The Effects of project WILD on Fourth Grade Students in Wisconsin:

Results of a Statewide Study, 1989-90

Technical Bulletin 193
Department of Natural Resources
Madison WI 53707
2002

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ABSTRACT

Project WILD (Wildlife in Learning Design) is a supplementary and interdisciplinary wildlife education program. To determine this program's effectiveness in Wisconsin, the Wisconsin Department of Natural Resources (DNR) conducted a statewide research project during 1989-90 in 24 fourth grade classes. Half of the classes were in rural communities; half in urban communities. Half the participating teachers had attended a Project WILD workshop and used some of the activities. The other half had not been exposed to Project WILD.

Both quantitative and qualitative data were collected. Students and teachers were surveyed in September 1989, at the beginning of the school year, and again in May 1990, at the end. The students' parents were surveyed once. In 16 of the classes, we interviewed students and teachers and conducted classroom observations.

Students exposed to Project WILD knew more about wildlife-related concepts than unexposed students. Since classes with WILD-trained teachers knew more about selected wildlife concepts before exposure to Project WILD activities (in September), factors other than just the activities themselves— perhaps teacher training and interest— may have affected student learning about wildlife and the environment. WILD-trained teachers used an average of seven activities during the year. Teachers reported that more training, classroom materials, and planning time would help them teach more environmental education and use more Project WILD activities.

Both WILD and non-WILD classes experienced some learning about wildlife during the year. Students, teachers, and parents all recognized school activities as an important source of learning about wildlife. There was no significant difference between WILD and non-WILD students in behaviors; action-oriented projects consisted largely of recycling or tree planting. Current events may have influenced what environmental topics teachers covered. High prior knowledge of wildlife concepts indicates that students are appropriate participants in wildlife and environmental education programs before the fourth grade. Project WILD was of greater benefit to urban-dwelling students than non-urban, which suggests that formal environmental education programs should be promoted more in urban areas. Project WILD has been effective in Wisconsin, yet increased emphasis in the areas mentioned could enhance environmental education efforts in the state.

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At the time of the research, there were three curriculum activity guides for Project WILD. Educators received these guides through teacher workshops.

INTRODUCTION

Project Wild Program

Project WILD (Wildlife In Learning Design) is an interdisciplinary and supplementary environmental and conservation education program for educators to use with kindergarten through high school age youth. The program focuses on developing awareness, knowledge, skills, and commitment regarding wildlife and the environment with the goal of promoting responsible behavior and constructive action. Activity guides for elementary and secondary level students form the program's core. Educators receive the activity guides through Project WILD workshop participation. The activities represent a variety of learning styles. Activities are designed to be incorporated or "infused" into all major subjects in the curriculum. Educators select individual activities to supplement a curriculum, rather than incorporating them as a whole package. The activities are used by both formal and non-formal educators (e.g., in nature centers, summer camps, and youth groups), but formal classrooms are the primary target audience.

Project WILD was developed by educators and natural resource experts through the Western Regional Environmental Education Council (WREEC) and the Western Association of Fish and Wildlife Agencies (WAFWA). The program has been adopted for use in all 50 states and five other nations. The Department of Natural Resources (DNR), with the Department of Public Instruction as co-sponsor, adopted the program in Wisconsin in 1985.

In Wisconsin, the state coordinator provides a two-and-a-half day training program for workshop facilitators. The facilitators then conduct six-hour workshops for teachers. As of 1992, approximately 15,000 educators had attended Project WILD workshops in Wisconsin, representing approximately 20% of the state's teachers. The workshops explain the philosophy of the program, introduce the activity guides, provide opportunity to practice some activities, and show how activities can be infused in existing curricula. The teachers, in turn, use the activities in science, social studies, language arts, math, art, music, or physical education classes. The DNR has supported Project WILD in Wisconsin, usually providing workshops and guidebooks free to educators, since 1984. With such an investment, department staff wanted to know what impact the program was having in the state.

Literature Review

From previous studies, we knew that Project WILD activities were being used (Charles 1986; Cantrell 1986, 1987; Smith-Walters 1988; Zosel 1988), though more at the elementary than secondary level (Cantrell 1987, Zosel 1988). Cantrell (1987) found that the people involved in Project WILD were a major factor in the program's success. Teacher background in environmental education and interest in wildlife positively affected use of Project WILD (Fleming 1983, Zosel 1988). Teachers found the workshops valuable and interesting (Fleming 1983, Cantrell 1986, Zosel 1988). Fleming (1983) showed that workshop participation made a difference in teacher attitudes and confidence about Project WILD. Teachers valued the activities and their testimony supported the belief that students enjoyed them (Fleming 1983, Cantrell 1987). But these studies didn't show what effect the workshops or the activities had on the students. Use of a program doesn't always correspond with the intent of the users (Berman and McLaughlin 1975, Romberg and Price 1982) or guarantee that educational goals will be met.

In the initial field test of the Project WILD materials (Fleming 1983), students made significant gains in learning and developed attitudes toward wildlife in keeping with the program's goals. Then, in a Florida study, two schools that implemented Project WILD were found to have made significantly greater gains than the control school (Fleming 1985). Specific activities were identified for each grade level in the Florida study, but the project is not generally implemented in this way. In a national survey, 91% of responding teachers said their students had increased awareness, knowledge, skills, and/or attitudes related to wildlife definition and needs (Charles 1986). Race (1990) found no significant differences in wildlife knowledge or attitudes between Colorado students who had been exposed to Project WILD and those who had not. However, Race relied on a questionnaire administered only once; hence her study does not show changes in knowledge or attitudes over time or through Project WILD exposure. Nor did she control for prior exposure to Project WILD through non-formal or other sources. Tudor (1992) reported that teachers in Washington perceived increases in student actions, however no clear cause-and-effect relationship between Project WILD and student behaviors was established. An evaluation of the effects of the program, as it is actually implemented, was clearly needed.

Urban-rural differences were particularly considered in reviewing relevant research findings. Fleming (1983) found that classes in rural, suburban, and urban surroundings all showed gains, with urban classes achieving greater (though not significantly) gains. An Oklahoma survey found rural, suburban, and urban educators used Project WILD similarly (Smith-Walters 1988). But in Colorado, Race (1990) found that urban students outscored rural students, and urban teachers used more Project WILD activities. Kellert and Westervelt (1983) found significant differences in knowledge and attitudes towards wildlife between urban and rural children in a Connecticut study. In early elementary years, rural children surpassed their non-rural peers in interest and knowledge related to animals. But by high school, the trend had changed to higher knowledge among suburban students.

Recognizing that Project WILD is not the only influence on student learning about wildlife, alternate influences were also reviewed. Research has found that the media, in the form of television and magazines, is very influential in conveying information about wildlife and the natural environment (Eyers 1975; Langenau and Mellon-Coyle 1977; Richmond and Morgan 1977; Pomerantz 1977, 1985; inter alia), although Fortner (1990) reminds us that electronic media and technology cannot replace direct experience. Race (1990) found that some wildlife-related activities significantly coincided with wildlife knowledge and attitudes: reading natural history books, watching nature programs on television, and participating in outdoor recreation activities such as hiking and hunting. The effects of Project WILD cannot be accurately assessed without considering the potential influence of these other factors.

The Focus of this Report

This report focuses on the DNR research study to examine the effects of Project WILD on Wisconsin students. The study was designed to address three key questions:

1. Do students exposed to Project WILD know more about selected wildlife concepts than students who were not exposed to Project WILD?
2. Do students exposed to Project WILD know more about selected wildlife concepts following exposure to Project WILD?
3. In what ways do students learn about wildlife and the environment?

The third question was intended to examine other influences on student learning about wildlife. Only by considering what other factors might have influenced student learning could we hope to determine the effects of one factor, Project WILD.

Information gained from the study was expected to help determine whether the program was meeting the needs of Wisconsin educators and achieving its educational objectives. Study results could lead to improvements to increase program use and effectiveness in developing awareness, knowledge, skills, and commitment concerning wildlife and the environment.

Research Methods

Study Design

Selection of Qualitative and Quantitative Methods

In designing the study, we acknowledged a plethora of potentially confounding factors. We knew it would be difficult to discern the effects of just a few educational activities used during the research year on children who had been exposed to environment, wildlife, and wildlife-related concepts and attitudes through direct experience, media, school, and family for nine years. No uncontaminated control classes could be guaranteed. Students might have been previously exposed to Project WILD through school experiences, specialty teachers, or non-formal education such as summer camp or scouts. Teachers who had not attended a workshop might have obtained Project WILD activities from teachers who had (Charles 1986, Cantrell 1986, Smith-Walters 1988). A teacher's style of processing an activity might influence student learning. The amount of time spent on wildlife education could be an important but difficult-to-measure factor affecting student learning. Each teacher could choose different activities from the WILD guides and different concepts might be taught in each class. The learning styles and academic abilities of the students might differ. We recognized the potential impact of socioeconomic differences on student learning about wildlife. While we acknowledged the many potentially confounding factors, we decided to study the effects of Project WILD *as it is used in Wisconsin.*

An advisory committee composed of representatives of DNR Bureaus of Information and Education (currently Communication and Education), Endangered Resources, Wildlife Management, and Research (currently Integrated Science Services), plus an elementary school teacher, selected a research design for collecting data in the real world rather than a laboratory setting. Wanting to understand student responses beyond simply counting quantitative responses and to explore ways students learn about wildlife, we decided to follow Patton's advice (1975) and include some qualitative methods. From that vantage point, we attempted to address the confounding factors inherent in human subject research, educational evaluation, and Project WILD itself.

The research design included eight schools (two classes each) in the "primary research," in which data were collected through student, teacher, and parent surveys and through student and teacher interviews and classroom observations. In these 16 classes both quantitative and qualitative data were collected. Another eight schools (one class each) participated in the "secondary research," in which only parent, teacher, and student surveys were administered. No qualitative data were collected from these eight classes.

Selection of Grade Level

The advisory committee selected the fourth grade level for the study for several reasons. Previous research indicated that elementary teachers used Project WILD activities more than secondary teachers (Fleming 1983, Cantrell 1987, Zosel 1988). Even in middle schools, teachers usually specialize in one subject and students have several teachers each day. Such a setting would complicate observations on the effects of Project WILD. In elementary schools, classrooms are more likely to be self-contained and controlled by an individual teacher. We foresaw difficulties in creating a survey that would be meaningful at or below the third grade level due to lower reading levels. We selected the fourth grade rather than the fifth for two reasons:

1. The study of Wisconsin history is usually incorporated into the fourth grade, and coverage of related natural resource topics might lend itself well to the use of Project WILD.

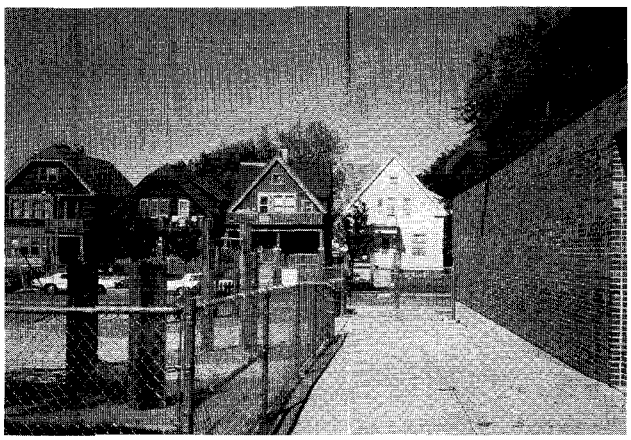
2. Fourth graders would, for the most part, remain in the same school through fifth grade should research follow-up be required.

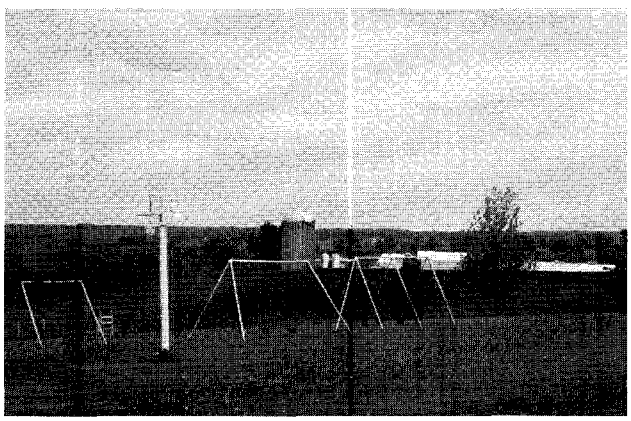
Research Design by Region

To give the research statewide definition, we divided the state into four geographic regions: two regions with urban school communities and two with rural. The northeast portion of the state was defined as urban industrial; the southeast as urban inner-city. The rural regions included the forested northwest and the agricultural southwest. Recruitment centered on six classes that could be matched within each region. Each matched pair included a teacher trained to use Project WILD and a teacher who had not attended Project WILD training (Figure 1). At least in the primary research, truly rural schools enrolling farm children were likely to be too small to fit the research design for paired or matched classes. Therefore, we focused on the surrounding school community for our definition. The children attending school might live in town, but the town was surrounded by agricultural land. We premised the regional divisions on the notion that students living in a town surrounded by forests might experience a slightly different exposure to wildlife and the environment than those living near paper mills and industry, those living near farm fields and cow pastures, or those surrounded by concrete sidewalks and buildings.

Research Design Timetable

Because we wanted pre- and post-exposure tests, the school calendar dictated the schedule. We field tested survey instruments in the spring of 1989. We surveyed





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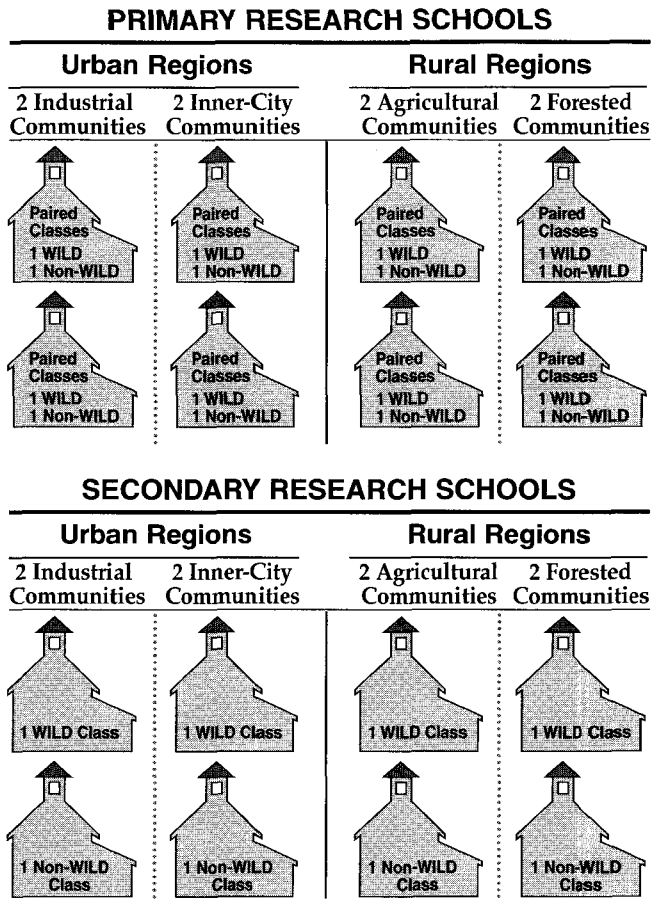
Students attending schools in different types of surroundings (e.g. urban or rural) might be exposed to wildlife in different ways. For this reason, schools located in both urban (top photo) and rural (bottom photo) settings were included in the study.

Figure 1. *Research design.*



students and teachers in September 1989, as close to the beginning of the school year as possible, then again in May 1990, near the end of the year. Parent surveys were conducted in the fall. In the eight primary research schools, we interviewed students and teachers on the same days that we surveyed them. Four observation visits with student interviews were conducted between the fall and spring survey dates in each of the primary research schools (Figure 2). An additional two visits were made for a total of 66 visits.

Recruitment of Schools

Completely random selection of schools was not possible because of the research design requirement for paired WILD and non-WILD classes. (We define a "WILD" class as one in which the teacher has participated in a Project WILD workshop and uses some of the activities. "Non-WILD" refers to classes with teachers who have not attended a Project WILD workshop and do not use activities from the WILD guides.) I began recruitment by asking

Figure 2. *Research design timetable.*

Primary Research	Spring 1989 Field Test (4 classes)	Fall 1989 Research (16 classes)	Spring 1990 Research (16 classes)
Teachers	Survey Interviews	Survey Observations Interviews	Observations Survey Interviews
Students	Survey Interviews	Survey Observations Interviews	Observations Survey Interviews
Parents	Survey 10 Parents	Letter and survey Remailing of survey	

Secondary Research	Fall 1989 Research (8 classes)	Spring 1990 Research (8 classes)
Teachers	Survey	Survey
Students	Survey	Survey
Parents	Survey and remail	

active Project WILD facilitators in each region for names of fourth grade teachers who had attended WILD workshops. Once I reached a fourth grade teacher, I asked for the name of another to make up the balance of the pair. After discussing the research commitment with each teacher, I contacted the principal for permission to conduct the research in the school (Appendix A).

In exchange for permission to conduct research in the school, teachers were provided with feedback on what their students were learning about wildlife and the environment plus a small monetary sum for purchasing classroom materials after the research was completed. Generally teachers said they would participate in the research because they wanted to contribute to environmental education or they wanted to teach more about wildlife and the environment. I did not seek out teachers who were reputed to be exceptionally environmentally oriented. No Project WILD facilitators were recruited. I offered to meet with each school's principal and participating teachers to arrange the research, but only two schools requested this option. I requested permission to survey students, teachers, and parents; to observe in the classroom; to interview students and teachers and tape record interviews; and to take photographs during observation visits. I asked whether students were assigned to classes in tracks based on academic ability or not and requested access to information about student race and parent addresses. The concepts covered by the surveys were not disclosed and the teachers did not see the student survey. Information about Project WILD was not provided to the non-WILD teachers, except to inform them of available WILD workshops after data collection from their classes. I asked the WILD teachers to commit to teaching at least four activities from Project WILD and to hold off using any WILD activities until after the fall survey. I asked the non-WILD teachers not to teach any Project WILD activities during the research year.

Development of Instruments

Student Surveys

To measure knowledge and learning related to the program's goals, advisory committee members and research staff defined seven key wildlife concepts appropriate to the fourth grade. These concepts flow logically from Project WILD materials, yet students in classes without Project WILD might have access to learning about the same concepts through other means. We have referred to the concepts as: habitat, adaptation, carrying capacity, definition of wildlife, food chains, human impact, and interdependence (Appendix B).

The advisory committee determined that questions related to student attitudes and behaviors, as well as knowledge, should be asked. We selected questions to examine attitudes in four basic categories: intrinsic value, human responsibility, hunting and fishing, and appreciation. We developed questions related to student behaviors in two categories: appreciative activities and responsible actions (Appendix B).

Survey instruments were subjected to multiple reviews and revisions. Advisory committee members categorized each question on the student survey according to whether it reflected a concept, attitude, or behavior. They aligned each knowledge-based question with a concept. They also reviewed the survey questions for clarity and age appropriateness. Research experts outside the DNR and beyond Wisconsin offered suggested revisions as well.

In student surveys, some questions used concept-specific vocabulary while others were independent of the specific vocabulary. As much as possible, we wanted to look at student understanding of the concept itself, not just the words. To address potentially different reading levels among the students, we decided that the survey should be read slowly aloud, avoiding as much biasing vocal inflection and non-verbal clues as possible, while students followed along, silently reading their own copy. Some questions were accompanied with slides as visual aids.

To field test the research instruments, I recruited 4 fourth grade teachers within a nearby radius. Two fit the urban-inner city region and two did not. Two field-test teachers (one each from the urban inner-city region and a rural community) were trained to use Project WILD; the other two were not.

We administered surveys to students in these four classes in May 1989. After administering the written survey, we interviewed 4-6 students in each class about the survey and their answers. Through interviews, we learned that students in non-WILD classes may respond inaccurately to questions that depend on familiarity with the WILD vocabulary (words such as habitat, food chain, and wildlife), regardless of whether they really understand the concept or not. From one survey question, we learned that all but one student thought the survey was either easy or "just right." Student scores were generally high.

Information from the field test helped improve the surveys. We dropped or rewrote questions identified as problematic in the interviews and shortened the survey. We struggled with how to make the survey more challenging without simply using bigger words. We sought revision suggestions from researchers outside the DNR and from Project WILD coordinators in other states.

Teacher Surveys

In developing the teacher surveys, we looked closely at a previously used Wisconsin WILD teacher use survey (Zosel 1988). Advisory committee members reviewed the new instrument, as did outside reviewers. The four field-test teachers completed a teacher survey and provided feedback on it. We needed to ask teachers some different questions at the beginning and end of the school year; thus, we developed two similar but different teacher surveys. Both asked questions about planned and actual environmental education teaching, Project WILD use, class characteristics, and teacher background. To uncover what opportunity students had to learn about the selected concepts, we camouflaged the seven key concepts in a list of 14 wildlife- or environment-related topics and asked

teachers to check the ones they had taught. The fall survey asked what teachers had done in the last year and what they intended to do during the research year (Appendix D). The spring survey asked what they had done during the research year and what they might do differently in the next year (Appendix E). There was no need to ask about basic college preparation related to environmental education or years of teaching experience again in the spring, since these data were unlikely to have changed since the fall. The spring surveys included a question about how many hours were spent teaching about wild animals during the semester. A separate questionnaire was sent to teachers with the same question at the end of the first semester in January 1990.

Parent Surveys

The parent survey was developed during the summer and early fall of 1989. Parent surveys included questions about wildlife-related activities students experienced outside school, wildlife and environmental interests of the adults in the household, and demographic information (Appendix F). The attitudinal Likert-style questions were adapted from Dunlap and Van Liere (1978).

To test the parent survey instrument, we contacted parents through the teacher on the advisory committee. We sent surveys, along with a questionnaire to evaluate the survey, to ten parents of fourth or fifth grade students. We incorporated suggestions from other researchers and the advisory committee members with the feedback from these parents.

Data Collection

Teacher Surveys

In August 1989, teacher surveys were mailed to the 24 participating teachers. When staff came to the school to administer student surveys in September, we collected the completed teacher surveys. The same process was used for the spring surveys.

Student Surveys

All four staff who administered student surveys attended a brief training session to ensure consistent data collection methods. We practiced pacing the reading and keeping students together on the same question. We observed each other in practices to check for leading verbal or nonverbal clues. In general, we decided not to answer questions during surveys. For clarity, we agreed to read all survey items as complete questions, even though they appeared in lists in the written version. Staff were asked to note the classroom appearance and the community type surrounding the school when they administered the surveys.

Staff administered student surveys in teams of two. In the primary research schools, one read the student survey aloud in the classroom while the other interviewed the teacher in a different room. Student surveys and teacher interviews took approximately 45 minutes. The teachers were asked to leave the room during the student survey to avoid teaching towards the research concepts or the survey questions.

Student and Teacher Interviews

Data related to the selected concepts, urban-rural differences, student learning sources, prior knowledge, and reactions to the survey questions were collected through student interviews. Individual student interviews were conducted following the survey and during observation visits. When we asked for interview volunteers, almost every student raised a hand. For the first round of interviews in each class, we tried to select students from both genders and whatever races were represented in the classroom. As we conducted more interviews on subsequent visits, we became more random in selecting interview participants. We did not exclude students with disabilities or behavior problems if they wanted to be interviewed. Over the year Ruth Keutemeyer and I conducted 300 student interviews.

It was difficult to find a place to hold interviews without distractions or disturbances. Surrounding sounds sometimes defeated efforts to tape record soft-voiced students. Students didn't seem bothered by the lack of complete privacy for the interviews, however, and some even volunteered to miss recess to talk with us.

One-on-one interviews were conducted by Ruth Keutemeyer and myself. At the start of each interview, the interviewer asked the student for permission to tape record the conversation. Because tape recordings might be unreliable, we also took notes. We initially used a written interview sheet, though a different one was developed for the entry, exit, and four observation visits (Appendix G). As the conversation progressed, we added questions to the sheet, keeping the interview informal. Student interviews lasted approximately 15 minutes, depending on the student's talkativeness, the school schedule, and the flow of the conversation.

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Researcher Ruth Keutemeyer conducts one of 300 fourth grade student interviews. Each student interview was taped and lasted approximately 15 minutes.

Similar methods were applied to teacher interviews. We interviewed the 16 teachers in the primary research individually, in September and May, when student surveys were being administered. We tape recorded the interviews and took notes. Teacher interviews lasted about half an hour. Along with spring exit interviews, we provided the 16 teachers in the primary research with a list of 91 environmental topics they might have covered (Appendix H). We hoped this would stimulate their thinking.

Classroom Observations

Ruth Keutemeyer and I conducted 66 classroom observations. We scheduled each visit with the teacher beforehand to minimize inconveniences. We asked all 16 teachers to schedule observations for when they would be covering environmental topics. At each visit, we noticed wildlife or environmental items or resources in the classroom: for example, bulletin boards, books, magazines, posters, plants, aquaria, hives, rocks, live animals, or taxidermy samples. We tried to remain as unobtrusive as possible. We introduced ourselves as observers rather than experts on wildlife or environmental issues. We observed what was done in the class and how students reacted. We took detailed notes on an observation form (Appendix I). The observations were essential in understanding some activities students described in interviews. For some observations, we accompanied the class on field trips.

During observation visits, we photographed activities, bulletin boards, group discussions, and field trips. The photos are valuable to review the salient activities we observed and to depict the research for others.

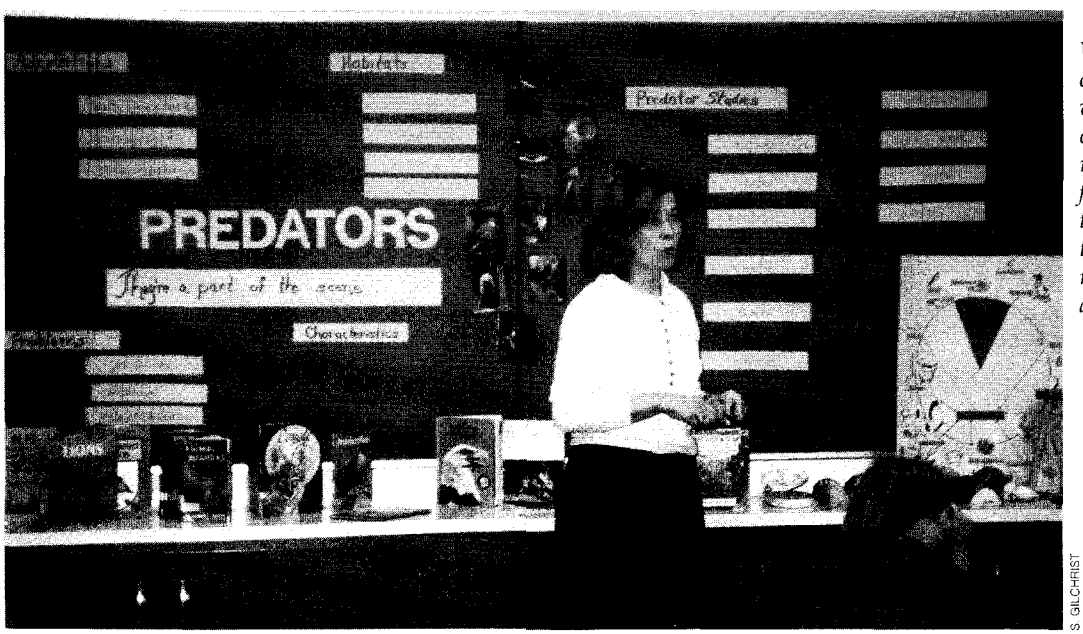
Avoiding Researcher Effect

A pitfall of qualitative research is researcher effects: that is, the researcher's effects on the site and the site's effects on the researcher. To avoid the first, we downplayed any subject knowledge or expertise. We tried to interact with all teachers with equal enthusiasm and emphasized that we were evaluating the Project WILD program, *not* the teachers. We spent time eating lunch at the school or just being there, "fitting into the landscape, taking a lower profile" (Miles and Huberman 1984, p. 233). We also asked participants about the effects of the research. We began by asking teachers why they agreed to participate in the study, and we ended by asking how they thought the researchers' presence had affected their teaching. In student exit interviews we also asked students what changes they noted related to the researchers' presence.

