Detangling the effects of patch attributes on bryophyte diversity in fragmented subtropical secondary forests – a case study of land-bridge islands

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# Detangling the effects of patch attributes on bryophyte diversity in fragmented subtropical secondary forests – a case study of land-bridge islands

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## ABSTRACT

Understanding patch attributes influencing biological diversity in fragmented habitats is of critical importance for biodiversity conservation. We investigated the bryophytes and six patch attributes (habitat diversity, area, elevation, isolation degree, vegetation coverage, and shape irregularity) across 168 islands in the Thousand Island Lake (TIL), China. Multivariate analyses showed that the six patch attributes explained 68.1% of the species richness (SR) variation and 13.3% of the species composition (SC) variation. Habitat diversity explained 55.5% of the total SR variation (8.4% by habitat diversity *per se* and 47.1% confounded by the remaining variables). Although area, vegetation coverage, shape irregularity, and elevation independently explained only 0.4% to 2.4% of the total SR variation, respectively, a large part of their effects were confounded with the other patch attributes. All surveyed patch attributes imposed weak but significant influences on bryophyte SC, independently accounting for 0.8-1.5% of the total SC variation. Analyses using the generalized linear mixed models (GLMMs) showed that habitat diversity was the most important determinant of bryophyte SR, followed by elevation, area, isolation degree, vegetation coverage, and shape irregularity. All six patch attributes exerted positive effects on SR except isolation degree. Area, elevation, and shape had a positive interaction effect on bryophyte SR. Our results imply that a subtropical forest reserve for bryophyte conservation had better be designated to have high habitat diversity, a large area, a large elevation range, and irregularly-shaped fragments adjacent in distance.

**RÉSUMÉ**
*Démêler les effets des caractéristiques des parcelles sur la diversité des bryophytes dans les forêts secondaires subtropicales fragmentées – une étude de cas des îles-ponts terrestres.*
La compréhension des caractéristiques des parcelles qui influencent la diversité biologique dans les habitats fragmentés est d'une importance capitale pour la conservation de la biodiversité. Nous avons étudié les bryophytes et six caractéristiques de parcelles (diversité de l'habitat, superficie, élévation, degré d'isolement, couverture végétale et irrégularité de forme) sur 168 îles du lac des Mille Îles (TIL), en Chine. Les analyses multivariées ont montré que les six caractéristiques des parcelles expliquent 68,1 % de la variation de la richesse spécifique (SR) et 13,3 % de la variation de la composition spécifique (SC). La diversité de l'habitat explique 55,5 % de la variation totale de la SR (8,4 % par la diversité de l'habitat et 47,1 % confondus par les autres variables). Bien que la superficie, la couverture végétale, l'irrégularité de la forme et l'élévation n'expliquent indépendamment que 0,4 % à 2,4 % de la variation totale de la SR, respectivement, une grande partie de leurs effets ont été confondus avec les autres caractéristiques des parcelles. Tous les attributs des parcelles étudiées ont exercé des influences faibles mais significatives sur la SC des bryophytes, expliquant indépendamment 0,8 à 1,5 % de la variation totale de la SC. Les analyses effectuées à l'aide des modèles linéaires mixtes généralisés (GLMM) ont montré que la diversité de l'habitat était le déterminant le plus important de la SC des bryophytes, suivi par l'altitude, la superficie, le degré d'isolement, la couverture végétale et l'irrégularité de la forme. Les six attributs des parcelles ont exercé des effets positifs sur la SR, à l'exception du degré d'isolement. La superficie, l'élévation et la forme ont eu un effet d'interaction positif sur la SR des bryophytes. Nos résultats supposent qu'une réserve forestière subtropicale pour la conservation des bryophytes devrait être désignée pour sa grande diversité d'habitats, une grande surface, une large gamme d'élévation, et des fragments de forme irrégulière adjacents en distance.

## INTRODUCTION

The subtropical secondary forests cover an extensive area in China. There are more than 98 000 dams and mountainous reservoirs in the country (including nearly 40% of the world's largest dams), which were formed by constructing dams for hydroelectric power (Song *et al.* 2022). With the construction of these dams and subsequent inundation, forests were fragmented and many land-bridge forest patches (islands) formed. Understanding patch attributes influencing biological diversity is of critical importance for conservation practitioners (Wilson *et al.* 2020).

Bryophytes, as an important component of subtropical forests (Cai *et al.* 2017), have received disproportional attention about the effects of forest patch attributes on their biodiversity in the context of forest fragmentation. They are characterized by short generation times, substrate specificity, a dominant haploid condition, a fast population colonization-extinction rate (Pharo & Zartman 2007; He *et al.* 2016), and not conducting water by vascular tissues as other green land plants (Richardson 1981). Additionally, bryophytes are sensitive to microhabitat changes associated with fragmentation (Hylander 2005). Therefore, the responses of bryophyte diversity to habitat fragmentation are likely different from those of vascular plants.

The effects of forest fragmentation on bryophytes have been sporadically reported in forests such as beech forests (Tangney *et al.* 1990), temperate forests (Pharo *et al.* 2004; Müller *et al.* 2019), and montane tropical forests of southeast Kenya (Malombe *et al.* 2016). The above studies found

that patch area, shape, degree of isolation, habitat diversity, vegetation coverage, and elevation all exert effects on bryophyte diversity to varying extents, yet we know little about what patch attributes and to what extent these attributes determine bryophyte diversity in fragmented subtropical secondary forests.

The species-area relationship (SAR) is one of the fundamental patterns in biogeography (Whittaker & Fernández-Palacios 2007). However, no consistent conclusions have been drawn about bryophyte SARs. For example, Moen & Jonsson (2003) found a weak positive effect of area on the species richness (SR) of epixylic liverworts. Pharo *et al.* (2004) reported that mosses had a higher diversity in larger remnants but liverworts did not, while Hylander & Hedderson (2006) demonstrated an opposite pattern. In Lake Manapouri, New Zealand, Tangney *et al.* (1990) found that the correlations of bryophyte SR with log-transformed areas in forest fragments followed the quadratic regression model. In the Zhoushan Archipelago, Yu *et al.* (2020) found a three-segmented SAR pattern for the bryophytes across 66 continental islands.

Patch shapes in fragmented forests may also be important for bryophyte assemblages because they control fundamental ecological processes such as edge effect, dispersal, and migration (Laurance 2000; Hill & Curran 2003). The influences of patch shape on diversity were mainly related to the edge effect (Laurance 2000). The environmental gradients from edge to inner region of fragmented patches in subtropical forests patches should be different from those of the other ecosystems. In the Zhoushan Archipelago, Yu *et al.* (2019) found positive effects of shape irregularity of

islands on the SR of major bryophyte families. In a rural landscape in Austria, SR increased with landscape shape irregularity for both vascular plants and bryophytes (Moser *et al.* 2002). We speculated that bryophyte SR was more easily affected by forest patch shape than vascular plants because of their high sensitivity to the microhabitats (Jiang *et al.* 2018). Therefore, the influences of the patch shape in subtropical forests on bryophytes should be different from those on other biotas in subtropical forests, but we know nothing about this.

Bryophytes may disperse well and over long distances by spores, even by vegetative propagation (Frahm 2008). In theory, long-distance dispersal would weaken the effects of island isolation on bryophyte SR (Patiño *et al.* 2014). There were some pieces of evidence to support this inference (Patiño *et al.* 2014; Jagodziński *et al.* 2018; Yu *et al.* 2019; Liu *et al.* 2020), but opposite viewpoints still existed (Korpelainen *et al.* 2011; Lönnell *et al.* 2012; Smith & Stark 2014; Chen *et al.* 2015). Investigating isolation effects on bryophyte assemblages in fragmented subtropical forests will provide more documents to better understand the effects of habitat isolation on bryophyte assemblages.

Habitat diversity is a key factor explaining species richness (Kreft *et al.* 2008). Williams (1964) proposed the habitat diversity hypothesis, which views area as affecting SR indirectly because of its association with habitat diversity rather than any direct effect of area *per se*. However, some studies rejected the habitat diversity hypothesis because SR increased with the island area while habitat diversity and heterogeneity were uncorrelated to the island area (Nilsson *et al.* 1988). Therefore, further studies, especially on special biota such as bryophytes, are still necessary for us to better understand the effect of habitat diversity on biodiversity in fragmented forests and to resolve the above discrepancies.

Land-bridge islands created by damming are ideal experimental systems for unraveling the effects of patch attributes on biodiversity in fragmented landscapes (Wu *et al.* 2003; Wang *et al.* 2010). In land-bridge island systems, all patches (islands) are formed at the same time as a result of a single known event. Land-bridge islands have well-delineated boundaries surrounded by water (Terborgh & Feeley 2008). Despite these advantages, few studies have been conducted to date to elucidate the effects of forest fragmentation on bryophyte assemblages on land-bridge islands.

Quantifying the effects of patch attributes on bryophyte SR and species composition (SC) in the context of forest fragmentation is important for bryophyte conservation. We assumed that all the above patch attributes may contribute to the variation of bryophyte SR and SC in fragmented subtropical secondary forests to varying extents. However, no attempts have been made to assess their comparative contributions within a single evaluation. By conducting a study on land-bridge islands with typical fragmented subtropical secondary forests, we aimed to reveal the relative contribution of area, elevation, isolation degree, vegetation coverage, shape, and habitat diversity of forest patches to the variation of bryophyte SR and SC.

## METHODS

### STUDY AREA

The Thousand Island Lake (hereafter referred to as TIL) (29°22'-29°50'N and 118°34'-119°15'E) was formed in 1959 by the damming of the Xinanjiang River in Chun'an County of Zhejiang Province, China (Fig. 1). With the construction of the dam, an area of *c.* 580 km² was inundated, forming 1078 land-bridge forested islands (patches) out of erstwhile hilltops when the water reached its final level (108 m) (Wang *et al.* 2009). During dam construction, the forests in the region were clear-cut, resulting in near complete deforestation before the lake's inundation. Currently, most islands are covered with typical subtropical secondary forests. These forests are dominated in the canopy by *Pinus massoniana* D.Don, which is mixed with some broad-leaved trees (Sun *et al.* 2008). The climate is typical of the subtropical monsoon zone and highly seasonal, with hot summers and cold winters. According to the data (2007-2010) of the TIL meteorological station, the average annual temperature was 17.6°C. The average monthly temperature ranged from 5.3°C in January to 29.0°C in August. The annual average precipitation was 1505.4 mm (Zhang *et al.* 2013).

The TIL is now protected as a national park, and its vegetation has not experienced significant human disturbances since 1962 (Wilson *et al.* 2016). The islands in the TIL are located in a relatively narrow region and basically have similar climates, which would eliminate the impacts of climate conditions on the relationships of bryophyte diversity with patch attributes. Therefore, the TIL is an ideal locality to quantify the comparative effects of patch attributes relevant to fragmentation on bryophyte assemblages in subtropical fragmented secondary forests.

### DATA COLLECTION
*Bryophyte occurrence*
We surveyed bryophytes on 168 islands (patches) in the TIL. These islands vary in area size, degree of isolation, maximum elevation, shape, and perimeter (Appendix 1; Fig. 1).

We conducted four field collections (August-September 2019; October-November 2019; November-December 2020; March-April 2022). The same team visited each island and spent a relatively comparable time on each inventory. Considering the localities, range, and island number of the study region, we used a method similar to floristic habitat sampling instead of plot sampling for estimating species richness by fully sampling representative landscapes and microhabitats (Newmaster *et al.* 2005). The main landscapes included hillsides, mountain streams, relatively natural forests, secondary forests, artificial forests, orchards, crop fields, rock cliffs, roadsides, and ditches; microhabitats mainly included different substrates (soil, rocks, tree trunks, tree bases, decayed logs and stumps). We continued collection and surveying until no additional landscapes, microhabitat types, or bryophyte species were found, ensuring that we obtained relatively complete lists of bryophytes and habitat types for each island and making the data comparable. On most small islands, we collected bryophytes all over the

island. For large islands, we mainly surveyed localities with different landscapes as many as possible. Large islands in the study region are mainly covered with dense forests. Besides various landscapes, we also collected bryophytes on forest edges or roadsides along forests because the floors of the forests are almost completely covered with shrubs, herbs, and litter, where bryophyte species are very rare and monotonous.

Preliminary identification of family and genus was completed in the field. All specimens were identified in the laboratory using a microscope. Voucher specimens were deposited at the bryophyte herbarium, Shanghai Normal University (SHTU). The nomenclature followed the TROPICOS database (Missouri Botanical Garden 2022).

### Environmental data

Environmental data (patch attributes) were collected at the island scale. To get the area and perimeter data of the 168 islands, we digitized all islands within the study region (Fig. 1) by using SPOT-6 imagery (https://www.intelligence-airbusds.com/en/147-spot-6-7-satellite-imagery). The area and perimeter of the study islands were calculated based on the digitized maps by using ArcGIS 9.3. These two variables were used to generate the shape irregularity index (SHA) as follows (Patton 1975):

$$SHA = \frac{P}{2\sqrt{A\pi}}$$

where P is the perimeter in meters, and A is the area (m²). The higher the SHA is, the more irregular the shape is, with 1 meaning that the island is circular.

The isolation degree of a given island was represented by the relative proportion of water within a circle (with a diameter of 1000 m) centered on the island (Berglund & Jonsson 2001) (hereafter referred to as ISW) and its shortest distance to the shore (hereafter referred to as ISD).

We recorded the habitat types on each island following the approach used by Sfenthourakis (1996) and Triantis *et al.* (2006), using aspects of the environment known to be important to bryophytes (Appendix 2) (Frego & Ross-Davis 2002; Newmaster *et al.* 2005; Bergeron & Fenton 2006; Paciorek *et al.* 2016). Habitat types were recorded as present or absent on each island *in situ* (Appendix 3). Habitat diversity was represented by the total number of these habitat types on each island. We didn't use NDVI to estimate vegetation coverage because many islands in the study region are too small (less than 1000 m²). The vegetation coverage of each island was quantitatively estimated based on the map from Google Earth by using the ImageJ Ecosystem software (Schindelin *et al.* 2015), which was calibrated *in situ*.

### DATA ANALYSIS

#### The relationship of accumulative species with accumulative specimens for large islands

Previous studies showed that the number of sampling points per unit area may decline with increasing island size (Gavish

*et al.* 2011), which resulted in a sampling bias for large islands. To make sure our sampling was adequate for large islands, after randomizing the collection sequence of specimens, we quantified the relationship of accumulative species with accumulative specimens by using the asymptotic model. We then obtain the expected species numbers for a given island via the relationship we constructed. The sampling error (SE) of a given island was calculated by comparing the difference between the expected species number (E) and the observed number (O) of the island.

$$SE = \frac{E - O}{E} \times 100\%$$

#### Contribution of patch attributes to the variations of SR

The species of different bryophyte families have different habitats and substrates. For example, the species of Pottiaceae Hampe often occur in harsh and dry environments (Zander & Eckel 1993), those of Funariaceae Schwägr. often grow in disturbed or open sites on bare soil such as farm fields (Li 2000), and those of Orthotrichaceae Arn. are recorded from tree trunks and branches, rotting logs, and rocks (Jia *et al.* 2005). Therefore, the responses of SR to environments are taxon-specific (Patiño *et al.* 2014) and could be quantified at the family level. The families were included in the analyses if they occurred in more than one-third of the 168 islands, the remaining moss species, and liverwort species were combined into a mixed moss group and a mixed liverwort group, respectively. Finally, a total of 17 categories, comprising three liverwort categories (Lophocoleaceae Müll.Frib. ex Vanden Berghen, Lejeuneaceae Rostovzev, a mixed liverwort group), and 14 moss categories (Leucobryaceae Schimp., Leskeaceae Schimp., Pottiaceae, Fissidentaceae Schimp., Hypnaceae Schimp., Entodontaceae Kindb., Orthotrichaceae, Thuidiaceae Schimp., Brachytheciaceae Schimp., Bryaceae Rchb., Anomodontaceae Kindb., Mniaceae Schwägr., a mixed moss group) were included in the analyses (Appendix 4).

The partial Redundancy Analyses (pRDA) were performed to detect the direct effect of a given patch attribute *per se* and the combined effect of the attribute with the remaining attributes on the SR because the length of the first ordination axis in the DCA was 2.7 S.D. (Braak & Šmilauer 2012). A Monte Carlo permutation test based on 499 random permutations was performed to test the significance of the eigenvalues of all canonical axes and to identify the contribution and statistical significance of the explanatory variables to SR variation with the forward selection of environmental variables (conditional effects).

