

Roadside Management Trends in Minnesota - 1973 to 1997

Mr. Kenneth L. Varland
Regional Wildlife Manager (acting)
Minnesota Department of Natural Resources
New Ulm, MN

Mr. Peter J. Schaefer
Roadside Wildlife Technician
Minnesota Department of Natural Resources
New Ulm, MN

Abstract

Minnesota's Roadside Wildlife Program (RWF) was initiated in 1984 to (1) promote roadside habitat awareness, (2) reduce spring/ summer roadside disturbance, and (3) improve quality of roadside habitat. Special roadside management surveys completed in 1973 and 1983 indicated that roadside disturbance was negatively impacting wildlife habitat on more than 40 % of roadsides. Each August, since 1984, the RWF Program conducted a management survey that coincides with the DNR's roadside wildlife counts to measure the Program's impacts and determine management trends. Roadside mowing dominated roadside disturbance. Disturbance has averaged a 19% decline impacting 42,450 ha since the beginning of the Program. A 1985 roadside mowing law has resulted in reduced roadside mowing. Weather is also a factor. Undisturbed roadside vegetation has remained relatively stable since 1987. The greatest reductions in roadside disturbance have occurred in east-central and west-central regions. The peak of mowing activity during summer has remained the same since 1984 with about 80 % occurring during July 1-31. Other disturbance factors (lawns and agricultural encroachment) have increased in east-central, south-central, and west-central regions. Poor quality nesting cover remained relatively stable from 1992-97 and averaged about 16% of roadsides surveyed. Good quality cover increased from 25% to 45% and moderate quality cover declined during this period. A public relations approach to roadside management has brought about changes in legislation, mowing behavior, and greater participation by road authorities. Future Program emphasis will include integrated roadside vegetation management and increased use of native prairie vegetation.

Key words: farmland, grassland, habitat, Minnesota, roadsides, wildlife.

Land use changes over the past half century have gradually depleted much of the wildlife habitat once found in farming regions of the upper Midwest (Mohlis 1974). Lack of undisturbed grasslands suitable for nesting and brooding is one of the major factors contributing to low numbers of many grassland nesting species [e.g. songbirds, ring-necked pheasants (*Phasianus colchicus*) (Graber and Graber 1983)]. Although grassy roadsides comprise only 1.5 % of land the area, they have gained increased importance as wildlife habitat because of their relative permanence and widespread uniform distribution.

Leopold (1931) remarked on the importance of roadsides as wildlife habitat in 1931 and scolded those who thought wild roadside vegetation is ugly and must be cut down". In fact, researchers in the Midwest have found that roadsides are important nesting areas and contribute significantly to pheasant populations (Linder et al. 1960, Chesness 1965, Chesness et al. 1968, Joselyn et al. 1968, Baxter and Wolfe 1973, Trautman 1982, Warner and Joselyn 1986). Roadsides are preferred nesting cover for gray partridge (*Perdix perdix*) in Iowa (Bishop et al. 1977) and North Dakota (Carroll 1987). Roadsides can also provide nesting habitat for waterfowl, mourning doves (*Zenaidura macroura*), killdeer (*Charadrius vociferus*) (Oetting and Cassel 1971), greater prairie-chicken (*Tympanuchus cupido*), sharp-tailed grouse (*T.*

phasianellus) (Svedarsky 1977), meadowlark (*Sturnella* spp), savannah sparrow (*Passerculus sandwichensis*), and several other songbirds.

Background Information

Roadsides occupy approximately 1.5% of Minnesota's land area (about equal to the size of Rhode Island). More than 123,455 kilometers (km) (76,731 miles) (mi) of roads comprising 212,749 hectares (ha) (525,307 acres) (ac) of vegetated roadsides occur in Minnesota's pheasant range. These rights-of-way are dominated by county and township roads which comprise nearly 83% of the total roadside area.

State and federal highways in the pheasant range [12,849 km (7,986 mi); 36,546 ha (90,241 ac) of roadside cover] are generally paved and have relatively wide rights-of-way [43.9 meters (m) (143.8 ft) to 49.0 m (160.6 feet (ft))] with shallow ditches conducive to roadside mowing. Mean roadside width (one side) is 13.6 m (44.5 ft) for federal highways and 14.2 m (46.7 ft) for state highways. These roads are maintained by the Minnesota Department of Transportation (DOT). About 40% of the rights-of-way are owned in fee-title by the State, and the remainder is controlled by easement.