To avoid the second type of researcher effect, we interviewed non-WILD as well as WILD teachers and students and observed in both classroom settings. We did not limit interview subjects to the elite, but tried to talk to as many students as possible within the research framework. We spread out site visits, spending weeks away from each site before we returned. As Miles and Huberman advise (1984, p. 235), we "compiled different sources of evidence, using different methods and operating at different levels of the school." We considered survey scores and testimony of students and teachers who were and were not using Project WILD. We also studied the program manual and materials. We looked for corroboration and verification as well as contrast and contradiction among the data we collected through different sources.

Parent Surveys

The principles of the Total Design Method developed by Dillman (1978) were adopted to elicit a high return rate from the parent surveys. The mailing to parents was personalized and as unimposing as we could make it. When possible, we used school stationery rather than state agency letterhead. We used first class postage stamps instead of metered mail on all mailings. We also provided return envelopes with first class postage. In addition, we



S. GILCHRIST

Wildlife related educational resources were observed in the classroom. These resources ranged from books to posters to aquaria; or, as in the case of the classroom pictured here, a bulletin board.

used multiple contacts. After the introductory letter, we sent the parents a survey with an accompanying letter. Nonrespondents received a postcard reminder and a second letter and survey.

Quantitative Analysis

Data were keyed into a computer and analyzed using SAS (Statistical Analysis System). Analyses were evaluated at the 5% level of significance ($P < 0.05$) unless noted otherwise.

Unit of Comparison and Sample Size

At the beginning of the research, the advisory committee, with input from DNR biometrician Paul Rasmussen and statistician Eugene Lange, discussed the unit of comparison for this study. They decided on the class, because all the students in one class are exposed to the same teacher and the key variable is whether the teacher had attended a Project WILD workshop or not. The analyses based on student survey scores were conducted in this manner. These analyses compared WILD to non-WILD class scores, fall to spring, and urban to rural school community. While the sample size consisted of 24 classes, with 19-29 students per class, there were 577 students surveyed in the fall and 588 in the spring. Only the 519 students who completed both fall and spring surveys were included in the statistical analyses.

Analyses based on the parent survey data used the individual student as the unit of comparison because we sought correlations between student scores and data provided in their parent surveys. We used a multiple linear regression analysis. The sample of 519 students who completed both fall and spring surveys was reduced to include only those 445 whose parents returned surveys. Of the 445, 217 were in non-WILD, 228 in WILD classes. Missing responses on some variables further reduced the actual number of observations, particularly in the multiple regression analysis.

Student Survey Scores

The student surveys included 27 concept questions. (With sub-questions, these were tallied as 36 items.) Student surveys were divided into three sections: concepts, attitudes, and behaviors. In the concept section, each answer was coded as right or wrong and the proportion of correct answers was calculated for each student. Analyses were conducted by concept and by overall concept scores. For the attitude questions, each answer was scaled from 1 (con-) to 5 (pro-wildlife attitudes). An average score was calculated for each student. Analyses were conducted by attitude and for overall attitudes scores. Each answer in the behavior section was scaled from 1 (less/worse) to 4 (more/better). An average score was calculated for each student. Analyses were conducted by behavior and for overall behavior scores. Thus, higher scores are seen as better in concepts, attitudes, and behaviors. Answers that were left blank were coded as missing rather than wrong, where "I don't know" or "unsure" was an option in the short answers provided in the test or where several items were omitted in a row.

WILD and Non-WILD Differences

To assess differences between WILD and non-WILD classes, we first conducted separate fall and spring analyses. An average score was calculated for each class for each concept, attitude, and behavior. WILD and non-WILD classes were paired by school (when both were in the same school) or community type (when only one class was selected in each school for the secondary research). A paired *t*-test was used first with fall, then with spring scores. Multiple regression analyses examined the variation in student survey scores due to Project WILD while controlling for other variables.

Fall-Spring Differences

To assess differences between fall and spring survey scores, we analyzed WILD scores and non-WILD scores, and then compared the fall-to-spring change. First the difference in each student's score from fall to spring was calculated. This difference was averaged for each class. A *t*-test showed whether these values were significantly different from zero for WILD classes and for non-WILD classes. To compare the fall-to-spring change, WILD and non-WILD classes were paired by school or community and a paired *t*-test was used.

Analysis of Variance for Combined Effects

The average score for each concept, attitude, and behavior for each class in each season was used to examine the combined effects of season (fall, spring), class type (WILD, non-WILD), and community type (urban, rural). An analysis of variance (ANOVA) was done to determine whether the average class scores varied significantly by season, class type, or community type. To assess if there were any significant differences based on student gender, an analysis of variance was calculated using the average score for each gender in each concept, attitude, and behavior in each class in fall and spring.

Student Learning and Prior Knowledge

When the entire class was accounted for in the analysis, there may have been limited room for improvement in initially high scoring classes. Therefore we conducted an analysis concentrating only on those students with the potential to learn in each class. We defined "learning" as what occurred when a student got a specific question wrong in the fall but correct in the spring. The percentage of students that learned each concept question was calculated. Considering the question as a block effect, an analysis of variance was done to determine the effects of class and community types on the percentage of students in a class that learned a concept.

Students who already knew the concepts couldn't learn them, and yet their responses would raise class

scores. When we defined learning according to student fall and spring scores, we also defined "prior knowledge." When a student got the same question correct in fall and spring surveys, we acknowledged that the student must have known the material before the research began. Students who answered correctly in the fall but incorrectly in the spring were said to have "guessed." If students answered correctly in the fall, but not in the spring, they did not really know the material at the beginning of the research, thus prior knowledge is different from high fall concept scores. The percentage of students that had prior knowledge of each concept question was calculated. A prior knowledge score was included in the separate multiple regression analyses conducted for WILD classes and non-WILD classes to see whether prior knowledge affected WILD or non-WILD class scores significantly.

To assess the student survey as an evaluatory tool for measuring student learning, we identified the questions which were learned by fewer than 50% of the students who answered them wrong in the fall. We also looked at the minimum and maximum concept score attained by students in each class to ascertain if it were possible for these students to answer the concept questions correctly. In addition, we divided the survey questions between vocabulary-dependent and -independent and compared scores.

Parent Characteristics

The analysis based on the student surveys with the class as the unit of comparison used *t*-tests and ANOVAs but did not control for other effects. We surveyed parents to gain a partial means to do that. After looking at frequency distributions and means in parent characteristics, we tested for differences between the parents of students in WILD classes and those with students in non-WILD classes. We used *t*-tests and χ^2 tests. After examining frequencies for wildlife-related activities, we constructed variables based on the number of each of the following: wildlife-related places the student visited, wildlife magazines available in the home, wildlife or environmental education programs the student attended, outdoor activities in which the student participated, organizations to which any adult in the household contributed, and projects any adult has engaged in to help wildlife (Appendix F, Sections I and II). We tested the means of these totals for statistical differences between WILD and non-WILD students. We also conducted a regression analysis with items from the parent survey plus the class (WILD or non-WILD) and school community (forested, agricultural, inner- city, or industrial).

R. QUEEN

Through parent surveys, factors outside of school programs were considered. These factors include wildlife magazines and outdoor activities; or as pictured here, visits to nature centers and state parks.

To estimate the effects of parental characteristics and other learning opportunities outside school, we pooled the fall and spring student survey scores to create a double sample size of 678 observations, then conducted the multiple linear regression analysis (Appendix J). The original model included many variables with nonsignificant coefficients. Hence a reduced model with only significant variables was fitted by stepwise regression. A factor analysis showed that different variables were significant to urban and rural dwellers, so different statistical models were necessary for urban- and rural-dwelling families.

Parent attitudes were introduced to the model. When we conducted a factor analysis of the attitude questions in the parent surveys, the questions clustered together differently than we expected. Only one factor was easily definable: the anthropocentric notion that nature exists only for human use and that human needs supersede nature. The questions constituting the other factors seemed to have no common definition or interpretable meaning. When parent attitudes were introduced to the regression analysis, they were introduced as they had clustered in the factor analysis, rather than the way we had originally defined them in creating the survey.

Because of correlations among independent (predictor) variables, coefficients in regression models are sometimes difficult to interpret. Confounding factors might obscure the WILD effect. Thus we expected that any effect attributable to Project WILD in the multiple regression analyses would strengthen any consistent findings from the less complicated analyses.

Teacher Characteristics

Frequencies and percentages of teacher characteristics, as reported in the teacher surveys, were examined for differences between WILD and non-WILD. From the teacher surveys we also developed an interest index score for each season. To build these scores, we selected questions that represented teacher interest in wildlife and environmental education from the surveys (Appendix K). Responses to these questions were divided into three groups according to frequency distribution: below average, average, or above average. They were recoded for a 99% confidence interval and tallied to create one score for fall and another for spring for each teacher. We looked for WILD and non-WILD differences between these scores with *t*-tests.

Urban-Rural Differences

Differences between urban and rural student scores were assessed by looking at frequencies and by an analysis of variance as mentioned above. For this analysis, the

school-community type served as the definitive factor: the class, including all its members, was considered urban or rural. With the multiple regression analysis, the residence reported on the parent survey was the basis for defining each student as rural or urban. With different variables being important to urban and rural dwellers, separate regression analyses were conducted for each residency type. We also conducted *t*-tests for fall (percentage of concept questions right in fall student surveys), spring (percentage of concept questions right in spring student survey), learning (percentage of questions wrong in the fall and right in the spring), and prior knowledge (percentage of total questions right in both fall and spring) with both definitions (residence and school community) of rural compared to nonrural.

Qualitative Analysis

Qualitative data were gathered as interview notes and recordings, observation notes, and photographs.

Observation Notes

Observation notes described the activity that was done in class and what occurred. These notes were summarized and the Project WILD activities observed were tallied. Then all the activities observed were categorized by type and tallied (see Table 25, p.30). We also tallied the activities observed according to the selected concepts.

Interview Notes and Transcripts

Interview notes pertained to the seven selected concepts and related definitions, sources of learning, wildlife-related experiences outside school, student reactions to the activities observed, and comments related to the survey questions. Interviews were useful in finding out which survey questions may have been particularly confusing, why some students answered as they did, and whether student concept knowledge were accurately reflected in survey scores. Although sometimes difficult to hear and accurately understand, the recorded student and teacher interviews were transcribed. In analyzing the qualitative data, the transcripts were read, but frequently interview notes were more reliable for tallying student responses. Some ideas emerged from the qualitative data, especially during collection. If a new hypothesis grew from one set of interviews, it could be explored in the next set. Through the interviews, I specifically sought validation, contradiction, or clearer interpretation of ideas related to the statistical analyses. For example, if survey results showed low scores in understanding one concept, I read interview responses to questions specifically about that concept to ascertain how well students could explain the concept in their own words. I categorized each answer as reflecting understanding or not, then quantified the answers. Or, if interview records suggested that urban students understood a definition differently than those in rural communities, I requested a statistical analysis of student survey responses on the related concept and compared urban and rural scores. In tallying responses to open-ended questions, I divided the answers into categories, then totaled the responses falling into each category. I also used another form of categorizing: I clumped interview questions together when the answers illuminated understanding best when taken as a block.

Photographs

Photographs assisted memory in formulating observations, questions, and conclusions. If photos indicated a possible similarity or comparison between classes, I could pursue the idea through interview records or survey responses. Although the methodologies are separate, the analysis of qualitative data was intertwined with the results found through analysis of quantitative data—and vice-versa— to provide a more objective and complete analysis of all the data.

Group Discussion

After all the data were collected, I met with the staff who had assisted in data collection and facilitated a group discussion of what we had observed during the study. While group discussion is a form of data collection, I used it to summarize, focus, and analyze our observations. This discussion was useful in formulating hypotheses to be examined in the analyses of the survey data, interviews, and observations. In accordance with Maxwell's definition (1992), we strove for validity as integrity to the purpose and circumstances of the research and as understanding of what the events we had observed might mean to the students and teachers engaged in them.

Results and Discussion

WILD and Non-WILD Differences

In general, the WILD classes scored higher on the student survey than their non-WILD counterparts. In the fall, the WILD classes scored significantly higher than the non-WILD classes in the definition of wildlife concept (P=0.01) and in overall concepts (P=0.03). In the spring, WILD classes scored significantly higher than non-WILD in overall concepts (P=0.01) and three individual concepts: interdependence (P=0.02), human impact (P=0.02), and carrying capacity (P=0.04)(Tables 1 and 2). No significant differences were found in attitudes or behaviors through the *t*-tests.

The analysis of variance results were similar, but not exactly the same, since we did not separate the fall and spring scores to compare WILD and non-WILD in this

Table 1. *Average proportion correct by WILD and non-WILD classes by concepts for fall season.*

Concept	Non-WILD[a]	WILD[a]	|t|[b]	*p*
Food chain	0.617 (0.022)	0.669 (0.013)	2.05	0.0653
Habitat	0.638 (0.013)	0.664 (0.017)	1.20	0.2559
Definition	0.711 (0.017)	0.765 (0.023)	3.14	0.0095
Adaptation	0.782 (0.026)	0.815 (0.021)	1.43	0.1810
Carrying capacity	0.557 (0.027)	0.596 (0.023)	1.12	0.2861
Interdependence	0.563 (0.024)	0.624 (0.030)	2.11	0.0583
Human impact	0.666 (0.028)	0.702 (0.027)	1.43	0.1811
Overall concepts	0.652 (0.014)	0.697 (0.016)	2.55	0.0271

[a] Figures in parentheses are Standard errors.

[b] The |t| values were computed under the paired *t*-test for the differences between the averages of non-WILD and WILD classes.

Table 2. *Average proportion correct by WILD and non-WILD classes by concepts for spring season.*

Concept	Non-WILD[a]	WILD[a]	|t|[b]	*p*
Food chain	0.731 (0.024)	0.781 (0.021)	1.58	0.1427
Habitat	0.703 (0.016)	0.723 (0.015)	1.66	0.1254
Definition	0.811 (0.019)	0.841 (0.025)	1.70	0.1236
Adaptation	0.855 (0.025)	0.898 (0.026)	1.62	0.1236
Carrying capacity	0.630 (0.019)	0.686 (0.023)	2.36	0.0377
Interdependence	0.685 (0.030)	0.753 (0.031)	2.81	0.0170
Human impact	0.801 (0.025)	0.853 (0.020)	2.70	0.0205
Overall concepts	0.748 (0.017)	0.788 (0.017)	3.03	0.0115

[a] Figures in parentheses are Standard errors.

[b] The |t| values were computed under the paired *t*-test for the differences between the averages of non-WILD and WILD classes.

Table 3. *Analysis of variance by season, class, community, and gender. Numbers represent p values.*

	Season	Class	Community	Gender
Concepts				
Adaptation	.0007	.0790	.0003	.0611
Carrying capacity	.0007	.0394	.0895	.2012
Definition of wildlife	.0001	.0349	.0027	.1971
Food chain	.0001	.0162	.7048	.0001
Habitat	.0002	.1368	.2216	.0014
Human impact	.0001	.0685	.0113	.0490
Interdependence	.0001	.0221	.0321	.0947
Overall concepts	.0001	.0060	.0078	.0011
Attitudes				
Appreciation	.8260	.0371	.0007	.7813
Human responsibility	.0003	.1388	.5382	.8663
Hunting	.0313	.9574	.0002	.0001
Intrinsic value	.0009	.0887	.0417	.9198
Overall attitudes	.0022	.0500	.0014	.1981
Behaviors				
Appreciative activities	.0918	.5578	.1185	.0001
Responsible actions	.1002	.4062	.0672	.8756
Overall behaviors	.8815	.8922	.0725	.0022

analysis (Table 3). Testing for combined effects, overall concepts (P=0.01) and four specific concept scores were significantly higher for WILD classes: carrying capacity (P=0.04), definition of wildlife (P=0.03), food chain (P=0.02), and interdependence (P=0.02). Human impact (P=0.07) would be considered significant if significance were expanded to the 10% level. The attitude we have called appreciation is represented by significantly higher scores among WILD classes (P=0.04). Intrinsic value (P=0.09) and overall attitudes (P=0.05) show significant differences for WILD classes at the 10% level. Like the *t*-tests, the analysis of variance showed no differences between WILD and non-WILD classes in behaviors.

Fall student scores were initially high and almost all the students reported that the surveys were just right or easy. We had had some concerns that the survey might be too simple, but when we tried to raise the level after the field test, we discovered that basic wildlife concepts are easy to understand with basic logic, yet hard to test for beyond vocabulary knowledge. However, we wondered why WILD classes scored higher than their non-WILD counterparts in September, before they should have been exposed to any Project WILD activities. We had expected to see no differences between WILD and non-WILD classes at the beginning of the school year. Therefore, we examined several factors that we thought might be related.

Family Characteristics

Looking at frequencies and using *t*-tests and χ^2 tests, we looked for differences between the WILD and non-WILD groups, using information from parent surveys. Significant differences in family characteristics might account for the differences in student survey scores between the two groups, rather than Project WILD.

We found no statistically significant differences between WILD and non-WILD classes in reading

wildlife books and magazines; watching wildlife programs on television; walking in the woods; watching birds; camping; canoeing or hunting; feeding birds; or visiting the zoo. We can rule out participation in these activities related to wildlife as the reason WILD students scored higher on the surveys.

After examining these frequencies, we constructed family activity score variables, including visits to wildlife-related places, availability of related magazines, attendance at environmental education programs, engagement in outdoor activities, adult membership in related organizations, and participation in environmental projects. None of these variables have statistically different means for WILD and non-WILD students (Table 4).

We looked at frequencies for parent characteristics and compared WILD and non-WILD groups through χ^2 tests. There were no significant differences in the number of adults hunting, fishing, or trapping between WILD and non-WILD groups. Likewise, there were no significant differences between WILD and non-WILD groups in the following: whether the family residences were urban or rural; whether the adults grew up in an urban or rural setting; whether the gender of the adults were male or female; whether the race was white or other; whether the adults were married or not; and whether the families were classified as low, middle, or high income. In addition, there were no significant WILD/non-WILD differences between parent responses to a question rating their concern for learning about the environment themselves or concern for their child's learning about the environment. These findings indicate that the differences between WILD and non-WILD student survey scores are not simply based on these family characteristics.

R. QUEEN

When examining the level of family participation in wildlife related activities, there was no significant difference between students exposed to Project WILD activities and students not exposed to Project WILD activities (see Table 4).

Reading Comprehension and Academic Ability

To determine if differences in scores were due to higher reading comprehension or tracking for academic ability in WILD classes, we read the surveys out loud to the students to compensate for individual reading ability. At the time of school recruitment, we had asked whether students were assigned to particular classes based on academic ability and understood from the verbal answers that they were not tracked that way. Especially in the schools in the primary research design, where the paired classes are in the same school, it is unlikely that the more academic achievement-oriented students would consistently have been placed in the WILD classes. Students were not placed in one class or another according to whether the teacher had taken a Project WILD workshop or not.

Through their surveys, teachers were asked how they perceived their students as learners. In the fall, non-WILD teachers defined their classes over a wider range than the WILD teachers defined theirs, but the end result does not appear uneven. Since the fall survey was administered near the beginning of the year, the teachers may not have had much time to observe their classes. So we repeated the question in the spring survey. Some teachers either changed their perceptions of the students or changed their interpretation of the question (Table 5). In spring responses, more non-WILD teachers perceived their

Table 4. *A comparison of WILD and non-WILD family activities.*

	Non-WILD (n=217)		WILD (n=228)		
Variable	**Mean**	**Standard Deviation**	**Mean**	**Standard Deviation**	**t**
Places visited	2.69	1.31	2.73	1.23	-0.34
Magazines available	1.41	1.51	1.62	1.63	-1.36
Education programs	0.70	0.78	0.77	0.77	-0.97
Outdoor activities	9.51	4.62	9.77	4.69	-0.59
Adult organizations	0.40	0.78	0.55	0.95	-1.85
Environmental projects	0.69	0.77	0.79	0.82	-1.35

Table 5. *Teacher perception of class learning ability by season and class.*

	Fall		Spring	
	WILD	**Non-WILD**	**WILD**	**Non-WILD**
Especially fast learners	0	1	1	0
Average 4th grade learners	11	8	10	5
Slower-than-average learners	0	1	1	4
A combination of especially fast and slower- than-average learners	1	2	0	3

Table 6. *Prior knowledge of wildlife concepts questions correct in fall and spring as percent of total questions by concept and by class.*

Concept	Non-WILD[a]	WILD[a]	|t|	*p*
Food chain	54.1 (1.9)	58.8 (1.9)	1.731	0.0842
Habitat	57.8 (1.2)	62.8 (1.5)	2.849	0.0046
Definition of wildlife	65.2 (1.2)	72.5 (1.5)	3.217	0.0014
Adaptation	74.6 (2.3)	78.0 (1.9)	1.162	0.2460
Carrying capacity	47.4 (2.0)	53.4 (1.5)	2.424	0.0159
Interdependence	62.6 (2.0)	67.4 2.0)	1.608	0.1087
Human impact	48.4 (2.7)	57.4 (2.5)	2.474	0.0138
Overall concepts	59.0 (2.7)	64.8 (1.1)	3.474	0.0006

[a] Figures in parentheses are Standard Errors.

Table 7. *Interest tallies of WILD and non-WILD teachers from fall surveys.*

	No. of Teachers That Do Each Activity	
	WILD	Non-WILD
Enjoy outdoor activities	12	10
Contribute to organizations	8	3
Participate in projects	11	8
Involve students in projects	8	4
Used guest speakers	7	3
Taught habitat	9	10
Taught food chains	10	7
Taught definition	5	6
Taught adaptation	9	8
Taught carrying capacity	2	2
Taught interdependence	10	6
Taught human impact	8	5
Rated environmental education very important	8	6
Have Project Learning Tree	2	1
Have environmental education college courses	5	4
Other: outdoor education	1	0
Project WILD	12	0

Table 8a. *T-test for difference between WILD and non-WILD teacher interest index scores in fall surveys.*

Class	n	Mean	Standard Error	t	*p*
Non-WILD	12	8.92	1.28	-2.1994	0.0387
WILD	12	12.83	1.24	-2.1994	0.0387

Table 8b. *t-test for difference between Wild and non-Wild teacher interest index scores in spring surveys.*

Class	n	Mean	Standard Error	t	*p*
Non-WILD	12	7.25	0.82	-1.0619	0.3005
WILD	12	8.67	1.05	-1.0619	0.2998

classes as slower than average. No differences between the learning speed or ability of the WILD compared to the non-WILD classes were perceived during the observations, the interviews, or the qualitative analysis, and the generally high survey scores suggest adequate learning abilities in all classes. If the class learning ability were the determining factor in the fall WILD and non-WILD score differences, then we might expect to see more significant differences across all the concepts as well as a significantly higher increase in WILD spring scores compared to non-WILD; however, such was not the case.

Prior Knowledge

To determine whether WILD students simply knew more before the research began, we compared WILD and non-WILD prior knowledge scores. Prior knowledge was found to be significantly ($P < 0.05$) higher in WILD classes compared to non-WILD classes overall plus in four concepts: habitat, definition of wildlife, carrying capacity, and human impact. The food chain concept was significant at the 10% level (Table 6).

The significant differences in prior learning between WILD and non-WILD classes indicate more differences between the classes than were found through other examination. We cannot be certain, however, exactly how or when these differences in prior knowledge occurred. Students in the WILD classes were not necessarily in the same third grade class, so they were not necessarily exposed to the same previous learning environment. We know from interviews that students had been learning about wildlife in the fourth grade, in the short time (1-3 weeks) between the beginning of school and survey administration. When we included prior knowledge in multiple regression analyses later, we found that prior knowledge was a significant influence on spring student survey scores in both WILD and non-WILD groups.

Exposure to Project WILD Prior to Fall Surveys

In considering the sources of prior learning related to wildlife, we did not ignore the potential influence of Project WILD. Although we asked participating WILD teachers not to conduct any Project WILD activities until after the fall surveys, some teachers didn't wait. When we interviewed students immediately following the fall survey, we asked three questions related to learning about wildlife. These questions were intended to ascertain how students thought they had learned about wildlife; what they found the most interesting in the last year; and how they acquired that knowledge.

The questions were open-ended so students could refer to experiences both in or out of school. There were many references to learning in third grade. However, 11 of 94 students interviewed specifically mentioned that they had learned from this year's teacher. Five of the seven teachers mentioned by these 11 students were WILD teachers. Two students, one in an urban school community and one in a rural, described Project WILD activities as sources of learning. Three teachers reported they had already conducted a WILD activity with their students

before the surveys. Only two teachers (one WILD and one non-WILD) thought their students had participated in WILD activities prior to fourth grade. While exposure to Project WILD activities through the WILD-trained teacher participating in the research immediately prior to the fall survey might have some effect on fall survey scores, WILD and non-WILD classes had equal chances of exposure to Project WILD activities in previous years. It is clear that learning related to wildlife had been occurring prior to the fall surveys, whether through Project WILD activities or not. It is possible that learning related specifically to the definition of wildlife concept may have been influenced by WILD-trained teachers.

Teacher Interest in Wildlife and Environmental Education

To explore the students' initial fall knowledge further, we also examined teacher interest as a potential factor. When conducting the fall surveys, we observed a striking difference between several WILD and non-WILD classrooms. Most WILD classrooms displayed more items related to wildlife and the natural environment. We considered these items a sign of interest in wildlife and environmental education and a potential influence on student learning, even in the very beginning of the school year. This observation prompted us to look more closely at teacher characteristics and other items that might translate into an interest assessment. Education backgrounds of WILD and non-WILD teachers were similar, so far as environmental education-related preparation, except for Project WILD training. However, more WILD teachers reported enjoying outdoor activities (such as walking in the woods, camping, and canoeing) compared to non-WILD teachers and contributed to more environmental, conservation, or sportsmen's organizations (e.g., National Audubon Society, Greenpeace, the Nature Conservancy, the Wildlife Society, and Ducks Unlimited). On a Likert-style question, more WILD teachers rated teaching environmental education very important. (With only 12 WILD and 12 non-WILD teachers participating in this study, the discussed differences between the WILD and non-WILD teachers are based on simple tallies of survey responses [Table 7].)

If we consider these factors representing interest, we can build a case for higher interest in wildlife and environmental education among the WILD teachers. It is possible that more spontaneous discussion related to wildlife could occur in classes where teachers are especially interested in the subject. At the beginning of the semester, non-WILD teachers claimed more frequency in teaching the broad topic of environmental education. At the end of the first semester, however, teachers completed a simple form reporting estimated hours they had spent teaching the students participating in the research specifically about wildlife and the environment. WILD teachers estimated they had spent more time on wildlife than their non-WILD peers estimated they had spent. At the end of the school year, however, these data changed again, due largely to one non-WILD teacher who reported spending extreme amounts of time teaching about wildlife and the environment.

PHOTOS: P. CALDWELL

(Top photo) Educational learning related to wildlife, whether through Project WILD activities or not, had been occurring prior to conducting fall surveys. Here a kindergarten class examines pond water.

(Bottom photo) Project WILD classrooms displayed more items related to wildlife and the environment than classrooms not participating in Project WILD activities.

