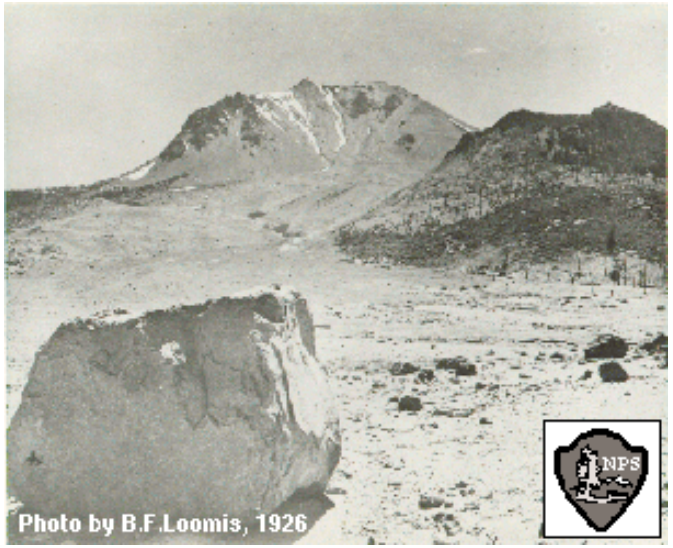
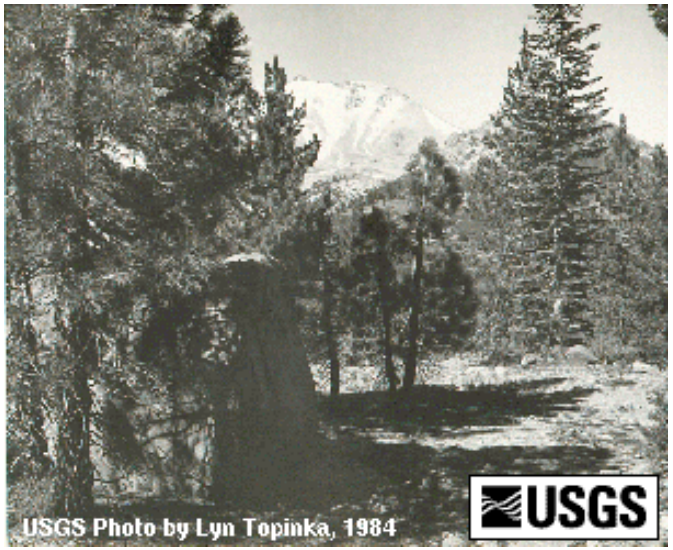


Lassen Peak after the May 22, 1915 blast. B.F. Loomis photograph, courtesy of the Loomis Museum Association, Mineral, California. Photo by B.F. Loomis, 1926.



Lassen Peak as viewed from the same location as A, 69 years after the blast. USGS Photo by Lyn Topinka, 1984.

http://vulcan.wr.usgs.gov/Monitoring/Bulletin1966/Chapter20/basic_volcano_photography.html

USDA Forest Service

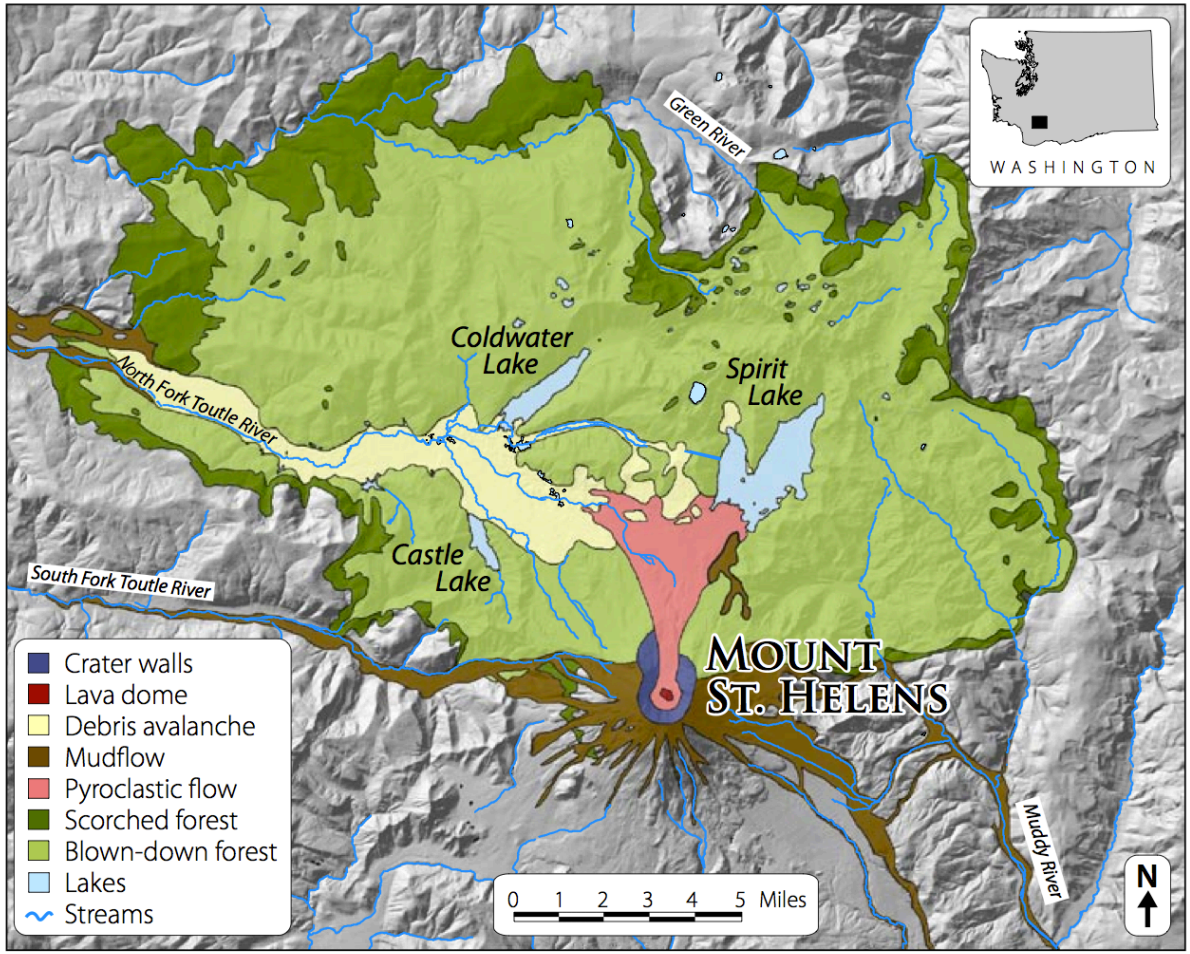
Tree-removal zone *during the first summer after the May 18, 1980, eruption.*

Joseph Means

Blowdown zone. *The lateral blast on May 18, 1980, toppled trees on thousands of acres in just a few minutes.*

© Charlie Crisafulli

Scorch zone. *Hot gases killed trees but most dead trees remained standing.*



Map by Theresa Valentine

Map shows the disturbance zones created by the May 18, 1980, eruption of Mount St. Helens.

