Project Proposal

Comparing the anadromous Atlantic salmon in Iceland and UK to research the impacts of temperature on Atlantic salmon

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1 Key words

Bayesian Life-cycle Model; Population Ecology; Salmon; North Atlantic

2 Introduction

Atlantic salmon (*Salmo salar*) are found to have two forms of life cycle in North Atlantic, the non-anadromous form and anadromous form [Verspoor et al., 2007]. The non-anadromous Atlantic salmon spend their entire life in a landlocked location, while the anadromous ones have more complicated life cycle. The anadromous Atlantic salmon are first born as eggs in freshwater, where they spend 2-4 years to slowly grow into smolts [Verspoor et al., 2007]. Then they go into the marine and live most of their time there except spawning. The first time of anadromous Atlantic salmon returning to spawn in rivers can range from 3 to 14 years after entering the sea [Chaput, 2012]. Due to the highly overlapping between the salmon's freshwater habitat and human-activities area plus other complicated historical factors, the production of Atlantic salmon in North Atlantic declined steeply since 1989 and has never recovered, which calls the attention of the society to conserve the species and control fisheries [Parrish et al., 1998]. The global average temperature of marine keeps increasing since 1950, implicating that temperature can be a potential crucial factor that lead to the reduction of Atlantic salmon population [Brohan et al., 2006]. According to previous studies in Prof. Woodward's lab, the Atlantic salmon in Iceland grow in rivers for 3 years and first return to spawn after 7 years in marine, while the ones in UK only grow for 1 year in rivers and first return to spawn after 2 years in marine. Thus, the anadromous Atlantic salmon in Iceland and UK can be excellent examples to represent the cold area and warm area in North Atlantic, which helps study the impacts of temperature on anadromous Atlantic salmon. The population model of salmon in Iceland has already been completed by Prof. Woodward's lab. At the moment, the population model of salmon in UK is required to be constructed to compare with the ones in Iceland.

3 Methods

The project is mainly conducted by computational methods. We intend to use Bayesian life-cycle model to construct the stage-structured population model of anadromous Atlantic salmon in UK. Bayesian life-cycle model is able to link different life stages of salmon and estimate stage-specific population of salmon under the effects of intrinsic and extrinsic factors [Ohlberger et al., 2018].

4 Objectives

The project is expected to construct the stage-structured population model of anadromous Atlantic salmon in UK. This model can improve stock assessment and calculation of conservation limits(CLs) and Quotas(QU), which provides both guidance on the conservation and fisheries. Further more, the project aims at comparing the anadromous Atlantic salmon between Iceland and UK to research the impacts of temperature on anadromous Atlantic salmon.

5 Project feasibility

The project is part of the SAlmonoid MAnagement Round the CHannel(SAMARCH). SAMARCH is a 7.8m five-year project (2017-2022) part funded by the France England Interreg Channel programme. The timeline of tasks is listed Figure.1.

Task		Month								
		1	2	3	4	5	6	7	8	9
1. Data preparation	1.1 Revision of Iceland data	■	■							
	1.2 Preparation of UK data						■	■		
2. Model construction	2.1 Revision of Iceland model			■	■					
	2.2 Construction of UK model							■	■	
3. Analysis	3.1 Analyzing the influence of temperature								■	■
4. Write-up	4.1 Introduction			■	■	■				
	4.2 Methods and results						■	■	■	■
	4.3 Discussion and conclusion							■	■	■
5. Milestone	*5.1 Research plan*	■								
	5.2 Introduction submission						■			
	5.3 Presentation and viva									■
	5.4 Report submission									■

Figure 1: Gantt chart of the project

6 Budget

No budget is required.

References

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I have seen and approved the proposal and the budget.

Signature:

Date: