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Landscape ecology in transportation planning

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Abstract

There has been a recent emergence of “road ecology” as a science that looks at the overall impacts of roadway systems on ecological communities in general. The evidence indicates that roadway impacts may extend beyond the operating right of way. To date, few projects have incorporated the idea of landscape ecology in the planning process. The I-90 Snoqualmie Pass East project is breaking new ground in integrating landscape ecology and ecosystem processes into the design of a proposed expansion of the existing highway from four to six lanes for a 15-mile stretch. The project crosses/bisects an area that has been identified as the narrowest band of publicly owned land in the Washington Cascades. To better accommodate the project’s identified ecological connectivity need, the project team has focused on sites called “Connectivity Restoration Areas.” These areas have the highest likelihood of linking aquatic, riparian, and terrestrial habitat of relatively high quality north and south of the highway. Although high-visibility wildlife (such as elk and deer) have been the major focus of most connectivity structures, there is a greater need to restore and enhance ecological processes (such as the regulation of hydrologic flows and soil retention) that often drive the ecosystem in general. This is most evident along the I-90 corridor during periods of snowmelt when water is a dominant feature on the landscape. The I-90 corridor contains numerous high-quality wetlands, some of which have been separated hydrologically by the existing highway. In some cases, the highway has created wetland areas by acting as a dike, interfering with natural-surface and subsurface flow paths. Many stream crossings have constriction points that impact the floodplain connectivity and do not allow for channel meander. Via a collaborative, interdisciplinary process, the Washington State Department of Transportation (WSDOT), South Central Region has developed guidance for recommending a preferred alternative that will integrate the needs of aquatic, riparian, wetland, and terrestrial ecosystems and the needs of the associated organisms into the design of the new highway expansion. This incorporates not only the area adjacent to the highway and within the operating right-of-way, but expands to look at proper functioning of hydrologic processes at a broader scale. WSDOT also incorporated the work of Singleton and Lehmkuhl (2000) that identified areas of animal movement and landscape permeability within the I-90 corridor. The placement of the structures should provide opportunities for movement of organisms between populations and reduce the risks associated with demographic isolation. Increasing the permeability of the highway should also reduce direct mortality of individuals and increase the likelihood of persistence of local and regional populations that may be genetically distinct. The desired, long-term conditions associated with the highway expansion

are a functioning ecosystem with latesuccessional reserve forests, properly functioning streams, and wetlands that provide additional opportunities for species diversity.

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LANDSCAPE ECOLOGY IN TRANSPORTATION PLANNING

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Abstract

There has been a recent emergence of “road ecology” as a science that looks at the overall impacts of roadway systems on ecological communities in general. The evidence indicates that roadway impacts may extend beyond the operating right of way. To date, few projects have incorporated the idea of landscape ecology in the planning process.

The I-90 Snoqualmie Pass East project is breaking new ground in integrating landscape ecology and ecosystem processes into the design of a proposed expansion of the existing highway from four to six lanes for a 15-mile stretch. The project crosses/bisects an area that has been identified as the narrowest band of publicly owned land in the Washington Cascades. To better accommodate the project’s identified ecological connectivity need, the project team has focused on sites called “Connectivity Restoration Areas.” These areas have the highest likelihood of linking aquatic, riparian, and terrestrial habitat of relatively high quality north and south of the highway.

Although high-visibility wildlife (such as elk and deer) have been the major focus of most connectivity structures, there is a greater need to restore and enhance ecological processes (such as the regulation of hydrologic flows and soil retention) that often drive the ecosystem in general. This is most evident along the I-90 corridor during periods of snow-melt when water is a dominant feature on the landscape. The I-90 corridor contains numerous high-quality wetlands, some of which have been separated hydrologically by the existing highway. In some cases, the highway has created wetland areas by acting as a dike, interfering with natural-surface and subsurface flow paths. Many stream crossings have constriction points that impact the floodplain connectivity and do not allow for channel meander.

Via a collaborative, interdisciplinary process, the Washington State Department of Transportation (WSDOT), South Central Region has developed guidance for recommending a preferred alternative that will integrate the needs of aquatic, riparian, wetland, and terrestrial ecosystems and the needs of the associated organisms into the design of the new highway expansion. This incorporates not only the area adjacent to the highway and within the operating right-of-way, but expands to look at proper functioning of hydrologic processes at a broader scale. WSDOT also incorporated the work of Singleton and Lehmkuhl (2000) that identified areas of animal movement and landscape permeability within the I-90 corridor. The placement of the structures should provide opportunities for movement of organisms between populations and reduce the risks associated with demographic isolation. Increasing the permeability of the highway should also reduce direct mortality of individuals and increase the likelihood of persistence of local and regional populations that may be genetically distinct.

The desired, long-term conditions associated with the highway expansion are a functioning ecosystem with late-successional reserve forests, properly functioning streams, and wetlands that provide additional opportunities for species diversity.

Biographical Sketch: For the past seven years, I have worked as the biology program coordinator at the Washington State Department of Transportation, South Central Region. This position is responsible for compliance with the Endangered Species and Clean Water acts and includes the writing of biological assessments, wetland inventories, and wetland mitigation plans. In addition, I have been a core member of the Mitigation Development Team for the I-90 Snoqualmie Pass East Project, which has been developing strategies for wildlife and hydrological connectivity from a landscape perspective.