

# **Monitoring the Fisheries and Wildlife Enterprise: A Content Analysis of Agency Annual Reports**

**Barbara A. Knuth**, *Department of Fisheries and Wildlife  
Sciences, Virginia Tech, Blacksburg, VA*

**Larry A. Nielsen**, *Department of Fisheries and Wildlife  
Sciences, Virginia Tech, Blacksburg, VA*

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*Abstract:* A content analysis of annual reports for 15 southeastern state fisheries and wildlife agencies revealed that resource information (e.g., habitat, populations, and use) appears much less frequently than administrative information (e.g., revenues, personnel, permit review). The "typical report" consists of 35% administrative, 28% fisheries, 16% facilities, 11% wildlife, and 11% public involvement information. States cluster into 4 groups based on relative emphasis of freshwater fisheries, freshwater and marine fisheries, wildlife, or facilities and administrative information. Reports consist primarily of quantitative data in a textual or tabular format, with little comparison to previous years. Content analysis of these reports is useful to illustrate objectively how state agencies present themselves and to provide a baseline for monitoring changes in the character of agency programs.

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That state fish and wildlife agencies must more actively sell their programs is now conventional wisdom. Way (1983) emphasized the importance of effective, positive, and regular communications with the public to establish a legitimate forum for support of agency activities. Without public acceptance and support, most resource policies would be meaningless (Wambach 1979). Further, an understanding of the variety of agency functions is becoming increasingly critical at a time when the percentage of the population involved in consumptive use of the resource is declining. If the popular perception of fish and wildlife agencies is strictly as a provider of game harvests, public support for wider-based conservation activities (e.g., habitat protection from development) will certainly disappear. A consistently informed public is necessary to ensure effective public involvement in resource decision-making (Hendee et al. 1974).

Among its various contacts with the public (magazines, public-service announcements, public meetings), the agency's annual report is the mechanism for describing the "state of the agency." The audience of such reports is frequently 2-fold, including both higher levels of government and the general public. As the summary of activities and accomplishments, the annual report provides a window on the state of the fisheries and wildlife in a state and shows what is important to the agency.

The annual reports of all southeastern states were analyzed to assess the nature of their public reporting and to form a general impression of the programs operating in the states. The objective is to prepare a baseline description of the fisheries and wildlife enterprise in the Southeast to: 1) compare to other regions and to future programs, and 2) serve as a model of current activities for the construction of a comprehensive fisheries and wildlife indicator system (Knuth and Nielsen 1983).

This information is directly useful to state agencies by indicating which activities are less fully documented to the public, by allowing a comparison between reporting and actual agency priorities, and by identifying other states with similar management priorities.

## **Methods**

Content analysis is a research technique used to make inferences on the content of a document by systematically and objectively identifying specified characteristics (Krippendorff 1980). This technique is frequently used for assessing differences among various source documents, and specifically for identifying the frequencies of occurrence of an item and the associations or relations among items. Stankey (1972) encouraged the use of the technique for analyzing public comment received by natural resource agencies. The technique is employed in this study for analyzing agency reports to the public.

The subject of this analysis is the most current available annual report for each of the southeastern states' agencies involved in managing the fisheries and wildlife resources. Southeastern states analyzed include: Alabama, Arkansas, Florida, Georgia, Louisiana, Maryland, Missouri, Mississippi, North Carolina, Oklahoma, South Carolina, Tennessee, Texas, Virginia, and West Virginia. No report was analyzed for Kentucky as that state no longer prepares annual reports. Only fisheries division reports were available for analysis from Georgia and Arkansas. Two reports were analyzed for Virginia, 1 on freshwater fisheries and wildlife, and 1 on marine fisheries.