When analyzing, the response variables were centered (which is obligatory for the RDA) but not transformed, each environmental variable was standardized using the corresponding maximum value of the variable among the 168 islands.

#### Contributions of environmental variables in explaining the variations of SC

The Canonical Correspondence Analysis (CCA) was performed because the response variables included absence/presence data-
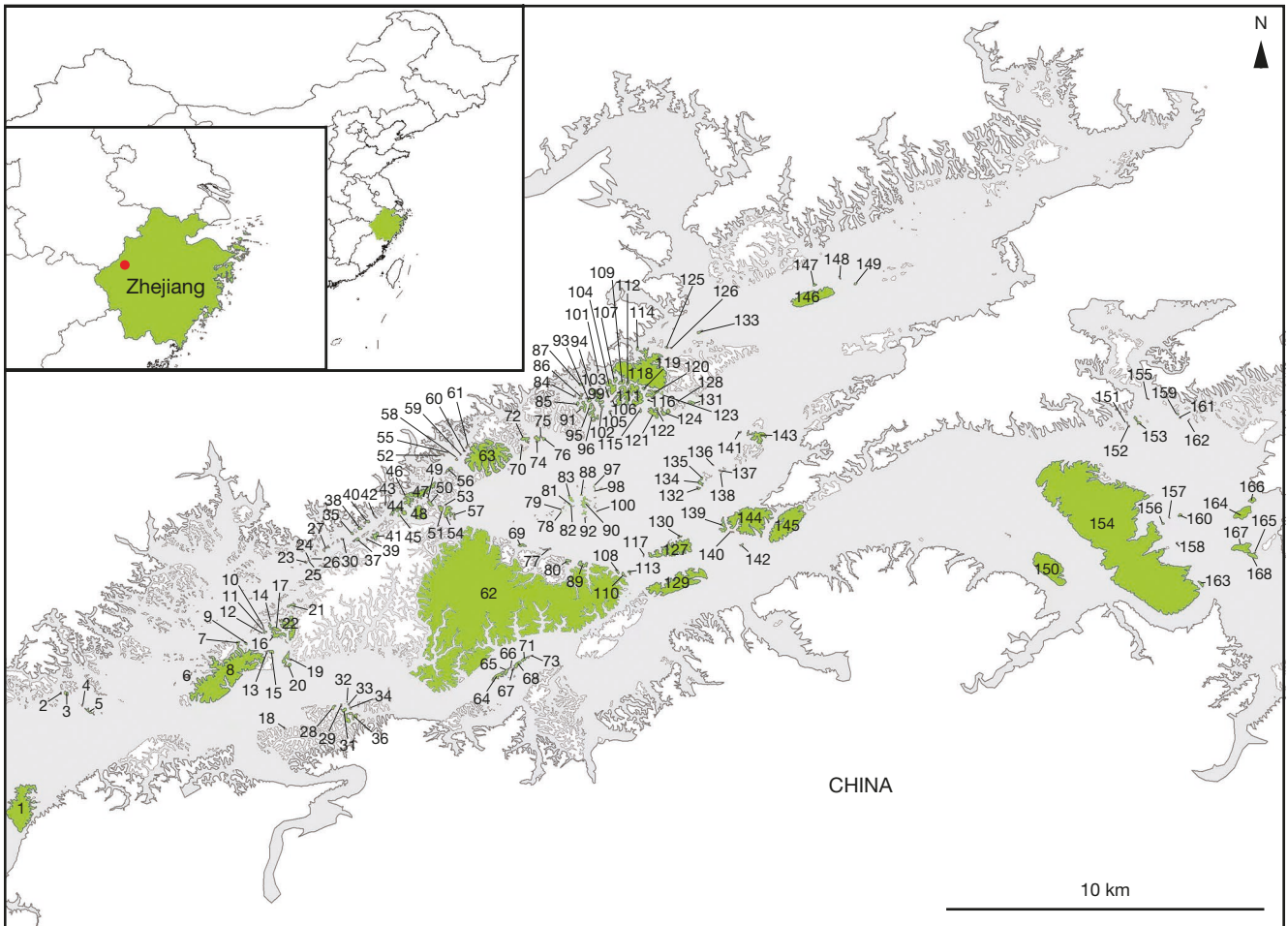
Fig. 1. — Localities of 168 islands in the Thousand Island Lake, China.

set (Braak & Šmilauer 2012). A Monte Carlo permutation test based on 499 random permutations was performed to test the significance of the eigenvalues of all canonical axes and to identify the contribution and statistical significance of the environmental variables to SC variation with the forward selection of environmental variables (conditional effects).

Variation Partitioning Analyses were performed to partition the variation in the response data (Appendix 5) into parts attributed to the focal explanatory variables *per se* and the confusing parts between the focal variables and the other remaining variables (Borcard *et al*. 1992).

When analyzing, the response variables were centered (which is obligatory for the RDA) but not transformed. Each environmental variable was standardized using the corresponding maximum value of the variable among the 168 islands.

*Effect patterns of environmental variables*
*on SR of different groups*
The generalized linear mixed model (GLMM) was employed here to analyze the variations of bryophyte SR depending on the target patch attribute (fixed effect) while controlling for the variations from the other remaining attributes, which were included in the random structure. To meet the requirements

of data type in GLMMs, each patch attribute was changed into a categorical variable with ten classes by using quantile division (Yu 2006; Yu *et al*. 2019). A series of univariate models were built by using GLMMs with a given target variable as a fixed factor in its continuous type and keeping other attributes (with their categorical type) in the random structure (Yu *et al*. 2019).

When analyzing, island area and elevation were ln-transformed. The R package "fitdistrplus" was used to confirm that the analyzed data followed the Poisson distribution. The relationships of the SR with the target environmental variable were fitted using GLMM with the Poisson distribution.

The method (Nakagawa & Schielzeth 2013) was used to estimate the variance explained by the fixed effect alone (marginal $R^2$) and that explained by both the fixed and random effects (conditional $R^2$, namely, the variance explained by the entire model). The ratio of marginal $R^2$ to conditional $R^2$ indicates the capability to explain the variation of bryophyte SR by the fixed variable *per se* (target environmental variable).

GLMMs were performed with the lmer function in the "lme4" package (Bates *et al*. 2015) within the R statistical framework v. 4.0.3 (R Development Core Team 2020).

TABLE 1. — Percentage of variation in SR of 17 bryophyte categories among 168 islands explained by the nine patch attributes in RDA estimated using two different methods. Displayed were percentages of explained variation and contribution, and with values of pseudo-F statistics and P-values. Note: **simple effects**, percentage of variation explained by an individual variable while used as the only constraining variable; **conditional effects**, additional variation explained by the variable at the time it was included in the stepwise selection; **ISD**, the shortest distance of a given island to the shore; **ISW**, the relative proportion of water within a circle (with a diameter of 1000 m) centered on a focal island.

| | Simple effects | | | Conditional effects | | |
|---|---|---|---|---|---|---|
| **Variables** | **% of the total variation** | **pseudo-F** | **P-value** | **% of the total variation** | **pseudo-F** | **P-value** |
| Habitat diversity | 55.5 | 207 | 0.002 | 55.5 | 207 | 0.002 |
| Elevation | 44.2 | 131 | 0.002 | 0.6 | 3 | 0.01 |
| Shape irregularity | 37.3 | 98.9 | 0.002 | 1.1 | 5.5 | 0.004 |
| Area | 36.9 | 97 | 0.002 | 6 | 25.8 | 0.002 |
| ISW | 25.4 | 56.4 | 0.002 | 0.3 | 1.6 | 0.16 |
| Vegetation coverage | 12.6 | 23.9 | 0.002 | 2.1 | 9.4 | 0.002 |
| Longitude | 0.5 | 0.8 | 0.402 | 0.7 | 3.2 | 0.014 |
| Latitude | 0.4 | 0.6 | 0.526 | 1.5 | 7.1 | 0.002 |
| ISD | 0.2 | 0.4 | 0.736 | 0.2 | 1.2 | 0.308 |

TABLE 2. — Variance partitioning resulting from the partial RDA of the nine patch attributes on SR of 17 bryophyte categories. Note: **\*/**, effect of a given environmental variable; **/\***, confounded effects of the environmental variable with the others; **DF**, **F**, **P**, parameters for a given environmental variable *per se* in the same row; **ISW** and **ISD** are the same as those in Table 1.

| **Fraction** | **Variation** | **% of total variation** | **DF** | **F** | **P-value** |
|---|---|---|---|---|---|
| Habitat diversity | 0.0838 / 0.4715 | 8.4 / 47.1 | 1 | 41.5 | 0.002 |
| Area | 0.0237 / 0.3452 | 2.4 / 34.5 | 1 | 11.7 | 0.002 |
| Vegetation coverage | 0.01934 / 0.1063 | 1.9 / 10.6 | 1 | 9.6 | 0.002 |
| Shape irregularity | 0.0078 / 0.3656 | 0.8 / 36.6 | 1 | 3.9 | 0.006 |
| Elevation | 0.0045 / 0.4372 | 0.4 / 43.7 | 1 | 2.2 | 0.046 |
| ISW | 0.0033 / 0.2503 | 0.3 / 25 | 1 | 1.6 | 0.134 |
| ISD | 0.0024 / 0.0001 | 0.2 / 0.0 | 1 | 1.2 | 0.302 |
| Longitude + latitude | 0.0194 / 0.0000 | 1.9 / 0.0 | 2 | 4.8 | 0.002 |
| ISD + ISW | 0.0055 / 0.2576 | 0.6 / 25.8 | 2 | 1.4 | 0.156 |
| Longitude + latitude + ISD + ISW | 0.0281 / 0.2446 | 2.8 / 24.5 | 4 | 3.5 | 0.002 |
| Area + elevation + shape irregularity | 0.0602 / 0.478 | 6.0 / 47.8 | 3 | 9.9 | 0.002 |

## RESULTS

### GENERAL ASPECTS

A total of 209 bryophyte species were identified based on 8570 specimens collected from the 168 islands (Fig. 1; Appendices 4-6), among them were one species of hornwort, 28 species of liverworts (21 genera and 15 families), and 180 species of mosses (85 genera and 35 families). Brachytheciaceae (23 species, 11.06%), Pottiaceae (19 species, 9.13%), Bryaceae (14 species, 6.73%), Hypnaceae (13 species, 6.25%), and Entodontaceae (10 species, 4.81%) were the most species-rich families. Pleurocarpous mosses (98 species, 46.89%) were dominant over acrocarpous mosses (78 species, 37.32%).

After randomizing the collection sequence of specimens, we found that the accumulative species increased with increasing accumulative specimens for the eight largest islands, well following the asymptotic model (Appendices 7; 12). The expected total species numbers were similar to those actually observed, with larger errors for Islands 129 and 146 (10.66%), indicating that sampling on larger islands was overall adequate.

### Contributions of environmental variables to SR variation

The Monte Carlo permutation test confirmed the overall significance of the RDA (P = 0.002). The seven patch attributes accounted for 68.1% of the total SR variation (Appendix 8).

According to the forward selection analysis and variance partitioning, all patch attributes except the degree of isolation imposed significant effects on the SR (Tables 1; 2).

As the only constraining variable, habitat diversity was the most important determinant of the SR, accounting for 55.5% of explained SR variation, followed by elevation (44.2%), shape irregularity (37.3%), area (36.9%), and ISW (25.4%). Geographical coordination and ISD exerted weak and insignificant effects on the SR (Table 1).

The forward selection analysis and variance partitioning confirmed significant effects of all patch attributes on the SR except isolation degree. Habitat diversity was the most important determinant of the SR, followed by island area. Variance partitioning showed that habitat diversity *per se* explained 8.4% of total SR variation, and as much as 47.1% was confounded with the other patch attributes. Area, vegetation coverage, shape, elevation, ISW, and ISD independently explained 2.4%, 1.9%, 0.8%, 0.4%, 0.3%, and 0.2% of the

FIG. 2. — Relationships of species richness with number of habitat types, area, elevation, shape irregularity, vegetative cover, and ISW for five bryophyte categories in 168 forest fragments of the Thousand Island Lake, China. The regression equations are derived from GLMMs. Note: **ISW**, the relative proportion of water within a circle of a diameter of 1000 m centered on a given island.

total SR, respectively (Table 2). Additionally, area, elevation, and shape together independently accounted for 6.0% of the total SR, indicating a positive effect on SR among these three patch attributes.

*Contributions of environmental variables to SC*
The Monte Carlo permutation test confirmed the overall significance of the CCA (P = 0.002) for the relationship of SC with these patch attributes. These patch attributes accounted for 13.3% of the total SC variation (Appendix 9).

As the only constraining variables, area, habitat diversity, shape irregularity, elevation, and ISW imposed impacts on bryophyte SC to a similar extent (Table 3).

The variance partitioning confirmed the significant effects of all nine patch attributes on bryophyte SC (Table 4). Vegetation coverage, habitat diversity, and area were three relatively important patch attributes. The independent effects of isolation on SC were similar to those of geographical localities (Table 4).

*Correlations of SR with environmental variables based on GLMMs*
The SR of most bryophyte categories increased with habitat diversity, island area, elevation, shape irregularity, and vegetation coverage, and decreased with ISW (Tables 5; 6; Figs 2; 3).

According to marginal $R^2$, for total bryophytes, total mosses, acrocarpous mosses, and pleurocarpous mosses, habitat diversity was the most important determinant of the SR in the study region, followed by elevation and area, while island area was the most important determinant of the SR of liverworts (Tables 5; 6).

Different bryophyte categories varied in their responses to the same environmental variable. For example, with increasing habitat diversity, elevation, and shape irregularity, the

SR increased faster in mosses than in liverworts, while at a similar rate in the acrocarpous and pleurocarpous mosses. With increasing ISW, the SR decreased faster in the mosses than in the liverworts, and in the pleurocarpous mosses than in the acrocarpous mosses (Table 5; Fig. 2).

Different families also varied in their responses to the same environmental variable. The slope of the relationships between the SR of a given family and a given island attribute reveals the sensitivity of the family to the island attribute. In terms of habitat diversity, Pottiaceae (0.2676) was most sensitive to the change in habitat diversity, followed by Hypnaceae (0.2314), Thuidiaceae (0.1933), Bryaceae (0.1575), Entodontaceae (0.1498), Brachytheciaceae (0.1121), Mniaceae (0.1067), and the other families (0.0409-0.0656). For elevation, Bryaceae (7.037), Hypnaceae (6.588), and Brachytheciaceae (5.934) were most sensitive to elevation change, followed by Entodontaceae (2.99), Fissidentaceae (2.77) and Leucobryaceae (2.538). Pottiaceae (0.8036) and Orthotrichaceae (0.1034) were the two families least sensitive to elevation.

Island area was the second important determinant of bryophyte SR. Hypnaceae (0.6262), Fissidentaceae (0.4283), Entodontaceae (0.4206), Bryaceae (0.29), and Leucobryaceae (0.2694) were relatively sensitive to area change, while Pylaisiadelphaceae Goffinet & W.R.Buck (0.109), Thuidiaceae (0.1578) were least sensitive to island area.

Negative effects of island isolation by ISW on SR were detected in most bryophyte categories. According to the slopes, with the increase of ISW, SR decreased faster in mosses (-19.190) than in liverworts (-2.969) and faster in pleurocarpous mosses (-12.262) than acrocarpous mosses (-0.441). Among the 13 families, Brachytheciaceae (-2.967) and Leucobryaceae (-1.6699) were most sensitive to ISW, followed by Entodontaceae (-1.588) and Hypnaceae (-1.520).

