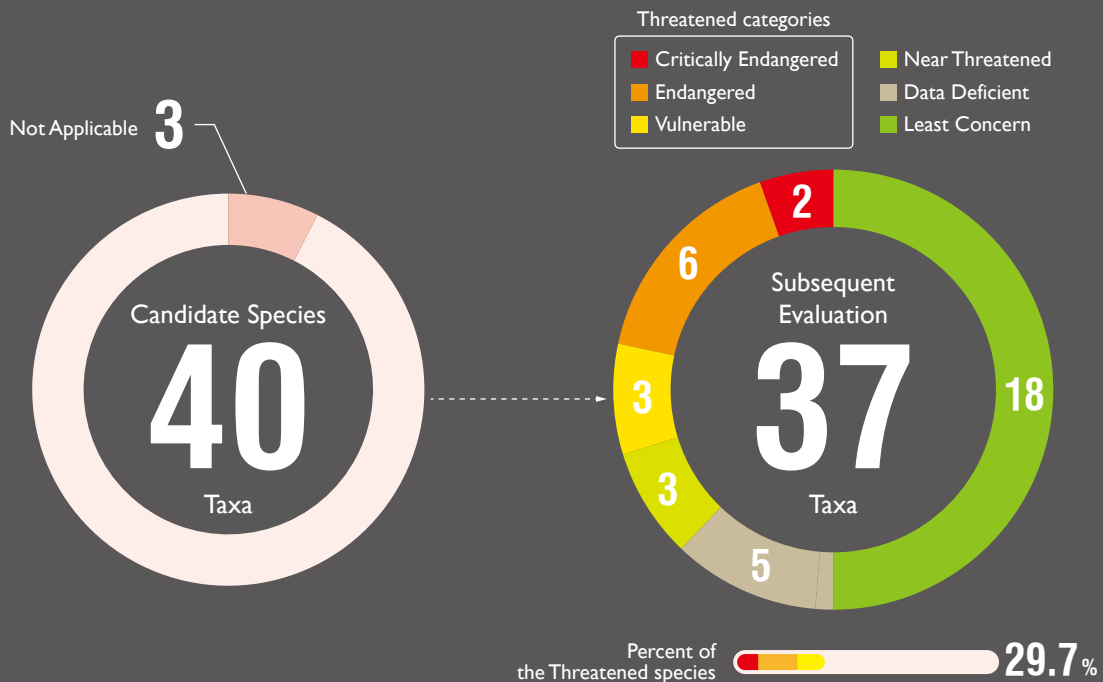
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## Abstract

This report has adopted the categories and criteria suggested by the International Union for Conservation of Nature (IUCN) for evaluating amphibians. It evaluates amphibian species listed in the Red List of Amphibians of Taiwan and determines the current threats to amphibian species in Taiwan. The 40 amphibian species on the red list were adopted as candidates for evaluation. However, three of these species were excluded because they were listed as “not applicable” for region-based evaluations. Therefore, 37 species were selected for preliminary evaluation. The results indicated two species in the critically endangered (CR) category, six in the endangered (EN) category, and three in the vulnerable (VU) category. These 11 threatened species comprised 29.7% of all the species evaluated in this study. Among the remaining 26 species, three were in the near-threatened (NT) category, five were in the data deficient (DD) category, and 18 were in the least concern (LC) category.





## 1. Introduction

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The operating procedures introduced in the *International Union for Conservation of Nature (IUCN) Red List of Threatened Species*, which was first published by the IUCN Species Survival Commission (SSC) in 1964, have gradually become the key reference for evaluating animal protection status and changing trends within animal species around the world (Rodrigues et al. 2006; IUCN 2016). Moreover, the *Guidelines for Application of IUCN Red List Criteria at Regional and National Levels* later published by the IUCN has also become a regulatory standard for evaluating the threat to native animal species in many countries (Townsend et al. 2007; IUCN 2012a). These evaluations not only help researchers understand the regional and national threat to animal species but also enhance the comprehensiveness of the assessment of species on the red list (Rodrigues et al. 2006).

