“Every river appears to consist of a main trunk, fed from a variety of branches, each running in a valley proportional to its size, and all of them together forming a system of valleys connecting with one another, and having such a nice adjustment of their descending slopes that none of them join the principal valley either on too high or too low a level; a circumstance which would be infinitely improbable if each of these valleys were not the work of the stream which flows in it.”

*Playfair’s Law* — John Playfair, 1802

A note from the authors

We thought we were on the cutting edge of watershed education when *The Stream Scene: Watersheds, Wildlife and People* began in 1985 at Corvallis (Oregon) High School. But John Playfair was far ahead of us, recognizing the basic features of a watershed and their implications in the early 1800s.

Human actions since Playfair’s time have had huge impacts on this country’s watersheds. We have dammed our rivers, logged our forests, farmed the bottomlands, grazed the hillsides, and developed nearly everything that’s left—most without a clear understanding of the cumulative effects.

Today, Oregonians and others across the country are facing the problems created in our watersheds—problems with water supplies, problems with water quality, and problems with fish.

The Oregon Plan for Salmon and Watersheds, a grass-roots effort championed by Governor John Kitzhaber, is a call to all Oregonians, whether they live in a city, a suburb, or on a farm, to join the effort to save our salmon and protect our rivers. It represents commitments on behalf of government, organizations, and private citizens from all areas of the state—citizens who feel salmon, trout, rivers, streams, and watersheds are worth saving. The Oregon Plan began as a way to address declines in coastal salmon. It has now expanded into a comprehensive statewide approach to watershed protection that includes improvements in water quality and fish populations and an expansion of public consciousness.

As a result, Oregonians from all walks of life have focused their attention on watersheds—and the uplands, waterways, and fish in them. Restoration and recovery efforts are taking place in nearly every major watershed. Everyone is “getting their feet wet”—government agencies, businesses, private landowners, educators,
students, and individuals. Everyone wants to help, but few know where to begin.

One place to begin a good watershed education is *The Stream Scene: Watersheds, Wildlife and People*. *Stream Scene* is a comprehensive look at watersheds from the top down. It starts with the water cycle, which drives the whole watershed system, and moves to uplands and riparian areas, hydrology, water quality, aquatic organisms, and lots in between.

Bruce Babbitt, U.S. Secretary of the Interior, in his address to Trout Unlimited on the event of their 40th birthday, confirmed the need for learning about watersheds:

> To protect wild salmon and trout, we must transcend traditional boundaries. After all, no stream—and no trout or salmon species—can be healthy if the land around it is sick. Moving water is a mirror of its surroundings. To save salmon and trout, we must heal the land itself. We must dream big dreams; we must think like a watershed.

Thinking like a watershed means realizing everything counts, that all parts of a watershed are connected. It means seeing linkages—understanding the science of stream health. . . .

Thinking like a watershed is about possibilities, too—about imagining the future by rediscovering the past. . . . Many say it can’t be done. But I have a simple reply: It is happening already.

And the reason it’s happening is because local individuals, organizations, educators, students, and others care enough to find a way to make a difference. Watershed education, whether community-based or school-based, is successful because each one of us has a deep-seated need for a “sense of place.” A “sense of place” is an awareness of who we are. It is recognition of our role in a community, a role that may take the form of participation in a watershed council, watershed education, or watershed stewardship as a caretaker of the land on a ranch or farm.

Put a local map in front of someone and watch them point out where they live. That’s a sense of place! Revisit your hometown and drop by your old school. That’s a sense of place! Relive special wading, angling, or rafting experiences and recapture the connection you felt with those streams. That’s a sense of place! A sense of place is also taking responsibility for shaping the future of a community, making personal choices to reduce our impacts on natural resources, and volunteering time and more just because it makes a difference.

Now, in Oregon and across the country, a sense of place is about watersheds. Watersheds have boundaries, but watershed education does not. Watershed education is for young and old, housewives and technical specialists, ranchers and developers. People, all kinds of people, are an integral part of watersheds. Michael Dombeck, chief of the U.S. Forest Service, described this human connection in a 1997 speech:

> Healthy watersheds retain historic flows and are resilient in the face of natural events such as floods, fire, and drought and are more capable of absorbing the effects of human-induced disturbances. They connect headwaters to downstream areas, wetlands and riparian areas to uplands, and subsurface to surface flows.... We simply cannot meet the needs of people if we do not first secure the health of our watersheds.

