

Voluntary Compliance with Forestry Best Management Practices in East Texas

Results from Round 4 of BMP Compliance Monitoring

by

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TEXAS FOREST SERVICE

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EXECUTIVE SUMMARY

A Best Management Practices (BMP) monitoring program evaluated the level of compliance with voluntary forestry BMPs. A total of 150 sites on which silvicultural activities occurred were evaluated. These sites are believed to be a representative sample of the forestry activities that occurred in East Texas between June 3, 1998 and August 31, 1999.

Overall BMP compliance of the sites monitored was 88.6%. In general, compliance was highest on sites owned by the USDA Forest Service or forest industry. Forest Service sites had an overall compliance of 97.9%, while industry sites had a 94.2% compliance rating. Nonindustrial private forest (NIPF) lands scored 81.2% overall.

Compliance with BMPs was statistically significantly higher when:

- the landowner was familiar with BMPs
- the logging contractor had attended formal BMP training
- a professional forester was involved
- BMPs were included in the timber sale contract

Compliance was generally lowest on sites:

- owned by nonindustrial private forest (NIPF) landowners
- where the landowner was not familiar with BMPs
- where the logging contractor had not been trained in BMPs

Major deficiencies noted during the evaluations were:

- sedimentation from stream crossings
- erosion problems from skid trails and temporary roads

Major improvements from previous rounds:

- presence of SMZs where needed
- increase in NIPF compliance

In previous rounds (1, 2, and 3) of monitoring, tracts were graded for compliance using a "Pass or Fail" method. For Round 4, a new system was developed that uses percentages to denote compliance. The tracts in Round 4 were also rated using the old method. When looking at ratings using the old method, this fourth round shows an increase in compliance overall and by NIPF landowners and industry. U.S. Forest Service lands again rated 100% in compliance.

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BACKGROUND AND OBJECTIVES

The Clean Water Act (CWA), as reauthorized in 1987, called for states to establish a program for development and implementation of Best Management Practices to reduce nonpoint source (NPS) water pollution. The Act also required states to develop methods for determining “BMP effectiveness,” including a measure of BMP compliance.

The Texas Silvicultural Nonpoint Source Pollution Project, funded by a FY96 CWA Section 319(h) grant from the Environmental Protection Agency (EPA) through the Texas State Soil and Water Conservation Board (TSSWCB), requires that a monitoring program be conducted to document the level of voluntary implementation of BMPs and effectiveness of BMPs in reducing NPS pollution from silvicultural activities. Objectives of the monitoring program are to:

- 1) Measure the degree of compliance with BMP guidelines by forest landowners, silvicultural contractors, forest industry, and government agencies
- 2) Evaluate the effectiveness of BMPs as applied in the field and identify weaknesses in the BMP guidelines.

This report documents the findings of the BMP compliance monitoring for 150 sites monitored between June 3, 1998 and August 31, 1999. This data represents Round 4 of BMP compliance monitoring conducted by the Texas Forest Service. Please refer to the Texas Forest Service October, 1992 publication *Voluntary Compliance with Forestry Best Management Practices in East Texas* for Round 1; the Texas Forest Service March, 1996 publication of the same title for Round 2 of compliance monitoring results; and the Texas Forest Service April, 1998 publication, also same name, for Round 3.

DISTRIBUTION AND SELECTION OF COMPLIANCE MONITORING SITES

To get a valid estimate of overall compliance with Forestry Best Management Practices in East Texas, compliance monitoring sites were distributed regionally within East Texas and among forestland ownership categories. Sites were believed to be representative of the distribution of all silvicultural activities across East Texas. The distribution of monitoring sites was based on estimated annual timber harvest for each county based on data from the annual Texas Forest Service Publication, *Texas Forest Resource Harvest Trends*. See Table 1.

Table 1. Distribution of Compliance Monitoring Sites by County.

County	1997 Average Annual Harvest (cubic feet)	Completed # Sites
Anderson	15,478,006	3
Angelina	35,671,913	8
Camp	2,021,873	1
Cass	26,874,572	7
Chambers	528,087	1
Cherokee	31,169,349	7
Franklin	1,138,862	1
Hardin	23,630,584	7
Harrison	21,211,475	4
Houston	17,846,114	5
Jasper	33,247,729	10
Liberty	23,974,017	6
Marion	14,934,002	6
Montgomery	28,850,503	3
Nacogdoches	24,669,556	5
Newton	35,946,305	7
Orange	7,053,366	3
Panola	17,700,880	5
Polk	52,371,998	8
Rusk	19,895,006	5
Sabine	18,370,194	4
San Augustine	23,842,889	5
San Jacinto	14,833,302	3
Shelby	26,366,244	6
Smith	7,760,106	1
Titus	2,444,710	1
Trinity	23,042,891	14
Tyler	36,164,011	5
Upshur	9,281,058	3
Walker	16,700,567	6
Total	624,233,944	150

QUALITY CONTROL

To eliminate bias, compliance monitoring sites were selected in a random manner using several methods, including aerial detection and information from Texas Forest Service (TFS) personnel, to identify sites. All monitoring evaluations were conducted by one or a combination of the two trained foresters assigned to the TFS BMP Project. Using only BMP Project employees as inspectors provided greater accuracy and quality control. At the beginning of the monitoring project, as well as periodically throughout

the project, both BMP Project foresters jointly evaluated tracts to maintain and improve consistency and fairness. The TFS BMP Project collected monitoring data in accordance with a Quality Assurance Project Plan, approved by TSSWCB and EPA.

MONITORING CHECKLIST – OLD vs. NEW

After six years and three rounds of monitoring with a scoring system that applied a “Pass or Fail” to each tract, a new form has been implemented that is more objective in nature. This is an attempt to coordinate with other southern state monitoring programs. Although there is a section for the evaluator to record a subjective score, this new form no longer grades a tract as No Effort, Poor, Fair, Good, or Excellent. Instead, each tract will receive a number, or percent, which demonstrates voluntary compliance. In other words, instead of a tract receiving a Good it might receive an 89%. This removes the “Pass or Fail” system. It is important to note that this form has been extensively field tested for constancy and accuracy of representing true BMP effectiveness. Once the field data is collected, it is entered into an Access database for storage and retrieval. This data can easily be imported into ArcView GIS for further analysis and geographical representation. Copies of the old and new forms are contained in the Appendix.

Previously, “effort” at installing BMPs was acknowledged. The subjective nature of the old form allowed for a tract that had some improperly installed BMPs to receive credit in some cases. The new form objectively notes whether or not, for example, waterbars were installed properly. No credit was given where the vast majority of BMPs were not effectively installed.

A new category of “significant risk” appears on the new form. A determination was made for each BMP or lack of a BMP to see if a significant risk to water quality existed. A significant risk was noted where it was determined that it was imminent that sediment would be delivered to a permanent water body following a normal rainfall.

For simplification each question was worded so that a positive answer was recorded with a “Yes” while a negative answer, indicating a departure from BMP recommendations, was answered “No.” This allowed readers to quickly determine any problem areas identified during an inspection.

INSPECTION CONTACTS

Landowners were contacted prior to the inspection of the site so that permission for entry onto the property could be obtained. During this initial contact, the forester explained the program and invited the landowner or his/her representative to join the BMP forester on site during the evaluation. Sites were not inspected if the landowner denied access. In nearly all cases on forest industry property, an industry forester accompanied the BMP forester.

Landowners, logging contractors, and timber buyers (where applicable and identifiable) were provided with a copy of the completed checklist, along with a cover

letter explaining the BMP Project and interpreting the form. Recommendations for remediation, if applicable, were made.

RESULTS

Between June 3, 1998 and August 31, 1999, TFS BMP foresters evaluated BMP compliance on 150 sites, totaling 14,724 acres, throughout East Texas. These 150 tracts are geographically represented by ownership category in Figure 1. Tabulated results by question on the BMP compliance monitoring checklist are located in the Appendix.

SITE CHARACTERISTICS

The 150 monitoring sites were distributed both geographically and by ownership, as shown in Figure 1. Seventy-four (49%) of the 150 sites were owned by forest industry. Sixty-seven sites (45%) were owned by nonindustrial private forest (NIPF) landowners. Nine sites (6%) were on U.S. Forest Service lands.

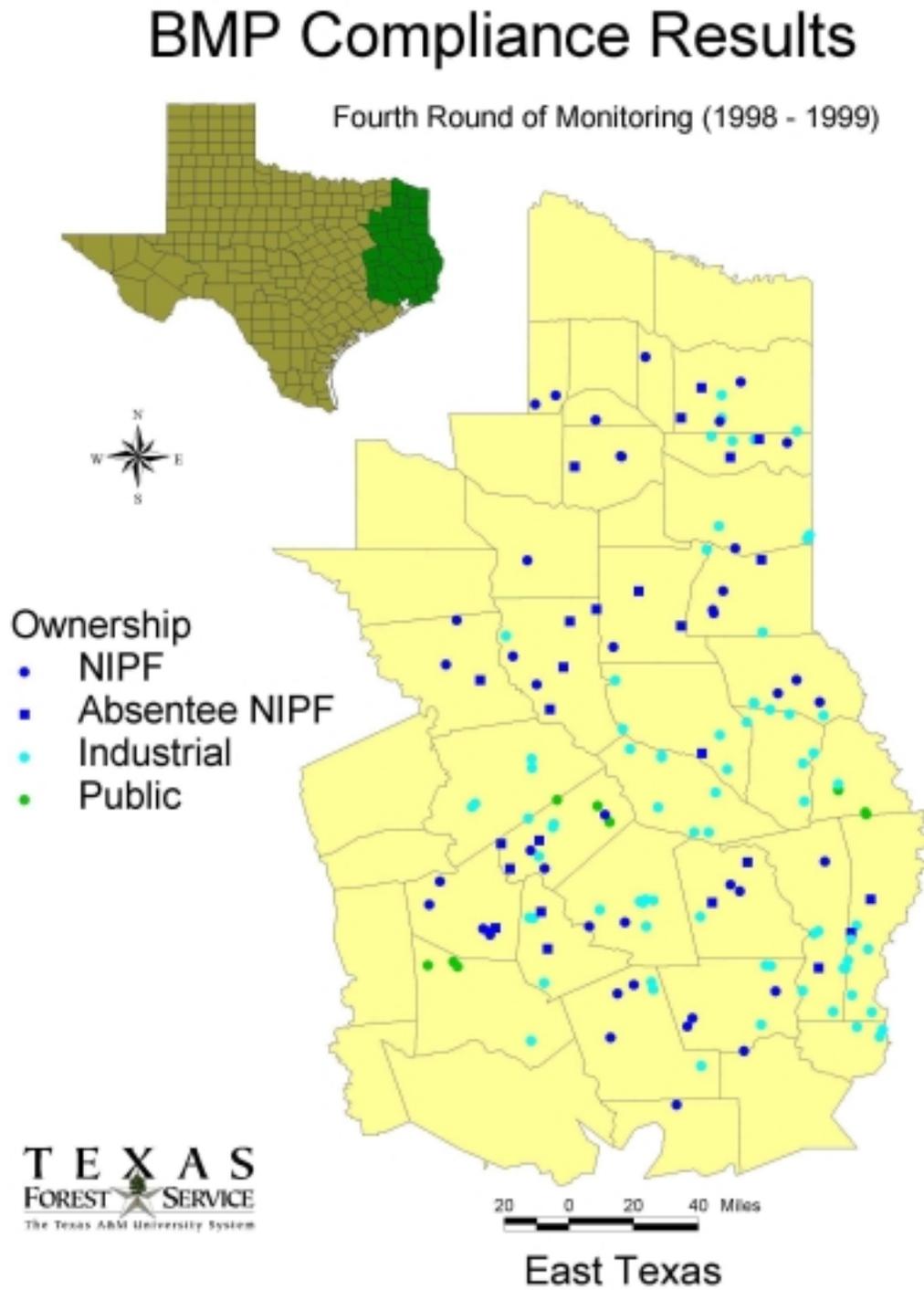
The majority of sites (60%) were monitored after a regeneration harvest, including 80 clearcuts and 10 partial harvests (such as diameter cuts, seedtree cuts, or selection harvests). Forty-seven thinning and 13 site preparation (only) operations were evaluated. In 49 cases, the site preparation evaluation was included in elements of the preceding timber harvest operation.

Professional foresters were involved in planning and/or implementing the silvicultural operation on 112 (75%) of the sites. On 77 sites, the forester was employed by forest industry. Private consultants were involved in 26 of the sites, while U.S. Forest Service foresters were involved on nine sites.

Terrain classification and soil erodability were recorded from the Natural Resources Conservation Service (NRCS) soil survey, if applicable, or estimated by the forester in the field. Forty-nine sites (33%) were on flat terrain. Ninety-four sites (63%) were on hilly terrain and seven (4%) were on steep terrain. Fifty sites (33%) were on soils with low erodability, 73 sites (49%) on medium erodability soils, and 27 (18%) were on high erodability soils.

Of the 150 sites, 81 had either a perennial (25) or intermittent (46) stream or both perennial and intermittent (10). A permanent water body was found within 800 feet of 40 sites (27%), while 110 sites (73%) did not have permanent water within 800 feet.

Figure 1. Site locations by ownership category.



PERMANENT ROADS

Permanent roads were evaluated for compliance with BMPs when they were used in the forestry operation. Permanent roads in the forestry context are generally graded dirt roads that are used for year-round access. County roads were not included in the monitoring, as they are not under the management control of the landowner. Permanent roads were applicable on 74 of the 150 sites. The percent compliance for permanent roads was 94% and one significant risk was noted. The lowest compliance was for having roads reshaped and stabilized when needed (76%). The area with the highest level of compliance was for roads meeting grade specifications and for respecting sensitive areas (100% and 99% respectively). See Table 2. Figure 2 breaks these numbers of sites down into ownership type.

Table 2. Compliance with Specific BMPs Relating to Permanent Roads.

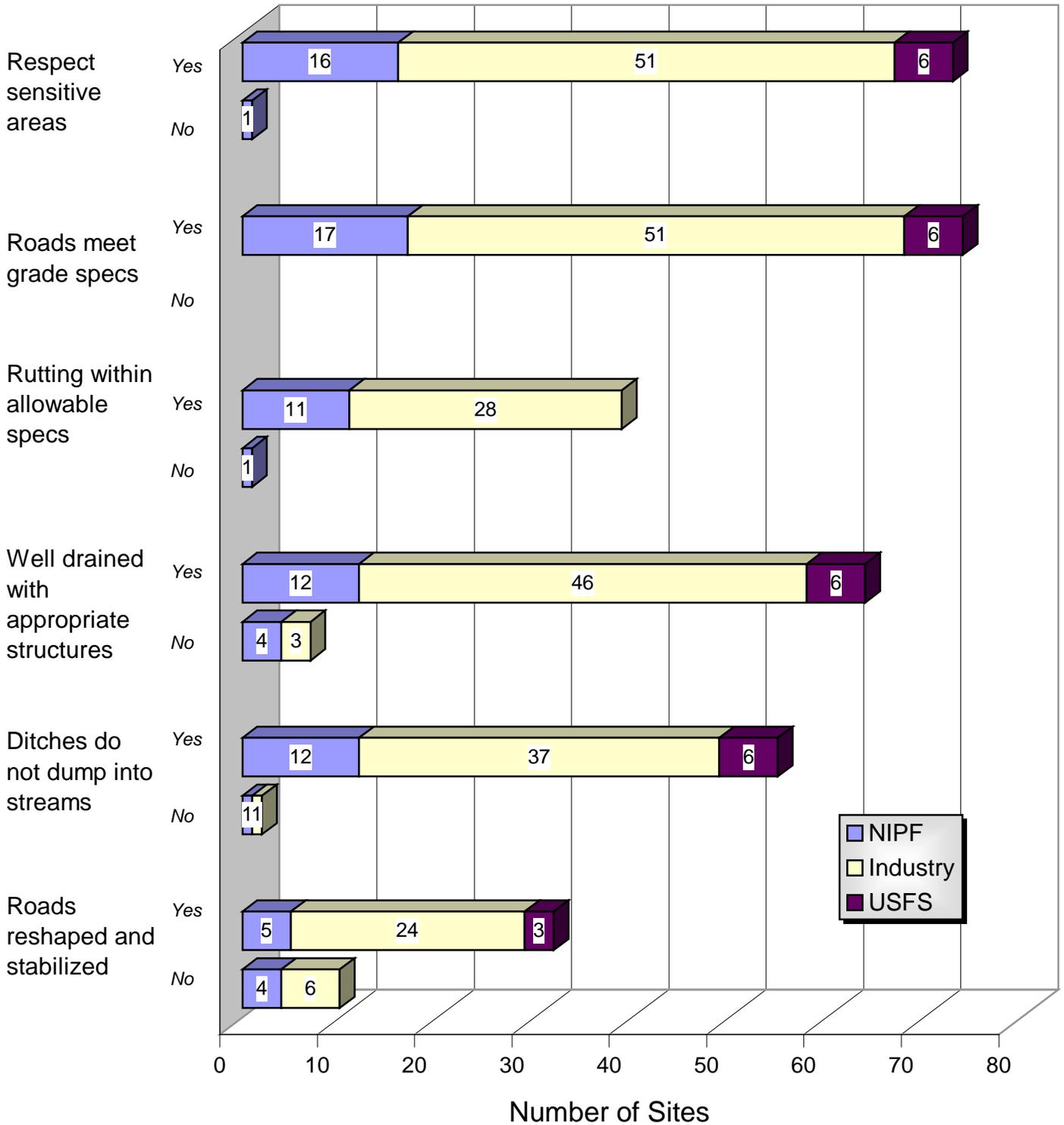
BMP	Yes	No	N/A	% Compliance	Number of Significant Risks
Respect sensitive areas	73	1	76	99	0
Roads meet grade specifications	74	0	76	100	0
Rutting within allowable specs	39	1	110	98	1
Well drained with appropriate structures	64	7	79	90	0
Ditches do not dump into streams	55	2	93	96	0
Roads reshaped and stabilized	32	10	108	76	0

It is important to note that non-use of a specific BMP does not necessarily imply lack of compliance with BMPs. Often, there are many alternative methods that could be applied in a given instance. The value of the evaluation of whether specific BMPs were used is its indication of whether efforts were made to use at least one of the more commonly recommended BMPs.

SKID TRAILS AND TEMPORARY ROADS

Skid trails and temporary roads were evaluated on 139 of the 150 monitoring sites. Skid trails are routes through the logging area by which logs are skidded or dragged to a permanent road or central loading point called a “set” or “landing.” Temporary roads are not designed to carry long-term traffic and are usually retired, closed, or reforested after the harvest activity. The percent compliance for temporary roads was 78% and a total of four significant risks were noted. The lowest compliance

Figure 2. Permanent roads by numbers of sites compliant/not compliant by ownership type.



category was for roads well drained with appropriate structures and road stabilization (50% and 60% respectively). Only one significant risk was noted for one of these two categories. The area with the highest compliance (99%) was for having slopes less than 15%. See Table 3 and Figure 3.

Table 3. Compliance with Specific BMPs Relating to Skid Trails and Temporary Roads.

BMP	Yes	No	N/A	% Compliance	Number of Significant Risks
Slopes less than 15%	137	2	11	99	0
Respect sensitive areas	126	13	11	91	2
Roads well drained with appropriate structures	53	54	43	50	1
Roads stabilized	72	48	30	60	0
Rutting within allowable specifications	76	18	56	79	1

STREAM CROSSINGS

Stream crossings were evaluated on 32 sites. Thirteen crossings were on permanent roads while 21 were on temporary roads. The percent compliance for stream crossings was 67% and a total of four significant risks were noted. Stream crossings on permanent roads received the lowest compliance in the crossing being free of sediment. The majority of these crossings were on intermittent streams and posed a significant risk in only one case. The highest compliance, 92%, was in keeping the number of crossings to a minimum. Crossings on temporary roads scored the lowest for having the crossings restored and stabilized and the stream free of sediment (38%). Also scoring low was the category of installing the crossings correctly (43%). However, 100% of the crossings were installed at right angles and 90% of the tracts kept the number of crossing to a minimum. See Table 4 and Figure 4.

Figure 3. Skid trails/temporary roads by numbers of sites compliant/not compliant by ownership type.

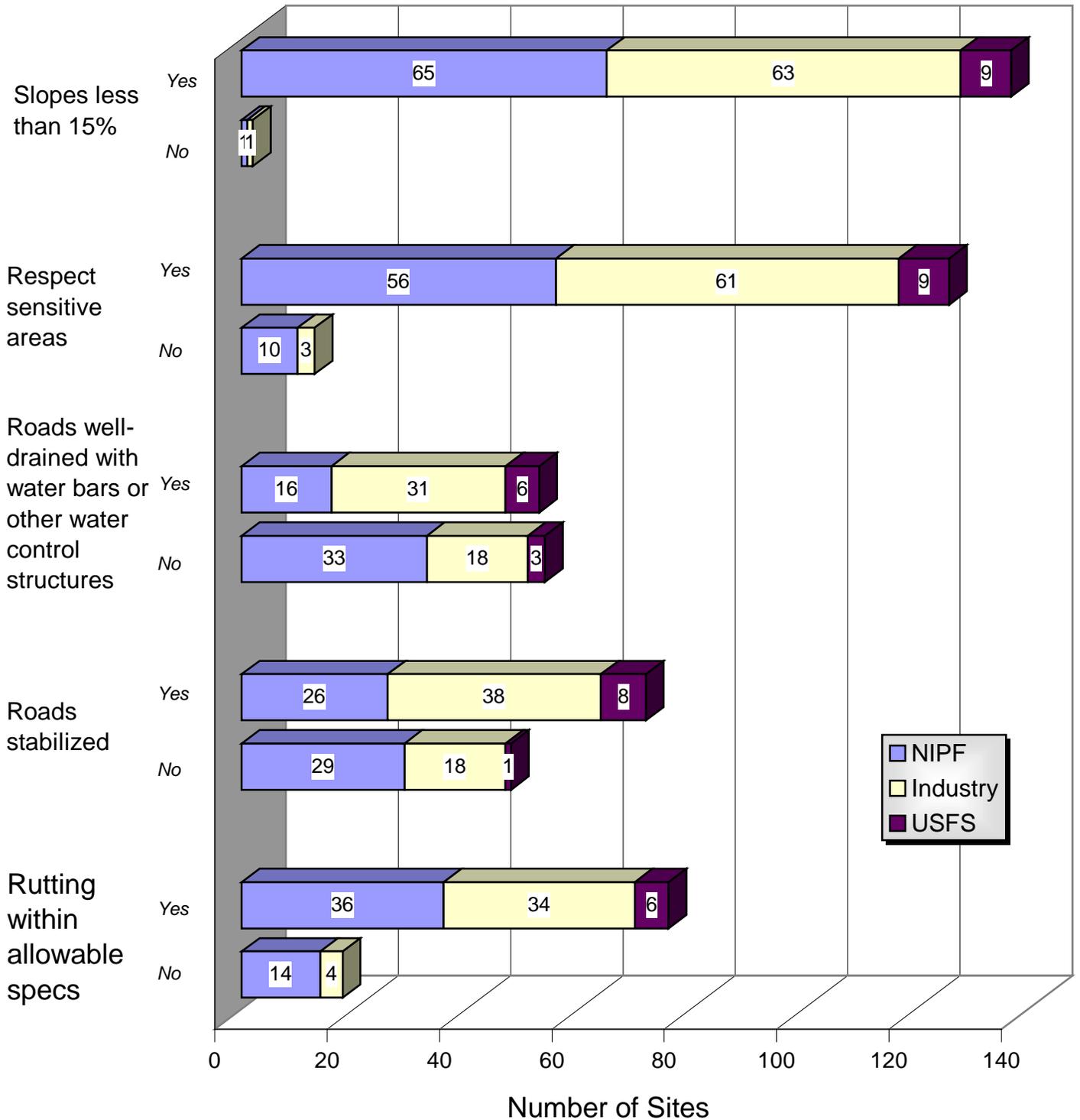


Figure 4. Stream crossings by numbers of sites compliant/not compliant by ownership type.