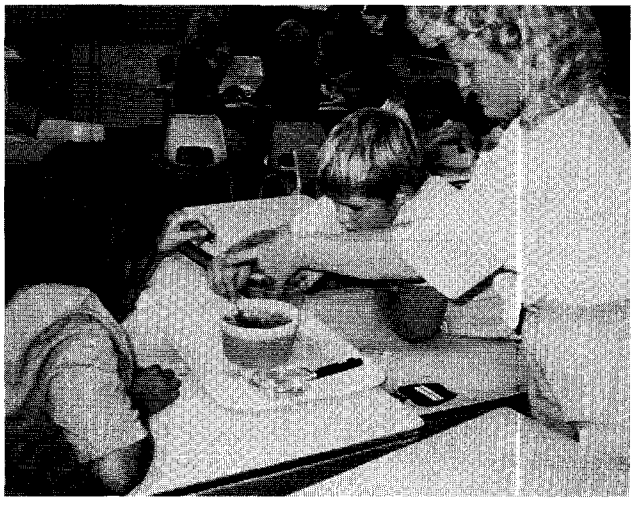
When we compared WILD and non-WILD teacher interest scores through *t*-tests in both fall and spring, we found WILD scores higher (Tables 8A and 8B). In the fall, WILD teachers scored significantly higher than non-WILD (Table 8A). Since teacher survey questions were not the same in the spring and fall, it is meaningless to compare the fall and spring scores. However, the statistical indication that WILD-trained teachers were more interested in wildlife than their non-WILD peers, at least in the fall, affirms other findings.

Table 9. *Students describe the most interesting activity related to wildlife.*

Activity Described	WILD Students (%)	Non-WILD Students (%)
Project WILD activity	17 (35)	1 (2)
Field trip	13 (27)	16 (33)
Couldn't remember	4 (8)	8 (16)
Research about animals	3 (6)	4 (8)
Film	3 (6)	3 (6)
Project WILD research	0	4 (8)
Reading	0	5 (10)
Drawing/art project	4 (8)	2 (4)

(Top photo) Project WILD teachers reported using a total of 86 Project WILD activities encompassing 46 different activities. The average number of WILD activities reported was 7. In this example of a WILD activity, students examine pond water.

(Bottom photo) Students and teachers identified Project WILD activities and field trips as the most interesting wildlife-related activity that they had done during the past year. Here students enjoy a field trip with a naturalist.



PHOTOS: S. GILCHRIST

In a national telephone survey, 79% of 30 Wisconsin teachers claimed Project WILD increased the amount of time they spent teaching about wildlife (Western Regional Environmental Education Council 1990). It may be that teachers who are more interested in wildlife and environmental education are those who attend Project WILD workshops, except in the few cases in which a school district requires attendance. As a whole, WILD teachers may be a self-selected group that demonstrates higher interest in wildlife and environmental education. There are several possible relationships between teacher interest and higher student scores in WILD classes. Prior research showed that teacher interest increased use of Project WILD and Project WILD workshops increased teacher interest (Zosel 1988). Teacher interest affected student learning and attitudes in the original field test of Project WILD (Fleming 1983).

The Influence of Project WILD Activities

In spring surveys, WILD teachers reported that they each used from 4 to 16 WILD activities during the research year. A total of 86 WILD activities, encompassing 46 different activities, was reported by the 12 WILD teachers. The average number of WILD activities reported was 7. The number of activities used is consistent with other research (Smith-Walters 1988, Zosel 1988).

As in Cantrell's study (1987), qualitative data indicated that Project WILD asserts a positive effect on students. When we interviewed teachers in the spring, we asked what was the most successful activity related to wildlife that they had done with the students that year. Their most frequent response was a WILD activity. The second most frequent response was a field trip. When we asked students what was the most interesting wildlife-related activity they had done in the past year, the most frequent response among 49 WILD students described a WILD activity. (Students did not necessarily know it was an activity from the Project WILD guide; they described the activity and I identified it as a WILD activity.) The second most frequent response was a field trip. Among 49 non-WILD students interviewed, the most frequent response was a field trip, the second most frequent response was "I don't remember" (Table 9). Perhaps an important benefit of Project WILD is similar to that of field trips: motivational (Falk and Balling 1979). Project WILD is similar to field trips in that both may provide breaks in the classwork routine. Both students and teachers seem to have found Project WILD activities memorable.

Significant Concepts

Definition of Wildlife

In the fall student surveys, WILD students scored significantly higher than non-WILD students in one concept: definition of wildlife. While wildlife experts use various definitions, it is likely that WILD-trained teachers would employ the same definition for wildlife used by Project WILD. It is also likely that this definition of wildlife might seep into their teaching in the fall, even before conducting any Project WILD activities. Many of the teachers began the school year with environment-related

topics while the weather was nice for outdoor learning or field trips. Also, students initiated some impromptu discussions related to wildlife. There may have been opportunity for teachers to convey this concept without consciously teaching it.

In fall interviews, we asked 92 students (44 WILD and 48 non-WILD) what they thought the word "wildlife" means. Responses were categorized as referring to habitat, nature, place, undomesticated, free, independent, or other (Table 10). A correct response referred to undomesticated, free or living in the wild, or independent of humans. Answers referring to one of these descriptions but listing pets as examples of wildlife were not considered correct unless there were some qualifying explanation about including pets as feral wildlife. Of the 48 non-WILD students, 23 (48%) gave correct responses. Of the 44 WILD students, 33 (75%) responded correctly (Table 11). The fall interviews agree with the fall survey scores that more WILD students understood the definition of wildlife in keeping with the Project WILD definition. And, like spring survey scores, the interview tabulations reflect a reduced difference between WILD and non-WILD understanding of the definition of wildlife in the spring compared to the fall.

In teacher interviews, the ways the WILD teachers defined wildlife were, as expected, more consistent with the Project WILD definition than the non-WILD teachers' ways. Through the checklist of topics provided to 16 teachers participating in the spring exit interviews, eight WILD teachers (100%) said they covered wild-domestic definitions. Only four non-WILD teachers (50%) said the same. In spring teacher surveys (administered by mail to all 24 teachers prior to the interview checklists), 10 of 12 WILD teachers reported covering definitions of domestic and wild, while only 6 of 12 non-WILD teachers reported the same. We know that more of the WILD teachers than non-WILD teachers covered the definition of wild versus domestic. We don't know when the teachers covered this topic, but it seems practical to begin the study of any topic with basic definitions.

Qualitative data support the quantitative finding that students in WILD classes knew more about the definition of wildlife than students in non-WILD classes. They also offer some explanation about why students in WILD classes may have scored significantly higher than their non-WILD peers in this concept in September. Although most of them were not exposed to Project WILD activities at that time, they were already exposed to the teacher and possibly that teacher's definition of wildlife.

Carrying Capacity

The concept with the lowest scores, both in fall and spring, in WILD and non-WILD classes, was carrying capacity. Yet WILD classes scored significantly higher than non-WILD classes in knowledge related to carrying capacity in the spring. An average of only 20% of the students in a class who defined carrying capacity incorrectly in the fall answered correctly in the spring. According to survey responses, most students thought carrying capacity meant "how much food an animal can carry." In spring teacher

Table 10. *Fall student interview responses on defining wildlife.*

Definition	WILD	Non-WILD	Total
Habitat	16	21	37
Nature	4	5	9
Place	3	5	8
Category total	23 (43%)	31 (57%)	54
Undomestic	14	10	24
Free	9	6	15
Independent	14	6	20
Category total	37 (63%)	22 (37%)	59
Other	5	14	19
Grand total	65	67	132

Table 11. *Correct student interview definitions of wildlife.*

	WILD			Non-WILD		
	Students Correct	Students Interviewed	%	Students Correct	Students Interviewed	%
Fall	33	44	75	23	48	48
Spring	36	51	71	32	49	65

In fall surveys, Project WILD students had a significantly greater understanding of the "Definition of wildlife" concept than non-WILD students. In particular, project WILD students scored significantly higher than non-WILD students when understanding the concept of domestic (top photo) versus wild (bottom photo).

surveys, 3 non-WILD and 4 WILD teachers reported teaching carrying capacity. In interviews of the teachers in the primary research, however, only one WILD and two non-WILD teachers said they covered the concept. I thought this difference might reflect a difference in understanding the phrase, especially as teachers attending a WILD workshop might be more likely to be exposed to the definition. When we asked the 16 teachers in the primary research what carrying capacity means, only 3 non-WILD and 4 WILD teachers were able to define it. Two teachers who knew the phrase said they didn't use it with their students, even though they covered the concept. Although vocabulary comprehension was certainly a confusing factor in analyzing the results of this concept, I don't think it was the key factor in the difference between WILD and non-WILD student scores. Teachers who weren't familiar with the phrase may have taught the concept without realizing that was what they were teaching. Project WILD teachers clearly had access to activities related to carrying capacity, even if they chose them for another reason. In spring surveys, 90% of the WILD students answered another question about carrying capacity right. This question (Appendix C, Part II, Number 8) did not depend on vocabulary comprehension. It may be that student knowledge of carrying capacity was related to the opportunity to learn about it, and the opportunity to learn may be related to exposure through Project WILD activities. WILD activities linked with carrying capacity in the WILD guide were used 14 times during the research, according to teacher spring survey tallies.

We observed one teacher facilitating the Project WILD activity "Oh Deer." This activity, where people simulate deer seeking food, water, and shelter until the deer population exceeds sustainable numbers, can convey the idea of carrying capacity in a fun way, without depending on the words. In fact, the teacher we observed using this activity was unable to define the phrase and said that she did not cover the concept with her students. Students interviewed following this activity said they learned about habitat and about deer population fluctuations. Sorting out vocabulary from concept comprehension is a difficult task for educational evaluation. These students were exposed to the concept without learning the definition of the phrase.

Interdependence

Knowledge of interdependence is difficult to measure because this concept overlaps with others. Many teachers saw food chains as an aspect of interdependence, and certainly the pattern created by animals needing to eat one another is a layer of the concept. None of the three questions that made up this concept tested for vocabulary comprehension; the word interdependence is not used in the concept questions. All three of the questions could be interpreted in relation to food chains, and one could be considered in relation to human impact. It was very difficult to create questions that truly measured this concept alone, as the concept itself is interdependent with other concepts.

A question (Appendix C, Part II, Number 3) about pesticides in the food chain is largely responsible for the significant difference between WILD and non-WILD responses to the interdependence questions. During interviews, we discovered that some students were familiar with this problem because they had studied it specifically. In teacher surveys we asked teachers only whether they covered interdependence in general. Of 24 teachers surveyed, 10 WILD and 5 non-WILD reported teaching interdependence. In the checklist given to the 16 teachers interviewed in the spring, 6 WILD and 6 non-WILD said they covered pesticides/ insecticides/ herbicides.

The Project WILD guide lists activities related to interdependence. During the research, WILD teachers used 13 of these activities a total of 29 times. These Project WILD activities might have affected student knowledge of interdependence. However, we do not know how the teachers focused each activity they used and different teachers used different activities.

Human Impact

Of the five survey items included in the human impact concept, the question that demonstrated the greatest difference between WILD and non-WILD responses was the following:

People have an effect on wildlife when they...

A. throw away trash
B. buy things that are made in factories
C. drive a car
D. all of these

S. GILCHRIST

This Project WILD activity about fluctuating deer populations exposed students to the concept of "carrying capacity" even if they didn't learn the definition of the phrase.

"All of these" was deemed the correct answer. The correct answer was selected by 60% of the non-WILD and 69% of the WILD classes. The second most frequently selected answer, though not considered correct, was "throw away trash" (20% of the non-WILD and 15% of the WILD classes selected this option). Because the research was conducted during the 20th anniversary of Earth Day, many schools offered programs related to litter and recycling, so it follows that students would see that throwing away trash affects wildlife. Four WILD teachers used the activity "Litter We Know" with their classes during the research year. In interviews, I was surprised that some students didn't see that driving a car could affect wildlife. Few even acknowledged roadkills, an obvious sign that driving a car can affect wildlife. In keeping with the stated goals of Project WILD, the concept of human impact is very important. Recognizing the potential impact of our actions on wildlife is key to taking responsible action. Ideally 100% of WILD and non-WILD students would answer "all of these" actions affect wildlife. Although there was only a 9% difference, this difference is in a positive direction for Project WILD.

Attitudes

No significant differences were found between WILD and non-WILD attitude scores either in the fall or spring *t*-tests (Tables 12 and 13). Strongly significant differences between WILD and non-WILD class attitudes in the fall might have influenced student learning in a confounding way. It is validating that student attitudes did not initially vary by class in the fall. In spring surveys, though the difference was not statistically significant, a higher percentage of WILD compared to non-WILD students provided preferred answers to four Likert-style items that constituted part of the appreciation attitude scores (Table 14).

When we look at the findings from the more complex analysis of variance, we notice that the attitude 'Appreciation' is represented by significantly higher scores among the WILD classes (Table 3). The title appreciation may be misleading, for we mean a positive attitude towards wildlife-related or outdoor activities.

We differentiated between attitudinal and behavioral questions by considering only those that measure what students actually do as representing behaviors. To balance the lack of independence in choosing all their own behaviors, we added some items to find out what students would do, if they had the opportunity. We considered these questions more reflective of attitudes than behaviors. In these questions, the percentage of students who responded "yes," they would like to do each activity, was similar in WILD and non-WILD classes, with a higher percentage of WILD students saying "yes" to camping, canoeing, and hunting. A slightly higher percentage of non-WILD students expressed interest in watching and feeding birds. More non-WILD students said they would like to go to the zoo also. Another survey item asked whether students had ever done these same activities and was considered in the behaviors category.

Behaviors

At the fourth grade level, students are frequently dependent on adult help. They cannot choose all their own wildlife-related behaviors. For example, students may not have opportunity to go fishing or camping unless an adult accompanies them. They may not have the option of visiting a nature center or museum unless an adult transports them. They may not be able to recycle

Table 12. *Average class score for attitude questions by class type and by attitudes for fall season.*

Attitude	Non-WILD[a]	WILD[a]	|t|[b]	*p*
Intrinsic value	3.76 (0.07)	3.92 (0.06)	2.06	0.0635
Human responsibility	3.48 (0.03)	3.54 (0.07)	0.90	0.3870
Appreciation	4.05 (0.05)	4.19 (0.06)	1.76	0.1055
Hunting	3.18 (0.05)	3.19 (0.06)	0.18	0.8606
Overall attitudes	3.63 (0.05)	3.72 (0.05)	2.00	0.0706

[a] Figures in parentheses are Standard errors.

[b] The |t| values were computed under the paired *t*-test for the differences between the averages of non-WILD and WILD classes.

Table 13. *Average class score for attitude questions by class type and by attitudes for spring season.*

Attitude	Non-WILD[a]	WILD[a]	|t|[b]	*p*
Intrinsic value	4.03 (0.07)	4.11 (0.07)	1.14	0.2803
Human responsibility	3.67 (0.06)	3.77 (0.05)	1.75	0.1077
Appreciation	3.23 (0.05)	3.29 (0.06)	0.87	0.4036
Hunting	3.29 (0.05)	3.29 (0.06)	0.08	0.9407
Overall attitudes	3.54 (0.05)	3.60 (0.05)	1.54	0.1522

[a] Figures in parentheses are Standard errors.

[b] The |t| values were computed under the paired *t*-test for the differences between the averages of non-WILD and WILD classes.

Table 14. *Percentage of student appreciation responses in spring surveys.*

Statement	Non-WILD	WILD	Response
Camping and outdoor activities are really fun.	91.3	93.2	Agree/Strongly agree
TV shows and movies about wildlife are interesting.	75.8	79.7	Agree/Strongly agree
When the weather's nice it's better to be outside than inside.	86.8	92.4	Agree/Strongly agree
Learning about wildlife is boring.	76.8	79.0	Disagree/Strongly disagree

Table 15. *Average class score for behavior questions by class type and by behavior for fall season.*

Behavior	Non-WILD[a]	WILD[a]	|t|[b]	*p*
Appreciative	2.50 (0.04)	2.53 (0.06)	0.47	0.6485
Responsible	2.88 (0.04)	2.90 (0.06)	0.29	0.7765
Overall behavior	2.60 (0.03)	3.64 (0.06)	0.54	0.6008

[a] Figures in parentheses are Standard errors.

[b] The |t| values were computed under the paired *t*-test for the difference between the averages of non-WILD and WILD classes.

Table 16. *Average class score for behavior questions by class type and by behavior for spring season.*

Behavior	Non-WILD[a]	WILD[a]	|t|[b]	*p*
Appreciative	2.58 (0.04)	2.60 (0.06)	0.40	0.6972
Responsible	2.95 (0.06)	3.01 (0.07)	0.85	0.4156
Overall behavior	2.66 (0.04)	2.69 (0.06)	0.62	0.5490

[a] Figures in parentheses are Standard errors.

[b] The |t| values were computed under the paired *t*-test for the difference between the averages of non-WILD and WILD classes.

Table 17. *Teachers involving students in action projects.*

Action Project	WILD Classes	Non-WILD Classes
Clean a pond	1	0
Recycle trash	7	6
Raise money	2	1
Write letters	3	0
Build bat/bird houses	1	1
Plant trees	10	11
Other	3	2

Table 18. *Percentage of students reporting participation in selected action projects.*

	Fall		Spring	
Action Project	WILD	Non-WILD	WILD	Non-WILD
Clean a pond	13.4	20.0	26.1	27.9
Recycle trash	65.4	53.7	82.1	80.8
Raise money	24.7	19.3	30.6	21.5
Write letters	35.3	34.7	34.0	33.3
Bird houses	51.4	48.1	57.4	60.9
Other	0.7	0.7	8.6	4.5

(Top photo) Focusing on action oriented projects, we found 13 (54%) of the 24 teachers surveyed in the spring reported recycling trash with their students.

(Bottom photo) In Wisconsin schools, planting trees is emphasized at the 4th grade level, thus it is not surprising that 21 (88%) of the 24 teachers reported tree-planting projects.

PHOTOS: H. QUEEN

unless there are recycling facilities in their home, school, or community. Because students are not always in a position to control their own behaviors, the behavior scores may not be a good representation of student interest in or responsibility for the welfare of wildlife. (It's not known if Project WILD has an impact on reducing destructive behaviors towards wildlife and habitat that could occur independently from adults, such as shooting songbirds.)

Nonetheless, we thought it would still be valuable to see whether any underlying difference between these behaviors set the WILD classes apart from the non-WILD. No significant differences were found in behavior scores between WILD and non-WILD classes in fall or spring (Tables 15 and 16). This lack of differences in behaviors suggests that significantly higher participation in wildlife-related activities did not influence higher concept scores in WILD classes; WILD and non-WILD classes were equally matched in terms of engaging in wildlife-related activities. A comparison of WILD to non-WILD family activities, based on information in parent surveys (Table 4), supports this conclusion.

However, Project WILD is intended to lead students from awareness to action. In a survey of Wisconsin WILD teachers, Zosel (1988) found 38% of the responding teachers said their students had been involved in action-oriented projects to benefit wildlife and the environment as a result of Project WILD. Thus we looked at information related to action-oriented projects that students participated in during the school year. Of the 24 teachers surveyed in the spring, 13 (54%) reported recycling trash with their students and 21 (88%) reported planting trees. Tree planting is particularly emphasized at the fourth grade level in Wisconsin schools. During our research year, Wisconsin's Governor Thompson encouraged every fourth grade student to plant a tree. The high number of teachers who planted trees with

Table 19. *Paired t-test for difference between spring and fall scores by concepts for WILD and non-WILD classes. Average difference represents the average difference between fall and spring scores.*

	Non-WILD			WILD			WILD vs. Non-WILD	
Concept	**Average Difference[a]**	**|t|[b]**	***p***	**Average Difference[a]**	**|t|[b]**	***p***	**|t|[c]**	***p***
Food chain	0.12 (0.02)	5.19	0.0003	0.11 (0.02)	5.78	0.0001	0.19	0.8512
Habitat	0.07 (0.02)	3.31	0.0070	0.06 (0.01)	4.23	0.0002	0.32	0.7573
Definition	0.10 (0.02)	4.76	0.0006	0.08 (0.01)	5.27	0.0002	1.10	0.2930
Adaptation	0.07 (0.02)	4.10	0.0018	0.08 (0.03)	3.17	0.0002	0.37	0.7190
Carrying capacity	0.08 (0.02)	3.35	0.0065	0.09 (0.03)	2.94	0.0002	0.36	0.7268
Interdependence	0.12 (0.03)	3.58	0.0043	0.13 (0.02)	5.41	0.0002	0.15	0.8844
Human impact	0.13 (0.02)	5.52	0.0002	0.15 (0.02)	8.90	0.0001	0.53	0.6054
Overall concepts	0.10 (0.01)	6.62	0.0001	0.09 (0.01)	11.18	0.0001	0.31	0.7660

[a] Figures in parentheses are Standard errors.
[b] *t*-test for difference between fall and spring for each concept.
[c] *t*-test for difference between Wild and non-Wild classes for each concept.

Table 20. *Paired t-test for difference between spring and fall scores by attitude for WILD and non-WILD classes. Average difference represents the average difference between fall and spring scores.*

	Non-WILD			WILD			WILD vs. Non-WILD	
Attitude	**Average Difference[a]**	**|t|[b]**	***p***	**Average Difference[a]**	**|t|[b]**	***p***	**|t|[c]**	***p***
Intrinsic value	0.28 (0.05)	5.90	0.0001	0.19 (0.05)	3.70	0.0035	7.53	0.1551
Human responsibility	0.20 (0.07)	2.28	0.0150	0.23 (0.05)	4.99	0.0004	0.46	0.6524
Appreciation	0.05 (0.07)	0.82	0.4305	0.02 (0.05)	0.48	0.6411	0.87	0.4449
Hunting	0.11 (0.04)	2.68	0.0214	0.10 (0.04)	2.28	0.439	0.23	0.8216
Overall attitudes	0.15 (0.04)	3.66	0.0038	0.12 (0.03)	4.44	0.0010	0.46	0.6626

[a] Figures in parentheses are Standard errors.
[b] *t*-test for difference between fall and spring for each attitude.
[c] *t*-test for difference between WILD and non-WILD classes for each attitude.

Table 21. *Paired t-test for difference between spring and fall scores by behavior for WILD and non-WILD classes. Average difference represents the average difference between fall and spring scores.*

	Non-WILD			WILD			WILD vs. Non-WILD	
Attitude	**Average Difference[a]**	**|t|[b]**	***p***	**Average Difference[a]**	**|t|[b]**	***p***	**|t|[c]**	***p***
Appreciative	0.10 (0.04)	2.13	0.0566	0.07 (0.06)	1.32	0.2130	0.25	0.8096
Responsible	0.04 (0.06)	0.67	0.5169	0.06 (0.06)	1.10	0.2947	1.25	0.2364
Overall behavior	0.09 (0.05)	1.93	0.0795	0.07 (0.05)	1.56	0.1461	0.26	0.7968

[a] Figures in parentheses are Standard errors.
[b] *t*-test for difference between fall and spring for each behavior.
[c] *t*-test for difference between WILD and non-WILD classes for each behavior.

their students is not surprising. Nor is the number who reported recycling unexpected. As 1990 marked the 20th anniversary of Earth Day, many schools and communities initiated or promoted recycling efforts. The number of other projects undertaken seemed few, however, and reports were similar from both WILD and non-WILD teachers (Table 17).

When we surveyed students about participation in selected action projects for wildlife, we found similar results between WILD and non-WILD classes both in the fall and spring (Table 18). The student survey question asked whether students had ever participated in a project to help wildlife or the environment, and thus was broader than the question asked teachers. We expected a more positive response, particularly on something so basic as letter writing. These data simply reiterate the absence of any significant differences between WILD and non-WILD classes in the category of behaviors.

Spring and Fall Differences

When we looked at the difference in student scores from fall to spring, we found that scores for all seven concepts and three attitudes (intrinsic value, human responsibility, and hunting) were significantly higher in the spring for both WILD and non-WILD classes (Tables 19 and 20). The analysis of variance showed the same results as the *t*-tests (Table 3). This indicates that some learning was taking place in both WILD and non-WILD groups. No behaviors were significantly higher in the spring than in the fall in either WILD or non-WILD classes (Table 21).

Concepts

Higher survey scores in the spring than in the fall suggest, as expected, that students in both WILD and non-WILD classes gained increased knowledge of wildlife. In the fall and in the spring, among both WILD and non-WILD students, the percentage of correct answers was the highest for the concept adaptation. The percentage of correct answers was the lowest for carrying capacity. We have already discussed student performance related to carrying capacity, interdependence, human impact, and the definition of wildlife. The remaining concepts are less complex and appropriate to the general discussion of increased scores from fall to spring.

Adaptation

The high understanding of adaptation demonstrated in student surveys was verified in student interviews. There was plenty of opportunity for students to learn about adaptation. In spring surveys, 10 WILD and 8 non-WILD (of 24 total) teachers reported that they taught adaptation. In interviews, all 16 (8 WILD and 8 non-WILD) reported covering adaptation. Adaptation is a topic that tends to be covered at an early age (personal observation). There were numerous references to prior learning related to adaptation among the fourth grade students we interviewed. We also observed teaching about adaptation in both WILD and non-WILD classes during the research. Some of the non-WILD lessons on adaptation were very involved activities, similar to Project WILD in style. We saw students making simulated bird beaks with short or elongated clothes pins and observing the differences in eating related to beak type. We also saw students seeking different colored toothpicks in the green grass and discussing which were easier to find and why. Among the Project WILD activities that were done during the research, ten are listed in the Project WILD guides under adaptation. WILD activities related to adaptation were used a total of 21 times. In short, it is not surprising that students scored high in adaptation.

Habitat

It is surprising, however, that student habitat scores were so low. In 24 teacher surveys, 11 WILD and 10 non-WILD teachers reported covering habitat. In 16 teacher interviews, 8 WILD and 8 non-WILD teachers (100%) reported teaching the topic. During observations, we saw activities and heard discussions related to habitat. More teachers (6) reported facilitating "Habitat Lapsit" than any other Project WILD activity. Fifteen other habitat-related WILD activities from the topical lists in the elementary Project WILD guide were used a total of 31 times. Some of these activities may have been processed to convey concepts other than habitat or to relate the concept of habitat indirectly.

When we interviewed teachers about the definition of habitat, we heard many answers. Although most teachers understood habitat as a place, they did not always associate the survival needs of animals with it or list them as Project WILD does: "food, water, shelter, and space in a suitable arrangement." We interpreted a broader range of answers as correct in interviews than we did in student surveys. It is possible that students understood the basic idea of animals needing a place to live but did not necessarily know the Project WILD-defined components of habitat. In student interviews, we asked what habitat means. In the fall we interviewed 95 students with this question and found that 65% answered correctly. In the spring, we interviewed 101 students regarding habitat and 84% answered correctly. The percentage of students answering correctly was higher in the spring than in the fall in both WILD and non-WILD classes, and slightly higher in WILD than non-WILD classes in both spring and fall (Table 22).

Most students interviewed displayed understanding of the concept that animals need a home, even if they couldn't define habitat. Perhaps the survey questions depended too much on definition rather than on understanding the concept. When we looked at maximum survey scores in each class, we noticed that, out of a possible

Both Project WILD and non-WILD teachers taught about adaptation. In this example of a non-WILD activity, students look for colored toothpicks in the grass.

PHOTOS: S. GILCHRIST

More teachers reported facilitating "Habitat Lapsit" than any other Project WILD activity, yet student scores related to habitat were low.

Table 22. *Student interviews defining habitat correctly.*

	Fall			Spring		
	Students Interviewed	Students Answering Correctly	%	Students Interviewed	Students Answering Correctly	%
WILD	46	37	80	51	45	88
Non-WILD	49	25	51	50	40	80
Total	95	62	65	101	85	84

24, there were only 4 classes in the fall and 9 in the spring in which at least one student scored 100% for the habitat questions. We expected that some students would be able to answer all four questions that composed the habitat concept correctly if our survey questions accurately measured student knowledge. The fact that so few classes had even one student who answered all the habitat questions correctly suggests that the survey questions for this concept may have been confusing or difficult. For whatever reason, the survey questions do not seem to yield habitat scores as high as expected from the observations and interviews, though quantitative trends (higher knowledge in WILD classes and higher knowledge in the spring) are consistent with qualitative findings.

Food Chains

Understanding food chains, like habitat, could be confused by inadequate vocabulary comprehension. From observations and interviews, it seemed that students understood that one animal eats another, yet food chain was not always easily explained. In addition, some students were not clear on the terms predator and prey.