TABLE 3. — Percentage of variation in SC of 17 bryophyte categories among 168 islands explained by the nine patch attributes in CCA estimated using two different methods. Displayed were percentages of explained variation and contribution, and with values of pseudo-F statistics and P-values. Note: **simple** and **conditional effects**, **ISW** and **ISD** are the same as those in Table 1.

| | Simple effects | | | Conditional effects | | |
|---|---|---|---|---|---|---|
| Variables | % of the total variation | pseudo-F | P-value | % of the total variation | pseudo-F | P-value |
| Area | 3.6 | 6.2 | 0.002 | 3.6 | 6.2 | 0.002 |
| Habitat diversity | 3.4 | 5.8 | 0.002 | 1.7 | 3 | 0.002 |
| Shape irregularity | 3.4 | 5.8 | 0.002 | 0.8 | 1.5 | 0.008 |
| Elevation | 3.1 | 5.2 | 0.002 | 1.9 | 3.3 | 0.002 |
| ISW | 3 | 5.2 | 0.002 | 1.1 | 1.9 | 0.002 |
| Vegetation coverage | 1.7 | 2.8 | 0.002 | 1.5 | 2.7 | 0.002 |
| Latitude | 1.1 | 1.8 | 0.002 | 1 | 1.8 | 0.002 |
| Longitude | 1.1 | 1.9 | 0.004 | 1 | 1.7 | 0.002 |
| ISD | 0.9 | 1.5 | 0.01 | 0.7 | 1.3 | 0.024 |

TABLE 4. — Variance partitioning resulting from partial CCA of the nine patch islands on bryophyte SC. Note: **\*/**, effect of a given variable; **/\***, confounded effects of the environmental variable with the others; **DF**, **F**, **P**, parameters for a given variable *per se* in the same row; **ISW** and **ISD** are the same as those in Table 1.

| Fraction | Variation | % of total variation | DF | F | P-value |
|---|---|---|---|---|---|
| Area | 0.0676 / 0.1393 | 1.2 / 2.4 | 1 | 2.1 | 0.002 |
| Elevation | 0.0620 / 0.1129 | 1.1 / 2 | 1 | 2 | 0.002 |
| ISD | 0.0408 / 0.0093 | 0.7 / 0.2 | 1 | 1.3 | 0.018 |
| Shape irregularity | 0.0470 / 0.1461 | 0.8 / 2.6 | 1 | 1.5 | 0.002 |
| ISW | 0.0495 / 0.1248 | 0.9 / 2.2 | 1 | 1.6 | 0.002 |
| Habitat diversity | 0.0763 / 0.1161 | 1.3 / 2 | 1 | 2.4 | 0.002 |
| Vegetation coverage | 0.0868 / 0.0096 | 1.5 / 0.2 | 1 | 2.8 | 0.002 |
| Longitude + latitude | 0.1046 / 0.0337 | 1.8 / 0.6 | 2 | 1.7 | 0.002 |
| ISD + ISW | 0.0953 / 0.1281 | 1.7 / 2.2 | 2 | 1.5 | 0.002 |
| Longitude + latitude + ISD + ISW | 0.2083 / 0.1455 | 3.6 / 2.5 | 4 | 1.7 | 0.002 |
| Area + elevation + shape irregularity | 0.2169 / 0.1703 | 3.8 / 3.0 | 3 | 2.3 | 0.002 |

Shape irregularity exerted insignificant but positive effects on the SR of most bryophyte categories. The positive effects of vegetation coverage on the SR were also identified for all categories except Pottiaceae, Bryaceae, and Thuidiaceae (Table 6; Fig. 3).

When area was the only constraining variable, the SARs of different bryophyte categories are listed in Appendix 9. The SR of all categories linearly and significantly increased with increasing area according to the ln-transformed functions (P < 0.001). In the TIL, the z value of the SAR for bryophytes (0.3565) was larger than those of ground-dwelling mammals (0.2078), mammals (0.2174), small mammals (0.1096), birds (0.1377), lizards (0.1063), spiders (0.2146), ants (0.1790), and vascular plants (0.1340) (Appendix 11).

## DISCUSSION

In subtropical fragmented secondary forests, habitat diversity, area, shape irregularity, vegetation coverage, and elevation all exerted significant and positive effects on the SR of total bryophytes. Patch shape irregularity and vegetation coverage exerted positive effects on most of the bryophyte categories. Habitat diversity was the most important determinant of bryophyte SR and SC. Isolation of forest fragments exerted a significant effect on bryophyte SC and a marginally significant and negative effect on bryophyte SR.

ABOUT AREA AND SARs

The slopes of SARs constructed by using the GLMMs for the 18 bryophyte categories were smaller or much smaller than those of SARs with area as the only constraining environmental variable (Appendix 10), indicating that the random effects of other environmental variables were controlled to an extent.

A comparison of the slopes in the SARs of a given biota between different ecosystems is useful to clarify how the biota responds to different environmens (Gould 1979). The z values in the SARs (log S = C + z × log A) were 0.18 to 0.35 (Macarthur & Wilson 1967). For bryophytes, the value in the study region (0.355) was smaller than that in the Zhoushan Archipelago (0.390) (Yu *et al.* 2019). The variation of z values among them was compatible with their environmental heterogeneity for the study region had lower environmental heterogeneity than the Zhoushan Archipelago in area, geographical range, and geographical distances among the islands (Yu *et al.* 2019).

In the TIL, the z values of SARs for 16 bryophyte categories varied from 0.1367 (Anomodontaceae Kindb.) to 0.3483 (pleurocarpous mosses), which was possibly related to their different sensitivities to island habitats, and to their different dispersal capacities. The above results were consistent with those in the Zhoushan Archipelago (Yu *et al.* 2019), and the opinion that the response of plant SR to environmental variables was strongly species-specific (Patiño *et al.* 2014).
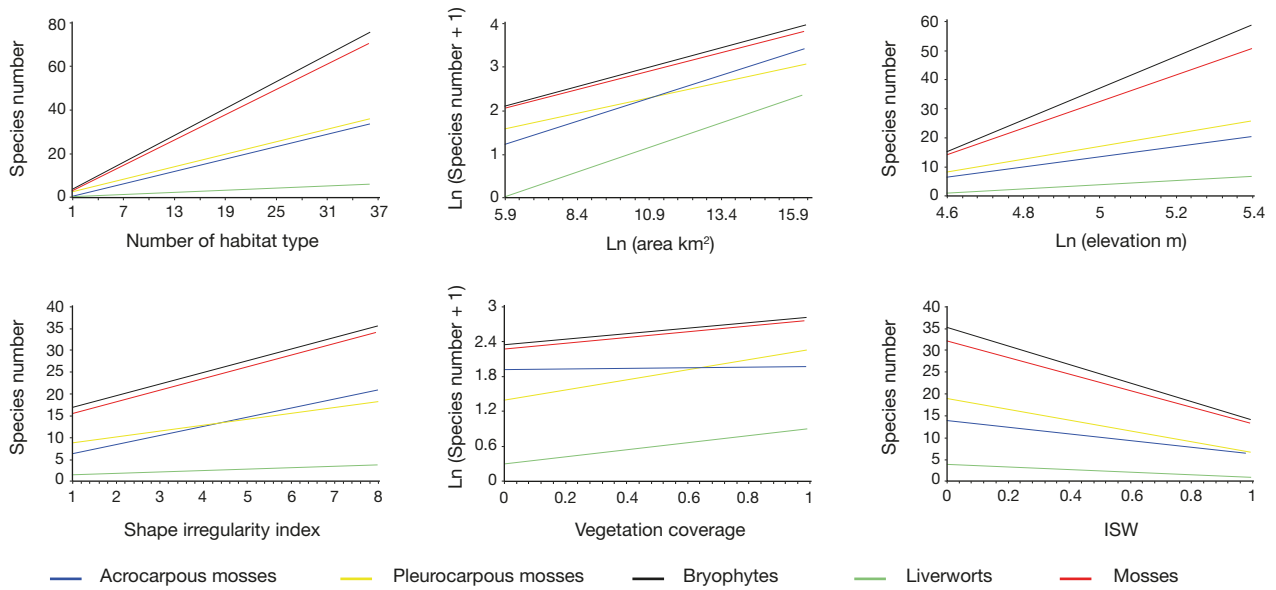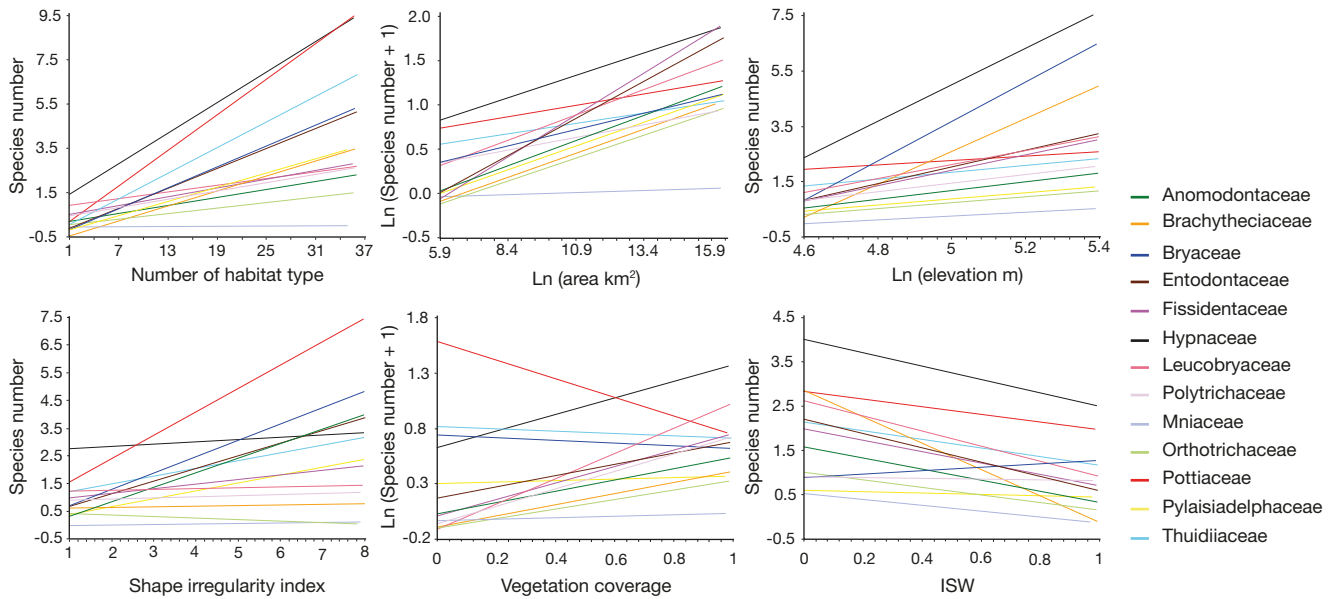
FIG. 3. — Relationships of species richness with number of habitat type, area, elevation, shape irregularity, vegetative cover, and ISW for 13 bryophyte families in 168 forest fragments of the Thousand Island Lake, China. The regression equations are derived from GLMMs. Note: **ISW**, the relative proportion of water within a circle of a diameter of 1000 m centered on a given island.

Isolation was considered a major factor affecting z values (Rosenzweig 1995). Generally speaking, large z values of SARs suggest substantial isolation among islands (Macarthur & Wilson 1967). Previous studies reported that z values varied within 0.20-0.40 for true isolates (Macarthur & Wilson 1967; Rosenzweig 1995; Triantis *et al.* 2012; Matthews *et al.* 2015). The z value of habitat islands were often lower than those of true islands, potentially because habitat islands are less isolated and have a higher immigration rate (Matthews *et al.* 2016). The z value of the bryophyte SARs in the study region was 0.3547, larger than those of most of biotas on true isolates, indicating isolation effects of fragmented forests on bryophyte SR to an extent.

Gould (1979) suggested to compare SARs of different taxa in the same region to investigate how different groups respond to the same eco-geographical condition. In the TIL, the z value of the bryophyte SAR was larger than those of large ground-dwelling mammals (Xu *et al.* 2014), mammals (Xu *et al.* 2014), small mammals (Zhao *et al.* 2009; Wang *et al.* 2010), birds (Ding *et al.* 2013), lizards (Hu *et al.* 2012), spiders (Ge 2015), ants (Zhou *et al.* 2019), and vascular plants (Hu *et al.* 2011) (Appendices 10; 11). Large z values of SARs were assumed to indicate a low immigration rate of biotas (Macarthur & Wilson 1967). In the region, the z value for bryophytes was higher than those of the other biotas, indicating a dispersal limitation for bryophytes in the region. Large z values of bryophyte SARs are also possibly due to higher extinction rates of bryophytes on smaller islands than those of other taxa (Davies & Smith 1998).

HABITAT
The habitat diversity hypothesis viewed area as affecting species richness indirectly because of its association with habitat

diversity (Williams 1964). In the TIL, habitat type number (Y) was closely related to area (X) (Y = 9.198 + 2.598 × ln X, r = 0.846, n = 168, P < 0.001). However, by using variance partitioning and after statistically controlling the effects of other environmental variables, we found that habitat diversity and area independently explained 8.4% and 2.4% of the total bryophyte SR variation, respectively. According to GLMMs, island area *per se* also independently explained bryophyte SR variation among 168 islands to a great extent (Table 5). Therefore, the habitat diversity hypothesis was not completely confirmed by our results.

Habitat diversity had been assessed by using different methods. On the region scale, with highly-resolved vector layers, Stein *et al.* (2014) assessed habitat diversity by using land cover diversity. Some previous studies used a habitat diversity index, taking into account the relative area of each habitat (Ricklefs & Lovette 1999). Triantis *et al.* (2006) thought that an accurate assessment of habitat area was not possible for every study. Following Rosenzweig *et al.* (2003), here we simply enumerated the habitat types presented on each island because we were unable to quantitatively measure the area of each habitat type on many large islands. Our results showed that the number of habitat types, which is a surrogate for environmental heterogeneity to a great extent, was an important determinant of bryophyte SR in fragmented subtropical secondary forests.

ELEVATION
Elevation was another important variable determining bryophyte SR in the study region. In the study region, the number of habitat types (Y) significantly increased with elevation (X), their relationship following Y = -104.5 + 24.17 × ln X (r = 0.821, P < 0.01). Therefore, we thought that the effects of elevation on SR were partially due to habitat diversity increasing with

TABLE 5. — GLMMs of 18 bryophyte categories revealing relationships of bryophyte SR with habitat diversity, area, and elevation in the Thousand Island Lake. Note: liverworts are including one hornwort species. The data in **brackets** are **marginal R²**, **conditional R²** and **(marginal R²/conditional R²)*100**, respectively. Superscripts: [a], t-value > 1.974 ($P < 0.05$); [b], t-value > 1.654 ($P < 0.1$); [c], t-value > 1.287 ($P < 0.2$); [d], t-value > 1.04 ($P < 0.3$); those without letter, t-value < 1.04 ($P > 0.3$).