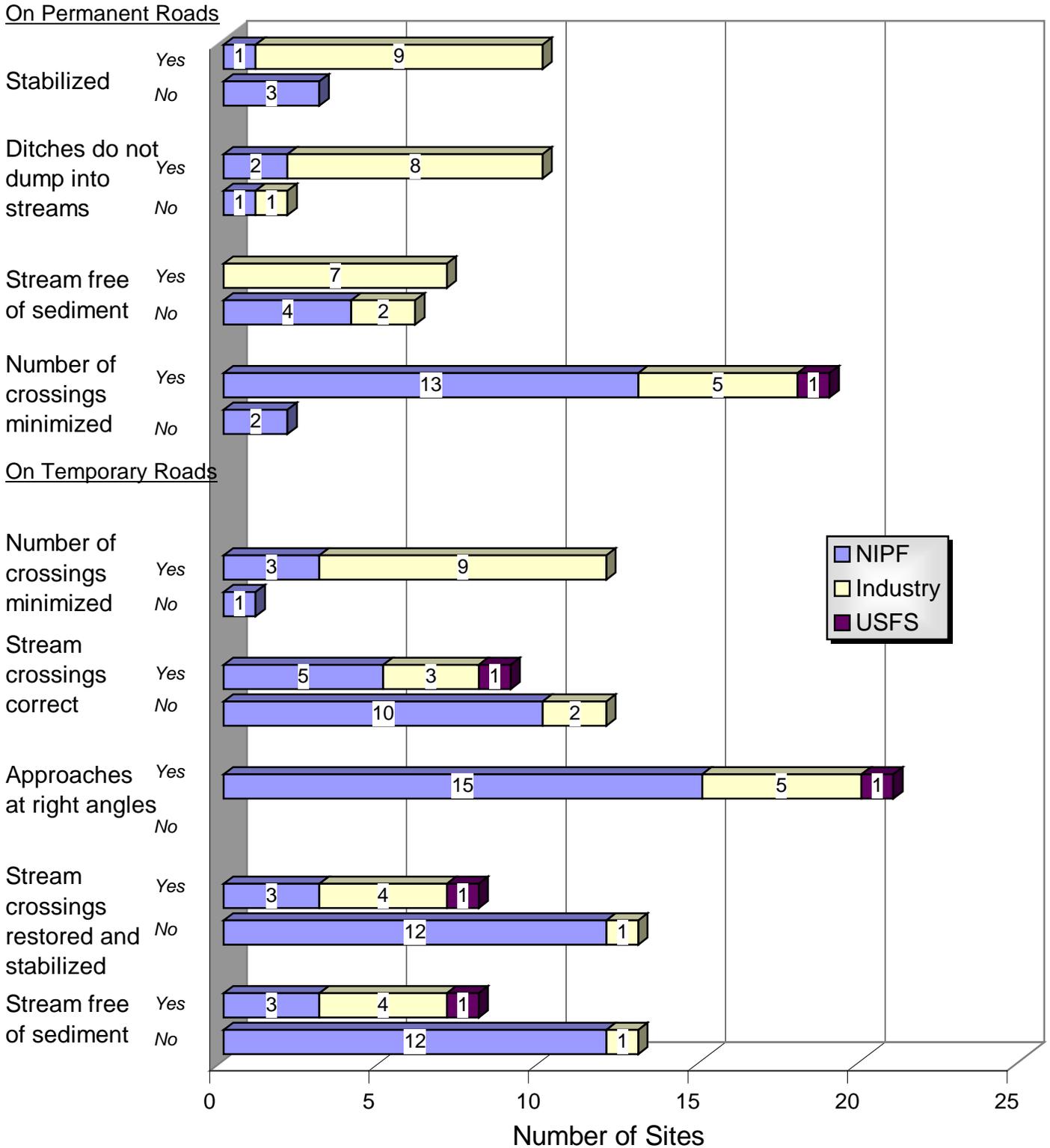


Table 4. Compliance with Specific BMPs Relating to Stream Crossings.

BMP	Yes	No	N/A	% Compliance	Number of Significant Risks
Permanent Roads					
Stabilized	10	3	137	77	2
Ditches do not dump into streams	10	2	138	83	0
Stream free of sediment	7	6	137	54	1
Number of crossings minimized	12	1	137	92	0
Temporary Roads					
Number of crossings minimized	19	2	129	90	0
Stream crossings correct	9	12	129	43	0
Approaches at right angles	21	0	129	100	0
Stream crossings restored and stabilized	8	13	129	38	1
Stream free of sediment	8	13	129	38	0

STREAMSIDE MANAGEMENT ZONES

Streamside management zones (SMZs) are recommended on all perennial and intermittent streams. All sites with either perennial or intermittent streams were evaluated for the presence and adequacy of SMZs. Streams were present on 81 of the 150 sites. Of these 81 sites, 25 had perennial streams only, 46 had intermittent streams only, and 10 had both perennial and intermittent streams. Overall compliance on SMZs was 86% and two significant risks were noted. It is important to note that the presence of an SMZ where needed on both permanent and intermittent streams was at 97% compliance. One noted deficiency in SMZs is that thinning within allowable specifications received a compliance of 67%. See Table 5 and Figure 5.

Figure 5. Streamside management zones by numbers of sites compliant/not compliant by ownership type.

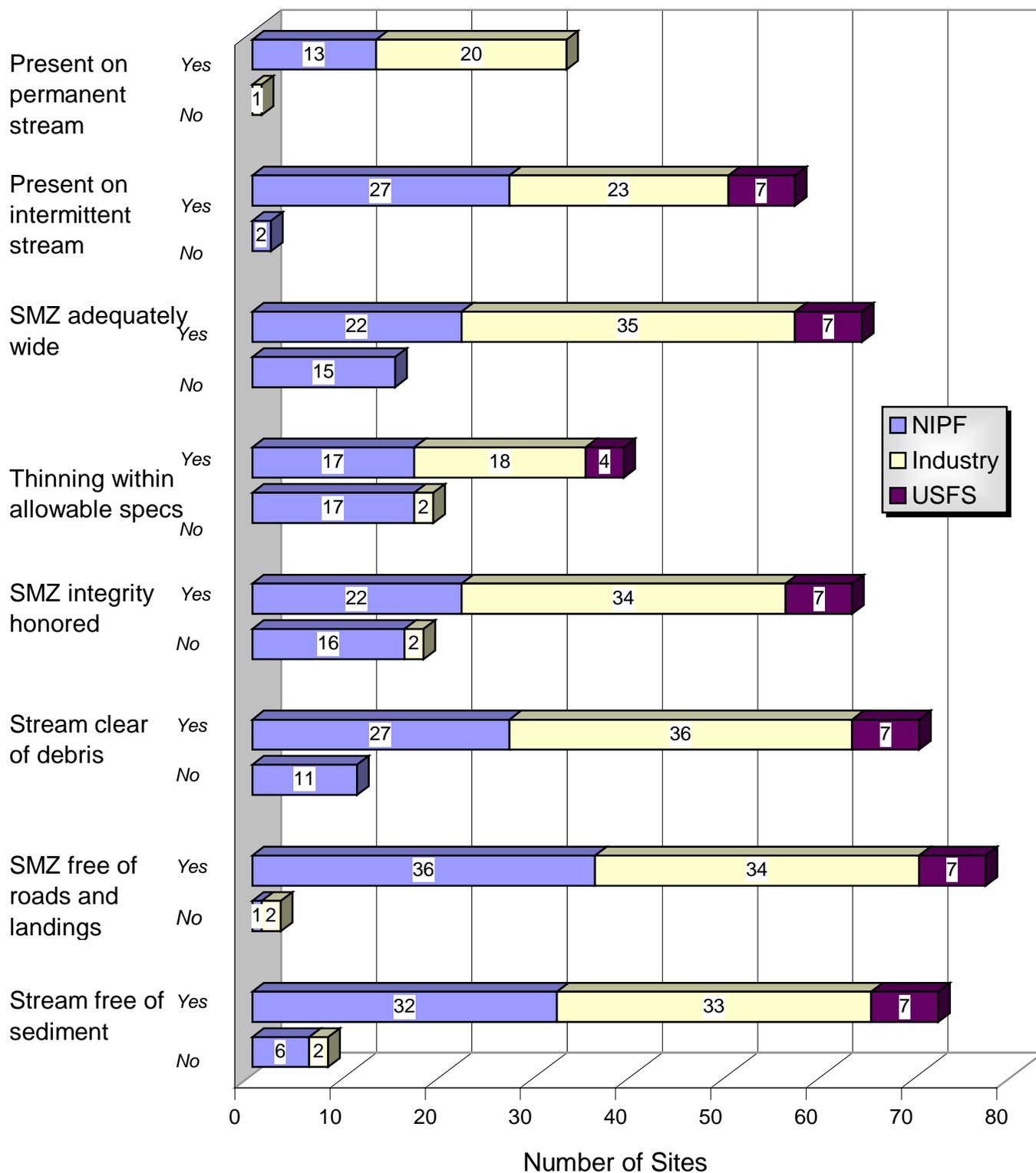


Table 5. Compliance with Specific BMPs Relating to SMZs.

BMP	Yes	No	N/A	% Compliance	Number of Significant Risks
Present on perennial stream	33	1	116	97	0
Present on intermittent stream	57	2	91	97	0
Adequately wide	64	15	71	81	0
Thinning within allowable specs	39	19	92	67	0
Integrity honored	63	18	69	78	0
Stream clear of debris	70	11	69	86	0
Free of roads and landings	77	3	70	96	0
Stream free of sediment	72	8	70	90	2

SITE PREPARATION

Fifty sites were evaluated for compliance with site preparation BMPs. A variety of site preparation techniques were evaluated, including 24 with some combination of shearing, piling, subsoiling, bedding, and/or burning. Two sites involved application of herbicide only. The compliance for site preparation was 96% and one significant risk was noted. Specific areas of site preparation receiving 100% compliance were respecting sensitive areas, honoring the integrity of SMZs, keeping chemicals on site, and keeping the stream free of sediment. One of four sites that were machine planted did not do so on the contour, resulting in a compliance of 75%. See Table 6 and Figure 6.

Table 6. Compliance with Specific BMPs Relating to Site Preparation.

BMP	Yes	No	N/A	% Compliance	Number of Significant Risks
Respect sensitive areas	50	0	100	100	0
No soil movement on site	44	5	101	90	1
Firebreak erosion controlled	24	1	125	96	0
SMZ integrity honored	29	0	121	100	0

Windrows on contour/free of soil	14	1	135	93	0
No chemicals off site	17	0	133	100	0
Machine planting on contour	3	1	146	75	0
Stream free of sediment	21	0	129	100	0

LANDINGS

Landings, sometimes called sets, are areas where logs are gathered, delimbed, bucked, and loaded onto log trucks. Landings were evaluated on 130 sites with an overall compliance of 99%. One hundred twenty-eight sites (98%) were free of oil and trash. All 89 sites (100%) with on-sites landing and SMZs had the landings located outside the SMZ. On 116 sites (99%) landings were located in a well-drained location. There were no significant risks noted on landings. See Table 7 and Figure 7.

Table 7. Compliance with Specific BMPs Relating to Landings.

BMP	Yes	No	N/A	% Compliance	Number of Significant Risks
Location free of oil/trash	128	2	20	98	0
Located outside of SMZ	89	0	61	100	0
Well-drained location	116	1	33	99	0
Number and size minimized	129	0	21	100	0
Respect sensitive areas	128	1	21	99	0
Restored/stabilized	78	4	68	95	0

Figure 6. Site preparation by numbers of sites compliant/not compliant by ownership type.

