Aquatic Ecology - Species Diversity

Name:_____ Date:_____ Group #:____

Location A: _____

1. Abiotic:

Water Temperature	C	Dissolved Carbon Dioxide	ppm
Dissolved Oxygen	ppm	pH	

Description: _____

_____

2. Biotic:

See reverse for an explanation and example of how to calculate Shannon-Wiener (H)

Name	Abundance	P_i	$(P_i)(\log_2 P_i)a$
Total / H		1.000	

3. Calculations:

a. Shannon-Wiener

$$H = -\sum_{i=1}^{s}(P_i)(\log_2 P_i)$$

H = Index of Species Diversity
S = number of species
Pi = proportion of total sample belonging to *i*th species

Example:

A pond with 2 species
(Species 1 = 99, Species 2 = 1)

$H = -[(P_1)(\log_2 P_1) + (P_2)(\log_2 P_2)$
$= -[(0.99)(\log_2 0.99) + (0.01)(\log_2 0.01)$
= 0.81 individuals

*The pond with the largest H has greater diversity and or equitable distribution.

b. Simpson's

$$D = 1 - \sum_{i=1}^{s}(P_i)^2$$

D = Simpson's index of Diversity
P_i = proportion of individuals of species I in the community

Example:

A pond with 2 species
(Species 1 = 99, Species 2 = 1)

$D = 1-[(0.99)^2 + (0.01)^2$
= 0.02

*The larger D is the greater the diversity.

Information-theoretic Approach

How difficult would it be to correctly predict the species of the next individual collected?

Used by communication engineers to 'crack' codes and predict the next letter in a message.

Actually a measure of uncertainty.

What would be the species diversity of this sample if all species were equal in abundance?

Probability Approach

What is the probability that two specimens picked at random in a community of infinite size will be the same species?

In the boreal forest, the probability of pick two trees of the same species randomly would be high.

In the tropical rainforests the probability of picking two trees of the same species randomly would be low.

Gives greater weight to common species than rare.