Public Debates Shaping Forestry's Future:
An Analysis

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The Contractor

This study was conducted by InfoTrend, Inc., a leader in computer content analysis of text and predictions of public opinion from the press. InfoTrend has done extensive work both individually and in partnership with survey and information management firms. InfoTrend, Inc. products, sometimes developed with partners, have been delivered to such governmental agencies as the Census Bureau, public interest groups like the Race Relations Council of Detroit, private foundations like the Robert Wood Johnson Foundation, private industry like Northern States Power Company, as well as other organizations. David Fan's InfoTrend predictions of consumer confidence/sentiment appear at the end of every month on Reuters Money Line.

The analysis was carried out by Prof. David Fan, President of InfoTrend, Inc. and Dr. David Bengston, ecological economist with Research Work Unit 4803, "Social and Economic Dimensions of Ecosystem Management," North Central Forest Experiment Station, St. Paul, MN.

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Background

The job of forest managers and policy makers is growing increasingly complex because of rapid change in the social, political, economic, and scientific environments in which forest management is carried out. Managing public lands in ways that are responsive to changing social conditions requires continuous monitoring and assessment. But traditional methods for monitoring the social environment are slow and expensive.

This study used innovative computer methods to analyze more than 30,000 online news media stories about the Forest Service and ecosystem management. Public attitudes, values, and the amount of discussion were examined for a set of issues critical to the Forest Service and its mission of caring for the land and serving people. Twenty-three issues were analyzed for the nation as a whole covering the period 1992-96, and for three regions covering the period 1994-96 (East, InterWest, and West). Analysis of the news media allows us to take the pulse of ongoing debates and discussions about natural resource issues as reflected in tens of thousands of stories.

Conclusions

Conservation Leadership:

Contrary to the conventional wisdom that the Forest Service is usually portrayed negatively in the press, the agency is generally viewed as a conservation leader and a good steward of the national forests. This finding is consistent with two nationwide surveys that found relatively high "approval ratings" for the Forest Service.

Healthy Productive Ecosystems:

Discussion of important ecological concepts in the news media was very limited. The low level of ecological content in media stories about the Forest Service presents a challenge because comprehension of basic ecological concepts is vital to the development of a meaningful understanding of most forestry issues.

The quantity of discussion about forest health jumped significantly in 1994 and has remained high, indicating continued concern about this topic. This finding is consistent with a 1994 nationwide survey that found a high level of agreement about the importance of forest health.

Attitudes toward ecosystem management were generally positive. The percent of positive attitudes has increased in recent years, indicating growing acceptance of this concept. This

finding is consistent with the results of several surveys that found evidence of strong support among the public for views consistent with ecosystem management. These findings suggest that ecosystem management may indeed be an idea whose time has come.

Benefits to People:

Recreation benefits and values were expressed in news stories more often than other categories of benefits and values, both at the national and regional levels. Expressions of recreation benefits and values as a percentage of expressions of all national forest benefits and values has increased in recent years. The dominance of expressions of recreation benefits and values is consistent with survey results.

Commodity benefits and values were also expressed frequently, but a slight downward trend is evident at the national level.

Ecological benefits and values were expressed frequently, just a little less than commodity benefits and values. This indicates a relatively high level of environmental concern and concern about protecting ecosystems.

Moral/spiritual/aesthetic benefits and values were expressed with an unexpectedly high frequency, given the intangible nature of these benefits. Both recreation and moral/spiritual/aesthetic benefits and values exhibited an annual cycle, with higher levels of expression in the warmer months of the year during the second and third quarters. This suggests that moral/spiritual/aesthetic benefits and values are likely to be experienced through participation in recreation activities.

Key Findings

Stewardship and ethics (see section 2.1)

- Attitudes toward the Forest Service's stewardship and ethics were generally positive nationwide — about 60 percent positive, overall (see figure ES-1).
- Attitudes toward the Forest Service's stewardship and ethics appear to be improving in the East but deteriorating in the West.

Collaboration and participation (see section 2.2)

- Messages about the Forest Service's use of collaborative and participatory approaches to planning and management were overwhelmingly positive — about 88 percent overall.
- A very slight downward trend in the number of positive collaboration messages since 1994 was found.
- In a qualitative analysis, a link between collaborative approaches and resolution of conflict was found.

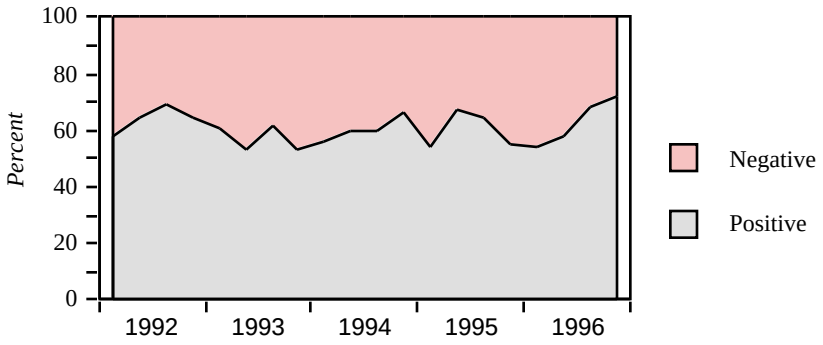

Figure ES-1. Percent of positive and negative attitudes toward the Forest Service's stewardship and ethics expressed in the news media, nationwide.

Science-based management (see section 2.3)

- Messages about science-based management in the Forest Service were overwhelmingly positive — about 96 percent overall.
- A gradual decline in the number of positive and negative science-based management messages was found, perhaps due to the winding down of the spotted owl debate.

Ecological literacy (see section 3.1.1)

- Discussion of important ecological concepts in the news media was very limited, indicating a low level of ecological content in media discussion of forestry issues. Therefore, ecological literacy depends on the public obtaining relevant information in other contexts.

Biodiversity (see section 3.1.2)

- Discussion of biodiversity has steadily declined since 1992. This trend may be driven more by the cooling down of the spotted owl debate than by a general decrease in concern about biodiversity.

Forest health (see section 3.1.3)

- Discussion of forest health jumped significantly in the third quarter of 1994 — following the deaths of 14 firefighters — and has remained high, indicating continued concern about this topic.

Ecosystem management (see section 3.2)

- About 75 percent of all attitudes expressed about ecosystem management were favorable nationwide.
- Attitudes toward ecosystem management were slightly more positive in the East (78 percent) and InterWest (77 percent) than in the West (72 percent).
- The percent of positive attitudes has increased in recent years, indicating growing acceptance of ecosystem management.

Recreation benefits and values (see section 4.1)

- Recreation benefits and values were expressed more often than other categories of benefits and values, and recreation as a percentage of all other categories of benefits and values has increased in recent years (see figure ES-2).
- The dominance of expressions of recreation benefits and values was found both at the national and regional levels.

Commodity benefits and values (see section 4.1)

- A slight downward trend is evident in expressions of commodity benefits and values at the national level.

Ecological benefits and values (see section 4.2)

- Ecological benefits and values were expressed frequently, mentioned just a little less often than commodity values.

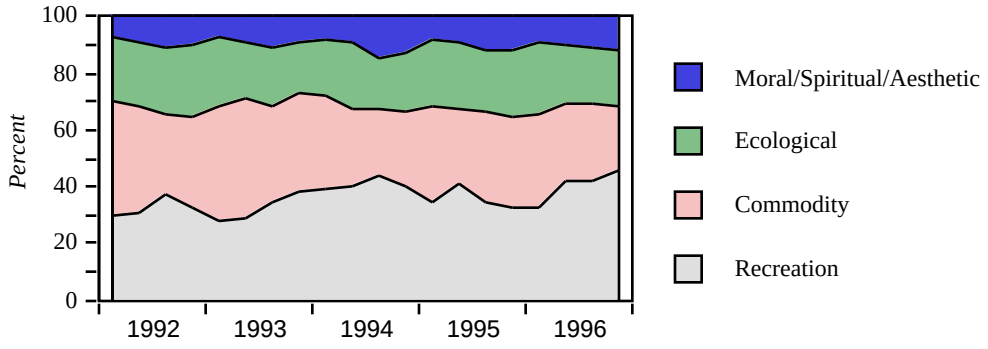

Figure ES-2. Expressions of recreation, commodity, ecological, and moral/spiritual/ aesthetic benefits and values associated with the national forests, nationwide.

Moral/spiritual/aesthetic benefits and values (see section 4.2)

- Moral/spiritual/aesthetic benefits and values were expressed with an unexpectedly high frequency, given the intangible nature of these benefits.

Firefighting benefits (see section 4.3)

- Large-scale wildfires are extremely "mediagenic" events — expressions of firefighting benefits surpassed those of all other benefit categories during major fire seasons.

Conflict over national forest policy and management (see section 5)

- Coverage of conflict jumped significantly in the first quarter of 1995 as the timber salvage issue began to be discussed in Congress.

- A gradual increase in conflict is evident in the East and InterWest, but no clear trend is apparent in the West.

1. Introduction

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1.1 Goals and Objectives

The overall goal of this project was to develop a social information system to monitor and evaluate:

- the quantity of public discourse in the news media, and
- public attitudes, values, and understanding responding to that discourse

on a set of issues critical to the Forest Service and its mission. This information system extends back in time to establish trends, is easily updated, and is expandable to cover additional issues or dimensions.

The specific objectives of this project are to evaluate trends in attitudes, understanding, and activities related to the first three key messages of the Forest Service Strategic Communication Plan. The key messages include:

1. **Conservation Leadership.** To what extent and in what ways is the Forest Service portrayed positively and negatively in the context of conservation leadership?

2. **Healthy Productive Ecosystems.**

    - *Ecological Concepts and Principles.* To what extent is the public informed about ecological concepts and principles such as healthy, productive, and sustainable ecosystems, etc.?
    - *Ecosystem Management.* To what extent is the public informed about ecosystem management? How have attitudes toward ecosystem management evolved over time?

3. **Benefits to People.** How does the press convey the Forest Service's contribution to recreation, commodity, ecological, and moral/spiritual/aesthetic benefits and values associated with the national forests?

A fourth concept not in the Forest Service Strategic Communication Plan was added to the analysis because we encountered it so often in news media stories about the Forest Service:

4. **Conflict Over National Forest Policy and Management.** How has the level of conflict changed over time?

The evaluation of these key messages includes a nationwide analysis and a regional breakdown: East (Forest Service Regions 8, 9), InterWest (Regions 1, 2, 3, 4), and West (Regions 5, 6). Forest Service Region 10 (Alaska) was not included due to a lack of online news sources during the period being studied.

1.2 Background

The Need to Monitor the Social Environment

The job of forest managers and policy makers is growing increasingly complex because of rapid change in the social, political, economic, and scientific environments in which forest management is carried out. For example:

- Environmental attitudes, values, and beliefs have changed significantly in recent decades (Kempton, et al. 1995, Ladd and Bowman 1995, Bengston and Xu 1997);
- The public and other stakeholders increasingly demand collaborative approaches to natural resource planning and management (Daniels and Walker 1996, Selin and Chavez 1995, Gerlach and Bengston 1994); and
- Natural resource management paradigms are shifting from traditional multiple-use to more holistic, ecosystem-based approaches (Gordon 1994, Bengston 1994).

Managing public lands in ways that are responsive to these and other social changes requires continuous monitoring and assessment of relevant trends in the social environment.

Why Analyze the News Media?

Natural resource management issues — ranging from timber salvage to ecosystem management — are debated in a variety of forums in society. As shown in Figure 1, social debates about natural resources and the environment take place in the courts, legislatures, meetings and hearings, confrontations, and the media. The media plays two important roles in these debates, serving as a direct forum for public discourse on natural resources (through editorials, letters to the editor, etc.) and reporting on debates occurring in all other forums. Computer content analysis of the news media allows us to take the pulse of on-going debates and discussions about natural resource issues as reflected in tens of thousands of stories. Content analysis of the media has repeatedly been shown to produce results that are remarkably similar to surveys and opinion polls (e.g., Fan 1988, Fan 1994, Fan and Holway 1994, Hauss 1993).

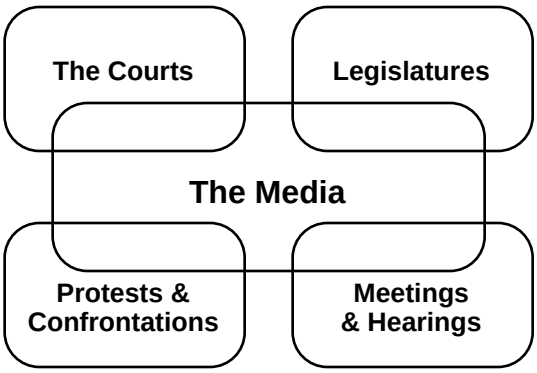

Figure 1. Forums for public debates about natural resource policy and management

Outline of Steps in this Analysis

This section briefly outlines the methodology used in this analysis. See Appendices A and B for a more detailed description of the data and methods.

1. *Downloading text.* The NEXIS and Dialog databases were searched for news media text on the Forest Service and the national forests, and separately for text on ecosystem management. A retrieval was made of a random sample of 28,669 stories (national and regional) about the Forest Service and national forests and a total of 2,319 stories about ecosystem management. All of the concepts analyzed in this study used the media text on the Forest Service and national forests, except for positive and negative attitudes toward ecosystem management which used the ecosystem management text.

   The national stories covered the period January 1, 1992 through December 31, 1996, and the regional stories covered January 1, 1994 through December 31, 1996. The shorter time span for the regional analysis was necessary to ensure a sufficient number of news sources for each region (fewer news sources were available online in the early 1990s).

2. *Filtering text.* InfoTrend computer instructions were written to "filter" the downloaded text to eliminate irrelevant paragraphs. For example, instructions were written to discard paragraphs not discussing the Forest Service or national forests or only mentioning these topics incidentally, as in murder investigations in which a body was found on a national forest, obituaries of former Forest Service employees, etc..

3. *Scoring paragraphs.* InfoTrend computer instructions were then developed to score the remaining paragraphs for each of the concepts of interest. The computer instructions for each concept were based on "dictionaries" of words and phrases created for each analysis. A set of word relationship rules was then written to combine the groups of dictionary words to give complex meanings. For example, one pair of word relationship rules evaluated (1) a *negation word* appearing within 30 characters of a *positive stewardship word* gave the idea of *negative;* (2) then *negative* within 50 characters of a *Forest Service word* gave the idea of *negative stewardship.* Using this pair of rules, the phrase "... has failed (negation word) to protect (positive stewardship word) our national forests (Forest Service word)" would be coded as a negative stewardship idea.

4. *Checking validity*. Finally, we examined random samples of paragraphs that were coded using our computer instructions in order to determine whether or not the instructions were able to identify expressions of the various concepts of interest with an accuracy level of at least 80 percent.

2. Conservation Leadership

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Key Dimensions of Conservation Leadership

An overall goal of recent Forest Service strategic plans has been "... to make the Forest Service the world's foremost conservation leader for the 21st century," (USDA Forest Service 1994b, p. 1). We examined Forest Service strategic planning documents, especially the national Strategic Communication Plan, "The Forest Service Ethics and Course to the Future," and the agency's "Mission, Vision, and Guiding Principles" (USDA Forest Service 1993, 1994a, 1994b), to identify key dimensions of conservation leadership for this evaluation. Three main dimensions of conservation leadership emerge from these documents:

- **Stewardship and ethics:** Good stewardship of the land and high ethical standards (both land and professional ethics) are at the heart of conservation leadership in all Forest Service strategic planning documents. We initially attempted to analyze stewardship and ethics individually, but found that they were inseparable.

- **Collaboration and Participation:** A collaborative or participatory approach to land management is a second theme closely tied to conservation leadership in Forest Service strategic planning documents. For example, the key message regarding conservation leadership in the Strategic Communication Plan states the following: "The American people expect our stewardship to be in partnership with them... Through joint actions involving the Forest Service, our customers and partners, new relationships are created that result in mutual learning, support for evolving land stewardship concepts, and joint management efforts and practices," (USDA Forest Service 1994a, p. 3).

  Collaboration with volunteers: We also measured the quantity of text discussing Forest Service collaboration with citizen volunteers to accomplish various tasks (e.g., rebuilding hiking trails). Collaboration with volunteers was analyzed separately because it is a special and limited type of collaboration.

- **Science-based management:** The Forest Service has a long tradition of science-based forest management and conducts the world's largest program of forestry research. The link between conservation leadership and using scientific information in land management was evident in Forest Service strategic planning documents.

  Scientific expertise: We also measured the quantity of text expressing the idea of scientific expertise in the Forest Service. This idea was captured mainly through the association of various scientific disciplines (e.g., wildlife biologist, ecologist, social scientist, etc.) with Forest Service personnel. Scientific expertise was analyzed separately because it is a limited indicator of science-based management.

Discussion of these three dimensions are interwoven in Forest Service strategic planning documents, but each is distinct and relevant to evaluating conservation leadership.

2.1 Stewardship and Ethics:

Highlights

National

- Positive stewardship and ethics messages about the Forest Service outweighed negative messages — about 60 percent positive.
- Expressions of both positive and negative attitudes appear to be declining over time, perhaps due to the winding down of the spotted owl debate.

Regional

- More positive stewardship and ethics messages were found in the East (65 percent) than in the InterWest and West (61 percent).
- The percent of positive stewardship and ethics messages increased in the East, but decreased slightly in the West. These trends suggest a potential growing split in regional views of the Forest Service that should be closely monitored in the future.

Concepts analyzed

- *Positive stewardship and ethics.* The computer instructions we developed to measure expressions of positive stewardship and ethics capture a wide range of favorable characterizations of the Forest Service's stewardship of the land and ethical practices, e.g., characterizations of the agency as: a good caretaker and manager of the national forests; a dedicated, truthful, trustworthy organization; protecting, preserving, restoring and sustaining natural resources, etc.
- *Negative stewardship and ethics.* The computer instructions we developed to measure negative stewardship and ethics capture a wide range of unfavorable characterizations of the Forest Service, e.g., characterizations of the agency as: a poor caretaker of the national forests; involved in illegal, unethical, or irresponsible activities; managing the national forests in an unsustainable manner, etc.

See Appendix B for detail about how these concepts were measured using the InfoTrend computer methods.

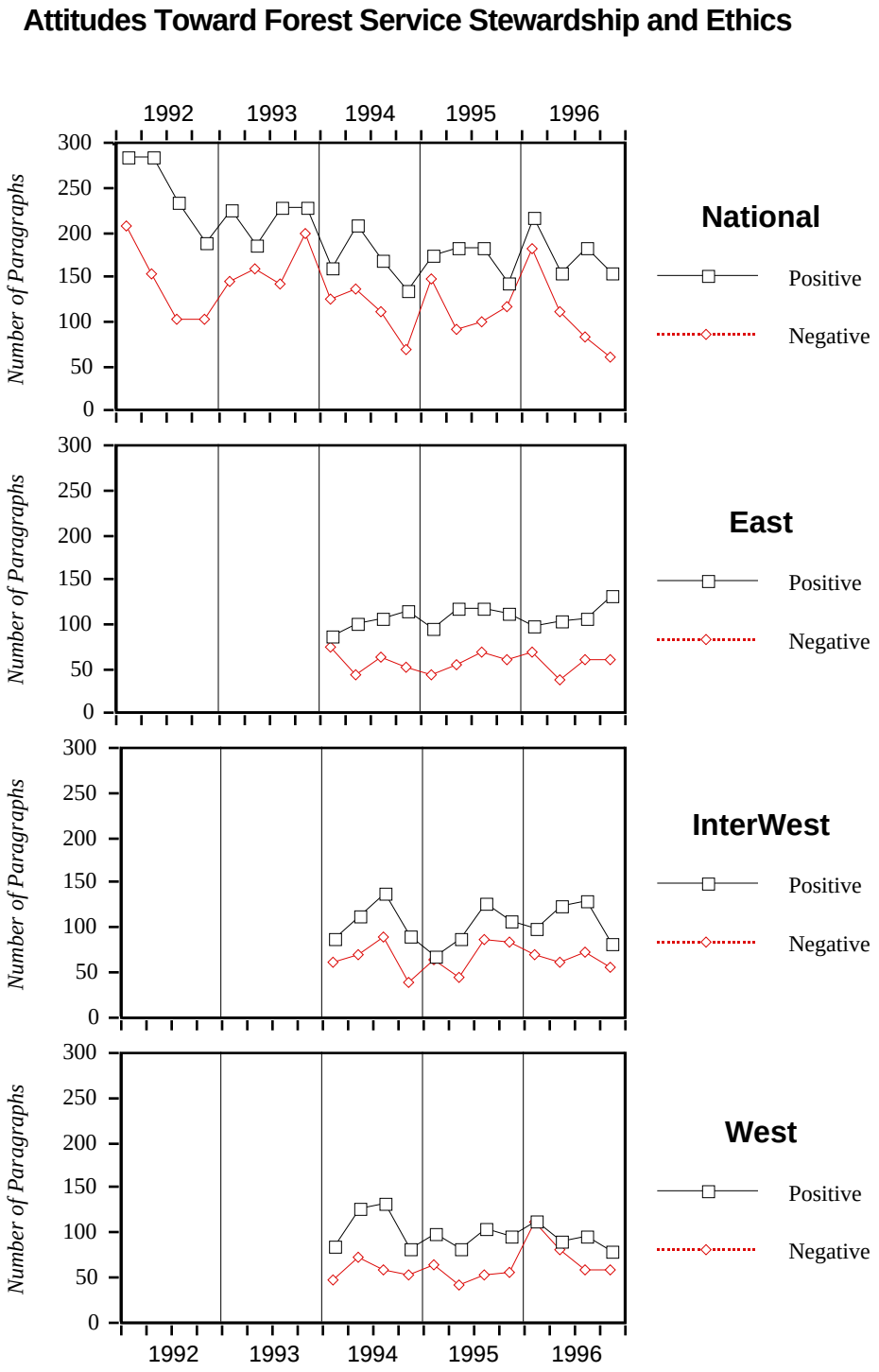

Figure 2.1. Positive and negative attitudes toward the Forest Service's stewardship of the national forests, land ethics, and professional ethics, plotted quarterly.