Amphibians are very sensitive to disturbances in ecosystems. Therefore, they are crucial indicators of environmental change. In 2004, the IUCN completed the first evaluation of the amphibians on the *IUCN Red List of Threatened Species*. Thereafter, results have been continually updated and revised. The IUCN engaged in two large-scale updates of its red list in 2006 and 2008 due to exponential increases in the amount of amphibian data collected. At present, approximately 650 expert scholars across 60 countries have conducted subsequent evaluations to systematically determine global amphibian population declines and conservation actions. According to data on amphibians in the 2008 *IUCN Red List of Threatened Species*, approximately one-third (32%) of global amphibian species are either threatened (including critically endangered, CR; endangered, EN; and vulnerable, VU) or extinct, 43% are not



**Rhacophorus arvalis**  
諸羅樹蛙 Farmland Treefrog  
EN B1ab(i,iii,iv)c(iii)  
林春富 / 攝

*Babina okinavana*  
豎琴蛙 Harpist Frog  
CR B1ab(iii)  
林春富 / 攝



*Rhacophorus prasinatus*  
翡翠樹蛙 Emerald Treefrog  
NT  
林春富 / 攝



threatened, and there is insufficient data on the remaining 25% to determine the threats they face. Among all amphibian species, roughly 42% are in decline. Thus, it is projected that more species will become threatened in the near future. By comparison, less than 1% of all amphibian species are increasing in population (IUCN 2016).

Dr. Kuang-Yang Lue (former professor at National Taiwan Normal University) and Dr. Wen-Hao Chou (researcher at National Taiwan Museum of Natural Science) were the first experts from

Taiwan to join the IUCN SSC amphibian expert team (joining in 2004). Together with other international experts they evaluated Taiwan's 31 native amphibian species. International evaluations of many of Taiwan's animal species were performed in 2008, 2009, and 2016. Recent rapid changes in Taiwan's ecosystems, ongoing publications of new species, and taxonomic revisions have greatly increased the urgency for a national-level evaluation to review and re-evaluate the risk of extinction to Taiwan's amphibians.



## 2. Assessment process

This report adopts the evaluation criteria and categories listed in the *IUCN Red List Categories and Criteria Version 3.1* (IUCN 2012b). Issues concerning native and invasive species were investigated using the *Guidelines for Application of IUCN Red List Criteria at Regional and National Levels* (IUCN 2012a), and a preliminary evaluation was performed on the species listed in the *Red List of Amphibians of Taiwan*. The evaluation outcomes were used to calculate the population ratio of every taxon between Taiwan and the world to highlight the risk of extinction measured according to various levels. The evaluation methods and procedures are described herein.

### 2.1 Defining the taxa to be included in the evaluation

The scope of the evaluation comprised all the amphibian species in Taiwan. The categorization criteria and scientific names of the species were based on *Amphibian Species of the World (ASW)* published by the American Museum of Natural History (Frost 2015). Forty amphibian species were considered as candidates for evaluation. Among these, *Lithobates catesbeianus*, *Kaloula pulchra*, and *Polypedates megacephalus* were invasive species and listed as “not applicable” for region-based evaluations. Therefore, 37 species were selected for evaluation.



