

**Figure 8.3**

*Different types of fragmentation processes depicted against a silhouette of the Ocala National Forest. Panel A depicts the regressive form as intense human land use approaches to the western edge. Panel B depicts enveloping fragmentation as the entire tract is surrounded by converted land use. Panel C depicts divisive fragmentation as results from highway develop-*

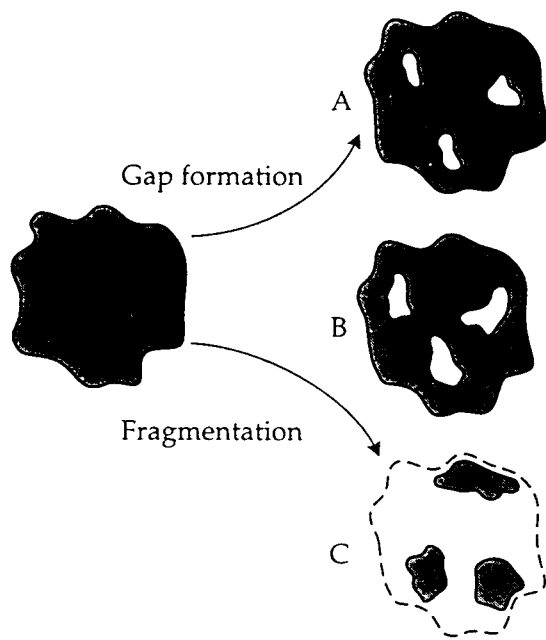
in short, fragmentation creates a landscape where the natural disturbances to which species have adapted over time (Noss and Cooperrider 1994). We will attempt to explain differences in explaining how fragmentation threatens biodiversity. I will admit at the outset that the mechanisms underlying the vulnerability of populations in natural and fragmented landscapes are often inferred, not proven. Fragmentation is not simply a matter of smaller lands. There are many degrees and scales of fragmentation, with unpredictable thresholds, not simply a matter of more, spatial heterogeneity and patchy distributions. Fragmented landscapes lead to complex distributions when they are compared to the often confounding predictions of biotic responses (Forman et al. 1995).

### The Fragmentation Process

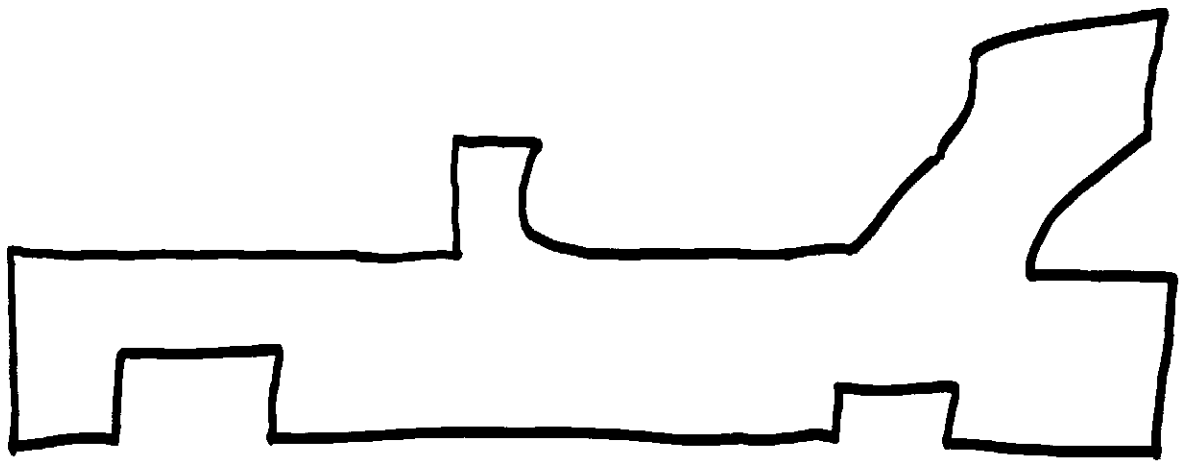
In terrestrial ecosystems, fragmentation typically begins with the perforation of the vegetative matrix as humans begin extracting resources there. For a while, the dominant habitat type (e.g., forest) remains as natural vegetation. As gaps (or abundance patterns) may be little affected (Figure 9.4). As gaps become more numerous, they eventually become larger and the continuity of the original vegetation is broken. By the time the gaps become much bigger than the cheese, the landscape has become fragmented.