County highways [47,233 km (29,356 mi); 87,907 ha (217,056 ac) of roadside cover] are managed by individual highway departments. These roads may be either paved or graveled. Most rights-of-way are controlled by easements, with the adjacent landowner having fee title to the center line of the road, but a few are owned in fee title by the county. County rights-of-way are generally between 23.4 m (76.7 ft) and 31.0 m (101.7 ft) wide. Mean roadside width (one side) is 10.0 m (32.7 ft) for county state-aid highways and 7.8 m (25.5 ft) for county roads.

Township roads [63,373 km (39,387 mi); 88,294 ha (218,010 ac) of roadside cover] are usually rural, gravel roads with a 20.2 m (66.1 ft) right-a-way and narrow ditches. Mean roadside width (one side) is 7.0 m (22.9 ft). Township roads are maintained by the local township board and are almost always under easement from the adjacent landowner.

Special roadside vegetation management surveys were conducted in Minnesota's pheasant range (Figure 1) in 1973 and 1983 (Schad 1984). The weighted mean for the amount of disturbance to roadside vegetation by the end of July was 37 % for all roads in 1973 and 44 % in 1983, an increase of 21 %. Cover quality of undisturbed roadsides, however, appeared to have changed more dramatically where roadsides were mowed the most. In 1973, only 34% of the roadside vegetation was rated good or excellent, whereas in 1983, these categories accounted for 70%.

Despite a preponderance of roadside disturbance, 60% of rural Minnesota landowners surveyed in 1973 indicated that they thought roadsides were useful to nesting wildlife (Montag 1981). The main reasons given for mowing were snow drift, weed control, neatness, and need for hay. In addition, 63% of county highway engineers surveyed encouraged landowners to mow roadsides because they believed that this would reduce time and money spent on maintenance (Montag 1981). Information derived indicated that

closer coordination with state and local officials and a better informed public could increase the quantity and quality of undisturbed roadside habitat.

The Minnesota Department of Natural Resources (DNR) initiated the "Roadsides for Wildlife" Program (RFW) in May 1984 in response to the results of these surveys. The RFW Program's objectives are: (1) to make people more aware of the importance of roadsides as wildlife habitat; (2) to reduce disturbance and destruction of roadside wildlife and habitats, especially during the spring and summer nesting season; and, (3) to improve the quality of roadside habitat for the benefit of wildlife.

To accomplish these objectives, a variety of public relations techniques and roadsides seeding demonstration projects have been employed to create a grassroots interest in roadside management so that other individuals and groups become involved in managing roadside vegetation for the benefit of wildlife.

Methods used to disseminate information to target audiences over a wide area include all forms of mass media as well as "networking" with DNR area wildlife managers, sportsmen, groups and interested individuals. Road officials are contacted personally to discuss how their goals for roadside maintenance could be integrated with wildlife habitat management.

Information is provided to youth groups in the state's pheasant range via a "Roadsides are for the Birds" Poster Contest. A 12-part "Roadsides for Wildlife" school curriculum is available to teachers upon request.

Demonstration seedings are being used with emphasis placed on showing how the establishment and management of low-maintenance, native prairie vegetation can meet road authorities long-term needs as well as provide good wildlife cover. In addition, a cost-share program is being used whereby local road authorities are given partial reimbursement for DNR approved prairie seed mixtures for use on newly re-graded roads if they agree to certain management conditions for a period of 10 years. Voluntary mowing reduction by adjacent landowners is a prerequisite for cost-sharing.

Legislative changes have also been implemented. One of the first major by-products of our public relations campaign was a new Minnesota Statute, passed in 1985, which restricted when state, county, and township road authorities may mow rural roadsides. The law, in effect, prohibited all but roadside shoulder mowing until after 31 July and before October 1 of each year. Exceptions were allowed for noxious weed and safety consideration. In general, the law does not limit mowing by adjacent landowners on easement highways. Sportsmen groups like Pheasants Forever, Inc. played a major role in lobbying for the law's passage.