Out of 101 students interviewed in the spring, 71 (70%) correctly explained food chains. In spring surveys, at least one student answered all the food chain questions right in all but two classes. In spring surveys of 24 teachers, 20 reported teaching food chains; 22 reported teaching predator-prey relationships. In interviews of 16 teachers, 14 reported covering the topic of food chains/food webs, while 15 covered predator-prey definitions. It is not surprising that both WILD and non-WILD students scored higher in the spring than in the fall regarding food chains.

Teachers reported using three of the five Project WILD activities listed under the topic of food chains in the elementary guide. At least one teacher participating in the research used each of the six WILD activities listed in the guide's topical index under predator-prey relationships. Project WILD may not offer as many activities related to food chains as related to habitat, but the WILD teachers in the research used what was available to them.

Attitudes

Spring scores were significantly higher than fall scores for both WILD and non-WILD classes in three attitudes: intrinsic value, human responsibility, and hunting. Attitude scores reflect a change in a positive direction from fall to spring.

A Connecticut pilot study of children's attitudes toward animals reported that the attitudes of fifth and sixth graders were still in the formative stages (Kellert and Westervelt 1983). At that age, and presumably at the fourth grade level in the Wisconsin study, children were actively interested in learning about animals. It may follow that these students were particularly impressionable in their attitudes towards wildlife at this stage, and education presented during this time was especially effective in influencing attitudes. It is also possible that student attitudes might have naturally altered during the research year as part of normal development.

Intrinsic Value

When we devised questions to measure the attitude called intrinsic value, we were looking for agreement or disagreement that all forms of wildlife are intrinsically valuable. The attitude of intrinsic value is similar to the concept of interdependence, which includes the statement that "every form of wildlife is a valuable part of the ecosystem it occupies." Concept- or knowledge-based questions were differentiated from attitude questions in that knowledge-based questions were designed with a correct answer in mind. There are no right or wrong answers for attitude questions; just a preferred opinion. Since student scores in the concept interdependence were significantly higher in the spring compared to the fall, it is reasonable to look for higher spring scores in the accompanying attitude, and validating to find them.

When, in spring surveys, teachers wrote the concepts they considered most important to convey to their students, some mentioned appreciation and respect. In this sense, appreciation was more akin to the attitude defined as intrinsic value (i.e., all forms of wildlife are intrinsically valuable) than the attitude appreciation (i.e., wildlife-related or outdoor activities are interesting, exciting, or fun). In other words, it is not surprising that student attitudes of valuing all wildlife increased during the year, since teachers wanted to convey that very idea.

Nor is it surprising that there were no significant WILD/non-WILD differences in the attitude of intrinsic value. According to Ingraham (1990), Project WILD does not address the intrinsic value of wildlife but tends towards the western utilitarian viewpoint. Thus the increase in spring scores for this attitude were not dependent on exposure to Project WILD.

Human Responsibility

The most frequent teacher response (12 teachers) to what they considered the most important idea to convey to their students boiled down to responsibility. The attitude we call human responsibility (i.e., humans hold some responsibility for the care and management of wildlife and the environment) resembles this dominant teacher goal. Hence, it is not surprising that student scores in this area increased.

This attitude also resembles one of the concepts in the research: human impact. All the concepts, including human impact, were significantly higher in the spring than in the fall and it's reassuring that an attitude closely identified with one of the concepts also shows improvement.

Due to the wording of some survey items, the attitude section of the student survey may leave room for different interpretations. We can say definitively, however, that in spring surveys, 92% of the non-WILD and 85% of the WILD students agreed or strongly agreed that people should make sure wild animals have a natural place to live where there's food and water. High agreement on this item suggests that students are embracing the attitude of human responsibility and the concept of human impact.

When one survey item (Appendix C, Part IV, Number 4) in the human responsibility attitude asked students what they would do if they knew that chemicals sprayed on fruits and vegetables to kill the insects were damaging to other wildlife, 62% of the students in each group (WILD and non-WILD) selected the sprayed but washed apples option. Both WILD and non-WILD students responded with more immediate concern for their own health than for the welfare of wildlife, without seeing people as part of the large web of interdependence.

Such contradictions were inherent in some schools we visited. Teachers would promote recycling with the students, yet school lunches would be served with disposable utensils and on styrofoam trays. Since there is no difference in the answers of students exposed to Project WILD compared to the non-WILD answers for this particular question, and since there is no significant difference between WILD and non-WILD behavior scores in general, this area of incorporating simple actions that support wildlife into our daily lives may be a direction for Project WILD to emphasize more in the future. At least some progress was indicated by an increase in the percentage of students opting to eat apples that have not been sprayed but might have brown spots on them (from 14% in the fall to 21% in the spring).

Hunting

The hunting attitude looked at agreement and disagreement with the belief that hunting is an appropriate human activity when done responsibly. There was no difference between WILD and non-WILD hunting attitudes, yet scores for both groups increased from fall to spring. One item in student surveys showed a picture of someone hunting and asked if the activity was bad for wildlife or would harm wildlife (Table 23). Through interviews it became apparent that students think in terms of hurting the individual animal rather than maintaining the health of the whole population. This is not surprising, but education may have affected student understanding of this question. The percentage of answers in the "yes" column was reduced from fall to spring.

DNR ARCHIVES

There were no differences found in hunting attitudes between Project WILD students and non-WILD students. Interestingly, scores for both groups were higher in the spring versus the fall.

Table 23. *Does hunting harm wildlife? Percentage of student responses in surveys.*

	Fall			Spring		
Class	**Yes**	**No**	**Unsure**	**Yes**	**No**	**Unsure**
WILD	74.3	14.7	10.3	58.1	24.4	16.2
Non-WILD	82.8	9.8	4.2	69.0	18.9	11.4

In classroom observations, we witnessed one teacher using the Project WILD activity "The Hunter," which deals with the sensitive issue of hunting through an incomplete story. Some teachers (three WILD and seven non-WILD) reported at least mentioning hunting and fishing in class, but it is my sense that few teachers directly addressed the topic of hunting as an educational issue. Perhaps student acceptance of responsible hunting increased in conjunction with increased knowledge of concepts related to the needs of wildlife and carrying capacity. Or perhaps student attitudes just changed as students grew older.

Behaviors

The lack of significant differences in behavior scores in the spring compared to the fall may indicate that students didn't have sufficient opportunity to engage in wildlife-related activities during the school year. The climate in Wisconsin, with long cold winters, supports this theory, as activities such as camping and canoeing depend on warmer weather. It may be harder for families to do even weather-independent activities during the school year too, since student time is tied up with school. We didn't necessarily expect any great increase in reporting these behaviors.

However, participation in action projects should have shown a marked increase from fall to spring if teachers were applying the environmental education goal of leading students from awareness to responsible action. The number of students who reported participating in selected action-oriented projects, according to student surveys, increased slightly in the spring (Table 18).

Ways Students Learn

An initial focus of this research was to look at ways students learn about wildlife and the environment. We hoped that looking at student learning in a larger context might provide some insights on how to implement Project WILD effectively. We wanted to know if students were indeed learning from exposure to Project WILD and what other factors influenced their learning.

Comparing WILD and Non-WILD Changes from Fall to Spring

Learning, as represented by increased survey scores from fall to spring, was occurring in both WILD and non-WILD classes. But WILD class survey scores did not increase significantly over non-WILD class scores when we compared the fall-to-spring changes in knowledge, attitudes, and behaviors. According to this analysis, students in WILD classes did not seem to be learning significantly more than students in non-WILD classes (Tables 19, 20, and 21).

The margin for increased survey scores was narrower for WILD classes, since their scores were initially higher in the fall, and the comparison is based on scores that have an upper limit. This narrower margin for improvement in WILD classes may have inhibited the growth of the difference between WILD and non-WILD scores in the spring. But there was still room for learning.

The lack of any significant difference between the WILD and non-WILD fall-to-spring change in knowledge, attitudes, and behaviors is not surprising. With the influence of seven Project WILD activities seeming small compared to nine years of life experiences that confound the research, we knew it would be difficult to measure so fine a difference statistically. It is surprising that any differences were found, that WILD classes scored higher at all.

Redefining Learning

When we redefined learning as a student answering a question wrong in the fall but right in the spring, compared to their non-WILD counterparts, the WILD classes had a higher percentage of students that learned in all concepts except habitat. Learning was significantly more for WILD classes in the concept adaptation to the 5% level (P=0.0248) and to the 10% level in food chains (P=0.0571), human impact (P=0.0858), and overall concepts (P=0.0780). These data reflect the average number of questions learned as a percentage of the total wrong answers in the fall (Table 24). The results of this analysis indicate a difference between WILD and non-WILD classes in their progress from fall to spring that

Table 24. *Percentage of the total number of wrong answers in the fall for each concept and over all concepts.*

Concept	Non-WILD[a]	WILD[a]	$\|t\|$[b,c]	p
Food chain	53.9 (2.8)	61.2 (2.7)	1.909	0.0571
Habitat	34.0 (2.2)	32.7 (2.1)	0.4220	0.6733
Definition	62.9 (3.1)	66.9 (3.2)	0.8975	0.3702
Adaptation	76.3 (4.5)	89.0 (3.3)	2.2717	0.0248
Carrying capacity	32.2 (3.2)	37.4 (3.3)	1.1440	0.2535
Interdependence	64.3 (4.1)	70.4 (3.8)	1.1108	0.2678
Human impact	59.7 (3.7)	68.6 (3.6)	1.7246	0.0858
Overall concepts	52.5 (1.4)	55.9 (1.3)	1.7674	0.0780

[a] Figures in parentheses are Standard errors

[b] t-test for difference in the percentage of total wrong answers between WILD and non-WILD classes for each concept.

[c] t-values were computed under the assumption of unequal variances.

was not detected in the other analysis. This may be because the whole class contributed to the earlier analysis, and there may have been limited room for improvement in the WILD classes in general, due to their high initial (fall) scores.

To check our understanding of student learning based on survey scores, we examined the survey questions for basic learnability. We identified the questions which were learned by less than 50% of the students who answered them wrong in the fall. Only 5 of 27 concept questions fell into this low level of learnability. Three of the five were questions that depended on vocabulary; the other two were linked with the definition of wildlife concept. Three of the five questions depended on slide images. The statistical indications that these particular questions were difficult or confusing were confirmed by some interviews. We also looked at the minimum and maximum concept score attained by students in each class to find out if it were possible for these students to answer the concept questions correctly. Maximums appeared to be comparable over all classes and most concepts had maximums of 100%. We also divided the survey questions between vocabulary-dependent and -independent and compared scores and discovered that students generally did better on the independent concept questions than on the vocabulary-dependent ones. Only 3% (3.6 in the fall; 2.4 in the spring) of the participating students reported on the survey that it was hard. Interviews were useful in finding out which questions may have been particularly confusing, why some students answered the way they did, and whether student concept knowledge was accurately reflected in survey scores.

Greater learning related to wildlife among WILD classes is consistent with expectations based on classroom observations as well. We requested that both WILD and non-WILD teachers focus on environmental education, particularly wildlife education, when we visited, and we encouraged WILD teachers to use WILD activities. Recognizing that classroom visits were very limited (four observations in each class over the year), and that we don't know with any certainty what happened when

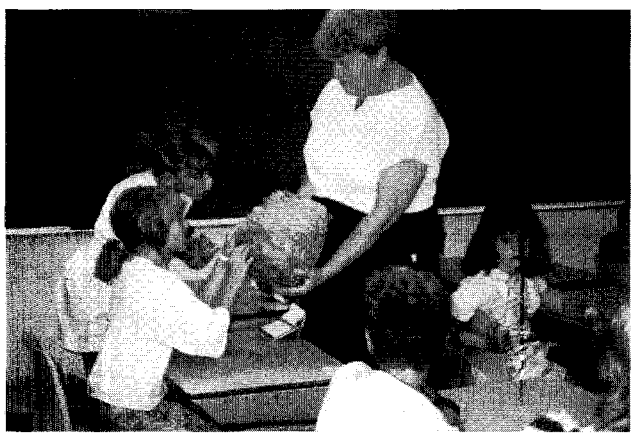
Table 25. *Activities observed by category*[a].

Activity	WILD	Non-WILD
Reading	2	9
Writing	3	4
Art	9	7
Film/video	3	9
Discussion	10	8
Brainstorm	4	3
Field trip	4	4
Participation game	11	2
Hands-on	7	6
Guest speaker	2	1
Show-n-tell	1	4
Outside at school	5	2
Worksheet	1	1
Pictures	2	—
Research	1	3
Interview/roles	1	2
Small group work	3	3
Q&A/ID/flash cards	—	3
Demonstration	1	2
Other	3	2

[a] Frequently more than one activity was seen during a single observation visit.

(Top photo) Teachers, students, and parents all identified the classroom as an important source of learning about wildlife. Here students examine a hornet nest.

(Bottom photo) Although current events were not rated as a major influence on student learning, most teachers incorporated a current events newsletter like Weekly Reader *to introduce key environmental topics.*



PHOTOS: S. GILCHRIST

we were not present, we saw more activities directly related to wildlife in the WILD classes than in the non-WILD. Of 32 total regular observations in WILD classes, 30 lessons were directly related to wildlife. Of 32 non-WILD observations, 22 were directly related to wildlife. The higher number of wildlife-related activities observed in WILD classes may reflect inadequate resources for wildlife activity ideas outside Project WILD. When classes were in the same school, they usually followed the same basic curriculum, so both the WILD and non-WILD classes, for example, covered adaptation, endangered species, rain forests, or pollution; only they tended to cover the same topics in different ways. The WILD-trained teachers had more resources related to wildlife education, specifically the Project WILD guides. The non-WILD teachers had no particular resource related to wildlife available, except occasional references to wildlife-related activities in textbooks, *Naturescopes*, magazines and *Weekly Reader* (a popular current events newsletter), or wildlife films. All these resources were available to WILD teachers as well as non-WILD. We saw more textbook reading and film watching in non-WILD classes, and more active participation activities in WILD classes (Table 25). If the prevalent theory in environmental education is true, students learn better from doing than from passively being told, whether by a teacher, a film, or a book. Wadsworth (1979) emphasized this aspect of Jean Piaget's research on child development and learning. Likewise, McInnis (1972) draws generalizations from educational research and says that people learn best by doing.

Sources of Learning

Other research has indicated that the classroom is not the main source of children's learning about wildlife and the natural environment; the media (television and magazines) is more influential (Eyers 1975; Langenau and Mellon-Coyle 1977; Richmond and Morgan 1977; Pomerantz 1977, 1985, 1986; inter alia). In this research, however, teachers, students, and parents all identified the classroom as an important source of learning about wildlife. Wildlife education in schools has probably increased in the years since most earlier research studies. Project WILD has been available since 1983, but only in some states. Legislation may have increased the amount of environmental education in schools in recent years as well. Or it may be that survey respondents were prompted to give a school-related response because the questions were presented to them through a school setting. For whatever reasons, participants in this study indicated that classroom activities were influential. In addition, television and magazines were used as classroom activities during the research and constituted part of the influential aspect of classroom activities, thus this research is not directly contradicting earlier findings.

To understand the effects of Project WILD, we investigated the influence of other confounding sources of student learning about wildlife. In their respective surveys, we asked students, teachers, and parents where students learned about wildlife (Tables 26, 27, 28). Table

26 shows the percentage of 24 teachers who provided each response. On a scale from 1 (no influence) to 5 (major influence), they rated nine selected influences. More teachers (19) rated classroom activities and teachers "strong" or "major" influences than rated any other influence "strong" or "major." All 6 teachers who rated Project WILD lessons as having no influence were non-WILD teachers. We expected all 12 non-WILD teachers to rate Project WILD as having no influence on their students, but some of them may have interpreted the question generically rather than specifically: how strong an influence might Project WILD have on students if they were exposed to it.

Although teachers did not rate current events as a major influence on student learning about wildlife on surveys, they referred to it as such during interviews, observations, and informal conversations. The 20th anniversary of Earth Day occurred during the research year, and the media coverage of this event certainly promoted Earth Day-related activities. The Exxon Valdez oil spill also happened during that year, and the news was full of tales of human impact on the natural environment and pollution effects on wildlife. Concern about deforestation of tropical rain forests was also a big news item at that time and the Yellowstone fires still drew media attention. Wildlife-related discussions sometimes sprang from current events discussions. Most of the teachers (20 of 24, or 83%) reported using a current events newsletter or periodical, such as *Weekly Reader*. *Weekly Reader* is used in approximately 90% of the nation's school districts.

Student surveys asked about sources of learning in a different way; still, student responses reiterated what the teachers said. More students said they learned from classroom activities than other sources listed. Both teachers and students identified student sources of learning in basically the same order: teachers and classroom activities as primary, field trips as secondary. Television, books, and magazines fell in the middle. Parents and family activities were listed as least influential, although interviews included many references to learning about wildlife through parents or personal experiences outside school. In the table based on student responses in spring surveys, answers are summarized with percentages of students who answered each way (Table 27).

A similar question was posed to parents as part of their survey. Parents saw the family as a comparatively stronger influence than the teachers or students did. Yet parents still saw school as a strong source of learning for their children (Table 28). This discussion is not meant to debate which influence on student learning about wildlife is stronger, school or family, but merely to establish that teachers, students, and parents all see schools as an important source of learning about wildlife. Later multiple regression analyses will show that parents and family activities do influence student learning in some situations.

Table 26. *Where students learned about wildlife according to spring teacher surveys*[a].

Influence on Students	No	Little	Some	Strong	Major
Classroom activities	0	4.2	16.7	45.8	33.3
Field trips	0	0	45.8	29.2	25
Television and movies	4.2	8.3	29.2	50	8.3
Books and magazines	0	8.3	50	25	16.7
Parents	0	20.8	58.3	12.5	8.3
Teachers	0	0	20.8	41.7	37.5
Location of home	8.3	16.7	41.7	29.2	4.2
Current events	0	0	58.3	33.3	8.3
Project WILD lessons	20.8	0	25	25	16.7

[a] Teachers were asked which factors have influenced student knowledge and attitudes regarding wildlife the most. This table shows the percentage of 24 teachers who provided each response.

Table 27. *Where students learned about wildlife according to spring student surveys*[a].

Influence	Yes	?[b]	No
Classroom activities	93.9	2.0	3.4
School field trips	88.4	4.3	7.1
Activities with family	67.3	16.3	15.5
Nature programs on television	81.6	11.1	6.8
Books and magazines	79.4	13.4	6.6
Visits to museums	78.7	12.1	8.7
Camp, scouts, or 4-H	57.0	34.2	8.5

[a] Students were asked whether they had learned about wildlife and the environment from each activity listed. Numbers are percentages of students responding.

[b] Students were directed to mark "?" if they were unsure.

Table 28. *Where students learned about wildlife according to parent surveys*[a].

How Much Has Your Child Learned About Wildlife	Nothing	Very Little	Some	Very Much	No. Responding
From school activities	0	7.1	61.8	31.1	437
From family activities	2.1	13.3	51.3	33.3	435
From books and magazines	2.3	27.1	56.2	14.5	436
From movies and television shows	1.1	21.7	54.3	22.9	438
From other sources	28.3	9.1	37.4	25.3	99

[a] Parents were asked how much they thought their child had learned about nature and wildlife from each of five sources on a scale where 1=nothing, 2=very little, 3=some, 4=very much. Numbers refer to percentages of parents responding.

Table 29. *Regression analysis for WILD students.*

Variable	Parameter Estimate	Standard Error	t for H_0: Parameter=0	*p*
Intercept	44.612664	2.339456	19.070	0.0001
Parent interest	2.779762	1.657667	1.677	0.0952
Rural community	-2.487932	0.945917	-2.630	0.0092
Black	-8.647459	1.711367	-5.053	0.0001
Rural residence	-0.176836	1.220691	-0.145	0.8850
Parent grew up rurally	-1.068813	0.913445	-1.170	0.2435
Male student	-1.456602	0.834325	-1.746	0.0825
Prior knowledge	0.570307	0.027964	20.394	0.0001

Table 30. *Regression analysis for non-WILD students.*

Variable	Parameter Estimate	Standard Error	t for H_0: Parameter=0	*p*
Intercept	36.688661	2.540778	14.440	0.0001
Outdoor activities	0.324404	0.129478	2.505	0.0132
Adult contributes	1.055172	0.744933	1.416	0.1586
Parent interest	2.392695	1.549303	1.544	0.1245
Rural community	-4.651255	1.382949	-3.363	0.0010
Black	-8.005520	2.712573	-2.951	0.0036
Lower middle income	-1.777254	1.222326	-1.454	0.1479
Rural	1.826782	1.538899	1.187	0.2369
Parent grew up rurally	0.932000	1.201744	0.776	0.4392
Poor black female	9.608989	5.755058	1.670	0.0969
Male student	3.161760	1.143316	2.765	0.0063
Prior knowledge	0.610164	0.037848	16.121	0.0001

R. QUEEN

Although male responses suggested more interest in hunting than female responses, gender was not a primary influence on student learning.

In fall student interviews, we asked 94 students three related questions:

1. How do you think you have learned about wildlife?
2. What's the most interesting thing you've learned about wildlife in the past year?
3. How did you learn that?

Categories that emerged from the interview responses were the same as those we had selected for inclusion in the survey questions. The most frequent response categories were: television/movies; school; family; books; nature/direct observation; and magazines. WILD students mentioned the teacher more frequently and the family less frequently than the non-WILD students did.

Gender as a Factor Related to Learning

When we added student gender to the analysis of variance, we found that scores were significantly higher for boys overall plus in three concepts (food chains, habitat, and human impact), hunting attitudes, and both appreciative and overall behaviors (Table 3).

The fact that boys scored significantly higher than girls in several areas is consistent with other research. Kellert and Westervelt (1983) found males more knowledgeable about animals and females more humanistic. Race (1990) found similarly that males scored higher in the cognitive domain, females in the affective.

As hunting has traditionally been a male-dominated activity, it is not surprising that male responses suggested more interest in hunting, both in surveys and interviews. Many of the boys expressed an interest in hunting when they were older. Few girls indicated the same.

However, in the multiple regression analysis, student gender was not a significant factor related to student survey scores. Hence gender does not appear in the reduced models of the general regression analysis. Survey instruments were sensitive enough to show some differences based on gender, yet gender was not a primary influence on student learning.

When we examined influences on WILD and non-WILD classes through separate regression analyses (Tables 29 and 30), we found that being male exerted a significant positive influence on student scores for non-WILD students only, not for WILD. This research does not indicate that students exposed to Project WILD must be male to learn well.

The Influence of Family Characteristics on Student Learning

To control for learning about wildlife outside the classroom and variation due to parental or family factors, we analyzed a total of 454 parent surveys. Although it took several months for some parents to return their completed

surveys, the response rate was 74%. In addition, an unexpected number of parents added written comments to the surveys. In the regression analysis models, parent interest in having the student learn about wildlife and the environment was a highly significant factor related to student survey scores (Tables 31A, 31B, and 31C).

Aside from one parent who stopped me in the hall to say that she hadn't returned the parent survey but would tell me information in person— and proceeded to enthusiastically relate her interest in wolves— we had no feedback from nonrespondents. The numbers of parents responding was similar in WILD and non-WILD classes, so even if responding indicated particular interest in wildlife or environmental education for their children, parent interest was balanced between the two groups.

In student interviews, the parents' influence on learning about wildlife came up repeatedly. Although teachers and students rated teachers or classroom activities a stronger influence on student learning, they recognized parents or family activities as an important contributing factor.

The typical profile for the adult filling out the parent survey (and thus most likely the family participating in the research) is: lives in an urban residence (80% of the non-WILD families, 80% of the WILD families); grew up in an urban residence (63% non-WILD, 64% WILD); is female (71% non-WILD, 67% WILD); is white (87% non-WILD, 88% WILD); is married (81% non-WILD, 78% WILD); earns a middle-level income (67% non-WILD, 66% WILD); is interested in learning about wildlife and the environment (80% non-WILD, 84% WILD); and is interested in having the child learn about wildlife and the environment (94% non-WILD, 93% WILD).

As to why both WILD and non-WILD parents expressed more interest in having their children learn about wildlife and the environment than themselves, we cannot say. Perhaps they see environmental issues as vital concerns of the future or believe they know enough already, or perhaps their own interests are simply channeled elsewhere. Regardless, the high interest parents expressed in having their children learn about wildlife and the environment bolsters support for environmental education programs, perhaps including Project WILD.

Having established that family characteristics of students in WILD classes were not appreciably different from those in non-WILD classes, that the samples were similar, and that comparisons between the two groups are valid, we investigated which family characteristics correlated with student scores in

Table 31a. *Regression analysis of family characteristics on spring student survey scores.*

Variable	Parameter Estimate	Standard Error	t for H_0: Parameter=0	*p*
Intercept	0.713966	0.017822	40.060	0.0001
Environmental programs	0.017853	0.007210	2.476	0.0137
Adult hunts	-0.024512	0.011226	-2.183	0.0297
Reads books	0.020423	0.011353	1.799	0.0729
Reads magazines	0.031159	0.011646	2.675	0.0078
Parent interest	0.066175	0.015451	4.283	0.0001
Agricultural community	-0.147059	0.048089	-3.058	0.0024
WILD class	0.047469	0.011071	4.288	0.0001
Lower middle income	-0.051172	0.012430	-4.117	0.0001
Poor female respondent	-0.039954	0.017592	-2.271	0.0237
Black female respondent	-0.150731	0.023545	-6.402	0.0001

Table 31b. *Regression analysis Model 2.*

Variable	Parameter Estimate	Standard Error	t for H_0: Parameter=0	*p*
Intercept	0.425979	0.027245	15.635	0.0001
Outdoor activities	0.002042	0.001045	1.954	0.0514
Adult hunts	-0.016765	0.009907	-1.692	0.0915
Parent interest	0.043321	0.012807	3.383	0.0008
WILD class	0.017531	0.009359	1.873	0.0619
Lower middle income	-0.036457	0.010390	-3.509	0.0005
Rural community	-0.025226	0.009903	-2.547	0.0113
Black female respondent	-0.152675	0.024538	-6.222	0.0001
Poor female respondent	-0.030217	0.015672	-1.928	0.0546
Poor black female	0.067352	0.040374	1.668	0.0962
Fall survey scores	0.501149	0.035891	13.963	0.0001

Table 31c. *Regression analysis Model 3.*

Variable	Parameter Estimate	Standard Error	t for H_0: Parameter=0	*p*
Intercept	0.380570	0.047947	7.937	0.0001
Outdoor activities	0.001428	0.001087	1.315	0.1896
Adult hunts	-0.009883	0.010370	-0.953	0.3413
Parent interest	0.043591	0.013650	3.194	0.0015
WILD class	0.016325	0.009643	1.693	0.0914
Lower middle income	-0.039809	0.010834	-3.674	0.0003
Rural community	-0.021761	0.010302	-2.112	0.0354
Black female respondent	-0.154326	0.025313	-6.097	0.0001
Poor female respondent	-0.032480	0.016585	-1.958	0.0510
Poor black female	0.056755	0.042577	1.333	0.1835
Fall survey scores	0.485454	0.037480	12.952	0.0001
Parent attitude 1	0.013420	0.009883	1.358	0.1755
Parent attitude 2	0.009150	0.010927	0.837	0.4030
Parent attitude 3	-0.005640	0.010856	-0.520	0.6038

both WILD and non-WILD classes. To identify these characteristics, we conducted a regression analysis, using variables from the parent survey plus school community (urban or rural) and class (WILD and non-WILD) from student surveys. These variables explain 31% (adjusted R-square 0.3097) of the variation. Students who attend more wildlife or environmental education programs, read more wildlife-related books and magazines, have parents more interested in learning about wildlife and the environment, and are in a WILD class, are likely to score well on the survey. According to this analysis, Project WILD is a strong, positive influence on student knowledge of wildlife concepts (Table 31A).

The four most significant variables were: (1) the parent survey respondent was a black female; (2) the student was in a WILD class; (3) the parent was interested in learning about wildlife and the environment; and (4) the household was lower middle income level. Of these four, the WILD class and parent interest in environmental education exerted positive influences on student performance in the surveys; the black female survey participant and lower middle income bracket exerted influence in a negative direction. We cannot explain the significance of the black female variable, as the set is not necessarily the same as the set of single parents or poor survey participants. The set is, however, a subset of urban participants. All we can say is that the variable we called black females must represent some unidentified but highly significant variable. It is not logical that the race and gender of the adult filling out the parent survey, as an isolated factor in its own right, should have any effect on the student's score, so this highly significant variable lacks meaning in this interpretation.

Since other research has found the media, especially television and magazines, very influential in conveying information about wildlife and the natural environment (Pomerantz 1986), we were surprised that television and movies were not significant in this analysis. It is possible that the student and parent questions related to television and movies about wildlife were too limiting. Television shows and movies on other subjects could teach concepts (or misconceptions) about wildlife incidentally. Or maybe the frequency of watching television is less relevant than the subject matter. From interviews we know that many students watch few wildlife television shows, but still watch a lot of television. The fact that television watching is nonsignificant in this analysis may not be meaningful.

Magazine availability did appear significant in this study, which is consistent with the media findings referred to above. Many students said they read *Ranger Rick* magazine either at home or at school. In a separate study on the effects of *Ranger Rick* (Pomerantz 1985), children who read the magazine were found to have higher knowledge scores and more positive conservation attitudes.

Using only the significant variables from this regression analysis model, a second model was constructed (Table 31B). This model explains 52% of the variation with few variables (adjusted R-square 0.5191) and yielded results similar to a third model constructed for the regression analysis and controlling for even more variables (Table 31C). This model explains 53% of the variation (adjusted R-square 0.5312). The parent attitudes (Parent Survey Section III) as they clustered in the factor analysis were added. None of these new factors was significant in the third model of the regression analysis. Parent interest and fall scores were highly significant in a positive direction. Lower middle income level and a black female parent survey respondent were both highly significant ($P < 0.01$) in a negative direction. Having a poor female complete the survey and being from a rural community school were both significant to the 5% level and in a negative direction. Project WILD exerts a positive influence on student scores, but in this model it is only significant to the 10% level. We still cannot adequately explain the significance of having a black female complete the parent survey as a factor affecting student survey scores. All but one of the black females who filled out the form lived in urban residences. Also, 84% of the poor females who filled out the survey are urban. Of these, 77% are non-WILD, 84% WILD. The fall scores are positively related to spring scores in this analysis, so that if a student scores above the mean in the fall, he or she is likely to score above the mean in the spring too.

The analysis accounting for the largest percentage of variation was a regression analysis conducted separately for WILD (71%) and non-WILD (75%) students, to determine which family characteristics influenced student survey scores significantly in each group. In each case a model with many variables was reduced. The spring overall concept score is the dependent variable. For the WILD analysis, the adjusted R-square is 0.7540 (Table 29). It's 0.7087 for the non-WILD version (Table 30). Different factors are significant for WILD than for non-WILD students. Students in WILD classes are significantly affected in a positive direction by parent interest in learning about wildlife and prior knowledge. Negative influences on WILD spring scores are: attending a rural school, being black, and being male. Attending a rural school and being black are both negative influences on non-WILD spring scores also. But non-WILD students were significantly and positively affected by more factors: outdoor activities, having a poor black female complete the parent survey, being a male student, and having higher prior knowledge.

For WILD students, the more prior knowledge and the more parental interest in learning about wildlife and the environment, the higher their spring overall concept scores. The directional influence of a rural community, however, is negative. Students in WILD classes who are from urban schools are more likely to score better in the spring than students from rural schools. Perhaps Project WILD is more effective in urban classes. This point is discussed further under the urban and rural differences section. Having a parent who grew up in a rural area and being male both yield a significant and negative effect. While males are traditionally more knowledgeable about wildlife, females may learn more from exposure to Project WILD. A rural upbringing was expected to correlate as a

positive influence on knowledge about wildlife. Perhaps students with parents who grew up in rural areas are exposed to wildlife knowledge incidentally, similar to the way students attending a school in a rural community might be, and so are less affected by a wildlife education program like Project WILD. Having prior knowledge is the strongest influence on spring scores among WILD classes; being black is the second. Black students in WILD classes are not scoring as high as nonblacks. This may be another reason for emphasizing urban education efforts, since the black students in this study were almost exclusively urban. If Project WILD is an effective tool for urban students but is not educating black students well, there may be other education needs in the black community that Project WILD does not address.

For non-WILD students, as for WILD students, prior knowledge is the strongest influence on spring survey scores. The more a student knew already, the higher his or her spring score would be. Other significant factors exerting positive influence on non-WILD spring scores are being male; participating in wildlife-related activities such as fishing, walking in the woods, camping, feeding birds, visiting the zoo; and having a poor black female complete the parent survey. In non-WILD classes, males, who are traditionally more knowledgeable about wildlife, do better than females. Traditionally males have also been involved in more outdoor activities and one would expect those who engage in more wildlife activities to know more about wildlife. Being black exerts a negative influence on non-WILD scores, as does attending a rural school. Black students don't do as well as nonblack students in non-WILD classes. The same is true for WILD classes. Students in rural schools don't learn as much in non-WILD classes as students from urban schools. This is also true for Project WILD classes. Perhaps what this means is that the formal education system related to wildlife is geared more to the nonrural setting. Environmental education tests may get the best results with students who already know formalized concepts and who are used to learning from the school rather than from the natural environment around them.

Parent interest in learning about wildlife is not significantly correlated with high spring scores in non-WILD classes, whereas for the WILD students it is. Perhaps parental interest creates the notion in student minds that Project WILD is a little different and especially interesting: an educational treat. This makes sense even if the parents are not personally familiar with Project WILD, simply because there are no other broad, concept-based wildlife education programs that are widely used in schools. Since WILD activities are memorable, students may talk to their parents about what they're learning, which may create a positive reaction among parents who are interested in learning about wildlife themselves. A positive parental reaction may encourage student participation more, whereas a negative parental reaction might reduce enthusiasm for the program. In a non-WILD, or more traditional classroom, students may be less dependent on parental interest in any particular topic. There is no clear cause-and-effect relationship defined by the data; these ideas represent one attempt to make sense out of many different data pieces.

The fact that different factors significantly affect learning about wildlife concepts in WILD and non-WILD schools may represent some undefined but fundamental difference in WILD classes compared to non-WILD classes. Perhaps teachers who use Project WILD are more comfortable with alternative forms of learning, such as participatory activities rather than sedentary and traditional activities such as text reading. Project WILD moves away from traditional education methods, but within the school or formal education setting. The program departs from traditional learning about wildlife too, because it is taught in a school context rather than necessarily out in the woods. Thus the program may be effective with urban students and females, with students who are used to formalized learning but are not the traditional wildlife experts either.

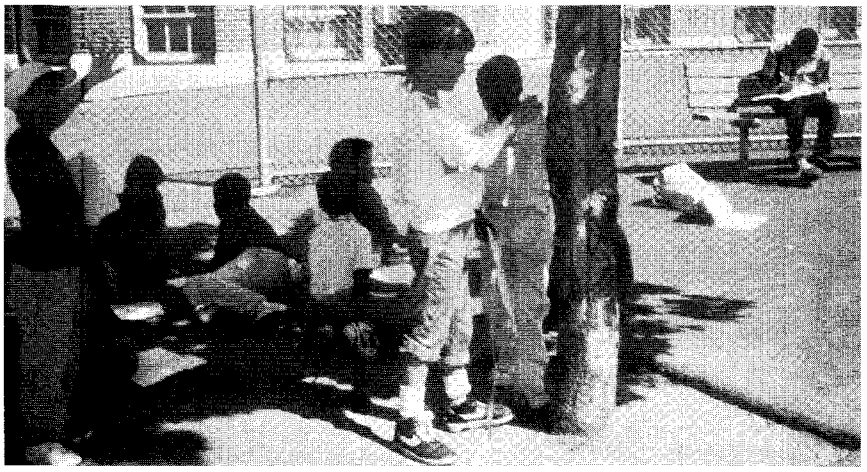
PHOTOS: S. GILCHRIST

Project WILD teachers may be more comfortable with alternative forms of learning than their non-WILD counterparts. Here teachers employ two types of learning: the more traditional method of text reading (left photo) and a Project WILD activity (right photo).

Urban and Rural Differences

In other research related to Project WILD, findings on urban and rural differences have been inconsistent (Fleming 1983, Smith-Walters 1988, Race 1990). In conducting analyses of student survey scores and in interviewing students, we noticed some differences between students in urban and rural school communities. We also looked at parent survey responses as a source of data regarding urban-rural differences in student knowledge. The analyses conducted through the parent survey data define the student as urban or rural based not on type of community surrounding the school, but on the residence reported by the parent. This individualized definition increased the ranks of the urban students because many students surrounded by rural communities actually lived in towns. These two different definitions of urban and rural may seem confusing, but I shall refer to one as the community or school and the other as the residence or dwelling. Differences in procedure and definition account for any apparent differences in results between the two analyses.

In the analysis of variance (Table 3), we examined the combined effects of season, class type, and community type on student survey scores. Average class scores were higher for rural classes in four concepts (adaptation, definition, human impact, and interdependence), three attitudes (appreciation, hunting, and intrinsic value), and no behaviors. (Note that many of the students considered rural in the analysis of variance were included in the urban category in the regression analysis, which probably accounts for the apparent contradiction.)



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Exposure to Project WILD is a highly significant positive factor for students living in urban surroundings because they are less likely to be exposed to wildlife in their daily surroundings.

Qualitative data particularly support one aspect of this finding. Although it was never the most common response, in interviews some students defined wildlife as animals that are potentially dangerous or mean. This response was more common among students in the inner-city school community than in the rural or urban industrial communities (Table 32). From a national attitude survey of fifth and sixth graders, Westervelt (1987) reported more fear of wild animals among urban residents. If students include a potential attitude of fear in defining wildlife, perhaps this needs to be addressed to open the door for further learning. The number of students defining wildlife as dangerous was fewer in the spring, so perhaps education fulfilled a clarifying function. All four of the inner-city teachers in the primary research design reported that they covered the definition of wild versus domestic animals with their students.

Through interviews, many children associated wild animals with those they see in zoos. Field trips to the zoo are common for elementary school children, particularly in urban areas. Although we did not explore this hypothesis further, it seems that trips to the zoo might affect the image or definition of wildlife in urban children's minds, especially if zoo animals are the majority of the undomesticated animals to which they are exposed within the framework of education.

Rural students have more access to wildlife-related activities and to hunting, and thus the difference in attitudes towards those things is not surprising. Nor is the lower score in intrinsic value of wildlife among urban students surprising. For the few who see wild animals as dangerous, it may be harder to value wild animals positively.

For the regression analysis constructed from the parent surveys, we found, through a factor analysis, that different variables were significant to urban and rural dwellers. We conducted two regression analyses, one for each type of residency (Tables 33 and 34). The season (spring scores being higher), reading more books, and having parents interested in learning about wildlife and the environment were factors significant to both rural- and urban-dwelling students.

Table 32. *Definition of wildlife as mean or dangerous by urban-rural school community.*

	Fall			Spring		
School Community	**No. Interviewed**	**No. Saying Mean/Dangerous**	**%**	**No. Interviewed**	**No. Saying Mean/Dangerous**	**%**
Rural forested	22	0	0	25	0	0
Rural agricultural	24	1	4	28	1	4
Urban industrial	24	1	4	22	1	5
Urban inner city	22	6	27	25	2	8

Table 33. *Regression analysis for rural dwellers.*

Variable	Parameter Estimate	Standard Error	t for H_0: Parameter=0	*p*
Intercept	0.585118	0.059021	9.914	0.0001
Outdoor activities	-0.007349	0.002039	-3.605	0.0004
Museum, etc. visits	0.032865	0.007244	4.537	0.0001
Reads books	0.082076	0.082770	3.941	0.0001
Parent interest	0.155896	0.047913	3.254	0.0015
Single parent	-0.072193	0.039315	-1.836	0.0686
Adult:child ratio	-0.052137	0.018591	-2.804	0.0058
Upper middle income	0.021829	0.018629	1.172	0.2434
Black	-0.123849	0.088464	-1.400	0.1639
Season	0.087302	0.017762	4.915	0.0001

Table 34. *Regression analysis for urban dwellers.*

Variable	Parameter Estimate	Standard Error	t for H_0: Parameter=0	*p*
Intercept	0.0373075	0.060615	6.155	0.0001
Wildlife programs	0.030726	0.006359	4.832	0.0001
Adult hunts	-0.018758	0.010127	-1.852	0.0645
Reads books	0.017795	0.009678	1.839	0.0665
Reads magazines	0.033371	0.010065	3.316	0.0010
Parent interest	0.044774	0.012684	3.530	0.0004
Forest community	0.072234	0.050958	1.418	0.1569
WILD class	0.050486	0.009502	5.313	0.0001
Adult's education	0.012479	0.003617	3.451	0.0006
Lower middle income	-0.040841	0.014374	-2.841	0.0047
Upper middle income	-0.017435	0.013705	-1.272	0.2038
Adult's occupation	0.018943	0.010238	1.850	0.0648
Adult grew up rurally	0.028129	0.010727	2.622	0.0090
Season	0.106282	0.009283	11.449	0.0001
Poor black female respondent	-0.043784	0.018091	-2.420	0.0158
Black female respondent	-0.100662	0.018781	-5.360	0.0001
Parent attitude 2	0.014281	0.009668	1.477	0.1402

Table 35. *Rural-nonrural comparison for overall concept scores; rural defined by residence.*

	Rural Mean	Nonrural Mean	t	DF	*p*
Fall	72.52	67.89	-2.6358	366.0	0.0088
Spring	81.44	78.62	-1.7436	366.0	0.0821
Prior knowledge	65.85	61.09	-2.2550	366.0	0.0247
Learned	55.22	54.06	-0.4888	366.0	0.6253

Table 36. *Rural-nonrural comparison for overall concept scores; rural defined by school community.*

	Rural Mean	Nonrural Mean	t	DF	*p*
Fall	70.86	66.65	-2.9770	366.0	0.0031
Spring	79.70	78.66	-0.7902	347.9	0.4299
Prior knowledge	64.19	59.76	-2.5981	351.2	0.0098
Learned	53.34	55.32	1.0320	366.0	0.3027

Exposure to Project WILD was not a significant factor for rural dwellers. For urban dwellers, however, exposure to Project WILD was highly significant.

Although it is not completely consistent with other research, this finding is logical in that people who are exposed to wildlife and the natural environment on a regular basis may not benefit as much from organized lessons; whereas those who are not likely to be exposed to wildlife through daily living may learn more through planned curricular activities such as Project WILD.

To better understand urban and rural differences, we conducted *t*-tests for fall and spring student survey scores, learning, and prior knowledge with both definitions of rural (residence and school community) compared to nonrural (Tables 35 and 36). Rural students scored higher than nonrural, particularly in the fall. Rural students (by either definition) had significantly more prior knowledge. Although the difference in overall learning was not significant, there would be more opportunity for Project WILD to affect urban (or nonrural) students, given that rural students knew more in the beginning.

Wildlife education programs such as Project WILD may be important sources of learning about wild animals for urban students, as they are less likely to have other opportunities. Learning about wildlife in the classroom may seem even more interesting to them due to the novelty of the subject and the familiarity of the place. On a visit to a rural school, I remarked appreciatively on the close proximity of a pond that boasted watchable turtles and swallows. The teacher and class seemed to take the pond for granted; they didn't appreciate it as a learning opportunity, since it was there all the time. Students who are not exposed to wildlife in their daily surroundings may benefit more from education programs.

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SUMMARY

In the examination of three key questions, we have explored the effects of Project WILD on fourth grade students in 24 classes in Wisconsin, through quantitative and qualitative methods.

1. Do students exposed to Project WILD know more about selected wildlife concepts than students who were not exposed to Project WILD?

Yes, students in WILD classes scored higher than students in non-WILD classes in both spring and fall. More learning took place in WILD classes, but there was also significantly more prior knowledge in WILD classes. In the multiple regression analysis, Project WILD exerted influence on student spring knowledge scores in a positive direction.

2. Do students exposed to Project WILD know more about wildlife-related concepts following exposure to Project WILD?

Yes, students in WILD classes scored higher in the spring than they did in the fall, but so did non-WILD classes. In the fall-to-spring change there was no significant difference between WILD and non-WILD improvement. When we considered learning as the questions students answered incorrectly in the fall and correctly in the spring, WILD classes learned significantly more than their non-WILD counterparts. An analysis of variance showed that season (spring compared to fall) was significant in all concepts; class (WILD compared to non-WILD) was significant in overall concepts plus four specific concepts.

3. In what ways do students learn about wildlife and the environment?

The answer to this question is very complex and should be pursued further. In this study, students, teachers, and parents identified classroom activities and teachers as important influences on student learning about wildlife. It is possible that teacher interest in wildlife and environmental education affected the WILD students, even in the fall. In general, students scored highest on the concept of adaptation, lowest on carrying capacity. Teachers conducted many activities related to the concept habitat. Sometimes the distinction between vocabulary comprehension and concept knowledge was confusing. An average of seven Project WILD activities were used in the WILD classes. When asked about the most interesting activity related to wildlife, students most frequently described field trips and Project WILD activities. Teachers most wanted to teach human responsibility to their students. Action-oriented projects consisted mostly of tree planting and recycling. The importance of current events as an influence on student learning may have been under-recognized. Books and magazines, parental interest in learning about wildlife, environmental education programs attended outside school, and Project WILD were significant positive influences on student spring survey scores. There were no significant differences in family characteristics between WILD and non-WILD classes, yet multiple regression analyses showed that different factors affected student learning in WILD compared to non-WILD classes. Likewise different factors influenced rural students than influenced urban students. Although rural students initially had higher scores, Project WILD proved a significant and positive influence on urban students but not on their rural counterparts.

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Teachers might use more Project WILD activities if workshops encouraged adapting WILD activities to fit existing curriculum units. In this example, rather than adapting a WILD activity on fish adaptation to fit with the current insect unit, the teacher decided to do an activity on fish adaptation unrelated to the current unit.

DNR ARCHIVES

Continued education through teacher workshops is highly recommended. Teachers trained in wildlife concepts may influence students in other ways aside from Project WILD activities.

Implications and Recommendations

The Future Role of Project Wild

Project WILD, as it has been implemented in Wisconsin, asserts a positive influence on student learning about wildlife. The program provides a good entry point for environmental education in the classroom. Not all teachers using the program are experts on wildlife concepts, yet they can use the activities. Students in non-WILD classes were learning about wildlife and the environment too, but their teachers had fewer resources. WILD-trained teachers seemed more interested in teaching about wildlife and the environment. Qualitative data showed that students and teachers liked the activities. The fact that Project WILD is a professionally developed program that has been evaluated validates teacher expenditure of class time on wildlife- and environment-related issues and this validation promotes the infusion of environmental education.

Students learn about wildlife and the environment both through schools and non-formal settings. Other positive influences on student learning about wildlife, such as books, magazines, and television, may be particularly available to students through the schools. Since students, teachers, and parents identified school activities as an important source of learning about wildlife and the environment, and since children spend many of their waking hours in school settings, the program should be continued with a focus on schools, where more students can be reached.

Since Project WILD activities and field trips shared similar appeal for teachers and students, Project WILD activities may work well to promote learning from field trips. Activities may be incorporated into the field trip or used as pre- or post-trip processing. Project WILD should continue to be offered through non-formal education settings as well as schools.

With parent interest being such an important factor in student learning about wildlife and the environment, especially for students exposed to Project WILD, WILD activities could be used more for whole family education through community events, family field day celebrations at schools, or to infuse education in family recreation at state parks and nature centers.

Given that teacher workshops may be associated with teacher interest in environmental education, which may be associated with increased program use and

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In one Project WILD activity, students played the roles of predators and prey where predators grabbed ribbon "tails" of prey. Student learning differed according to the different ways teachers processed the activity.

effectiveness, continued dissemination through teacher workshops is recommended. Teacher training in wildlife concepts may influence the students through teacher definitions and related discussions, aside from the activities themselves.

However, teacher use of activities could be increased and the activities could probably be used more frequently and effectively. When we asked teachers what would help them incorporate more wildlife education into their curricula and use more Project WILD activities, they responded: more training, more educational materials, and more planning time. Their response is consistent with other research (Johnson 1980, Zosel 1988). We can't control the amount of planning time available to teachers, but by providing more training and more specifically adapted materials, we can reduce the need for planning time. Lewis (1981) indicated that teacher training supplemented with classroom activities yields increased student knowledge and promotes positive attitudes towards the environment.

In classroom observations, I noticed that teachers tended not to adapt Project WILD activities to their own curriculum units. For example, a teacher conducting a unit on insects interrupted the unit to do "Fashion a Fish," rather than altering the activity to "Fashion an Insect." This may have been a side effect of the researchers' presence. However, teachers may use more activities from the guides if they see how to adapt them for their own use. This kind of adaptation can be demonstrated in workshops and the flexibility of the program can be emphasized. In addition, since many teachers cover current events in their classes, relating Project WILD activities to current events in teacher workshops may help teachers see how to infuse wildlife and environmental education.

Given that each Project WILD activity may convey more than one concept, depending on how the activity is processed or discussed, it may be useful to stress conscious processing of activities towards specific concepts. In one salient example, I observed a Project WILD activity related to predators and prey as it was conducted in two different WILD classes: "Quick Frozen Critters." In this activity, an adaptation of freeze tag, potential prey have to collect food tokens while predators try to catch them. The activity is designed to teach about adaptation and limiting factors, yet it relates to food chains in that it dramatizes the predator-prey relationship. Students participating in the activity might learn about escape and protection methods of prey or about the difficulties of being a predator. In one class, one student dropped his "tail," a ribbon that predators had to snatch to signify catching prey, and was consequently tagged by a predator. The boy was in tears, so the teacher stopped the action and facilitated a discussion on the question of fairness in nature. When we interviewed a sample of students who had participated in the activity, they told us they had learned that animals in nature don't get a second chance if they make a mistake. In another class, the teacher facilitated and processed the same activity differently. There, the teacher increased the number of predators from one round of the activity to the next. During the discussion following the activity, the teacher emphasized the point that the prey were all caught more quickly when there were more predators. However, the way this point was stated during the discussion and the way it came back to us during student interviews was that it was easier to catch all the prey when there were more predators. This statement is not necessarily true. If predators compete with each other for the same prey, it is likely to be harder for each predator to catch sufficient prey to survive. This difference in learning through the same activity illustrates the importance of processing activities carefully to attain whatever educational goals prompted use of the activities. Project WILD workshop facilitators can emphasize the processing aspect of activities as they prepare teachers to use the guides.

People do not always share the same definition of wildlife, which adds to the confusion of any wildlife education program. Yet students in classes with WILD-trained teachers understood the concept more consistently, even in the fall. Wildlife education should begin with defining wildlife. It may be particularly advisable to initiate wildlife education programs for urban populations with a basic definition. Facilitators of WILD workshops can address the definition of wildlife and encourage teachers to define terms with their students.

Fourth grade students in the research exhibited a lot of prior knowledge related to wildlife concepts. Fall survey scores were high and the students generally perceived the survey as easy. This indicates that students younger than fourth grade can master some wildlife-related concepts. Prior knowledge was higher for WILD classes than non-WILD and prior knowledge was a significant influence on both WILD and non-WILD spring scores. It may be advantageous to teach appropriate concepts to children at a younger age.

Project WILD made more of a difference for urban students, although urban students initially knew less than their rural counterparts. It is logical to promote academically feasible wildlife and environmental education programs such as Project WILD in urban areas, where students may have less access to traditional outdoor learning experiences. People in large population centers can influence decision-makers because of their concentrated numbers. It is imperative, as the country is urbanized, that city dwellers understand the needs of wildlife, or it may become increasingly difficult to manage habitat for wildlife conservation. This research suggests that Project WILD should be promoted with urban audiences.

Aside from tree planting and recycling projects, there were few action-oriented projects undertaken in the fourth grade classes participating in the research. There was no significant difference between WILD and non-WILD student participation in action projects. Yet Project WILD aspires to lead students from awareness to action. Perhaps Project WILD workshops need to emphasize more responsible behavior and constructive actions. The national trend in Project WILD towards schoolyard habitat sites and action grants may begin to address this point. It may be, too, that teachers need more training to support their students in taking action.

As Project WILD gains acceptance and recognition, and as the activities are used more widely and more frequently, the program may fill its potential function in moving environmental education, and wildlife education specifically, into the mainstream of education. In Wisconsin, we have legislation to assist with this movement, yet many schools are slow to actually infuse teaching about the environment into their classrooms. I see Project WILD as a program with the ability to facilitate the widespread infusion of environmental education, if we use the opportunity.

Future Research Related to Project Wild

This evaluation of Project WILD has uncovered many questions we'd like to explore. Since Project WILD is used more at the elementary level, how can we better meet the needs of secondary educators? Since fewer activities from the aquatic WILD guides were used during the research, we could identify what aquatic education resources are used and assess what would foster the increased infusion of aquatic wildlife education in schools. Since urban-dwelling students tend to know less about wildlife concepts, yet benefit from Project WILD, how can we best meet their environmental education needs? Since Project WILD is a positive influence for urban-dwelling students but may not be educating black students effectively, we need to find out how to reach people of color with wildlife and environmental education. Since students in classes with WILD-trained teachers tended to perform better on surveys even at the beginning of the school year, it would be interesting to conduct a more extensive study comparing the effectiveness of teacher workshops alone, educational materials and classroom activities alone, or workshops and materials combined. Since training is one potential way to increase the infusion of environmental education in school and community, yet we can't completely retrain professionals already practicing in the field of education, it would be valuable to determine whether efforts are better expended in training new teachers through preservice programs, or whether we should focus efforts on practicing teachers (including new teachers as they complete preservice programs and join the experienced work force) through in-service efforts. Since a goal of Project WILD and other environmental education efforts is to progress from awareness to action to create an environmentally responsible citizenry, we should examine the characteristics of educators involved with action oriented projects to determine what leads to successful student action. Then we could develop and implement a prescription for developing an actively involved and environmentally responsible citizenry. Since family interest and activities may influence student learning about wildlife and the environment, we could pursue use of Project WILD and other environmental education programs with families and evaluate the effectiveness of those efforts.

APPENDIXES

Appendix A.
School Recruitment Materials

Street Address:
125 South Webster Street
Madison, WI 53707
Phone: (608) 266-3390

Herbert J. Grover
Superintendent of Public Instruction

Mailing Address:
Post Office Box 7841
Madison, WI 53707-7841

April 19, 1989

Dear :

Because I believe environmental education to be a very important curricular area, I am writing to ask your support of a new research study dealing with the environment and wildlife education. I know you are proud, as are all Wisconsin educators, that only the best educational materials are used in your school. But to determine which materials are best, which provide children with maximum opportunities to learn, requires research.

Wisconsin enjoys the reputation of a strong environmental consciousness. This department has supported the environmental education program, Project WILD, as one set of materials to further this consciousness among school children. Project WILD, an interdisciplinary, supplementary environmental education program, has been adopted by 44 other states in addition to Wisconsin. Here in our state, we have worked with the Bureau of Information and Education in the Department of Natural Resources to provide the Project WILD materials and training in their use to many teachers, including one or more from your school.

You will soon receive an invitation from the Wildlife Research staff of the Department of Natural Resources to participate in a new research study dealing with environmental education and Project WILD. Through surveys, interviews and classroom observations, the research will attempt to determine the impact of instruction using Project WILD on student knowledge, attitudes, and behaviors related to the environment and wildlife. The results of this study will provide direction to Wisconsin and the National Project WILD program in planning to help children learn about the environment and wildlife related principles.

Susan Gilchrist, from the DNR wildlife research staff, will be contacting you soon to enlist support for this research in your

school. I hope you will give this project high priority so that we can maximize its impact on school children.

Thank you for your support.

Sincerely,

Herbert J. Grover
State Superintendent

HJG:gm

cc: , Superintendent

John Benson, Assistant Superintendent
Division for Instructional Services, DPI

Arnold Chandler, Director
Bureau for Program Development, DPI

David Engleson, Environmental Education Supervisor, DPI

Susan Gilchrist, Project WILD Specialist, DNR

PROJECT WILD RESEARCH

WISCONSIN DEPARTMENT OF NATURAL RESOURCES

BUREAU OF RESEARCH

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PROJECT WILD RESEARCH COORDINATOR

BENEFITS OF PARTICIPATION

By participating in Project WILD Research, you will find out what 4th grade students in your school are learning about wildlife and wildlife-related principles.

The results of the study will be provided to you upon completion of the analysis. While results of the overall study will be shared in Wisconsin and across the nation, data specific to individual respondents and schools will remain confidential, unless your permission is given to release these specific results for your school.

By participating in Project WILD Research, you will be participating in the promotion of quality environmental education programs in Wisconsin.

Whatever the results of the study are, they can be applied to Wisconsin's educational system. Currently many school districts are in the process of developing curriculum guides in environmental education. The information about how and what students are learning related to wildlife and the environment will be very useful to help shape the curricula and promote the use of the best educational tools available.

By participating in Project WILD Research, you will be providing direction to Wisconsin and the National Project WILD program in developing and improving Project WILD educational materials.

At the national level, Project WILD will be evaluated in 1990 for possible improvements. Results from the Wisconsin study are of high interest to Project WILD staff in other states and in the National Project WILD office.

For full participation in Project WILD Research, each class will receive a modest contribution for the purchase of classroom materials for environmental education.

For participation in the surveys, interviews, and observations, the Department of Natural Resources will provide a contribution of $50 to $100 to each class for the purchase of educational materials. This contribution will be provided after the research is completed, so that an influx of new materials will not interfere with the objectivity of the research.

By participating in Project WILD Research, you will be joining a network of educators interested in sharing good ideas about environmental education.

By observing in many excellent classrooms where environmental education is being taught in Wisconsin, Project WILD Research staff will gain exciting classroom ideas. When the research is completed, these ideas will be shared with anyone interested in environmental education.

PROJECT WILD GOALS

Project WILD is an interdisciplinary and supplementary program in wildlife education. Wisconsin began its Project WILD program in 1985. Wisconsin Project WILD is sponsored by the Department of Natural Resources and the Department of Public Instruction.

The program goal of Project WILD is:

> to assist learners of any age in developing awareness, knowledge, skills, and commitment to result in informed decisions, responsible behavior, and constructive actions concerning wildlife and the environment upon which all life depends.

Previous research has examined the effectiveness of the Project WILD activities and studied teacher use of Project WILD. Currently the Wisconsin Department of Natural Resources is receiving federal funds to study the effect of the Project WILD program on 4th grade students in Wisconsin.

The Project WILD research goal is:

> to determine whether exposure to Project WILD influances student knowledge/attitudes/behaviors relevant to wildlife and wildlife-related principles.

THE RESEARCH QUESTIONS

The basic question posed by the research is: What effect does Project WILD have on students? This question encompasses three specific queries:

1. Do Project WILD students have more knowledge about wildlife and wildlife-related principles than students who have not had Project WILD?

2. Do students have more knowledge about wildlife and wildlife-related principles after exposure to Project WILD than they did before?

3. What other factors influence student learning regarding wildlife and wildlife-related principles?

RESEARCH METHODS

To answer the research questions, both qualitative and quantitative research methods will be used. The study will include fourth grades in sets of two comparable classes: one where the teacher has attended a Project WILD teacher training workshop and uses some Project WILD activities, and one where the teacher has not attended any Project WILD training and does not use Project WILD activities. Written surveys, personal interviews, and classroom observations will be used to collect the necessary information.

Written Surveys

Surveys will be given to the fourth grade students early in the fall of 1989 and late in the spring of 1990. Surveys will take approximately 45 minutes per class, each time. While the students are taking the survey, their teachers will be asked to fill out a brief teacher survey form. In addition, brief surveys will be mailed to parents of participating students.

Interviews

The selected teachers and a sample of approximately five students from each class will be individually interviewed following each survey and classroom observation. The interviews will be short (10-15 minutes each). The interviews will provide an opportunity for teachers and students to respond without the limitations of multiple choice questions and to more clearly define their backgrounds relative to wildlife education. The interviews will be tape recorded to ensure accurate representation when the data is analyzed.

Classroom Observations

Classroom observations will be conducted four to six times during the school year. Classroom observations will be arranged in conjunction with each teacher's schedule and curriculum plan. Observers will be as inconspicuous as possible, to avoid interfering with the teacher's plans.

PROJECT WILD RESEARCH SURVEYS

Project WILD research will begin in September, 1989. The study will include fourth grade classes from both urban and rural regions of the state. In some of the classes studied, the teacher will have received Project WILD training and will be using some Project WILD activities in the classroom. In other classes studied, the teacher will not have received Project WILD training and will not use any Project WILD activities in the classroom.

Student Surveys

Staff from the Department of Natural Resources will supervise administration of the written surveys to fourth grade students. Surveys will be administered in September, 1989, and again, at the end of the school year, in May, 1990. The surveys will take approximately forty-five minutes for a class to complete. The surveys will include questions related to key wildlife concepts, student attitudes toward wildlife, and relevant student behaviors.

Teacher Surveys

While students are responding to their survey, 4th grade teachers will be asked to fill out a brief survey form in another room. This survey will take no more than a half hour to complete. The teacher surveys will include questions such as the amount of time spent on environmental education in the classroom, teacher background and related training, and text book use.

Parent Surveys

Only part of a child's learning takes place in the classroom. Therefore the study will include a brief survey for the parents of the fourth grade students in the study to fill out. The research staff will depend on the assistance of the school in obtaining parent names and addresses for the mailing of the surveys. We will ask for a brief support letter on school stationery to accompany the survey.

Survey Results

The results of the survey will be compiled and analyzed during the 1990-91 school year. These results will be made available to you as soon as the analysis is completed.

Appendix B
Definition of Concepts, Attitudes, and Behaviors

KNOWLEDGE CONCEPTS
There were 27 student survey questions defining knowledge in seven concept areas.

1. **Definition of Wildlife:**
   - Wildlife includes all animals that are undomesticated.
   - Wildlife varies in color, shape, size (from large to microscopic), and is found everywhere.

   Four survey questions were included in this concept: Part I, number 3; Part II, numbers 6 and 7; and Part VI, number 1. This concept is based on the definition of wildlife that appears in the Project WILD guides.

2. **Food Chains:**
   - All animals, including people are part of food chains.
     all animals, including people, depend directly or indirectly on plants to survive.
   - Predators are animals that hunt, kill, and eat other animals.

   Four survey questions were included in this concept: Part I,1; Part II,2,4; Part VI,2.

3. **Habitat:**
   - All living things depend upon habitat that includes food, water, shelter, and space in a suitable arrangement.

   Four survey questions were included in this concept: Part I,2; Part II,1,5; Part VI,3.

4. **Adaptation:**
   - Species that continue to thrive have adapted to their environment in ways that protect them or help them obtain food and meet their other needs.

   Four questions were included in this concept: Part I,6; Part II,11,15,16. Question number 16 was dropped from the analysis after interviews identified it as confusing.

5. **Carrying Capacity:**
   - Each area of land, water, and ultimately the planet, has a limit to the plants, animals, and people it can support.
   - Species populations will vary according to the availability of food, water, shelter, and space, appropriateness of climate, and human interaction in each area.

   Three questions were included in this concept: Part I,4; Part II,8,13.

6. **Human Impact:**
   - Human actions impact the environment, including wildlife.
   - Humans have some responsibility for the care and management of the environment and wildlife.
   - Human responsibility for wildlife and the environment begins with individual actions.

   Five questions initially were included in this concept: Part I,5; Part II,9,10; Part VI,4,5. The last two questions, Part VI, 4 and 5, were dropped from the statistical analysis because interviews indicated that they were confusing.

7. **Interdependence:**
   - All animals, including people, are part of a large web of interdependence and interact with their environment.
   - Every form of wildlife is a valuable part of the ecosystem it occupies.

   Three questions were included in this concept: Part II,3,12,14.

ATTITUDES

For the attitudes section, 2 attitudes contained 4 items each; the other 2 each contained 5 of the 18.

1. **Intrinsic Value:**
   - All forms of life are intrinsically valuable.

   The four survey items used to measure this attitude are: Part III,1,2,3,4.

2. **Human Responsibility:**
   - Humans hold some responsibility for the care and management of wildlife and the environment.

   The five survey items used to measure this attitude are Part III,5,6,7,8; Part IV,4.

3. **Hunting and Fishing:**
   - Hunting and fishing are appropriate human activities when done responsibly.

   The four survey items used to measure this attitude are: Part III,13,14,15,16

4. **Appreciation:**
   - Wildlife related or outdoor activities are interesting, exciting, or fun.

   The five survey items used to measure this attitude are: Part III, 9,10,11,12; Part V,1.

BEHAVIORS

The behavior section contained a total of 7 questions under the two categories.

1. **Appreciative Activities:**
   - Respondents choose activities to appreciate or enjoy wildlife or the outdoors.

   Five survey items were used to measure this behavior: Part IV,1,2,5,6; Part V,2.

2. **Responsible Actions:**
   - Respondents act responsibly for wildlife and the environment.

   Two survey items were used to measure this behavior: Part IV,3; Part V,3.

Appendix C.
Student Survey

WILDLIFE EDUCATION SURVEY
4TH GRADE

DIRECTIONS

Please answer the following questions about wildlife as well as you can. This is not a test. We just want to know what you think. We will use the information to help other students learn about wildlife.

We will not count this survey as part of your grade. We will not tell anyone else how you personally answered any of the questions.

We will read each of the questions out loud. Please go through the questions slowly and carefully, along with the whole group.
If you really don't understand the question, just leave it blank.
Please do not talk during the survey.

Near the end of the survey, we will show slides with some of the questions. We will need your cooperation to make sure that everybody can see the slides and that everybody keeps quiet.

This survey is completely voluntary and we really appreciate your taking the time to help us with your answers.

First we need to find out a little about you.
Please write your first and last name in the blank. Print your name carefully so that we can read it clearly. Then fill in your age.

We have written your teacher's name and today's date on the board. Please copy them in the blanks below.

NAME:_____AGE:_____

TEACHER:_____DATE:_____

Please circle the letter next to your BEST answer to the questions that follow.

1. Are you ...

   A. a boy

   B. a girl

2. Do you live...

   A. in the country, on a farm

   B. in the country, but not on a farm

   C. in a town or city

   D. on the edge of a city, in a suburb

PART I

The statements in this section are true or false.
If you think the statement is true, circle "TRUE".
If you think it is not true, circle "FALSE".
If you really do not know the answer, circle "?".
Circle only ONE answer.

EXAMPLE:

	All animals need food.	TRUE	?	FALSE
1.	Animals can live without plants.	TRUE	?	FALSE
2.	People and wild animals both depend on their habitats to live.	TRUE	?	FALSE
3.	No wild animals are found in cities.	TRUE	?	FALSE
4.	If there are too many deer in one place, some may not get enough food.	TRUE	?	FALSE
5.	When people build shopping centers and parking lots, they take away habitat from some animals.	TRUE	?	FALSE
6.	Different kinds of birds have different kinds of beaks, depending on how they need to get food.	TRUE	?	FALSE

PART II

The questions in this section are multiple choice.
Please circle the letter next to the BEST answer.
Circle only ONE answer.

EXAMPLE:

Butterflies are ...

A. plants

B. insects

C. birds

D. mammals

1. The BEST way to help wildlife is...

A. give them shelter

B. feed them

C. make sure there is water

D. protect their habitat

2. Which of these animals is a predator?

A. a donkey

B. a deer

C. a fox

D. a rabbit

3. To prevent grasshoppers from damaging crops, farmers sprayed a chemical called a pesticide on the leaves. Grasshoppers ate the leaves and were poisoned. Why did some nearby birds lay eggs with shells that were too thin?

A. because the birds didn't have enough food

B. because the birds ate the poisoned insects

C. because the birds built their nests with poisoned leaves

D. because the birds found no leaves left to build their nests

4. Which list is an example of a food chain?

   A. seeds → mouse → deer

   B. grass → bushes → trees

   C. people → cheese → cows

   D. grass → rabbits → hawks

5. The <u>BEST</u> definition of wildlife habitat is

   A. habits of animals

   B. a place with food, shelter, water, and suitable space

   C. a place with sand, rocks, and earth worms

   D. a place with fresh air and sunshine

6. Which of the following is a list of <u>only wild animals</u>?

   A. cows, pigs, horses

   B. rabbits, wolves, cows

   C. spiders, wolves, beavers

   D. chickens, bears, beavers

7. Wildlife is found...

   A. everywhere

   B. in forests

   C. in deserts

   D. in water

8. In a forest, there are 5 bears. There is only enough food there for 4 of them. What will happen to the bears?

   A. they will have more bear cubs than usual

   B. the bears will share the food

   C. all of the bears will go to a state park

   D. one of the bears will leave or die

9. People have an effect on wildlife when they ...

A. throw away trash

B. buy things that are made in factories

C. drive a car

D. all of these

10. At one time there were many wolves in Wisconsin. More and more people kept moving into places where wolves lived. What happened to the wolves?

A. the wolves were killed or pushed out

B. the wolves adapted to farm life

C. the wolves had more pups in order to survive

D. the number of wolves stayed the same

11. Which of the following animals would <u>most likely be caught and eaten</u> by another animal?

A. an animal that hides in a place that is the same color as itself

B. an animal that hides in a place that is a different color than itself

C. an animal that is very fierce

D. an animal that runs very fast

12. If all the animals that eat dead animals disappeared, what would happen?

A. human diseases would go away

B. fewer animals would be run over by cars

C. there would be a lot of dead animals lying around

D. nothing would change

13. Carrying capacity means...

A. how much food an animal can carry

B. how much food an animal can eat

C. how many animals can live on a piece of land

D. how strong an animal's muscles are

14. If all the foxes and owls that eat mice were removed from a field, what would happen to the mice?

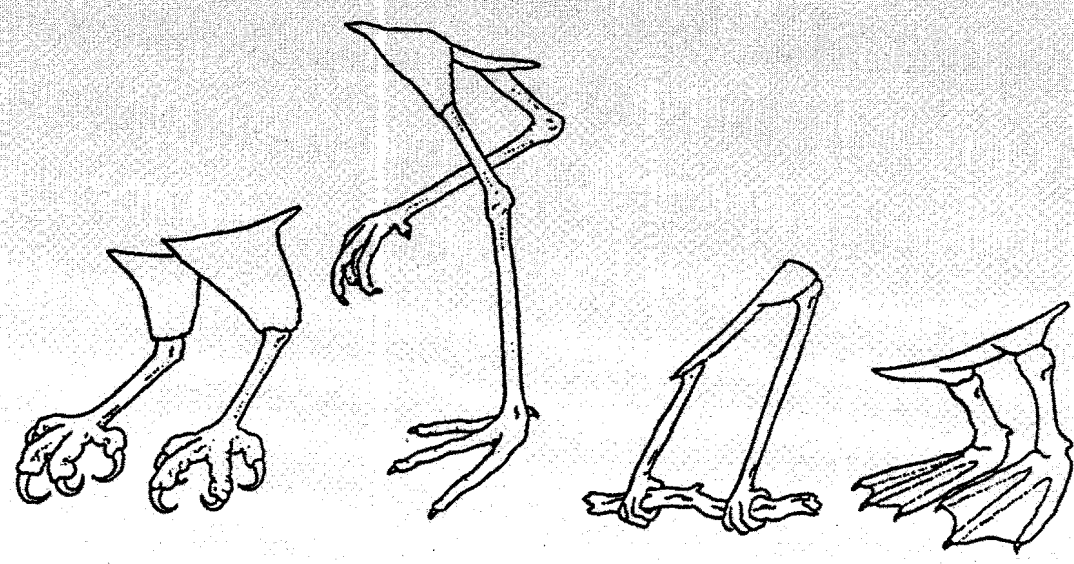
A. no more mice would ever die

B. the mice would live longer and have more babies until they used up too much food

C. the mice would move to another field to find owls and foxes

D. the mice would get sick becguse they depend on the owls and foxes for food

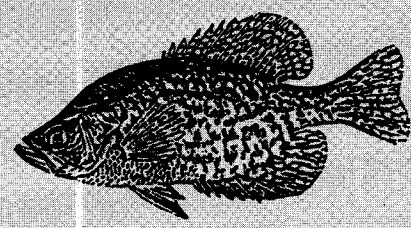
15. Which kind of foot would a bird that holds prey be likely to have?



A. B. C. D.

16. The fish pictured here have different color patterns to help them survive. Which fish would be hardest to see from above and below?

A.



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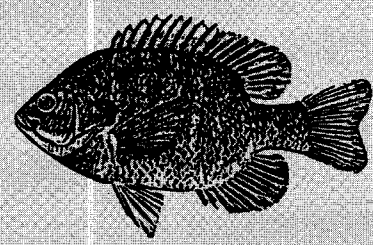

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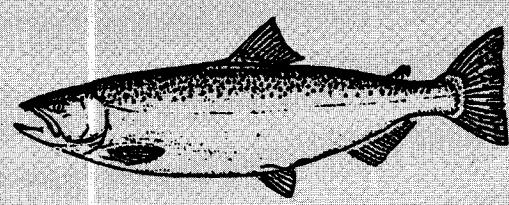
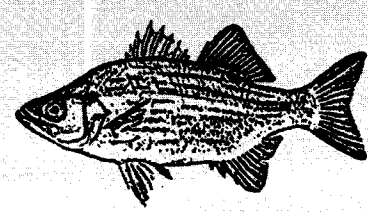


D.



PART III

We want to know what you think or feel about wildlife.
Please circle the words that **BEST** describe your feeling for each statement:
"**STRONGLY AGREE**" if you feel strongly about the statement and agree with it,
"**AGREE**" if it's basically okay with you,
"**UNSURE**" if you are not sure,
"**DISAGREE**" if you don't completely agree with the statement, and
"**DISAGREE STRONGLY**" if you do not agree with the statement at all and feel strongly about it.

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1. All rare kinds of animals are worth protecting, even if it costs a lot.

   Strongly Agree Agree Unsure Disagree Strongly Disagree

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2. All wild animals that might hurt livestock or pets should be killed.

   Strongly Agree Agree Unsure Disagree Strongly Disagree

---

3. Every kind of animal has an important and valuable part to play in the world.

   Strongly Agree Agree Unsure Disagree Strongly Disagree

---

4. Insects are pests and should be wiped out.

   Strongly Agree Agree Unsure Disagree Strongly Disagree

---

5. People should not buy a product if making that product endangers rare wildlife.

   Strongly Agree Agree Unsure Disagree Strongly Disagree

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6. People should make sure wild animals have a natural place to live where there's food and water.

   Strongly Agree Agree Unsure Disagree Strongly Disagree

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7. There should be more laws against littering and polluting.

   Strongly Agree Agree Unsure Disagree Strongly Disagree

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8. People have no responsibility for the continued existance of wild animals.

Strongly Agree Agree Unsure Disagree Strongly Disagree

9. Camping and outdoor activities are really fun.

Strongly Agree Agree Unsure Disagree Strongly Disagree

10. TV shows and movies about wildlife are interesting.

Strongly Agree Agree Unsure Disagree Strongly Disagree

11. When the weather's nice, it's better to be outside than inside.

Strongly Agree Agree Unsure Disagree Strongly Disagree

12. Learning about wildlife is boring.

Strongly Agree Agree Unsure Disagree Strongly Disagree

13. Hunting should be against the law.

Strongly Agree Agree Unsure Disagree Strongly Disagree

14. People should be able to hunt and kill as many animals as they want.

Strongly Agree Agree Unsure Disagree Strongly Disagree

15. It's okay to hunt for food.

Strongly Agree Agree Unsure Disagree Strongly Disagree

16. It's okay to hunt for fun even if you don't want the meat for food.

Strongly Agree Agree Unsure Disagree Strongly Disagree

PART IV

In this part, the questions ask about what you actually do in your own life or what you think you would do in a particular situation. Please answer as honestly as you can. Circle the letter next to your BEST answer. The right answer to these questions is whatever you think you would really do. If the answers given do not match your own answer exactly, pick the answer that is closest to your own.

1. At home, I watch shows about wildlife on TV

   A. hardly at all

   B. almost every month

   C. almost every week

   D. almost every day

2. I have enjoyed some outdoor activity such as hiking, bird watching, fishing, hunting, camping, walking in the woods

   A. hardly at all

   B. almost every month

   C. almost every week

   D. almost every day

3. When I open a piece of gum or a candy bar, I

   A. drop the wrapper on the ground

   B. put the wrapper in a trash can

   C. throw the wrapper at someone or something

   D. don't notice what I do with the wrapper

4. If I knew that chemicals sprayed on fruits and vegetables to kill the insects were damaging to other wildlife, I would rather eat

   A. spotless apples that must have been sprayed

   B. apples that have not been sprayed but might have brown spots on them

   C. sprayed apples as long as they are washed off

   D. no fruits and vegetables

5. Since this time last year, I have gone to a nature center or museum with exhibits on wild animals

A. not at all

B. once or twice

C. about 3-6 times

D. more than 6 times

6. I read Ranger Rick, Zoo Book, or some other magazine or book about wildlife

A. not at all

B. once or twice a year

C. about 3 - 12 times in a year

D. every month

PART V

In this section of the survey, each question has several parts. Please answer each part separately with a "YES", a "NO", or a "?" if you really don't know.

1. Of the activities listed, which would you really like to do if you could?
Circle "YES" if you think you would like the activity, "NO" if you would not like it, or "?" if you aren't sure.

A. go fishing	YES	?	NO
B. walk in the woods	YES	?	NO
C. watch birds	YES	?	NO
D. go camping	YES	?	NO
E. go canoeing	YES	?	NO
F. go hunting	YES	?	NO
G. feed birds	YES	?	NO
H. go to the zoo	YES	?	NO

2. Which activities have you done?
Circle "YES" if you have ever done the activity, "NO" if you have not done it, or "?" if you aren't sure.

A. go fishing	YES	?	NO
B. walk in the woods	YES	?	NO
C. watch birds	YES	?	NO
D. go camping	YES	?	NO
E. go canoeing	YES	?	NO
F. go hunting	YES	?	NO
G. feed birds	YES	?	NO
H. go to the zoo	YES	?	NO

3. Have you ever <u>participated in a project to help wildlife or the environment</u>?
Please circle "YES" if you have helped with the activity,
"NO" if you have never helped with the activity, or
"?" if you aren't sure.

A.	clean a pond or stream	YES	?	NO
B.	recycle trash	YES	?	NO
C.	raise money for wildlife	YES	?	NO
D.	write letters	YES	?	NO
E.	build bat or bird houses	YES	?	NO

F. other projects:_____

4. Where have you <u>learned about wild animals and the environment</u>?
Please circle "YES" if you have learned about wildlife or the environment from the activity listed,
"NO" if you have <u>not</u> learned about wildlife or the environment from the activity listed, or "?" if you aren't sure.

A.	classroom activities	YES	?	NO
B.	school field trips	YES	?	NO
C.	activities with family	YES	?	NO
D.	nature programs on TV	YES	?	NO
E.	books and magazines	YES	?	NO
F.	visits to museums	YES	?	NO
G.	camp, scouts, or 4-H	YES	?	NO

PART VI

In this part, you will look at some slides and answer questions about the pictures.

1. Which kinds of animals are wild?
For each picture, decide whether the animal is a **FARM ANIMAL OR PET** or a **WILD ANIMAL**. Circle your BEST answer.
Circle "?" if you really don't know.

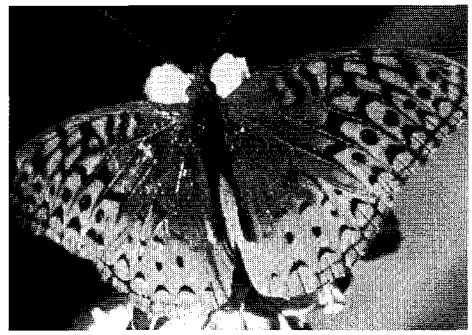
A. Is this a...	farm animal or pet	?	wild animal
B. Is this a...	farm animal or pet	?	wild animal
C. Is this a...	farm animal or pet	?	wild animal
D. Is this a...	farm animal or pet	?	wild animal
E. Is this a...	farm animal or pet	?	wild animal
F. Is this a...	farm animal or pet	?	wild animal

2. Which animals are predators?
For each picture, circle "YES" if the animal is a predator, "NO" if it is not a predator, or "?" if you really don't know.
Circle only ONE answer.

A. Is this animal a predator?	YES	?	NO
B. Is this animal a predator?	YES	?	NO
C. Is this animal a predator?	YES	?	NO
D. Is this animal a predator?	YES	?	NO

Part VI, Question 1. Which kinds of animals are wild?

A



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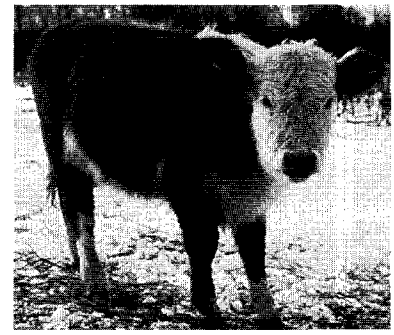


C

D

E

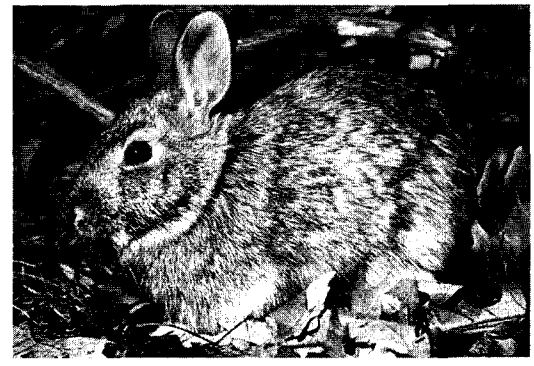
F

Part VI, Question 2. Which animals are predators?

A

B

C



D

3. The next slides are pictures of <u>places</u>.
Circle "YES" if some wildlife could live in the place in the picture, "NO" if no wildlife could live there, or "?" if you really don't know.
Circle your <u>BEST</u> answer.

A. Could wildlife live in this place?	YES	?	NO
B. Could wildlife live in this place?	YES	?	NO
C. Could wildlife live in this place?	YES	?	NO
D. Could wildlife live in this place?	YES	?	NO
E. Could wildlife live in this place?	YES	?	NO

4. Do the activities shown in the next pictures <u>help or hurt wildlife</u>?
Decide if the activity is GOOD or BAD for wildlife, and circle your <u>BEST</u> answer. If the activity could be good for some wildlife and bad for others, circle "BOTH".
Circle "?" if you really don't know.

A. burning prairies	GOOD	BAD	BOTH	?
B. logging timber	GOOD	BAD	BOTH	?
C. getting rid of waste	GOOD	BAD	BOTH	?
D. heating houses	GOOD	BAD	BOTH	?
E. spraying crops	GOOD	BAD	BOTH	?
F. draining wetlands	GOOD	BAD	BOTH	?

Part VI, Question 3. The next slides are pictures of places. Circle "YES" if some wildlife could live in the place in the picture, "NO" if no wildlife could live there, or "?" if you really don't know. Circle your BEST answer.

A

B

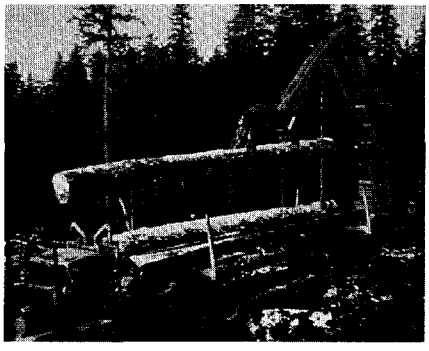
C

D

E

Part VI, Question 4. Do the activities shown in the next pictures help or hurt wildlife?