Because fragmentation is a complex process, two landscapes are likely to show identical trajectories. Each landscape at any point in time will have its own unique configuration. Landscapes in a given region subjected to the same process of resource exploitation may have very similar patterns. Forman suggested a number of measures of landscape pattern: patch size and shape complexity, positive or negative association between patch types, and isolation (O'Neill et al. 1988; Turner 1989; Mladenoff et al. 1992). The relevance of these statistics to conservation has not been established, time series analysis of change in landscape pattern by various spatial statistics, can be related to changes in biodiversity and other expressions of biodiversity, and provide a useful approach (Noss 1990).

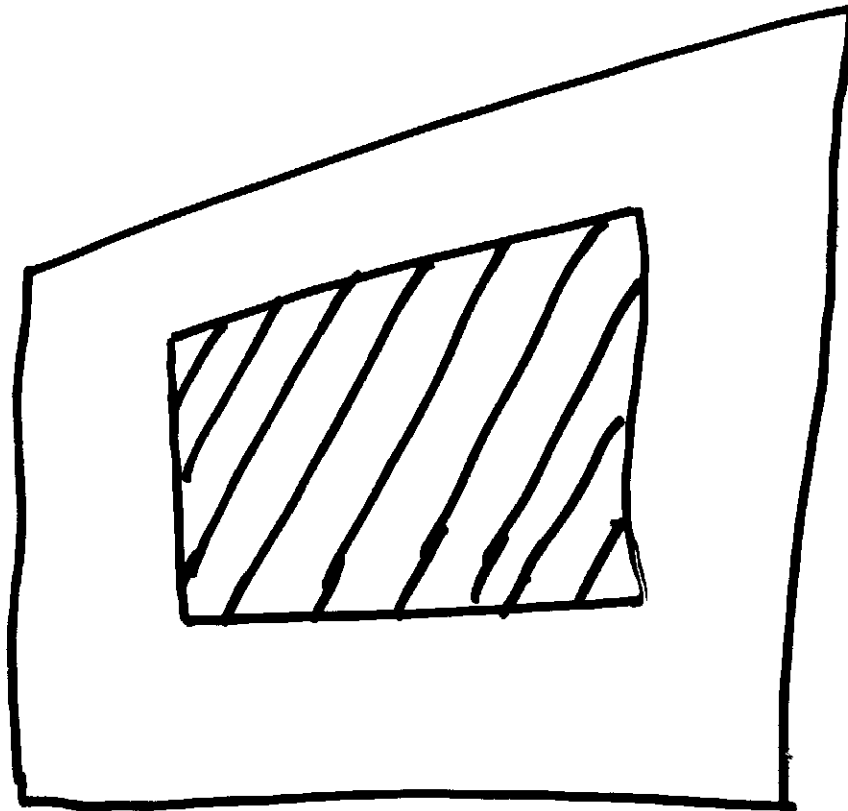
The point in the fragmentation process at which biodiversity declines dramatically usually is not known, as few long-term studies have been conducted over a long enough period. Research on the consequences of fragmentation without observing the process, but not the long-term consequences, is common.