The RFW Program also became involved in a Wildflower Task Force, promoted by the Lt. Governor, to make wildflowers a cornerstone in the beautification of Minnesota's roadsides. Minnesota now has designated 6 roadside Wildflower Routes along state highways. In addition, 15 proposed Wildflower Routes are awaiting designation. Minnesota Department of Transportation (DOT) is now committed to seeding a projected 14,100 ha (35,000 acres) of prairie grasses and wildflowers along newly constructed rights-of-way during the next 20 years. Joint DNR-DOT coordination efforts involve preservation and restoration projects in most Minnesota counties.

The scope of this paper is to present trends in roadside vegetation management since the creation of the RFW Program, keeping in mind the background information just provided.

Methods

Information relating to June and July roadside cover disturbance (primarily mowing) was collected in 1973 (Montag 1981) and 1983 (Schad 1984) prior to the initiation of the RFW Program. In 1973, the following information was obtained for 1650 miles of roadside sampled (measured 8221 sample points): mean width of surveyed roadsides, percent of roadside vegetation classified as excellent, good, fair, or poor, and percent of roadside vegetation destroyed by July 26. In 1983, the following information

was obtained (measured 6577 sample points): miles of roadway, average width of roadway, acres of roadside, average legal road width, amount (percent) of cover destroyed, percent roadways encroached on, average feet lost to encroachment, estimated acres lost to encroachment, and quality of cover (height and density).

In 1973 and 1983 roads were sampled to closely resemble the relative percentage of each road type breakdown for the study area for federal, state, county, and township roads.

Some differences in the two surveys were:

- * In 1973, 45 counties in Minnesota's pheasant range were surveyed. In 1983, all 64 counties of the pheasant range were surveyed.

- * In 1973, landowners and highway engineers were surveyed to determine how and why they managed roadsides. In 1983, there was no management survey of landowner and highway engineers.

- * In 1983, the total right-of-way width was measured and legal right-of-way widths were obtained from highway engineers.

- * In 1973, the week of vegetation destruction, if any, was determined as well as the type and amount of destruction. In 1983, the type and amount of destruction was recorded only as before or after July 28.

- * In 1983, mowing and haying were differentiated, whereas in 1973, they were grouped together under mowing.

Since 1984, annual roadside vegetation management information has been collected by Minnesota DNR personnel who were also conducting roadside wildlife counts. One-hundred seventy of these 25-mile roadside routes are surveyed from August 1 to 15 each year. The following information is obtained on one side of the road for ten, 1-mile segments sampled: side of road, type of road, estimated percent mowed, estimated date of mowing (between 1 June and 15 August), percent of "other" disturbance, types of "other" disturbance, percent undisturbed, quality of undisturbed nesting cover for pheasants or mallards (*Anas platyrhynchos*). Miles of roadside surveyed were 670 and 688 for 1984 and 1985 respectively. Miles sampled for the period 1986 through 1997 ranged from 1190 to 1530 and averaged 1430.

Results

Roadside Vegetation Disturbance

Roadsides surveyed in 1973 and 1983 included all road types (federal and state highways, county, township roads). The 1973 and 1983 data were adjusted by using weighted means to match the road type composition of the wildlife roadsides census routes (primarily on township and county secondary roads).

Disturbance to roadside vegetation by the end of July, 1973 had a weighted mean of about 40.8% for roads in Minnesota's pheasant range.

A similar analysis of 1983 data (Schad 1984) indicated that about 42.7% of the roadside vegetation was disturbed or destroyed by the end of July (mowed, driven on, grazed, burned, eroded, flooded, or under construction). In addition, farm tillage encroachment eliminated nesting cover from more than 20,800 ha (51,376 ac) annually.

Of this disturbance in 1983, 57% of the roadside segments sampled (estimated to be 93,800 ha (231,686 ac) for the pheasant range) were mowed, much of it for hay harvest along federal, state and county highways. The percent cover disturbed for the different road types were as follows: federal highways (57%), state highways (52%), county state-aid highways (47%), county roads (44%), and township roads (38%). Disturbance was greatest in intensively farmed areas of western and southwestern Minnesota. Furthermore, quality of nesting cover for more than 58,000 ha of grassy roadsides in the pheasant range were rated only poor to fair based on vegetation height and density (Schad 1984).

Roads surveyed from 1984 to 1997 were primarily secondary township and county roads. The year 1984 is considered a "base" year for the RFW Program because disturbance in 1984 was similar to 1973 and 1983. Comparisons of subsequent changes in roadside

disturbance for the period 1985-1997 were made with this "base" year.