Content of the reports was assessed by assigning information reported into 1 of 42 categories (Table 1). Individual information items were identified as separate units if each covered a distinct measurement of agency activities (e.g., harvest measured as pounds, dollars, or quality). Length of textual coverage (e.g., number of sentences) was not a criterion for identification. Qualitative information, therefore, tended to occupy more physical space per

**Table 1. Major groups and categories used to assess content of annual reports.**

Fisheries	Wildlife	Facilities	Administrative	Public
Research	Research	Revenue	Agency description	Recreational fishing
Game species	Game species	Expenditures	Agency goals	Commercial fishing
Non-game species	Non-game species	Commercial market	Personnel	Trapping/Hunting
Hatchery production	Harvest	Present holdings	Accounting	Non-consumptive use
Stocking	Habitat management	Land acquisition	Engineering	Public education
Recreational harvest	Depredation/Damage	Water acquisition	Data processing	Landowners/Clubs
Commercial harvest		Structural acquisition	Planning	
Habitat management		Construction	Legislation	
Environmental quality		Maintenance	Commentary	
			Social research	
			Enforcement	
			Information/Education	

unit recorded than did quantitative information. Subject matter categories were grouped into 5 major types for comparisons among states. Information within each category was further classified as being quantitative or qualitative; comparative with past years' information or noncomparative; and textual, graphical, tabular, or pictorial in presentation format. Average analysis time was 6 hours per report. Two reports were analyzed by an outside recorder to determine objectivity of the technique.

Content diversity was calculated for each state using a modification of Simpson's index (Peet 1974),  $D = 1 - \sum_{i=1}^{49} p_i^2$ , where  $p_i$  is the proportion of total information items reported by each state in category  $i$ . Relative frequencies of category reporting were calculated for each state. A cluster analysis (Krippendorff 1980) was performed comparing category reporting characteristics over all states.

## Results and Discussion

### State Comparisons

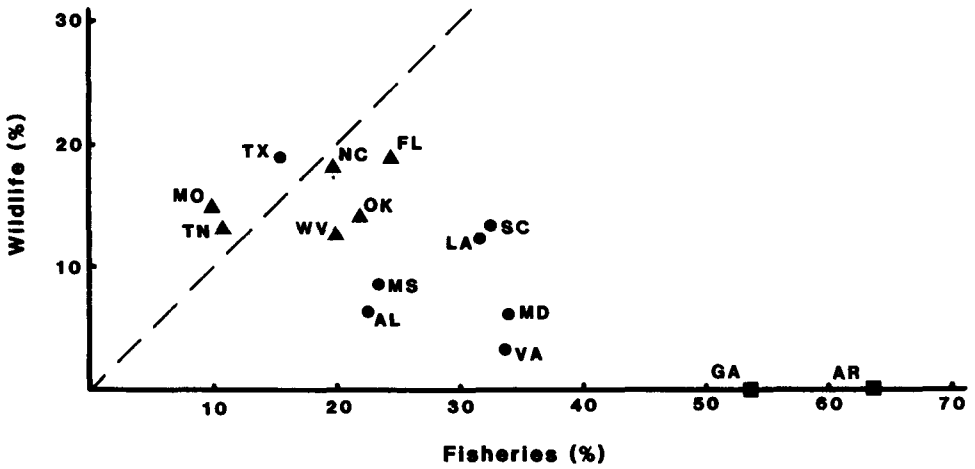
The 5 major reporting categories for the "typical report" averaged 27.8% fisheries; 10.7% wildlife; 15.5% facilities/economics; 35.4% administrative; and 10.7% public involvement. Two of the 15 analyses were based only on fisheries division reports and therefore are not directly comparable to the broader reports. Among the remaining 13 states, no category comprised greater than 46% of a report. Overall diversity of report content did not vary greatly among states, with values ranging from 0.90 to 0.95 (Table 2). This indicates all states report on a variety of information to some degree, rather than concentrating on 1 type (e.g., financial data).

States differ in emphasis on each of the 5 categories of information, as indicated by the relative frequencies of each major category (Table 2). The most emphasized category overall was that of administrative information (e.g., personnel, information/education, professional commentary). States well below average for this category were Arkansas and Georgia, which only reported fisheries information. This suggests that within-agency performance is less important at the "division" level than at the agency level. This extensive coverage of administrative data implies non-resource information is judged more important for public knowledge than is resource information in fisheries and wildlife categories. This is surprising in that commissioners and agency chiefs presumably wish to solicit public support by stimulating an interest in the animals and habitats they manage.