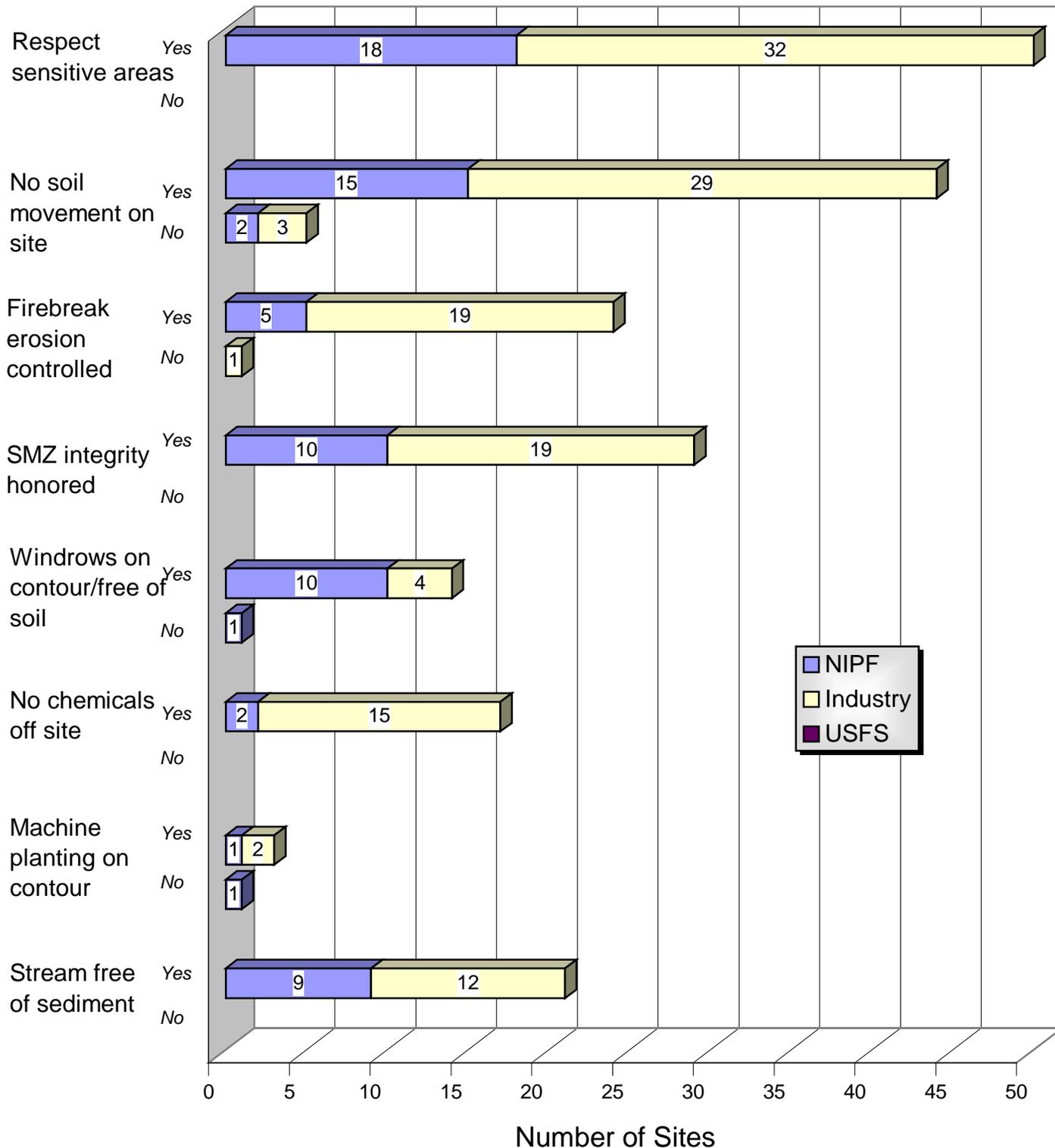
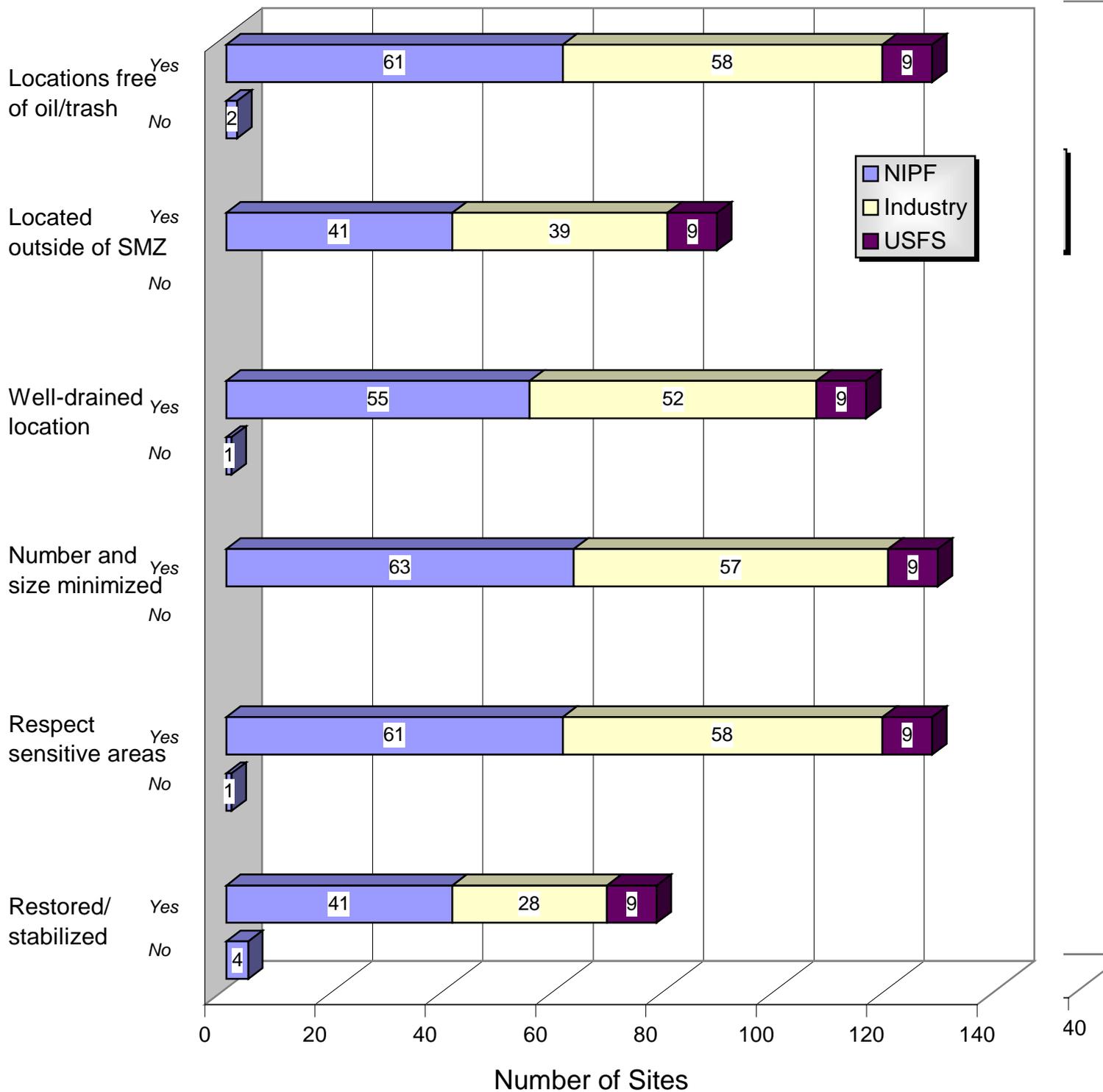


Figure 7. Landings by numbers of sites compliant/not compliant by ownership type.



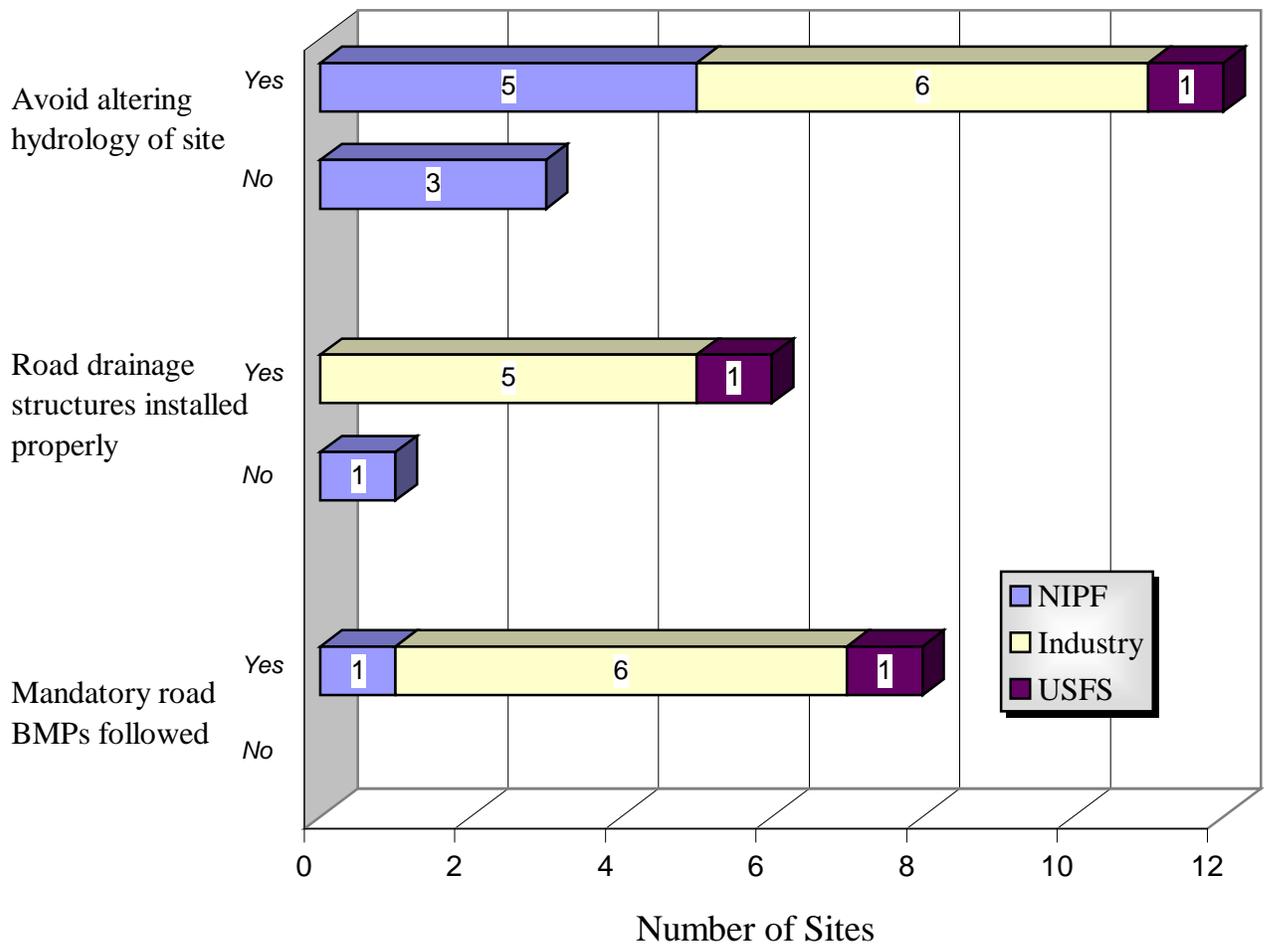
WETLANDS

Fifteen sites had wetland areas. These sites had an overall compliance of 87%. No significant risks were noted and all mandatory road BMPs for wetlands were followed. See Table 8 and Figure 8.

Table 8. Compliance with Specific BMPs Relating to Wetlands.

BMP	Yes	No	N/A	% Compliance	Number of Significant Risks
Avoid altering hydrology of site	12	3	135	80	0
Road drainage structures installed properly	6	1	143	86	0
Mandatory road BMPs followed	8	0	142	100	0

Figure 8. Wetlands by numbers of sites compliant/not compliant by ownership type.