We hope *Stream Scene* is a meaningful guide as you develop a “sense of place” and watershed responsibility in your students, school, and community.
Active Learning

The Stream Scene: Watersheds, Wildlife, and People is a curriculum guide to basic knowledge about watersheds. It encourages responsibility, action and community involvement.

Activities in Stream Scene are largely designed for middle and high school students, but each activity suggests ways to adapt the concepts for younger students. Adult learners also benefit from the background material and activities in Stream Scene.

Each chapter provides teachers with clear, up-to-date background information. Chapter content is suitable for student reading or it can be outlined and used in a lecture or discussion format. Some sections are more technical than others. Evaluate the reading level before assigning student reading.

Other chapter features include a vocabulary list of key words, activity extensions, a bibliography, and student activities to develop and expand the concepts presented in the chapter.

Extensions, found at the end of each background section, include activities from other water and watershed education curriculum, including Aquatic Project WILD, Project WET, Earth: The Water Planet, Groundwater: A Vital Resource, The Comprehensive Water Education Book, Watershed Uplands Scene, and others. Educators can strengthen a student’s watershed education experience by incorporating ideas from the extensions list. For copies of extension activity curricula, refer to the starred items in Chapter 14.4 of the resources section beginning on 519. You will also find sources of equipment, reference books, posters, and more in this section.

Activities are presented in both “teacher” and “student” versions. Teacher versions include objectives, methods, suggestions for younger students, materials lists, vocabulary, answer keys, notes to the teacher, and scientific inquiry ideas.

Ideally Stream Scene studies will lead to a series of field investigations. Classroom activities used without a field experience are generally effective, but to develop the connections hinted at by Babbitt, Dombeck, and others, students need to become “part” of their watershed. Only by studying its history, its future, its problems, its successes—totally immersing themselves in the reality of their watershed—can students develop the “sense of place” that translates into responsibility, action, and stewardship. Suggestions for field investigations begin on page 439. Begin with these procedures, but encourage students to ask questions and develop further investigations in their watershed. Brainstorm a list of individuals who can provide professional and technical resources. Invite them to visit your class or study site to share their knowledge. Once students are proficient and accurate with stream sampling methods, opportunities may exist to assist with local watershed monitoring efforts. Look into a

Calvin and Hobbes

by Bill Watterson

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partnership with your local watershed council and encourage student participation in the watershed council process. Students can become an important part of what is happening in their watershed.

Assigned teams in a half-day field trip can complete all of the field investigations included in this book. Hopefully, you and your students are not limited to a single half-day field exercise. The more numerous and more varied the activities in the watershed system, the richer the experience for the students. Find ways to help them get their hands dirty and their feet wet. It’s all part of effective watershed education.

In most cases the standard English system of measurement is used throughout Stream Scene. Refer to pages 511 for metric conversion tables. Other helpful tools found in Stream Scene are hints for “make and take” field equipment, information about Oregon’s Salmon-Trout Enhancement Program (STEP), field data collection sheets, other curriculum resources, websites, watershed council contacts, a glossary, and more.

Because a number of Oregon’s fish species are classified as threatened species under the Endangered Species Act (ESA), certain conditions and guidelines apply to fish sampling or habitat restoration work. When considering fish sampling or habitat restoration work as part of your watershed study, contact the nearest Oregon Department of Fish and Wildlife (ODFW) office to discuss your ideas with a STEP biologist or local fish biologist. Refer to the map and addresses in Chapter 11.
**Meeting Oregon’s education standards**

An important part of each Stream Scene activity is its correlation with Oregon’s academic content area standards. *Stream Scene* can help your students meet standards for English, science, social studies, math, and career related learning. Refer to the correlations in Chapter 13 beginning on page 483.

An important feature of each activity is the “Going Further” section. “Going Further” is a list of inquiry-based activities. Most of these suggestions will help students reach success in meeting scientific inquiry standards.

