**PROJECT TITLE:** Forecasting changes in aquatic systems and resilience of aquatic populations in the North Atlantic Landscape Conservation Cooperative: Decision-support tools for conservation

## **SCOPE OF WORK:**

Overall, the Service is seeking a set of tools for managers to evaluate how to manage streams for fish in the face of a changing climate. The goal is to develop a user-friendly decision support system (DSS) that will enable managers to make the most informed decisions about conservation actions regarding stream fish. Some products will be tools such as maps of stream fish habitat and models for eastern brook trout that conservation managers will use to evaluate the effects of different management actions on fish in stream networks as small as a 30-feet long and river basins as large as hundreds of miles. These maps and models will identify which conservation actions are going to be the most effective. Managers will be able to use the DSS and associated products to incorporate information from climate change models into existing conservation models to develop comprehensive landscape-scale conservation plans. Table 1 outlines the tasks, time table and estimated costs to accomplish these goals.

The objective of Phase 1, which is being funded via this cooperative agreement, is to develop a webbased decision support system for evaluating effects of alternate management strategies on local population persistence of brook trout under different climate change scenarios. This DSS will include a hierarchical Bayesian model that accounts for multiple scales and sources of uncertainty in climate change predictions; it will include models to predict stream flow and temperature based on air temperature and precipitation; and it will incorporate climate change forecasts into population persistence models. Table 1. Timeline of tasks for Forecasting changes in aquatic systems and resilience of aquatic populations in the North AtlanticLandscape Conservation Cooperative: Decision-support tools for conservation.

Task		Year 1		Year 2		Year 3		Year	Year		Year	
								4	5		6	
1. Hierarchical	1. Determine										1	
model development	statistical model	14	14									
	structure											
	2. Estimate										1	
	statistical model		16	14	14						1	
	parameters											
	3. Develop										1	
	simulation model			14	14	14					1	
	based on #2											
	4. Combine all										1	
	statistical models					1/	14				1	
	into simulation					14	14				1	
	model											
	5. Incorporate										1	
	simulation model					14	14				1	
	into user interface											
2. Air temperature/	1 Deploy paired										1	
stream temperature	temperature	10	8								1	
model	recorders											
	2. Develop										1	
	statistical model for			•	•							
	paired temperature			O	O						1	
	recorder data											
	3. Apply statistical										1	
	model to selected				8	8					1	
	watersheds											
3. Climate change	1. Obtain	10	10									
modeling	downscaled stream										1	

	flow and								
	temperature								
	predictions for the								
	West brook								
	2. Develop model to								
	apply downscaled	10	10	10					
	estimates to	- <b>-</b> O							
	selected watersheds								
4. Decision support	1. Develop web-		22	22	22				
system	based user interface								
	2. Incorporate								
	simulation model			22	22	20			
	into web-based user								
	interface								
5. Model	1. Develop training								
use/application	tools				5	5			
workshops									
	2. Conduct training								
	class at USFWS					9.5			
	Region 5 office								
6. Incorporate	1. Develop models								
habitat quality and	for effects of								
fragmentation into	habitat quality and								
DSS	habitat								
	fragmentation on								
	population								
	persistence								
	2. Incorporate								
	habitat quality and								
	fragmentation into								
	simulation models								
7. Develop	1. Combine existing								
population	data with new data								

persistence models	to develop models					
for other aquatic	for non-salmonid					
species	species					
8. Link terrestrial	1. Link terrestrial					
landchange/landuse	modeling from					
models to aquatic	other LCC projects					
models	to aquatic					
	population					
	persistence models					