| Bryophyte categories (Y) (species number) | Environmental variables (X) | | |
|---|---|---|---|
| | Number of habitat type | Ln (area m²) | Ln (elevation m) |
| Bryophytes (209) | Y = 2.0496[a]·X + 1.6190 (0.4885, 0.7793, 62.68) | Y = 0.1787[a]·X + 1.0523 (0.1704, 0.6881, 24.76) | Y = 54.770[b]·X - 236.790 (0.2749, 0.8181, 33.61) |
| Liverworts (29) | Y = 0.1779[a]·X - 0.0056 (0.2598, 0.6195, 41.94) | Y = 0.2239[a]·X - 1.2715 (0.3932, 0.4729, 83.14) | Y = 7.182[a]·X - 32.027 (0.325, 0.7209, 45.08) |
| Mosses (180) | Y = 1.9323[a]·X + 1.0264 (0.5187, 0.7879, 65.83) | Y = 0.1692[a]·X + 1.0758 (0.1627, 0.6937, 23.45) | Y = 45.800[b]·X - 196.460 (0.2448, 0.8143, 30.06) |
| Acrocarpous mosses (78) | Y = 0.9602[a]·X - 0.4336 (0.5395, 0.7133, 75.64) | Y = 0.2103[a]·X + 0.0122 (0.2860, 0.4920, 58.14) | Y = 17.545[b]·X - 74.277 (0.2054, 0.6394, 32.13) |
| Pleurocarpous mosses (98) | Y = 0.9472[b]·X + 1.8948 (0.3776, 0.7813, 48.33) | Y = 0.1427[a]·X + 0.7450 (0.0999, 0.7057, 14.15) | Y = 22.220[d]·X - 94.180 (0.1492, 0.8567, 17.41) |
| Anomodontaceae (6) | Y = 0.0591[c]·X + 0.1792 (0.1351, 0.3932, 34.35) | Y = 0.1121[a]·X - 0.6232 (0.1753, 0.3749, 46.76) | Y = 1.561·X - 6.627 (0.0687, 0.6417, 10.71) |
| Brachytheciaceae (23) | Y = 0.1121[c]·X - 0.5426 (0.1656, 0.7319, 22.62) | Y = 0.1094[a]·X - 0.7382 (0.1763, 0.4998, 35.26) | Y = 5.934[d]·X - 27.087 (0.1234, 0.9597, 12.85) |
| Bryaceae (14) | Y = 0.1575[a]·X - 0.3073 (0.2802, 0.7191, 38.97) | Y = 0.0724[c]·X - 0.0749 (0.0508, 0.4846, 10.47) | Y = 7.034[b]·X - 31.482 (0.2678, 0.8476, 31.59) |
| Entodontaceae (10) | Y = 0.1498[a]·X - 0.2579 (0.3018, 0.6237, 48.39) | Y = 0.1675[a]·X - 0.9819 (0.2636, 0.4283, 61.54) | Y = 2.990·X - 12.919 (0.1004, 0.7083, 14.18) |
| Fissidentaceae (9) | Y = 0.0656[c]·X + 0.4641 (0.0846, 0.5394, 15.68) | Y = 0.1879[a]·X - 1.1590 (0.3485, 0.5585, 62.41) | Y = 2.770·X - 11.920 (0.1448, 0.6163, 23.50) |
| Hypnaceae (13) | Y = 0.2314[a]·X + 1.1486 (0.3255, 0.6839, 47.59) | Y = 0.1005[a]·X + 0.2379 (0.0991, 0.6096, 16.26) | Y = 6.588[a]·X - 27.924 (0.2907, 0.6559, 44.32) |
| Leucodontaceae (7) | Y = 0.0512·X + 0.8552 (0.0541, 0.4855, 11.15) | Y = 0.1125[a]·X - 0.3385 (0.1440, 0.4427, 32.53) | Y = 2.538[b]·X - 10.563 (0.1347, 0.5386, 25.00) |
| Polytrichaceae (7) | Y = 0.0554[a]·X - 0.1747 (0.1855, 0.6201, 29.91) | Y = 0.1379[b]·X - 0.9736 (0.1198, 0.6595, 18.17) | Y = 0.6878[a]·X - 11.4534 (0.3692, 0.6338, 58.25) |
| Mniaceae (7) | Y = 0.1067[a]·X - 0.3017 (0.4478, 0.6035, 74.2) | Y = 0.1073[a]·X - 0.6341 (0.2004, 0.3918, 51.15) | Y = 1.127·X - 4.760 (0.0741, 0.4507, 16.45) |
| Orthotrichaceae (5) | Y = 0.0409[c]·X + 0.0218 (0.0712, 0.2835, 25.13) | Y = 0.1035[a]·X - 0.7282 (0.1758, 0.4494, 39.11) | Y = 1.034·X - 4.434 (0.0277, 0.6791, 4.08) |
| Pottiaceae (19) | Y = 0.2676[a]·X - 0.0746 (0.3830, 0.5960, 64.27) | Y = 0.0512·X + 0.4338 (0.0219, 0.4252, 5.16) | Y = 0.8036·X - 1.7583 (0.0046, 0.4621, 1.00) |
| Pylaisioideae (4) | Y = 0.0619[a]·X + 0.4278 (0.132, 0.4182, 31.57) | Y = 0.0571[c]·X + 0.0118 (0.0467, 0.4012, 11.63) | Y = 1.521[d]·X - 6.161 (0.0767, 0.57, 13.46) |
| Thuidiaceae (7) | Y = 0.1933[a]·X - 0.1135 (0.4540, 0.6032, 75.27) | Y = 0.0478[d]·X + 0.2675 (0.0240, 0.4192, 5.73) | Y = 1.258·X - 4.466 (0.0232, 0.5589, 4.16) |

elevation (Kreft *et al.* 2008). Additionally, species replacement increased with increasing elevation for some bryophyte ecological groups (Hernández-Hernández *et al.* 2017), which was another possible reason for the positive effects of elevation on bryophyte SR. Elevation, area, and shape irregularity independently explained 0.4%, 2.4%, and 0.8% of the total SR variation, while they together independently explained 6.0% of the total SR variation (Table 2), showing a positive interaction effect among these three environmental variables. This is consistent with the findings of Kalmar & Currie (2006) that SR is often related to the interaction among environmental variables.

ISOLATION

Bryophytes have been considered as having a long-distance dispersal capacity by spores (Frahm 2008). Theoretically, the long-distance dispersal capacities would weaken the effect of island isolation on biotas. However, we detected a significantly negative effect of isolation on the SR of most of the bryophyte categories in the TIL. Such effects were stronger in pleurocarpous mosses than in acrocarpous mosses, which was possibly due to the fact that acrocarpous mosses produced sporophytes more frequently and thus dispersed better than pleurocarpous mosses.

Many bryophytes actually have a limited dispersal capability (Haila 1999; Hedenäs *et al.* 2003; Frahm 2008) and a narrow geographic range. The dispersal strategy by spores should cause bryophytes to have large geographical ranges. In fact, many factors exerted negative influences on the long-distance dispersal of bryophytes. For example, long-distance dispersal should occur at higher altitudes in the atmosphere.

TABLE 6. — GLMMs of 18 bryophyte categories revealing relationships of bryophyte SR with ISW, shape irregularity, and vegetative cover in the Thousand Island Lake. Note: liverworts are including one hornwort species. The data in **brackets** are **marginal R²**, **conditional R²** and **(marginal R²/conditional R²)\*100**, respectively. The species number was ln-transformed when modeling the correlation of SR with vegetative cover. **ISW** is the same as those in Table 1. Superscripts: [a], t-value > 1.974 (P < 0.05); [b], t-value > 1.654 (P < 0.1); [c], t-value > 1.287 (P < 0.2); [d], t-value > 1.04 (P < 0.3); those without letter, t-value < 1.04 (P > 0.3).

| Bryophyte categories (species number) | Environmental variables (X) | | |
| --- | --- | --- | --- |
| | ISW | Shape irregularity index | Vegetation coverage |
| Bryophytes (209) | $Y = -21.410^{d} \cdot X + 35.390$ (0.0616, 0.7064, 8.72) | $Y = 2.6750 \cdot X + 14.3220$ (0.0124, 0.7706, 1.61) | $Y = 0.4836^{c} \cdot X + 2.3401$ (0.0282, 0.6875, 4.10) |
| Liverworts (29) | $Y = -2.9690^{d} \cdot X + 3.8100$ (0.0714, 0.6353, 11.24) | $Y = 0.3329 \cdot X + 1.1533$ (0.0111, 0.7630, 1.46) | $Y = 0.6111^{a} \cdot X + 0.3004$ (0.0732, 0.4305, 17.01) |
| Mosses (180) | $Y = -19.190^{d} \cdot X + 32.290$ (0.0613, 0.7056, 8.69) | $Y = 2.6720 \cdot X + 12.9140$ (0.0154, 0.7707, 2.00) | $Y = 0.4981^{c} \cdot X + 2.2692$ (0.0318, 0.6973, 4.56) |
| Acrocarpous mosses (78) | $Y = -7.441^{d} \cdot X + 13.809$ (0.037, 0.5791, 6.39) | $Y = 2.0840 \cdot X + 4.3120$ (0.0403, 0.6653, 6.05) | $Y = 0.0560 \cdot X + 1.9145$ (0.0004, 0.5522, 0.08) |
| Pleurocarpous mosses (98) | $Y = -12.262^{d} \cdot X + 18.894$ (0.0733, 0.7600, 9.65) | $Y = 1.3640 \cdot X + 7.3210$ (0.0132, 0.7848, 1.68) | $Y = 0.8879^{a} \cdot X + 1.3864$ (0.0828, 0.7238, 11.45) |
| Anomodontaceae (6) | $Y = -1.2567^{c} \cdot X + 1.5815$ (0.0667, 0.4305, 15.49) | $Y = 0.5183^{c} \cdot X - 0.1722$ (0.1308, 0.6207, 21.07) | $Y = 0.5054^{a} \cdot X + 0.0264$ (0.0853, 0.2895, 29.48) |
| Brachytheciaceae (23) | $Y = -2.967^{d} \cdot X + 2.857$ (0.0972, 0.7504, 12.96) | $Y = 0.0225 \cdot X + 0.5984$ (0.0001, 0.7644, 0.01) | $Y = 0.4930^{b} \cdot X - 0.0816$ (0.0677, 0.3644, 18.58) |
| Bryaceae (14) | $Y = 0.3773 \cdot X + 0.8910$ (0.0021, 0.433, 0.47) | $Y = 0.5873^{d} \cdot X + 0.1266$ (0.0700, 0.5992, 11.69) | $Y = -0.1211 \cdot X + 0.7414$ (0.0031, 0.4675, 0.65) |
| Entodontaceae (10) | $Y = -1.588^{d} \cdot X + 2.188$ (0.0439, 0.4602, 9.53) | $Y = 0.4575^{d} \cdot X + 0.2288$ (0.0564, 0.5505, 10.24) | $Y = 0.5016^{c} \cdot X + 0.1724$ (0.0563, 0.4172, 13.5) |
| Fissidentaceae (9) | $Y = -1.277^{d} \cdot X + 1.966$ (0.0344, 0.4724, 7.29) | $Y = 0.1680 \cdot X + 0.8174$ (0.0067, 0.7056, 0.95) | $Y = 0.7396^{a} \cdot X + 0.0134$ (0.1377, 0.4086, 33.7) |
| Hypnaceae (13) | $Y = -1.520^{d} \cdot X + 4.017$ (0.0195, 0.5235, 3.73) | $Y = 0.0837 \cdot X + 2.6750$ (0.0007, 0.7615, 0.10) | $Y = 0.7433^{a} \cdot X + 0.6314$ (0.1305, 0.6483, 20.14) |
| Leucodontaceae (7) | $Y = -1.6699^{a} \cdot X + 2.6046$ (0.0648, 0.4303, 15.05) | $Y = 0.0295 \cdot X + 1.2154$ (0.0003, 0.5012, 0.06) | $Y = 1.1361^{a} \cdot X - 0.1072$ (0.3151, 0.5064, 62.22) |
| Polytrichaceae (7) | $Y = -1.0047^{d} \cdot X + 1.1415$ (0.0541, 0.6854, 7.89) | $Y = -0.098 \cdot X + 0.497$ (0.0074, 0.7263, 1.02) | $Y = 0.0843 \cdot X + 0.2934$ (0.0009, 0.4509, 0.20) |
| Mniaceae (7) | $Y = -0.1770 \cdot X + 0.6184$ (0.0016, 0.4112, 0.39) | $Y = 0.2843^{d} \cdot X + 0.1071$ (0.0591, 0.5284, 11.19) | $Y = 0.0654 \cdot X + 0.3061$ (0.0017, 0.3795, 0.44) |
| Orthotrichaceae (5) | $Y = -0.8429 \cdot X + 0.9883$ (0.0279, 0.4978, 5.61) | $Y = -0.0559 \cdot X + 0.4607$ (0.0018, 0.5377, 0.34) | $Y = 0.4343^{a} \cdot X - 0.1026$ (0.0743, 0.3198, 23.24) |
| Pottiaceae (19) | $Y = -0.8508 \cdot X + 2.8255$ (0.005, 0.4172, 1.19) | $Y = 0.8452^{d} \cdot X + 0.7158$ (0.0779, 0.5135, 15.16) | $Y = -0.8377^{a} \cdot X + 1.5832$ (0.1089, 0.5375, 20.27) |
| Pylaisioideae (4) | $Y = -0.1052 \cdot X + 0.9224$ (0.0004, 0.5191, 0.08) | $Y = 0.0445 \cdot X + 0.8388$ (0.0013, 0.4063, 0.32) | $Y = 0.7896^{a} \cdot X - 0.0640$ (0.1972, 0.3845, 51.28) |
| Thuidiaceae (7) | $Y = -0.9756 \cdot X + 2.1521$ (0.0162, 0.5063, 3.19) | $Y = 0.2804 \cdot X + 0.9402$ (0.0213, 0.5189, 4.10) | $Y = -0.0991 \cdot X + 0.8146$ (0.0021, 0.457, 0.47) |

Therefore, diaspores must be able to get into these altitudes, which is difficult for most bryophyte species from the forest floor (Frahm 2008). For bryophytes, long-distance dispersal may occur only occasionally because spore production seems to be highly constrained due to unsuccessful sexual reproduction (Aranda *et al.* 2014).

In fragmented island systems, each island has its own potential pool of immigrants, and the isolation of an island depends not just on the distance to the mainland (with its major species pool), but also on the area represented by the nearby islands (with their own local species pool). Namely, the isolation degree for a given island also depends on the amount of habitat within some distance of the islands (Fahrig 2013). Bender *et al.* (2003) and Tischendorf *et al.* (2005)

also thought that the amount of habitat within a given buffer around a given patch was an ideal measure of the patch's isolation degree. Furthermore, in the TIL, most islands were multi-long branched in appearance (Appendix 13). It was thus inappropriate to only take the nearest distance of a given island from the shore as a measure of its isolation degree. Therefore, according to the special landform of islands in the study region, besides ISD, we also used ISW as a surrogate for isolation degree for a given patch.

SHAPE IRREGULARITY
In the study region, the shape irregularity of patches overall exerted positive effects on the SR for most of the bryophyte categories. The effect of island shape on SR was mainly

related to the ratio of the edge to the interior environment (Laurance 2000). Most of the bryophytes are unable to grow in forests with closed and shady understory environments. The proportion of edge zone to the interior environments of patches increases with increasing their shape irregularity, providing favorable microclimates and a competitive advantage for most bryophyte species (Hill & Curran 2003; Jiang *et al.* 2018). Therefore, it is explainable that bryophyte SR overall increased with the irregularity of patch shape in fragmented forests because of the positive edge effects in fragmented patches for bryophytes (Jiang *et al.* 2018).

The effects of island shape on SR were taxon-specific. For example, in the fragmented tropical forests of Ghana, Hill & Curran (2003) found that regenerating, light-demanding pioneers and mature, animal-dispersed species often grew along the edges of the forests. In the study region, for most bryophyte categories, island shape irregularity exerted positive effects on their SR, especially for those often growing in open and dry habitats such as Pottiaceae and Bryaceae. The positive effects of island shape irregularity on SR are stronger in mosses than in liverworts, which is attributed to the fact that mosses more frequently grow in open and sunny habitats than liverworts (Smith 1982).

ABOUT THE RELATIONSHIPS BETWEEN SC
AND PATCH ATTRIBUTES
The nine patch attributes accounted for 68.1% of the SR variation but only 13.3% of the SC variation, implying that the SR and SC of bryophytes differed in response to patch attributes in the fragmented subtropical forests. The relatively low explanatory power of the patch attributes to the SC variation was possibly due to a relatively high similarity of the SC between the patches. In the study region, the average bray-curtis distance coefficient of SC between patches was 0.228, but that of SR was 0.417. Overall, the explanatory power of environmental variables to explain SC variation was relatively low. For example, only 12.0% of the SC variation of the plants in the outer archipelago of Stockholm in the Baltic Sea (Sweden) was explained by seven island attributes according to the CCA (Aggemyr *et al.* 2018). On the Great Alvar of Öland, Sweden, Tyler *et al.* (2018) found that 13% of the SC variation of the bryophytes could be explained by nine environmental variables.

Differences in SC across patches with different environmental attributes were almost certainly driven to some extent by species' functional traits. Mosses tend to be more drought tolerant than liverworts (Kürschner 1999; Hylander *et al.* 2005). The gametangia of acrocarpous mosses occur on the stem apex, while those of pleurocarpous mosses occur on the side shoots. Gametangium position influenced shoot growth direction and branching patterns, thus influencing adaptation of mosses to environments (Kürschner 2004). Generally speaking, acrocarpous mosses, often in turfs and cushions, prefer sunny and xeric habitats, whereas pleurocarpous mosses prefer shady and humid habitats (Kürschner 2004). The species of different bryophyte families have different preferences for habitats and substrates. For example, the species of Pottiaceae often prefer sunny, harsh, and dry environments (Zander & Eckel 1993; Gao 1996), while those of Bryaceae prefer disturbed or open sites on bare soil (Li 2000). The species of Anomodontaceae and Entodontaceae essentially prefer rocks and tree trunks (Wu 2002; Hu & Wang 2002), and those of Pylaisiadelphaceae are typical epiphytes (Wu & Jia 2004).

CONCLUSION

In subtropical fragmented secondary forests, habitat diversity, area, elevation, shape irregularity, and vegetation coverage essentially exerted significant and positive effects on bryophyte assemblages. The number of habitat types was the most important determinant of bryophyte SR and SC. Isolation of forest fragments exerted a significant effect on bryophyte SC and a marginally significant and negative effect on bryophyte SR. The area of forest fragments could independently explain SR variation to a certain extent, which was not consistent with the habitat diversity hypothesis and the habitat amount hypothesis. Area, elevation, and shape had a positive interaction effect on bryophyte SR. Our results implied that a subtropical forest reserve for bryophyte conservation had better be designated to have various habitat types, a large area, a large elevation range, and irregularly-shaped fragments adjacent in distance.