During the period 1985 to 1997, spring and summer roadside disturbance has declined throughout the pheasant range and has averaged about 34%. This decline has averaged 19.0% along county and township roads sampled within Minnesota's pheasant range (Figure 2) when compared to 1984. The greatest reduction in disturbance occurred in 1986 when only 28.6% of roadside vegetation was disturbed. Roadside disturbance was slightly higher in 1988 (38.6%) and slightly lower in 1993 (30.8%). Disturbance increased again in 1994 but leveled off in subsequent years. The peak of mowing activity during summer has remained the same since 1984 with about 80 % of the activity occurring during July 1-31.

Most of the disturbance was attributable to roadside mowing (Figures 3 through 9) although mowing was reduced in all regions of the pheasant range. The greatest reductions in mowing have occurred in east-central (67 %) and west-central (48 %) Minnesota. The least reduction occurred in south-central Minnesota (8%). If this reduction in roadside disturbance is extrapolated to the entire pheasant range, this computes to more than 17,180 ha (42,450 acres) of additional undisturbed roadside habitat available to farmland wildlife during the spring and summer nesting season.

Despite the fact that roadside mowing has decreased, the amount of undisturbed vegetation has remained relatively stable since 1987. Increased disturbance from agriculture in the west-central region and lawns in the east-central, south-east, and south-central regions are the primary reasons for this. The amount of undisturbed vegetation has increased in the south-west region and decreased in the east-central region since 1987.

Roadside Vegetation Quality

Because nesting cover requirements vary a great deal among wildlife species, quality of roadside nesting cover was visually classified as it related to nesting cover for ring-necked pheasants or mallards. Relative quality of undisturbed roadside nesting cover was rated as either poor, moderate, or good from 1992 to 1997 (Figure 10). Poor cover remained relatively stable during this period and averaged about 16%. Good quality cover increased from about 25% to about 45 % during this period. At the same time, moderate quality cover declined.

Roadside Disturbance from "Other" Factors

Other roadside disturbance factors, besides mowing, that were recorded in the August roadside surveys included agriculture, grazing, construction, lawns, and other (development, burning).

The roadside survey form was changed in 1992. Rather than record the actual percent disturbance for any one factor, the surveyor recorded the disturbance based on a pre-determined category such as 0 %, 10 %, 20 %, 30 %, etc. This had an impact on the relative occurrence of minor disturbance factors that normally impacted less than 10 % of any roadside area. Thus the "other" non-mowing roadside disturbances may be inflated slightly.

Both agriculture and lawns showed increases from 1984 to 1997 (Figure 11). Lawns showed the biggest increases in east-central, south-east, and south-central regions. Agriculture showed the biggest increase in the west-central region.

Discussion and Management Implications

Creation of the RFW Program in Minnesota has resulted in several significant changes to our roadside vegetation management program statewide. The passage of a 1985 law resulted in a sharp decrease (32.5%) in roadside mowing between 1984 and 1986. Reduced mowing has been maintained since that time. The only significant variations to this were in 1988 when roadside mowing increased (probably because of dry weather conditions which increased the need for roadside hay) (National Oceanic and Atmospheric Administration 1988) and in 1993 where roadside mowing decreased (probably because of extremely wet conditions

which prevented roadsides from being mowed because roadside ditches were full of water) (National Oceanic and Atmospheric Administration 1993). An "increase" in 1994 resulted from a probable short term need for roadside hay. The law does not limit mowing by adjacent private landowners on easement highways.

Over the past 14 years, RFW Program personnel completed or provided coordination for demonstration seeding projects at more than 165 sites totaling over 6226 ha (2520 acres). Particular emphasis is being placed on restoration of native prairie vegetation in Minnesota roadsides.

Public relations is vital for any natural resources program to function and make progress (Gilbert 1971). One of the major missions of Minnesota's RFW Program is to inform the public about roadside habitat and create a grassroots effort in reducing roadside disturbance for the benefit of wildlife. Our public relations and awareness projects have generated an increased interest by road officials, conservation groups and individuals.