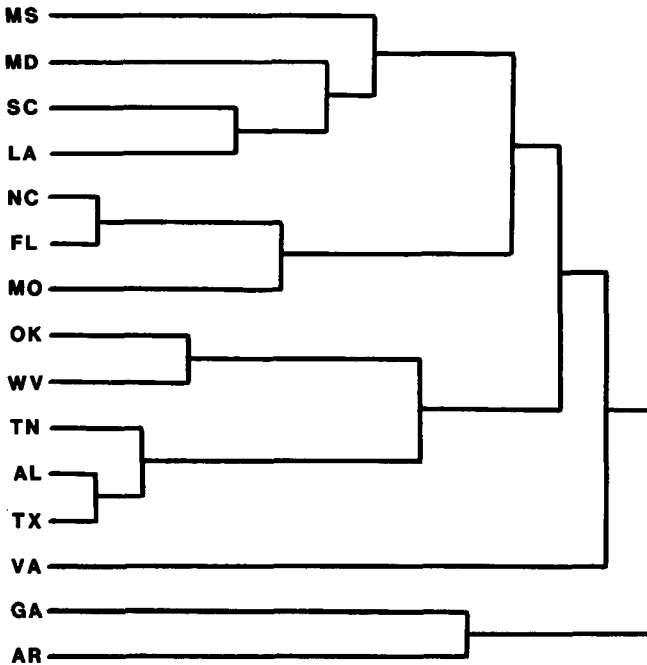
Fisheries was the second-most frequently reported category (27.8%). Omitting the 2 states preparing only fisheries division reports changes the mean value only slightly (23%). Wildlife information, however, was reported only

**Table 2.** Proportions and diversity of major content categories presented in annual reports of each southeastern state.

State	Diversity	Content categories (%)					Total N of items	Pages
		Fisheries	Wildlife	Facilities	Administrative	Public		
AL	0.930	22.3	6.2	28.9	37.8	4.8	291	34
AR	0.895	63.8	0.1	12.3	17.2	6.6	1,144	128
FL	0.948	24.3	18.9	6.0	35.8	15.0	646	21
GA	0.902	53.6	0.0	9.9	21.3	15.2	446	36
LA	0.935	31.3	12.1	13.5	36.4	6.6	527	30
MD	0.951	34.1	6.0	10.6	43.3	6.0	367	24
MO	0.940	10.0	14.9	16.0	32.4	26.7	824	122
MS	0.930	23.5	8.5	11.1	42.9	14.0	422	43
NC	0.936	19.7	18.1	6.7	45.9	9.5	503	32
OK	0.938	21.9	14.1	25.6	28.1	10.4	270	17
SC	0.917	32.7	13.2	9.0	34.8	10.4	986	109
TN	0.913	10.8	13.0	27.4	44.3	4.5	332	23
TX	0.940	15.2	18.9	18.6	41.1	6.2	650	35
VA	0.896	33.7	3.1	22.5	30.0	10.8	1,362	117
WV	0.931	19.8	12.7	13.9	40.0	14.2	663	80
Mean		27.8	10.7	15.5	35.4	10.7	629	57



**Figure 1.** Relationship between proportion of annual reports of 15 state agencies devoted to wildlife information and fisheries information. Dashed line indicates equal reporting of fisheries and wildlife information. Symbols are as follows: fisheries-only reports ■; freshwater fisheries and wildlife reports ▲; freshwater and marine fisheries and wildlife reports ●.



**Figure 2.** Cluster analysis dendrogram illustrating state clustering based on content analysis categories.

half as frequently as fisheries information (mean of 12% based on 13 states), ranking it fourth in importance among the 5 categories.

Seven states (Alabama, Louisiana, Maryland, Mississippi, South Carolina, Texas, and Virginia) include marine fisheries resources in their annual reports. This appears to account for the bias shown toward fisheries information. Figure 1 demonstrates this relationship. Marine-reporting states (except Texas) group together well below the line of even distribution. Four of the remaining 6 states reporting wildlife and freshwater fisheries information lie close to this line, while the other 2 include slightly more fisheries information. Texas is an exception in reporting relatively less freshwater and marine information than wildlife information.

Information regarding public involvement was not reported highly by any state with the exception of Missouri. Reporting information on public involvement appears to be more important in states where revenues are derived from the general public than in states where revenues are based largely on license sales. Conservation department funding in Missouri, for example, is based largely (57%) on income from a statewide sales tax.