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# APPENDICES

APPENDIX 1. — The nine patch attributes of the 168 islands in the Thousand Island Lake, China.

| | | | | | | | Spatial and environmental variables | | |
|---|---|---|---|---|---|---|---|---|---|
| Island no. | Longidue (°) | Latitude (°) | Area (ha) | Maximum elevation (m) | Distance to shore (m) | Shape index | Isolation degree by water | Vegetation coverage | Number of habitat types |
| 1 | 118.752 | 29.463 | 76.198 | 208 | 43.17 | 2.606 | 0.860 | 0.600 | 24 |
| 2 | 118.763 | 29.496 | 0.251 | 99 | 491.23 | 1.215 | 0.839 | 0.743 | 4 |
| 3 | 118.765 | 29.496 | 1.163 | 99 | 491.31 | 1.320 | 0.905 | 0.878 | 7 |
| 4 | 118.769 | 29.493 | 0.182 | 99 | 1096.15 | 1.501 | 0.985 | 0.428 | 5 |
| 5 | 118.771 | 29.491 | 1.361 | 100 | 1238.13 | 2.535 | 0.982 | 0.811 | 11 |
| 6 | 118.799 | 29.501 | 0.439 | 99 | 199.87 | 1.990 | 0.905 | 0.796 | 6 |
| 7 | 118.813 | 29.510 | 0.884 | 112 | 86.48 | 1.298 | 0.749 | 0.866 | 10 |
| 8 | 118.815 | 29.505 | 137.951 | 229 | 1132.63 | 4.066 | 0.350 | 0.967 | 18 |
| 9 | 118.816 | 29.510 | 0.383 | 99 | 104.25 | 1.224 | 0.781 | 0.889 | 7 |
| 10 | 118.820 | 29.515 | 0.088 | 99 | 916.06 | 1.551 | 0.845 | 0 | 2 |
| 11 | 118.821 | 29.514 | 0.159 | 99 | 862.48 | 1.230 | 0.865 | 0.563 | 5 |
| 12 | 118.821 | 29.514 | 0.454 | 99 | 769.86 | 1.298 | 0.865 | 0.829 | 8 |
| 13 | 118.821 | 29.508 | 0.292 | 99 | 96.42 | 1.404 | 0.778 | 0.829 | 7 |
| 14 | 118.822 | 29.515 | 0.635 | 107 | 706.31 | 1.381 | 0.760 | 0.897 | 9 |
| 15 | 118.823 | 29.508 | 0.932 | 99 | 186.24 | 1.327 | 0.813 | 0.918 | 11 |
| 16 | 118.824 | 29.512 | 4.250 | 117 | 247.63 | 1.942 | 0.838 | 0.949 | 13 |
| 17 | 118.824 | 29.514 | 1.813 | 113 | 460.48 | 1.689 | 0.715 | 0.966 | 10 |
| 18 | 118.827 | 29.486 | 0.593 | 101 | 729.32 | 1.853 | 0.572 | 0.572 | 7 |
| 19 | 118.827 | 29.507 | 3.095 | 109 | 107.62 | 2.122 | 0.799 | 0.922 | 9 |
| 20 | 118.828 | 29.504 | 1.103 | 99 | 158.86 | 1.563 | 0.877 | 0.908 | 6 |
| 21 | 118.828 | 29.521 | 1.193 | 106 | 169.74 | 1.892 | 0.850 | 0.743 | 8 |
| 22 | 118.829 | 29.515 | 11.842 | 123 | 64.53 | 3.049 | 0.498 | 0.944 | 12 |
| 23 | 118.832 | 29.533 | 0.265 | 100 | 529.18 | 1.190 | 0.960 | 0.780 | 7 |
| 24 | 118.833 | 29.534 | 0.066 | 100 | 562.25 | 1.310 | 0.964 | 0.280 | 3 |
| 25 | 118.833 | 29.534 | 0.145 | 100 | 509.88 | 1.262 | 0.963 | 0.587 | 7 |
| 26 | 118.834 | 29.534 | 0.038 | 100 | 503.98 | 1.561 | 0.946 | 0.12 | 2 |
| 27 | 118.838 | 29.537 | 0.968 | 100 | 239.84 | 1.942 | 0.918 | 0.750 | 10 |
| 28 | 118.840 | 29.492 | 0.820 | 101 | 677.63 | 1.391 | 0.760 | 0.867 | 8 |
| 29 | 118.843 | 29.493 | 0.295 | 99 | 607.72 | 1.340 | 0.457 | 0.808 | 6 |
| 30 | 118.843 | 29.540 | 0.226 | 100 | 194.87 | 1.326 | 0.863 | 0.483 | 6 |
| 31 | 118.843 | 29.491 | 1.206 | 108 | 428.84 | 1.389 | 0.984 | 0.896 | 10 |
| 32 | 118.844 | 29.494 | 0.069 | 100 | 680.72 | 1.212 | 0.903 | 0.594 | 5 |
| 33 | 118.845 | 29.493 | 0.171 | 100 | 573.15 | 1.249 | 0.880 | 0.652 | 7 |
| 34 | 118.845 | 29.492 | 0.321 | 101 | 448.26 | 1.068 | 0.834 | 0.880 | 5 |
| 35 | 118.846 | 29.542 | 0.369 | 100 | 310.83 | 1.192 | 0.854 | 0.540 | 7 |
| 36 | 118.847 | 29.490 | 4.892 | 114 | 96.27 | 2.428 | 0.791 | 0.938 | 9 |
| 37 | 118.847 | 29.540 | 0.932 | 100 | 117.96 | 1.748 | 0.867 | 0.481 | 10 |
| 38 | 118.848 | 29.543 | 0.649 | 104 | 45.32 | 1.441 | 0.827 | 0.879 | 8 |
| 39 | 118.850 | 29.540 | 0.208 | 100 | 68.02 | 1.314 | 0.610 | 0.746 | 8 |
| 40 | 118.850 | 29.545 | 0.896 | 100 | 72.24 | 1.710 | 0.729 | 0.394 | 14 |
| 41 | 118.852 | 29.541 | 2.373 | 100 | 19.49 | 2.139 | 0.565 | 0.804 | 8 |
| 42 | 118.852 | 29.546 | 0.471 | 102 | 196.09 | 1.904 | 0.694 | 0.487 | 11 |
| 43 | 118.855 | 29.550 | 0.087 | 99 | 47.09 | 1.225 | 0.654 | 0.100 | 3 |
| 44 | 118.858 | 29.548 | 4.026 | 109 | 166.25 | 2.600 | 0.809 | 0.531 | 15 |
| 45 | 118.859 | 29.547 | 0.471 | 100 | 343.13 | 1.443 | 0.732 | 0.687 | 7 |
| 46 | 118.862 | 29.551 | 2.910 | 105 | 450.83 | 2.405 | 0.753 | 0.403 | 12 |
| 47 | 118.865 | 29.553 | 9.226 | 110 | 436.41 | 3.384 | 0.732 | 0.418 | 16 |
| 48 | 118.865 | 29.548 | 7.759 | 124 | 173.78 | 2.434 | 0.689 | 0.935 | 11 |
| 49 | 118.867 | 29.552 | 0.090 | 100 | 730.41 | 1.159 | 0.648 | 0.576 | 5 |
| 50 | 118.868 | 29.550 | 1.169 | 105 | 492.77 | 1.666 | 0.621 | 0.717 | 7 |
| 51 | 118.871 | 29.548 | 1.570 | 105 | 485.21 | 1.553 | 0.711 | 0.974 | 7 |
| 52 | 118.872 | 29.564 | 0.756 | 100 | 86.22 | 2.187 | 0.925 | 0.304 | 7 |
| 53 | 118.872 | 29.550 | 0.092 | 100 | 730.41 | 1.175 | 0.490 | 0.486 | 5 |
| 54 | 118.873 | 29.548 | 3.698 | 112 | 317.75 | 1.889 | 0.780 | 0.920 | 12 |
| 55 | 118.873 | 29.565 | 0.191 | 100 | 321.95 | 1.093 | 0.930 | 0.361 | 7 |
| 56 | 118.873 | 29.560 | 0.776 | 100 | 366.96 | 1.643 | 0.869 | 0.596 | 9 |
| 57 | 118.874 | 29.547 | 1.096 | 104 | 374.99 | 2.100 | 0.895 | 0.889 | 10 |
| 58 | 118.875 | 29.562 | 0.224 | 100 | 428.42 | 1.239 | 0.861 | 0.349 | 6 |
| 59 | 118.876 | 29.564 | 0.048 | 100 | 519.66 | 1.474 | 0.799 | 0.41 | 2 |
| 60 | 118.877 | 29.565 | 0.151 | 100 | 499.94 | 1.278 | 0.727 | 0.630 | 7 |
| 61 | 118.878 | 29.566 | 0.349 | 103 | 522.01 | 1.883 | 0.706 | 0.753 | 8 |
| 62 | 118.882 | 29.524 | 1242.393 | 232 | 822.14 | 7.995 | 0 | 0.981 | 36 |
| 63 | 118.883 | 29.563 | 70.177 | 170 | 661.96 | 4.589 | 0.371 | 0.972 | 11 |

Appendix 1. — Continuation.

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | **Spatial and environmental variables** | | | | |
| Island no. | Longidue (º) | Latitude (º) | Area (ha) | Maximum elevation (m) | Distance to shore (m) | Shape index | Isolation degree by water | Vegetation coverage | Number of habitat types |
| 64 | 118.887 | 29.501 | 2.493 | 100 | 502.55 | 2.250 | 0.948 | 0.978 | 10 |
| 65 | 118.889 | 29.502 | 1.035 | 100 | 610.03 | 1.523 | 0.928 | 0.982 | 10 |
| 66 | 118.891 | 29.504 | 0.038 | 100 | 699.4 | 1.059 | 0.929 | 0.01 | 3 |
| 67 | 118.891 | 29.503 | 0.157 | 100 | 784.35 | 1.435 | 0.932 | 0.393 | 6 |
| 68 | 118.892 | 29.504 | 1.442 | 100 | 681.95 | 1.449 | 0.952 | 0.981 | 9 |
| 69 | 118.893 | 29.538 | 0.689 | 100 | 142.2 | 1.852 | 0.758 | 0.448 | 6 |
| 70 | 118.894 | 29.566 | 0.099 | 99 | 749.06 | 1.156 | 0.830 | 0.282 | 5 |
| 71 | 118.894 | 29.506 | 0.838 | 100 | 590.91 | 1.819 | 0.967 | 0.982 | 8 |
| 72 | 118.895 | 29.568 | 1.757 | 115 | 484.89 | 1.735 | 0.804 | 0.887 | 10 |
| 73 | 118.897 | 29.507 | 0.081 | 100 | 626.74 | 1.372 | 0.967 | 0.421 | 5 |
| 74 | 118.898 | 29.568 | 1.525 | 111 | 439.85 | 1.538 | 0.913 | 0.903 | 9 |
| 75 | 118.899 | 29.569 | 0.126 | 100 | 483.51 | 1.282 | 0.901 | 0.701 | 5 |
| 76 | 118.900 | 29.568 | 0.475 | 102 | 555.65 | 1.259 | 0.919 | 0.890 | 8 |
| 77 | 118.900 | 29.537 | 0.062 | 102 | 231.72 | 1.191 | 0.845 | 0 | 1 |
| 78 | 118.905 | 29.548 | 0.099 | 100 | 1361.76 | 1.223 | 0.990 | 0.781 | 5 |
| 79 | 118.905 | 29.549 | 0.037 | 100 | 1535.2 | 1.149 | 0.983 | 0.148 | 4 |
| 80 | 118.907 | 29.534 | 1.159 | 105 | 102.12 | 1.713 | 0.777 | 0.914 | 9 |
| 81 | 118.907 | 29.550 | 0.282 | 100 | 2047.79 | 1.511 | 0.954 | 0.744 | 7 |
| 82 | 118.908 | 29.549 | 0.289 | 100 | 1621.99 | 1.496 | 0.938 | 0.721 | 7 |
| 83 | 118.908 | 29.551 | 0.963 | 100 | 1808.95 | 1.854 | 0.956 | 0.831 | 10 |
| 84 | 118.909 | 29.580 | 0.272 | 100 | 656.58 | 1.645 | 0.898 | 0.614 | 6 |
| 85 | 118.910 | 29.578 | 0.626 | 100 | 903.11 | 1.259 | 0.825 | 0.835 | 7 |
| 86 | 118.910 | 29.580 | 0.761 | 100 | 716.44 | 2.025 | 0.861 | 0.701 | 7 |
| 87 | 118.910 | 29.584 | 0.544 | 102 | 437.94 | 1.311 | 0.900 | 0.703 | 5 |
| 88 | 118.911 | 29.553 | 0.132 | 100 | 2005.92 | 1.208 | 0.953 | 0.636 | 6 |
| 89 | 118.911 | 29.533 | 2.353 | 111 | 76.29 | 1.916 | 0.713 | 0.959 | 8 |
| 90 | 118.911 | 29.550 | 2.245 | 105 | 1742.42 | 2.878 | 0.940 | 0.746 | 10 |
| 91 | 118.911 | 29.577 | 2.721 | 106 | 966.14 | 1.936 | 0.796 | 0.822 | 9 |
| 92 | 118.911 | 29.547 | 0.534 | 100 | 1431.13 | 1.471 | 0.963 | 0.841 | 9 |
| 93 | 118.913 | 29.579 | 1.048 | 100 | 935.03 | 1.567 | 0.826 | 0.851 | 10 |
| 94 | 118.913 | 29.583 | 0.164 | 100 | 588.67 | 1.147 | 0.903 | 0.336 | 5 |
| 95 | 118.913 | 29.577 | 1.187 | 100 | 1128.63 | 1.671 | 0.809 | 0.868 | 9 |
| 96 | 118.914 | 29.575 | 3.609 | 109 | 1259.98 | 2.766 | 0.746 | 0.862 | 8 |
| 97 | 118.914 | 29.555 | 0.189 | 100 | 2377.59 | 1.984 | 0.993 | 0.472 | 5 |
| 98 | 118.914 | 29.554 | 0.082 | 100 | 2257.2 | 1.263 | 0.979 | 0.347 | 3 |
| 99 | 118.914 | 29.581 | 5.514 | 110 | 550.21 | 3.105 | 0.852 | 0.888 | 8 |
| 100 | 118.915 | 29.548 | 0.064 | 100 | 1621.61 | 1.072 | 0.973 | 0.104 | 2 |
| 101 | 118.915 | 29.588 | 0.258 | 100 | 121.66 | 1.375 | 0.618 | 0.434 | 5 |
| 102 | 118.916 | 29.577 | 0.618 | 104 | 1141.8 | 1.533 | 0.855 | 0.813 | 5 |
| 103 | 118.918 | 29.580 | 0.299 | 102 | 858.08 | 1.254 | 0.744 | 0.741 | 4 |
| 104 | 118.918 | 29.584 | 6.737 | 118 | 402.7 | 1.966 | 0.572 | 0.939 | 8 |
| 105 | 118.919 | 29.576 | 0.401 | 100 | 1379.46 | 1.525 | 0.916 | 0.505 | 9 |
| 106 | 118.919 | 29.579 | 0.233 | 102 | 1020.09 | 1.614 | 0.755 | 0.262 | 4 |
| 107 | 118.920 | 29.585 | 1.282 | 110 | 394.21 | 1.574 | 0.615 | 0.840 | 8 |
| 108 | 118.921 | 29.530 | 0.616 | 101 | 51.84 | 1.543 | 0.616 | 0.861 | 9 |
| 109 | 118.922 | 29.584 | 1.797 | 106 | 511.34 | 1.350 | 0.475 | 0.921 | 9 |
| 110 | 118.922 | 29.530 | 0.751 | 106 | 46.36 | 1.542 | 0.775 | 0.878 | 8 |
| 111 | 118.923 | 29.581 | 25.725 | 122 | 745.43 | 3.996 | 0.583 | 0.968 | 11 |
| 112 | 118.924 | 29.584 | 0.918 | 111 | 642.37 | 1.151 | 0.397 | 0.921 | 9 |
| 113 | 118.924 | 29.530 | 0.646 | 100 | 208.52 | 1.685 | 0.906 | 0.789 | 9 |
| 114 | 118.926 | 29.594 | 0.708 | 102 | 91.95 | 1.268 | 0.577 | 0.932 | 8 |
| 115 | 118.927 | 29.576 | 0.771 | 100 | 1524.71 | 1.591 | 0.193 | 0.584 | 7 |
| 116 | 118.928 | 29.583 | 0.771 | 106 | 1071.94 | 1.237 | 0.393 | 0.887 | 8 |
| 117 | 118.928 | 29.535 | 0.180 | 100 | 866.24 | 1.877 | 0.934 | 0.447 | 7 |
| 118 | 118.929 | 29.586 | 97.535 | 218 | 50.48 | 2.818 | 0.180 | 0.985 | 23 |
| 119 | 118.930 | 29.579 | 0.121 | 103 | 1281.88 | 1.180 | 0.723 | 0.470 | 5 |
| 120 | 118.931 | 29.581 | 4.441 | 118 | 1016.75 | 1.867 | 0.612 | 0.938 | 6 |
| 121 | 118.931 | 29.575 | 4.751 | 117 | 1538.19 | 1.786 | 0.890 | 0.915 | 7 |
| 122 | 118.932 | 29.577 | 0.698 | 109 | 1585.59 | 1.182 | 0.870 | 0.890 | 6 |
| 123 | 118.933 | 29.581 | 0.702 | 107 | 1223.95 | 1.464 | 0.702 | 0.694 | 7 |
| 124 | 118.934 | 29.575 | 3.277 | 114 | 1648.29 | 2.005 | 0.855 | 0.910 | 8 |
| 125 | 118.935 | 29.594 | 0.552 | 104 | 656.68 | 1.149 | 0.877 | 0.788 | 6 |
| 126 | 118.936 | 29.594 | 0.194 | 101 | 798.8 | 1.143 | 0.903 | 0.769 | 6 |
| 127 | 118.937 | 29.537 | 30.107 | 165 | 993.29 | 3.270 | 0.649 | 0.973 | 21 |
| 128 | 118.938 | 29.579 | 0.317 | 106 | 641.71 | 1.314 | 0.985 | 0 | 2 |
| 129 | 118.938 | 29.527 | 51.113 | 165 | 514.47 | 3.070 | 0.568 | 0.894 | 25 |