**Rhacophorus aurantiventris**  
橙腹樹蛙 Orange Belly Treefrog  
EN B2ab(iii)  
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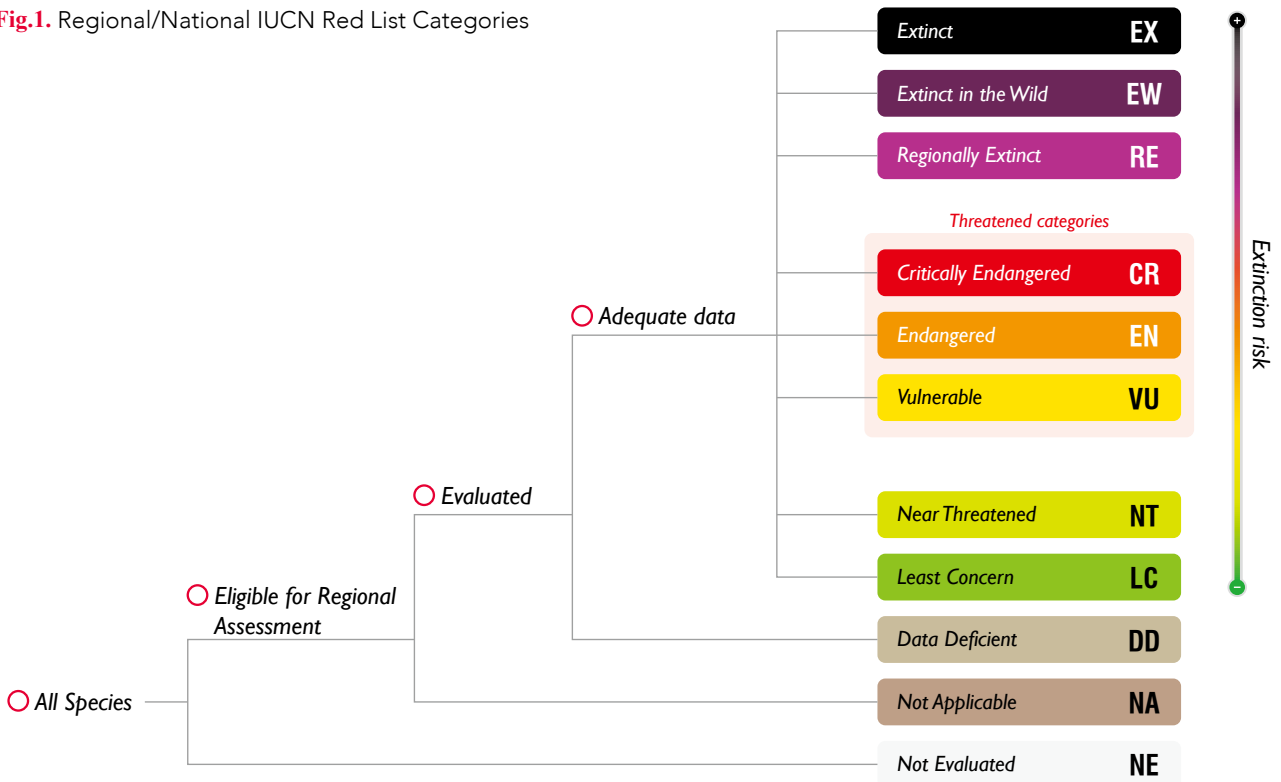
## 2.2 Data Collection and Preliminary Evaluation

After the species for evaluation were confirmed, the *IUCN Red List Categories and Criteria* (IUCN 2012b) was used to create a datasheet for each taxon. Relevant data from academic papers, research reports, databases, and expert opinions were entered into the datasheet and necessary explanations were recorded.

Each taxon was evaluated in accordance with the *Guidelines for using the IUCN Red List Categories and Criteria Version 12* published by the IUCN Standards and Petitions Subcommittee in 2016. The evaluation items were compiled into a logic tree comprising five major criteria (A. Rapid population reduction; B. Small range and

fragmented, declining, or extreme fluctuations; C. Small population and declining; D. Very small population; and E. Quantitative analysis) and numerous subcriteria and qualifiers (Table 1). Each taxon was analyzed against each criterion and listed as threatened if they satisfied one or more of the criteria. The taxa were then listed under the appropriate categories, and corresponding criteria and sub-criteria were listed under each taxon. Taxa that did not belong to the CR, EN, or VU categories but approximated or may potentially reach the VU category were listed in the near-threatened (NT) category.

Fig.1. Regional/National IUCN Red List Categories





**Table 1.** Summary of IUCN Red List Threatened (CR, EN, VU) and Near-threatened Categories and Criteria. Revised from the *Guidelines for using the IUCN Red List Categories and Criteria Version 12* published by the IUCN Standards and Petitions Subcommittee in 2016.