So, what’s next? Consider using the self-directed learning approach outlined in *Watershed Uplands Scene: Catching The Rain*. Funded by the Governor’s Watershed Enhancement Board and created by Kate Ferschweiler, Kermit Horn, and Al Hughes of the Environmental Education Association of Oregon, this program helps high school students dig deeper into the study of watersheds. Students work as part of independent study teams to explore the interdependencies among weather and climate, soils, vegetation, and wildlife in a watershed. The next level of study looks at human uses of a watershed—the social impacts and processes that affect land uses such as urban, forestry, recreation, and agriculture. Finally, students tie all they have learned together in a land-use decision-making investigation. Using activities from the *Watersheds Uplands Scene* is also a good way to help older students meet Oregon’s education benchmarks. To get a copy of the *Watershed Uplands Scene*, consult the resources section on page 530.

**Suggestions for student assessment**

One way students can monitor their progress toward achievement of the statewide education benchmarks is to create and maintain a portfolio of their work. A portfolio is a collection of work items most representative of a student’s skills and accomplishments. It lets students and others track their progress, share what they have learned with others, and offers a way for students to value their own work.

Allow students to choose the items that go into the portfolio. Encourage your students to personalize their portfolio and update it regularly to represent their best work. Provide models of good portfolios and standards for their assessment.

Items in the portfolio might include journal entries, field data reports, artwork, creative writing, graded activities, related newspaper clippings or magazine articles, or any other evidence of participation in watershed education studies. Students should also include their own personal thoughts about the significance of any part of the portfolio or the community effects that may be realized as a result of student involvement in watershed issues.

Journal entries, as part of a portfolio, help students evaluate the benefits they have gained from their watershed education experiences. Journal entries might include:
- descriptions of new knowledge and skills they have gained;

For more information about ODFW’s Aquatic and Angler Education Program, contact the department at 503-947-6002, or write to ODFW Aquatic Education Program, 3406 Cherry Ave. NE, Salem, OR 97303-4924. Inquiries about the annual Creeks and Kids Educator Workshop should be directed to Lin Howell, Jackson Bottom Wetlands Preserve, 503-681-6429.
I learned how to define a watershed today and what a "sense of place" means to me. John and I first outlined the boundaries of the Metolius River watershed with one color. Then we outlined the Lake Creek watershed, the stream we are studying, in another color. We also marked the school’s location on the map. It was sometimes hard to tell where to draw the lines, but using the maps made it easy to see that a watershed reaches from "ridgetop to ridgetop." I was surprised to learn that one watershed fits into another.

The smaller watersheds are called subbasins. Even though the Metolius River flows into the Deschutes River, it is still part of one big giant watershed, the Columbia River Basin. Mr. Wolf showed us a map of the Columbia River watershed. It’s huge! It stretches clear into British Columbia and Alberta, Canada, plus Idaho, Montana, Wyoming, Nevada, Washington, and Oregon. I guess I didn’t realize how connected it all is. No wonder everyone is so worried about the salmon!

Student Journal

6/1/99 A Sense of Place

I learned how to define a watershed today and what a "sense of place" means to me. John and I first outlined the boundaries of the Metolius River watershed with one color. Then we outlined the Lake Creek watershed, the stream we are studying, in another color. We also marked the school’s location on the map. It was sometimes hard to tell where to draw the lines, but using the maps made it easy to see that a watershed reaches from "ridgetop to ridgetop." I was surprised to learn that one watershed fits into another.
**Example journal entry ideas**

**Activity Name** ________________________________________________________

Describe what you did in this activity.

What did you expect to learn or discover during this activity? What new skills did you gain or improve?

What part of the activity was most important? Why?

What was the most enjoyable? What part was most useful?

What is the next logical question that could be answered by continuing this activity? What happened during the activity that caused you to ask this question?

Look at your question above. Design an investigation that would answer the question. Make sure the investigation is safe and can actually be accomplished.

Next, design a data or recording form to record the results of your investigation.

List the possible outcomes of your investigation. Answer your original questions for each of the outcomes.

How have your skills in other subject areas (English, math, social studies, etc.,) helped you with this activity?

How have you become more aware of watersheds during this activity? How has this affected your attitude about the environment in general and about watersheds specifically?

How would you rate your effort and personal progress in this activity? Explain.
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