Similarities among annual reports are illustrated in a cluster analysis dendrogram (Fig. 2). Four clusters of states appear. The first includes Mississippi, Maryland, South Carolina, and Louisiana which stress fisheries, including marine fisheries, and de-emphasize wildlife. The second cluster contains North Carolina, Florida, and Missouri, all of which stress wildlife, de-emphasize fisheries, and tend to emphasize public involvement. A third cluster contains Oklahoma, West Virginia, Tennessee, Alabama, and Texas. These states emphasize wildlife, facilities, and agency information, de-emphasize fisheries, and almost ignore public involvement. Two states (Georgia, Arkansas) readily group together in that they report only fisheries information. Virginia does not readily group with others. The Virginia data, which combined an inland fisheries/wildlife and a marine report, emphasized commercial harvest data, accounting for this uniqueness.

If information in annual reports reflects the importance given certain management objectives, clustered states are likely to share similar objectives. Managers and biologists from states within clusters may benefit from consulting with each other regarding their activities and strategies. Similarly, if a state agency desires to change its management emphasis, a state within the appropriate cluster would be the best model.

#### Category Comparisons

Of the 42 information categories used in this study, the 15 listed in Table 3 accounted for 70.4% of the average report. The most reported and least variable category was information/education. This administrative division presumably is the most familiar with reporting techniques due to the nature of its work, and probably prepares the report in most agencies. The emphasis given this category may be an artifact of this situation or may actually

Table 3. Content characteristics of the most frequently reported categories in annual reports.

Category	Mean (%)	Range	Coeff. of var.	Characteristics <sup>a</sup>		Format <sup>b</sup>		
				Quantitative (%)	Comparative (%)	Textual (%)	Tabular (%)	Graphical (%)
Information/Education	10.1	1.8-16.9	0.45	63.4	4.3	84.2	12.9	0.0
Fisheries research	7.1	0.4-23.4	0.89	46.2	0.9	91.8	7.7	0.0
Enforcement	6.9	0.0-17.3	0.73	80.6	0.2	54.7	34.2	9.2
Personnel	5.3	1.8-10.8	0.51	60.2	8.3	74.5	18.1	0.2
Fish stocking	5.2	0.0-15.5	1.00	88.7	3.3	67.7	31.9	0.0
Agency revenues	5.1	0.0-14.8	0.92	91.4	8.3	38.3	59.7	1.7
Commercial harvest	4.8	0.0-25.2	1.43	89.1	51.8	54.1	8.6	37.0
Commentary	4.8	1.5-11.7	0.56	40.9	18.3	74.3	21.9	3.8
Recreational fishing	3.9	0.3-15.2	0.92	80.3	6.7	77.5	20.8	0.0
Agency expenditures	3.7	0.3-9.6	0.84	98.7	16.9	13.3	81.4	5.3
Hunting/Trapping	3.2	0.0-10.9	0.96	87.1	21.6	62.4	36.9	0.0
Hatchery production	2.7	0.1-12.1	1.35	80.2	1.9	70.0	25.7	1.9
Fisheries habitat	2.7	0.1-9.0	0.83	68.8	7.8	79.1	19.9	0.4
Wildlife habitat	2.5	0.0-6.2	0.74	74.0	1.3	83.5	13.9	0.0
Wildlife research	2.4	0.0-8.3	0.89	45.8	0.6	92.7	3.9	0.0
Mean				73.0	10.1	67.9	26.5	4.0

<sup>a</sup> Characteristics are not mutually exclusive and therefore do not total 100%.

<sup>b</sup> Format does not include % illustrations and therefore does not total 100%.



reflect agency objectives. Other categories with low variability include personnel and professional commentary. Emphasis on activities such as employee training, publishing, attending meetings, and participating in environmental review processes appears to be common among all agencies.

The most variable category was commercial fisheries harvest. Although only 7 of the 15 states report marine fisheries data, this category ranks seventh overall due to the emphasis placed on commercial harvest by these states. Other highly variable categories include fish stocking and hatchery production, reflecting the emphasis different agencies place on supplementing existing stocks.

Combining categories on revenue and expenditures accounts for 8.8% of the average report. This reflects the importance of handling and distributing funds. Both the public and higher levels of government presumably are interested in how their dollars are spent.

Recreational fishing and hunting/trapping rank 9 and 11, respectively. The low level of recreational fishing information is inconsistent with the prevalence of fisheries management goals directed toward putting more in the angler's creel. Fisheries recreational harvest information lags further behind angling, ranking 34 out of 42 (0.7%). Wildlife harvest is reported more frequently (1.5%) but still with little emphasis, ranking 22 out of 42.