Appendix 1. — Continuation.

| | | | | | | | Isolation degree by | Vegetation | Number of |
|---|---|---|---|---|---|---|---|---|---|
| Island no. | Longidue (º) | Latitude (º) | Area (ha) | Maximum elevation (m) | Distance to shore (m) | Shape index | water | coverage | habitat types |
| 130 | 118.939 | 29.541 | 0.563 | 101 | 2047.31 | 1.895 | 0.735 | 0.814 | 8 |
| 131 | 118.942 | 29.579 | 1.331 | 100 | 1959.55 | 1.404 | 0.854 | 0.651 | 11 |
| 132 | 118.944 | 29.554 | 0.443 | 101 | 1650.12 | 1.460 | 0.956 | 0.875 | 10 |
| 133 | 118.944 | 29.599 | 0.979 | 100 | 639.54 | 1.407 | 0.956 | 0.895 | 4 |
| 134 | 118.944 | 29.556 | 1.135 | 107 | 1596.55 | 1.719 | 0.951 | 0.821 | 17 |
| 135 | 118.945 | 29.557 | 0.406 | 102 | 1703.89 | 1.176 | 0.949 | 0.827 | 16 |
| 136 | 118.948 | 29.561 | 0.173 | 100 | 1682.77 | 1.420 | 0.961 | 0 | 1 |
| 137 | 118.950 | 29.559 | 0.446 | 100 | 1395.73 | 1.695 | 0.961 | 0.714 | 8 |
| 138 | 118.950 | 29.559 | 0.061 | 100 | 1368.75 | 1.284 | 0.964 | 0 | 2 |
| 139 | 118.951 | 29.544 | 3.501 | 113 | 1023.89 | 2.326 | 0.934 | 0.948 | 9 |
| 140 | 118.953 | 29.542 | 0.287 | 100 | 1221.24 | 1.658 | 0.721 | 0.718 | 9 |
| 141 | 118.955 | 29.570 | 0.424 | 100 | 1698.01 | 1.467 | 0.938 | 0.724 | 8 |
| 142 | 118.956 | 29.538 | 0.512 | 100 | 1310.02 | 1.338 | 0.943 | 0.910 | 5 |
| 143 | 118.960 | 29.569 | 8.834 | 124 | 969.06 | 2.749 | 0.779 | 0.936 | 18 |
| 144 | 118.961 | 29.544 | 65.256 | 177 | 64.69 | 2.763 | 0.362 | 0.967 | 30 |
| 145 | 118.966 | 29.542 | 56.812 | 186 | 58.01 | 1.767 | 0.606 | 0.963 | 26 |
| 146 | 118.977 | 29.609 | 37.233 | 185 | 1507.5 | 1.736 | 0.608 | 0.955 | 29 |
| 147 | 118.977 | 29.612 | 0.679 | 100 | 1035.11 | 1.499 | 0.725 | 0.861 | 6 |
| 148 | 118.984 | 29.614 | 0.370 | 100 | 930.34 | 1.424 | 0.966 | 0.648 | 7 |
| 149 | 118.988 | 29.612 | 0.451 | 100 | 1354.51 | 1.098 | 0.990 | 0.864 | 10 |
| 150 | 119.044 | 29.532 | 1.260 | 163 | 389.51 | 1.523 | 0.463 | 0.986 | 14 |
| 151 | 119.065 | 29.573 | 0.300 | 94 | 266.95 | 1.296 | 0.924 | 0.834 | 6 |
| 152 | 119.066 | 29.572 | 0.274 | 95 | 389.86 | 1.546 | 0.936 | 0.830 | 7 |
| 153 | 119.069 | 29.573 | 1.693 | 97 | 242.19 | 1.854 | 0.907 | 0.909 | 12 |
| 154 | 119.070 | 29.532 | 869.035 | 379 | 355.94 | 3.064 | 0.034 | 0.871 | 33 |
| 155 | 119.071 | 29.580 | 0.243 | 94 | 365.97 | 1.403 | 0.945 | 0.173 | 3 |
| 156 | 119.075 | 29.544 | 0.415 | 100 | 153.49 | 1.086 | 0.855 | 0.33 | 7 |
| 157 | 119.077 | 29.546 | 0.165 | 100 | 416.61 | 1.123 | 0.981 | 0.12 | 3 |
| 158 | 119.079 | 29.539 | 0.408 | 100 | 229.03 | 1.210 | 0.971 | 0.1 | 2 |
| 159 | 119.080 | 29.575 | 0.426 | 95 | 335.02 | 1.186 | 0.933 | 0.928 | 8 |
| 160 | 119.080 | 29.547 | 1.097 | 100 | 627.34 | 1.226 | 0.992 | 0.552 | 5 |
| 161 | 119.080 | 29.574 | 0.240 | 94 | 402.35 | 1.107 | 0.947 | 0.904 | 6 |
| 162 | 119.083 | 29.574 | 0.126 | 94 | 459.45 | 1.398 | 0.945 | 0 | 3 |
| 163 | 119.087 | 29.527 | 1.045 | 100 | 78.99 | 1.389 | 0.797 | 0.694 | 10 |
| 164 | 119.098 | 29.547 | 12.565 | 137 | 509.28 | 1.291 | 0.857 | 0.949 | 12 |
| 165 | 119.099 | 29.538 | 11.577 | 129 | 797.91 | 1.424 | 0.825 | 0.903 | 19 |
| 166 | 119.101 | 29.551 | 2.578 | 111 | 261.36 | 1.249 | 0.888 | 0.822 | 11 |
| 167 | 119.101 | 29.535 | 3.061 | 113 | 667.53 | 1.214 | 0.836 | 0.03 | 9 |
| 168 | 119.102 | 29.536 | 0.374 | 110 | 659.25 | 1.441 | 0.822 | 0.99 | 2 |

APPENDIX 2. — Description of the 36 habitat types.

| Habitat type no. | Habitat type | Definition |
|---|---|---|
| 1 | Abandoned buildings | A patch with abandoned buildings or building relic |
| 2 | Abandoned nursery and orchards | A patch for once planted fruit trees or tea trees, with an area larger than 500 m² |
| 3 | Abandoned vegetable fields | A patch once planted vegetables, with an area larger than 50 m² |
| 4 | Artifical ditches | Ditches in orchards or tea gardens |
| 5 | Artifically planted *Pterocarya stenoptera* forests | A patch with an area larger than 100 m², and containing artifically planted *Pterocarya stenoptera* |
| 6 | Bamboo forests | A patch with an area larger than 100 m², and containing bamboos (*Phyllostachys heterocycla*) |
| 7 | Big broadleaved trees | One or several large broadleaved trees whose diameter (at a height of 1.5 m above the ground) was larger than 40 cm, often along road or around buildings |
| 8 | Brick walls | Brick walls in use or abandoned, or brick relic |
| 9 | Broadleaved forests | A patch with an area larger than 100 m², and containing broad-leaved trees whose diameter was all larger than 20 cm |
| 10 | Buildings in use | A patch with at least one building still used by local residents, in some larger islands such as Island 109, 70 and 71 |
| 11 | Cemetery | A patch with a burial ground, often building with cement or stones |
| 12 | Fir forests | A patch with an area larger than 100 m², and containing artifically planted *Cunninghamia lanceolatea* |
| 13 | Flower bed and flowerpots | A patch containing a flower bed with an area larger than 25 m², or any flowerpot (with a upper diameter larger than 20 cm) in use |
| 14 | Habitats with fallen woods | A patch with fallen woods (whose diameter was larger then 10 cm), often under forests |
| 15 | Habitats with rotten woods | A patch with rooten woods (of different leves of decay), often under forests |
| 16 | High coniferous forests | A patch with an area larger than 100 m², and containing more than three coniferous trees (*Pinus massoniana*) whose diameter was all larger than 20 cm. The habitats were covered with forests (*c.* 90%) dominated by *P. massoniana* in the canopy and broad-leaved plants in the sub-canopy and understory |
| 17 | High herbaceous vegetation | A patch with an area larger than 25 m², and containing grasses with a mean heigh thigher than 60 cm |
| 18 | Low coniferous forests | A patch with an area larger than 100 m², and containing more than five coniferous forest (*Pinus massoniana*) whose diameter (at a height of 1.5 m above the ground) was all smaller than *c.* 10 cm |
| 19 | Low herbaceous vegetation | A patch with an area larger than 25 m², and containing grasses with a mean height lower than 30 cm |
| 20 | Middle herbaceous vegetation | A patch with an area larger than 25 m², and containing grasses with a mean height between 30-60 cm |
| 21 | Mixed forests | A patch with an area larger than 100 m², and containing broad-leaved trees, confierous trees and shrub |
| 22 | Moist boulders or stone walls | Moist or dripping boulders or stone walls |
| 23 | Mountain stream or ravine | A setion of ditch or ravine in mountain |
| 24 | Nursery and orchards | A patch for planting fruit trees or tea trees, with an area larger than 500 m² |
| 25 | Old cement walls | Abandoned cement walls |
| 26 | Open rocky habitats | A patch with boluders in open habitats |
| 27 | Rocky habitats under forests | A patch with boluders under forests |
| 28 | Samll ditches or ponds | A patch with small ponds or artificial ditches in flatlands |
| 29 | Shrub | A patch with an area larger than 100 m², and containing shrubs |
| 30 | Soil road in open habitats | A section road with soil substrate in oper environments for human walk |
| 31 | Soil road under forests | A section road with soil substrate under foress for human walk occassionally |
| 32 | Soil slope under forests | A setion of soil slope with bevel width wider than *c.* 50 cm |
| 33 | Sone walls | A section of wall piled with stones |
| 34 | Stone steps | A step road building with stones, in some large islands |
| 35 | Transportation station | Dock for fishing boats and passenger ships |
| 36 | Vegetable fields | A patch for planting vegetables, with an area larger than 50 m² |

APPENDIX 3. — 36 habitat types on the 168 islands in the Thousand Island Lake, China.

| Island no. | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 | 32 | 33 | 34 | 35 | 36 | Richness of habitat types |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 1 | 1 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 0 | 24 |
| 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 4 |
| 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 7 |
| 4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 5 |
| 5 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 11 |
| 6 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 6 |
| 7 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 10 |
| 8 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 18 |
| 9 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 7 |
| 10 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 |
| 11 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 5 |
| 12 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 8 |
| 13 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 7 |
| 14 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 9 |
| 15 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 0 | 0 | 1 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 11 |
| 16 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 13 |
| 17 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 10 |
| 18 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 7 |
| 19 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 9 |
| 20 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 6 |
| 21 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 8 |
| 22 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 12 |
| 23 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 7 |
| 24 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 |
| 25 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 7 |
| 26 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 |
| 27 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 10 |
| 28 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 8 |
| 29 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 6 |
| 30 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 6 |
| 31 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 10 |
| 32 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 5 |
| 33 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 7 |
| 34 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 5 |
| 35 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 7 |
| 36 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 9 |
| 37 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 10 |
| 38 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 8 |
| 39 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 8 |
| 40 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 14 |
| 41 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 8 |
| 42 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 11 |
| 43 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 |
| 44 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 1 | 1 | 1 | 0 | 0 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 15 |
| 45 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 7 |
| 46 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 1 | 1 | 1 | 0 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 12 |
| 47 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 16 |
| 48 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 11 |
| 49 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 5 |
| 50 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 7 |
| 51 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 7 |
| 52 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 7 |
| 53 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 5 |
| 54 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 12 |
| 55 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 7 |
| 56 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 9 |
| 57 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 10 |
| 58 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 6 |
| 59 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 |
| 60 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 7 |
| 61 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 8 |
| 62 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 36 |
| 63 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 11 |
| 64 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 10 |
| 65 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 10 |
| 66 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 |
| 67 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 6 |
| 68 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 9 |
| 69 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 6 |
| 70 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 5 |
| 71 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 8 |
| 72 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 1 | 1 | 1 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 10 |
| 73 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 5 |
| 74 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 9 |
| 75 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 5 |
| 76 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 8 |

Appendix 3. — Continuation.

| Island no. | | | | | | | | | | | | | | | | | | Habitat types | | | | | | | | | | | | | | | | | | | Richness of habitat types |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 | 32 | 33 | 34 | 35 | 36 | |
| 77 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| 78 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 5 |
| 79 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 4 |
| 80 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 9 |
| 81 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 7 |
| 82 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 7 |
| 83 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 10 |
| 84 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 6 |
| 85 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 7 |
| 86 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 7 |
| 87 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 5 |
| 88 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 6 |
| 89 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 8 |
| 90 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 10 |
| 91 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 9 |
| 92 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 9 |
| 93 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 10 |
| 94 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 5 |
| 95 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 9 |
| 96 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 8 |
| 97 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 5 |
| 98 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 |
| 99 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 8 |
| 100 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 |
| 101 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 5 |
| 102 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 5 |
| 103 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 4 |
| 104 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 8 |
| 105 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 9 |
| 106 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 4 |
| 107 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 8 |
| 108 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 9 |
| 109 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 9 |
| 110 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 8 |
| 111 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 1 | 1 | 0 | 1 | 0 | 1 | 0 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 11 |
| 112 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 1 | 0 | 1 | 1 | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 9 |
| 113 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 1 | 1 | 0 | 1 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 9 |
| 114 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 8 |
| 115 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 7 |
| 116 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 8 |
| 117 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 7 |
| 118 | 1 | 0 | 1 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 0 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 23 |
| 119 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 5 |
| 120 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 6 |
| 121 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 7 |
| 122 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 6 |
| 123 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 7 |
| 124 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 8 |
| 125 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 6 |
| 126 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 6 |
| 127 | 1 | 0 | 1 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 1 | 1 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 21 |
| 128 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 2 |
| 129 | 1 | 0 | 1 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 0 | 0 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 25 |
| 130 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 8 |
| 131 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 11 |
| 132 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 10 |
| 133 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 4 |
| 134 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 1 | 0 | 1 | 0 | 1 | 1 | 1 | 0 | 17 |
| 135 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 16 |
| 136 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| 137 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 8 |
| 138 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 2 |
| 139 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 9 |
| 140 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 9 |
| 141 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 8 |
| 142 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 5 |
| 143 | 1 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 1 | 0 | 1 | 1 | 0 | 1 | 0 | 1 | 1 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 18 |
| 144 | 1 | 0 | 1 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 30 |
| 145 | 1 | 0 | 1 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 26 |
| 146 | 1 | 0 | 1 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 29 |
| 147 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 6 |
| 148 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 7 |
| 149 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 10 |
| 150 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 1 | 1 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 14 |
| 151 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 6 |
| 152 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 7 |

Appendix 3. — Continuation.