OVERALL COMPLIANCE WITH BMPs

To illustrate the spread of the compliance scores, Figures 9 and 10 separate the results into six categories: 0-49%, 50-59%, 60-69%, 70-79%, 80-89%, 90-100%. Figure 9 geographically illustrates compliance across all ownership categories. Figure 10 provides the number of tracts across all ownership categories receiving the respective level of compliance. A map depicting forestland ownership patterns in East Texas is located in the Appendix.

COMPLIANCE BY SITE CHARACTERISTICS

Ownership

BMP compliance varied by ownership category. The public ownership category (U.S. Forest Service) fared best, with 97.9% for the nine tracts with no significant risks noted.

The 74 sites owned by forest industry had an overall BMP compliance of 94.2% and had only three significant risks.

Nonindustrial private forest (NIPF) landowners had a compliance rating of 81.2%, the lowest level of the three ownership types and had nine significant risks.

Type of Activity

Four types of silvicultural activities were monitored: regeneration harvests, partial regeneration cuts, thinning, and site preparation. Thirteen sites were evaluated for site preparation only, although site preparation was evaluated along with a regeneration harvest 29 times. See Table 9.

Table 9. Overall Compliance with BMPs by Type of Operation.

Type of Operation	BMP Compliance
Regeneration harvest (clearcut)	85%
Regeneration harvest (partial cut)	93%
Thinning	92%
Site preparation (only)	93%

Figure 9. Overall compliance scores across all ownerships and monitoring criteria.

BMP Compliance Results

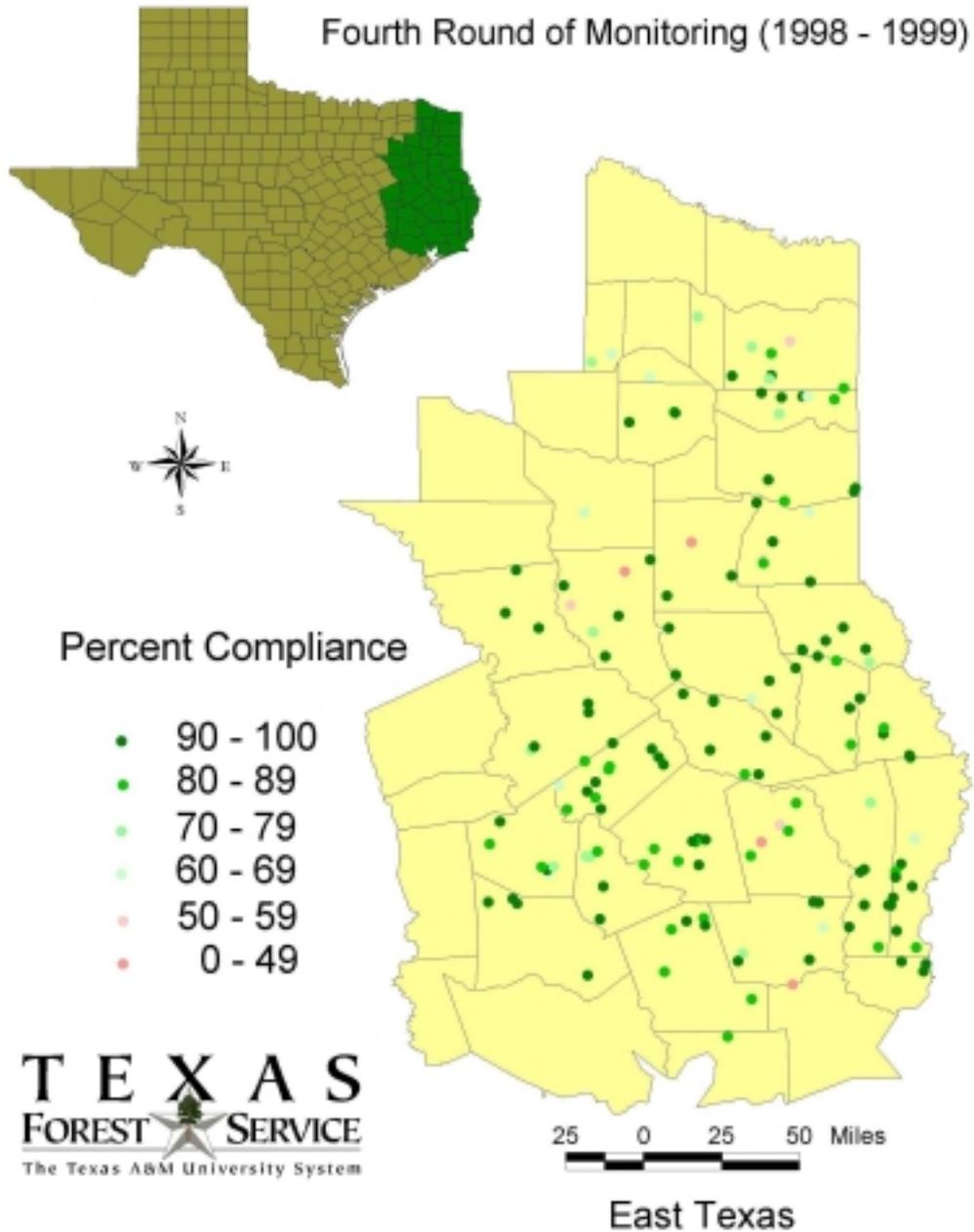
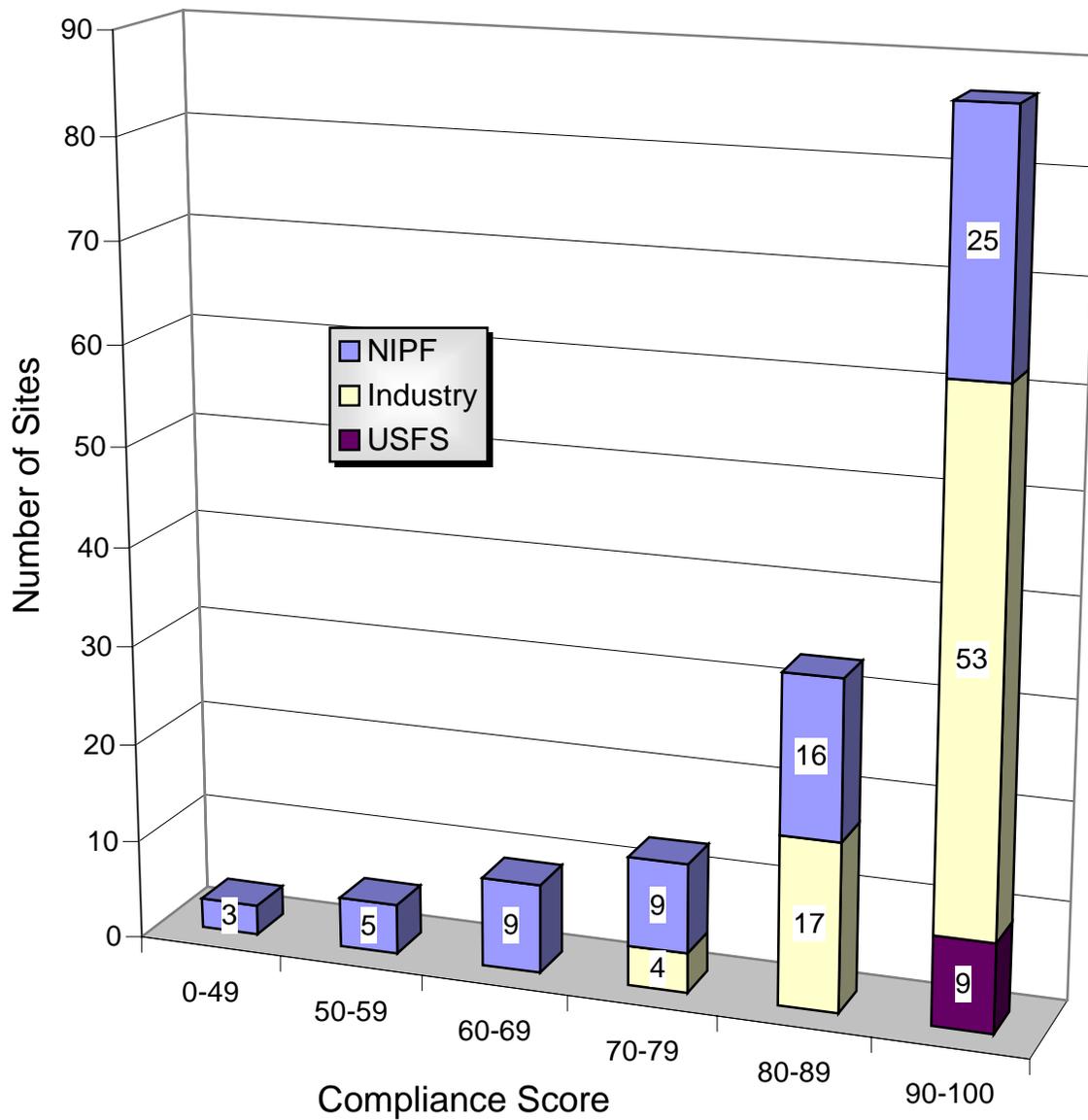


Figure 10. Overall compliance scores by number of sites and ownership type.



Terrain

Monitoring sites were classified by BMP foresters as Flat, Hilly, or Steep. BMP compliance on a total of 49 flat sites was 92% with no significant risks; on the majority or 94 hilly sites, 87% with 10 significant risks; and on seven steep sites, 85% with two significant risks. This trend of increased compliance with flatter terrain is to be expected since less erosion and less adverse effect on water quality is likely.

Erodability

Monitoring sites were identified as Low, Medium, or High soil erodability. BMP compliance on a total of 50 low erodability sites was 90% with three significant risks; on 73 medium erodability sites, 88% with six significant risks; and on 27 high erodability sites, 87% with three significant risks.

Distance to Permanent Water

Distance to nearest permanent water was determined for each monitoring site. BMP compliance on 38 sites with permanent water less than 300 feet away was 87% with seven significant risks. On two sites with permanent water 300 to 800 feet away, compliance was 85% with no significant risks. Ten sites were 800 to 1600 feet from permanent water. BMP compliance on these sites was 88% with no significant risks. Of the 100 sites in which permanent water was greater than 1,600 feet away, BMP compliance was 89% with five significant risks.

Professional Forester Involvement

BMP compliance was higher when a professional forester was involved in the activity. One hundred twelve sites were identified as having a professional forester involved and had a compliance rating of 92%. Sites in which there was no or unknown forester involvement had a BMP compliance rating of 77%. See Figure 11.

