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Chapter 17

THE ROLE OF GENOMICS IN STUDYING TROUT AND SALMON BIOLOGY

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ABSTRACT

Genomics is a relatively new and complex field that is rooted in the fundamentals of biochemistry and genetics, and is growing exponentially as a result of technological and computational advances. This chapter examines the vast benefits that genomics can bring to the field of fish biology by focusing on salmonids (trout, salmon and charr), for which there is currently no fully sequenced reference genome. Specifically, genomic tools, or suites of genomic tools are described using examples of genomic studies addressing biological questions in areas such as aquaculture, ecology, toxicology and evolution. We also discuss the extensive research opportunities that the whole genome sequences for Atlantic salmon and rainbow trout, both of which are currently underway, will bring to the field of fish genomics and to fish biology in general.

1. INTRODUCTION

1.1. What is Genomics?

The field of genomics applies the techniques used to study genetics and molecular biology to genetic mapping and DNA sequencing of groups of genes or the complete genomes of organisms. Whereas genetics is the study of a single gene or a few genes in isolation, genomics examines all of the genes, as well as the non-coding elements (i.e., regions that do not encode proteins or RNA components of the cell), within the DNA of a

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