Scientists expected that in certain areas, no organisms would have survived, and the establishment of new life would be slow and

of permanent ecological study plots and began studies of short- and long-term ecological changes. The research program has yielded major findings.

Legacies. Living and dead organisms, termed "legacies," were present throughout much of the disturbed

Pearly everlasting
Anaphalis margaritacea

Pussypaws
Cistanthe umbellata

Penstemon
Penstemon sp.

Fireweed
Chamerion angustifolium

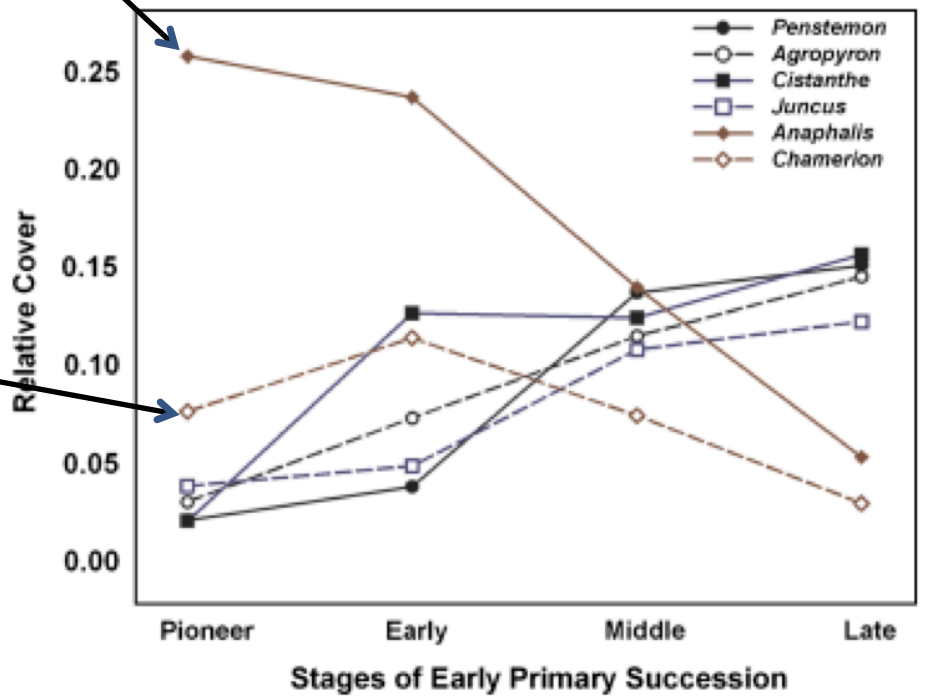


Fig. 3. Changes in relative cover (proportion of total cover in the sample) of common species in the four stages of early primary succession. The first four species are persistent; the last two are pioneer species (defined in Appendix S1).

PHYSIOLOGICAL AND LIFE HISTORY CHARACTERISTICS OF EARLY- AND LATE-SUCCESSIONAL PLANTS

Characteristic	Early Succession	Late Succession
Photosynthesis		
Light-saturation intensity	high	low
Light-compensation point	high	low
Efficiency at low light	low	high
Photosynthetic rate	high	low
Respiration rate	high	low
Water-use efficiency		
Transpiration rate	high	low
Mesophyll resistance	low	high
Seeds		
Number	many	few
Size	small	large
Dispersal distance	large	small
Dispersal mechanism	wind, birds, bats	gravity, mammals
Viability	long	short
Induced dormancy	common	uncommon?
Resource-acquisition rate	high	low?
Recovery from nutrient stress	fast	slow
Root-to-shoot ratio	low	high
Mature size	small	large
Structural strength	low	high
Growth rate	rapid	slow
Maximum life span	short	long

SOURCES.—Budowski 1965, 1970; Pianka 1970; Ricklefs 1973; Bazzaz 1979.

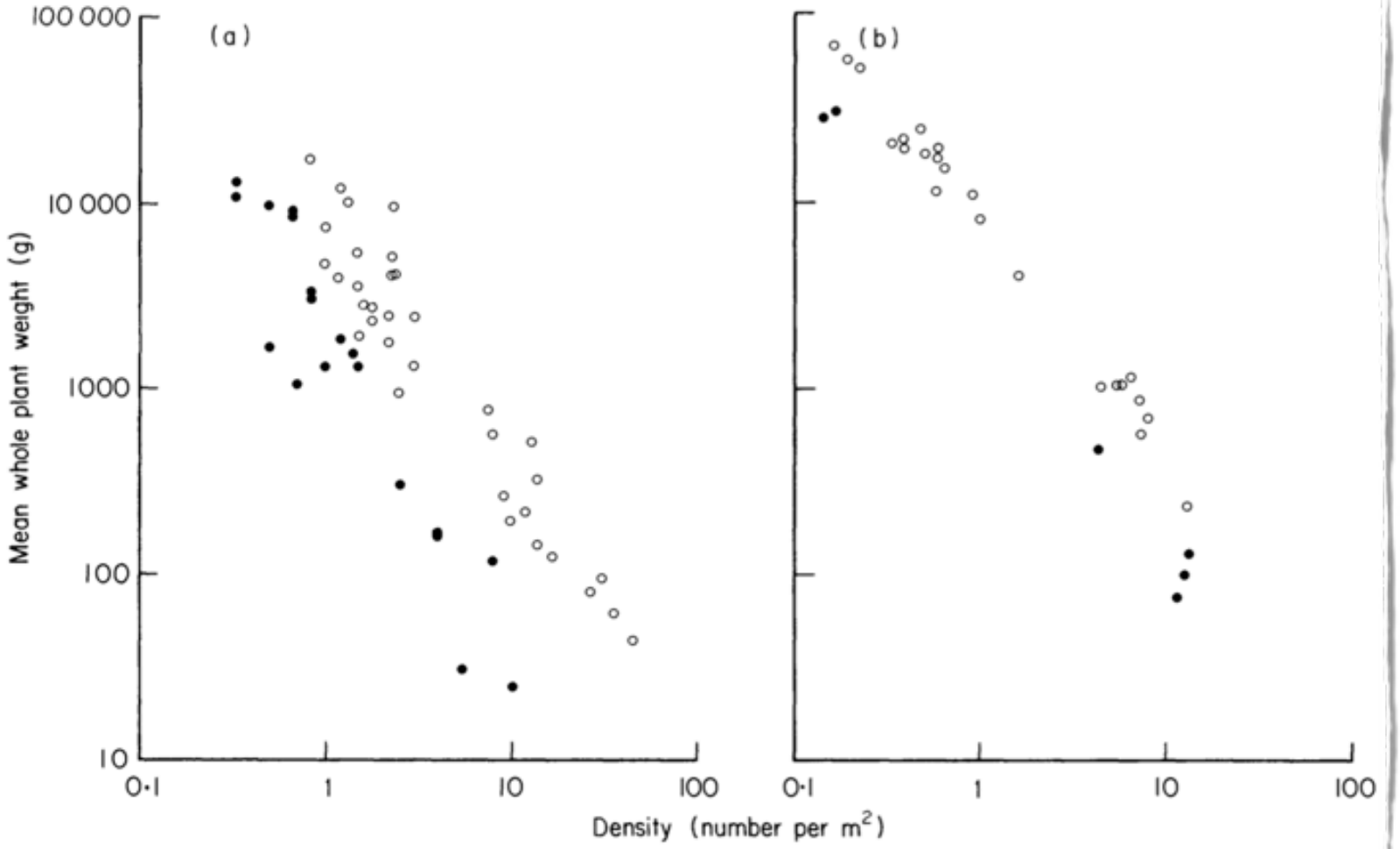


FIG. 1. Scatter diagrams of mean whole plant dry weight versus density for (a) *Prunus pensylvanica* and (b) *Abies balsamea*. Open circles represent plots in which mean plant weight was judged to be mainly a function of density alone; filled circles represent plots not used in the analysis, as explained in the text.