Networking with wildlife managers, key individuals from the private sector, and statewide groups such as Pheasants Forever, Inc. has allowed the roadside message to be spread beyond the capabilities of the RFW Program's small staff. This in turn has brought about changes in legislation, spring and summer mowing behavior, and increased participation by road authorities in roadside for wildlife seeding and habitat improvement projects. In addition, the roadsides message has generated interest beyond Minnesota's borders as we have received numerous calls and letters of inquiry from other states.

Warner and Joselyn (1986) reported a positive response by pheasant populations in Illinois where block roadside management was practiced. We have not tested the relationship between reduced roadside mowing and its possible effect on wildlife populations.

"Roadsides for Wildlife" is not the end-all answer to declining wildlife populations in the farming areas of the Midwest. It is simply one piece of the puzzle of restoring wildlife to our landscape. Changing perceptions and management practices along roadsides in farming areas probably will require a long-term effort utilizing a variety of public relations tools, legislative initiatives, improved seeding mixtures and establishment techniques, and cooperative support by sportsmen and interested rural residents.

It is not practical for the DNR to duplicate work that is already being done by road authorities. It is more efficient to create awareness, provide demonstration areas, and modify existing management practices to produce wildlife habitat benefits. The results have been promising.

Acknowledgments

We wish to thank the following for their assistance in the collection of data: Dave Pauley and Cathy Fouchi. We would also like to thank the following for their help in editing and data analysis: Don Nelson, Bob Barta, Jane Mueller, John Schladweiler, Tom Conroy, and Rachel Bode. Special thanks goes to Al Berner and Mike Osterberg for their extra help in the final stages of this project. Numerous Minnesota DNR staffers assisted in diligently performing roadside management surveys during the period 1984 to 1997 and for this we are grateful.

References Cited

- Baxter, W.L. and C.W. Wolfe. 1973. Life history and ecology of the ring-necked pheasant in Nebraska. Nebr. Game and Parks Commission, Lincoln. 58pp.
- Bishop, R.A., R.C. Nomsen, and R.E. Andrews. 1977. A look at Iowa's Hungarian partridge. Page 10-28 in G.D. Kobriger, ed., Perdix I: Hungarian partridge workshop. Central Mtns. and Plains Sec. And North Dakota Chapter The Wildl. Soc., Dickinson, N.D.
- Carroll, J.P. 1987. Gray partridge ecology in north-central North Dakota. Page 123 in R.O. Kimmel, J.W. Schulz, and G.J.

- Mitchell, eds., *Perdix IV: gray partridge workshop*. Minn. Dep. Nat. Resour., Mendota.
- Chambers, R.A. 1965. Ringneck nesting ... southern Minnesota style. *Minn. Conserv. Volunteer*. 28:48-51.
- Graber, J. And R. Graber. 1983. Declining grasslands birds. *Illinois Nat. Hist. Surv. Rep.* 227:1-2.
- Gilbert, D.L. 1971. Natural resources and public relations. *The Wildl. Soc.*, Washington, D.C. 320pp.
- Joselyn, G.B., Warnock, and S.L. Etter. 1968. Manipulation of roadside cover for nesting pheasants -- a preliminary report. *J. Wildl. Manage.* 32:217-233.
- Leopold, A. 1931. *Vegetation and birds in 1931 report of the Iowa State Horticultural Society Vol. LXXVI. Des Moines.*
- Linder, R.L., D.L. Lynn, and C.P. Agee. 1960. An analysis of pheasant nesting in south-central Nebraska. *Trans. North Am. Wildl. Conf.* 25:214-230.
- Montag, D. 1981. A condition and management survey of roadsides in Minnesota's agricultural area, 1973. *Minn. Wildl. Res. Q.* 41:41-70.
- Mohle, C.K. 1974. *Land use and pheasant habitat in north-central Iowa, 1938-1973. M.S. Thesis. Iowa State Univ., Ames. 84pp.*
- National Oceanic and Atmospheric Administration. 1988. *Climatological Data Annual Summary, Minnesota, 1988. National Climatic Data Center, Asheville, N.C. Vol. 94.*
- National Oceanic and Atmospheric Administration. 1993. *Climatological Data Annual Summary, Minnesota, 1993. National Climatic Data Center, Asheville, N.C. Vol. 99.*
- Oetting, R.B. and J.F. Cassel. 1971. Waterfowl nesting on interstate highway right-of-way in North Dakota. *J. Wildl. Manage.* 35:774-781.
- Schad, D. 1984. Status of Minnesota's pheasant range roadsides, 1983 and changes since 1973. *Minn. Dep. Nat. Resour., St. Paul. 21pp.*
- Svedarsky, W.D. 1977. Roadside nesting by prairie grouse in northwest Minnesota. *Prairie Nat.* 9:41-42.
- Trautman, C.G. 1982. History, ecology and management of the ring-necked pheasant in South Dakota. *S.D. Dep. Game, Fish, and Parks. Bull 7. 118pp.*
- Warner, R.E. and G.B. Joselyn. 1986. Responses of Illinois ring-necked pheasant populations to block roadside management. *J. Wildl. Manage.* 50:525-532.

