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## TEMPORAL TRENDS IN SELECTED ENVIRONMENTAL PARAMETERS MONITORED IN PUGET SOUND

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### **Temporal Trends in Selected Environmental Parameters Monitored in Puget Sound**

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#### EXECUTIVE SUMMARY

This report focuses on the identification of temporal trends in selected measures of the environmental quality of Puget Sound, based upon a review of historical and recent data. Although extensive research and monitoring have been conducted in Puget Sound, particularly in recent years, no synopsis exists of the temporal trends in the environmental conditions of the region. This report represents a first attempt to compile the available data to produce such a synopsis. The report presents a summary of selected information describing conditions related to Puget Sound from the late 1800s to present. Three objectives were addressed: 1) to place recent studies of the present environmental conditions of the Sound into a long-term perspective; 2) to present historical changes in the basic physical characteristics (temperature, precipitation, etc.) of the region; and 3) to make initial comparisons of trends observable in different long-term data sets.

The population of the Puget Sound region has increased rapidly since the first settlements in the mid-1800s. Commercial and industrial development associated with the growth of municipalities led to increasing volumes of human and industrial wastes. By the mid-1900s, there were reports of incidences of gross pollution near pulp mills resulting in fish kills and other problems with resident organisms and pollution of beaches by human wastes near major cities. Such extreme pollution by conventional pollutants (i.e., oxygen demanding materials and nutrients) has been virtually eliminated in recent years through regulation and treatment of conventional waste inputs.

As these obvious forms of pollution have diminished, attention has turned to more subtle problems associated with the discharge of certain chemicals. These chemicals were known to be toxic to marine life in some circumstances. However, certain types of environmental data have not been collected consistently in the past because accurate methods of measurement have been perfected only recently. Therefore, our ability to depict trends is limited to two methods. The first, semi-quantitative descriptions of waste disposal practices and pollution incidences dating from the 1940s and 1950s, indicates that historical levels were probably not lower than at present. The second, limited data from the analyses of sediment cores and animal tissues, indicates that the levels of polynuclear aromatic hydrocarbons (PAHs), polychlorinated biphenyls (PCBs), and some other toxic materials have decreased and are lower, at least in some areas, today than they have been in the past. Concentrations of some substances have been stable; and others (e.g., silver) may be increasing in concentration with time.

The populations of harvested resident organisms in Puget Sound appear to have been affected historically more by economic demand, management decisions, and habitat disturbance, than by water quality problems. The Olympia oyster is one species that appears to be an exception: it has decreased in abundance as a result of pulp mill pollution. A number of species, including all salmon, Great Blue Heron, and harbor seals, have increased in numbers in recent years, although their present populations are probably a small fraction of those that existed before the region was settled.

Overall, most of the trends presented here indicate improvement in the overall biological health of Puget Sound in recent years. There are many gaps in information, however, particularly those regarding the inputs, distributions, and effects of pollutants in the Sound.

The impetus for this report and some of the data discussed here resulted from another report titled "Development of Effective Regional Environmental Monitoring for Puget Sound" (Chapman et al., in press). During preparation of that report, it became apparent that an abundance of information was available in monitoring program records, old agency reports, and other historical information that could be compiled to develop an overview of long-term trends in the Puget Sound ecosystem. This report is the result of that compilation and review.