$$ln(\text{weight}) = c + k \times ln(\text{density})$$

Connell, J. H., and R. O. Slatyer. 1977. Mechanisms of Succession in Natural Communities and Their Role in Community Stability and Organization. The American Naturalist 111:1119-1144.

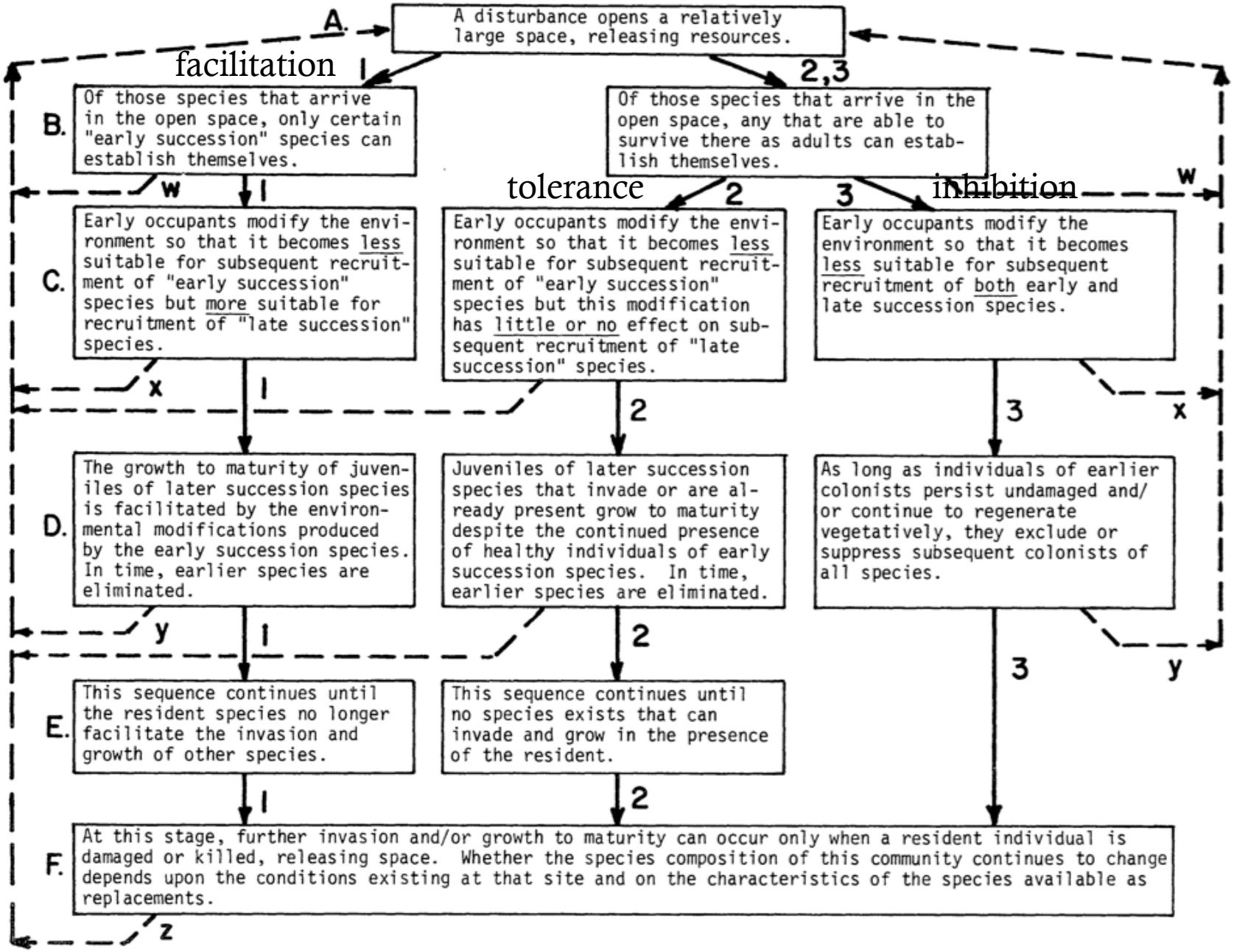


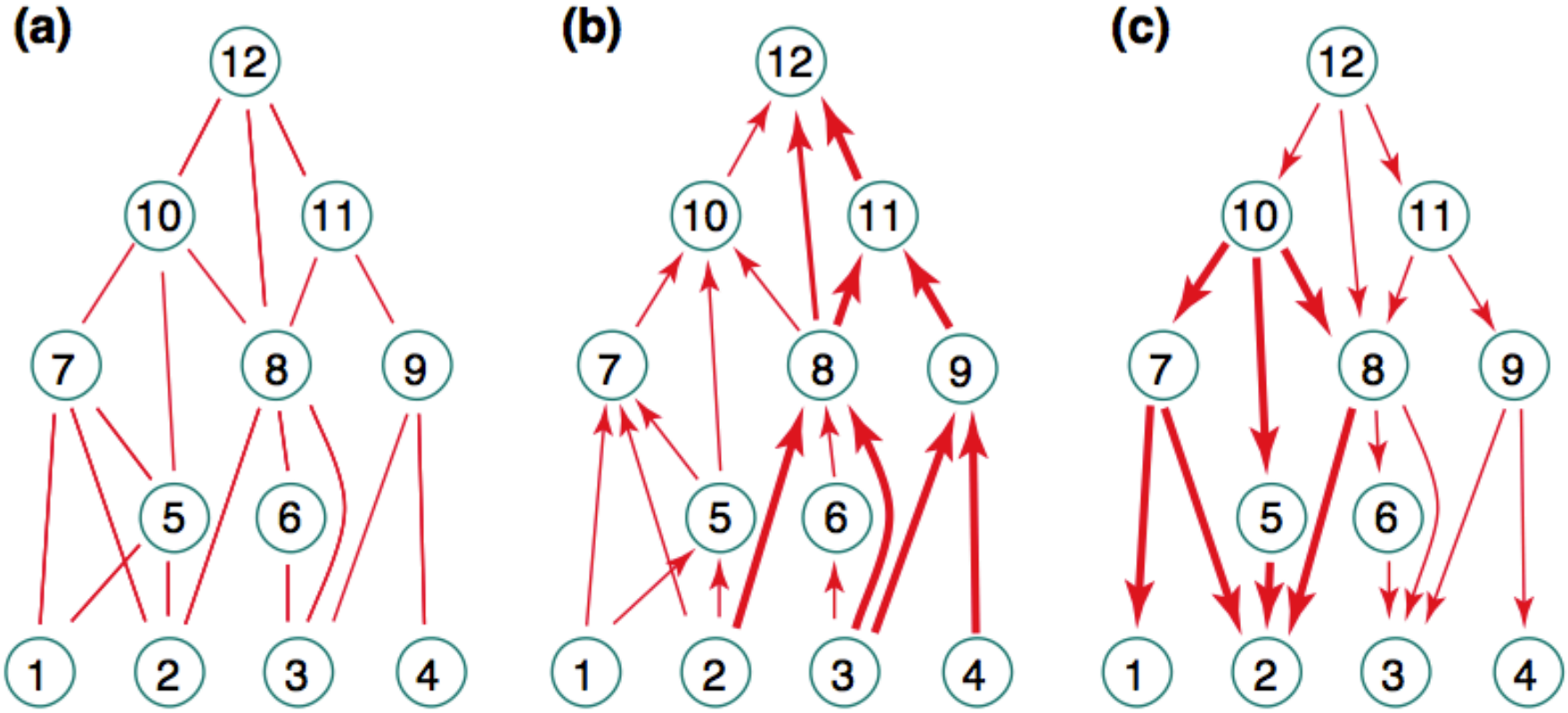
FIG. 1.—Three models of the mechanisms producing the sequence of species in succession. The dashed lines represent interruptions of the process, in decreasing frequency in the order w, x, y, and z.

Three ways of characterizing food webs

connectance

energy

interaction

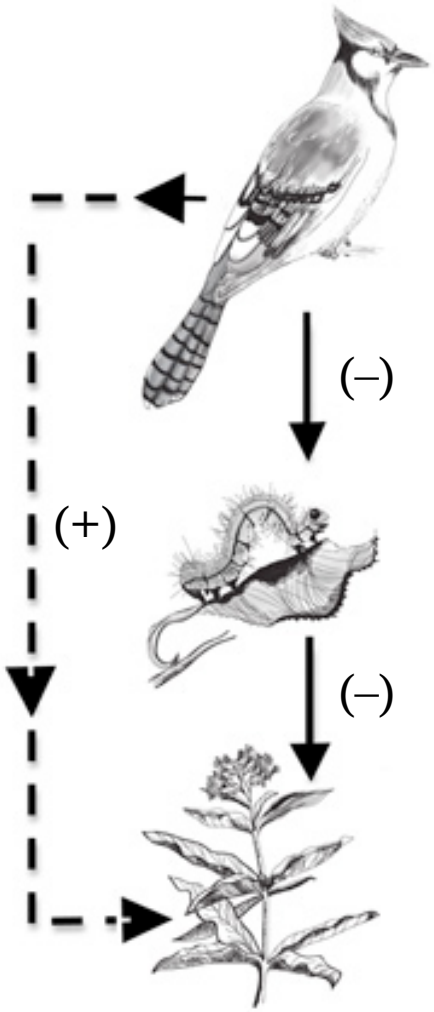


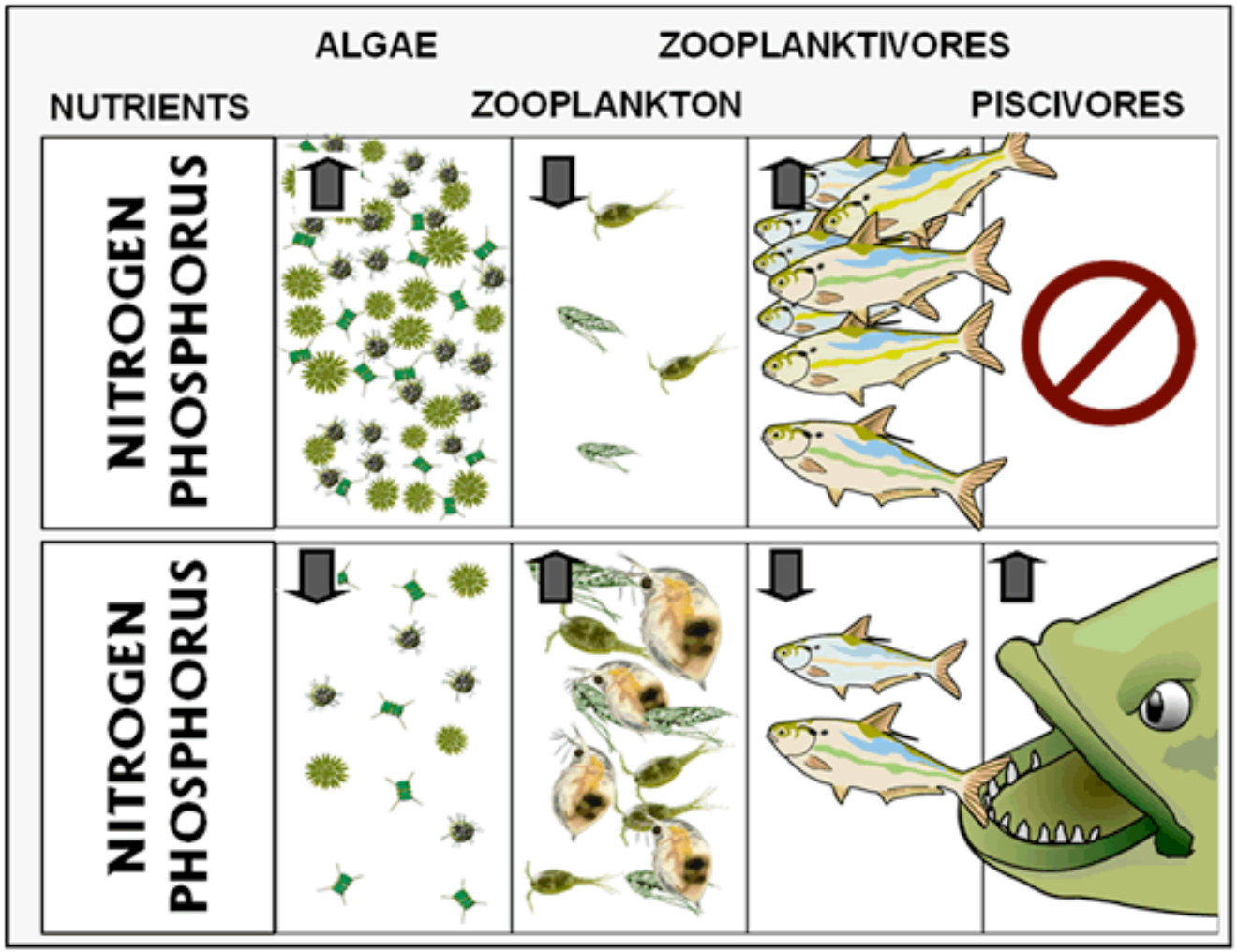
FCL = 4 (max & mean)

FCL ≈ 3 (mean)

Fig. I

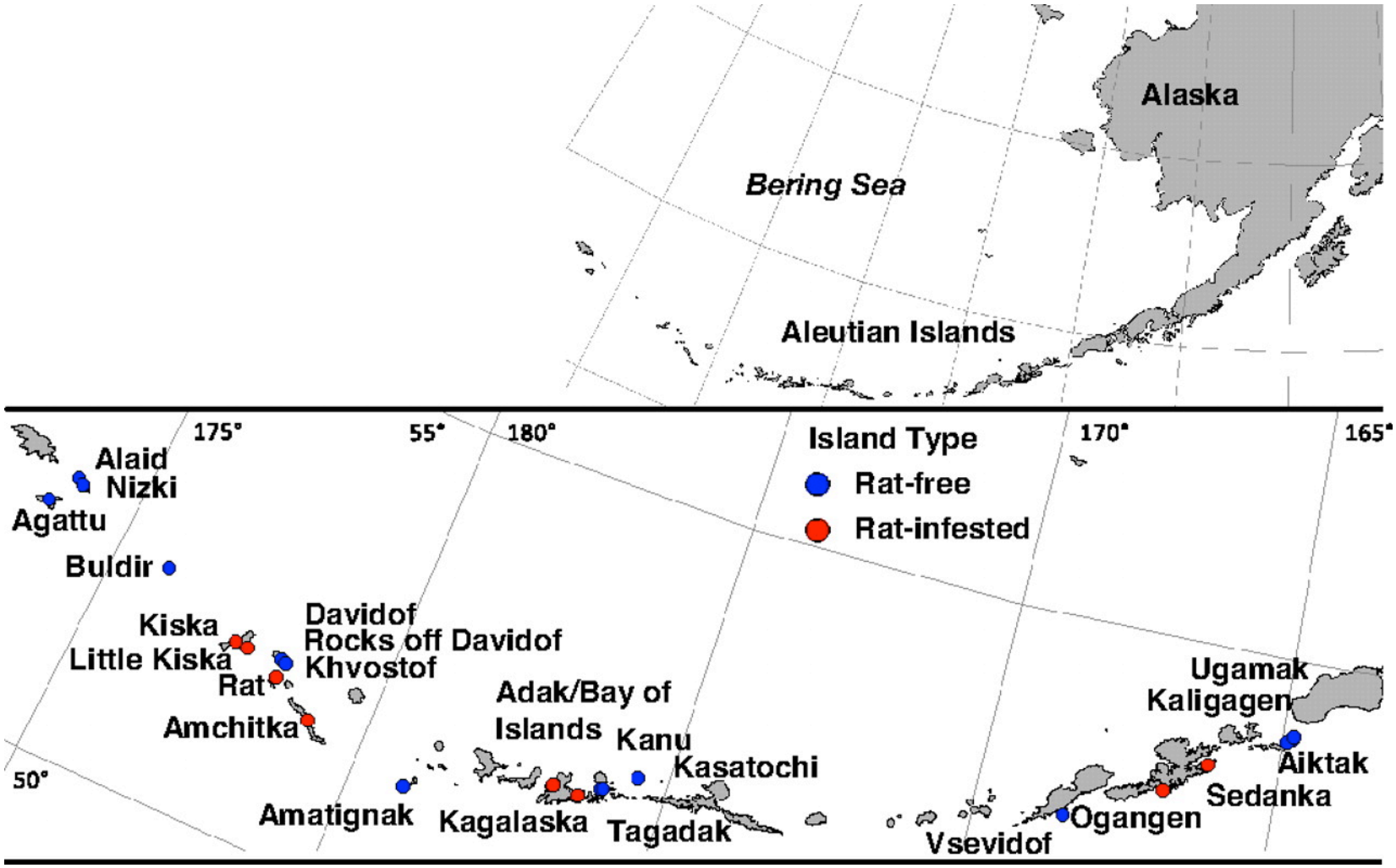
TRENDS in Ecology & Evolution





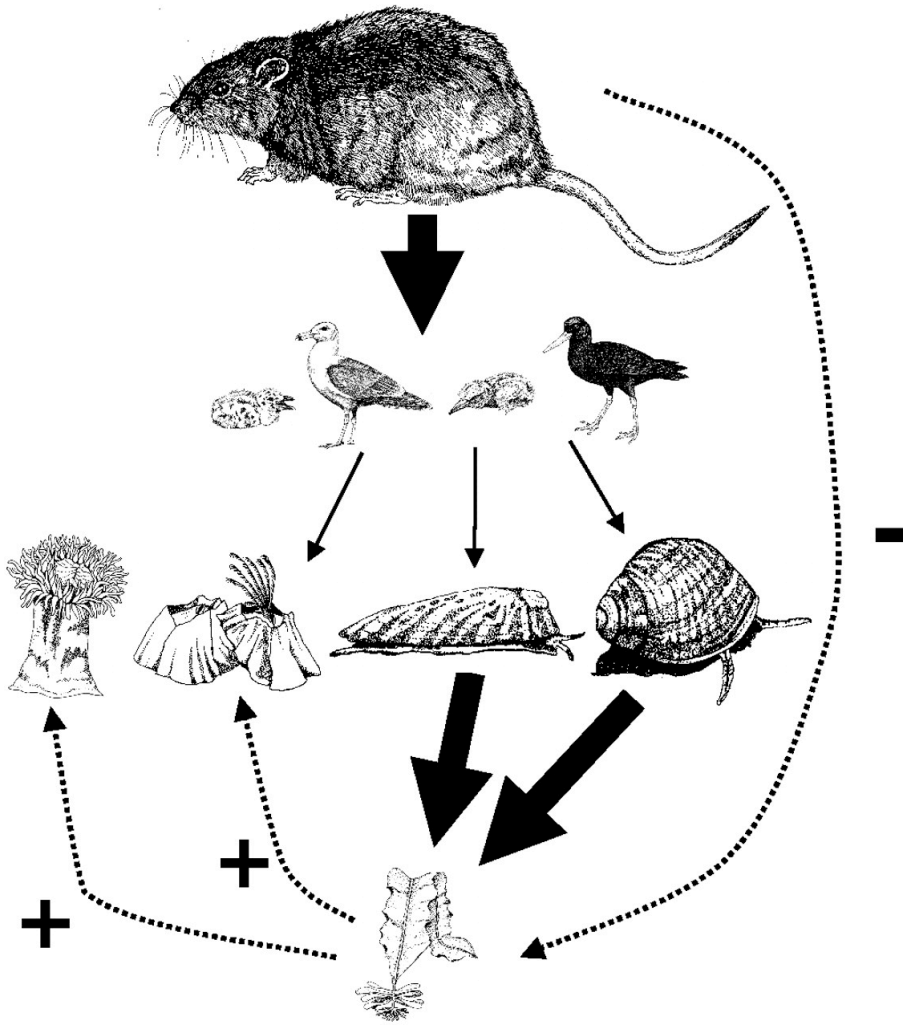
An indirect effect interaction chain, specifically a trophic cascade, in which the predator (bird) has a positive effect on the basal species (plant) via reduction in the abundance of the herbivore (caterpillar).