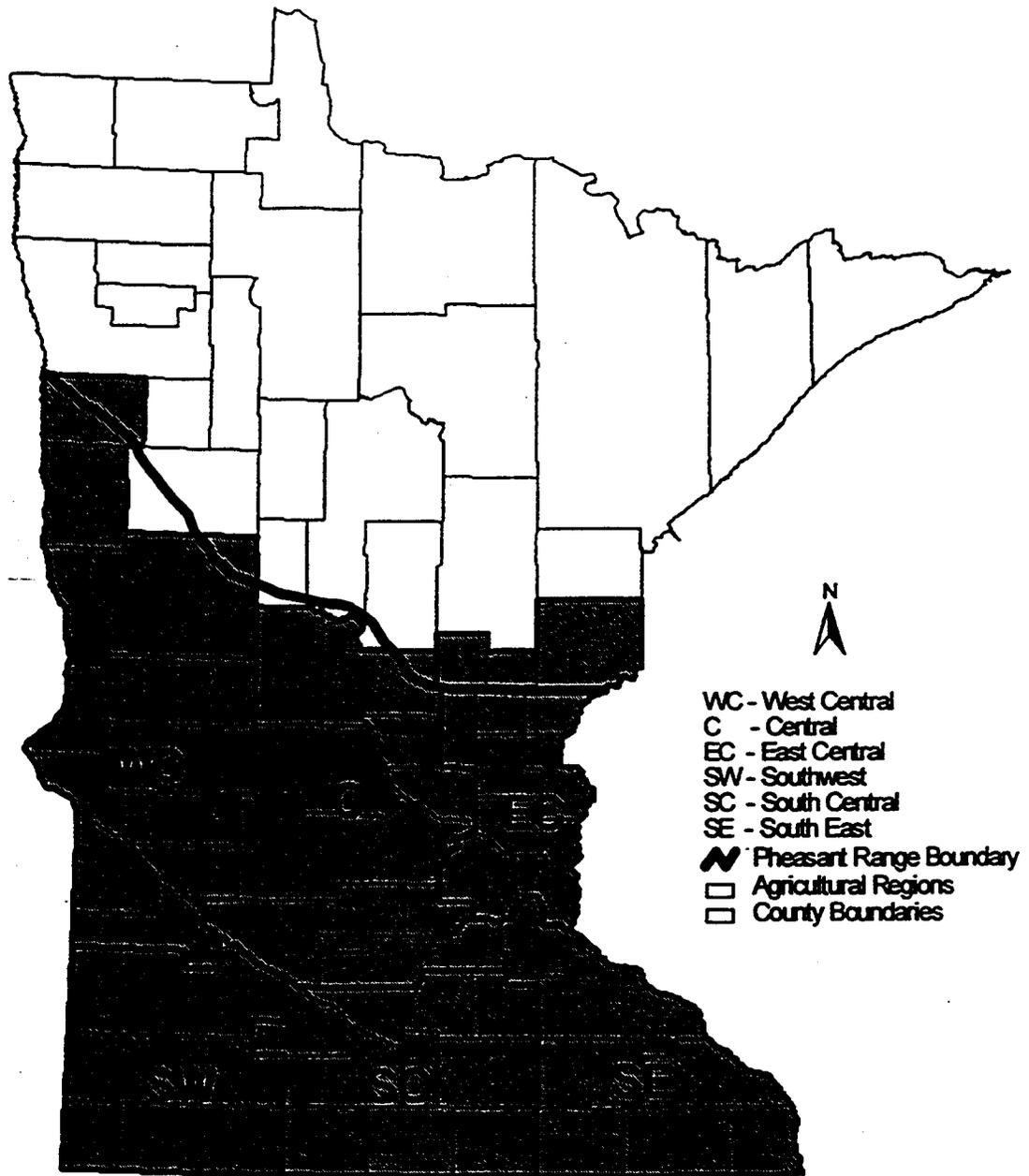


Figure 1.
Minnesota counties (shaded area) where the "Roadsides for Wildlife" Program conducted roadside management surveys from 1984 to 1997. The range of ring-necked pheasant lies south of the heavy black line.