| Island no. | \_\_\_ Habitat types \_\_\_ | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | Richness of habitat types |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 | 32 | 33 | 34 | 35 | 36 | |
| 153 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 1 | 0 | 1 | 0 | 1 | 0 | 0 | 1 | 1 | 0 | 1 | 1 | 0 | 0 | 1 | 1 | 0 | 0 | 12 |
| 154 | 1 | 1 | 1 | 1 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 33 |
| 155 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 |
| 156 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 7 |
| 157 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 |
| 158 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 |
| 159 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 8 |
| 160 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 5 |
| 161 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 6 |
| 162 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 |
| 163 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 1 | 1 | 0 | 1 | 1 | 1 | 0 | 0 | 1 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 10 |
| 164 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 12 |
| 165 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 0 | 0 | 1 | 0 | 1 | 0 | 19 |
| 166 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 1 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 11 |
| 167 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 9 |
| 168 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 |

APPENDIX 4. — Species number of 17 bryophyte categories on the 168 islands in the Thousand Island Lake, China.

| Island no. | Anomodontaceae (6) | Brachytheciaceae (23) | Bryaceae (14) | Entodontaceae (10) | Fissidentaceae (9) | Hypnaceae (13) | Lejeuneaceae (4) | Leucobryaceae (7) | Lophocoleaceae (5) | Polytrichaceae (7) | Mniaceae (7) | Orthotrichaceae (5) | Other liverworts (19) | Other mosses (49) | Pottiaceae (19) | Pylaisiadelphaceae (4) | Thuidiaceae (7) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 1 | 6 | 7 | 2 | 2 | 4 | 1 | 0 | 2 | 2 | 4 | 0 | 4 | 9 | 5 | 0 | 2 |
| 2 | 0 | 0 | 1 | 0 | 0 | 2 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 |
| 3 | 0 | 0 | 0 | 1 | 2 | 4 | 0 | 2 | 0 | 0 | 1 | 0 | 1 | 1 | 0 | 1 | 1 |
| 4 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 2 | 1 | 0 | 1 |
| 5 | 2 | 0 | 2 | 1 | 1 | 2 | 0 | 1 | 0 | 0 | 2 | 0 | 2 | 3 | 5 | 0 | 3 |
| 6 | 0 | 0 | 1 | 0 | 1 | 2 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 2 | 5 | 0 | 2 |
| 7 | 0 | 0 | 1 | 1 | 2 | 3 | 0 | 2 | 0 | 0 | 0 | 0 | 1 | 3 | 2 | 1 | 1 |
| 8 | 2 | 4 | 2 | 3 | 6 | 6 | 0 | 2 | 2 | 1 | 2 | 2 | 5 | 11 | 6 | 1 | 4 |
| 9 | 1 | 0 | 1 | 0 | 0 | 2 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 0 |
| 10 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 |
| 11 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 |
| 12 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 3 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 1 |
| 13 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 |
| 14 | 0 | 0 | 0 | 1 | 0 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 2 | 1 |
| 15 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 1 | 0 | 0 | 2 | 2 | 1 | 1 |
| 16 | 0 | 0 | 0 | 0 | 1 | 4 | 0 | 2 | 0 | 0 | 0 | 0 | 1 | 4 | 0 | 1 | 2 |
| 17 | 0 | 0 | 0 | 0 | 2 | 4 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 3 | 1 | 0 | 2 |
| 18 | 0 | 0 | 1 | 0 | 0 | 3 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 0 |
| 19 | 2 | 0 | 1 | 1 | 1 | 3 | 0 | 3 | 0 | 0 | 1 | 1 | 0 | 3 | 1 | 2 | 2 |
| 20 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 3 | 1 | 2 | 0 |
| 21 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 3 | 0 | 0 | 0 | 0 | 0 | 2 | 1 | 0 | 0 |
| 22 | 1 | 0 | 1 | 0 | 1 | 3 | 1 | 3 | 0 | 0 | 0 | 0 | 2 | 3 | 1 | 3 | 1 |
| 23 | 0 | 0 | 3 | 0 | 0 | 2 | 0 | 0 | 0 | 1 | 0 | 0 | 2 | 6 | 4 | 0 | 3 |
| 24 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 4 | 0 | 1 |
| 25 | 3 | 0 | 1 | 1 | 0 | 3 | 1 | 1 | 0 | 0 | 1 | 1 | 0 | 4 | 5 | 1 | 4 |
| 26 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 |
| 27 | 1 | 0 | 1 | 2 | 0 | 5 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 4 | 4 | 0 | 3 |
| 28 | 1 | 0 | 0 | 1 | 0 | 2 | 1 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 |
| 29 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 0 |
| 30 | 1 | 1 | 2 | 1 | 2 | 4 | 2 | 1 | 1 | 2 | 0 | 0 | 1 | 5 | 5 | 1 | 1 |
| 31 | 1 | 0 | 0 | 0 | 1 | 3 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 2 | 1 | 2 | 1 |
| 32 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 1 | 1 | 0 | 0 |
| 33 | 1 | 1 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 0 |
| 34 | 0 | 0 | 2 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 2 |
| 35 | 0 | 0 | 1 | 0 | 1 | 1 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 6 | 5 | 0 | 1 |
| 36 | 1 | 0 | 1 | 0 | 1 | 4 | 0 | 2 | 0 | 0 | 1 | 0 | 2 | 2 | 0 | 2 | 1 |
| 37 | 1 | 0 | 3 | 3 | 0 | 4 | 2 | 0 | 0 | 0 | 0 | 1 | 1 | 8 | 9 | 0 | 2 |
| 38 | 1 | 0 | 2 | 1 | 0 | 2 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 4 | 2 | 1 | 3 |
| 39 | 0 | 2 | 0 | 2 | 3 | 3 | 0 | 0 | 1 | 2 | 1 | 1 | 1 | 6 | 1 | 1 | 3 |
| 40 | 1 | 0 | 2 | 3 | 0 | 4 | 1 | 1 | 0 | 0 | 1 | 0 | 1 | 5 | 7 | 0 | 3 |
| 41 | 2 | 1 | 1 | 3 | 3 | 7 | 1 | 2 | 1 | 2 | 1 | 1 | 2 | 6 | 0 | 0 | 1 |
| 42 | 1 | 0 | 3 | 0 | 0 | 2 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 3 | 5 | 0 | 2 |
| 43 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 0 | 0 |
| 44 | 2 | 2 | 7 | 3 | 1 | 2 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 4 | 5 | 1 | 5 |
| 45 | 0 | 0 | 2 | 0 | 2 | 5 | 0 | 3 | 0 | 0 | 0 | 1 | 0 | 4 | 5 | 0 | 0 |
| 46 | 0 | 0 | 4 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 6 | 8 | 1 | 2 |
| 47 | 0 | 0 | 4 | 0 | 1 | 3 | 0 | 1 | 0 | 1 | 0 | 0 | 2 | 9 | 7 | 1 | 2 |
| 48 | 0 | 0 | 1 | 1 | 0 | 5 | 0 | 2 | 1 | 0 | 1 | 0 | 1 | 3 | 1 | 0 | 2 |
| 49 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 1 |
| 50 | 0 | 0 | 0 | 2 | 2 | 2 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 2 | 0 | 1 | 4 |
| 51 | 1 | 0 | 1 | 0 | 1 | 2 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 0 |
| 52 | 1 | 0 | 2 | 1 | 0 | 4 | 0 | 0 | 1 | 0 | 2 | 1 | 1 | 1 | 4 | 0 | 4 |
| 53 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 |
| 54 | 1 | 1 | 4 | 4 | 3 | 8 | 0 | 2 | 1 | 1 | 3 | 0 | 2 | 12 | 10 | 1 | 3 |
| 55 | 2 | 0 | 1 | 0 | 0 | 5 | 1 | 0 | 3 | 0 | 1 | 1 | 1 | 3 | 5 | 2 | 3 |
| 56 | 0 | 1 | 0 | 2 | 0 | 2 | 0 | 0 | 0 | 0 | 2 | 0 | 1 | 2 | 3 | 1 | 2 |
| 57 | 2 | 0 | 2 | 1 | 0 | 7 | 0 | 2 | 0 | 2 | 1 | 1 | 2 | 8 | 1 | 2 | 2 |
| 58 | 1 | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 2 | 1 | 0 | 4 |
| 59 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 |
| 60 | 1 | 0 | 1 | 3 | 1 | 5 | 1 | 0 | 2 | 0 | 1 | 0 | 1 | 2 | 4 | 0 | 5 |
| 61 | 2 | 0 | 1 | 1 | 0 | 2 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 3 | 3 | 0 | 2 |

Appendix 4. — Continuation.

| Island no. | Anomodontaceae (6) | Brachytheciaceae (23) | Bryaceae (14) | Entodontaceae (10) | Fissidentaceae (9) | Hypnaceae (13) | Lejeuneaceae (4) | Leucobryaceae (7) | Lophocoleaceae (5) | Polytrichaceae (7) | Mniaceae (7) | Orthotrichaceae (5) | Other liverworts (19) | Other mosses (49) | Pottiaceae (19) | Pylaisiadelphaceae (4) | Thuidiaceae (7) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 62 | 5 | 21 | 7 | 10 | 7 | 12 | 4 | 5 | 5 | 3 | 5 | 4 | 14 | 32 | 13 | 3 | 7 |
| 63 | 1 | 2 | 2 | 2 | 4 | 5 | 0 | 3 | 2 | 2 | 2 | 0 | 2 | 8 | 3 | 2 | 3 |
| 64 | 2 | 1 | 0 | 2 | 1 | 5 | 1 | 2 | 1 | 0 | 1 | 1 | 1 | 5 | 2 | 0 | 3 |
| 65 | 0 | 3 | 0 | 1 | 2 | 3 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 4 | 2 | 0 | 1 |
| 66 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 |
| 67 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 |
| 68 | 1 | 1 | 0 | 3 | 2 | 3 | 0 | 2 | 0 | 0 | 1 | 2 | 3 | 1 | 0 | 2 | 4 |
| 69 | 0 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 2 | 2 | 1 | 1 |
| 70 | 1 | 0 | 1 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 |
| 71 | 1 | 2 | 1 | 1 | 3 | 2 | 0 | 2 | 0 | 0 | 0 | 2 | 3 | 5 | 1 | 1 | 1 |
| 72 | 2 | 1 | 2 | 1 | 1 | 2 | 1 | 2 | 0 | 1 | 0 | 0 | 1 | 6 | 2 | 2 | 2 |
| 73 | 0 | 0 | 1 | 1 | 1 | 2 | 0 | 1 | 0 | 0 | 1 | 0 | 1 | 1 | 1 | 0 | 0 |
| 74 | 0 | 1 | 2 | 0 | 2 | 2 | 0 | 2 | 0 | 0 | 0 | 1 | 2 | 4 | 2 | 0 | 1 |
| 75 | 0 | 0 | 1 | 0 | 0 | 2 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 2 | 1 | 0 | 0 |
| 76 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 2 | 1 | 2 | 0 |
| 77 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 |
| 78 | 0 | 0 | 2 | 2 | 1 | 3 | 1 | 0 | 0 | 0 | 1 | 0 | 2 | 3 | 1 | 0 | 2 |
| 79 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 0 | 2 |
| 80 | 0 | 0 | 0 | 0 | 3 | 3 | 0 | 2 | 0 | 0 | 0 | 1 | 0 | 4 | 1 | 3 | 0 |
| 81 | 1 | 0 | 2 | 3 | 2 | 3 | 0 | 1 | 0 | 0 | 2 | 1 | 1 | 5 | 2 | 1 | 2 |
| 82 | 0 | 1 | 1 | 1 | 0 | 2 | 0 | 1 | 0 | 1 | 1 | 0 | 0 | 4 | 1 | 0 | 1 |
| 83 | 1 | 1 | 4 | 4 | 1 | 3 | 1 | 2 | 0 | 0 | 1 | 0 | 1 | 5 | 5 | 1 | 3 |
| 84 | 1 | 0 | 1 | 0 | 1 | 1 | 1 | 2 | 0 | 0 | 0 | 0 | 1 | 2 | 1 | 1 | 1 |
| 85 | 0 | 0 | 1 | 1 | 0 | 4 | 0 | 2 | 0 | 0 | 1 | 0 | 1 | 4 | 1 | 1 | 2 |
| 86 | 1 | 1 | 1 | 0 | 2 | 3 | 1 | 1 | 0 | 0 | 1 | 1 | 2 | 5 | 1 | 2 | 1 |
| 87 | 0 | 0 | 1 | 0 | 1 | 2 | 0 | 3 | 0 | 0 | 0 | 0 | 1 | 3 | 1 | 0 | 0 |
| 88 | 0 | 0 | 1 | 2 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 2 |
| 89 | 0 | 0 | 0 | 1 | 2 | 2 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 3 | 0 | 0 | 0 |
| 90 | 1 | 0 | 5 | 5 | 6 | 8 | 1 | 2 | 2 | 1 | 1 | 0 | 3 | 10 | 9 | 1 | 4 |
| 91 | 3 | 0 | 1 | 2 | 0 | 2 | 0 | 2 | 0 | 2 | 0 | 3 | 1 | 7 | 2 | 2 | 1 |
| 92 | 2 | 0 | 3 | 5 | 2 | 5 | 1 | 3 | 0 | 1 | 1 | 0 | 1 | 8 | 2 | 3 | 3 |
| 93 | 1 | 0 | 0 | 1 | 1 | 5 | 0 | 4 | 1 | 0 | 0 | 0 | 2 | 3 | 2 | 2 | 3 |
| 94 | 0 | 0 | 1 | 0 | 2 | 3 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 3 | 2 | 0 | 1 |
| 95 | 2 | 1 | 1 | 0 | 0 | 2 | 0 | 1 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 1 | 3 |
| 96 | 2 | 0 | 0 | 2 | 3 | 4 | 0 | 1 | 1 | 0 | 0 | 0 | 1 | 3 | 0 | 1 | 2 |
| 97 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 1 |
| 98 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 |
| 99 | 2 | 1 | 2 | 2 | 2 | 4 | 0 | 2 | 0 | 0 | 1 | 2 | 2 | 4 | 4 | 2 | 2 |
| 100 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 |
| 101 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 2 | 1 | 0 | 1 |
| 102 | 1 | 0 | 1 | 0 | 0 | 2 | 2 | 0 | 0 | 0 | 1 | 1 | 1 | 5 | 0 | 1 | 2 |
| 103 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 3 | 0 | 1 | 0 |
| 104 | 3 | 2 | 1 | 3 | 3 | 5 | 1 | 3 | 0 | 1 | 1 | 1 | 4 | 9 | 3 | 3 | 4 |
| 105 | 0 | 0 | 2 | 1 | 2 | 3 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 3 | 1 | 1 | 2 |
| 106 | 1 | 0 | 3 | 2 | 0 | 2 | 2 | 0 | 0 | 0 | 0 | 0 | 1 | 2 | 1 | 0 | 1 |
| 107 | 2 | 1 | 2 | 1 | 2 | 6 | 2 | 3 | 0 | 0 | 1 | 1 | 2 | 8 | 4 | 1 | 1 |
| 108 | 1 | 1 | 0 | 1 | 1 | 3 | 0 | 1 | 0 | 0 | 0 | 1 | 1 | 3 | 1 | 2 | 2 |
| 109 | 2 | 2 | 1 | 3 | 3 | 4 | 1 | 5 | 0 | 0 | 1 | 4 | 3 | 5 | 2 | 1 | 3 |
| 110 | 1 | 0 | 0 | 1 | 1 | 3 | 0 | 1 | 0 | 0 | 0 | 1 | 1 | 3 | 1 | 2 | 1 |
| 111 | 2 | 0 | 1 | 4 | 3 | 5 | 1 | 5 | 0 | 2 | 1 | 5 | 2 | 11 | 6 | 3 | 3 |
| 112 | 2 | 1 | 1 | 3 | 1 | 4 | 1 | 2 | 0 | 0 | 1 | 3 | 1 | 2 | 2 | 2 | 1 |
| 113 | 0 | 0 | 1 | 0 | 2 | 4 | 0 | 2 | 1 | 0 | 1 | 0 | 1 | 2 | 0 | 1 | 1 |
| 114 | 0 | 1 | 0 | 0 | 1 | 3 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 3 | 2 | 1 | 0 |
| 115 | 0 | 0 | 0 | 1 | 1 | 2 | 0 | 2 | 0 | 0 | 1 | 0 | 2 | 3 | 1 | 2 | 0 |
| 116 | 1 | 0 | 1 | 2 | 1 | 3 | 1 | 3 | 1 | 0 | 1 | 1 | 3 | 7 | 1 | 2 | 4 |
| 117 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 2 | 1 | 0 | 1 |
| 118 | 4 | 9 | 2 | 5 | 6 | 8 | 2 | 5 | 2 | 2 | 4 | 4 | 6 | 14 | 5 | 3 | 5 |
| 119 | 0 | 1 | 3 | 1 | 1 | 3 | 0 | 2 | 0 | 0 | 0 | 0 | 1 | 2 | 2 | 0 | 1 |
| 120 | 1 | 0 | 1 | 1 | 1 | 4 | 1 | 2 | 1 | 0 | 0 | 0 | 2 | 4 | 2 | 1 | 1 |
| 121 | 0 | 0 | 1 | 0 | 1 | 5 | 0 | 2 | 0 | 1 | 0 | 1 | 1 | 3 | 1 | 0 | 0 |
| 122 | 0 | 1 | 2 | 0 | 2 | 5 | 0 | 3 | 0 | 1 | 0 | 0 | 0 | 5 | 2 | 2 | 1 |