A

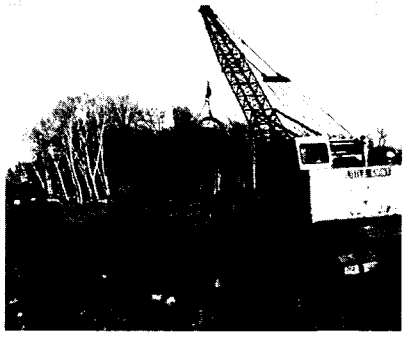


B

C

D

E



F

5. Are these recreation activities bad for wildlife?
If the activity pictured would harm wildlife, circle "YES".
If the activity would not harm wildlife, circle "NO".
Circle "?" if you really don't know.

A. riding vehicles on sand dunes	YES	?	NO
B. cross country skiing	YES	?	NO
C. swimming	YES	?	NO
D. watching wildlife	YES	?	NO
E. speedboating	YES	?	NO
F. photographing wildlife	YES	?	NO
G. fishing	YES	?	NO
H. hunting	YES	?	NO

6. There is no picture for this question, but we would like to know whether you found the questions hard or easy.
Please circle the letter next to your BEST answer.

A. Most of the questions were too hard.

B. Most of the questions were about right.

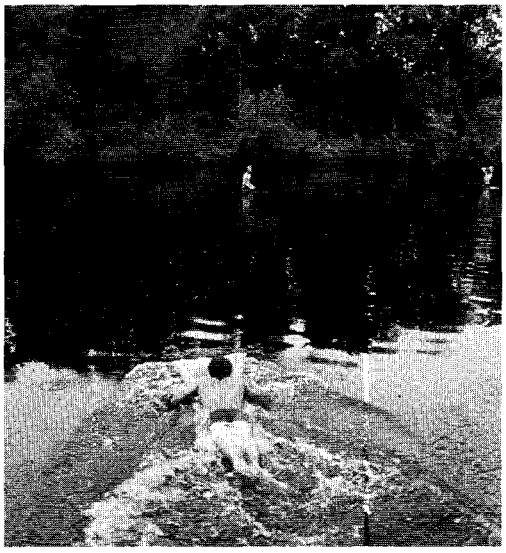
C. Most of the questions were too easy.

THANK YOU VERY MUCH

Part VI, Question 5. Are these recreation activities bad for wildlife?

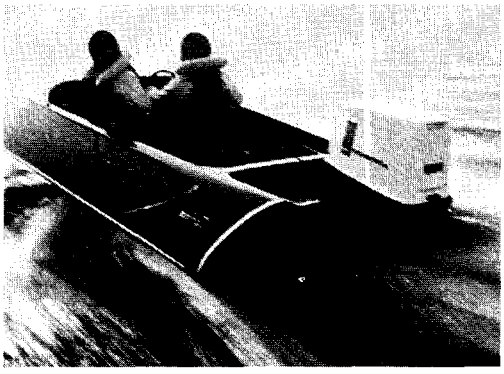
A

B

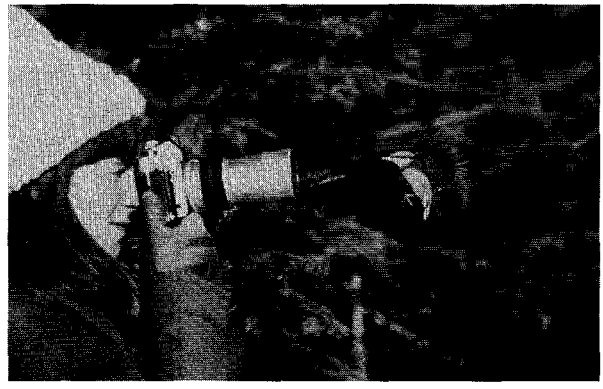


C

D



E



F

G

H

Appendix D.
Teacher Fall Survey

PROJECT WILD RESEARCH

ENVIRONMENTAL EDUCATION TEACHER SURVEY

To understand how fourth grade students in Wisconsin are learning about wildlife, we would like to ask you some questions about your teaching plans and your interest in wildlife and wildlife-related issues.

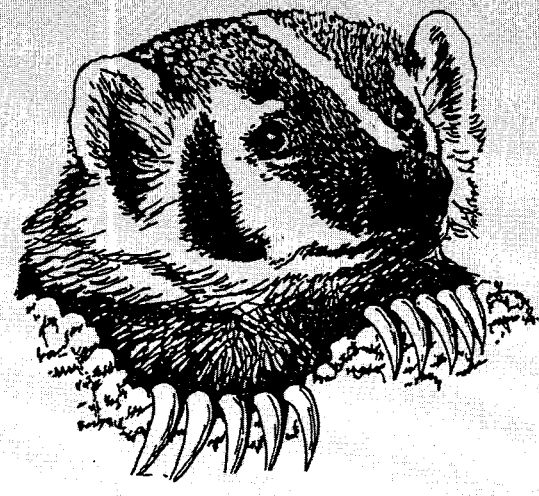
We hope you will help us by completing this teacher survey. Your participation in this study is completely voluntary and we appreciate your time.

While we hope you will respond to all the questions, you may skip any question you choose and go on to the next one. Your answers will be kept confidential.

NAME: _____

SCHOOL: _____

DATE: _____



Section I: Teaching Environmental Education

We'd like to know how you integrated environmental education into your classroom in the last school year (1988-89) and what your plans are for this year (1989-90).

For the questions that follow, please place a check mark in the "LAST YEAR" column for everything that applied to the last school year (1988-89).

Please also place a check mark in the "THIS YEAR" column for everything that you expect to apply to this year (1989-90).

Check ALL appropriate answers.

If you did NOT teach last year, check here:_____ and leave the "LAST YEAR" column blank.

	LAST YEAR	THIS YEAR
1. Did/will you include some environmental education in your curriculum?		
A. Yes	_____	_____
B. No	_____	_____
2. Which environmental education programs did/will you use in your classroom?		
A. Project WILD	_____	_____
B. Aquatic Project WILD	_____	_____
C. Project Learning Tree	_____	_____
D. CLASS Project (National Wildlife Federation)	_____	_____
E. Acclimatization	_____	_____
F. OBIS	_____	_____
G. Naturescopes (National Wildlife Federation)	_____	_____
H. Other: _____	_____	_____
I. Other: _____	_____	_____
J. Other: _____	_____	_____

	LAST YEAR	THIS YEAR
3. In what subject areas did/will you integrate environmental education?		
A. Language Arts/Reading	_____	_____
B. Social Studies	_____	_____
C. Science	_____	_____
D. Mathematics	_____	_____
E. Art	_____	_____
F. Physical Education	_____	_____
G. Music	_____	_____
H. Other: _____	_____	_____
4. Did/will you use a textbook that includes environmental education?		
A. Yes	_____	_____
B. No	_____	_____

If yes, please list the text(s) by subject area(s).

Science: _____
Social Studies: _____
Language Arts: _____
Other: _____
Other: _____

5. Did/will you teach environmental education as a separate unit?		
A. Yes	_____	_____
B. No	_____	_____

If yes, how many hours long is the unit?
_____ Hours

	LAST YEAR	THIS YEAR
6. What wildlife or environment-related field trips did/will you take with your class? Write the number of times you did/will take each field trip.		
A. Nature walks	_____	_____
B. Museum with exhibits on wildlife or natural history	_____	_____
C. School forest	_____	_____
D. National, state, or county park	_____	_____
E. City park	_____	_____
F. Zoo	_____	_____
G. Nature center	_____	_____
H. Wildlife management area	_____	_____
I. Other: _____	_____	_____
7. What environment-related or wildlife topics did/will guest speakers present to your class? Write the number of times guest speakers did/will present on each topic.		
A. Endangered species	_____	_____
B. Information on specific wildlife: _____	_____	_____
_____	_____	_____
C. Pollution	_____	_____
D. Habitat preservation	_____	_____
E. Utilization of natural resources	_____	_____
F. Aquatic resources	_____	_____
G. Hunting/trapping	_____	_____
H. Current environmental issues: _____	_____	_____
_____	_____	_____
I. Other: _____	_____	_____
8. Did/will you use Wisconsin DNR materials for wildlife education?		
A. Wildlife fact sheets	_____	_____
B. Study guides	_____	_____
C. Posters	_____	_____
D. Other: _____	_____	_____

	LAST YEAR	THIS YEAR
9. Which wildlife-related or environmental topics did/will you teach?		
A. Pollution	_____	_____
B. Weather records and measurements	_____	_____
C. Plant identification	_____	_____
D. Bird identification	_____	_____
E. Habitat	_____	_____
F. Food chains	_____	_____
G. Predator/prey relationships	_____	_____
H. Definitions of domestic and wild	_____	_____
I. Adaptation	_____	_____
J. Carrying capacity	_____	_____
K. Human impact on the environment	_____	_____
L. Web of interdependence	_____	_____
M. Water conservation	_____	_____
N. Energy conservation	_____	_____
O. Other: _____	_____	_____
P. Other: _____	_____	_____
10. Considering planned and unplanned opportunities to teach environmental education, how often did/will you cover environmental or wildlife-related topics?		
A. Daily	_____	_____
B. Weekly	_____	_____
C. Monthly	_____	_____
D. Only for special events	_____	_____
E. Only when the weather's nice	_____	_____
F. Rarely or not at all	_____	_____
G. Other: _____	_____	_____

11. What do you consider to be the most important concepts or ideas to convey to fourth grade students regarding wildlife?

_____
_____
_____
_____
_____
_____
_____

Section II: Rating the Importance of Environmental Education

Given there are many things for children to learn in school, how important is it that they learn about wildlife and the environment?

In the questions that follow, please rate the importance of environmental education on a scale of one (**NOT IMPORTANT**) to five (**VERY IMPORTANT**).

Please circle the number on the scale that corresponds MOST CLOSELY TO YOUR OPINION.

1. How important is it to you to teach environmental education?

1	2	3	4	5
NOT IMPORTANT				**VERY IMPORTANT**

2. How important do you think environmental education in your school is to the school administrator?

1	2	3	4	5
NOT IMPORTANT				**VERY IMPORTANT**

3. How important do you think environmental education in your school is to the parents of your current fourth grade class?

1	2	3	4	5
NOT IMPORTANT				**VERY IMPORTANT**

4. How important do you think it is to your current fourth grade students to learn about wildlife and the environment?

1	2	3	4	5
NOT IMPORTANT				**VERY IMPORTANT**

Section III: Using Project WILD

Please answer the following questions if you have attended Project WILD training OR use any Project WILD activities.

If you have NOT participated in Project WILD training AND you DON'T use any Project WILD activities, you may skip this section and go on to section IV.

1. How many Project WILD activities did you use in the last school year (1988-89)? _____ Activities

2. Please list any Project WILD activities you used last year:

_____
_____
_____
_____
_____
_____
_____
_____
_____
_____

3. Have you done any Project WILD activities already this school year (1989-90)? Please check the appropriate answer.

   YES _____ NO _____

4. Please list any Project WILD activities you have used already this school year:

_____
_____
_____

5. Did you participate in a Project WILD training program? Please check the appropriate answer.

   YES _____ NO _____

6. How many hours of Project WILD training did you attend? _____ Hours

7. Which Project WILD Guide did the training program you attended emphasize? Check ALL answers that apply.

   Elementary _____ Secondary _____ Aquatic _____

Section IV: Classroom Characteristics

We'd like to know a little about your current fourth grade class. Please answer the questions that follow with your BEST estimate.

1. How many students are there in your fourth grade class? _____

2. Where does the majority of your fourth grade students live? Please circle the letter next to your BEST answer.

   A. In a rural area, on farms
   B. In a rural area, NOT on farms
   C. In a city that is industrial
   D. In an inner city
   E. In the suburbs

3. Circle the letter next to the phrase that BEST describes your fourth grade class.

   A. Especially fast learners
   B. Average fourth grade learners
   C. Slower than average learners
   D. A combination of A and C above

4. Do you think any of the students in your class have participated in Project WILD activities prior to fourth grade? Please circle the letter next to your BEST answer.

   A. Yes
   B. No
   C. I don't know

5. How do parents assist in your class program? Please circle ALL answers that apply.

   A. Parents assist with the curriculum in the classroom
   B. Parents assist on field trips
   C. Parents attend parent-teacher conferences
   D. Parents attend school open houses and special events
   E. Parents assist as guest speakers in the classroom
   F. Parents assist in other ways:
      (Please list)_____
   G. Parents do NOT assist

6. Do parents assist in teaching any wildlife-related concepts?

   A. Yes: (Explain)_____
   B. No

Section V: Teacher Background

We would like to know a little about your background and interests as they relate to wildlife education.

1. How many years have you been teaching?

   A. Formal, classroom teaching: _____ Years
   B. Non-formal teaching (camps, parks, youth groups) _____ Years

2. How many years have you been including environmental education in your school curriculum?

   _____ Years

3. Have you taken college courses in any of the following subjects? Circle the letter next to EVERY answer that applies.

   A. Botany
   B. Zoology
   C. Ecology
   D. Geology
   E. Geography
   F. Other environmental-related education: (Please list)_____

4. Have you taken any training to teach wildlife or environmental education? Circle the letter next to EVERY answer that applies.

   A. Project WILD
   B. Aquatic Project WILD
   C. Project Learning Tree
   D. CLASS Project
   E. College courses in environmental education or environmental studies
   F. Other training: (Please list)_____

5. What college degree(s) do you have? Please list your degree(s) and major study area(s).

   Degree: _____ Major: _____

   Degree: _____ Major: _____

6. What outdoor activities do you personally enjoy? Please circle ALL answers that apply.

A. Fishing
B. Walking in the woods
C. Watching birds
D. Camping
E. Canoeing
F. Hunting
G. Feeding birds
H. Visiting the zoo
I. Other: _____
J. Other: _____

7. Do you belong to or contribute to any environmental, conservation, or sportsman's organizations? Please circle the letter next to the name of EVERY organization in which you participate by attending meetings or contributing funds.

A. Wisconsin Association for Environmental Education
B. The Wisconsin Wildlife Society
C. National Audubon Society
D. Wisconsin Society for Ornithology
E. The Nature Conservancy
F. Sierra Club
G. Defenders of Wildlife
H. World Wildlife Fund
I. Greenpeace
J. Wings Over Wisconsin
K. Wisconsin Waterfowlers
L. Ducks Unlimited
M. Pheasants Forever
N. National Wild Turkey Federation
O. The Ruffed Grouse society
P. The Wisconsin Trapper Association
Q. The Timber Wolf Association
R. Other: _____
S. Other: _____

8. Have you participated in any projects to benefit wildlife or the environment? Please check the "**PARTICIPATED**" column for **EVERY** project in which you've been involved.

   Please check the "**INVOLVE STUDENTS**" column for **EVERY** project in which you plan to involve your fourth grade students.

		PARTICIPATED	INVOLVE STUDENTS
A.	Clean a pond or stream	_____	_____
B.	Recycle trash	_____	_____
C.	Raise money for wildlife	_____	_____
D.	Write letters	_____	_____
E.	Build bat or bird houses	_____	_____
F.	Other: _____	_____	_____
G.	Other: _____	_____	_____

9. What do you think influenced your students' learning about wildlife in the past year? Please list the influences.

_____
_____
_____
_____
_____
_____

10. What improvements do you suggest for this teacher survey?

_____
_____
_____
_____
_____
_____

THANK YOU VERY MUCH FOR YOUR PARTICIPATION IN THIS STUDY

PROJECT WILD RESEARCH

FIRST SEMESTER LEARNING ABOUT WILD ANIMALS

Please answer the following questions as they pertain to the fourth grade class participating in Project WILD Research, during the first semester of the 1989-90 school year.

1. What is the estimated number of hours you have spent teaching about wild animals this semester?

_____Hours

2. Have any other teachers in your school spent class time on wild animals with the fourth grade students participating in Project WILD Research?

____Yes ____No

If yes, in which subjects? Please check all that apply.

Art _____

Music _____

Phy Ed _____

Language Arts_____

Social Studies____

Science _____

Math _____

Other: (please specify)

_____

NAME:_____

SCHOOL:_____

SEMESTER DATES: FROM __/__/89 TO 1/__/90

Appendix E.
Teacher Spring Survey

PROJECT WILD RESEARCH

ENVIRONMENTAL EDUCATION TEACHER SURVEY - SPRING

To understand how fourth grade students in Wisconsin are learning about wildlife, we would like to ask you some questions about your teaching and your interest in wildlife and wildlife-related issues.

We hope you will help us by completing this teacher survey. Your participation in this study is voluntary and we appreciate your time.

While we hope you will respond to all the questions, you may skip any question you choose and go on to the next one. Your answers will be kept confidential.

NAME: _____

SCHOOL: _____

DATE: _____

Section I: Teaching Environmental Education

We'd like to know how you integrated environmental education into your classroom in **THIS** school year (1989-90) and what your plans are for **NEXT YEAR** (1990-91).

For the questions that follow, please place a check mark in the "**THIS YEAR**" column for everything that applied to this school year (1989-90).

Please also place a check mark in the "**NEXT YEAR**" column for everything that you expect to apply to next year (1990-91).

Check **ALL** appropriate answers.

If you do **NOT** plan to teach next year, check here: _____ and leave the "**NEXT YEAR**" column blank.

	THIS YEAR (1989-90)	NEXT YEAR (1990-91)
1. Did/will you include some environmental education in your curriculum?		
A. Yes	_____	_____
B. No	_____	_____
2. Which environmental education programs did/will you use in your classroom?		
A. Project WILD	_____	_____
B. Aquatic Project WILD	_____	_____
C. Project Learning Tree	_____	_____
D. CLASS Project (National Wildlife Federation)	_____	_____
E. Acclimatization	_____	_____
F. OBIS	_____	_____
G. NatureScopes (National Wildlife Federation)	_____	_____
H. Living Lightly in the City	_____	_____
I. Other: _____	_____	_____
J. Other: _____	_____	_____

	THIS YEAR	NEXT YEAR
3. In what subject areas did/will you integrate environmental education?		
A. Language Arts/Reading	_____	_____
B. Social Studies	_____	_____
C. Science	_____	_____
D. Mathematics	_____	_____
E. Art	_____	_____
F. Physical Education	_____	_____
G. Music	_____	_____
H. Other:_____	_____	_____
4. Did/will you use a textbook that includes environmental or wildlife topics?		
A. Yes	_____	_____
B. No	_____	_____

If yes, please list the text(s) and publisher by subject area(s).

Science: _____
Social Studies: _____
Language Arts: _____
Other: _____
Other: _____

5. Did/will you use a current events newspaper to cover environmental issues with your class?		
A. Yes	_____	_____
B. No	_____	_____

If yes, which one? _____
_____

6. Did/will you teach environmental education as a separate unit?		
A. Yes	_____	_____
B. No	_____	_____

If yes, how many hours long is the unit?
_____ Hours

	THIS YEAR	NEXT YEAR
7. What wildlife or environment-related field trips did/will you take with your class? Write the number of times you did/will take each field trip.		
A. Nature walks	_____	_____
B. Museum with exhibits on wildlife or natural history	_____	_____
C. School forest	_____	_____
D. National, state, or county park	_____	_____
E. City park	_____	_____
F. Zoo	_____	_____
G. Nature center	_____	_____
H. Wildlife management area	_____	_____
I. Other: _____	_____	_____
8. What environment-related or wildlife topics did/will guest speakers present to your class? Write the number of times guest speakers did/will present on each topic.		
A. Endangered species	_____	_____
B. Information on specific wildlife: _____	_____	_____
_____	_____	_____
C. Pollution	_____	_____
D. Habitat preservation	_____	_____
E. Utilization of natural resources	_____	_____
F. Aquatic resources	_____	_____
G. Hunting/trapping	_____	_____
H. Current environmental issues: _____	_____	_____
_____	_____	_____
I. Other: _____	_____	_____
9. What Wisconsin DNR materials/ services did/will you use for wildlife education?		
A. Wildlife fact sheets	_____	_____
B. Study guides	_____	_____
C. Posters	_____	_____
D. DNR guest speaker	_____	_____

	THIS YEAR	NEXT YEAR
10. Which wildlife-related or environmental topics did/will you teach?		
A. Pollution	_____	_____
B. Weather records and measurements	_____	_____
C. Plant identification	_____	_____
D. Bird identification	_____	_____
E. Habitat	_____	_____
F. Food chains	_____	_____
G. Predator/prey relationships	_____	_____
H. Definitions of domestic and wild	_____	_____
I. Adaptation	_____	_____
J. Carrying capacity	_____	_____
K. Human impact on the environment	_____	_____
L. Web of interdependence	_____	_____
M. Water conservation	_____	_____
N. Energy conservation	_____	_____
O. Other: _____	_____	_____
P. Other: _____	_____	_____
11. Considering planned and unplanned opportunities to teach environmental education, how often did/will you cover environmental or wildlife-related topics? Check ONE answer in each column.		
A. Daily	_____	_____
B. Weekly	_____	_____
C. Monthly	_____	_____
D. Only for special events	_____	_____
E. Seasonally, when the weather's nice	_____	_____
F. When a related issue arises in current events		
G. Rarely or not at all	_____	_____
H. Other: _____	_____	_____

12. What is the estimated number of hours you have spent teaching about wild animals this semester?

Semester dates: from __/__/90 to __/__/90 _____ hours

13. Have other teachers in your school spent class time on wild animals with the fourth grade students participating in Project WILD Research this semester? Please circle the letter next to your BEST answer.

A. Yes
B. No

14. If yes, in which subjects? Please circle the letter next to EVERY answer that applies.

A. Art
B. Music
C. Phy Ed
D. Lang. Arts
E. Soc. Studies
F. Science
G. Math
H. Other (please specify): _____

15. What do you consider to be the most important concepts or ideas to convey to fourth grade students regarding wildlife?

_____

_____

_____

_____

_____

_____

Section II: Rating the Importance of Environmental Education

Given there are many things for children to learn in school, how important is it that they learn about wildlife and the environment?

In the questions that follow, please rate the importance of environmental education on a scale of 1 (**NOT IMPORTANT**) to 5 (**VERY IMPORTANT**).

Please circle the number on the scale that corresponds MOST CLOSELY TO YOUR OPINION.

1. How important is it to you to teach environmental education?

1	2	3	4	5
NOT IMPORTANT				**VERY IMPORTANT**

2. How important do you think environmental education in your school is to the school administrator?

1	2	3	4	5
NOT IMPORTANT				**VERY IMPORTANT**

3. How important do you think environmental education in your school is to the parents of your current fourth grade class?

1	2	3	4	5
NOT IMPORTANT				**VERY IMPORTANT**

4. How important do you think it is to your current fourth grade students to learn about wildlife and the environment?

1	2	3	4	5
NOT IMPORTANT				**VERY IMPORTANT**

Section III: Using Project WILD

Please answer the following questions if you have attended Project WILD training OR use any Project WILD activities.

If you have NOT participated in Project WILD training AND you DON'T use any Project WILD activities, you may skip this section and go on to section IV.

1. How many Project WILD activities did you use this school year (1989-90)? _____ Activities

2. Please list any Project WILD activities you used this year:

_____
_____
_____
_____
_____
_____
_____
_____
_____
_____

3. Do you plan to use any Project WILD activities next school year (1990-91)? Please circle the letter next to your BEST answer.

   A. Yes
   B. No

4. What would you need in order to use more Project WILD activities? Circle the letter next to EVERY answer that applies.

   A. More background information about wildlife
   B. More training
   C. More funds
   D. More support from school administration
   E. More classroom materials
   F. Better access to outdoor facilities such as parks
   G. More planning time
   H. Other: _____

Section IV: Classroom Characteristics

We'd like to know a little about your current fourth grade class. Please answer the questions that follow with your BEST estimate.

1. How many students are there in your fourth grade class? _____

2. Where does the majority of your fourth grade students live? Please circle the letter next to your BEST answer.

   A. In a rural area, on farms
   B. In a rural area, NOT on farms
   C. In a city that is industrial
   D. In an inner city
   E. In the suburbs

3. Circle the letter next to the phrase that BEST describes your fourth grade class.

   A. Especially fast learners
   B. Average fourth grade learners
   C. Slower than average learners
   D. A combination of A and C above

4. How many students in your fourth grade class fit the categories that follow? Please write the approximate number in each blank.

   A. ED _____
   B. LD _____
   C. ESL _____
   D. Physically handicapped _____
   E. Other: (specify)_____

5. Do you think any of the students in your class have participated in Project WILD activities through any other teacher or field trip? Please circle the letter next to your BEST answer.

   A. Yes (Please explain):_____
   B. No
   C. I don't know

6. What wildlife-related magazines do your students have easy access to in the classroom or the school library? Circle ALL answers that apply.

   A. Zoobook
   B. Ranger Rick
   C. Others: (list)_____

7. Did parents assist in teaching any wildlife-related concepts?

A. Yes: (Explain)_____
B. No

8. In which ways did parents assist in teaching wildlife-related concepts? Circle the letter preceding ALL that apply.

A. Guest speakers
B. Field trip assistants
C. Volunteers with special projects: (Explain)_____
_____
D. Other: (Explain)_____

9. Which factors have influenced student knowledge and attitudes regarding wildlife the most? On a scale from 1 (**NO INFLUENCE**) to 5 (**MAJOR INFLUENCE**), please rate the following influences on your students. Circle ONE number for each item.

INFLUENCE ON STUDENTS:	NO	LITTLE	SOME	STRONG	MAJOR
A. Classroom activities	1	2	3	4	5
B. Field trips	1	2	3	4	5
C. TV and movies	1	2	3	4	5
D. Books and magazines	1	2	3	4	5
E. Parents	1	2	3	4	5
F. Teachers	1	2	3	4	5
G. Location of home	1	2	3	4	5
H. Current events	1	2	3	4	5
I. Project WILD lessons	1	2	3	4	5
J. Other: _____	1	2	3	4	5

Section V: Teacher Background

We would like to know a little about your background and interests as they relate to wildlife education

1. This year, have you taken any training to teach wildlife or environmental education? Circle the letter next to EVERY answer that applies.

   A. Project WILD
   B. Aquatic Project WILD
   C. Project Learning Tree
   D. CLASS Project
   E. College courses in environmental education or environmental studies
   F. Other training:
   (Please list) _____

2. How often do you watch TV shows about wildlife at home? Circle the letter preceding your BEST answer.

   A. Hardly at all
   B. Almost every month
   C. Almost every week
   D. Almost every day

3. Have you participated in any projects to benefit wildlife or the environment? Please check the "PARTICIPATED" column for EVERY project in which you've been involved.

   Please check the "INVOLVE STUDENTS" column for EVERY project in which you involved your fourth grade students.

		PARTICIPATED	INVOLVE STUDENTS
A.	Clean a pond or stream	_____	_____
B.	Recycle trash	_____	_____
C.	Raise money for wildlife	_____	_____
D.	Write letters	_____	_____
E.	Build bat or bird houses	_____	_____
F.	Plant trees	_____	_____
G.	Other: _____	_____	_____

4. What do you think influenced your students' learning about wildlife in the past year? Please be specific.

_____
_____
_____
_____
_____
_____

5. What would help you incorporate more wildlife education into your curriculum?

_____

_____

_____

_____

_____

6. How has our research project affected your teaching this year? Please circle the letter next to EVERY answer that applies.

A. Stimulated me to offer more environmental education
B. Used class time better spent in other ways
C. Validated my teaching withut changing it
D. Distracted students/ increased discipline problems
E. Criticized me so I taught less about wildlife than usual
F. Added interest for students
G. Altered daily schedules
H. Reduced my teaching of larger environmental concerns to focus on wildlife
I. Other: (Explain)_____

_____

THANK YOU VERY MUCH FOR YOUR PARTICIPATION IN THIS STUDY

Appendix F.
Parent Survey

PROJECT WILD RESEARCH

WILDLIFE SURVEY FOR PARENTS

Knowing how children learn about nature and wild animals at home will help us see how children are learning at school. We would like very much to know about the wildlife-related activities your family does.

All your answers are strictly confidential.

Your participation is completely voluntary, but we hope you will take the time to respond to the survey.

By sharing this information with Project WILD Research, you will be helping to improve wildlife education programs for children in Wisconsin and across the nation.

A stamped return envelope has been provided for your convenience.

INSTRUCTIONS

Please read each question carefully.

Circle the number in the right hand column that corresponds with the answer that suits you best.