Discussion of findings

Figure 2.1 shows the time trends for positive and negative attitudes toward the Forest Service's stewardship of the national forests, land ethics, and professional ethics. The national analysis (top graph in Figure 2.1) reveals that positive stewardship and ethics messages outweigh negative messages. Over the entire 5-year time period, about 60 percent of the coded paragraphs portray the Forest Service as a good steward or with positive ethics and about 40 percent as a poor steward or with questionable ethics.

> *Comparison with surveys:* This 60 percent "approval rating" is similar to the results of recent surveys of U.S. residents. Hammond (1994) included a neutral response category in his survey of the public. When the neutral response category is eliminated to make Hammond's findings comparable to ours, 66 percent of the respondents agreed or strongly agreed with the statement "The federal government is an effective caretaker of the public forests and grasslands."
>
> Steel, et al. (1997) surveyed citizens residing in western Washington, Oregon, and Northern California about their views of ecosystem management. They found that about 62 percent of those with a negative orientation toward ecosystem management had a moderate to a great deal of confidence in the ability of the Forest Service to "contribute to good forest management decisions," a higher confidence level than respondents had for other government agencies or institutions. Sixty-nine percent of those with an intermediate orientation toward ecosystem management had confidence in the Forest Service, but only 38 percent of those with a positive orientation toward ecosystem management had confidence in the Forest Service.
>
> In a national survey conducted in October, 1994 for American Forests, 74 percent of the public was found to have favorable attitudes toward the Forest Service (Smith and Clark 1994). This was a higher favorable rating than environmental groups (64 percent),[1] state forest agencies (47 percent) timber companies (36 percent), or the U.S. Bureau of Land Management (33 percent).

At the national level, expressions of both positive and negative stewardship and ethics appear to be declining over time. This trend may be influenced by the peak of the spotted owl debate in the early 1990s and gradual fading of this dominant issue since then.

The regional breakdown of stewardship and ethics messages (bottom three graphs in Figure 2.1) reveals some interesting differences. Positive stewardship and ethics messages outweigh negative ones for all three regions, but there is a larger gap between positive and negative messages in the East: About 65 percent of the coded paragraphs were positive (35 percent negative) in the East, compared with 61 percent positive in the InterWest and West (39 percent negative). The trend in expressions of positive stewardship and ethics in the East is gradually increasing, with positive and negative messages diverging over time. While no clear trend in positive or negative stewardship and ethics messages is apparent in the InterWest, there appears to be a slight narrowing of the difference between positive and negative messages in the West. This divergence between positive and negative messages in the East and narrowing in the West suggests a potential split in regional public and stakeholder views of the Forest Service that should be closely monitored in the future.

[1] The 1994 Times Mirror National Environmental survey found that 74 percent of Americans have a favorable attitude toward environmental groups (Roper Starch Worldwide 1994).

2.2 Collaboration and Participation:

Highlights

National

- Messages about the Forest Service's use of collaborative and participatory approaches to planning and management were overwhelmingly positive — about 88 percent overall.
- A very slight downward trend in the number of positive collaboration messages since 1994 was found, which should be monitored.

Regional

- Collaboration messages were slightly more positive in the East (91 percent) than in the West (89 percent).

Concepts analyzed

- *Positive collaboration.* The computer instructions we developed to measure positive collaboration capture a wide range of favorable characterizations of the Forest Service's use of collaborative and participatory approaches to planning and management, e.g., characterizations of the agency as involved in partnerships and joint efforts; being willing to listen; seeking input from the public, etc.
- *Negative collaboration.* Our computer instructions to measure negative collaboration capture a wide range of unfavorable characterizations of the Forest Service's use (or non-use) of collaborative and participatory planning and management, e.g., characterizations of the agency as not using or insufficiently using collaboration; being dictatorial or heavy-handed; not seeking or ignoring input from the public, etc.
- *Volunteer collaboration.* Our computer instructions to measure this concept capture all types of volunteer activities with the Forest Service, such as ecological restoration projects, maintaining or rebuilding hiking trails, involvement of volunteers in research projects, etc. This is a more limited indicator of collaboration which was always positive.

See Appendix B for detail about how these concepts were measured using the InfoTrend computer methods.

Attitudes Toward Forest Service Collaboration and Participation

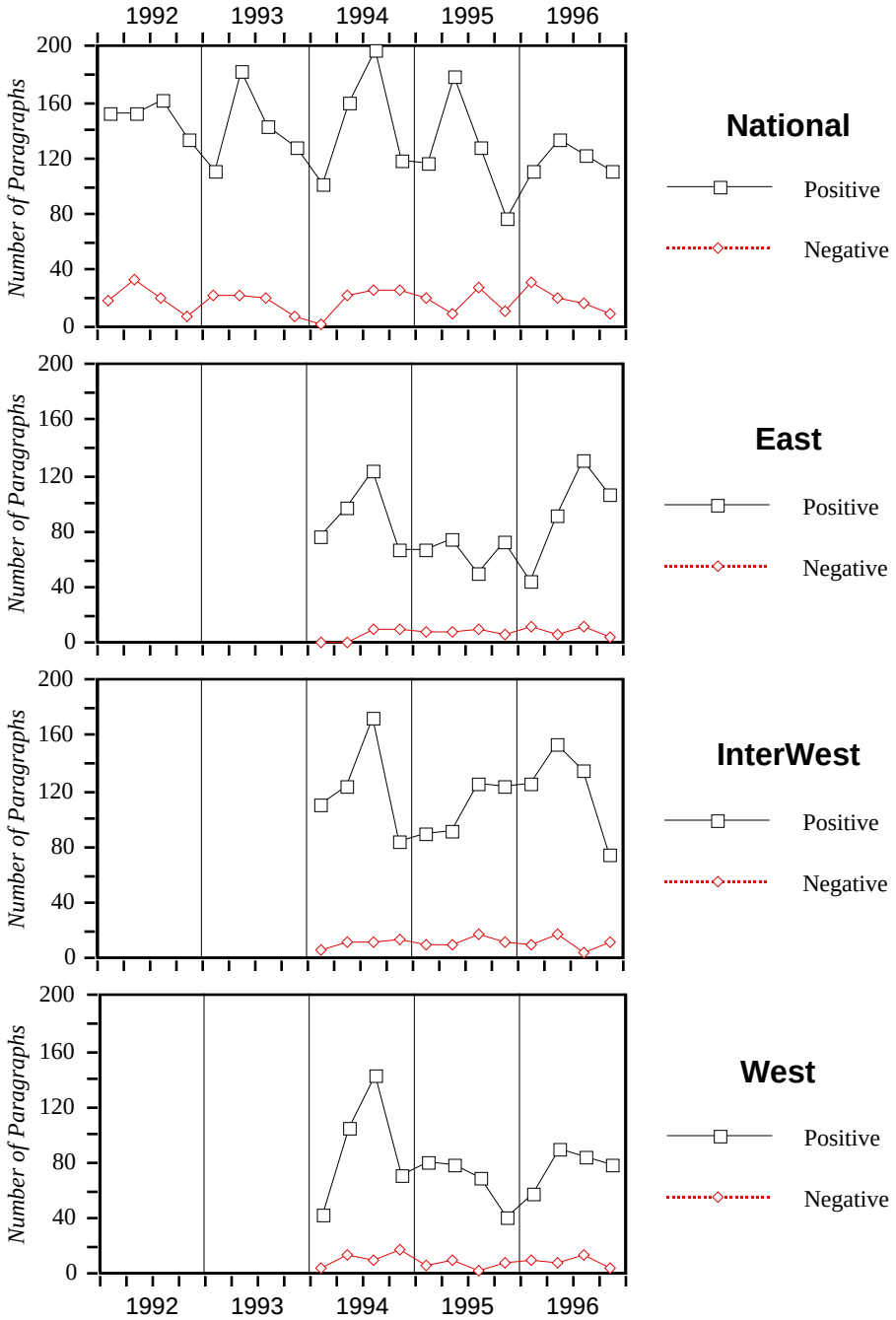

Figure 2.2a. Positive and negative attitudes toward the Forest Service's use of collaborative and participatory approaches to planning and management, plotted quarterly.

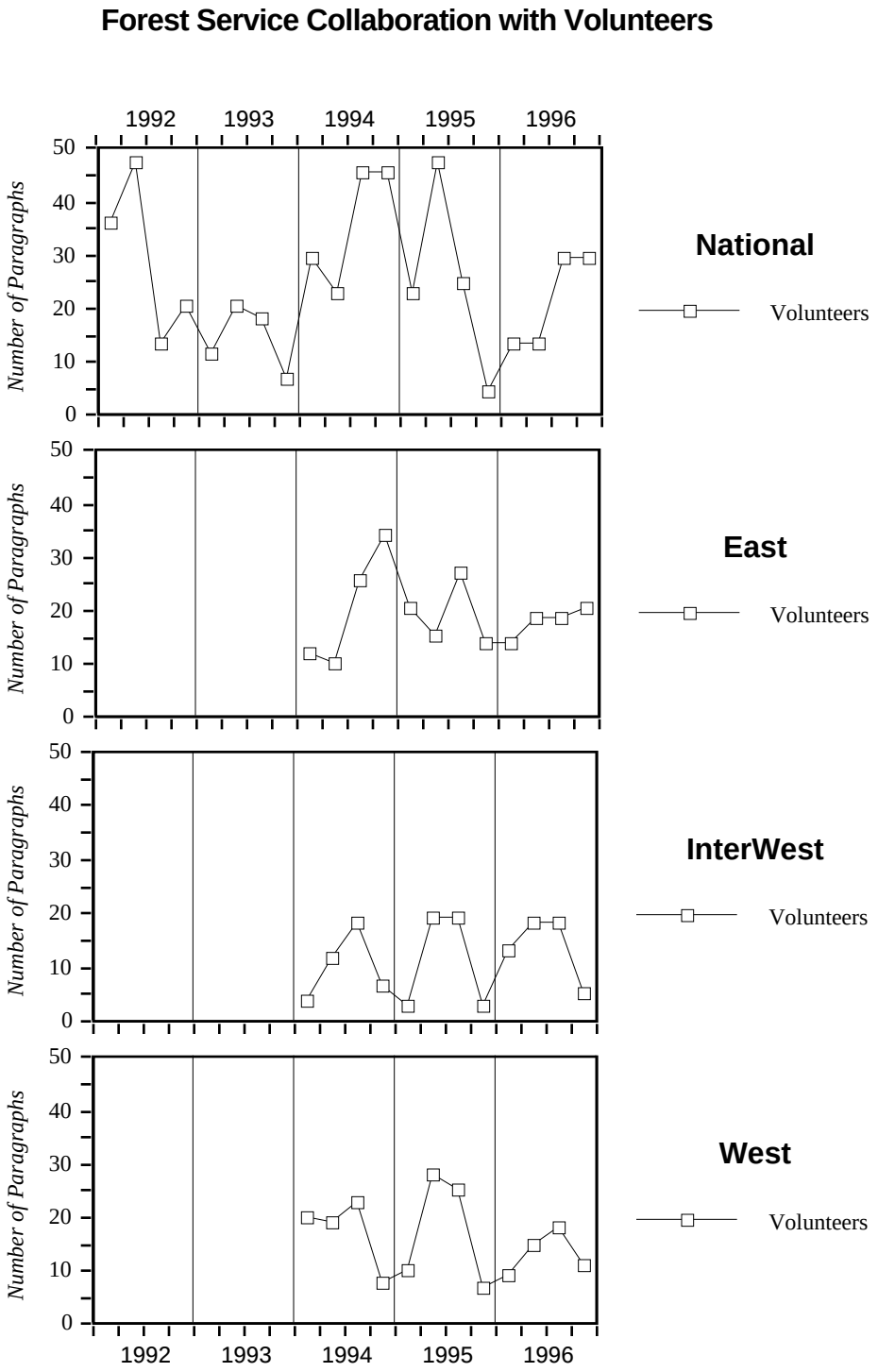

Figure 2.2b. Collaboration with volunteers in the Forest Service, plotted quarterly.

Discussion of findings

Trends in positive and negative attitudes toward the Forest Service's use of collaborative and participatory approaches to planning and management are shown in Figure 2.2a. The national analysis reveals a significant gap between positive and negative attitudes: Only about 12 percent of the collaboration messages coded over the 5-year period were negative, while 88 percent portrayed the Forest Service's use of collaborative and participatory approaches in a positive light. Negative collaboration messages are fairly constant over time, but there appears to be a slight downturn in the trend for positive collaboration, which should be monitored.

> *Comparison with surveys:* The public clearly values collaborative and participatory approaches to forest management. Hammond (1994) found that 88 percent of the public agreed or strongly agreed with the statement "It is important for the federal government to inform and interact with the American people about all public forest matters."

The regional analysis (bottom three graphs in Figure 2.2a) shows the same large gap between positive and negative collaboration messages that was found for the national analysis. About 92 percent of the collaboration messages in the East were positive, 91 percent in the InterWest were positive, and 89 percent in the West were positive. Although there is significant quarter-to-quarter variation in the number of collaboration messages, no clear time trends are revealed for the regions over the 3-year period.

Forest Service collaboration with volunteers is shown in Figure 2.2b. This figure shows the number of paragraphs discussing the Forest Service working with citizen volunteers. We found significant variability from quarter-to-quarter in discussion of collaboration with volunteers. At the national level, a cycle of alternating high and low discussion of this topic can be seen (top graph in Figure 2.2b). Collaboration with volunteers dropped off in mid-1992, remained low through 1993, increased in 1994 and the first half of 1995, and declined again in late 1995. This cycle may be driven in part by major collaborative efforts involving large numbers of citizen volunteers which receive significant media coverage, such as the Midewin National Tallgrass Prairie restoration project in Illinois. There may be significant opportunities to increase collaboration with volunteers in the Forest Service. The 1993 Times Mirror National Environmental Forum Survey reported that more than half the country is interested in volunteering, but the 1993 and 1994 Times Mirror surveys found that more than half of Americans (56 percent) say they are unaware of volunteer opportunities.

We found an important connection between collaboration and resolution of conflict during the early phase of this analysis. While developing the computer instructions to measure expressions of conflict over national forest planning and management (see section 5), we developed preliminary computer instructions to measure the concept "resolution of conflict." It became clear that resolution of conflict was, in most cases, closely related to collaborative approaches to planning and management, as illustrated in the following example from a western newspaper: "It will surprise no one when this conflict is resolved not by the victory of one over the other but by a compromise. Just as it is unfair to limit floaters but not powerboaters in the canyon, it is too much for floaters to expect that the canyon's traditional powerboat presence be completely eliminated. And the Forest Service is working toward a compromise, slowly and tentatively." (Source: story 18544, file b19, 11-20-92). This link between collaboration and the resolution of conflict should be explored in future analyses.

2.3 Science-Based Management:

Highlights

National

- Messages about science-based management in the Forest Service were overwhelmingly positive — about 96 percent.
- A gradual decline in the number of positive and negative science-based management messages and scientific expertise messages can be seen, perhaps due to the winding down of the spotted owl debate.

Regional

- Science-based management messages were overwhelmingly positive in each of the regions — 96 percent in the East, 94 percent in the InterWest, and 95 percent in the West.

Concepts analyzed

- *Positive science-based management.* The computer instructions we developed to measure positive science-based management capture a range of scientific activities by the Forest Service, e.g., conducting research; applying the findings of research; maintaining research stations, etc.
- *Negative science-based management.* Our computer instructions to measure negative science-based management capture characterizations of the Forest Service as not using science — or using poor or inadequate science — in managing the national forests, e.g., characterizations of the agency's management as unscientific; rejecting sound science; conducting research of questionable validity, etc.
- *Scientific expertise.* Our computer instructions to measure expressions of scientific expertise in the Forest Service capture the association of a wide range of scientific disciplines (e.g., wildlife biologist, ecologist, social scientist, etc.) with agency employees. This is a more limited — and only positive — indicator of science-based management.

See Appendix B for detail about how these concepts were measured using the InfoTrend computer methods.

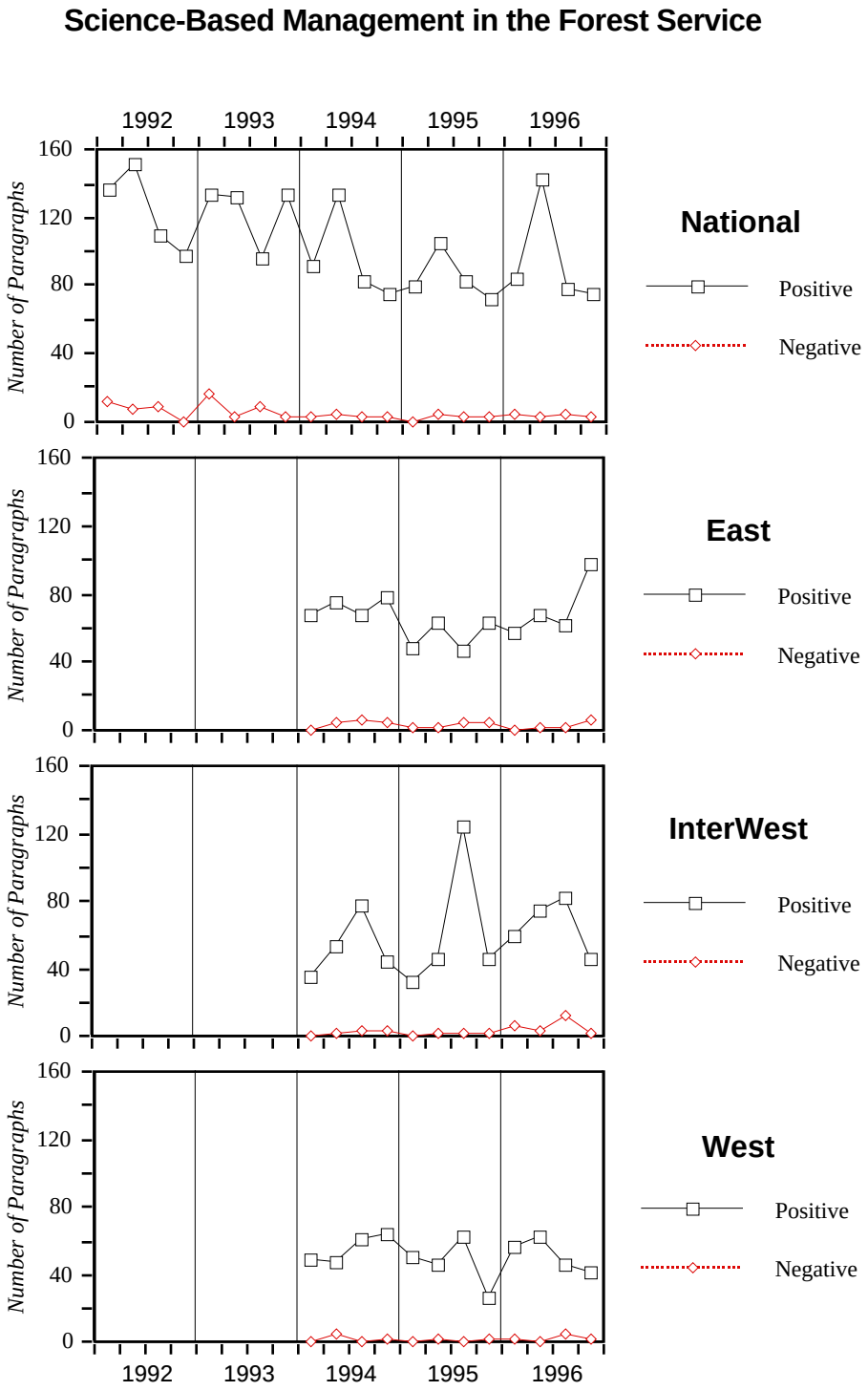

Figure 2.3a. Positive and negative views of the use of science-based management in the Forest Service, plotted quarterly.

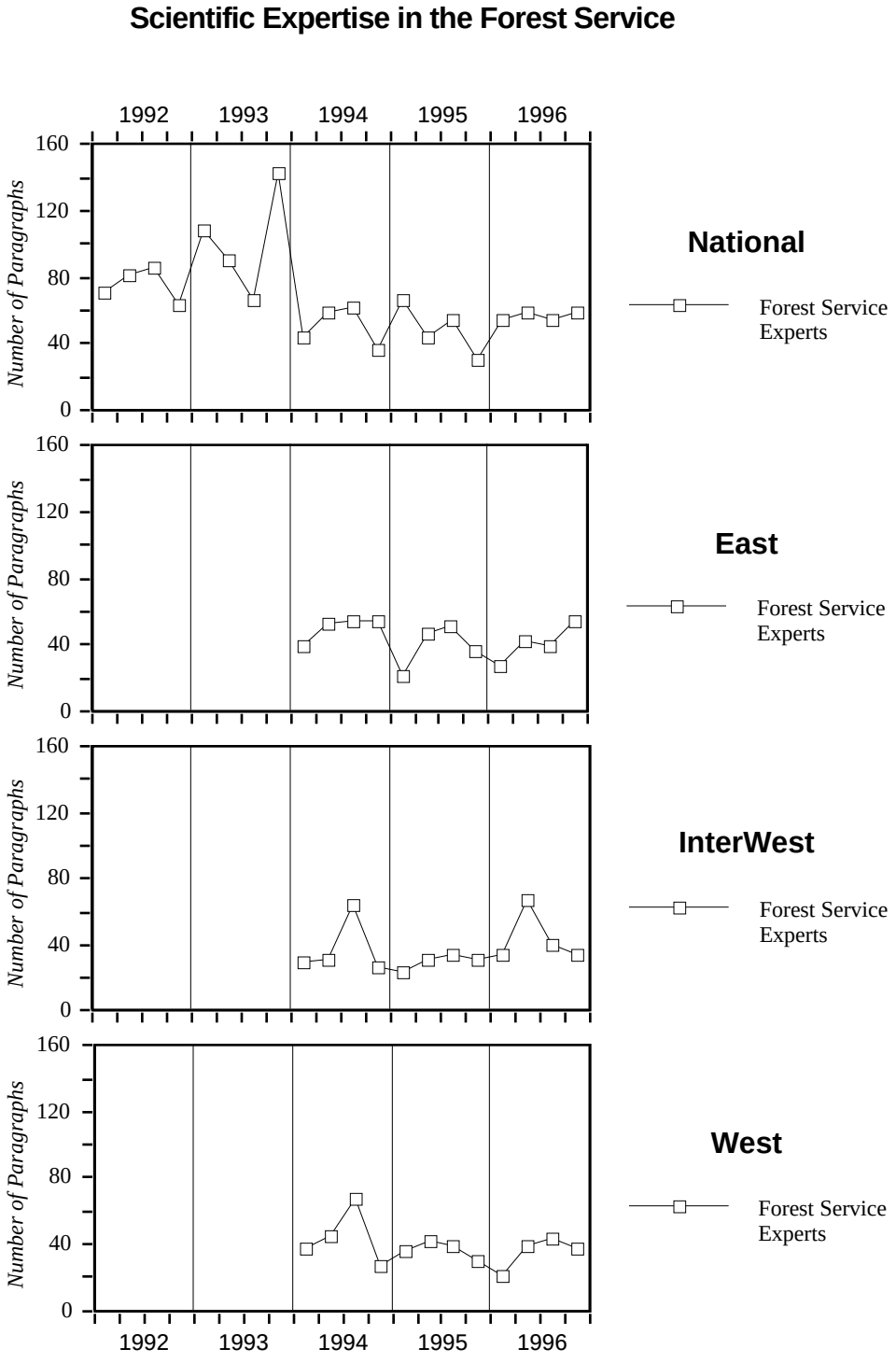

Figure 2.3b. Scientific expertise in the Forest Service, plotted quarterly.

Discussion of findings

Figure 2.3a shows the trends in positive and negative attitudes toward the Forest Service's use of science-based management. The Forest Service's long commitment to scientific research and science-based management is reflected in the news media. Nationally and regionally, messages that portray the Forest Service as using science in national forest planning and management overwhelm the messages suggesting that the Forest Service uses insufficient, unreliable, or otherwise inadequate scientific information. About 96 percent of all science-based management messages in the national database were positive, with very similar percentages in the regions (96 percent in the East, 94 percent in the InterWest, and 95 percent in the West).

These findings point to an important strength of the Forest Service, because a strong commitment to scientific research is important in establishing claims of legitimacy and credibility in the media (e.g., see Anderson, 1993 and studies cited therein). In recent years, many environmental groups have significantly increased their commitment to scientific research. Environmental groups with a strong research commitment may be increasingly perceived as providing scientifically sound and credible options for forest policy in the future.

> *Comparison with surveys:* Hammond (1994) found that 81 percent of the public agrees or strongly agrees with the statement "It is important to take a scientific approach to the management of the public forests and grasslands."

A gradual decline in the number of positive and negative science-based management messages can be seen at the national level (the top graph in Figure 2.3a). This is likely due to the gradual winding down of the spotted owl debate, in which scientific studies conducted by the Forest Service or involving Forest Service scientists were frequently cited. No clear trends are evident at the regional level.

Trends in messages about scientific expertise in the Forest Service are shown in Figure 2.3b. At the national level, a slight decline in scientific expertise messages is evident from the early 1990s to the mid 1990s. This is similar to the slight downward trend in science-based management messages at the national level. No clear trends in scientific expertise messages are evident at the regional level.

3. Healthy Productive Ecosystems

3. Healthy Productive Ecosystems

The key message in the national Strategic Communication Plan related to "healthy productive ecosystems" states that "The well-being of the human race depends on healthy, productive and diverse ecosystems and their sustainable use." The communication goal related to this key message is as follows:

> "American and international customers are aware of the importance of ecosystems, and the significant changes which the Forest Service is making in ethical management of natural resources. Customers understand ecosystem functions, and support the continuing evolution in ecosystem management concepts and actions through partnerships and individual leadership."

In this study, we analyzed nine concepts to measure the public's awareness of the importance of ecosystems and support for ecosystem management concepts and actions. The first three concepts were selected because they measure successively more in-depth ecological understanding or "ecological literacy":

- **Ecological components and concepts.** A broad measure of ecological components, concepts, and processes.
- **Ecological services.** A measure of the amount of discussion about the services and benefits provided by trees and ecosystems.
- **Nutrient cycling.** An in-depth measure of discussion of two fundamental ecological concepts: nutrient cycling and energy flow.

The next set of indicators focus on four important concepts and issues of an ecological nature influencing forest management and policy in recent years:

- **Biodiversity**
- **Natural disturbances**
- **Forest health**
- **Sustainability**

Finally, we examined attitudes expressed in the news media toward ecosystem management, and how they have evolved over time:

- **Positive attitudes toward ecosystem management**
- **Negative attitudes toward ecosystem management**

3.1.1 Ecological Components, Ecological Services, Nutrient Cycling:

Highlights

National

- Discussion of ecological services and material cycling was almost nonexistent, indicating a low level of ecological content in media discussion of forestry issues.
- Discussion of ecological components has gradually declined since 1992 and 1993.

Regional

- A low level of ecological content was found in all regions, with no clear trends or differences between regions.

Concepts analyzed

- *Ecological components.* Our computer instructions to measure ecological components capture discussion of a general ecological nature in news media text about the Forest Service, including discussion of a wide range of ecological components (e.g., aquatic, bacteria, biota, invertebrates, etc.) and ecological concepts and processes (e.g., carrying capacity, endemic, eutrophication, etc.).
- *Ecological services.* Our computer instructions to measure ecological services capture discussion about a wide range of services and benefits provided by trees and ecosystems (e.g., absorption of pollutants, carbon sequestration, flood mitigation, binding soil, etc.).
- *Nutrient cycling* is a much more ecologically sophisticated indicator of ecological literacy and discussion of ecological concepts and principles. Our computer instructions capture expressions of two fundamental ecological principles: nutrient cycling (e.g., the nitrogen cycle, oxygen cycle, hydrologic cycle, etc.) and energy flow (i.e., the one-way flow of energy through ecosystems).

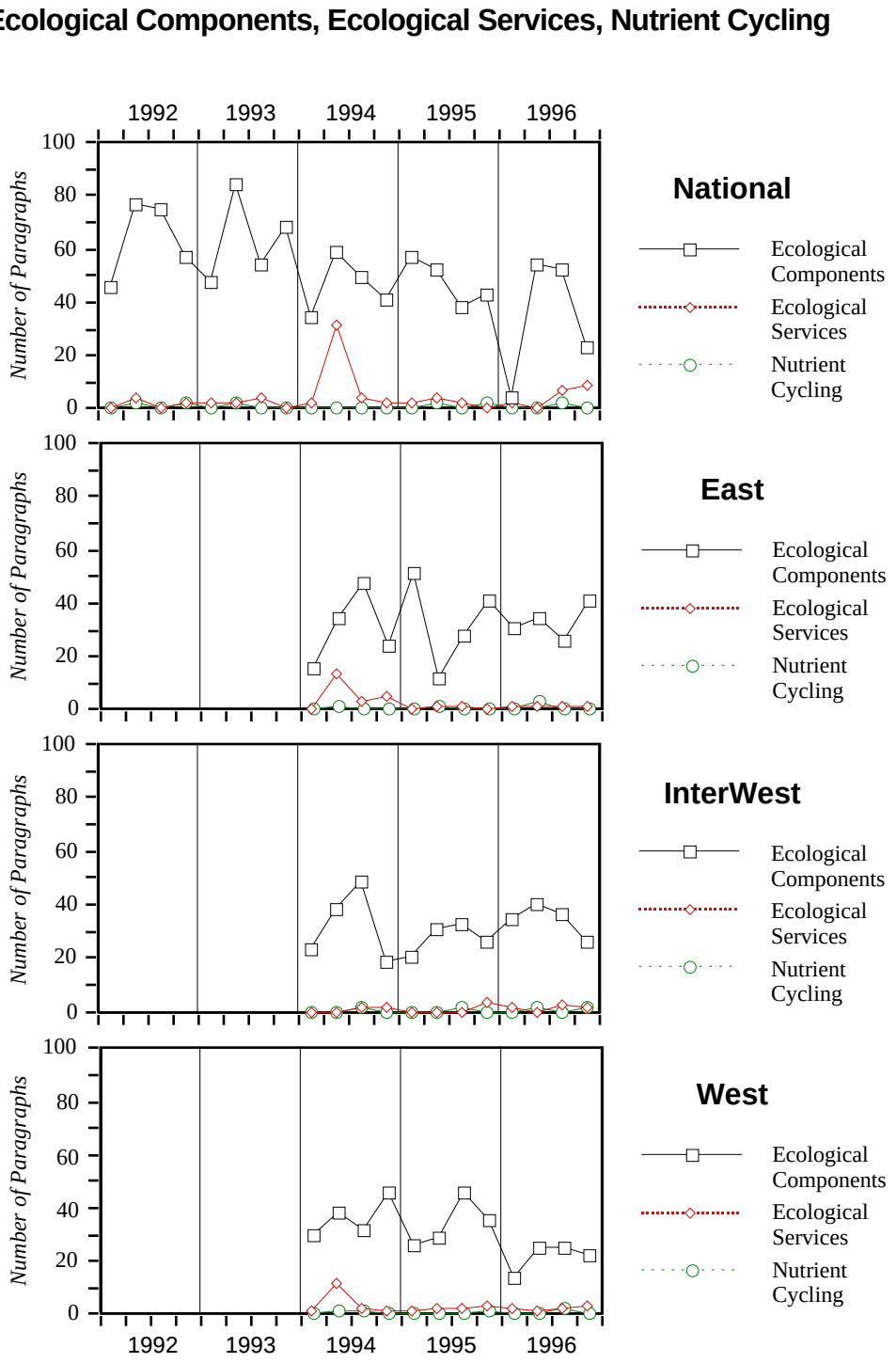

Figure 3.1.1. Ecological concepts and principles: Ecological components and concepts, ecological services, and nutrient cycling, plotted quarterly.

Discussion of findings

National-level trends in ecological components, ecological services, and nutrient cycling are shown in Figure 3.1.1. The quantity of discussion of ecological components (our most general indicator of ecological content) has gradually declined since 1992 and 1993. This trend may be influenced by the gradual decline of the spotted owl debate in recent years. Discussion of ecological services and nutrient cycling are both at very low, almost nonexistent levels, indicating the low level of ecological content in mass media discussion of forestry issues. The lack of discussion of ecological services indicates a low level of appreciation of the benefits and services provided by trees and forests, which may make it more difficult to build support for forestry-related programs.

> *Comparison with surveys and other research:* The low level of implicit ecological literacy we found is consistent with survey findings of Kellert (1993), although Kellert's focus was on wildlife issues.
>
> Furlow (1994) found newspaper reporting to be ecologically shallow in a content analysis of five biological subissues and five ecological concepts in articles on the spotted owl debate.
>
> Journalism researchers have concluded that the mass media generally cover environmental stories in a simplistic manner and in small quantities (e.g., McGeachy 1989, Greenberg, et al. 1989).

A significant jump in discussion of ecological services can be seen in the second quarter of 1994, both at the national level and in the East and West. This was due to media coverage of a large-scale study of the benefits of trees in urban areas conducted by researchers at the Northeast Forest Experiment Station (McPherson, et al. 1994). An article about this research was published in the *New York Times* and picked up by many news wires and newspapers around the country.

No clear trends or regional differences are apparent in the regional breakdown of ecological components, ecological services, or nutrient cycling. As with the national-level analysis, the quantity of discussion of more advanced ecological concepts and principles (ecological services and nutrient cycling) is extremely low.

The low level of ecological content in media stories about the Forest Service presents a challenge because comprehension of basic ecological concepts is vital to the development of a meaningful understanding of most forestry issues. A sufficient level of ecological understanding among Forest Service customers — including the general public — is likely required for successful collaborative stewardship. Research has shown that newspapers are the most important source of information about the environment for most people (Ostman and Parker 1987).

3.1.2 Biodiversity and Natural Disturbances:

Highlights

National

- Discussion of biodiversity has steadily declined since 1992, but this may be driven more by the cooling down of the spotted owl debate than by a general decrease in concern about biodiversity.
- Discussion of natural disturbances has been relatively constant, except for peaks during major fire seasons.

Regional

- No clear downward trend is apparent for biodiversity in the East or InterWest.
- The amount of discussion of biodiversity was greater in the InterWest and West than in the East.

Concepts analyzed

- *Biodiversity*. The computer instructions we developed to measure the amount of discussion concerning biodiversity capture discussion of genetic, biological, and landscape diversity; general discussion of sensitive, threatened and endangered species; discussion of specific species such as the California condor, Florida panther, red-cockaded woodpecker, etc.
- *Natural disturbances.* Our computer instructions to measure this concept capture discussion of a variety of disturbances (e.g., insects and disease, drought, wind, hurricanes, and discussion of wildfire as a natural disturbance). Anthropogenic ecosystem disturbances such as forest management practices are not included.

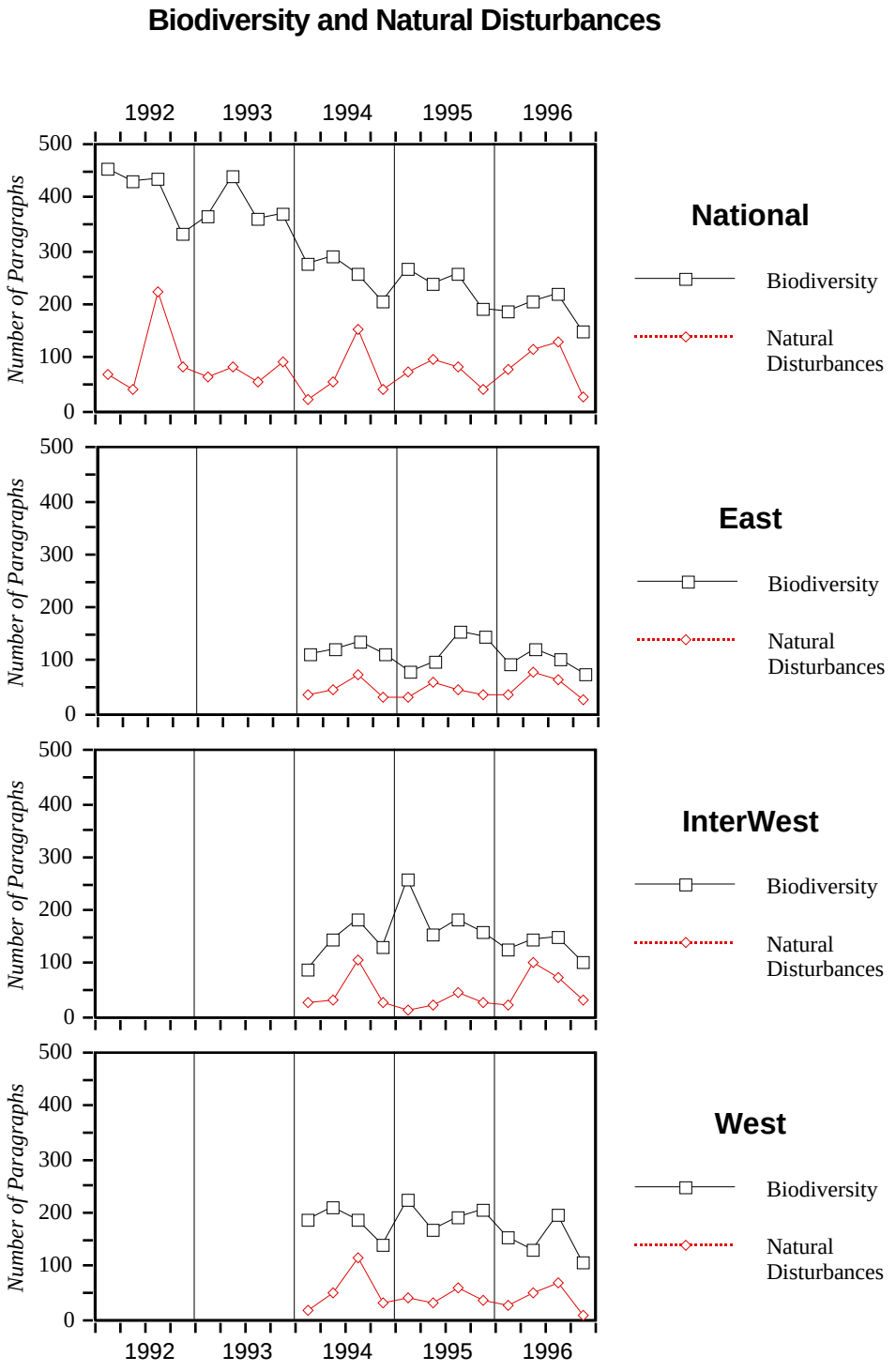

Figure 3.1.2. Ecological concepts and principles: Discussion of biodiversity and natural disturbances in the news media, plotted quarterly (note scale change from Figures 3.1.1 and 3.1.3).

Discussion of findings

National-level discussion of biological diversity has steadily and significantly declined since 1992 (top graph in Figure 3.1.2). This downward trend is likely due to the decline in the spotted owl debate and should not be interpreted as a drop in public interest in biodiversity or species protection.

> *Comparison with surveys:* Hammond (1994) found that 61 percent of respondents agreed or strongly agreed with the following statement: "Threatened and endangered species in American public forests and grasslands should be protected even if it has a negative economic impact on U.S. citizens." 24 percent disagreed or strongly disagreed with this statement and 15 percent neither agreed nor disagreed).
>
> The 1994 Times Mirror National Environmental Survey found that 51 percent of the public believes that laws and regulations for protecting endangered species have not gone far enough, 26 percent believe we have struck the right balance with species protection, 16 percent believe we have gone too far, and 6 percent don't know (Roper Starch Worldwide 1994).
>
> A 1994 survey conducted by Peter D. Hart Research Associates for the National Wildlife Federation found that Americans prefer to maintain strong requirements in the Endangered Species Act to protect endangered species rather than relax these requirements by 57 to 32 percent.

Discussion of natural disturbances has been relatively constant over the past five years, except for peaks in coverage during major fire seasons (the third quarters of 1992, 1994 and 1996). In this analysis, we have measured only the total quantity of discussion of biodiversity and natural disturbances. Further insights could be gained by a more detailed breakdown of these issues, e.g., specific natural disturbances could be broken out individually, or biodiversity messages related to individual species could be analyzed separately, thereby identifying the "next spotted owl."

The regional trends in biodiversity and natural disturbances are similar to the national picture, except that no clear downward trend is apparent for biodiversity in the East or InterWest. As would be expected, the absolute amount of discussion of biodiversity is greater in the InterWest and West than in the East.

3.1.3 Forest Health and Sustainability:

Highlights

National

- Discussion of forest health jumped significantly in the third quarter of 1994 — following the deaths of 14 firefighters — and has remained high.
- Sustainability received surprisingly little discussion in news media stories about the Forest Service.

Regional

- Discussion of forest health increased in each region.

Concepts analyzed

- *Forest health.* The computer instructions we developed to measure forest health capture discussion of all types about this topic, including forest, ecosystem, and ecosystem health.
- *Sustainability.* The computer instructions we developed to measure sustainability capture discussion of all types related to this topic, including forest, ecosystem, and ecological sustainability.

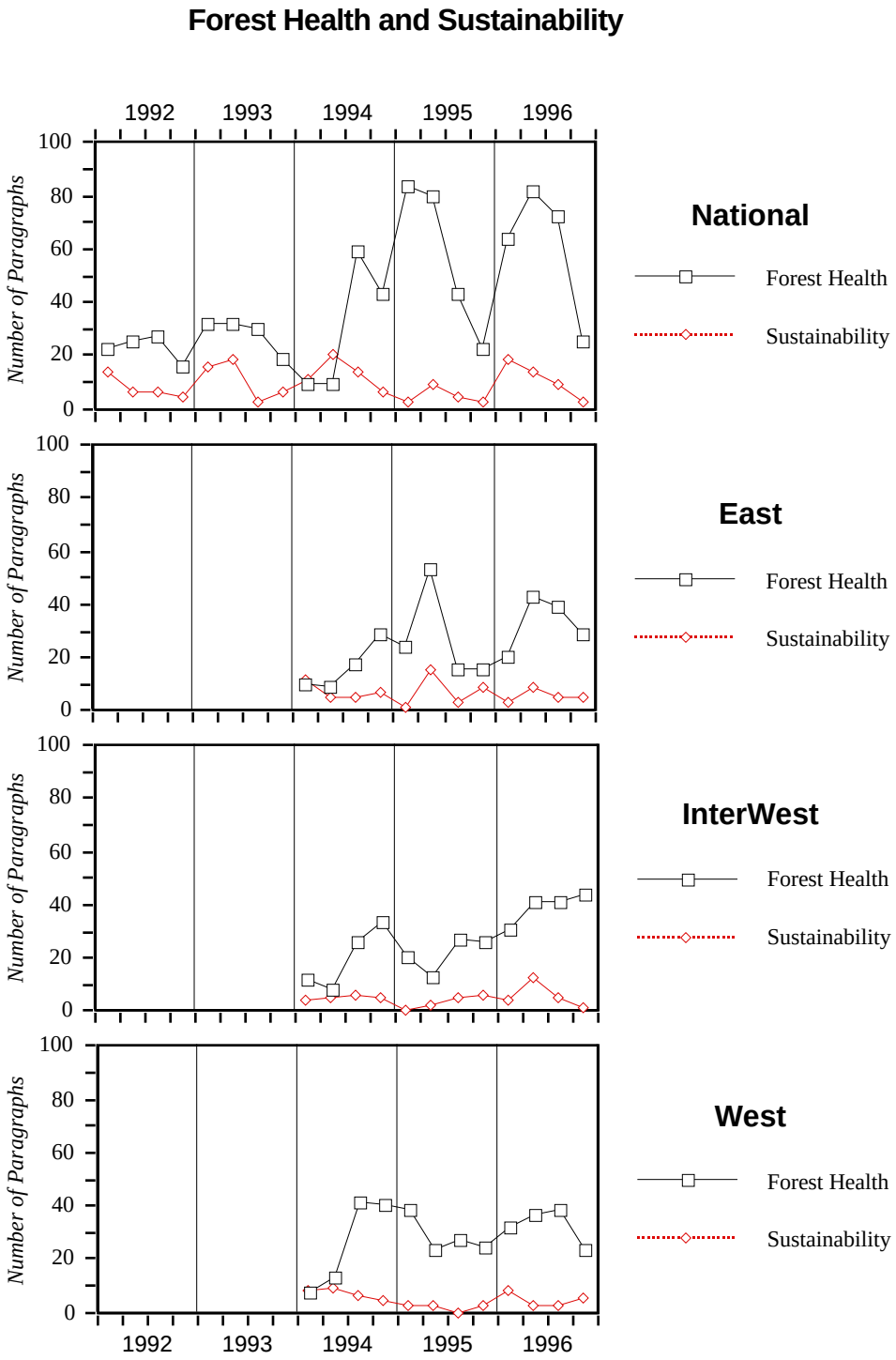

Figure 3.1.3. Ecological concepts and principles: Discussion of forest health and sustainability in the news media, plotted quarterly.