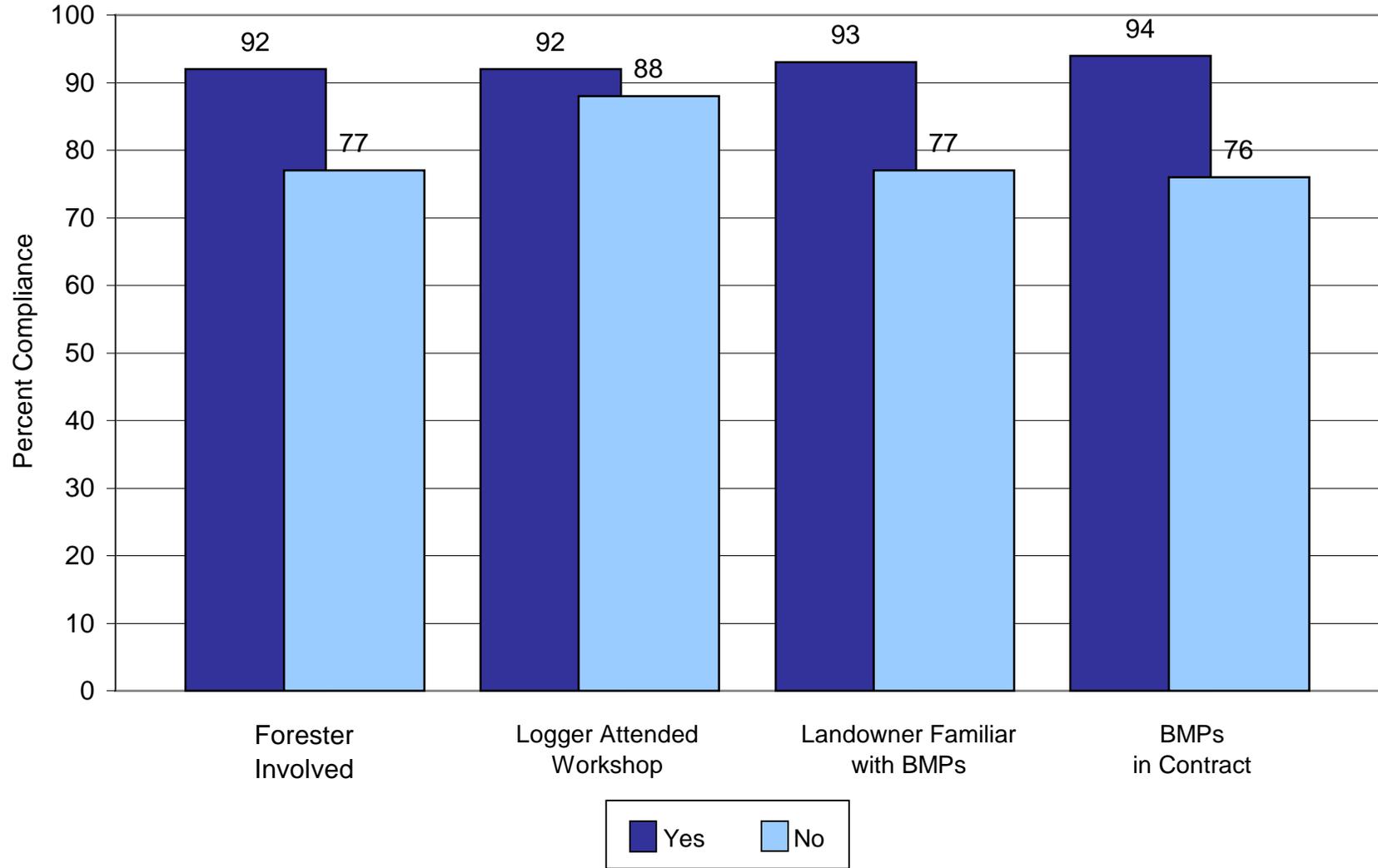
Landowner Familiarity with BMPs

Landowner familiarity with BMPs influences BMP compliance. Sites with landowners who were not familiar with BMPs had an overall compliance rating of 77%, while sites with landowners who were familiar with BMPs had a compliance rating of 93%. One hundred five of 150 sites had landowners who were familiar with BMPs, while 30 were not. Landowner familiarity was unknown on 15 sites. Only 23 of 67 NIPF landowners (34%) were identified as being familiar with BMPs. See Figure 11.

Logging Contractor Familiarity with BMPs

Logging contractor familiarity with BMPs also influences compliance. Contractor familiarity was identified on 107 of 150 tracts. Of the 73 inspections where the logging contractor was identified as having attended the formal TFS/TFA BMP

Figure 11. Overall compliance by various levels of involvement



training, the compliance was 92%. Sites in which there was no or unknown attendance by the logger at the formal BMP training had a compliance rating of 85%. See Figure 11.

BMPs in Timber Sale Contract

BMPs were included in the timber sale contract, if applicable, on 102 sites. Compliance on sites with BMPs included in the contract was 94%, while compliance on tracts without BMPs in the contract was 76%. See Figure 11.

STATISTICAL SIGNIFICANCE

A one-tailed *t*-test was performed on the following categories: Professional Forester Involvement, Logger Attending BMP Training, Landowner Familiarity with BMPs, and BMPs Included in Contract. To determine statistical significance, the resulting *P* value was compared to the level of significance. *P* value is the probability of observing a value of the test statistic as contradictory (or more) to the null hypothesis as the computed value of the test statistic. In these tests, a 0.05 (5%) level of significance was used. For the two compliance ratings to be significantly different, the *P* value must be lower than the level of significance. The compliance ratings for the “yes” answers and the “no” answers were calculated to be significantly different in all of these categories. See Table 10.

Table 10. Results of *t*-tests Determining Statistically Significant Differences.

	% Compliance		<i>P</i> value	Level of Significance	Statistically Different?
	Yes	No			
Forester Involved	92	77	0.0001	0.05	Yes
Logger Attended BMP Training	92	85	0.0034	0.05	Yes
Landowner Familiar with BMPs	93	77	< 0.0001	0.05	Yes
BMPs in Contract	94	76	0.0001	0.05	Yes

DISCUSSION

As mentioned in the monitoring checklist section of this report, a new approach to reporting the percent compliance has been implemented. This new method was field tested extensively. Tracts were also scored the old way at the time of monitoring to see how the new method paralleled the old. The results provided confidence in using the new reporting method.

Because of the change in reporting method, the results from this new method *cannot* be directly compared to the previous (Rounds 1-3) data. Consider the following example. BMP compliance on USFS-owned land is currently at 97.9%. It was 100% for the previous three rounds. Did it actually decrease? Previously a tract *passed*, or was considered to be in compliance, if it received a Fair, Good or Excellent score. Not all USFS tracts received an Excellent; however, they all passed and were all in compliance. Overall compliance on USFS tracts was 100% on previous rounds since all individual tracts were in compliance.

The new method of computing overall compliance considers the individual tract’s actual percent compliance. For example, consider that on a particular tract, under the new method, the score is 85%. Using the old method, it is likely that the tract would have received at least a Fair. Previously that tract would have

been added with all other Fair, Good, and Excellent scores, and then divided by the total number of tracts to determine overall compliance of all tracts. It is now factored in individually as an 85%. Every single tract would have had to receive a 100% under the new system to stay at that level of compliance.

A brief discussion of the three previous rounds of monitoring is provided to give a historical perspective on BMP monitoring in Texas.

OVERALL COMPLIANCE – Rounds 1, 2, and 3

Round 1 of BMP compliance monitoring, conducted between July 1, 1991 and August 31, 1992, yielded an overall compliance of 88.2%. Round 2 of compliance monitoring, conducted between July 8, 1993 and November 15, 1995, showed an overall compliance of 87.4%. Round 3 of monitoring showed overall compliance with voluntary BMPs at 87.3%.

BMP compliance on industry land had steadily increased from 89.6% in Round 1 to 95.1% in Round 2 to 98.4 % in Round 3. This substantial increase documents the diligence of forest industry in using voluntary BMPs.

Publicly-owned land BMP compliance has increased from 93.3% in Round 1 to 100% in Round 2, and maintained its 100% compliance in Round 3. In Round 3, the USDA Forest Service owned all 11 public sites that were monitored. Specifically, compliance on tracts owned and managed by the USDA Forest Service was at 100%.

In Round 1 of monitoring, compliance on NIPF land was 86.3%. During Round 2, NIPF compliance was 82.9%. Round 3 showed NIPF compliance to be at 76.3%.

OVERALL COMPLIANCE – Round 4

Using the new method, BMP compliance on USFS-owned land is currently 97.9% with no significant risks to water quality identified. Compliance on industry-owned land is currently 94.2% with three significant risks, while compliance on NIPF land is 81.2% with nine significant risks to water quality. This results in an overall BMP compliance of 88.6% with a total of 12 significant risks considering all ownership categories.

BMP compliance on NIPF land lags behind other ownerships and accounted for nine of the 12 significant risks. NIPF landowners are generally less intensely involved in forest management, only infrequently sell timber, may be absentee, and may lack technical knowledge necessary to implement BMPs. It is important to note that the average size of the harvested NIPF tract was 83 acres compared to 115 acres for industrial tracts. This lower level of compliance is occurring on smaller tracts while the higher level of BMP implementation is occurring on larger tracts of land.

Scores for this fourth round of monitoring were also calculated using the old method. Table 11 shows these results and compares all four rounds using the old method. This shows an across-the-board increase in compliance in each ownership category and overall from Round 3 to Round 4. NIPF landowners have improved from the last monitoring period; industry scores remain high, even improving slightly; and USFS lands are again at the 100% level.

Table 11. Percent Compliance by Ownership Type, All Four Rounds.

	Round 1	Round 2	Round 3	Round 4	
				Old Method	New Method
NIPF	86.3	82.9	76.3	79.1	81.2

Industry	89.6	95.1	98.4	98.6	94.2
Public/USFS	93.3	100.0	100.0	100.0	97.9
Overall	88.2	87.4	87.3	90.0	88.6

The majority of the USFS and industry tracts that were monitored installed BMPs that met or exceeded the recommended voluntary guidelines. Even though compliance for these two groups is less than 100% (97.9% for USFS and 94.2% for industry), only one industry and no USFS tracts did not receive a passing score using the old system.

CONCLUSION

Positive correlations between landowner familiarity with BMPs, forester involvement, logging contractor training in BMPs, and BMP compliance were shown. The compliance percentages were statistically proven to be significantly different in all four of these categories. This demonstrates the need for NIPF landowners to involve a forester or some sort of professional assistance and a knowledgeable logging contractor to ensure BMP compliance.

Using the old method of site evaluation, across-the-board increases in compliance are shown from all landowner types from the last round to this round of monitoring. This demonstrates that the already-implemented education and training strategies geared towards loggers, landowners, and foresters were an impetus behind the increases in compliance. Concentrating innovative educational efforts on NIPF landowners and continuing BMP training for loggers appear to be the best methods for minimizing potential water quality impacts from silvicultural operations.

Appendix

Compliance Monitoring Checklist
(old and new forms)

Evaluation Criteria

Summary of Results

Forestland Ownership Patterns

TEXAS BMP MONITORING CHECKLIST

GENERAL

- 1. County _____ 2. Block/Grid _____
- 3. Latitude _____ Longitude _____
- Forester: 4. _____ 5. _____
- 6. Timber Buyer _____
- 7. Logger _____
- 8. Activity _____
- 9. Estimated date of activity _____
- 10. Acres affected _____
- 11. Inspector _____

LANDOWNER:

- 12. Owner Type: N L A I P
- 13. Name _____
- 14. Address _____
- 15. City _____ ZIP _____
- 16. Phone _____
- 17. Date of Inspection _____
- 18. Accompanied by: _____

SITE CHARACTERISTICS

- 19. Terrain: F H S
- 20. Erodability hazard: L M H
- 21. Type stream present P I
- 22. Distance to nearest permanent water body:
 <300' 300-800' 800-1600' 1600'+
- 23. Predominant soil series/texture: _____ / C CL L SL S

PERMANENT ROADS

[] NOT APPLICABLE

- 24. Avoid sensitive areas. Y N NA
- 25. Roads meet grade specs. Y N NA
- 26. Stabilized stream crossing. Y N NA
- 27. Rutting within allowable specs. Y N NA
- 28. Ditches do not dump into streams. Y N NA
- 29. Were BMP's used. Y N NA
 Type: RD WD WB RE OC PL RS CU BR LW
- 30. Were BMP's effective. Y N NA
- 31. Stream free of sediment. Y N NA

SKID TRAILS / TEMPORARY ROADS

[] NOT APPLICABLE

- 32. Slopes less than 15%. Y N NA
- 33. Rutting within allowable specs. Y N NA
- 34. Water bars evident. Y N NA
- 35. Water bars working. Y N NA
- 36. Stream crossings minimized. Y N NA
- 37. Stream crossings correct. Y N NA
- 38. Stream crossings restored & stabilized. Y N NA
- 39. Were BMP's used. Y N NA
 Type: RD WD WB RE OC PL RS CU BR LW
- 40. Stream free of sediment. Y N NA

SMZ

[] NOT APPLICABLE

- 41. SMZ present on permanent stream. Y N NA
- 42. SMZ present on intermittent stream. Y N NA
- 43. SMZ adequately wide. Y N NA
- 44. Thinning within allowable specs. Y N NA
- 45. SMZ integrity honored. Y N NA
- 46. Stream clear of debris. Y N NA
- 47. SMZ free of roads and landings. Y N NA
- 48. Stream free of sediment. Y N NA

SITE PREPARATION

[] NOT APPLICABLE

- 49. Site prep method _____
- 50. Regeneration method _____
- 51. No soil movement on site. Y N NA
- 52. Firebreak erosion controlled. Y N NA
- 53. SMZ integrity honored. Y N NA
- 54. Windrows on contour / free of soil. Y N NA
- 55. No chemicals off site. Y N NA
- 56. Were BMP's used. Y N NA
 Type: WB RE OC RS
- 57. Stream free of sediment. Y N NA

LANDINGS

[] NOT APPLICABLE

- 58. Locations free of oil / trash. Y N NA
- 59. Located outside SMZ. Y N NA
- 60. Well drained location Y N NA
- 61. Restored, stabilized. Y N NA

62. Overall compliance with Best Management Practices

NEEDS IMPROVEMENT
 NO EFFORT POOR

PASS
 FAIR GOOD EXCELLENT

See Evaluation Criteria for a full description of numbered questions.