Here is an example that has been done for you:

EXAMPLE

1. In what state do you live now?

Illinois.....1

Michigan.....2

Wisconsin.....(3)

Minnesota.....4

There are no right or wrong answers. If none of the answers provided for a question seems exactly right, choose the one that is closest to your own answer. The best answer is the one which most closely reflects your own feelings and beliefs, or what you actually do.

Please answer every question that applies to you.
Thank you very much.

SECTION I: WAYS YOUR CHILD HAS LEARNED ABOUT WILDLIFE

In this first part, we are asking questions about ways your fourth grade student has learned about wild animals and the environment, outside of the school program, through family and friends.

1. In the past year, which of the following places has your fourth grader visited with an adult relative or friend? Circle all that apply.

   A nature center/environmental education center.....1

   A natural history museum or wildlife exhibit.....2

   A zoo or aquarium.....3

   A national, state, or county park.....4

   A state wildlife management area.....5

2. Are any of the following wildlife magazines available in your home? Circle all that apply.

   "Outdoor Life".....1

   "Field and Stream".....2

   "Wisconsin Natural Resources".....3

   "Sports Afield".....4

   "Fur-Fish Game".....5

   "Wisconsin Sportsman".....6

   "Turkey Call".....7

   "Audubon".....8

   "National Wildlife".....9

   "National Geographic".....10

   "Ranger Rick".....11

   "Zoo Book".....12

   "My Big Back Yard".....13

   Other:_____.....14

3. Does your fourth grade child read any of these wildlife magazines?

   Yes.....1

   No.....2

   I don't know.....3

   If yes, which magazines?_____

4. In the past year, has your fourth grader read books (or listened to books read aloud) about wild animals?

   Yes.....1

   No.....2

   I don't know.....3

   If yes, which books?_____

5. How often does your fourth grade child watch shows about nature or wildlife on TV? Circle the letter representing the answer that comes closest. Circle only one answer.

   Hardly at all.....1

   Almost every month.....2

   Almost every week.....3

   Almost every day.....4

   I don't know.....5

6. Which wildlife or environmental education programs, besides school programs, has your fourth grader ever attended? Circle all that apply.

   A state park or nature center program such as Wisc. Junior Ranger?.....1

   A summer camp including nature lore or environmental education.....2

   Scouts, 4-H, Campfire Girls, other youth groups.....3

   None that I know of.....4

7. In the past year, what outdoor activities has your fourth grade child done with adults in your household, and how often?

Please circle the number corresponding to your best answer on a scale where 1 = never, 2 = once or twice, 3 = 3-12 times, 4 = 13-24 times, 5 = 25 or more times.

Circle one number for each item.

HOW OFTEN IN THE PAST YEAR HAS YOUR CHILD GONE...	NEVER	1-2 TIMES	3-12 TIMES	13-24 TIMES	25 + TIMES
A. Fishing	1	2	3	4	5
B. Walking in the woods	1	2	3	4	5
C. Watching birds	1	2	3	4	5
D. Camping	1	2	3	4	5
E. Canoeing	1	2	3	4	5
F. Hunting	1	2	3	4	5
G. Feeding birds	1	2	3	4	5
H. Visiting the zoo	1	2	3	4	5
I. Other:_____	1	2	3	4	5

8. How much do you think your child has learned about nature and wildlife from each of the following sources?

Please circle the number corresponding with your best answer on a scale where 1 = nothing, 2 = very little, 3 = some, and 4 = very much.

Circle one number for each item.

HOW MUCH HAS YOUR CHILD LEARNED ABOUT WILDLIFE?	NOTHING	VERY LITTLE	SOME	VERY MUCH
A. From school activities	1	2	3	4
B. From family activities	1	2	3	4
C. From books and magazines	1	2	3	4
D. From movies and TV shows	1	2	3	4
E. From other sources: (list) _____	1	2	3	4

SECTION II: WILDLIFE INTERESTS OF ADULTS IN THE HOUSEHOLD

In this part of the survey, we will ask you some questions about the wildlife-related interests of the adults in your household, as they might affect the interests of the fourth grader. Please circle the number in the right column for every answer that applies.

1. Is any adult in your household a contributor to or member of any wildlife-related organization? Circle all that apply.

National Wildlife Federation.....1

Wisconsin Wildlife Society.....2

National Audubon Society.....3

Wisconsin Society for Ornithology.....4

The Nature Conservancy.....5

Sierra Club.....6

Defenders of Wildlife.....7

World Wildlife Fund.....8

Greenpeace.....9

Wings Over Wisconsin.....10

Wisconsin Waterfowlers.....11

Ducks Unlimited.....12

Pheasants Forever.....13

National Wild Turkey Federation.....14

The Ruffed Grouse Society.....15

The Wisconsin Trapper Association.....16

The Timber Wolf Association.....17

A Rod and Gun (sportsman's) Club.....18

Other:_____.....19

2. In the past ten years, has any adult in your household participated in a project to help wildlife or the environment?
Circle all that apply.

Cleaning up a pond or stream for wildlife.....1

Raising funds for the protection of endangered species.....2

Writing letters to support wildlife or environmental concerns.....3

Building bird or bat houses.....4

Other:_____.....5

3. Does any adult in your household hunt? Circle your best answer.

Yes.....1

No.....2

If yes, what do they hunt?_____

4. Does any adult in your household fish? Circle your best answer.

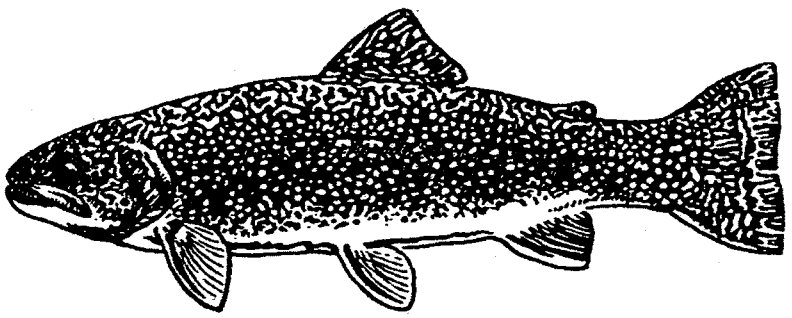
Yes.....1

No.....2

5. Does any adult in your household trap fur bearing animals?
Circle your best answer.

Yes.....1

No.....2



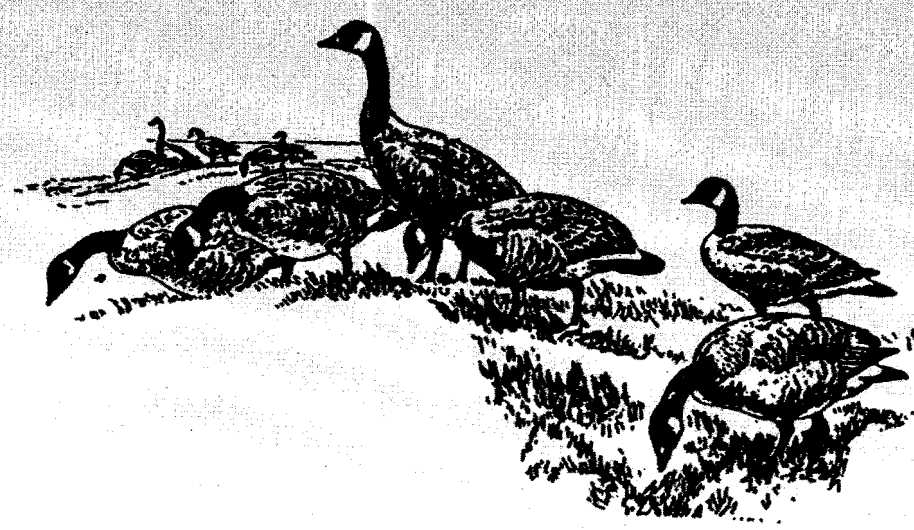
SECTION III: YOUR ATTITUDES ABOUT WILDLIFE AND THE ENVIRONMENT

People have different feelings about environmental issues. We are interested in learning how you feel about each of the following statements. Please circle one number for each statement.

1 = strongly agree, 2 = probably agree, 3 = probably disagree, 4 = definitely disagree.

	STRONGLY AGREE	PROBABLY AGREE	PROBABLY DISAGREE	DEFINITELY DISAGREE
1. All plant and animal species have an equal right to exist.	1	2	3	4
2. Plants and animals exist primarily to be used by humans.	1	2	3	4
3. People do not need to be concerned with the extinction of species because plant and animal species are always dying out as a natural part of the evolutionary process.	1	2	3	4
4. Everyone has a responsibility to conserve plant and animal species.	1	2	3	4
5. The balance of nature is very delicate and is easily upset.	1	2	3	4
6. Humans are justified in changing the natural environment to suit their needs.	1	2	3	4
7. Humans must live in harmony with nature in order to survive.	1	2	3	4
8. We shouldn't be concerned about environmental problems because science and technology will solve them.	1	2	3	4

	STRONGLY AGREE	PROBABLY AGREE	PROBABLY DISAGREE	DEFINITELY DISAGREE
9. Endangered species of plants and animals and natural areas should be preserved no matter what the cost.	1	2	3	4
10. Preservation of the environment is justified only to the extent that preservation does not interfere with human activities.	1	2	3	4
11. Society has more important problems than preserving natural area and endangered species of plants and animals.	1	2	3	4



SECTION IV: BACKGROUND INFORMATION

We would like to know a little about your background. This information will help us compare your answers to those of other people. All of your answers are strictly confidential.

1. Please rate your interest in the activities that follow, on a scale where: 1 = no interest at all, 2 = not much interest, 3 = neutral, 4 = some interest, 5 = very much interest.

Circle one number for each question.

HOW INTERESTED ARE YOU?	NOT AT ALL	NOT MUCH	NEUTRAL	SOME	VERY MUCH
A. In learning about wildlife and the environment?	1	2	3	4	5
B. In having your child learn about wildlife and the environment?	1	2	3	4	5

2. Do you live...

In the country on a farm.....1
In the country, but not on a farm.....2
In a small city or town.....3
In a big city.....4
On the edge of a city, in a suburb.....5

3. When you were growing up, did you live...

In the country on a farm.....1
In the country, but not on a farm.....2
In a small city or town.....3
In a big city.....4
On the edge of a city, in a suburb.....5

4. Are you...

Male.....1
Female.....2

5. How old are you? I am _____ years old.

6. Do you consider yourself...

White.....1
Black.....2
Hispanic.....3
American Indian.....4
Asian.....5
Other:_____.....6

7. How many years of school have you completed?

1 2 3 4 5 6 7 8 9 10 11 12

Technical Training.....13
Some college.....14
B.A., B.S., or equivalent.....15
M.A., M.S., or equivalent.....16
Advanced degree (M.D., PhD. etc.).....17

8. What is your primary occupation? Circle the one that comes closest.

Homemaker.....1
Professional/Technical.....2
Manager/Administrator.....3
Clerical/Sales.....4
Skilled industrial worker.....5
Service worker.....6
Farm worker/Farmer.....7
Student.....8
Unemployed.....9

9. Please circle the number that corresponds with the figures that come closest to your total household income before taxes.

$0 - 9,999.....1
$10,000 - 19,999.....2
$20,000 - 29,999.....3
$30,000 - 39,999.....4
$40,000 - 49,999.....5
$50,000 - 59,999.....6
$60,000 or more.....7

10. Are you...

Single.....1
Married.....2
Widowed.....3
Divorced.....4

11. How many are in your household?

Adults (18 or older)____ Children (under 18)____

12. Your comments on your child's wildlife and environmental education are welcome here:

YOUR
NAME: _____

YOUR
ADDRESS: _____

NAME OF YOUR FOURTH GRADE
CHILD: _____

YOUR CHILD'S
SCHOOL: _____

YOUR FOURTH GRADE CHILD'S
TEACHER: _____

May we contact you if we have further questions? If yes, what is your

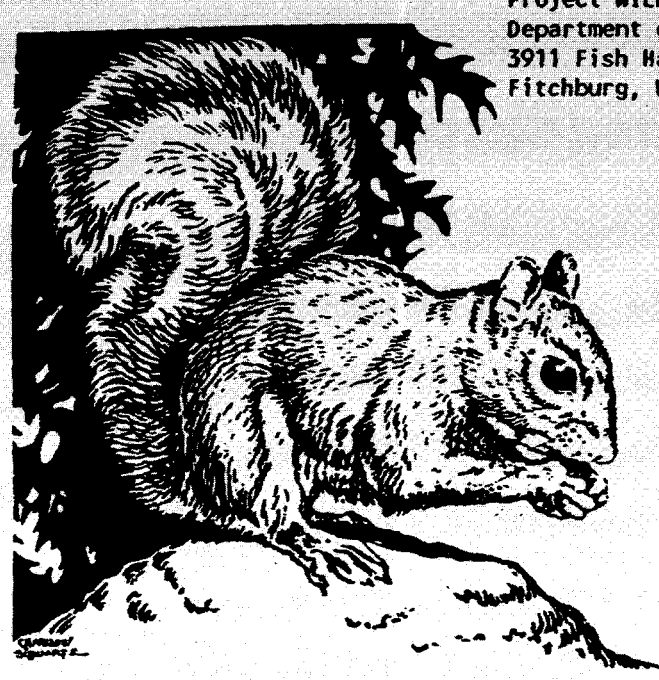
Daytime phone number? _____

Evening phone number? _____

THANK YOU for completing the survey.

Please return this survey as soon as possible in the enclosed, stamped envelope, addressed to:

Susan Gilchrist
Project WILD Research
Department of Natural Resources
3911 Fish Hatchery Road
Fitchburg, WI 53711.



Appendix G.
Student Interview Sheets

STUDENT INTERVIEWS

TEACHER: _____

SCHOOL: _____

STUDENT: _____

INTERVIEWER: _____ DATE: _____

1. What did you think of the survey?

2. Which questions in the survey interested you most, and what was it about them that interested you?

3. Which questions in the survey were confusing, and what was it about them that was confusing?

4. What do you think the word "wildlife" means?

5. What kinds of wildlife might be found in cities?

6. What do you think the word "habitat" means?

7. How do you think people can best help wildlife?

8. How do you think you have learned about wildlife?

9. What's the most interesting thing you've learned about wildlife in the past year?

10. How did you learn that?

11. What nature shows have you watched on TV recently?

12. What kind of outdoor activities do you like to do?

13. What books have you read about wildlife?

14. What kinds of things do you do with your parents related to wildlife?

OBSERVATION STUDENT INTERVIEWS

TEACHER: _____

SCHOOL: _____

STUDENT: _____

INTERVIEWER: _____ DATE: _____

ACTIVITY OBSERVED: _____

1. What activity/lesson did you do today?

2. What did you think of the activity you did today?

3. What do you think the teacher was trying to teach you?

4. In today's class, what did you learn?

5. In what way have you learned about this before today?

6. In what way was today's class different than usual?

7. What does "wildlife" mean to you?

8. What does "hunting" mean to you?

9. How do you feel about hunting?

10. What caused you to feel that way about hunting?

11. Tell me something interesting you've learned about wildlife in the past year.

12. How did you learn that?

OBSERVATION STUDENT INTERVIEWS

TEACHER: _____

SCHOOL: _____

STUDENT: _____

INTERVIEWER: _____ DATE: _____

ACTIVITY OBSERVED: _____

1. What activity/lesson did you do today?

2. What did you think of the activity you did today?

3. What do you think the teacher was trying to teach you?

4. In today's class, what did you learn?

5. In what way have you learned about this before today?

6. In what way was today's class different than usual?

7. When I say "wild animal," what does the word "wild" mean?

8. How do you feel about wild animals and what caused you to feel that way?

9. What kind of pets do you have?

10. What is your responsibility for these pets?

11. Tell me something you've learned about wild animals in the past year.

12. How did you learn that?

OBSERVATION STUDENT INTERVIEWS

TEACHER:_____

SCHOOL:_____

STUDENT:_____

INTERVIEWER:_____DATE:_____

ACTIVITY OBSERVED:_____

1. What activity/lesson did you do today?

2. What did you think of the activity you did today?

3. What do you think the teacher was trying to teach you?

4. In today's class, what did you learn?

5. In what way have you learned about this before today?

6. In what way was today's class different than usual?

7. When I say "wild animal," what does the word "wild" mean?

8. What's your favorite wild animal?

9. What do you like about that animal?

10. How did you become interested in that animal?

11. Tell me something you've learned about wild animals in the past year.

12. How did you learn that?

PROJECT WILD RESEARCH
SPRING STUDENT EXIT INTERVIEWS

TEACHER _____

SCHOOL _____

STUDENT _____

INTERVIEWER _____ DATE _____

1. What did you think of the survey?

2. Look through the survey and tell me about one question you liked.
   What did you like about it?

3. Look through the survey and tell me about one question you didn't like.
   What didn't you like about it?

4. Tell me about a survey question you answered differently this spring than you did last fall.
   What changed your mind about it?

5. What does the word "wildlife" mean?

6. What does the word "habitat" mean?

7. What does the phrase "food chain" mean?

8. What does the phrase "carrying capacity" mean?

9. What responsibility do people have for wildlife?

10. How do you feel about hunting?
    What caused you to feel that way?

11. How do you feel about forest or prairie fires?
    What caused you to feel that way?

12. What outdoor activities are you planning to do this summer?
    How is this different from last summer?

13. What do you recycle?
    What got you started recycling?

14. Tell me something about wild animals you learned in school this year.
    How did you learn that?

15. Tell me something about wild animals you learned outside of school this year.
    How did you learn that?

16. Tell me something about wild animals you learned from your family.
    How did you learn that?

17. What was the most interesting activity related to wild animals that you did in school this year?

18. If you were the teacher, what would you teach 4th graders about wild animals?
    How would you teach it?

19. Have you ever heard of Project WILD?
    What do you think Project WILD is?
    What do you think of Project WILD ?

Appendix H.
Teacher Interview Sheets

TEACHER INTERVIEWS

TEACHER: _____

SCHOOL: _____

INTERVIEWER: _____ DATE: _____

1. What did you think of the teacher survey?

2. What are your major goals as a fourth grade teacher?

3. What do you think environmental education is?

4. How important is environmental education to you?

5. How important is environmental education to your school administration?

6. How does environmental education help you meet your goals for the fourth grade?

7. How do you define "wildlife"?

8. How do you think people can best help wildlife?

9. What influences affect student learning about wildlife and the environment?

10. What sources of classroom activities are you using to develop your wildlife curricula?

11. How do your plans for teaching wildlife and environmental education differ from previous years?

12. What training have you experienced relevant to wildlife and environmental education?

13. Why did you attend the training?

14. How has this training influenced you and your teaching?

15. Why did you agree to participate in Project WILD Research?

16. How do you think Project WILD affects the students?

17. What changes in your own lifestyle have you incorporated because you've taught wildlife or environmental education?

SPRING TEACHER INTERVIEWS

TEACHER: _____

SCHOOL: _____

INTERVIEWER: _____ DATE: _____

1. Which topics related to environmental education have you covered with the fourth grade this year, through spontaneous discussion or planned activities? Use this partial list of possibilities to remind you of topics you covered.

2. What is the main message you tried to teach your fourth grade students in environmental education?

3. How would you characterize this year's fourth grade?

Now we'd like to ask you specifically about wildlife education.

4. What do you think your students learned about wildlife this year?

5. How do you think they learned this about wildlife?

6. What do you think was the strongest influence on the children's learning about wild animals this year?

7. How do you think the especially knowlegeable student(s) in your class developed interest and learned about wild animals?

8. What was your most successful wildlife-related activity with this year's fourth grade students, and what was the source of the activity?

9. What special events/expert speakers in the school or community stimulated student interest in wildlife?

10. How did any student-teacher or parent volunteers affect the students' learning about wild animals?

11. How did local issues or national news related to wildlife affect your teaching or student learning?

To understand how and what the students are learning, we need to know what you think about a few things.

12. What's your attitude towards hunting?

13. How do you feel about forest or prairie fires?

14. Since different experts may work with different definitions, we'd like to know what the following terms mean to you:

    A. wildlife

    B. habitat

    C. food chain

    D. carrying capacity

15. Which wildlife-related topics you covered did students <u>not</u> understand?

16. What do you need to incorporate more wildlife education (Project WILD) into your curriculum?

17. Which wildlife-related (Project WILD) activities worked well with the students, and which did not?

18. What effect has your (using Project WILD) teaching about wildlife had on student knowledge, attitudes and behaviors related to wild animals?

19. How has participation in this research affected you and your class?

In answering questions about teaching environmental education, please consider this list of potential topics. Perhaps you have covered some of these topics with your students, even though you may not have been intentionally covering environmental education at the time.

Please check each topic tnat you have covered with the fourth grade class participating in Project WILD Research this year.

ENVIRONMENTAL EDUCATION TOPICS COVERED 1989-90

1. weather/atmosphere
2. pollution
3. oil spills
4. air quality
5. toxics/chemicals/hazardous wastes
6. pesticides/insecticides/herbicides
7. point/non-point pollution
8. recycling
9. renewable/non-renewable resources
10. conservation
11. energy
12. hydro-electric power
13. solar power
14. nuclear power
15. human impact
16. forest/prairie fires
17. hunting
18. fishing
19. trapping/fur trade
20. tracking
21. camping/hiking
22. watching birds/wildlife
23. farming
24. soils
25. composting
26. soil erosion
27. logging
28. reforestation/tree planting
29. forest products
30. tree identification
31. quarrying/mining
32. rocks and minerals
33. volcanoes/earthquakes
34. fossils
35. glaciers
36. pond/forest/prairie succession
37. road/railroad construction
38. urban sprawl
39. population growth
40. ozone depletion
41. global warming/greenhouse effect
42. drought
43. nature appreciation

Appendix I.
Observation Sheets

OBSERVATION SHEET

TEACHER:_____

SCHOOL:_____

OBSERVER:_____CLASS SUBJECT:_____

DATE:_____BEGINNING TIME:_____ENDING TIME:_____

1. What was the environmental education topic of today's class?

2. What concepts related to wildlife were covered?

3. What teaching methods were used?

4. Describe the activity:

5. Preparation/planning that occured prior to this activity:

6. Follow-up intended for after this activity:

7. Resources/materials used:

8. Classroom displays related to wildlife or environmental education:

9. Class mood/group dynamics:

10. Student engagement:

11. Teacher interest/enthusiasm:

12. Comments:

Appendix J.
Creating the Multiple Regression Analysis

To explain the variation in spring student survey scores due to Project WILD, while controlling for other influences that may have affected student learning about wildlife, we conducted a multiple regression analysis.

The first model included 34 variables (taken from the parent surveys plus the class and school community): activities score (Section I, 7); adult contributions to wildlife organizations (Section II, 1); projects to help the environment (Section II, 2); magazines available (Section I.2); wildlife places visited (Section 1, 1); environmental education programs (Section I, 6); hunting adults (Section II, 3); fishing adults (Section II, 4); magazines students read (Section I, 3); books students read (Section 1, 4); parent interest in learning about wildlife (Section IV, 1A); parent interest in student learning about wildlife (Section IV, 1B); education of the parent (Section IV, 7); poor, lower middle income, upper middle income (all from Section IV, 9); professional/managerial occupation, homemaker/industrial worker, or clerical/sales/service occupation (all from Section IV, 8); black respondent (Section IV,6); rural residence (Section IV, 2); respondent grew up rurally (Section IV,3); single female respondent, black female respondent, poor female respondent, lower middle income female, and poor black female (all combinations of items in Section IV with number 4); the adult-child ratio (Section IV, 11); and male students (based on student surveys), agricultural, inner city, or forested community, and WILD class.

Appendix K.
Teacher Interest Index

From the teacher surveys we developed an interest index score. To build this score, we selected questions representative of teacher interest in wildlife and environmental education from the teacher surveys: the number of environmental education programs the teacher planned to use/used (Section I, 2); the number of subjects the teacher planned to infuse/infused with environmental education (Section I, 3); the number of field trips planned/taken this year (Section I, 6); the number of guest speakers planned/used (Section I, 7); the number of topics planned/taught (Section I, 9); the importance of environmental education to the teacher (Section II, 1); the importance of environmental education to the students (Section II, 1); the number of training programs attended (Section V, 4); the number of related activities enjoyed (Section V, 6); the number of environmental organizations in which teachers were involved (Section V, 7); and the number of action project in which teachers participated (Section V, 8). The fall interest index included items related to teacher plans for the research year; the spring index included items referring to what teachers actually did. Responses to these questions were divided into three groups according to frequency distribution (below average, average, or above average). They were recoded accordingly and tallied to create a single score for each teacher.

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Acknowledgments

This study was supported in part by funds supplied by the Federal Aid to Wildlife Restoration Act under Pittman-Robertson Project W-141-R. This report represents a Final Report for Study 030.

The author wishes to thank those who have supported this research project with guidance and advice, teacher recruitment, data collection, data entry, data analysis, the writing of this report, and general moral encouragement. Thanks to the Bureau of Integrated Science Services for supporting the project to completion.

For guidance and advice, and help in a myriad of ways, thanks especially to Jerry Bartelt, Dennis Yockers, and Ed Nelson. Thanks to other members of the research advisory committee: Catherine Young, David Gjestson, Randy Jurewicz, Carrie Morgan, Mary Kay Judd (Salwey), Kari Esbenson, Sherry Klosiewski, Jo Temte, and Joy Ludtke. Thanks to Bob Dumke, Chuck Pils, Tom Hauge, and Steve Miller for support at the administrative level. Thanks to Judy Klippel, Dean Sauers, Mark Breseman, Joe Belliveau, Jim Anderson, and the Project WILD facilitators who helped recruit teachers to participate in the research. Thanks to the experts who helped with the research design and development of the survey instruments: Ken Zeichner, Gary Price, Mary Gomez, Betsy David, Ben Payton, Paul Moberg, Riley Dunlap and Kent Van Liere.

For help collecting or entering the data, supreme thanks are due Ruth Keutemeyer, as well as Mary Mullen, Laurel Sturges, Kim Giese, residents of Oshkosh Correctional facility, Lisa Dlukowski, Brian Dhuey, and John Huff. Paul Rasmussen, Robert Rolley, and Gene Lange merit thanks for assistance with the statistical analysis. Khalil Supple and Jean Adams are the experts who conducted the statistical analysis on which this paper is largely based.

Thanks to those who have offered assistance with the writing of the research results: Betty Les, Wendy McCown, Michelle Voss, Stephanie Brouwer, and Julia Barrett. Thanks to those who reviewed my writing, especially Tom Romberg, Dan Shaw, Dennis Yockers, Jerry Bartelt, Paul Rasmussen, and Ed Nelson.

I'm grateful to the Project WILD network of people who have maintained interest in the research over time and supported completion of the project and dissemination of the findings, especially Dan Shaw, Steve Bissell, Dennis Yockers, Karen Van Norman, Carl Wolfe, Robert Long, Miriam Westervelt, Luba Mycio-Mommers, and Cheryl Charles.

Thanks also to my family for tolerating my absences while I collected data and put in long hours during the writing phase of this paper.

Last but far from least, I remain eternally grateful to the teachers who volunteered their classes to field test the research instruments, the principals of the 16 schools who participated in the research, the 24 teachers who welcomed me to their classrooms, the students who eagerly volunteered to take the survey and be interviewed, and the parents who cared enough to respond to the surveys for the research.

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Susan C. Gilchrist conducted the Evaluation of Project WILD for the Wisconsin DNR, Bureau of Research, from 1989 to 1993. Her background includes an M.A. in Teaching degree from Cornell University and years of experience in education and teacher training in a variety of different settings, with people of all ages, preschool through adult. Prior to the DNR, she worked for the Department of Health and Social Services as Program Coordinator for a curriculum development and research program promoting adolescent health. Recently, through the DNR, she has coordinated curriculum development and evaluation for the *One Bird - Two Habitats* project on neotropical migratory bird conservation. As a result of her involvement in the Evaluation of Project WILD, Susan has become a facilitator for Project WILD, Project Learning Tree, and Project WET workshops. She is active in the Wisconsin Association for Environmental Education and served two terms on the Board of Directors. She has presented at state, regional, national, and international conferences. In addition, Susan is a professional storyteller.

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