The Aleutian archipelago with sample islands indicated in red (rat-infested, n = 8) and blue (rat-free, n = 15).

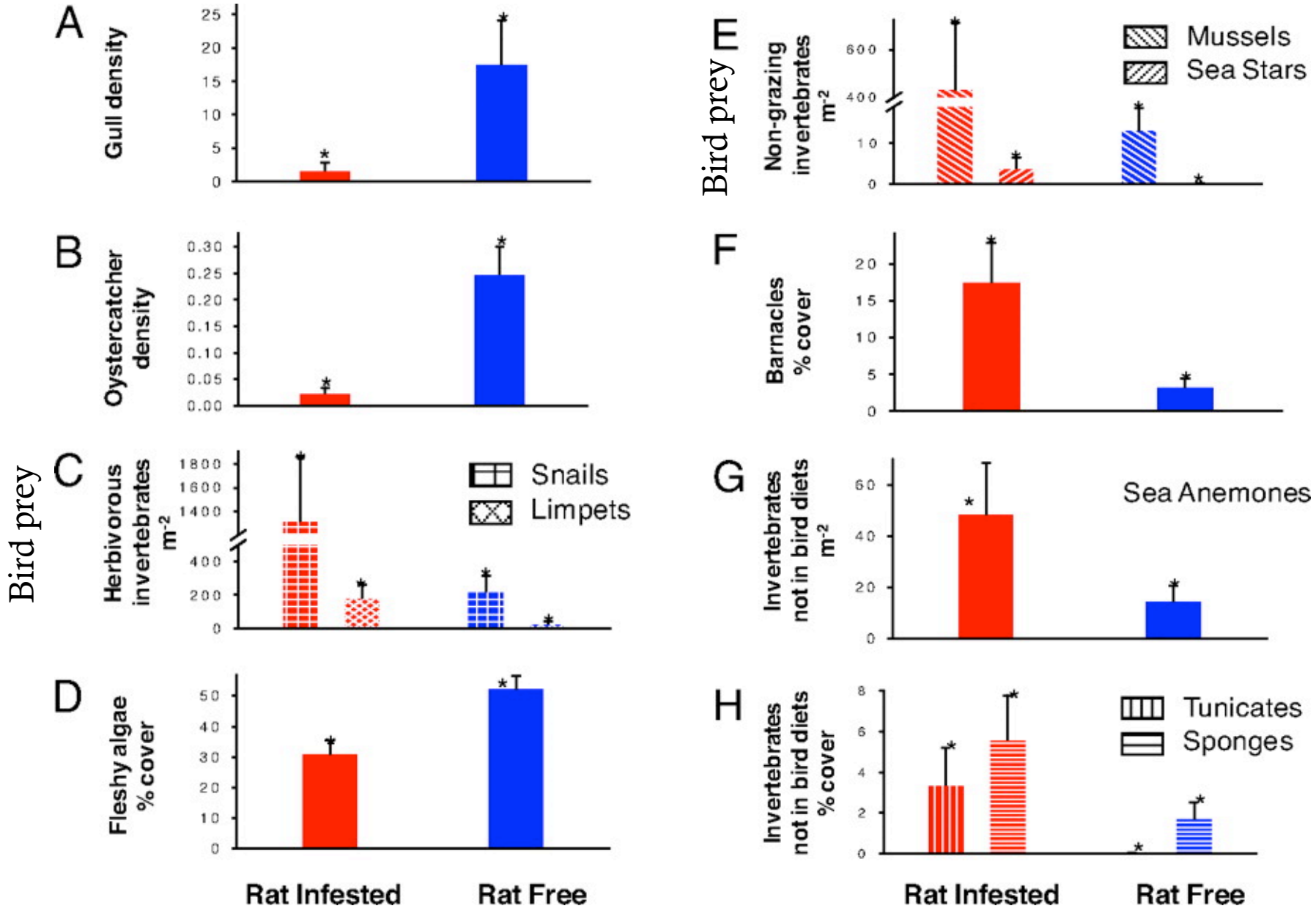


Kurle C M et al. PNAS 2008;105:3800-3804

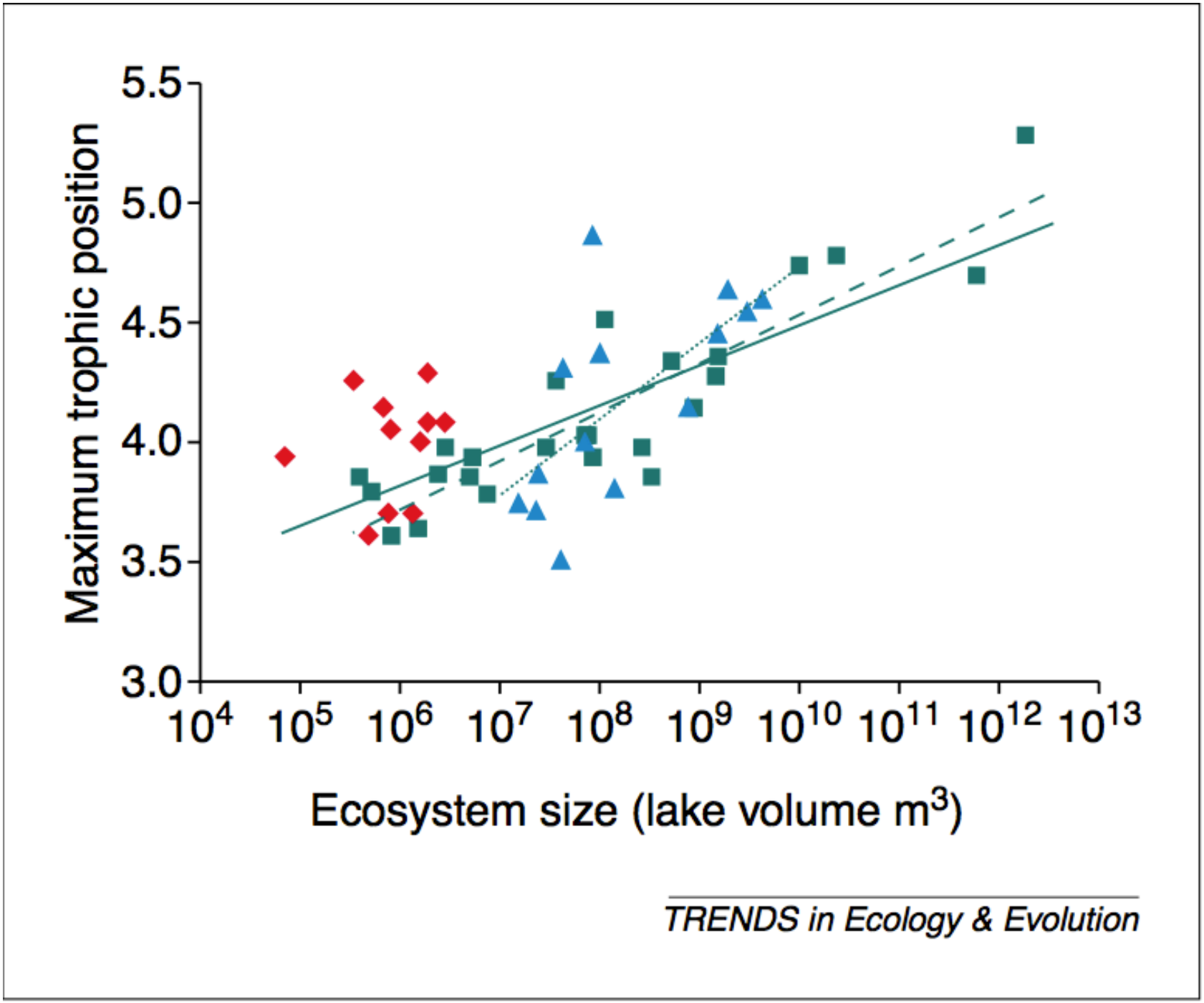
Introduced Norway rats indirectly alter the intertidal community in the Aleutian Islands through direct predation on birds that forage in the intertidal.



Kurle C M et al. PNAS 2008;105:3800-3804



Mean (±SE) values for parameters sampled on (n = 8) rat-infested (red) and (n = 15) rat-free (blue) islands in the Aleutian Islands. * indicates a significant difference at the P ≤ 0.05 level.


Maximum trophic position
5.5
5.0
4.5
4.0
3.5
3.0
10^4 10^5 10^6 10^7 10^8 10^9 10^{10} 10^{11} 10^{12} 10^{13}
Ecosystem size (lake volume m^3)
TRENDS in Ecology & Evolution

The roles of productivity and ecosystem size in determining food chain length in tropical terrestrial ecosystems

Hillary S. Young,[1,2,3,7] Douglas J. McCauley,[4,5] Robert B. Dunbar,[6] Michael S. Hutson,[1] Ana Miller Ter-Kuile,[1] and Rodolfo Dirzo[1]

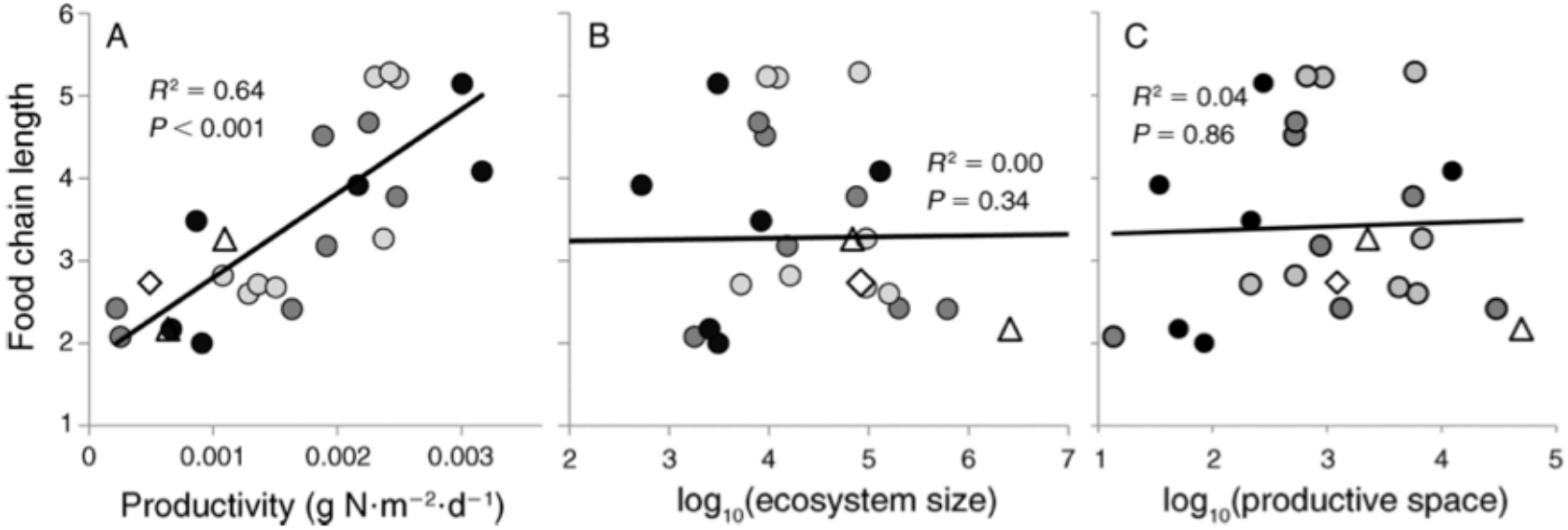


FIG. 1. Maximum trophic position by ecosystem properties. Maximum trophic position (highest mean trophic position of any consumer species) was used to approximate food chain length in our study islets. (A) It had a strong positive relationship with ecosystem productivity as estimated by g N·m^{-2}·d^{-1} but showed no significant relationship with (B) ecosystem size (measured in m^2) or (C) productive space (the product of productivity and ecosystem size). Along the productivity gradient, omnivores (open triangles) and herbivores (open diamonds) were found occupying the maximum trophic position only at low-productivity sites, but there were no other significant overall relationships between the maximum trophic position of the islet and the identity of the predator (*Neoscona theisi*, light-gray circles; *Lepidodactylus* spp., medium-gray circles; and *Heteropoda venatoria*, dark-gray circles).

The roles of productivity and ecosystem size in determining food chain length in tropical terrestrial ecosystems

Hillary S. Young,[1,2,3,7] Douglas J. McCauley,[4,5] Robert B. Dunbar,[6] Michael S. Hutson,[1] Ana Miller Ter-Kuile,[1] and Rodolfo Dirzo[1]