Site ID

I. General Landowner and Tract Information

County TFS Block and Grid

Latitude Longitude

Owner Type: N A I P

Forester Type Name

Landowner: Name

Timber Buyer Logging Contractor Address

Activity Acres Affected City State

Estimated Date of Activity Date of Inspection Zip

Inspector Accompanied by Phone

II. Site Characteristics

Terrain: Flat Hilly Steep

Erodibility hazard: Low Medium High

Type stream present: Perennial Intermittent

Distance to nearest permanent water body: < 300' 300 - 800' 800 - 1600' 1600' +

Predominant soil series/texture:

Clay Clay Loam Loam Sandy Loam Sand

III. Permanent Roads

	YES	NO	NA/NN	Sig. Risk
1. Respect sensitive areas	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. Roads meet grade specs	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. Rutting within allowable specs	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. Well drained with appropriate structures	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5. Ditches do not dump into streams	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6. Roads reshaped and/or stabilized	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
BMPs present <input type="checkbox"/> RD <input type="checkbox"/> WD <input type="checkbox"/> WB <input type="checkbox"/> RE <input type="checkbox"/> OC				
BMPs present <input type="checkbox"/> PL <input type="checkbox"/> RS <input type="checkbox"/> CU <input type="checkbox"/> BR <input type="checkbox"/> LW				
Section Total	<input type="text" value="0"/>	<input type="text" value="0"/>		<input type="text" value="0"/>
Percent Compliance	<input type="text" value="N/A"/>			

IV. Skid Trails/Temporary (secondary) Roads

	YES	NO	NA/NN	Sig. Risk
1. Slopes less than 15%	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. Respect sensitive areas	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. Roads well drained with water bars or other water control structures	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. Roads stabilized	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5. Rutting within allowable specs	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
BMPs present <input type="checkbox"/> RD <input type="checkbox"/> WD <input type="checkbox"/> WB <input type="checkbox"/> RE <input type="checkbox"/> OC				
BMPs present <input type="checkbox"/> PL <input type="checkbox"/> RS <input type="checkbox"/> CU <input type="checkbox"/> BR <input type="checkbox"/> LW				
Section Total	<input type="text" value="0"/>	<input type="text" value="0"/>		<input type="text" value="0"/>
Percent Compliance	<input type="text" value="N/A"/>			

V. Stream Crossings

On Permanent Roads

1. Stabilized
2. Ditches do not dump into streams
3. Stream free of sediment
4. Number of crossings minimized

On Temporary Roads

5. Number of crossings minimized
6. Stream crossings correct
7. Approaches at right angles
8. Stream crossings restored and stabilized
9. Stream free of sediment

BMPs present CU BR LW

YES NO N/A/NN Sig. Risk

<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Section Total 0 0 0

Percent Compliance N/A

VI. Streamside Management Zones

1. Present on permanent stream
2. Present on intermittent stream
3. SMZ adequately wide
4. Thinning within allowable specs
5. SMZ integrity honored
6. Stream clear of debris
7. SMZ free of roads and landings
8. Stream free of sediment

YES NO N/A/NN Sig. Risk

<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Section Total 0 0 0

Percent Compliance N/A

VII. Site Preparation

Site preparation method

Regeneration method

1. Respect sensitive areas
2. No soil movement on site
3. Firebreak erosion controlled
4. SMZ integrity honored
5. Windrows on contour / free of soil
6. No chemicals off site
7. Machine planting on contour
8. Stream free of sediment

YES NO N/A/NN Sig. Risk

<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Section Total 0 0 0

Percent Compliance N/A

VIII. Landings

1. Locations free of oil / trash
2. Located outside of SMZ
3. Well drained location
4. Number and size minimized
5. Respect sensitive areas
6. Restored / stabilized

YES NO N/A/NN Sig. Risk

<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Section Total 0 0 0

Percent Compliance N/A

IX. Wetlands (may or may not be jurisdictional)

1. Avoid altering hydrology of site
2. Road drainage structures installed properly
3. Mandatory road BMPs followed

YES NO N/A/NN Sig. Risk

<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Section Total Percent Compliance **X. Overall Compliance**

YES NO NA/NN Sig. Risk

<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>

Overall Total Total Significant Risk Percent Compliance

Subjective Score

Needs Improvement

Pass

 No Effort Poor Fair Good Excellent

Follow Up Questions

Was activity supervised by landowner or representative?

Who?

Was landowner familiar with BMPs?

Was logger familiar with BMPs?

Has logger attended BMP Workshop?

Were BMPs included in the contract?

Is landowner a member of TFA? Landowner Association? Other?

Organization

Is remediation planned by landowner (if needed)?

YES NO N/A/NN

<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
--------------------------	--------------------------	--------------------------

<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
--------------------------	--------------------------	--------------------------

<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
--------------------------	--------------------------	--------------------------

<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
--------------------------	--------------------------	--------------------------

<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
--------------------------	--------------------------	--------------------------

<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
--------------------------	--------------------------	--------------------------

Date

Comments (Explain discrepancies observed in the field check. Make recommendations for better compliance.)

Map/Sketch Area (on back if needed)

Evaluation Criteria for BMP Monitoring Checklist Texas Forest Service BMP Project

I. General Landowner and Tract Information

County: TFS County code.

TFS Block and Grid: Enter only entry point if multiple blocks or grids.

Latitude and Longitude:

Forester Type: Professional, i.e. consultant, industry, etc.

Forester Name: First and last name.

Timber Buyer: First and last name or Corporation name.

Logging Contractor: First and last name or business name.

Activity: Type activity occurring, e.g. harvesting, site preparation, etc.

Acres Affected: Acres affected by activity.

Estimated Date of Activity: Quarter and year activity appears to have occurred. Use first entry if multiple entries.

Date of inspection: mmddyy.

Inspector: Name of TFS forester doing BMP inspection.

Accompanied by: Name of landowner, industry or consulting forester, logger, etc. who is present during the inspection.

Owner Type: Nonindustrial (N), Absentee nonindustrial (A), Industry (I), Public (P).

Name, Address, City, Zip, and Phone: Contacts for the landowner.

II. Site Characteristics

Terrain: Check only one; Flat, Hilly, or Steep.

Erodibility hazard: Check only one; Low, Medium, or High.

Type stream present: Perennial or Intermittent.

Distance to nearest permanent water body: Distance to nearest blue line stream or lake.

Predominant soil series: Series number from Soil Survey data (if available).

Predominant soil texture: Check only one; Clay, Clay Loam, Loam, Sandy Loam, or Sand.

III. Permanent Roads

1. Respect sensitive areas: Do roads avoid wet areas, SMZs, steep slopes if an alternative exist, erosion prone areas if an alternative exists, etc.?
2. Roads meet grade specs: Pertains to new roads or roads which are substantially reworked. Are roads within 2-10 percent grade except for short distances? Are roads on contour? Are ridge tops avoided?
3. Rutting within allowable specs: Is the road free of ruts in excess of 6 inches deep for more than 50 feet?
4. Well drained with appropriate structures: Are roads constructed so that water will quickly drain from them to minimize soil movement?
5. Ditches do not dump into streams: Are water turn outs and water bars venting far enough from the stream to prevent sediment from entering the stream channel?
6. Roads reshaped and stabilized: If needed, are roads reworked to minimize soil movement?

BMPs present: Which types of BMPs were used? Rolling dips (RD), Wing ditches (WD), Water bars (WB), Revegetate (RE), On contour (OC), Proper placement (PL), Reshaping (RS), Culverts (CU), Bridge (BR), Low water crossing (LW).

IV. Skid Trails/Temporary Roads

1. Slopes less than 15 %: Are skid trails run on or near contour as per guideline recommendations, rather than up and down steep slopes?
2. Respect sensitive areas: Do skid trails and temporary roads avoid wet areas, SMZs, steep slopes if an alternative exist, erosion prone areas if an alternative exists, etc.?
3. Roads well drained with water bars or other water control structures: Were BMPs installed effectively to reduce erosion from the road?
4. Roads stabilized: If needed, are skid trails and temporary roads worked to minimize soil movement?
5. Rutting within allowable specs: Are skid trails and temporary roads free of ruts in excess of 6 inches deep for more than 50 feet?

BMPs present: see section III above.

V. Stream Crossings

On Permanent Roads:

1. Stabilized: Are stream banks and fill stabilized? Are culverts properly sized? Are bridges used where necessary? Are washouts evident? Are crossings at right angles?
2. Ditches do not dump into streams: Are water turn outs and water bars venting far enough from the stream to prevent sediment from entering the stream channel?
3. Stream free of sediment: Has sedimentation from the road into the stream channel been minimized?
4. Number of crossings minimized: Was an effort made to use as few crossings as possible?

On Temporary Roads

5. Number of crossings minimized: Was an effort made to use as few crossings as possible?
6. Stream crossings correct: Is the crossing located so as to minimize the potential erosion in the stream channel? Is the crossing at a right angle to the stream channel?
7. Approaches at right angles: Are approaches at right angles to the stream channel to minimize bank disturbance?
8. Stream crossings restored and stabilized: Have the temporary crossings been removed, excess fill removed from the stream channel and the banks been stabilized against erosion? Has the SMZ been stabilized in the area of the crossing?
9. Stream free of sediment: Has sedimentation from the road into the stream channel been minimized?

BMPs present: Which types of BMPs were used? Culverts (CU), Bridge (BR), Low water crossing (LW).

VI. Streamside Management Zones

1. Present on permanent stream: Is there an SMZ present on any permanent stream?
2. Present on intermittent stream: Is there an SMZ present on any intermittent stream?
3. SMZ adequately wide: Is the stream being protected from erosion and deposition of sediments? Does the width meet the guidelines recommendations?
4. Thinning within allowable specs: If thinning was done, is the basal area remaining at least 50 square feet? Is there minimal soil disturbance from felling and skidding?
5. SMZ integrity honored: Was an effort made to stay out of the SMZ with skidders, landings, roads, etc. (except for designated stream crossings)? Is the SMZ free of firebreaks?
6. Stream clear of debris: Are tops and limbs removed from permanent and intermittent stream channels? Has any brush or debris pushed into the stream channel been removed?
7. SMZ free of roads and landings: Were guidelines followed in locating roads and landings outside of the SMZ?
8. Stream free of sediment: Has sedimentation reaching the stream channel through the SMZ been minimized?

VII. Site Preparation

Site preparation method: Shear/pile/burn, Sheer only, Drum chop, Hot fire, Chemical, Disk/bed, Sub-soil, Disk/burn, Disking only.

Regeneration method: Mechanical, Hand, Natural, None.

1. Respect sensitive areas. Effort to prevent site prep intrusion into sensitive areas? Effort to prevent heavy equipment intrusion into sensitive areas? Effort to prevent fire intrusion into sensitive areas?
2. No soil movement on site: Is there no soil movement on site? Are rills or gullies prevented? Is there no problem with broad scale sheet erosion?
3. Firebreak erosion controlled: If present, has potential erosion from firebreaks been minimized as per guideline recommendations?
4. SMZ integrity honored: Effort to prevent site prep intrusion into the SMZ? Effort to prevent heavy equipment intrusion into the SMZ? Effort to prevent fire intrusion into the SMZ? Are perennial or intermittent streams free of debris?
5. Windrows on contour / free of soil: Are windrows on contour on hilly lands rather than up and down slopes? Was soil disturbance minimized? Was soil in windrows minimized?
6. No chemicals off site: Does it appear that chemicals were used according to label directions? Have they remained on site and out of water bodies?
7. Machine planting on contour: Are rows on contour on hilly lands rather than up and down slopes?
8. Stream free of sediment: Has sedimentation reaching the stream channel because of site prep activities been minimized?