Habitat protection and enhancement is a prime concern in fisheries and wildlife management yet reporting of management practices for fisheries and wildlife habitats rank 13 and 14 out of 42, respectively. A wide discrepancy exists between reporting of fisheries research activities (2 out of 42) and wildlife research activities (15 out of 42).

Given the trends in the past few years toward emphasis of nongame species management and nonconsumptive uses of wildlife, these categories are surprisingly scarce. Nongame species information (1.5%) ranks 23, while nonconsumptive activity information (0.3%) ranks 36. Another area in which wildlife agencies are expanding their activities is in the area of formal public education in schools, yet this category ranks 41 out of 42.

Of the top 10 categories, 6 cover administrative or facilities information rather than resource information. Clearly, areas can be identified which either are not reported sufficiently by an agency to reflect their activities, or are not emphasized in an agency's objectives despite growing awareness of their desirability. As also shown in Table 2 this emphasis on non-resource categories may reflect the interests of the intended audience, or may indicate a weakness in the ability to report adequately information on resource-based activities.

#### Form of Information

The form of the information reported largely determines its usefulness and impact. Quantitative presentation was stressed in the reports, accounting for nearly three-quarters of the information. The greatest percentages of quantitative data were reported in the revenue and expenditures category

(Table 3) as might be expected. Other categories with a high percentage of quantitative data include fish stocking, commercial harvest, and hunting/trapping. These categories are commonly reported as numbers of individuals or species stocked or harvested, and numbers of man-days or percent success. Categories with low percentages of quantitative information include professional commentary, wildlife research, and fisheries research. Review activities and meetings attended tend to be reported in qualitative terms describing the type of review or purpose of meeting. Research activities tend to be reported as qualitative descriptions of activities and results.

Comparisons with previous years' data was uncommon (10%) and varied widely among categories (0.2%–51.8%). Reporting such information would allow an assessment of the progress of an agency over the years. Trend data may highlight management activities which have been repeated with good results, or conversely, activities which are repeated from year to year with little apparent success. Comparative data occurred most frequently in the commercial fisheries harvest category. Because marine fisheries assessment is commonly based on techniques requiring several years' data, comparative data are undoubtedly more available here than in other categories. The lowest percentage of comparative data was reported for the enforcement category. Change in the number of violations and other indices over time may be good indicators of enforcement or education effectiveness, yet few states report such information.

Physical presentation of information can also influence the quality and impact of the data reported. A large amount of textual coverage may discourage the reader, while a tabular or graphical summary may quickly draw the reader's eye to critical information. Although reports averaged two-thirds text, one-third consisted of tables, graphs, and illustrations. Tabular data were presented more frequently (26.5%) than graphical data (4.0%). Wildlife research and fisheries research were reported textually to the greatest degree (92% and 91.8%, respectively), while expenditures and revenues were infrequently reported within the text (13.3% and 38.3%, respectively). These latter 2 categories usually appeared in tabular terms (81.4% and 59.7%, respectively). Graphical presentations were relatively common only for commercial fisheries harvest. Graphs lend themselves to the presentation of comparative and quantitative data, which corresponds with commercial harvest reporting. A combination of techniques may be the most effective method of transmitting information. Preparers of annual reports should consider expanding the variety of presentations to include more tabular and graphical information.

## **Conclusions**

While the "typical" annual report contains a diversity of information, administrative topics are clearly emphasized over resource or user informa-

tion. There are 2 potential problems with this approach. First, although an agency may be highly effective in its internal administrative operations, it is not necessarily accomplishing its goals or satisfying its constituency (Cameron 1980). The move toward "management by objectives" and similar programmatic management strategies means that more complete monitoring of resource-based data is essential. Development of measures to monitor resources should result in more clearly reportable progress. The reporting of resource-based data at the agency level, however, requires that management by objectives extend to the highest levels in the organization.

Second, the relative paucity of information reported on the fisheries and wildlife resource should be of concern to those desiring a public knowledgeable about the biological environment. Even presuming that the primary audience is higher governmental levels, concern should be focused on the value of fisheries and wildlife resources, not on the administrative status of the agency. Greater emphasis should also be given to assessing and reporting public involvement. If public benefits from fisheries and wildlife management can be articulated, greater legislative and financial support are sure to follow.

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