Discussion of findings

Figure 3.1.3 shows the national and regional trends in discussion of forest health and sustainability. A significant increase in discussion of forest health occurred in the third quarter of 1994. During this quarter, 14 firefighters died battling a single blaze in Colorado. The deaths of those and other firefighters during 1994 galvanized concern about forest health and "unhealthy forests" among elected officials and the public (Thomas 1995). The forest health / timber salvage debate has continued to receive significant attention, with notable dips in media coverage in the fourth quarters of each year.

> *Comparison with surveys:* The identified increase in discussion of forest health is consistent with the survey results of Hammond (1994). He found that 82 percent of the public agreed or strongly agreed with the statement "The primary purpose of managing public forests is to maintain a healthy environment," and 85 percent agreed or strongly agreed with the statement "The United States has an international obligation to maintain the health of America's forests."

As seen by the text examples in Appendix C, we found a diversity of views expressed about forest health and what it means, ranging from utilitarian (i.e., emphasizing commodity outputs) to ecosystem perspectives (i.e., emphasizing ecological processes). We also found a significant amount of expression of the idea that healthy economies and healthy forests or ecosystems are inseparable, perhaps indicating a growing acceptance of this idea. A further analysis of forest health could determine which view or views of forest health are gaining ground and becoming more widely accepted.

The concept of sustainability has received little attention in news media text about the Forest Service, with no clear trend in recent years. This finding was somewhat surprising, given the number of recent high-level discussions about sustainability (e.g., President's Council on Sustainable Development 1996, Journal of Forestry 1995, USDA Forest Service 1996). As with the issue of forest health, we found a diversity of views about sustainability and the meaning of this concept, ranging from an emphasis on sustaining commodity outputs to sustaining ecosystem integrity.

The regional breakdowns reflect the same increase in discussion of forest health that was seen at the national level, with no trend in discussion of sustainability.

3.2 Attitudes Toward Ecosystem Management:

Highlights

National

- About 75 percent of all attitudes expressed about ecosystem management were favorable.
- The percent of positive attitudes toward ecosystem management has increased in recent years, indicating growing acceptance.
- Ecosystem management is on the downside of the issue cycle, with discussion of this concept rising in the early 1990's and declining in recent years.

Regional

- Attitudes toward ecosystem management were slightly more positive in the East (78 percent) and InterWest (77 percent) than in the West (72 percent).

Concepts analyzed

- *Positive ecosystem management.* The computer instructions we developed to measure this concept capture favorable characterizations of ecosystem management, e.g., descriptions of ecosystem management as innovative, science-based, pre-emptive, necessary for good stewardship, an alternative to species-by-species approaches, etc.
- *Negative ecosystem management.* Our computer instructions for measuring negative ecosystem management capture unfavorable characterizations of this concept, e.g., characterizations of ecosystem management as a pretext for locking up resources, a fad, not based on sound science, vague, uncertain, etc.

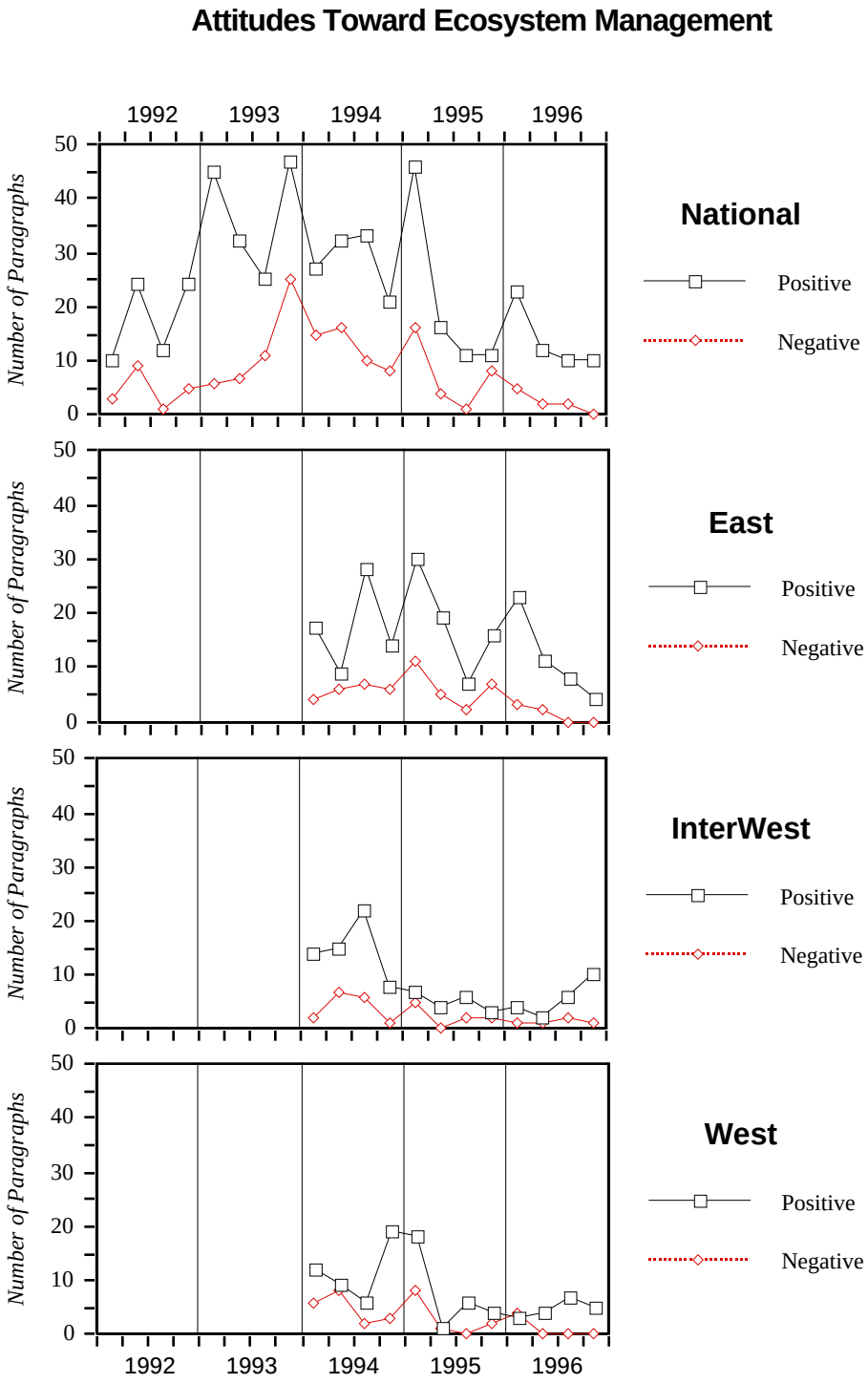

Figure 3.2. Positive and negative attitudes toward ecosystem management expressed in the news media, plotted quarterly (not specific to the Forest Service).

Discussion of findings

The issue cycle for ecosystem management can be seen in Figure A-2 (in Appendix A, showing the total number of paragraphs of text on ecosystem management) and Figure 3.2 (showing positive and negative attitudes toward ecosystem management). The number of paragraphs and expressions of attitudes — both positive and negative — increased in 1992 and 1993. Significant events during the rise of this issue included the announcement by Chief Dale Robertson that ecosystem management would be the official policy of the Forest Service in June of 1992 (Robertson 1992) and Interior Secretary Bruce Babbitt's championing of ecosystem management during 1993. The number of ecosystem management paragraphs and expressions of attitudes began to decline during 1994, and continued to fall in 1995 and 1996 except for a notable jump in the first quarter of 1995.

The decline in the number of paragraphs and expressions of attitudes about ecosystem management has been accompanied by a gradual narrowing of the gap between positive and negative attitudes, i.e., the percent of positive attitudes has increased in recent years. The combination of a declining number of paragraphs of text devoted to ecosystem management and an increased share of positive attitudes suggests that this may be becoming a "settled" issue with broad acceptance. Despite the apparent growing acceptance, we found a diversity of ideas about what ecosystem management entails, ranging from species protection to ecological restoration (see text examples in Appendix C). Soule (1994) identified five distinct conceptions of ecosystem management.

At the national level, about 75 percent of all attitudes expressed about ecosystem management have been favorable. This compares with 78 percent positive in the East, 77 percent in the InterWest, and 72 percent in the West. The regional trends in total number of paragraphs devoted to ecosystem management and expressions of attitudes are generally similar to the national trends, revealing a gradual decline in the past three years.

> *Comparison with surveys:* Our finding of strongly positive attitudes toward ecosystem management is consistent with surveys by Shindler, et al. (1993), Steel, et al. (1994), and Manning, et al. (1997), who found evidence of strong support among the public for views consistent with ecosystem management.

4. Benefits to People

4. Benefits to People

Changing National Forest Values and Benefits

In recent decades, the benefits that people seek from national forests have expanded and the values which people hold for them have shifted (Bengston and Xu 1996, Xu and Bengston 1997). Environmental historian Samuel Hays has written that "New values have emerged about what the forest in America is and what role it ought to play in modern society." (Hays, 1988, p. 550). Others have stated that managing national forests in ways that are responsive to new public values is the core challenge faced by the Forest Service (Shands, 1991). Forest Service strategic planning documents all recognize the diversity of services, products, values, and uses provided by the national forests and grasslands.

In this study, we analyzed the following five major categories of national forest benefits and values:

- **Recreation benefits and values**
- **Commodity benefits and values**
- **Ecological benefits and values**
- **Moral, spiritual and aesthetic benefits and values**
- **Firefighting benefits**

The category “firefighting benefits” was added after we began to analyze news media stories about the Forest Service. During a major fire season, the amount of text dealing with wildfires overwhelms all other media coverage of the Forest Service, and much of this text discusses the benefits of firefighting activities.

Two other potential benefit categories were mentioned in the contract for this project: (1) knowledge and understanding of natural resources, and (2) cooperation with others. These concepts are not analyzed here because they significantly overlap with previously analyzed concepts. Knowledge and understanding of natural resources overlaps with both science-based management and ecological concepts and principles, and cooperation with others overlaps with collaboration and participation.

4.1 Recreation and Commodity Benefits and Values

Highlights:

National

- Recreation benefits and values were expressed more often than other categories of benefits and values.
- A slight downward trend is evident in expressions of commodity benefits and values.
- Recreation exhibits an annual cycle, with coverage lower in the first and fourth quarters, and higher in the warmer months during the second and third quarters.

Regional

- Recreation benefits and values were expressed more often than other categories of benefits and values in each region, including the West.
- The largest difference in the number of expressions of recreation and commodity values was in the East, and the smallest difference was in the West.

Concepts analyzed

- *Recreation benefits and values.* The computer instructions we developed to measure the quantity of discussion of recreation benefits and values capture the full range of recreation activities (e.g., bird watching, off-road vehicle use), recreation resources (e.g., campgrounds, snowmobile trails), and participants (e.g., hunters, mountain bikers).
- *Commodity benefits and values.* The computer instructions we developed to measure the amount of discussion of commodity benefits and values capture the full range of commodity oriented benefits and values associated with the national forests, including the production of various commodities, jobs and other economic benefits associated with commodities, concern over loss of jobs and economic benefits, and language reflecting economic values and goals.

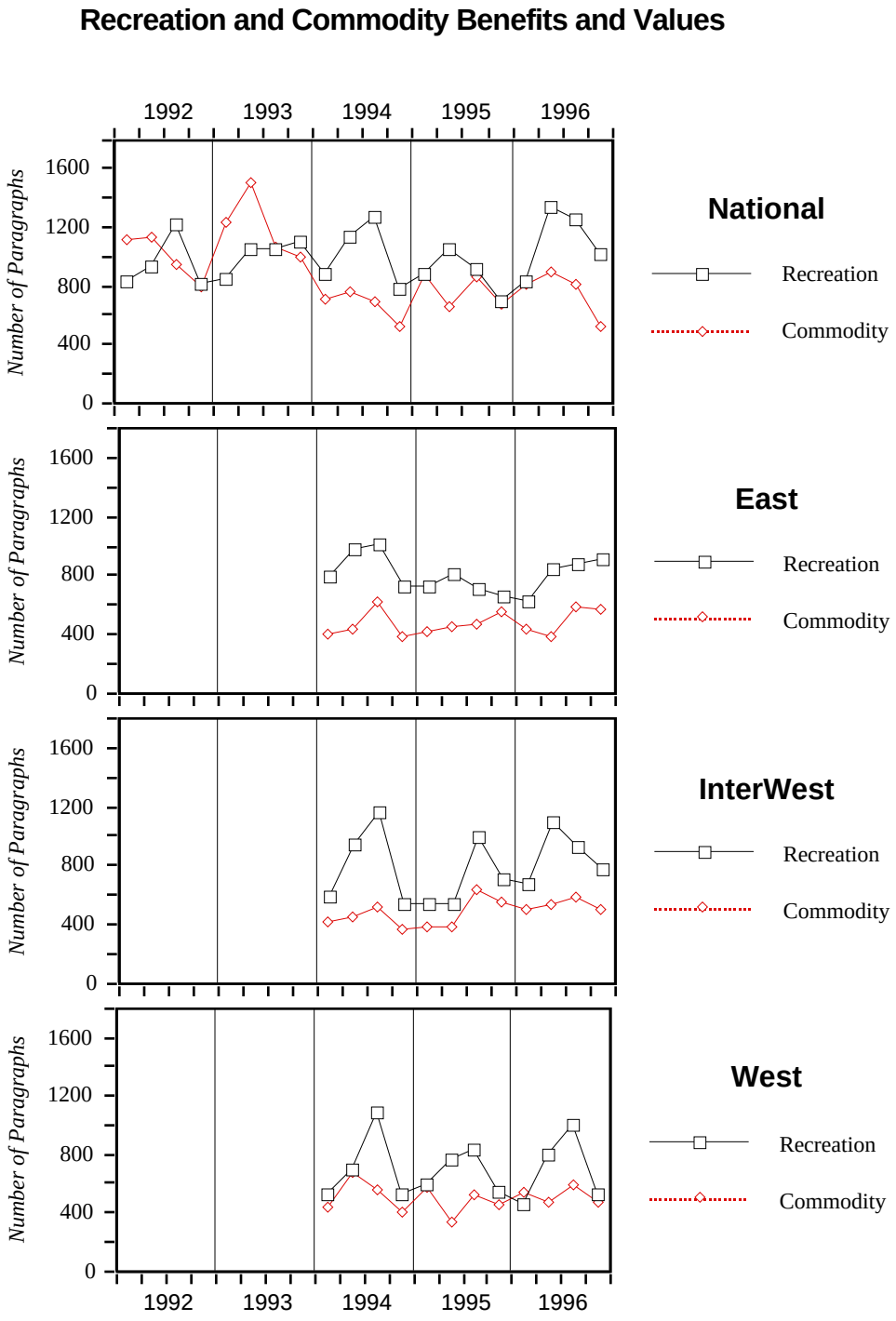

Figure 4.1. Recreation and Commodity values and benefits associated with the national forests expressed in the news media, plotted quarterly.

Discussion of findings

Figure 4.1 presents trends in the quantity of discussion concerning recreation and commodity benefits and values on the national forests. We found that recreation benefits and values were discussed more often than other categories of benefits and values. At the national level, recreation was discussed more than commodity benefits and values except in the first half of 1992 and the first half of 1993. The peak in commodity benefits and values in the second quarter of 1993 is likely due to media attention to President Clinton's Forest Conference in early April of 1993.

> *Comparison with surveys:* The dominance of recreation benefits and values is consistent with survey results found by Hammond (1994). In a national sample, 62 percent of respondents agreed or strongly agreed with the statement "Creating recreation opportunities (boating, hunting, camping, etc.) on public forest lands is important to me." When asked about commodity benefits and values, only 36 percent agreed or strongly agreed (47 disagreed or strongly disagreed) with the statement "Natural resources in public forests and grasslands should be made available to produce consumer goods."
>
> The National Survey on Recreation and the Environment (Cordell 1997) found that participation in outdoor recreation has continued to grow in the 1990s, and that almost all Americans 16 years of age and older participate in some form of outdoor recreation.
>
> Forest Service data on the number of recreation visitor days in national forests show rapid growth in the 1990s (see the annual Report of the Forest Service).

As would be expected, recreation exhibits a clear annual cycle, with coverage generally lower in the first and fourth quarters, and higher in the warmer months during the second and third quarters. Nationally, a slight downward trend is evident for commodity benefits and values, but recreation exhibits no clear trend over this time period.

> Previous research found a decrease in expressions of commodity-oriented benefits and values associated with the national forests from the early 1980s through the early 1990s (Bengston and Xu 1995).

The regional figures (bottom three graphs in Figure 4.1) reveal that the largest difference in expressions of recreation and commodity benefits and values is in the East and the smallest difference is in the West. It is interesting to note that recreation related concerns receive more overall coverage even in the West, where commodity concerns have traditionally been dominant. In the West and InterWest, recreation and commodity values generate roughly equal amounts of discussion during the first and fourth quarters, but recreation jumps ahead during the second and third quarters in most years.

4.2 Ecological and Moral/Spiritual/Aesthetic Benefits and Values

Highlights:

National

- Ecological benefits and values were expressed frequently — just a little less often than commodity values.
- Moral/spiritual/aesthetic benefits and values were also expressed with surprising frequency, given the nature of these benefits.

Regional

- Expressions of ecological and moral/spiritual/aesthetic benefits and values in the East and the InterWest appear to have increased slightly in recent years.

Concepts analyzed

- *Ecological benefits and values.* The computer instructions we developed to measure expressions of ecological benefits and values capture a range of ecologically oriented benefits, including various ecosystem functions and services, goals related to ecological value and indicators of the achievement of these goals, and expressions of concern about loss of ecological values or damage to ecological functions.
- *Moral/spiritual/aesthetic benefits and values.* The computer instructions we developed to measure expressions of moral/spiritual/aesthetic benefits and values capture expressions of the spiritual value or sacredness of nature, attachment-orientation to nature, heritage and cultural values, aesthetic value, and expressions of concern about the loss of these values.

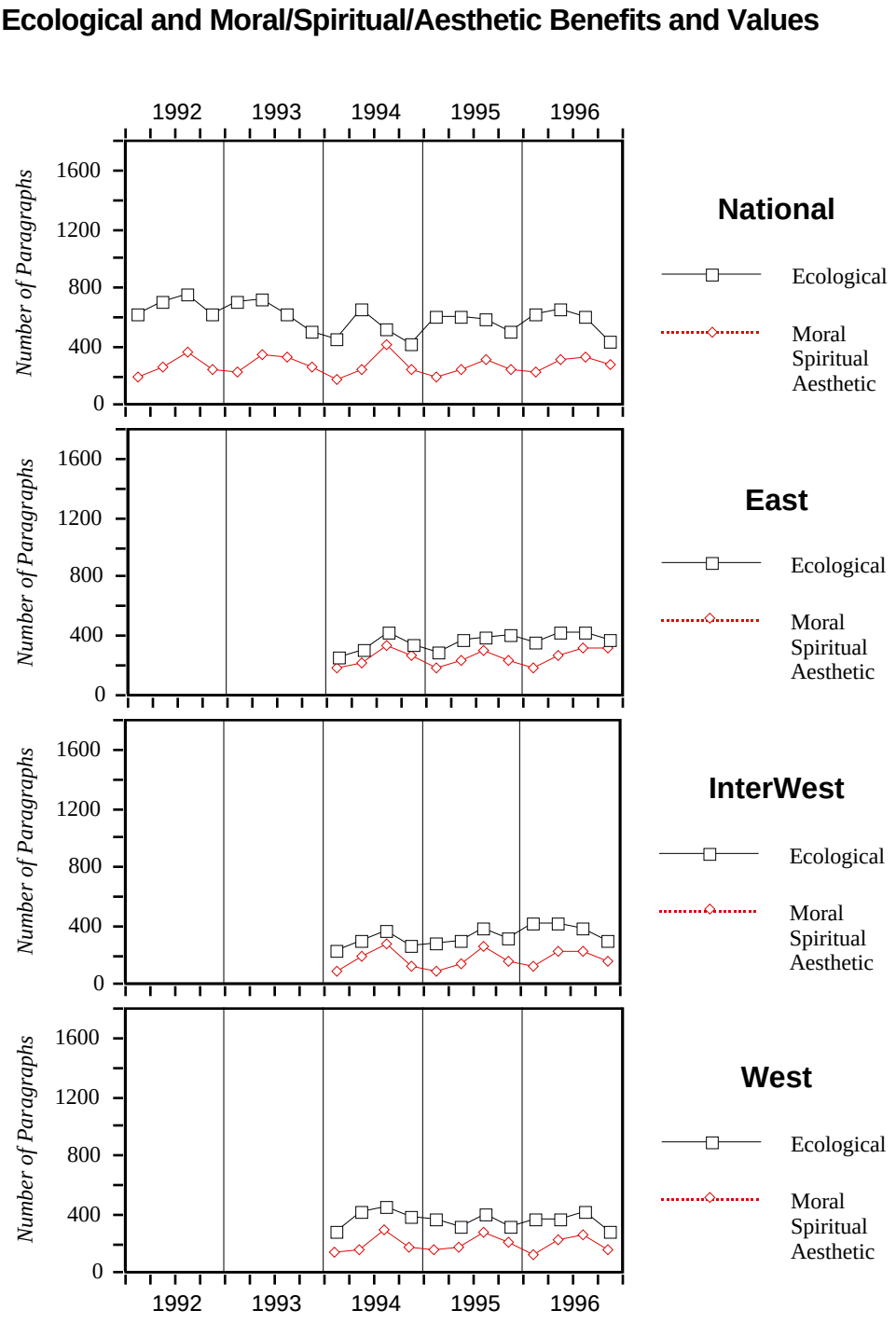

Figure 4.2. Ecological and Moral/Spiritual/Aesthetic values and benefits associated with the national forests expressed in the news media, plotted quarterly.