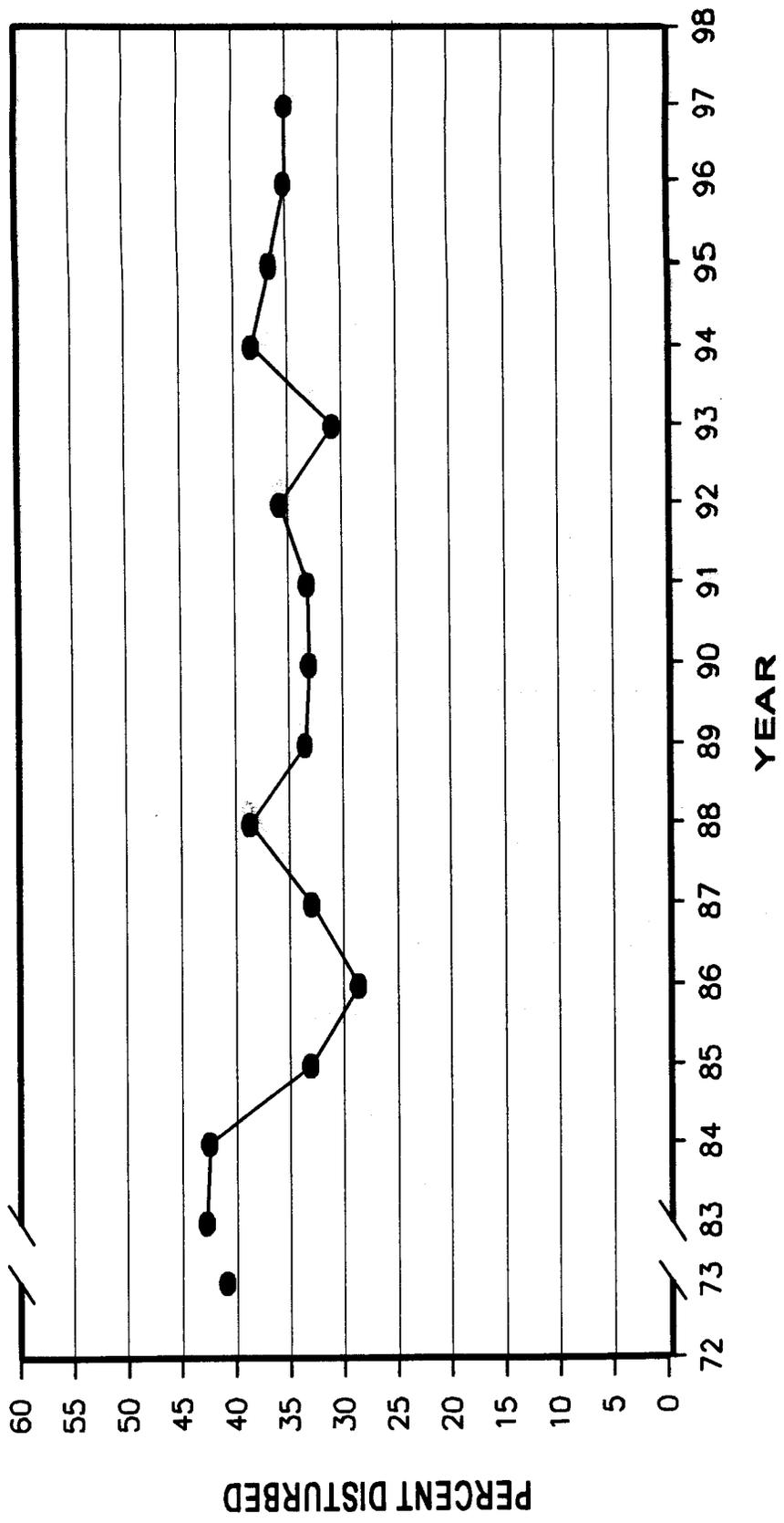


Figure 2.
 Estimated percent of all roadside disturbance (primarily mowing) during June and July for the years 1973 and 1983 through 1997 within Minnesota's pheasant range. (Data for 1984-1997 also included mowing that occurred August 1-15.)