Use any of the criteria A-E	Critically Endangered	Endangered	Vulnerable	Near Threatened
<b>A. Population size reduction (declines measured over the longer of 10 years or 3 generations)</b>				
A1	≥ 90%	≥ 70%	≥ 50%	≥ 30%
A2, A3 & A4	≥ 80%	≥ 50%	≥ 30%	≥ 20%

A1. Population reduction observed, estimated, inferred, or suspected in the past where the causes of the reduction are clearly reversible AND understood AND have ceased, based on and specifying any of the following:

- (a) direct observation. [except A3]
- (b) an index of abundance appropriate to the taxon.
- (c) a decline in area of occupancy (AOO), extent of occurrence (EOO) and/or habitat quality.
- (d) actual or potential levels of exploitation.
- (e) effects of introduced taxa, hybridization, pathogens, pollutants, competitors or parasites.

A2. Population reduction observed, estimated, inferred, or suspected in the past where the causes of the reduction may not have ceased OR may not be understood OR may not be reversible.

A3. Population reduction projected, inferred or suspected to be met in the future (up to a maximum of 100 years) [(a) cannot be used for A3]

A4. An observed, estimated, inferred, projected or suspected population reduction where the time period must include both the past and the future (up to a max. of 100 years in future), and where the causes of reduction may not have ceased OR may not be understood OR may not be reversible.



**Hylarana taipehensis**  
臺北赤蛙 Taipei Grass Frog  
EN B2ab(ii,iii,iv)c(ii,iii)  
林春富 / 攝

Use any of the criteria A-E	Critically Endangered	Endangered	Vulnerable	Near Threatened
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### B. Geographic range in the form of either B1 (extent of occurrence) AND/OR B2 (area of occupancy)

B1. Extent of occurrence (EOO)	< 100 km <sup>2</sup>	< 5,000 km <sup>2</sup>	< 20,000 km <sup>2</sup>	< 20,000 km <sup>2</sup>
B2. Area of occupancy (AOO)	< 10 km <sup>2</sup>	< 500 km <sup>2</sup>	< 2,000 km <sup>2</sup>	< 2,000 km <sup>2</sup>

AND at least 2 of the following 3 conditions (at least one for Near-threatened category):

(a) Severely fragmented OR # locations	= 1	≤ 5	≤ 10	≤ 10
(b) Continuing decline observed, estimated, inferred or projected in any of: (i) extent of occurrence; (ii) area of occupancy; (iii) area, extent and/or quality of habitat; (iv) number of locations or subpopulations; (v) number of mature individuals				
(c) Extreme fluctuations in any of: (i) extent of occurrence; (ii) area of occupancy; (iii) number of locations or subpopulations; (iv) number of mature individuals				

### C. Small population size and decline

Number of mature individuals	< 250	< 2,500	< 10,000	< 20,000
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AND at least one of C1 or C2

C1. An observed, estimated or projected continuing decline of at least (up to a max. of 100 years in future):	25% in 3 years or 1 generation	20% in 5 years or 2 generations	10% in 10 years or 3 generations	10% in 10 years or 3 generations
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C2. An observed, estimated, projected or inferred continuing decline AND at least one of the following 3 conditions:

a(i) Number of mature individuals in each subpopulation	≤ 50	≤ 250	≤ 1000	≤ 1000
a(ii) % of mature individuals in one subpopulation =	90%	95%	100%	100%

(b) Extreme fluctuations in the number of mature individuals

### D. Very small or restricted population Either:

D. Number of mature individuals	< 50	< 250	D1. < 1000	D1. < 2500
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AND/OR

D2. Only applies to the VU and NT category Restricted area of occupancy or number of locations with a plausible future threat that could drive the taxon to CR or EX in a very short time.	NA	NA	D2. AOO < 20 km <sup>2</sup> or number of locations ≤ 5	D2. AOO < 50 km <sup>2</sup> or number of locations ≤ 10
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### E. Quantitative Analysis

Indicating the probability of extinction in the wild to be:	≥ 50% in 10 years or 3 generations (100 year max.)	≥ 20% in 20 years or 5 generations (100 year max.)	≥ 10% in 100 years	≥ 5% in 100 years
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### 3. The Red List of Amphibians of Taiwan

The outcomes revealed that among the amphibian species in Taiwan, two were in the CR category, six were in the EN category, and three were in the VU category. These 11 threatened species comprised 29.7% of all the species

evaluated in this report. In addition, three species were in the NT category, five were in the DD category, and 18 were in the LC category. The evaluation data and outcomes summarized in this report are available from the corresponding author.

#### 3.1 List of Threatened Amphibian Taxa in Taiwan (Incl., CR, EN, and VU)


Taxon name	Taiwanese Red List Category	Taiwanese Red List Category	Proportion (%) of Global population
<i>Hynobius glacialis</i> Lai and Lue, 2008 Nanhu Salamander	CR B1ab(iii)	—	100
<i>Babina okinavana</i> (Boettger, 1895) Harpist Frog	CR B1ab(iii)	EN B1ab(iii,iv)+2ab(iii,iv)	30
<i>Hynobius formosanus</i> Maki, 1922 Formosan Salamander	EN B1ab(iii)	EN B1ab(iii)+2ab(iii)	100
<i>Hynobius fuca</i> Lai and Lue, 2008 Taiwan Lesser Salamander	EN B1ab(ii,iii)	—	100

| *Rhacophorus aurantiventris*  
橙腹樹蛙 Orange Belly Treefrog  
EN B2ab(iii)  
林春富 / 攝



### 3.1 List of Threatened Amphibian Taxa in Taiwan (Incl., CR, EN, and VU) (cont.)

Taxon name	Taiwanese Red List Category	Taiwanese Red List Category	Proportion (%) of Global population
<i>Hynobius sonani</i> (Maki, 1922) Sonan's Salamander	EN B1ab(iii)	EN B1ab(iii)+2ab(iii)	100
<i>Hylarana taipehensis</i> (Van Denburgh, 1909) Taipei Grass Frog	EN B2ab(ii,iii,iv)c(ii,iii)	LC	1
<i>Rhacophorus arvalis</i> Lue, Lai, and Chen, 1995 Farmland Treefrog	EN B1ab(i,iii,iv)c(iii)	EN B1ab(iii)+2ab(iii)	100
<i>Rhacophorus aurantiventris</i> Lue, Lai, and Chen, 1994 Orange Belly Treefrog	EN B2ab(iii)	EN B1ab(v)+2ab(v); C2a(i)	100
<i>Hynobius arisanensis</i> Maki, 1922 Arisan Salamander	VU B2ab(iii)	VU B1ab(iii)+2ab(iii)	100
<i>Micryletta steinegeri</i> (Boulenger, 1909) Steineger's Narrow-mouthed Frog	VU B1b(i,iii)c(ii)	EN B1ab(iii)	100
<i>Rhacophorus taipeianus</i> Lin and Wang, 1978 Taipei Treefrog	VU B1ab(i)	NT	100


  
*Hynobius sonani*  
 楚南氏山椒魚 Sonan's Salamander  
 EN B1ab(iii)  
 林春富 / 攝



### 3.2 List of Near-Threatened and Data Deficient Amphibian Taxa in Taiwan

Taxon name	Taiwanese Red List Category	Taiwanese Red List Category	Proportion (%) of Global population
<i>Pelophylax fukienensis</i> (Pope, 1929) Fukien Gold-striped Pond Frog	NT B1c(iii)	LC	10
<i>Rana longicrus</i> Stejneger, 1898 Long-legged Frog	NT B1b(iii)	VU B1ab(iii,v)	10
<i>Rhacophorus prasinatus</i> Mou, Risch, and Lue, 1983 Emerald Treefrog	NT B1b(iii)	NT	100
<i>Microhyla butleri</i> Boulenger, 1900 Butler's Narrow-mouthed Frog	DD	LC	1
<i>Kurixalus berylliniris</i> Wu, Huang, Tsai, Lin, Jhang, and Wu, 2016 Emerald-eyed Treefrog	DD	—	100
<i>Kurixalus eiffingeri</i> (Boettger, 1895) Eiffinger's Treefrog	DD	LC	50
<i>Kurixalus wangi</i> Wu, Huang, Tsai, Lin, Jhang, and Wu, 2016 Wang's Treefrog	DD	—	100
<i>Fejervarya cancrivora</i> (Gravenhorst, 1829) Mangrove Frog	DD	LC	1