Discussion of findings

Trends in ecological and moral/spiritual/aesthetic (MSA) benefits and values are shown in Figure 4.2. In order to facilitate comparison, these figures are plotted on the same scale as the recreation and commodity benefit trends in Figure 4.1 and the firefighting benefit trends in Figure 4.3. Ecological benefits and values are expressed with frequently, just a little less than commodity values.[1] No clear time trend is evident for ecological benefits at the national level.

> *Comparison with other research:* Previous research using computer content analysis found a steady and statistically significant rise in expressions of ecological values from the early 1980s through the early 1990s (Bengston and Xu 1995).

Although expressed less frequently than the other categories, MSA benefits and values are expressed frequently given the intangible nature of these benefits. No obvious national-level trend can be seen in Figure 4.2.

> *Comparison with surveys and other research:* Bengston and Xu (1995) found evidence of an increase in the frequency of expression of moral/spiritual values from 1982 to 1993.
>
> Hammond (1994) found that 90 percent of the public agreed or strongly agreed with the following statement related to future generations (a dimension of moral value): "The federal government has the responsibility of conserving public forest resources for future generations."
>
> Wight (1996) found that "the opportunity to enjoy scenery/nature" — which is related to aesthetic benefits and values — is the primary motivation for both the experienced ecotourist and general travelers planning their next ecotourism vacation.

There appears to be an annual cycle for MSA benefits and values, with higher levels of expression during the second and third quarters, similar to the annual recreation cycle. This suggests an obvious link between recreation activities and MSA benefits and values: MSA benefits are likely to be experienced during recreation activities.

At the regional level (bottom three graphs in Figure 4.2), there may be a slight increase over time in both ecological and MSA benefits and values in the East and the InterWest. These trends appear to be slight in the figures, in part due to the scale used for the vertical axis. Statistical analysis is needed to determine whether or not these apparent upward trends are significant. In the West, no clear trends in ecological and MSA benefits are evident, but it is interesting to note that ecological benefits were expressed with about the same frequency as commodity benefits during the fourth quarter of 1994 and the second quarter of 1995.

---

[1] The relatively high expression of ecological benefits and values may seem to be inconsistent with the low level of implicit ecological literacy reported in section 3.1.1. But these two concepts are quite different. Ecological benefits and values is, in large part, a general measure of ecological or environmental concern (e.g., concern about protecting the environment, restoring environmental degradation, etc.). Our indicators of ecological literacy, on the other hand, measure expressions of fairly detailed ecological knowledge. Therefore, based on this analysis it appears that the public is concerned about the environment and protecting ecosystems, but is not very knowledgeable about ecological principles and concepts.

4.3 Firefighting Benefits:

Highlights

National

- Expressions of firefighting benefits surpass all other benefit categories during a major fire season.
- Large-scale wildfires are extremely "mediagenic" events.

Regional

- No regional differences were apparent in the expression of firefighting benefits.

Concepts analyzed

- *Firefighting benefits.* The computer instructions we developed to measure firefighting benefits capture language describing the Forest Service as actively fighting and controlling wildfires, and protecting or saving people, animals, and buildings.

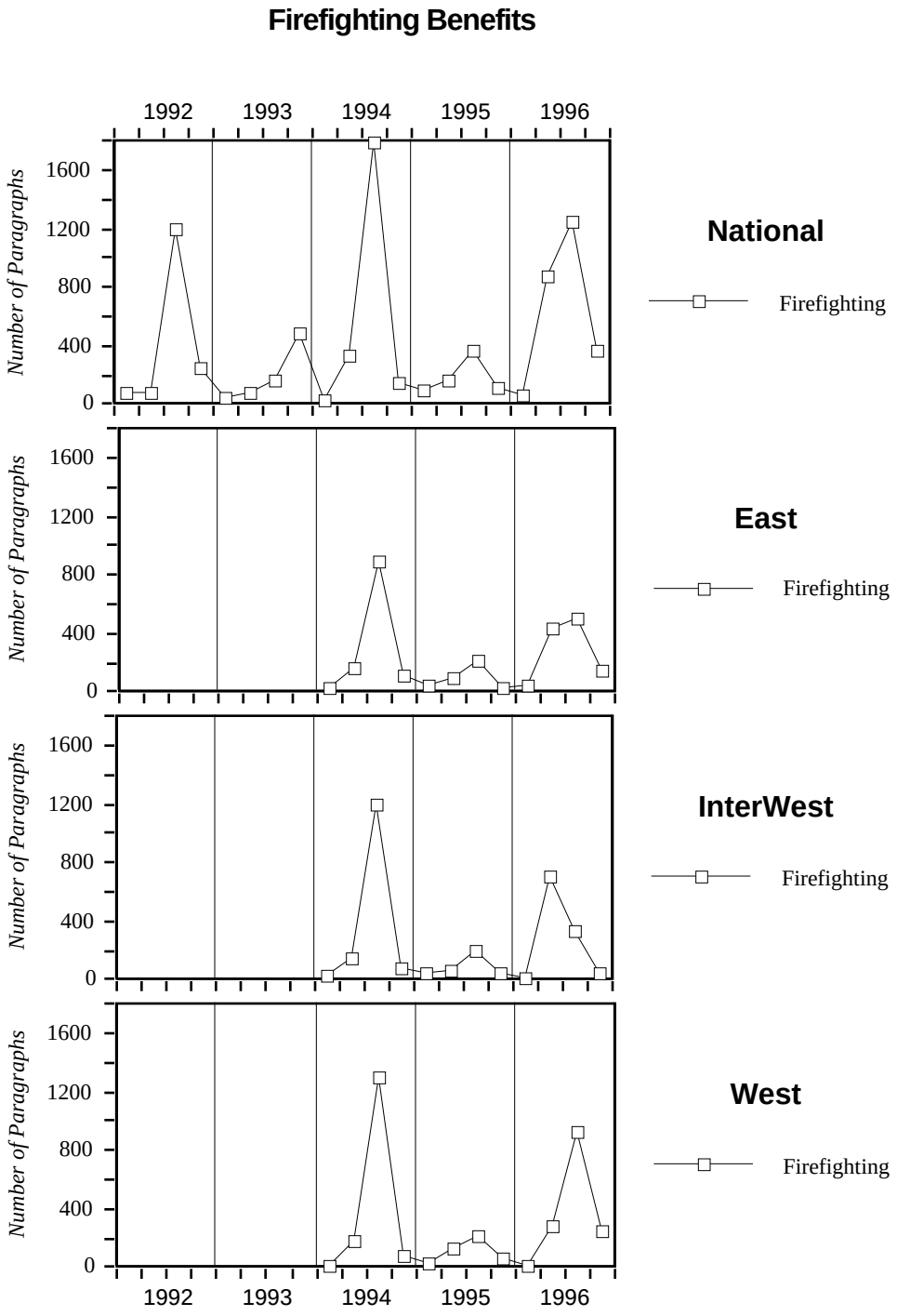

Figure 4.3. Firefighting benefits associated with the Forest Service expressed in the news media, plotted quarterly.

Discussion of findings

Figure 4.3 displays trends in the expression of firefighting benefits (plotted on the same scale as the other categories of benefits and values to facilitate comparison). Not surprisingly, expressions of the benefits associated with fighting wildfires usually peaks — sometimes quite dramatically — in the third quarter of each year. During a major fire season, such as 1994, expressions of firefighting benefits surpass the number of expressions of all other benefit categories. It is clear that large-scale wildfires are extremely "mediagenic" events (Smith 1992a, 1992b). News media coverage of wildfires during a major fire season is so heavy that it may crowd out discussion of other important issues related to the Forest Service. This suggests the importance of timing critical messages to the media so they won't be ignored due to saturation of the news media with wildfire coverage.

The regional breakdown reveals that firefighting benefits are discussed in the East as well as in the InterWest and West, despite the fact that the vast majority of wildfires do not occur in the East. In 1996, the peak in discussion of firefighting benefits occurred in the second quarter in the InterWest and in the third quarter in the West. Both of these regional peaks were evident in the East.

> *Comparison with surveys:* A survey conducted for American Forests found that 55 percent of the public believe that the Forest Service should extinguish all wildfire, versus 36 percent who would allow more fires to burn themselves out (Smith and Clark 1994). Thus, most people view firefighting as a desirable or beneficial activity, which is consistent with our observation that firefighting is most often portrayed as a benefit in the media. The prevalence of this view suggests that wildfire policies which place less emphasis on suppression and greater emphasis on the role of wildfires in ecosystems may face significant opposition.

5. Conflict Over National Forest Policy and Management

5. Conflict Over National Forest Policy and Management

President Benjamin Harrison signed the Forest Reserve Act on March 3, 1891 after two decades of contentious congressional debate over the nation's forests (Steen 1991). Conflict has thus surrounded U.S. forest policy and management since before the inception of the national forest system, and continues to this day. In a democratic and pluralistic society, some level of conflict is a natural and unavoidable part of forest management. We constructed an indicator for measuring the level of conflict over forest policy and management and monitoring change in conflict over time.

5. Conflict Over National Forest Policy and Management:

Highlights

National

- Conflict has varied significantly over time.
- 1994 — Jack Ward Thomas' first year as Chief — was a period of relatively low conflict.
- Conflict jumped significantly in the first quarter of 1995 as the timber salvage issue began to be discussed in Congress.

Regional

- A gradual increase in conflict is evident in the East and InterWest, but no clear trend is apparent in the West.

Concepts analyzed

- *Conflict.* The computer instructions we developed to measure expressions of conflict capture all types of conflict associated with the national forests. Indicators of conflict include the participants in conflict situations, angry emotions, name-calling and other derogatory characterizations, terms referring to legal battles, civil disobedience, and general conflict words and phrases.

See Appendix B for detail about how this concept was measured using the InfoTrend computer methods.

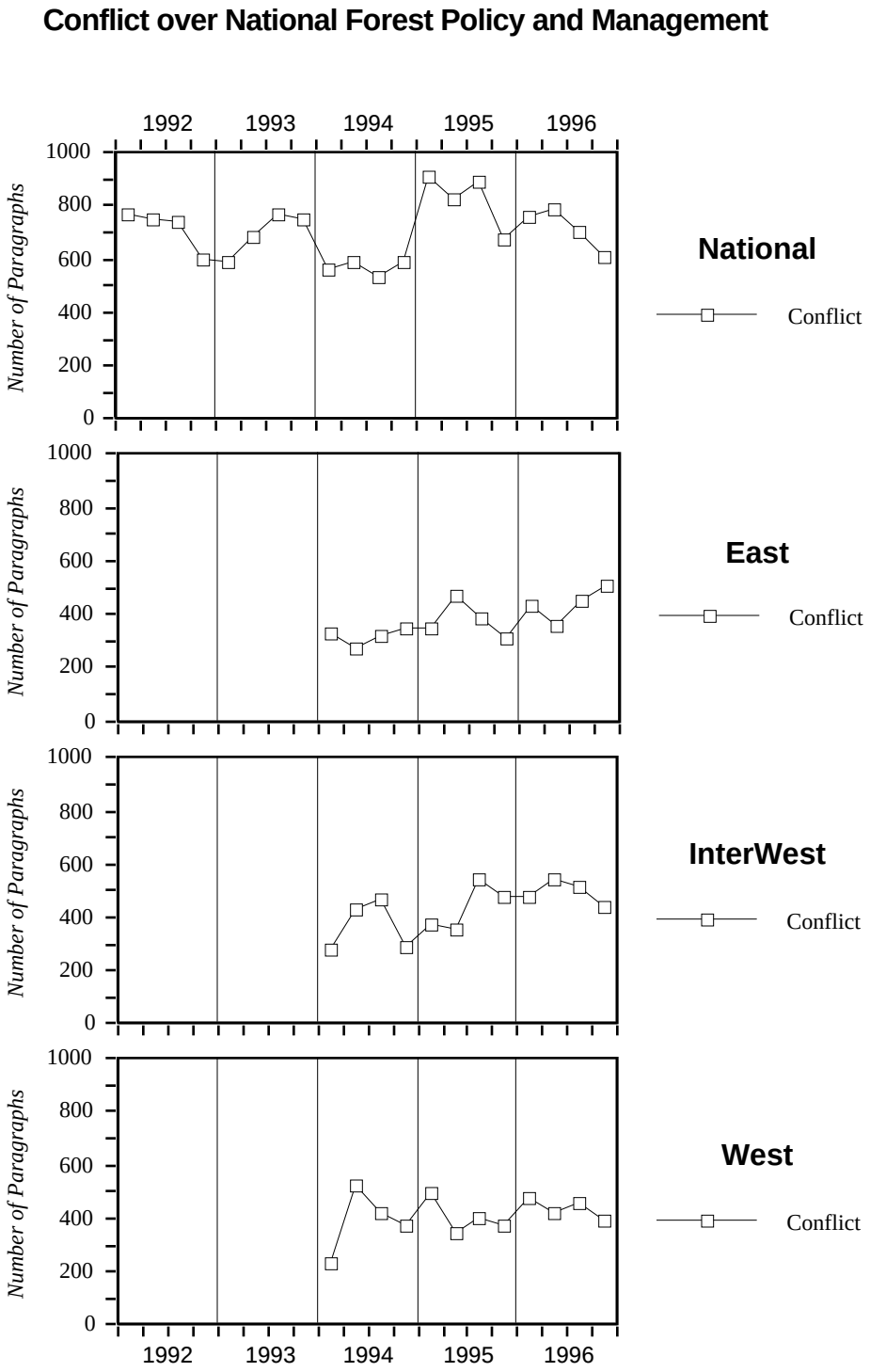

Figure 5. Conflict over national forest policy and management, plotted quarterly.

Discussion of findings

Figure 5 shows the level of conflict over national forest policy and management reflected in the mass media. At the national level, the number of paragraphs dealing with conflict has varied substantially over time. The year 1994 was a period of relatively low conflict. This was Jack Ward Thomas' first year as Chief, and the low conflict level may be due to a "honeymoon" period for the new chief and fairly widespread (but not universal) approval of his policies. Conflict jumped significantly in the first quarter of 1995 as the timber salvage issue began to be discussed in Congress. Conflict rose during the first two quarters of 1996, and then began to decline. This decline corresponds with a memorandum from the Secretary of Agriculture to the Chief of the Forest Service dated July 2, 1996, which was intended to respond to public concerns about timber salvage sales.

The regional breakdown of conflict reveals an increasing trend in the East and InterWest, but no clear trend in the West. These regional differences point to the need for a further breakdown of conflict, for instance, how much conflict is due to various contentious issues such as timber salvage, the spotted owl, other endangered species, motorized vs. non-motorized recreation, etc.?

As mentioned in section 2.2, we found a link between resolution of conflict and use of collaborative approaches to planning and management. In the news media text we examined, conflict was rarely resolved by one side prevailing over the other, but by all sides working together in a collaborative manner.

> *Comparison with other research:* Gericke and Sullivan (1994) found some evidence of a relationship between the form of public participation and the probability of a high level of conflict over forest plans. They found that public participation activity in small group form was a statistically significant variable in reducing the probability of high conflict, where conflict is defined as the average time required to resolve forest plan appeals.

6. Directions for Future Research

6. Directions for Future Research

As mentioned in the Introduction, the overall goal of this project was to develop a social information system to monitor and evaluate:

- the quantity of public discourse in the news media, and
- public attitudes, values, and understanding responding to that discourse

on a set of issues critical to the Forest Service and its mission. Essentially, this project is a system for monitoring the social debates and the social context in which forest policy and management takes place today. Advantages of using computer content analysis of online news media text to develop such an information system are that it can easily be expanded to include additional issues and that current issues can be analyzed in greater depth.

This section briefly identifies key areas for future research to make this social information system more useful to Forest Service managers and policy makers.

1. Continue monitoring the trends identified in this report:

This study has identified many important trends in the social environment that should continue to be monitored in the future.

2. Analyze key trends in greater detail:

Recreation. Recreation has become the most socially and economically important activity on the national forests. A detailed breakdown of recreation activities, attitudes, and benefits would produce information similar to that produced by the National Survey on Recreation and the Environment, except that it could be updated annually. *An expanded analysis could track emerging trends in the full range of recreation activities — from bird watching to off-road vehicles — and analyze conflict related to recreation use.*

Forest Health. Forest health is a high priority for the Forest Service (Dombeck 1997). This analysis revealed a significant jump in discussion of forest health beginning in 1994, indicating increased concern and debate about this topic. We also found a diversity of views expressed about forest health and what this concept means. *An expanded analysis of forest health could examine evolving attitudes and determine which view or views of forest health are becoming more widely accepted.*

Biodiversity. Our analysis showed a steady decline in the quantity of discussion concerning biodiversity in the past five years, perhaps due to the winding down of the spotted owl debate. *Insights about the "next spotted owl" could be gained if biodiversity messages related to individual species were analyzed separately.*

3. Add important new issues, concepts, and dimensions:

Additional Topics. A wide variety of new topics could be added to this information system, e.g., additional benefit categories such as *subsistence uses* of the national forests (mushroom and berry gathering, etc.); concern about and attitudes toward *exotic species* and *noxious weeds;* trends in *urban forestry;* attitudes toward *pesticides;* and so on.

Rural/Urban Differences. As more newspapers from smaller communities become available online in the future, rural views could be analyzed separately and compared to urban views, and a more detailed regional breakdown could be added.

Stakeholder Differences. The views of individual stakeholder groups — such as Native Americans, mainstream environmentalists, radical environmentalists, and the timber industry — could also be analyzed separately.

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Appendix A:

National and Regional News Sources

Selection of News Sources

NEXIS is an online commercial database which, among other things, contains a large number of newspapers. To avoid bias, we selected only newspapers with the full texts of all articles archived in the database for our analysis (plus several newswires and television and radio news transcripts for the national analysis). This approach results in a large database of text for the nationwide analysis that goes back to the beginning of 1992.

For the regional analyses, the number of news sources available online going back to 1992 was insufficient to represent each region. We therefore limited the regional databases of news media text to the period 1994-96. By 1994, enough newspapers were available in the NEXIS database to adequately represent all three regions. We added one additional newspaper, *The Oregonian*, to the database for the West in order to round out the coverage in this region. *The Oregonian* was not available in NEXIS, but was obtained through the Dialog commercial database.

The search command used to search NEXIS for text on the Forest Service or national forests was: (((forest service) or (national forest)) and not ((texas forest service) or murder or homicide or Kaczynski or Rathbun)). This search command eliminated stories about homicide investigations in which a body had been found on a national forest and stories about Unabomber suspect Theodore Kaczynski.

The search command used to search NEXIS for text on ecosystem management was: ((ecosystem or ecological) w/2 (manag! or approach)) or (eco! and (holistic w/2 (manag! or approach))) or (((forest service) w/p Singular(new)) and (singular(new) pre/1 plural(perspectives)))).

Data

Data for this evaluation consisted of national and regional text from news media stories about the USDA Forest Service and a separate set of stories about ecosystem management.[1] Tables A-1 through A-4 identify the specific national and regional news sources used in this analysis. A total random sample of 28,669 stories about the Forest Service and 2,319 stories about ecosystem management was downloaded from the NEXIS and Dialog databases:

Retrievals of text on the Forest Service:

National stories (1992-96):

[1] The text used in the analysis includes both news articles ("factual") and opinion articles (editorials and letters to the editor). Past studies have shown that opinion predictions are accurate when news and opinion articles are combined. This is not surprising because, for most issues, all opinion material combined only accounts for about 10 percent of total news coverage.

- 9,995 of 22,634 stories (24 newspapers, 5 news wires, and 4 television and radio news transcripts);

Regional stories (1994-96):

- East (Forest Service Regions 8 and 9): 5,996 of 10,230 stories (42 newspapers);
- InterWest (Forest Service Regions 1, 2, 3, and 4): 6,000 of 7,737 stories (9 newspapers);
- West (Forest Service Regions 5 and 6): 6,000 of 6,574 stories (9 newspapers) and 678 stories from *The Oregonian* in Dialog. Forest Service Region 10 (Alaska) was not included due to a lack of news sources available online during the period being studied.

Retrievals of text on Ecosystem Management:

National stories (1992-96):

- All 1,176 stories (24 newspapers, 5 news wires, and 4 television and radio news transcripts);

Regional stories (1994-96):

- East (Forest Service Regions 8 and 9): 603 of 606 stories (42 newspapers);
- InterWest (Forest Service Regions 1, 2, 3, and 4): All 263 stories (9 newspapers);
- West (Forest Service Regions 5 and 6): All 246 stories (9 newspapers) and 31 stories from *The Oregonian* in Dialog.

Figures A-1 and A-2 show the total number of paragraphs on the Forest Service and ecosystem management that were analyzed. The peaks in Forest Service text (Figure A-1) during certain quarters is due mainly to coverage of wildfires.

Table A-1. News media sources for the national analysis.

News Source & Circulation[2] (Daily/Sunday edition)	Date First Online[3]
National Newspapers:	
1. USA Today (1,429,024)	1/89
2. Christian Science Monitor (90,095)	1/80
Newspapers:	
3. Los Angeles Times (CA) (1,058,598/1,457,583)	1/85
4. Sacramento Bee (CA) (281,222/353,953)	11/88
5. San Diego Union - Tribune (CA) (406,860/461,223)	1/92
6. San Francisco Chronicle (CA) (570,364/704,322)	10/89
7. Hartford Courant, The (CT) (229,092/317,953)	6/91
8. Orlando Sentinel (FL) (281,104/401,056)	1/90
9. St. Petersburg Times (FL) (372,451/470,924)	1/87
10. Atlanta Constitution / Journal (GA) (300,890/713,835)	5/91
11. Lewiston Morning Tribune (ID) (24,965/26,054)	6/90
12. Chicago Tribune (IL) (691,283/1,098,765)	1/85
13. Chicago Sun-Times (IL) (500,969/493,253)	1/92
14. Courier Journal (Louisville, KY) (244,379/331,268)	1/87
15. Boston Globe (MA) (516,981/798,298)	9/88
16. Star Tribune (Minneapolis, MN) (412,871/685,975)	9/91
17. St. Louis Post-Dispatch (MO) (332,713/553,104)	1/89
18. Billings Gazette, The (MT) (54,304/61,188)	2/88
19. New York Times, The (NY) (1,060,666/1,770,504)	6/80
20. Newsday (NY) (circulation not reported)	1/88
21. Houston Chronicle (TX) (449,755/620,752)	9/91
22. Seattle Times, The (WA) (231,446/503,544)	1/90
23. Washington Post (DC) (840,232/1,153,822)	1/77
24. Washington Times (DC) (99,364/66,326)	7/89
Newswires:	
25. Associated Press	1/77
26. Gannett News Service	1/89
27. UPI Newswire	9/80
28. UPI State & Regional Wires	11/80
29. States News Service	8/84
Television and Radio News Transcripts:	
30. ABC News Programs	1/90
31. CNN News	1/90
32. MacNeil/Lehrer Newshour	1/82
33. NPR (All Things Considered, Morning Edition, Weekend Edition)	1/92

[2] Circulation numbers are from the *Gale Directory of Publications and Broadcast Media, 3 volumes,* Detroit and London: Gale Research, Inc. 1995 edition.

[3] Source: *Fulltext Sources Online,* Needham Heights, MA: BiblioData. July 1996.

Table A-2. News media sources for the East (Forest Service Regions 8 and 9), 1994-present.

News Source & Circulation (Daily/Sunday edition)		Date First Online
Forest Service Region 8		
1.	Orlando Sentinel (FL) (281,104/401,056)	1/90
2.	Palm Beach Post (W. Palm Beach, FL) (238,462/294,699)	1/94
3.	St. Petersburg Times (FL) (372,451/470,924)	1/87
4.	Sun-Sentinel (Ft. Lauderdale, FL) (281,693/382,821)	1/94
5.	Tampa Tribune (FL) (279,561/378,322)	1/94
6.	Atlanta Constitution / Journal (GA) (300,890/713,835)	5/91
7.	Courier Journal (Louisville, KY) (244,379/331,268)	1/87
8.	Advocate, The (Baton Rouge, LA) (100,552/137,293)	1/94
9.	Times-Picayune,The (New Orleans, LA) (267,792/321,347)	1/93
10.	Greensboro News & Record (NC) (109,935/129,419)	1/94
11.	Herald-Sun, The (Durham, NC) (54,069/66,076)	1/94
12.	Commercial Appeal (Memphis, TN) (187,222/280,317)	1/94
13.	Austin American Statesman (TX) (177,717/235,871)	1/94
14.	Dallas Morning News (TX) (515,571/821,894)	10/92
15.	Houston Chronicle (TX) (449,755/620,752)	9/91
16.	Houston Post (TX) (318,218/359,046)	1/94
17.	Roanoke Times & World News (VA) (115,323/125,565)	1/94
18.	Charleston Daily Mail (WV) (100,018/105,615)	1/94
19.	Charleston Gazette (WV) (circulation not reported)	1/94
Forest Service Region 9		
20.	Hartford Courant, The (CT) (229,092/317,953)	6/91
21.	Chicago Sun-Times (IL) (500,969/493,253)	1/92
22.	Chicago Tribune (IL) (691,283/1,098,765)	1/85
23.	State Journal-Register (Springfield, IL) (66,656/76,009)	1/94
24.	Indianapolis Star (IN) (226,562/339,583)	1/94
25.	Indianapolis News (IN) (83,208/no Sun.)	1/94
26.	Baltimore Sun, The (MD) (264,583/372,972 - Sat.)	1/94
27.	Boston Globe (MA) (516,981/798,298)	9/88
28.	Boston Herald MA) (304,505/223,447)	1/94
29.	Star Tribune (Minneapolis, MN) (412,871/685,975)	9/91
30.	Kansas City Star (MO) (288,295/429,337)	1/94
31.	St. Louis Post-Dispatch (MO) (332,713/553,104)	1/89
32.	Record, The (Bergen/Passaic Co's, NJ) (circ. not reported)	1/94
33.	Buffalo News, The (NY) (283,855/365,049)	11/92
34.	New York Times, The (NY) (1,060,666/1,770,504)	6/80
35.	Times Union (Albany, NY) (100,585/162,588)	1/94
36.	Columbus Dispatch (OH) (261,002/404,292)	1/94
37.	Dayton Daily News (OH) (161,611/219,147)	1/94
38.	Plain Dealer, The (Cleveland, OH) (404,400/544,386)	11/92
39.	Morning Call, The (Allentown, PA) (135,601/188,521)	1/94
40.	Pittsburgh Post Gazette (PA) (247,145/no Sun.)	1/94
41.	Capital Times (Madison, WI) (22,048/no Sun.)	1/94
42.	State Journal (Madison, WI) (85,286/164,039)	1/94

Table A-3. News media sources for the InterWest (Forest Service Regions 1, 2, 3, and 4), 1994-present.

News Source & Circulation (Daily/Sunday edition)		Date First Online
Forest Service Region 1		
1.	Billings Gazette, The (MT) (54,304/61,188)	2/88
Forest Service Region 2		
2.	Denver Post, The (CO) (302,125/453,032)	1/94
3.	Rocky Mountain News (CO) (336,071/449,550)	1/94
Forest Service Region 3		
4.	Arizona Republic (AZ) (399,702/611,704)	1/93
5.	Phoenix Gazette, The (AZ) (Mon-Sat 75,872)	1/93
6.	Santa Fe New Mexican (NM) (23,263/25,589)	1/94
Forest Service Region 4		
7.	Idaho Falls Post Register (ID) (29,047/29,601)	1/93
8.	Lewiston Morning Tribune (ID) (24,965/26,054)	6/90
9.	Salt Lake Tribune (UT) (123,897/159,084)	1/94

Table A-4. News media sources for the West (Forest Service Regions 5, 6, and 10), 1994-present.

News Source & Circulation (Daily/Sunday edition)		Date First Online
Forest Service Region 5		
1.	Los Angeles Times (CA) (1,058,598/1,457,583)	1/85
2.	Sacramento Bee (CA) (281,222/353,953)	11/88
3.	San Diego Daily Transcript (CA) (8,813/no Sun.)	1/91
4.	San Diego Union - Tribune (CA) (406,860/461,223)	1/92
5.	San Francisco Chronicle (CA) (570,364/704,322)	10/89
6.	San Francisco Examiner (CA) (137,635/704,322)	8/93
Forest Service Region 6		
7.	Oregonian, The (OR) (350,978/446,296)	1/89
8.	Columbian, The (Vancouver, WA) (55,042/66,781)	5/94
9.	News Tribune, The (Tacoma, WA) (126,303/143,033)	1/94
10.	Seattle Times, The (WA) (231,446/503,544)	1/90
Forest Service Region 10		
(No news sources were available online during the entire period being studied)		

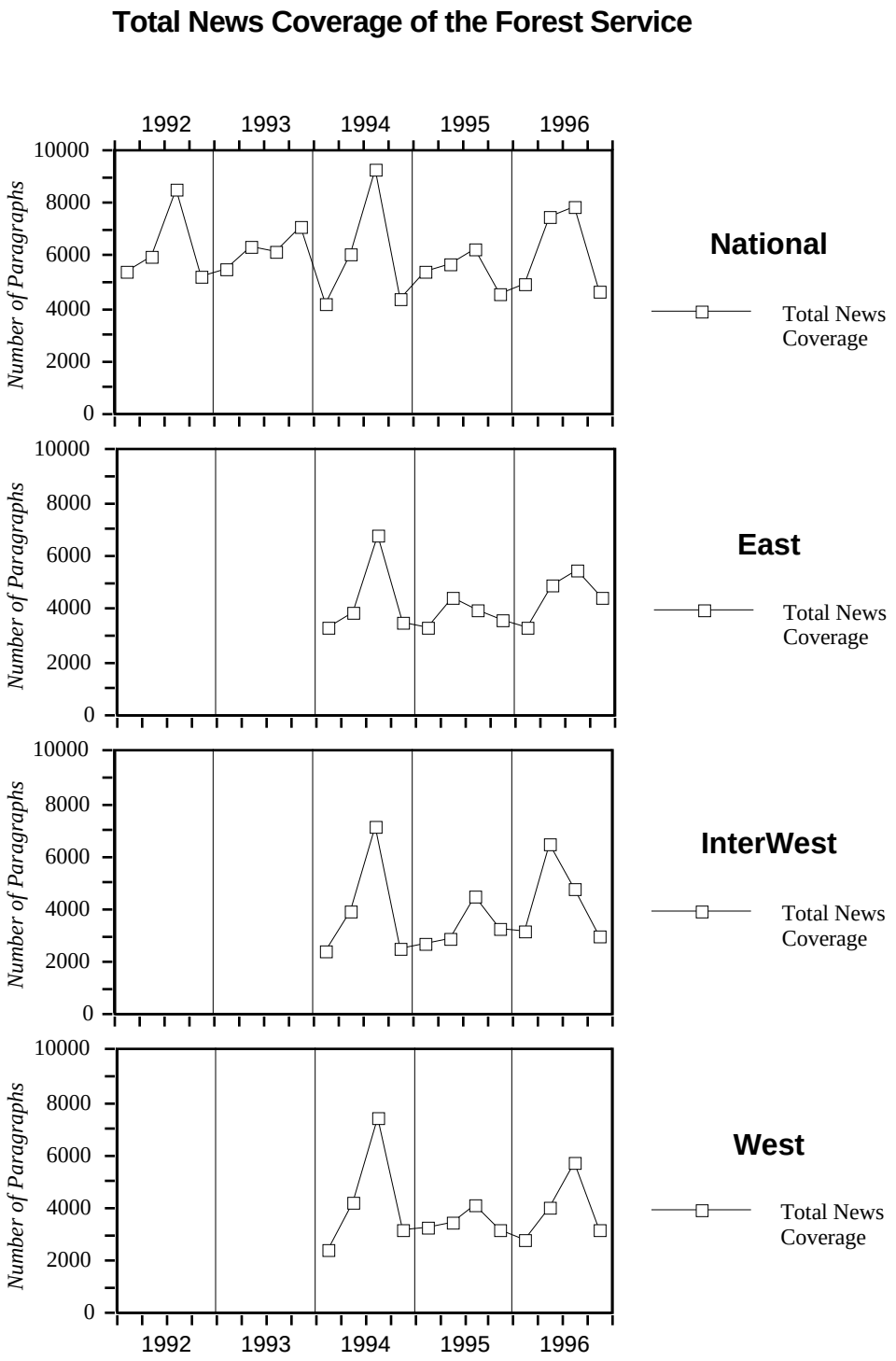

Figure A-1. Total number of paragraphs about the Forest Service analyzed, plotted quarterly.

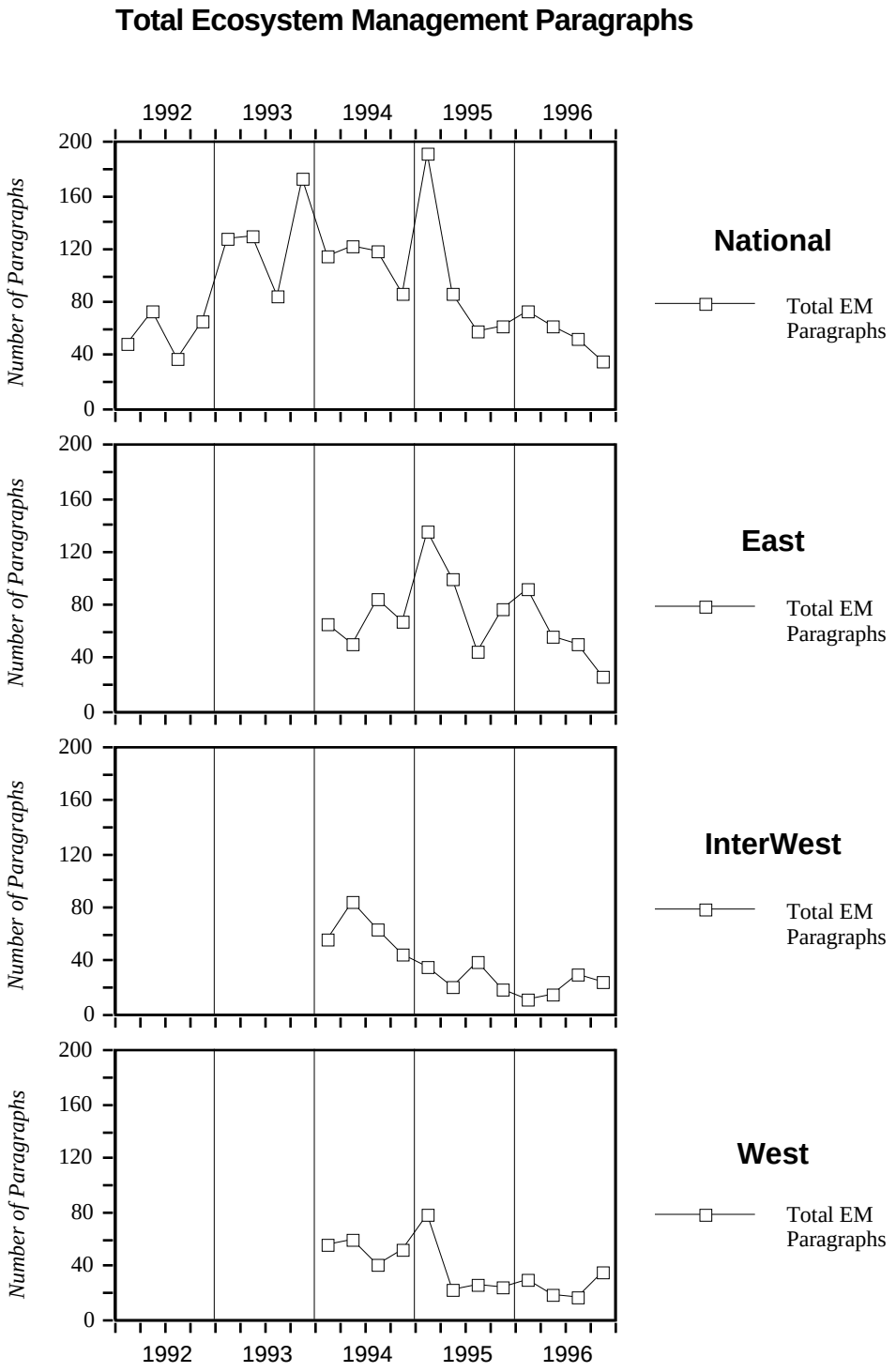

Figure A-2. Total number of paragraphs about ecosystem management analyzed, plotted quarterly.

Appendix B:

Methodology and Validity Analysis

This section describes the computer content analysis methodology we developed to measure:

- attitudes related to each of the three dimensions of conservation leadership (stewardship and ethics, collaboration and participation, and science-based management), and
- expressions of conflict over national forest policy and management.

These examples are provided to illustrate the methodology for the interested reader. For more detail on the InfoTrend method, see Fan (1988).

Conservation Leadership

This section describes the computer content analysis rules we developed to capture expressions of each of the three dimensions of conservation leadership identified previously. This was done using the InfoTrend (Fan 1990, 1994) computer software developed by David Fan. The approach is to write computer instructions customized in the analysis using the high level Filtscor computer language. Since we were interested in evaluating the extent to which the Forest Service has achieved its strategic goal of being recognized as a conservation leader, we developed content analysis rules to identify both positive and negative — or favorable and unfavorable — expressions relating to each of the dimensions. The Filtscor language has two components. One is a dictionary listing ideas important for the analysis and groups of words and phrases associated with each idea. The other Filtscor language component is a series of idea transition rules which specify how pairs of ideas are combined to give new meanings. For example, an idea transition rule could specify that words of the negation idea appearing in close proximity to words expressing the idea of positive stewardship combine to create the new meaning of negative stewardship. The idea transition rules are based on the order of words in the text as well as on the distances between words.

In the development stage of the analysis, the coding decisions made by the computer are written to screen and the analyst modifies the dictionaries and rules until the computer coding of the text agrees with the analyst's interpretations at least 80 percent of the time. The following sections briefly explain the content analysis rules developed for coding positive and negative expressions of each dimension of conservation leadership. Our goal for each dimension was to develop computer rules that would count the number of paragraphs in our database of stories containing favorable and unfavorable messages about the Forest Service's stewardship and ethics, collaboration, and science-based management.

Stewardship and Ethics Content Analysis Rules. The computer instructions we developed to capture positive and negative expressions of the Forest Service's stewardship of land and ethical practices contained four main groups of words: (1) *Forest Service words* (words and phrases that refer to the agency, e.g., Forest Service, national forest, ranger,

forest supervisor, and federal forester); (2) *positive words* (words and phrases with favorable connotations for Forest Service stewardship and ethics, e.g., caretakers, committed, dedicated, forward-thinking, guardians, innovative, praised, preserved, protect, restore, sustaining, wisely, etc.); (3) *negative words* (words and phrases with unfavorable connotations for Forest Service stewardship and ethics, e.g., abomination, betrayal, capricious, decimate, deforest, despoil, disgraceful, flagrant, hinder, illegal, irresponsible, mismanage, pretense, public outcry, rapacious, scandalous, unsound, unsustainable, unwise, whistle-blower, etc.); and (4) *negation words* (words that change the sense of the positive and negative words, e.g., failed, lacking, never, no, not, can't, won't, etc.). The words in each of these groups were truncated where appropriate, to include variations such as illegal, illegally, illegality, etc.

Using these main groups of words, the idea transition rules for stewardship and ethics specified how ideas associated with the words were related to each other. For example, one set of rules stated that a negation word within 30 characters of a positive (negative) word becomes a negative (positive) word. Using this rule, the phrase "... has failed (negation) to protect (positive) our forests..." would give a negative idea. Another set of idea transition rules specified that a negative (positive) word within 50 characters of a Forest Service word be coded as a negative (positive) stewardship and ethics message. For example, the phrase "... the national forests (Forest Service word) have been mismanaged (negative word)..." would be coded as a negative stewardship message. Finally, a set of rules specified that a negation word appearing up to 30 characters ahead of a positive (negative) stewardship message should be coded as a negative (positive) stewardship message. For example, the phrase "... the national forests (Forest Service word) have not (negation) been mismanaged (negative word)..." would be coded as a positive stewardship message.

In addition to the main word groups and sets of rules, several other word groups and idea transition rules were developed to capture additional expressions related to stewardship and ethics. For example, rules were developed to capture descriptions of tree planting activities by the Forest Service, which were then included with the positive ideas, and to capture harvesting timber on steep slopes in national forests (causing erosion), which were then included with the negative words. Appendix C presents several examples of news media text that was coded for positive and negative expressions of Forest Service stewardship and ethics using these rules.

Collaboration Content Analysis Rules. The computer instructions we developed to identify favorable and unfavorable expressions of the Forest Service's use of collaborative and participatory approaches to planning and management contained five main categories of words: (1) *Forest Service words* (same as the stewardship and ethics rules); (2) *positive collaboration words* (words and phrases which describe or connote collaborative or participatory approaches to planning and management, e.g., broad-based, citizens planning, coalition, collaboration, consensus, dialogue, interagency, joint effort, open house, partnership, willing to listen, win-win, etc.); (3) *negative collaboration words* (words and phrases which describe or connote the opposite of collaborative or participatory approaches to planning and management, e.g., bureaucratic, centralized, dictatorial, entrenched, heavy-handed, in bed with, in cahoots, non-accountable, out of touch, unaccountable, etc.); (4) *political words* (words that refer to the political process, e.g., bipartisan, congressional, democrat, legislation, political, senate, subcommittee, etc.); and (5) *negation words* (similar to the negation words used in the stewardship and ethics rules).

Idea transition rules for positive and negative collaboration were developed using these main word groups. For example, a positive collaboration word appearing in the same

paragraph as a Forest Service word was coded as a positive collaboration message; a negative collaboration word appearing in the same paragraph as a Forest Service word was coded as a negative collaboration message; and a positive collaboration word appearing in the same paragraph as a political word was deleted from the analysis. This last rule was designed to eliminate messages such as "... the subcommittee (political word) reached consensus (positive collaboration word) on ...", which refer to political actions affecting the Forest Service but not taken by the agency.

Several other word groups and idea transition rules were developed to identify additional, specialized aspects of collaboration. For example, a rule was developed to capture expressions of common goals and visions, which were then included with the positive collaboration words. Another rule was developed to identify expressions related to ending or limiting the appeals process for timber sales on national forests, which were then included with the negative collaboration words.

A special category of collaboration was also created and coded for expressions of the Forest Service working with citizen volunteers to accomplish various tasks, such as maintaining or rebuilding hiking trails. This is a form of collaborative management, but because it is a limited type of collaboration involving only one stakeholder group — and because there are virtually no negative expressions related to the use of volunteers — a separate category was created for "volunteer collaboration." Appendix C presents several examples of news media text that was coded for positive and negative expressions of the Forest Service using collaboration in planning and management, and collaboration with volunteers.

Science-based Management Content Analysis Rules. Finally, we developed computer instructions to identify favorable and unfavorable expressions of the Forest Service's use of science-based management. These rules involved four main categories of words: (1) *Forest Service words* (same as the stewardship and ethics rules); (2) *science words* (words and phrases which relate to science or research, e.g., analysis, experimental forest, findings, laboratory, research, scientific, studying, etc.); (3) *negative science words* (words and phrases which connote the opposite of science or poor science, e.g., junk science, pseudo-science, nonscientific, unscientific, voodoo, etc.); (4) *negation words* (similar to the negation words used in the stewardship and ethics rules). As before, relationships between these word groups were specified in idea transition rules. For example, a science word appearing in the same paragraph as a Forest Service word was coded as a positive science-based management message; a negative science word appearing in the same paragraph as a Forest Service word was coded as a negative science-based message; and a negation word appearing within 30 characters ahead of a science word became a negative science word.