Appendix 4. — Continuation.

| Island no. | Anomodontaceae (6) | Brachytheciaceae (23) | Bryaceae (14) | Entodontaceae (10) | Fissidentaceae (9) | Hypnaceae (13) | Lejeuneaceae (4) | Leucobryaceae (7) | Lophocoleaceae (5) | Polytrichaceae (7) | Mniaceae (7) | Orthotrichaceae (5) | Other liverworts (19) | Other mosses (49) | Pottiaceae (19) | Pylaisiadelphaceae (4) | Thuidiaceae (7) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 123 | 1 | 1 | 0 | 2 | 2 | 4 | 1 | 1 | 0 | 0 | 1 | 2 | 2 | 4 | 1 | 0 | 1 |
| 124 | 1 | 0 | 0 | 1 | 3 | 6 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 3 | 3 | 2 | 0 |
| 125 | 0 | 0 | 0 | 0 | 2 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 2 | 0 | 1 | 0 |
| 126 | 1 | 0 | 1 | 1 | 0 | 2 | 0 | 2 | 0 | 0 | 0 | 0 | 1 | 5 | 0 | 0 | 1 |
| 127 | 1 | 3 | 5 | 7 | 1 | 8 | 1 | 5 | 0 | 0 | 1 | 4 | 3 | 6 | 6 | 3 | 3 |
| 128 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 |
| 129 | 0 | 4 | 5 | 2 | 4 | 6 | 0 | 1 | 2 | 2 | 2 | 0 | 2 | 12 | 7 | 0 | 6 |
| 130 | 0 | 0 | 1 | 1 | 2 | 7 | 0 | 3 | 0 | 0 | 0 | 0 | 1 | 4 | 2 | 1 | 2 |
| 131 | 0 | 1 | 2 | 2 | 1 | 2 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 2 | 3 | 0 | 2 |
| 132 | 1 | 1 | 3 | 2 | 2 | 5 | 0 | 4 | 2 | 1 | 3 | 0 | 2 | 5 | 5 | 3 | 4 |
| 133 | 0 | 1 | 0 | 0 | 0 | 2 | 0 | 2 | 0 | 0 | 0 | 0 | 2 | 2 | 0 | 2 | 0 |
| 134 | 2 | 1 | 4 | 2 | 1 | 7 | 1 | 3 | 0 | 1 | 2 | 1 | 2 | 8 | 4 | 2 | 2 |
| 135 | 0 | 0 | 0 | 1 | 1 | 4 | 0 | 2 | 1 | 0 | 1 | 0 | 0 | 3 | 2 | 1 | 2 |
| 136 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 0 |
| 137 | 0 | 0 | 1 | 0 | 2 | 5 | 0 | 2 | 0 | 0 | 1 | 0 | 1 | 3 | 5 | 0 | 0 |
| 138 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 0 |
| 139 | 0 | 1 | 3 | 0 | 3 | 2 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 3 | 2 | 1 | 1 |
| 140 | 1 | 1 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 3 | 2 |
| 141 | 1 | 0 | 0 | 0 | 0 | 3 | 0 | 2 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 2 | 0 |
| 142 | 0 | 1 | 0 | 1 | 0 | 5 | 0 | 1 | 0 | 0 | 0 | 0 | 2 | 2 | 0 | 1 | 1 |
| 143 | 0 | 1 | 5 | 1 | 1 | 7 | 0 | 3 | 2 | 0 | 2 | 0 | 2 | 5 | 6 | 2 | 3 |
| 144 | 3 | 6 | 8 | 5 | 5 | 10 | 1 | 4 | 3 | 2 | 3 | 2 | 6 | 17 | 10 | 3 | 5 |
| 145 | 3 | 6 | 4 | 4 | 6 | 5 | 1 | 1 | 1 | 2 | 4 | 3 | 4 | 11 | 8 | 3 | 5 |
| 146 | 2 | 9 | 7 | 6 | 4 | 9 | 2 | 5 | 1 | 3 | 2 | 2 | 5 | 19 | 8 | 3 | 4 |
| 147 | 1 | 0 | 2 | 0 | 1 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 2 | 1 | 0 |
| 148 | 1 | 0 | 1 | 3 | 0 | 3 | 0 | 1 | 2 | 0 | 1 | 1 | 1 | 4 | 2 | 2 | 2 |
| 149 | 0 | 3 | 2 | 1 | 0 | 2 | 0 | 0 | 1 | 0 | 1 | 0 | 1 | 4 | 1 | 1 | 3 |
| 150 | 1 | 1 | 1 | 2 | 1 | 3 | 0 | 4 | 1 | 1 | 1 | 0 | 3 | 5 | 2 | 2 | 1 |
| 151 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 3 | 3 | 1 | 0 |
| 152 | 0 | 0 | 0 | 0 | 1 | 2 | 0 | 2 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 2 | 0 |
| 153 | 1 | 0 | 0 | 1 | 1 | 3 | 0 | 1 | 0 | 0 | 0 | 1 | 2 | 1 | 1 | 2 | 1 |
| 154 | 5 | 8 | 6 | 5 | 8 | 8 | 2 | 6 | 1 | 4 | 3 | 4 | 9 | 25 | 11 | 3 | 5 |
| 155 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 |
| 156 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 |
| 157 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 |
| 158 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 |
| 159 | 0 | 0 | 1 | 0 | 1 | 2 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 0 |
| 160 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 |
| 161 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 |
| 162 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 |
| 163 | 2 | 0 | 0 | 1 | 2 | 4 | 0 | 3 | 2 | 2 | 1 | 1 | 0 | 6 | 2 | 2 | 1 |
| 164 | 1 | 0 | 0 | 1 | 3 | 7 | 0 | 2 | 1 | 0 | 1 | 0 | 2 | 7 | 3 | 2 | 3 |
| 165 | 0 | 0 | 1 | 0 | 1 | 6 | 0 | 2 | 1 | 2 | 1 | 0 | 3 | 8 | 2 | 1 | 2 |
| 166 | 0 | 0 | 1 | 0 | 0 | 4 | 0 | 2 | 0 | 0 | 0 | 0 | 1 | 3 | 1 | 3 | 0 |
| 167 | 0 | 1 | 2 | 0 | 1 | 5 | 0 | 1 | 0 | 2 | 1 | 0 | 2 | 4 | 2 | 0 | 1 |
| 168 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 0 |

APPENDIX 5. — Occurrence of the 209 bryophyte species on the 168 islands in the Thousand Island Lake, China. https://doi.org/10.5852/cryptogamie-bryolo-gie2023v44a6_s5

APPENDIX 6. — Specimen number of the 209 bryophyte species on the 168 islands in the Thousand Island Lake, China. https://doi.org/10.5852/cryptogamie-bryologie2023v44a6_s6

APPENDIX 7. — Relationships of accumulative species number with accumulative sampling efforts for eight largest islands. Sampling error = (E - O)/E*100%; with **E**, maximum expected total species number; **O**, observed species number.

| Island no. | Area (ha) | Number of observed species/specimen number | Asymptotic models | Expected species number | Error (%) |
|---|---|---|---|---|---|
| 1 | 76.20 | 48/95 | Y = 52.68 - 51*exp(-exp(-3.74)*x) | 52.68 | 8.88 |
| 8 | 137.95 | 58/134 | Y = 63.80 - 60.6*exp(-exp(-3.74)*x) | 63.8 | 9.09 |
| 62 | 1242.39 | 158/1172 | Y = 160.22 - 134.51*exp(-exp(-5.68)*x) | 160.22 | 1.39 |
| 118 | 97.54 | 85/191 | Y = 88.12 - 84.22*exp(-exp(-4.2)*x) | 88.12 | 3.54 |
| 129 | 51.11 | 53/86 | Y = 59.33 - 58.09*exp(-exp(-3.7)*x) | 59.33 | 10.66 |
| 144 | 65.26 | 92/236 | Y = 96.50 - 93.23*exp(-exp(-4.47)*x) | 96.5 | 4.66 |
| 146 | 37.23 | 93/156 | Y = 104.10 - 99.27*exp(-exp(-4.34)*x) | 104.1 | 10.66 |
| 154 | 869.03 | 109/356 | Y = 112.72 - 106.1*exp(-exp(-4.83)*x) | 112.72 | 3.3 |

APPENDIX 8. — Results of Redundancy Analysis on relationships of SR of 17 with environmental variables in the TIL, summarizing eigenvalues, explained variation and additional statistics for each of the four ordination axes. Total variation is 8788.893, explanatory variables account for 68.1% (adjusted explained variation is 66.3%). Test of significance of first canonical axis: pseudo-F = 265, P = 0.002. Test of significance of all canonical axes: pseudo-F = 37.5, P = 0.002.

| | Axes | | | |
|---|---|---|---|---|
| Statistic parameters | 1 | 2 | 3 | 4 |
| Eigenvalues | 0.627 | 0.027 | 0.019 | 0.004 |
| Explained variation (cumulative) | 62.68 | 65.35 | 67.28 | 67.64 |
| Pseudo-canonical correlation | 0.926 | 0.658 | 0.651 | 0.465 |
| Explained fitted variation (cumulative) | 92.03 | 95.95 | 98.78 | 99.31 |

APPENDIX 9. — Results of CCA on relationships between bryophyte SC and environmental variables in the TIL summarizing eigenvalues, explained variation and additional statistics for each of the four ordination axes. Total variation is 5.7249, explanatory variables account for 13.3% (adjusted explained variation is 8.3%). Test of significance of first canonical axis: pseudo-F = 6.4, P = 0.002. Test of significance of all canonical axes: pseudo-F = 2.7, P = 0.002.

| | Axes | | | |
|---|---|---|---|---|
| Statistic parameters | 1 | 2 | 3 | 4 |
| Eigenvalues | 0.224 | 0.125 | 0.110 | 0.074 |
| Explained variation (cumulative) | 3.92 | 6.11 | 8.03 | 9.33 |
| Pseudo-canonical correlation | 0.955 | 0.820 | 0.936 | 0.829 |
| Explained fitted variation (cumulative) | 29.53 | 46.05 | 60.54 | 70.33 |

APPENDIX 10. — Parameters for SARs of different bryophyte categories. SAR: ln (species number + 1) = C + z × ln (area, m²); all SARs are significant at P < 0.001; the SARs were produced by area as the only constraining variable. Note: **C**, **z**, **r** are intercept, slope, and correltion coefficient of SAR equation, respectively.

| Categories | Parameters | | | Categories | Parameters | | |
|---|---|---|---|---|---|---|---|
| | C | z | r | | C | z | r |
| Bryophytes | 2.786 | 0.357 | 0.734 | Fissidentaceae | 0.606 | 0.214 | 0.668 |
| Liverworts | 0.802 | 0.257 | 0.685 | Hypnaceae | 1.242 | 0.220 | 0.653 |
| Mosses | 2.720 | 0.345 | 0.734 | Leucobryaceae | 0.728 | 0.171 | 0.555 |
| Acrocarpous mosses | 1.999 | 0.296 | 0.688 | Meteriaceae | 0.218 | 0.126 | 0.584 |
| Pleurocarpous mosses | 2.145 | 0.349 | 0.7 | Mniaceae | 0.404 | 0.141 | 0.566 |
| Anomodontaceae | 0.433 | 0.136 | 0.516 | Orthotrichaceae | 0.26 | 0.125 | 0.514 |
| Brachytheciaceae | 0.343 | 0.204 | 0.661 | Pottiaceae | 1.023 | 0.148 | 0.432 |
| Bryaceae | 0.646 | 0.170 | 0.519 | Pylaisiadelphaceae | 0.563 | 0.138 | 0.504 |
| Entodontaceae | 0.571 | 0.179 | 0.55 | Thuidiaceae | 0.789 | 0.166 | 0.515 |

APPENDIX 11. — Parameters for SARs fitted by using the ordinary least square for different biotas. SAR: ln (species number + 1) = C + z × ln (area, m²); the SARs were produced by area as the only constraining variable. Note: **C**, **z**, **r** are intercept, slope, and correltion coefficient of SAR equation, respectively.

| Biotas | C | z | r | Reference |
|---|---|---|---|---|
| Bryophytes | 2.786 | 0.357 | 0.734 | – |
| Liverworts | 0.802 | 0.257 | 0.685 | – |
| Mosses | 2.720 | 0.345 | 0.734 | – |
| Acrocarpous mosses | 1.999 | 0.296 | 0.688 | – |
| Pleurocarpous mosses | 2.145 | 0.349 | 0.7 | – |
| Ants | 3.197 | 0.179 | 0.892 | Zhou *et al.* 2019 |
| Birds | 3.171 | 0.138 | 0.819 | Ding *et al.* 2013 |
| Large ground-dwelling mammals | 0.781 | 0.208 | 0.677 | Xu *et al.* 2014 |
| Lizards | 4.041 | 0.106 | 0.55 | Hu *et al.* 2012 |
| Mammals | 0.851 | 0.217 | 0.73 | Xu *et al.* 2014 |
| Small mammals | 1.103 | 0.110 | 0.492 | Zhao *et al.* 2009; Wang *et al.* 2010 |
| Spiders | 2.224 | 0.215 | 0.678 | Ge 2015 |
| Vascular plants | 3.973 | 0.134 | 0.58 | Hu *et al.* 2011 |

APPENDIX 12. — Relationships of accumulative species number with accumulative sampling efforts for eight largest islands.
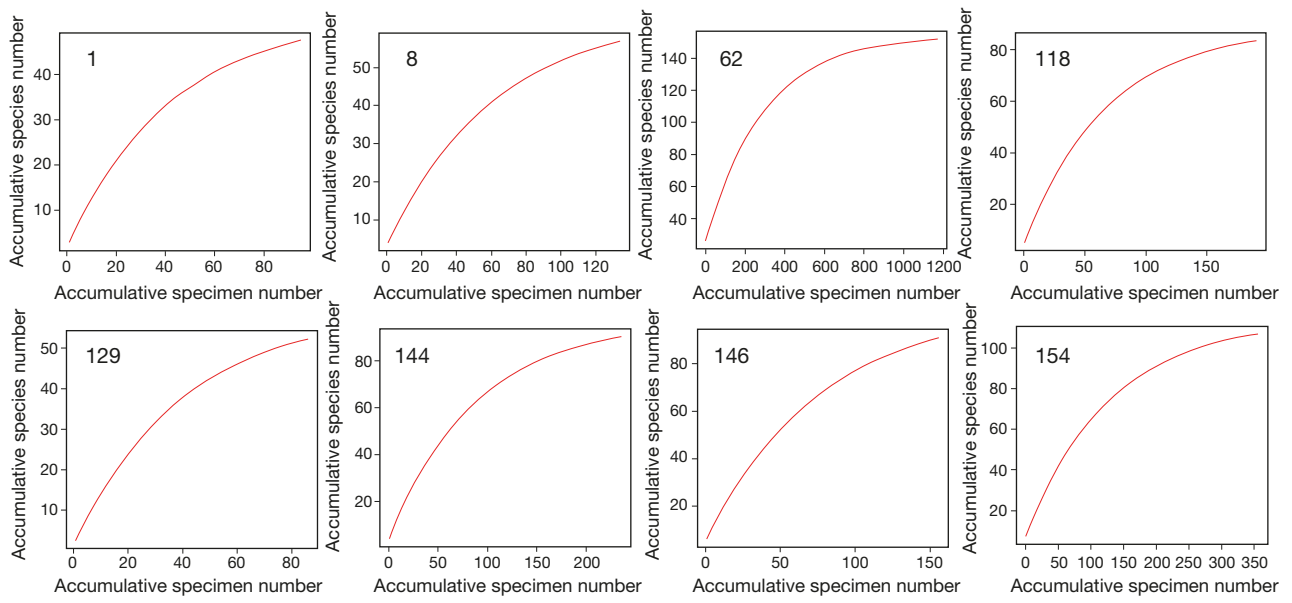


APPENDIX 13. — Islands with multi-long branched appearance in the Thousand Island Lake, China.