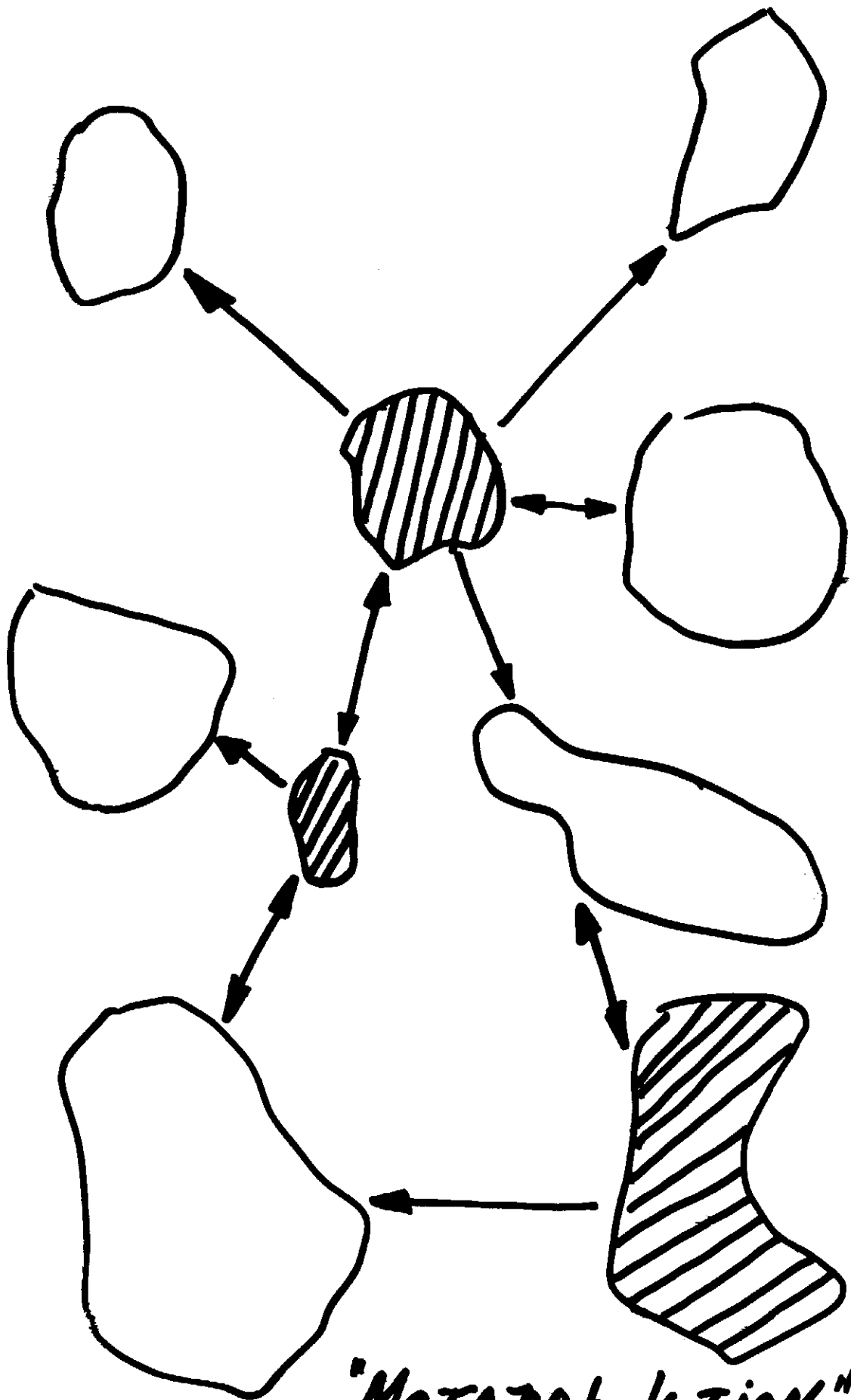
**Figure 9.4** A fragmentation sequence begins with gap formation or perforation of the landscape (A). Gaps become bigger or more numerous (B) until the landscape matrix shifts from forest to anthropogenic habitat (C). (From Wiens 1989.)



Area: 39 hectáreas  
CORE: 0 hectáreas



Area: 47 hectáreas  
CORE: 20 hectáreas



"Metapopulation"  
Concept