VIII. Landings

1. Locations free of oil / trash: Any sign of deliberate oil spills on soil? Is trash picked up and properly disposed of?
2. Located outside of SMZ: Was the landing located outside SMZ so as to minimize traffic and erosion in the SMZ?
3. Well drained location: Were the landings located so as to minimize puddling, soil degradation and soil movement?
4. Number and size minimized: Were the number and size of landings kept to a minimum?
5. Respect sensitive areas: Were landings kept out of wet areas, SMZs, steep slopes if an alternative exist, erosion prone areas if an alternative exists, etc.?
6. Restored / stabilized: Has the landing been back bladed or otherwise restored as per guideline recommendations? Has erosion been minimized through spreading bark, etc., seeding, water bars, or other recommended BMP practices?

IX. Wetlands (may or may not be jurisdictional)

1. Avoid altering hydrology of site: Were ruts and soil compaction kept to a minimum?
2. Road drainage structures installed properly: Were BMPs installed to effectively to maintain the flow of water and keep erosion to a minimum in the wetland?
3. Mandatory road BMPs followed: Were the 15 federal mandatory BMPs followed?

X. Overall Compliance

Section compliance percentages are determined by dividing the number of questions receiving a yes answer by the total applicable questions in each section. $Y/(Y+N)$

Overall compliance is determined in a similar manner using the totals from all sections combined. $Y/(Y+N)$

Significant Risk. A significant risk to water quality exists if during a normal rainfall sediment is likely to be delivered to a permanent water body.

Subjective Score.

No Effort: Substantial erosion as a result of operations. Sedimentation in streams. Temporary stream crossings not removed. No SMZ when needed, etc. Poor attitude evident about the job.

Poor: Some effort at installing BMPs. Generally poor quality construction or no effort in certain locations which suffer from erosion, stream sedimentation, etc. Substantial lack of BMPs in a particular emphasis such as roads, skid trails or SMZ.

Fair: (1) Generally a pretty good effort at BMPs. Poor application procedures perhaps. Lack of BMPs in a particular emphasis but with moderate consequences. (2) No BMPs on a site which requires few BMPs but has some resultant minor problems.

Good: (1) BMPs generally installed correctly. Guidelines generally followed. Allows for some failures of BMP devices or failure to observe guidelines but with light consequences. (2) Good quality job which required no BMPs and has few problems.

Excellent: (1) BMPs installed correctly. Guidelines followed. (2) Some BMPs implemented even when they might not have been required. Few if any problems exist.

Summary of Responses to BMP Compliance Monitoring Checklist Items, All Sites, Round 4

I. General Landowner and Tract Information

<u>Owner type</u>		<u>Forester type</u>		<u>Activity</u>	
NIPF	42	Industry	77	Regeneration Harvest	
NIPF-Absentee	25	Private Consultant	26	Clearcut	80
Industry	74	Federal	9	Partial	10
USFS (Public)	9			Thinning	47
				Site Prep only	13

II. Site Characteristics

<u>Terrain</u>		<u>Erodibility hazard</u>		<u>Type stream present</u>	
Flat	49	Low	50	Perennial	25
Hilly	94	Medium	73	Intermittent	46
Steep	7	High	27	Both	10
				None	69

Distance to nearest permanent water body

< 300'	38
300 - 800'	2
800 - 1600'	10
1600' +	100

Predominant soil series/texture

Clay	0	Sandy loam	78
Clay loam	15	Sand	23
Loam	33		

III. Permanent Roads 74 applicable

	<u>Yes</u>	<u>No</u>	<u>NA/NN</u>	<u>Sig. Risk</u>
1. Respect sensitive areas	73	1	76	0
2. Roads meet grade specs	74	0	76	0
3. Rutting within allowable specs	39	1	110	1
4. Well drained with appropriate structures	64	7	79	0
5. Ditches do not dump into streams	55	2	93	0
6. Roads reshaped and stabilized	32	10	108	0

IV. Skid Trails/Temporary (secondary) Roads 139 applicable

	<u>Yes</u>	<u>No</u>	<u>NA/NN</u>	<u>Sig. Risk</u>
1. Slopes less than 15%	137	2	11	0
2. Respect sensitive areas	126	13	11	2
3. Roads well drained with water bars or other water control structures	53	54	43	1
4. Roads stabilized	72	48	30	0
5. Rutting within allowable specs	76	18	56	1

V. Stream Crossings 32 applicable

<u>On Permanent Roads</u>		13 applicable		<u>Yes</u>	<u>No</u>	<u>NA/NN</u>	<u>Sig. Risk</u>
1. Stabilized				10	3	137	2
2. Ditches do not dump into streams				10	2	138	0
3. Stream free of sediment				7	6	137	1
4. Number of crossings minimized				12	1	137	0
<u>On Temporary Roads</u>		21 applicable					
5. Number of crossings minimized				19	2	129	0
6. Stream crossings correct				9	12	129	0
7. Approaches at right angles				21	0	129	0
8. Stream crossings restored and stabilized				8	13	129	1
9. Stream free of sediment				8	13	129	0

VI. Streamside Management Zones		81 applicable		
	<u>Yes</u>	<u>No</u>	<u>NA/NN</u>	<u>Sig. Risk</u>
1. Present on permanent stream	33	1	116	0
2. Present on intermittent stream	57	2	91	0
3. SMZ adequately wide	64	15	71	0
4. Thinning within allowable specs	39	19	92	0
5. SMZ integrity honored	63	18	69	0
6. Stream clear of debris	70	11	69	0
7. SMZ free of roads and landings	77	3	70	0
8. Stream free of sediment	72	8	70	2

VII. Site Preparation		50 applicable		
	<u>Yes</u>	<u>No</u>	<u>NA/NN</u>	<u>Sig. Risk</u>
1. Respect sensitive areas	50	0	100	0
2. No soil movement on site	44	5	101	1
3. Firebreak erosion controlled	24	1	125	0
4. SMZ integrity honored	29	0	121	0
5. Windrows on contour/free of soil	14	1	135	0
6. No chemicals off site	17	0	134	0
7. Machine planting on contour	3	1	146	0
8. Stream free of sediment	21	0	129	0

VIII. Landings		130 applicable		
	<u>Yes</u>	<u>No</u>	<u>NA/NN</u>	<u>Sig. Risk</u>
1. Locations free of oil/trash	128	2	20	0
2. Located outside of SMZ	89	0	61	0
3. Well-drained location	116	1	33	0
4. Number and size minimized	129	0	21	0
5. Respect sensitive areas	128	1	21	0
6. Restored/stabilized	78	4	68	0

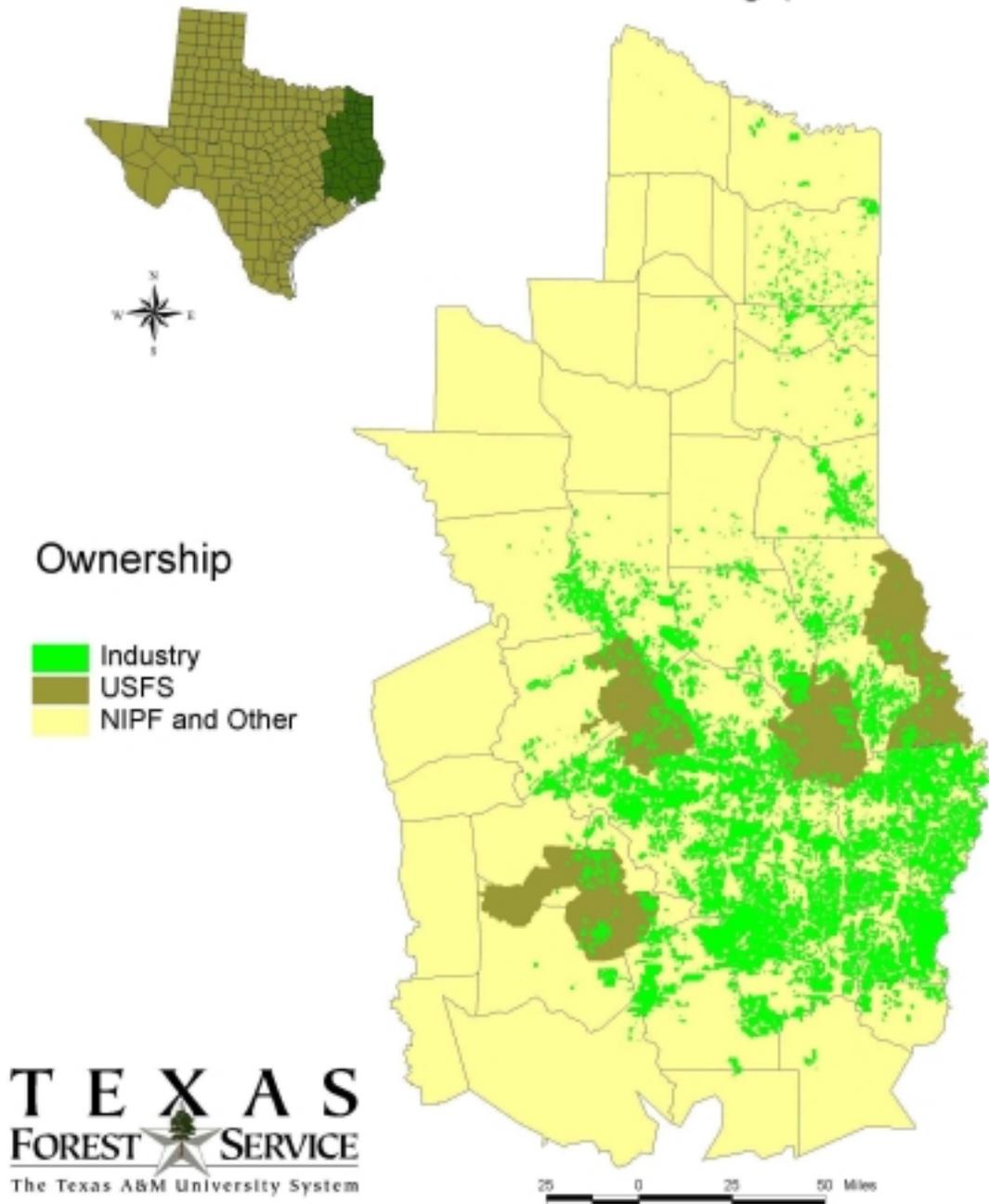
IX. Wetlands		15 applicable		
	<u>Yes</u>	<u>No</u>	<u>NA/NN</u>	<u>Sig. Risk</u>
1. Avoid altering hydrology of site	12	3	135	0
2. Road drainage structures installed properly	6	1	143	0
3. Mandatory road BMPs followed	8	0	142	0

X. Overall Compliance				
	<u>Yes</u>	<u>No</u>	<u>NA/NN</u>	<u>Sig. Risk</u>
III. Permanent Roads - 94%	337	21	542	1
IV. Skid Trails/Temporary Roads - 78%	464	135	151	4
V. Stream Crossings - 67%	104	52	1194	4
VI. Streamside Management Zones - 86%	475	77	648	2
VII. Site Preparation - 96%	202	8	990	1
VIII. Landings - 99%	668	8	224	0
IX. Wetlands - 87%	26	4	420	0

Follow-up Questions				
	<u>Yes</u>	<u>No</u>	<u>NA/NN</u>	
Was activity supervised by landowner or rep.?	133	7	10	
Was landowner familiar with BMPs?	105	30	15	
Was logger familiar with BMPs?	107	0	43	
Has logger attended BMP workshop?	73	32	45	
Were BMPs included in the contract?	102	19	29	
Is landowner a member of TFA, LO Assoc., etc.?	113	20	17	

Forestland Ownership Patterns

Fourth Round of Monitoring (1998 - 1999)



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