As with collaboration, a special category of messages related to science-based management was created, specifically, expressions of the scientific expertise of Forest Service employees. Identification of Forest Service employees as scientific experts in media text is a type of message about the agency's use of science-based management, but we coded separately for this category because there are essentially only positive expressions of this idea. The "expert science-based" word group included the wide range of scientific disciplines employed by the Forest Service, such as archeologist, botanist, ecologist, entomologist, hydrologist, ornithologist, plant physiologist, silviculturalist, etc. An idea transition rule specified that these scientific specialties had to appear within 60 characters of a Forest Service word to be counted as an expert/science-based management message. Appendix C presents examples of text that was coded as positive or negative messages regarding the Forest Service's use of science-based management, and the separate category of expert/science-based management.

Conflict Over National Forest Policy and Management

The objective of this part of the analysis was to produce a set of valid indicators of conflict over forest policy and management. Unlike the concepts related to conservation leadership in the preceding section, conflict is basically a one dimensional concept, which enable us to take a somewhat simpler approach to developing the content analysis rules. We developed a list of words and phrases — called a dictionary in the nomenclature of content analysis — and a set of computer rules to identify expressions of forest conflict. Development of the forest conflict dictionary and content analysis rules involved an iterative process. An initial dictionary was developed by examining a random sample of news media stories from our database. The initial dictionary was then refined and the validity of its words and phrases as indicators of forest conflict was assessed using computer-generated key-word-in-context (KWIC) lists. Words and phrases that were found to be used ambiguously or incorrectly for the purposes of this study were dropped. For example, the word "sue" (with spaces before and after the word) was originally included as an indicator of legal conflict. But examination of the use of this word in context revealed that it sometimes appeared as a given name, as in "Forest Service spokeswoman Sue Johnson said ..." The word "sue" was therefore dropped. Other words that were removed from the initial dictionary include "arrest" and "arrested" (which was usually found in articles about marijuana growers on national forests) and "threat," "threaten" and "threatened" (which often referred to threatened and endangered species).

The process of refining the conflict dictionary by applying it to a sample of text, assessing the accuracy of coding in context, and revising the dictionary and rules as needed was repeated until a satisfactory level of validity was achieved. Content analysis researchers often define a satisfactory accuracy level as 80 percent or greater. We achieved a 95 percent accuracy level in this study, because conflict is a relatively easy concept to capture with computer-coded content analysis.

Words and phrases in our final conflict dictionary include:

1. *Participants* that fill various roles related to conflict, e.g., agitators, assailant, appellant, attorney, critics, demonstrators, dissenters, factions, federal judge, lawyer, litigators, magistrate, protesters, terrorists, whistleblower, etc.;

2. *Anger* and related emotions, e.g., angry, animosity, bitter, discontent, disgruntled, furious, incensed, irate, ire, mistrust, resentment, vitriol, wrath;

3. *name-calling,* e.g., eco-freak, enviro-revolutionaries, extremists, forest circus (referring to the Forest Service), name-calling, timber barons, timber beasts, tree hugger, zealot, etc.;

4. *other derogatory characterizations,* e.g., addlebrained, bullying, capricious, charade, eco-babble, dictatorship, disingenuous, fallacious, flim-flam, hair-brained, hogwash, insidious, ludicrous, mean-spirited, overzealous, pandering, propaganda, reprehensible, schizophrenic, subterfuge, witch hunt ;

5. terms referring to *legal battles,* e.g., affidavit, court battle, court order, district court, federal court, illegal, injunction, intend to sue, judicial, lawsuit, legal action, litigation, plan to sue, prosecute, restraining order, sued, suing, will sue, etc.

6. *civil disobedience,* e.g., chained himself, chained themselves (referring to chaining ones' self to a tree or logging truck), civil disobedience, monkeywrench, spiked, spiking (referring to tree spiking),[1] terrorism, violence, etc.; and

7. *general conflict words,* i.e., a large number and wide variety of other words and phrases associated with conflict, e.g., at odds with, at each other's throats, badmouth, bickering, brouhaha, contentious, cried foul, decry, divisive, drawn fire, fray, friction, hot button, in-your-face, irreconcilable, lightening rod, loggerheads, powder key, polarized, schism, sniping, squabble, tempestuous, timber wars, turmoil, under-siege, up-in-arms, vendetta, wrangling, etc.

In addition to the main conflict dictionary, two other dictionaries and a set of rules relating them were developed to capture additional expressions of conflict. One dictionary consisted of words and phrases dealing with wildfires and insect infestations (e.g., blaze, fire, firefighters, gypsy moth, hot shots, infestation, insect, smokejumpers, etc.), and the other captured the idea of fighting (e.g., assault, attack, battling, battleground, fight, fought, front line, warfare, etc.). A computer rule specified that if a word from the fight dictionary appeared in the same paragraph as a word from the fire/insect dictionary, it was deleted (i.e., not counted as an expression of conflict). A second rule specified that other instances of words from the fight dictionary — those in paragraphs without fight/insect words — were counted as expressions of conflict. Together, these rules excluded paragraphs that discuss "fighting wildfires," "battling a blaze," or "declaring war on the gypsy moth," but included conflict between people and between social groups.

Once the conflict dictionary and word relationship rules were finalized, expressions of forest conflict were measured by applying them to our database of news media text, i.e., using the InfoTrend software, we searched our database for the words and phrases contained in the dictionary. Each paragraph in the database that contained one or more of the words and phrases in the dictionary was counted as one expression of forest conflict. Expressions of conflict were then aggregated by quarters in order to develop time trends.

Validity and Reliability

Following the development and refinement of the content analysis dictionaries and word relationship rules, a formal validity analysis was carried out. Weber (1990:15) noted that "A content analysis variable is valid to the extent that it measures the construct the investigator intends it to measure." We examined random samples of paragraphs that were coded using our content analysis rules in order to determine whether or not the rules were able to identify expressions of the various concepts of interest with a sufficient level of accuracy. A sufficient level of accuracy was defined as correct coding at least 80 percent of the time — a rule of thumb sometimes used in content analysis. After final refinements in the dictionaries and rules, they accurately identified expressions of the concepts with at least 80 percent accuracy (and as high as 95 percent) for all but two of the 23 concepts: Ecological services (79 percent accuracy) and nutrient cycling (75 percent accuracy). These two concepts were rarely expressed in news media text, making it difficult to code with a higher level of accuracy.

In addition to concerns about validity in content analysis, the reliability or consistency of text classification is a concern when multiple human coders are used. Human coders

[1] The practice of spiking trees involves driving large nails into living trees in order to prevent them from being harvested.

inevitably introduce variability in how they interpret and apply category definitions or other coding rules. In this study, the use of computer coding eliminates problems with inter-coder reliability — the computer always applies the coding rules consistently.

Appendix C:

Examples of News Media Text Illustrating Coded Concepts

Examples of positive stewardship and ethics messages:

U.S. Forest Service Supervisor Brad Powell deserves credit for his decision to update and revise the current management plan for preserving the red-cockaded woodpecker. While there may be some grumbling about timber sale cancellations and delays pending the Forest Service's action on the plan, Powell's timely move will probably avert much more disruptive court proceedings that were looming on the horizon. (Source: story 11235, file b22, 7-25-94).

- Feb. 12 - Tour the Ocala Seed Orchard where guests will learn about the Forest Service's role in improving the quality of trees found in the forest. Learn how pollen is collected and stored, how improved seed is obtained and how grafting can be used to produce better trees. (Source: story 17794, file b22, 1-31-93).

The Forest Service says its preferred plan to preserve the endangered Northern Spotted Owl would cut logging in the Northwest's National Forests... (Source: story 22382, file b23, 1-25-92).

The U.S. Forest Service has purchased 6,900 acres in Southeast Missouri. Leo Drey, a St. Louis conservationist, sold the Oregon County tract, which will be added to Mark Twain National Forest. The sale ensures that Greer Spring will be protected from logging, mining and other activities ... (Source: story 17935, file b23, 1-17-93).

Few in Congress on either side of the logging issue could have predicted that federal Judge Michael Hogan's ruling would open up more tracts of old-forest logging. Patches of virgin forest the Forest Service says deserve protection. (Source: story 4346, file b24, 2-12-96).

Terri Liestman, a U.S. Forest Service official who helped organize the Northern Plains Governors' Conference, said the gathering is intended to help state and federal agencies improve the management and preservation of fossils on public land. (Source: story 19753, file b24, 8-22-92).

Separate from Hatfield's proposal, Maddock said there is an effort to draft legislation to create a permanent regional body in the northwest to set priorities for recovering fish. Federal agencies ranging from the Forest Service to NMFS are working to recover declining salmon runs, he said, and the electric utility industry has thrown up its hands in frustration. (Source: story 6435, file b24, 8-9-95

Examples of negative stewardship and ethics messages:

If the general public only knew more about the abuse of power by the U.S. Forest Service in the public-owned national forests and the corporate greed motivating the rapid destruction of global ecosystems, this information would lead to an even bigger public outcry. (Source: story 12397, file b21, 04-28-94).

The Forest Service has blatantly ignored this mandate. Instead, it has followed a course of ecological destruction for our public forests, relying on large-scale clear-cutting. (Source: story 20235, file b21, 7-23-92).

... U.S. Fish and Wildlife Service rejected a petition by several conservation groups to list the Queen Charlotte Goshawk, a bird of prey found in Southeast Alaska, as endangered. The bird, a subspecies of the Northern Goshawk, is threatened by forest practices in giant Tongass National Forest... (Source: story 6731, file b22, 7-20-95).

"I think very few of the public is aware of the low number of starts from Cache Creek," Heinecke said, accusing the Forest Service and Lewiston Tribune of hiding the number. (Source: story 625, file b22, 10-23-96).

He also said lands such as the Tongass National Forest in Southeast Alaska should be placed under state jurisdiction if federal foresters do not improve their caretaking of the region... (Source: story 5414, file b23, 11-6-95).

Whitney says environmentalists might be more comfortable with all this latitude if the scientists who wrote the plan were responsible for carrying it out. He doesn't trust the Forest Service to do the job right. (Source: story 12639, file b24, 4-11-94).

Examples of positive collaboration and participation messages:

Knowles Creek flows through lands managed by the Forest Service, Bureau of Land Management and The Campbell Group, a private timberland manager. They have joined in partnership with Pacific Rivers Council to restore the creek at a time when these parties are often in conflict. (Source: story 16883, file b1, 4-12-93).

The Forest Service received an estimated 6,000 comments during a 45-day period that closed this week. Spokesman Chris Holmes said the agency is likely to consider some changes in the proposal given the heavy public response. (Source: story 16268, file b1, 6-3-93).

The experiment is a joint effort of the U.S. Park Service; the Daniel Boone National Forest; the U.S. Fish and Wildlife Service; the University of Tennessee; and Kentucky and Tennessee state wildlife agencies. (Source: story 15689, file b62, 7-19-93).

...Historic Trail Foundation, the Nez Perce Tribe, the U.S. Forest Service and the Nez Perce National Historic Park, represents the first gathering of Nez Perces and officials from various federal and state agencies charged with developing the trail. (Source: story 5567, file b63, 10-18-95).

Harley Greiman, the Forest Service's liaison to the state, said federal wildlife agencies are already cooperating with official and grass-roots efforts to manage California's wildlands as ecosystems. Greiman said those efforts will continue with or without the owl plan. (Source: story 14124, file b62, 11-13-93).

The tension between environmental preservation and timber jobs is sure to continue as the Forest Service works to finalize the plan over the next year. "This is our best shot at trying to come up with a compromise," said Terry Seyden, a spokesman for the Forest Service in Asheville. (Source: story 19859, file b62, 8-17-92).

Examples of negative collaboration and participation messages:

The Forest Service has unilaterally, without public input, decided to cut the quotas in half. (Source: story 3736, file b64, 4-8-96).

Groups accuse the Forest Service of failing to consult with the National Marine... (Source: story 12610, file b2, 4-13-94).

Kevin Kirchner, an attorney with the Sierra Club Legal Defense Fund, said his group could live with restrictions on appeals} adopted by Congress. But he said the Forest Service's more restrictive proposal reinforces the agency's credo: to minimize citizen input}. (Source: story 16807, file b24, 4-20-93).

But environmentalists said the proposal is filled with exemptions and short comment periods that will allow the government to log national forests in violation of environmental laws despite objections from the public. (Source: story 16869, file b51, 4-14-93).

... BLM and Forest Service lands including recreation, hunting and conservation. It limits public input at various stages and circumvents environmental laws, they said. (Source: story 6760, file b53, 7-19-95).

Examples of collaboration with volunteers:

At Bayswater, there is a forest plotting experiment in which the volunteers will help Forest Service employees mark off a patch of trees and monitor their development. They also get training in marine biology and all areas of biology that relate to the salt marshes they work in. (Source: story 9514, file b12, 11-25-94).

The living history weekend is sponsored by the Laguna Mountain Volunteer Association and the Descanso Ranger District of the Cleveland National Forest. (Source: story 1533, file b8, 8-28-96).

... canoe cleanup of the east fork and land cleanup of Sam Houston National Forest. Canoe volunteers check in at 7 a.m. and land volunteers at 8 a.m. at San Jacinto County Fairgrounds, a quarter mile east of Coldspring on Texas 150. (Source: story 12470, file b9, 4-22-94).

The U.S. Forest Service will manage the prairie and coordinate its restoration with other agencies, including the U.S. Fish and Wildlife Service, the Illinois Department of Natural Resources, as well as a host of environmental organizations that will be able to provide thousands of hours of volunteer muscle power to help steward the land. (Source: story 4344, file b12, 2-12-96).

Examples of positive science-based management:

But the proposal comes as new studies by Forest Service biologists show owl populations in the Sierra have dropped 5 percent annually from 1990 to 1995, the most significant evidence to date of the owl's decline. (Source: story 1643, file b1, 08-22-96).

An author of one of the studies, Forest Service biologist Barry Noon, concluded that the findings "suggest that interim measures to retain spotted owl habitat should at least be maintained, and possibly expanded..." (Source: story 1643, file b1, 08-22-96).

The Forest Service began studying the ATV proposal more than two years ago at the request of the Midwest Trail Riders Association, a group of some 600 dirt bike and ATV enthusiasts from Missouri and surrounding states. (Source: story 13395, file b1, 1-23-94).

"It (the collection) basically represents a good picture of forest insects of the Northeast at the time," says Michael Montgomery, supervisory resident entomologist at the Forest Service's Northeastern Forest Experiment Station in Hamden. The laboratory is the descendant of the Massachusetts laboratory of the 1910s. (Source: story 17889, file b3, 1-21-93).

Examples of negative science-based management:

One environmental group, the Superior Wilderness Action Network, contends that the U.S. Forest Service has not adequately studied the potential consequences of logging. It is asking the agency to prepare an environmental-impact study on its plan before allowing any logging or associated activities. (Source: story 832, file b1, 10-11-96).

Murtha rejected the Forest Service's claim that the logging would not significantly harm the environment, charging that the service hadn't studied the issue. For instance, he said, officials had not considered the soil erosion and noise impact of all-terrain vehicles that would gain access to the area on new... (Source: story 4964, file b52, 12-16-95).

The ruling by US District Judge William Dwyer came in a lawsuit filed by 12 environmental organizations that challenged the agency's plan to manage owls and ancient forests. Last month, Judge Dwyer ruled that the Forest Service's environmental impact statement for its latest owl plan did not consider new scientific evidence that the threatened birds are declining faster than earlier thought. Todd True, with the Sierra Club Legal Defense fund, says yesterday's decision forces the agency to draw up a new plan that takes this evidence into account. (Source: story 20545, file b14, 7-3-92).

Forest Service officials are ignoring the scientific advice from their own employees, acting as timber industry promoters, and violating federal resource protection laws, a coalition of government whistle-blowers said Thursday. (Source: story 21737, file b51, 3-26-92).

"These are species the Forest Service knows inhabit the (Cove-Mallard) area or strongly suspect inhabit the area... The Forest Service has a very strict legal mandate to take care of these species, but it has not done any kind of studies to determine where these species live," said Eric Ryberg, spokesman for the Earth First group. (Source: story 19922, file b16, 8-11-92).

Top Forest Service officials in the Southwest Region have warned that the national forests will burn down or be eaten by bugs if harvest schedules are not met, a position so scientifically discredited that it's laughable to all but the most unsophisticated. (Source: story 17769, file b6, 2-2-93).

Examples of scientific expertise:

"Even if you survived the fire, you may not survive the floods," said Peter Wohlgemuth, an erosion specialist with the U.S. Forest Service. (Source: story 14107, file b2, 11-14-93).

"For so long, our policy has been to low-key these things (to prevent vandalism), but now we believe that if public is more aware of the artifacts, they will help us protect and preserve them," said Dick Markley, a Forest Service archaeologist in Nevada City. (Source: story 12355, file b2, 5-3-94).

Kelly Cable, a Forest Service wildlife biologist, said several more annual surveys will be needed to firmly determine whether eagle populations have reached saturation limits. However, she said, "Nests are showing up in places where we've never seen them before - places that are not considered premium eagle nesting habitat, at least from a human perspective." (Source: story 6418, file b4, 8-10-95).

Forest Service managers and scientists in the Southern Appalachian forest said that they had some reservations about the conclusions of the study, but noted that logging practices in some national forests were already undergoing a philosophical change to address such issues. (Source: story 19498, file b4, 9-7-92).

A representative of Potlatch Corp. is scheduled to present the industry's perspective on Pacfish April 6. Al Issacson, a former U.S. Forest Service hydrologist, is scheduled to give his views on the issue April 13. (Source: story 12766, file b5, 3-30-94).

Examples of ecological components messages:

Environmental organizations have excluded from old-growth classification any areas that display logging scars and lack the diversity of foliage endemic to virgin forests. (Source: story 17216, file b2, 3-23-93).

...hunters do not lean heavily on the case that they keep the population in check, if it swells beyond the carrying capacity of the shrinking habitat, disease will kill many instead. (Source: story 16449, file b2, 5-21-93).

In the early part of the century, as in recent years, Forest Service biologists were looking for parasites that would attack the gypsy moth. (Source: story 17889, file b3, 1-21-93).

"Any surface is covered with microbes. The idea of finding a fungus on a tree was an absolute sure thing. But the chance of finding a taxol-producing fungus was about 10 million to one." (Source: story 16944, file b4, 4-8-93).

There will be plenty of decomposing timber to keep the food chain going. Some of these trees will be lost before we can move this package through the Congress. Depending on the variety of tree, we have between 6 months and 2 years until these trees rot to the point they are of no value as timber. This is why we have an emergency. (Source: story 7411, file b7, 5-26-95).

... and Forest Service employees are going to have to wash their trucks after passing through infested areas. Outfitters are going to have to use weed-free feed for their stock. And trail heads now infested with thistle and other exotics will have to be cleaned up, lest backpackers track seed into unexposed areas. (Source: story 5416, file b12, 11-6-95).

"There's so many subspecies out there they want us to protect, and there's only one person..." (Source: story 3680, file b8, 4-15-96).

At Bayswater, there is a forest plotting experiment in which the volunteers will help Forest Service employees mark off a patch of trees and monitor their development. They also get training in marine biology and all areas of biology that relate to the salt marshes they work in. (Source: story 9514, file b12, 11-25-94).

A trickle of calls have rolled in so far about what plans to use Dworshak to help migrating salmon will mean for recreation there at certain times of the summer. (Source: story 21459, file b10, 4-23-92).

Examples of ecological services messages:

Scientists have long known that trees exert a cooling effect, absorb pollutants, improve water quality, lessen flooding and abate noise, among other benefits. (Source: story 12571, file b64, 4-16-94).

... environmentalists "tree huggers," he said: "trees provide oxygen and clean water. We can't live without them. Every human being, whether he or she hugs or kisses a tree, needs trees." (Source: story 14963, file b77, 9-19-93).

Urban trees have long been cherished amenities, connections to a softer, greener world beyond asphalt and concrete. And scientists have long known that trees cool cities, absorb pollution and bestow a number of other environmental benefits. But in this era of the budgetary squeeze, city officials have begun to ask whether planting and maintaining trees are worth the cost. (Source: story 12559, file b87, 4-17-94).

A recent United States Forest Service study of the Chicago metropolitan area showed that trees, which filter out sulfur dioxide, carbon dioxide and ozone from the air, as well as provide shade in summer and wind protection in winter, save millions of dollars for that city . (Source: story 12164, file b5, 5-19-94).

Foresters and geologists say that when trees are cut, the root systems that hold the soil firm decompose faster than the growth of the new roots of the seedlings planted in place of the logged trees, resulting in a temporary weakening of the surface soil. Some studies have shown most slides in clear-cut... (Source: story 133, file b8, 12-18-96).

The idea was to provide a contiguous corridor for wildlife to roam free while protecting the river from encroaching development and pollution. Wetlands would remain wetlands, cleansing and purifying water. (Source: story 3815, file b15, 3-29-96).

To determine how much carbon the trees would store, researchers clipped 125,000 leaves from area trees, dried them in ovens and weighed them. The carbon-storing potential of trees is... (Source: story 12234, file b13, 5-15-94).

The value in the preservation of wilderness areas far surpasses that provided by recreation and wildlife habitats. Forests are sources of knowledge of useful products that have yet to be discovered. And I mean sources of the knowledge, not the products. Forests are important in the control of weather and are invaluable watersheds. They cleanse the air of pollutants and remove most of the carbon dioxide produced by our activities. (Source: story 9520, file b16, 11-24-94).

… forest products industry, and the 20 percent carbon dioxide removal will interest the energy suppliers who funded the research... The productivity gains and the removal of the extra carbon dioxide probably are not maintained throughout the life of the forest, however. (Source: story 779, file b24, 10-14-96).

