

Habitat Fragmentation

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1831 1882
1902 1950

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What is it?

- Habitat fragmentation is the process by which habitat loss results in the division of large, continuous habitats into smaller, more isolated remnants (Fahrig 2003)

1 2 3

time →

Figure 1 The process of habitat fragmentation, where "a large expanse of habitat is transformed into a number of smaller patches of smaller total area, isolated from each other by a matrix of habitats unlike the original" (Wilcove et al. 1986). Black areas represent habitat and white areas represent matrix.

Types of Fragmentation

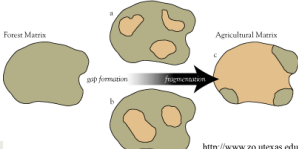
- Natural
 - Water bodies, mountains, deserts, elevation

- Anthropogenic
 - Agriculture, roads, power lines, fences, buildings
 - Species are not evolutionarily adapted to these conditions


<http://prccip.meas.ncsu.edu/pdfs/AppalachianMap.jpg>
 <http://image.slidesharecdn.com/populations-160719102206-rbcpapp0195/populations-36-725.jpg?cb=1272553614>

The Matrix

- Habitat fragmentation describes habitat loss resulting in the division of large, continuous habitats into a greater number of smaller patches of lower total area, isolated from each other by a matrix of dissimilar habitats (Lion et. al 2014)
- Although edge is good for certain species, particularly generalist or game species, it favors those species over interior species, or species that require specific habitat types



<http://www.zo.utexas.edu/faculty/sjasper/images/55.6.gif>

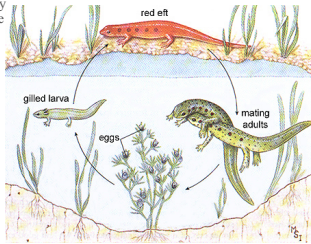


<http://www2.ca.uky.edu/ag/nubs/for/for76/05.gif>

“In pristine, contiguous environments, aquatic habitats of larvae and terrestrial habitats of adults occur side by side, and individuals can cross freely between them. In fragmented landscapes, terrestrial habitats of adults may be isolated from aquatic breeding sites.”
(Lion et. al 2014)

Affects of Fragmentation


- Unable to disperse normally
 - “Breeding sites lacking connectivity to suitable terrestrial habitat may be population sinks due to high mortality of juveniles during emigration.” (Cushman 2006)
 - When they begin to disperse, they are more susceptible to predators and desiccation
- Isolation of small populations can lead to reduced genetic variability
- Local extinctions because species with more complicated lifecycles are not able to complete them, especially if there is no water in the patch



<https://buffonescience9.wikispaces.com/file/view/newlifecycle.jpg/221236180/568x436/newlifecycle.jpg>

Affects of Fragmentation


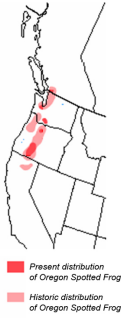
- In the Franche-Comté region of France, tree frog populations have been declining since the 1990s
- Mainly due to the destruction and fragmentation of their habitat.
- Recently, landscape fragmentation has been further intensified by the implementation of a high-speed railway line (Clauzel et. al 2015)
- The direct destruction of breeding ponds and the fragmentation of its habitat are thought to be the main causes of its decline



http://upload.wikimedia.org/wikipedia/commons/1/15/Hyla_ arborea_3-3.JPG

Affects of Fragmentation

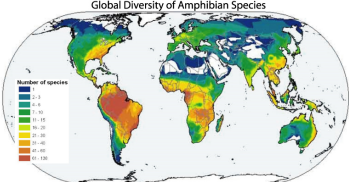
- Oregon Spotted Frogs are an endangered amphibian found only in the Pacific Northwest
- It is estimated that the Oregon Spotted frog is gone from 70-90% of its original territory
- Highly associated with water
- Humans have made several alterations to wetland areas by constructing dams that have completely fragmented existing populations

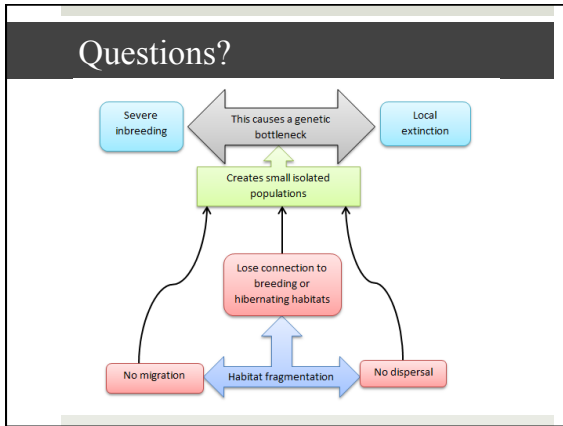
<http://www.sararegistry.gc.ca/default.asp?lang=En&n=E077A28D-1&offbet=1&oc=hide>

Why is this important?

- Habitat loss and fragmentation is the leading cause of amphibian declines
- It causes isolation of populations which causes loss of genetic diversity which affects a populations ability to respond to changes
- It can cause amphibians to not be able to disperse to breeding grounds
- On top of these reasons, it amplifies other topics we've covered such as disease, UV-B radiation, and insecticides



Source: Global Amphibian Assessment



References

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Images:
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