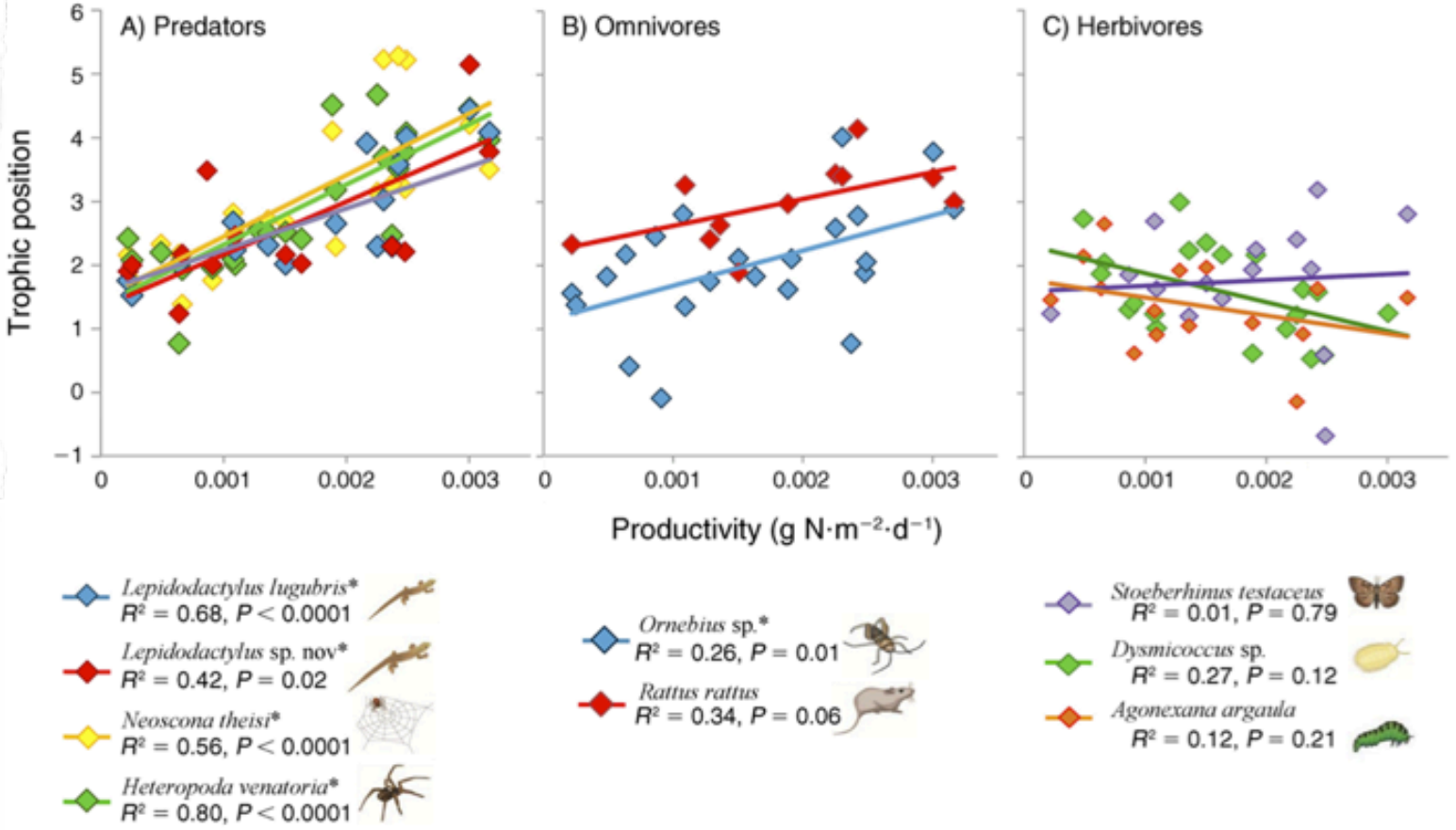
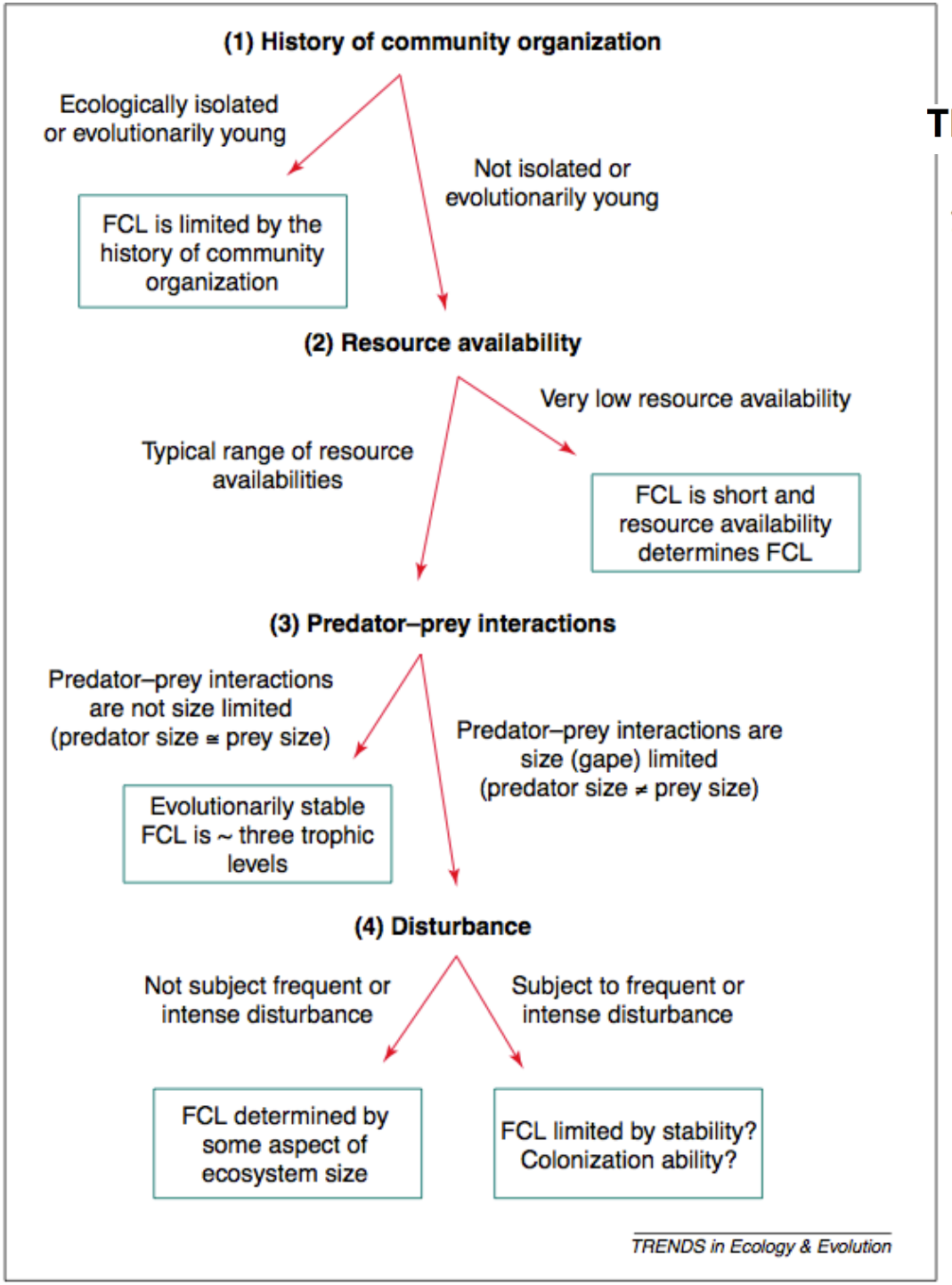


FIG. 2. Average trophic position by consumer taxa and ecosystem properties. Average trophic position of a given consumer on each islet is strongly correlated to productivity (as estimated by g $N \cdot m^{-2} \cdot d^{-1}$) for (A) all four predators and for (B) one of the two omnivores (results are only marginally nonsignificant for *R. rattus*), but (C) not for any of the measured herbivores. Significant relationships are marked with an asterisk.

* $P < 0.05$.



The long and short of food-chain length

David M. Post

TRENDS in Ecology & Evolution Vol.17 No.6 June 2002