Examples of material cycling messages:

... plant growth, we're seeing nitrates flowing out of the watershed (along the Colorado front range)," says Williams. "What we're seeing is nitrogen saturation -- the basin has gotten to a point where it just can't take up any more nitrogen, so it's exporting it in stream waters." (Source: story 16706, file b8, 4-28-93).

... weak trees, recycle nutrients, turn trees into habitat for birds and animals, create openings and vary the forest landscape for different types of trees and plants; the insects are food for birds and animals. They correct the distorted unnatural forests left behind after im-proper logging and planting by killing trees that aren't suited to that area and helping native trees grow back. (Source: story 7648, file b62, 5-8-95).

Fire recycles nutrients back to the soil in the form of ash. It reduces insect infestations and outbreaks of disease. It creates habitats for bird species that make their home in large "snags," trees killed by fire. And it... (Source: story 1438, file b90, 8-31-96).

Examples of biodiversity messages:

Dicks is trying to find ways to free some timber for logging without posing a threat to the Northern Spotted Owl or other species in old-growth forests. (Source: story 16268, file b1 6-3-93).

The owl is listed as a threatened species under the Endangered Species Act. To encourage its recovery, hundreds of thousands of acres of federal lands previously open to logging have been set aside. (Source: story 18564, file b2, 11-19-92).

Headline: Dwindling salmon spur West to save rivers ... After the Coho now on their way to the Little Butte spawn this month, the hatchlings will find an inviting nursery. A test of this strategy in another stream increased the number of surviving young salmon a thousandfold, said Mark Grenbemer, a member of the watershed restoration team. (Source: story 9600, file b2, 11-15-94).

Yet the red-cockaded woodpecker exists in sizeable populations in only four habitats - and the two on private land, in Orange County and Southwest Florida, are badly underpopulated ... The birds' best nesting trees were destroyed, and the forest's population plummeted. Almost overnight, the Apalachicola National Forest became the world's no. 1 habitat for the red-cockaded woodpecker. (Source: story 15123, file b20, 9-5-93).

The lawsuits filed by the Sierra Club Legal Defense Fund in Idaho, Montana and Washington, D.C., allege that the Forest Service has violated the federal Endangered Species Act by its logging and road construction practices. (Source: story 15646, file b3, 7-21-93).

Headline: Dumped oil wastes suspected in endangered Condor's death; Wildlife biologists say the bird may have drunk an antifreeze mixture used by Ventura County flood control employees. (Source: story 17760, file b3, 2-3-93).

Examples of natural disturbances messages:

"We now know that fire (along with wind and perhaps insect epidemics) was a natural process in the forests of northern Wisconsin without which species may be lost," they said. (Source: story 15373, file b45, 8-11-93).

Scientists have said that decades of fire suppression have contributed to the poor health of the forest because a natural fire cycle would have cleaned out much of the material that is now so susceptible to burning. (Source: story 20504, file b60, 7-6-92).

Opal's legacy: Hurricane Opal's speedy sojourn through Georgia last October toppled thousands of trees and caused widespread damage to houses, cars and businesses. Opal also felled scores of big trees in the Chattahoochee National Forest in north Georgia. But some naturalists who got a firsthand look the other day at the felled trees in the Cooper's Creek Recreation Area of the national forest were smiling rather than lamenting. (Source: story 4371, file b1, 2-9-96).

Some are beginning to question the soundness of continuing the U.S. Forest Service program, however, now that millions more trees are dying each year from the drought-induced insect invasion. (Source: story 11445, file b7, 7-11-94).

... course, allowing fire and disease processes to proceed. Our forests, after all, managed well enough before being subjected to the profession of forestry. But in many areas this is not practical. (Source: story 2717, file b70, 6-14-96).

"The dogwood anthracnose has been around for some years, but it's only come to the forefront in the past three to five years. A lot of Forest Service people are working on it." (Source: story 12650, file b7, 4-10-94).

Conservationists unknowingly suppressed their reproduction by eliminating natural fires. But today, one of the chief conservation efforts is to set fires to areas. Ground fires served as a benefit to redwoods. By killing organic material on the... (Source: story 13519, file b1, 1-7-94).

Examples of forest health messages:

When a big tree falls in an old-growth forest because of high winds or disease or for other reasons, it creates an opening in the otherwise dark woods where sunlight can penetrate and new plants can thrive. New plant growth is vital to the health of a mature forest, says Christopher Haney of the Wilderness Society, one of the hikers who... (Source: story 4371, file b1, 2-9-96).

"... long-term economic and environmental health of the Greater Yellowstone Region," said The Wilderness Society. (Source: story 22563, 1-7-92).

Republican lawmakers, who have a new plan of their own, argue that timber mill jobs are at risk as is the health of the forests, which suffered massive fires in 1994. (Source: story 4029, file b4, 3-11-96).

The five-year plan for managing 2.5 million acres of federal timber land grew out of a common belief that the U.S. Forest Service has failed to provide either healthy forests or stable local economies. (Source: story 15694, file b4, 7-19-93).

The reserves would encompass remaining old growth, which is scattered across most of the 430-mile-long mountain range, but would also include younger trees in the belief that the healthiest forests are a complex mix of stands. (Source: story 2801, file b4, 6-8-96).

Now, the thought of improving forests' health by logging might sound a little unnatural, but Forest Service spokesmen don't see it that way. They say many of these forests wouldn't be such overgrown tinderboxes if state and federal... (Source: story 9280, file b8, 12-17-94).

The Forest Service has come to rely more strongly upon salvage timber sales as a way to manage federal forests, the Times reported. The sales assist in preserving the forest's health by more quickly ridding dead and diseased trees, proponents argue. However, environmentalists counter that the practice enables companies to cut additional tracts of healthy, old-growth trees in public forests. (Source: story 3866, file b6, 3-25-96).

Examples of sustainability messages:

About all that is certain is that any enduring solution will have to include: substantial ancient forest preservation; an arrangement assuring a stable (and sustainable) supply lumber from public lands; ... (Source: story 17216, file b2, 3-23-93).

We are announcing a plan today which, we believe, will strengthen the long-term economic and environmental health of the Pacific Northwest and Northern California. The plan provides an innovative approach to forest management, to protect the environment and to produce a predictable and sustainable level of timber sales. (Source: story 15949, file b5, 7-1-93).

The President maintains the plan would provide sustainable management of forest, but both the timber industry and environmentalists have opposed it. (Source: story 12169, file b5, 5-19-94).

Much of the oldest woodland in the Southeast, for instance, is owned by the United States Forest Service, which contracts with private industry to cut timber. More than 60 percent of that national forest is scheduled to be cut at intervals of 60 to 120 years, says Dan Boone, an ecologist at The Wilderness Society -- a rotation much too short to sustain the diversity of the ecosystem. (Source: story 13625, file b7, 12-26-93).

The simplistic answer to this complex problem is to consolidate these checkerboard lands and manage them as integrated units. Land exchanges have been and will continue to be powerful conservation tools. They improve options for protecting unique ecological values and facilitate the development of sustainable timber management programs... (Source: story 4101, file b8, 3-3-96).

Mr. Debonis advocates "sustainable forestry," which uses selective cutting to produce timber while maintaining an undisturbed ecosystem. He says the policy of clear-cuts is turning national forests into tree plantations, which he thinks will yield less timber in the long term. (Source: story 21908, file b11, 3-9-92).

Loggers, environmentalists and wood industry representatives all say their main concern is development and management of a sustainable forest that balances multiple uses. Through their legal challenge -- based on the law of the land -- the Southern Appalachian Biodiversity Project and Kentucky Heartwood have elevated ecosystem and biodiversity... (Source: story 11235, file b22, 7-25-94).

Examples of Positive Ecosystem Management Messages:

… ecosystem approach, said the Secretary, is "clearly an idea whose time has come." (Source: story 950, file f1, 3-2-93).

But times have changed, and today, particularly as the DNR moves toward a resource-management scheme called ecosystem-based management, a wider variety of species and their constituencies must be considered before projects of this kind are undertaken. (Source: story 92, file f1, 6-14-96).

But they also spotlight a problem officials say is growing across western wild lands, one that is complicating firefighting efforts as well as the ecosystem management that could prevent such episodes - the presence of man. (Source: story 1067, file f1, 8-31-92).

It's a powerful message of hope that in the future we will be able to focus on ecosystem management and protection." (Source: story 705, file f2, 11-21-93).

Hamburg said it is important to preserve the entire 44,000 acres as an ecosystem instead of just protecting an island of ancient trees. The Clinton administration also favors an ecosystem approach to land management. (Source: story 750, file f2, 10-12-93).

"We could litigate and fight over permitting these things... or we can take this ecosystems approach and get a better result," Dyer said. (Source: story 13, file f2, 12-1-96).

"Out of necessity, we're moving to a more balanced ecosystem approach for our national forests," said Karyn Wood, the acting Supervisor of the Shasta-Trinity National Forest and a former Ranger for the Hayfork District. (Source: story 229, file f2, 9-3-95).

More important, they said, are plans by Interior Secretary Bruce Babbitt to shift from a single-species "crisis" management of endangered species to a broader "ecosystem" approach that includes human impacts and human needs. (Source: story 914, file f2, 3-26, 93).

Examples of Negative Ecosystem Management Messages:

The lawsuits liken the Clinton plan to a "grand experiment in ecosystem management, with the explicit, unprecedented and illegal goal of eradicating from those forests all influence of two centuries of European settlement." (Source: story 542, file f2, 5-12-94).

But even Babbitt's strongest allies are skeptical that his holistic approach toward endangered species protection will work on the state's waterways. (Source: story 906, file f2, 4-2-93).

"Some people see ecosystem management as a plot to grab land and lock it up," Frampton said. (Source: story 588, file f2, 3-25-94).

One: the concept is unproven and difficult for many observers and DNR stakeholders to understand. Two: the words "ecosystem-based management" grate some hunters, anglers and other conservationists, who consider the term to be too "green," too vague and too dismissive of species-specific management, which generally is how game and fish have been managed in the past. And three: hunters and anglers, who historically have paid for much of Minnesota's natural resources management, worry that ecosystem-based management will diminish their influence within the DNR and undercut resource management practices that have benefited them in the past. (Source: story 187, file f2, 12-17-95).

Promising too much in the case of the Forest Service has in the past been a serious impediment to being truthful and accountable. Given that the Forest Service is currently promising such an elusive goal as ecosystem management, where neighbor relations will be stretched to extremes, promising too much could be fatal in the types of negotiations that are needed. (Source: story 543, file f2, 5-11-94).

The Republicans, including those in Washington's Congressional delegation who've lived through the owl crisis, however, have shown no interest in the ecosystem approach. (Source: story 312, file f2, 3-29-95).

Examples of recreation benefits and values messages:

Officials at the Nez Perce and Clearwater National Forests are reminding campers, hunters and boaters to use caution this Labor Day weekend, especially when fire is involved. (Source: story 10346, file b1, 9-3-94).

Once at the top, we tied our horses to trees and had a chilly picnic of sandwiches, chips and sodas before heading down again. Because it was winter and the leaves were gone, we had some sweeping views of the Shenandoah Valley and of the historic town of Lexington. (Source: story 16744, file b1, 4-25-93).

It went down in the Kaibab National Forest, 2 miles northeast of Grand Canyon Airport, the base for much of the lucrative Grand Canyon tour industry. (Source: story 8646, file b1, 2-14-95).

One of Laurel County's natural treasures is being threatened. The Daniel Boone National Forest district ranger is proposing a project of harvesting timber, clear cutting, burning and spraying with herbicides around 2,000 acres of land in the vicinity of Laurel Lake. Most of the boat ramps and campgrounds in this area will be affected. (Source: story 635, file b1, 10-22-96).

Florida law allows bear hunting during a limited fall and winter period on private lands in Baker and Columbia Counties and in the Osceola and Apalachicola National Forests in north Florida. Estimates of the total bear population range from 400 to 1,500. Hunters killed 60 bears during the 1991-92 bear hunting season. (Source: story 21325, file b1, 5-8-92).

... people in Idaho and Montana do not want to cede more of their prime hunting and camping lands to Ursus Arctos Horribilis. (Source: story 5495, file b1, 10-29-95).

[Headline]: Wellstone caught between environmentalists, outdoors enthusiasts ... But the region is home to bald eagles, timber wolves, bears and moose and it's treasured by a wide variety of outdoor enthusiasts, including snowmobilers, fishermen, backpackers and canoeists, with often conflicting interests. (Source: story 5409, file b1, 11-6-95).

"Exploring beyond Yellowstone" (Wilderness Press, $15.95) describes recreational and camping options in the larger area that includes Yellowstone and Grand Teton National Parks and the national forest lands surrounding those parks. (Source: story 329, file b1, 11-24-96).

Examples of commodity benefits and values messages:

Soon, Comer is speaking confidently with the aide to Oklahoma Sen. Don Nickles. "Ma'am, I work for a lumber mill being shut down because it can't get timber sales loose from the Forest Service. Wonderin' if you knew about it?" (Source: story 12795, file b1, 3-27-94).

[Headline]: Clinton plan will balance forest and job protections. (Source: story 16268, file b1, 6-3-93).

At the crux of the talks is the question of how to value the headwaters. Citing a 1993 U.S. Forest Service appraisal, Pacific Lumber officials say the forest is worth $500 million as lumber. But others point out that much of that value might never be realized because of logging restrictions, and other appraisals have put the value at $200 million or less. (Source: story 2143, file b1, 7-20-96).

... softwood lumber doubled between October 1992 and March 1993 — the steepest sustained rise in nearly 20 years — and topped $600 per thousand board feet in some markets... Analysts said this week that the mere mention of reduced logging volume was enough to send lumber prices through the roof. (Source: story 8035, file b1, 4-5-95).

The uranium-mining company's proposal to operate the mine was approved by the U.S. Forest Service in 1986, and the Secretary of Agriculture refused to hear the tribe's ensuing appeal. (Source: story 21677, file b1, 3-30-92).

Regional Forest Service officials have concluded that it is possible to protect the spotted owl while increasing logging to the proposed limit of 620 million board feet. The Forest Service says the proposal would boost timber industry employment in the Sierra by 2,000 jobs, a 50 percent increase. (Source: story 1643, file b1, 8-22-96).

... for grazing animals on public land. The 1993 rate will be $2.04 per animal unit per month. That's down 21 cents from the 1992 rate. An animal unit is the amount of forage needed to sustain one horse, a cow and her calf or five sheep or goats. The rate is pegged to private land lease rates, beef cattle prices and the cost of livestock production. The land is held by the Forest Service and the... (Source: story 17994, file b1, 1-13-93).

The worst of several fires in the region, it has blackened enough commercial timber to build 50,000 houses. Smoke and ash have been seen as far away as the San Francisco area. (Source: story 19682, file b1, 8-25-92).

Examples of ecological benefits and values messages:

"Causing these declines is habitat damage caused by human activities," said Willa Nehlsen, lead author of the report. (Source: story 16887, file b1, 4-12-93).

The amphibian, believed to be the one in Mark Twain's famous story, is the first creature to get the designation after a yearlong moratorium by Congress. Projects that could damage its habitat will now face federal review. (Source: story 3010, file b1, 5-21-96).

In addition, an independent, comprehensive study of the Sierra, released in June, found that many aspects of the Sierra ecosystem are in significant decline and pointed to destructive logging practices as one of the reasons. The report found that only 15 percent of the Sierra's original forests remain. (Source: story 1643, file b1, 8-22-96).

If the project succeeds -- and in this marriage of convenience that is still a big if -- it could have a profound impact on the resolution of other conflicts over endangered species and on the federal government's approach to managing imperiled wildlife. (Source: story 5495, file b1, 10-29-95).

(Headline): Sequoias protected by education, regulations, even fire... species of redwood became extinct accept [sic] twelve that are still scattered in tiny little relic populations. (Source: story 13519, file b1, 1-7-94).

(Headline): Contractor pays $400 for digging up stream ... the U.S. Forest Service also will stabilize stream banks at the site. (Source: story 18554, file b1, 11-19-92).

Nonetheless, the Administration, sensitive to criticism of what was coming to be known as a "Christmas rush" on the nation's forests, halted the final sales of timber in some of the most environmentally sensitive forests of the Pacific ... (Source: story 162, file b1, 12-14-96).

Examples of moral/spiritual/aesthetic benefits and values messages:

"The 'Path of Life Trail Lands' will remain a wilderness for longer than we can envision," said Vincente Lujan, the tribe's warchief. "For as long as our people exist , the sacred areas will remain a place of prayer for all life, and a place of mediation for our people." (Source: story 12498, file b2, 4-21-94).

Spanning 17 million acres on the rocky shores and numerous islands , the Tongass is the biggest of the national forests , once described by the naturalist John Muir as " an endless rhythm and beauty." (Source: story 13463, file b2, 1-15-94).

"Let's stop cutting white pine so future generations won't have to say that the white pine disappeared from the Superior National Forest because of past management practices," said Ray Fenner, who was instrumental in preparing the group's appeal, filed this week at Superior Forest headquarters in Duluth. (Source: story 832, file b1, 10-11-96).

When they lost their right to take their families fishing to some of these beautiful wilderness areas they were very much offended... (Source: story 5409, file b1, 11-6-95).

"We haven't gotten to the environmental impact, but if there are archaeological claims, we'll work closely with those groups to see that they're protected," Justus said. (Source: story 9926, file b2, 10-9-94).

Hardwoods mixed among shortleaf pines create a stunning display during the foliage season, late October to mid-November. (Source: story 10151, file b2, 9-18-94).

(Headline): Pueblos call for government's return of sacred lands... With Wheeler Park's expansion to 20,000 acres over the last 24 years, the Pueblos' sacred land is not needed to keep the region's acreage above the minimum 5,000 required for wilderness status... (Source: story 12498, file b2, 4-21-94).

... explore the natural wonders of the area, including the Caribbean National Forest, a magnificent rainforest, 20 miles East of San Juan. (Source: story 40, file b2, 12-29-96).

Examples of Firefighting Benefits Messages:

Firefighters worried about high winds and diverting flames from some 100 homes that were threatened Monday night... Two fires also burned in California, a 1,000-acre blaze in Plumas National Forest, and a 200-acre fire in Mendocino National Forest. There were voluntary evacuations in the smaller blaze, which firefighters battled in steep terrain and erratic... (Source: story 1859, file b1, 8-12-96).

U.S. Forest Service and California Department of Forestry personnel, in addition to San Diego and Poway fire fighters, were called to fight the blaze. Four air tankers and two helicopters also were involved. (Source: story 2669, file b1, 6-18-96).

(Headline): Fire fighters check spread of California wild fires... Near the coast 110 miles south of San Francisco, another 950 fire fighters had contained 98 percent of a 2,800-acre wildfire in the Ventana Wilderness of the Los Padres National Forest east of Big Sur. (Source: story 20073, file b1, 8-4-92).

The northern fire was 125 acres and the southern fire was 35 acres, but both were contained Tuesday night, according to Elayne M. Murphy of the Nez Perce Forest. (Source: story 11204, file b1, 7-27-94).

...unburned timber could provide fuel for the fire , a U.S. Forest Service spokesman said. The fire was expected to be under full control by Sunday evening and extinguished by Tuesday night, the spokesman said. (Source: story 19031, file b1, 10-4-92).

Elsewhere in California, more than 1,200 firefighters kept an 9,000-acre blaze in Inyo National Forest on the eastern Sierra Nevada from spreading to inhabited areas. A 6,400-acre fire 40 miles west of Redding was 70 percent contained. (Source: story 19682, file b1, 8-25-92).

Twenty-eight firefighters worked to contain a 10-acre fire ignited by the crash, National Forest spokesman David Olson said. (Source: story 15613, file b1, 7-24-93).

About 1,350 of the firefighters had surrounded 95 percent of the most damaging fire, which had burned 2,820 acres and destroyed 10 homes and nearly 50 vehicles in the San Bernardino and Angeles National Forests near Wrightwood about 40 miles northeast of Los Angeles. Fire officials predicted full containment by Monday night. (Source: story 11751, file b2, 6-27-94).

Examples of Conflict Messages:

The activists were camped south of Dixie during the summer and were protesting road building and logging in the Cove-Mallard portion of the... (Source: story 13729, file b19, 12-14-93).

... thing has a chilling effect. The idea is to use the lawsuit to intimidate and discourage people from protesting." Similar lawsuits have been filed by timber interests against Earth First protesters for damage to equipment or work delays. (Source: story 472, file b19, 11-8-96).

(Headline): Proposal for trail debated environmentalists lock horns with dirt bike, ATV-users over forest... The angry exchanges were flying fast and furious - like the mud spray from a dirt bike - at a public meeting to discuss using a 400,000-acre tract of the Mark Twain National Forest for a motorcycle and ATV trail. "This issue's mild compared to mining," said Eric Morse, as he sat at the back of the Elks Lodge in Rolla Saturday and listened to the squabbling. Morse is the U.S. Forest Service employee who supervises the Mark Twain. (Source: story 21912, file b19, 3-9-92).

The former head of the U.S. Forest Service's whistleblower program acknowledged claims of employees who reported political pressure to log national forests illegally. (Source: story 13171, file b20, 2-14-94).

A 1987 Eldorado National Forest study, for example, strongly suggested that cabins should give way to wider public use at Silver, Caples and other lakes on Highway 88. Its primary recommendation was the elimination of 82 of 182 cabins to open up the lakeshores and enlarge public campgrounds. But the study was withdrawn after a long legal battle between the cabin owners and the Forest Service. (Source: story 1401, file b20, 9-2-96).

Rural California counties, already staggering from reductions in federal timber harvests, are preparing to fight the U.S. Forest Service over a new policy that they say puts the owl before people and their jobs. (Source: story 17723, file b20, 2-9-93).

Bob Piva's voice shakes with anger when he talks about the Forest Service displacing 400 cattle owned by several ranchers from pasture land by the Salmon River in August. (Source: story 18933, file b20, 10-13-92).

... only narrow significance in the overall battle pitting the bird's future against the timber industry, a mainstay of region's economy. (Source: story 21719, file b20, 3-26-92).