USGS Data Exploration Unit: Introduction

The Contaminant Exposure and Effects-Terrestrial Vertebrates (CEE-TV) database, summarizes contaminant exposure and effects information for free-ranging amphibians, reptiles, birds, and mammals residing within approximately 30 km of Pacific, Atlantic, and Gulf coasts and estuarine ecosystems including Alaska and Hawaii. The curriculum described below introduces high school students to the database and, more importantly, guides them through the process by which scientists move from raw data to conclusions about the impacts of contaminants on wild animals. The CEE-TV lesson plans will develop problem-solving skills by using an inquiry approach. Each lesson stimulates students to first ask questions, and then to determine how to use data to address those questions. Finally, students are asked to interpret observed trends and to hypothesize about future effects and the need for human intervention.

This unit contains five lessons developed for use in a high school biology class. The first two lessons introduce students to the nature of science, data analysis, the effect of DDE on bald eagles food webs and bioaccumulation. Lessons three and four focus on data collection, organization, and analysis, by having students work with a simplified version of the CEE-TV data for Bald Eagles. All data used in lessons three and four is based both on the CEE-TV Database and the *Biological and Ecotoxicological Characteristics of Terrestrial Vertebrate Species Residing in Estuaries* (Estuarine Top Monitoring Species) web pages (http://www.pwrc.usgs.gov/ceetv/ and http://www.pwrc.nbs.gov/bioeco/ respectively).

Students will use the database provided to develop their science skills and learn about the effects of environmental contaminants on biological resources. Depending on classroom resources, students will prepare web or print presentations of their results to summarize what they have learned. We will invite teachers to submit examples of class work for posting on the CEE-TV Education web page. We would also appreciate feedback from teachers and students after this unit has been used in the classroom. In section VI of this manual evaluation forms have been provided. Information in the evaluations will be used to help improve this unit for future users.

For this unit, each student will need his/her own copy of the student workbooks for each section. The student workbook packet includes worksheets to help students follow each presentation, in-class activity worksheets, and homework assignments. Students will need to have the student workbook packet for each lesson, so it may help to have students turn in the workbooks daily, and only take home the homework section of the packet.

Opening Questions: Each day of the unit begins with warm-up questions that can be used to focus students as they enter the classroom. As students come into the classroom they can immediately sit down and answer the warm-up questions in their student workbook packets.

Power Point Presentations: Each lesson will start with a presentation based on Power Point presentation provided. For Lessons One, Two and Five these presentations will take between 20-25 minutes and for lessons three and four these presentations will require between 15-20 minutes.

Students will be able to follow the main points of each presentation through completing the Presentation Points Worksheets in their student packets. Presentation Points Worksheets consist of fill-in the blank and short-answer questions that encourage students to follow along with the presentation and focus on the points of the presentation that will be most essential for successful completion of the in-class activities, homework activities, and data analysis project.

In-class Activity: Following each presentation, there is an in-class activity. In-class activities can be modified according to the class level and class size. The objective of in-class activities is to reinforce the main points of the presentations and to teach students how to analyze data. The in-class activities require between 25 and 35 minutes.

Homework: Lessons One through Four all have homework activities that review information in the lessons and give background information for the following day's lesson. The homework activity for Lesson One is important in giving students a solid background for all the other lessons in the unit. In Lesson Two, the homework activity is helpful, but optional. For Lessons Three and Four, different kinds of homework options exist depending on the availability of computers.