■ *Pelophylax fukienensis*  
福建金線蛙 Fukien Gold-striped Pond Frog  
NT  
林春富 / 攝



### 3.3 List of Least Concern Amphibian Taxa in Taiwan

Taxon name	Taiwanese Red List Category	Taiwanese Red List Category	Proportion (%) of Global population
<i>Bufo bankorensis</i> Barbour, 1908 <b>Bankor Toad</b>	LC	LC	100
<i>Duttaphrynus melanostictus</i> (Schneider, 1799) <b>Black-spectacled Toad</b>	LC	LC	1
<i>Fejervarya limnocharis</i> (Gravenhorst, 1829) <b>Rice Field Frog</b>	LC	LC	1
<i>Hoplobatrachus rugulosus</i> (Wiegmann, 1834) <b>Chinese Bullfrog</b>	LC	LC	1
<i>Limnonectes fujianensis</i> Ye and Fei, 1994 <b>Fujian Large-headed Frog</b>	LC	LC	10
<i>Hyla chinensis</i> Günther, 1858 <b>Chinese Tree Frog</b>	LC	LC	1
<i>Microhyla fissipes</i> Boulenger, 1884 <b>Ornate Narrow-mouthed Frog</b>	LC	LC	1
<i>Microhyla heymonsi</i> Vogt, 1911 <b>Heymon's Narrow-mouthed Frog</b>	LC	LC	1
<i>Babina adenopleura</i> (Boulenger, 1909) <b>Olive Frog</b>	LC	LC	10
<i>Hylarana guentheri</i> (Boulenger, 1882) <b>Guenther's Frog</b>	LC	LC	1
<i>Hylarana latouchii</i> (Boulenger, 1899) <b>Latouche's Frog</b>	LC	LC	1
<i>Odorrana swinhoana</i> (Boulenger, 1903) <b>Swinhoe's Brown Frog</b>	LC	LC	100
<i>Rana sauteri</i> Boulenger, 1909 <b>Sauter's Brown Frog</b>	LC	EN B1ab(iii)	100



### 3.3 List of Least Concern Amphibian Taxa in Taiwan (cont.)

Taxon name	Taiwanese Red List Category	Taiwanese Red List Category	Proportion (%) of Global population
<i>Buergeria japonica</i> (Hallowell, 1861) Japanese Stream Treefrog	LC	LC	40
<i>Buergeria robusta</i> (Boulenger, 1909) Strong Stream Treefrog	LC	LC	100
<i>Kurixalus idiootocus</i> (Kuramoto and Wang, 1987) Mientien Treefrog	LC	LC	100
<i>Polypedates braueri</i> (Vogt, 1911) Brauer's Treefrog	LC	—	5
<i>Rhacophorus moltrechti</i> Boulenger, 1908 Moltrecht's Green Treefrog	LC	LC	100

**|** *Bufo bankorensis*  
盤古蟾蜍 Bankor Toad  
LC  
林春富 / 攝



## 4. Globally Threatened Amphibian Species of Taiwan

A total of 37 amphibian species were adopted as candidates for evaluation. Nine are globally threatened species, seven are threatened in Taiwan (CR, EN, and VU), one is near-threatened, and one is least concern.

