PhD Dissertation
Department of Environmental Science and Policy
George Mason University

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Defense Date and Time: Monday, July 8th, 10:30 A.M.
Defense Location: ENGR 1605
Title: Conservation of the American Eel (*Anguilla rostrata*): A new framework for analyzing watersheds using ArcGIS

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ABSTRACT

American Eel was once the most numerous fish on the Atlantic Coast but its population has become depleted in recent decades as a result of overfishing, dams, pollution, invasive parasites and other factors. We present a work in four sections to provide a roadmap for restoring this species and its habitats. Chapter One provides the most recent literature review on the species, including an overview of each of the anthropogenic factors affecting the population and potential mitigation measures. Chapter Two is a study of the American Eel fisheries in Maine and South Carolina based on published data and interviews with state agencies, commercial fishers, exporters and tribal fishers. Chapter Three is a compilation of data on American Eel in the Chesapeake Bay and tributaries from 1911 to 2018, with records on nearly four million individual fish, with a discussion on eel demographics over time and space. Chapter Four builds upon the dataset in Chapter Three to create a map of the subwatersheds of the Chesapeake Bay in ArcGIS to study the effects of dams and habitat on eels. Our conclusions are that the American Eel recovery is primarily limited by the many dams and barriers blocking access to habitat, which has reduced the carrying capacity of this species from pristine levels. Our dataset is the largest of its kind, combining several biological and ecological factors and our GIS model presents a novel method for studying watersheds and migratory icthyofauna.