Taxon name	Taiwanese Red List Category	Global Red List Category	Proportion (%) of Global population
<i>Babina okinavana</i> (Boettger, 1895) <b>Olive Frog</b>	CR B1ab(iii)	EN B1ab(iii,iv)+2ab(iii,iv)	30
<i>Hynobius formosanus</i> Maki, 1922 <b>Formosan Salamander</b>	EN B1ab(iii)	EN B1ab(iii)+2ab(iii)	100
<i>Hynobius sonani</i> (Maki, 1922) <b>Sonan's Salamander</b>	EN B1ab(iii)	EN B1ab(iii)+2ab(iii)	100
<i>Rhacophorus arvalis</i> Lue, Lai, and Chen, 1995 <b>Farmland Treefrog</b>	EN B1ab(i,iii,iv)c(iii)	EN B1ab(iii)+2ab(iii)	100
<i>Rhacophorus aurantiventris</i> Lue, Lai, and Chen, 1994 <b>Orange Belly Treefrog</b>	EN B2ab(iii)	EN B1ab(v)+2ab(v); C2a(i)	100
<i>Hynobius arisanensis</i> Maki, 1922 <b>Arisan Salamander</b>	VU B2ab(iii)	VU B1ab(iii)+2ab(iii)	100
<i>Micryletta steinegeri</i> (Boulenger, 1909) <b>Steineger's Narrow-mouthed Frog</b>	VU B1b(i,iii)c(iii)	EN B1ab(iii)	100
<i>Rana longicrus</i> Stejneger, 1898 <b>Long-legged Frog</b>	NT	VU B1ab(iii,v)	10
<i>Rana sauteri</i> Boulenger, 1909 <b>Sauter's Brown Frog</b>	LC	EN B1ab(iii)	100

## 5. Acknowledgements

We would like to extend our sincerest gratitude to Yuan-Long Chen for participating in discussions concerning the evaluation process and providing many revision suggestions; Da-Chaun Yeh and Sin Chen for assisting in the collection and collation of the evaluation data; and many experts and scholars consulted for their provision of information and suggestions throughout the evaluation process. We also thank Mark Bruce Wilkie for his help editing the English.



**|** *Rhacophorus prasinatus*  
翡翠樹蛙 Emerald Treefrog  
NT  
林春富 / 攝

## 6. References

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# 2017 臺灣兩棲類紅皮書名錄

## The Red List of Amphibians of Taiwan, 2017

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**出版** 行政院農業委員會特有生物研究保育中心  
行政院農業委員會林務局

**地址** 55244 臺灣南投縣集集鎮民生東路 1 號

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**地址** 708 臺南市安平區健康路三段 326 號

**電話** 06-2933266

**出版年月** 2017 年 7 月

**ISBN** 978-986-05-1678-4

**GPN** 1010601058

**定價** 新臺幣 100 元

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**Publisher** Kuo-Yun Fang, Hwa-Ching Lin

**Authors** Chun-Fu Lin, Cheng-Hsiung Yang and Ruey-Shing Lin

**Published by** Endemic Species Research Institute, COA, EY, R.O.C.(Taiwan)  
Forestry Bureau, COA, EY, R.O.C.(Taiwan)

**Address** No. 1, Ming-Shen East Road, Jiji Township, Nantou County, 55244, Taiwan

**Art Designed by** Dawn Cultural Enterprises

**Address** No. 326, Sec. 3, Jiankang Road, Anping District, Tainan City, 708, Taiwan

**Telephone** 06-2933266

**Published Date** July, 2017

**ISBN** 978-986-05-1678-4

**GPN** 1010601058

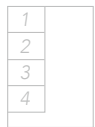
**Price** NT100

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**引用方式** 林春富、楊正雄、林瑞興。2017。2017 臺灣兩棲類紅皮書名錄。行政院農業委員會特有生物研究保育中心。南投。

**Citation** Lin, C.-F., C.-H. Yang and R.-S. Lin. 2017. The Red List of Amphibians of Taiwan, 2017. Endemic Species Research Institute, Nantou, Taiwan.



### 封底照片 /

#### 1 | *Hynobius fuca*

觀霧山椒魚 Taiwan Lesser Salamander  
EN B1ab(ii,iii)  
林春富 / 攝

#### 2 | *Rhacophorus prasinatus*

翡翠樹蛙 Emerald Treefrog  
NT  
林春富 / 攝

#### 3 | *Hynobius arisanensis*

阿里山山椒魚 Arisan Salamander  
VU B2ab(iii)  
林春富 / 攝

#### 4 | *Buergeria japonica*

日本樹蛙 Japanese Stream Treefrog  
LC  
林春富 / 攝