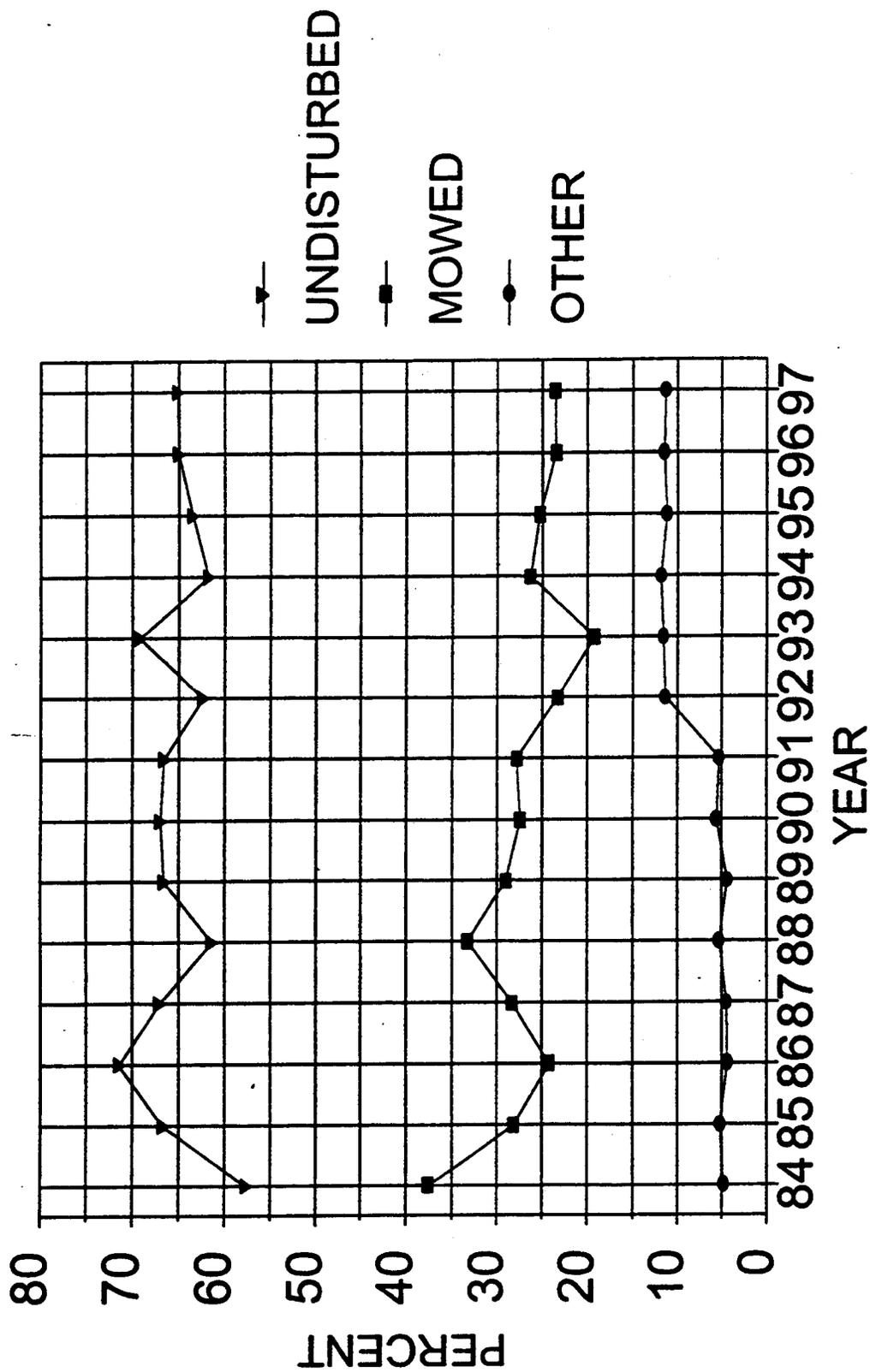


Figure 3.
 Percent of roadside vegetation in Minnesota's pheasant range which was undisturbed, mowed, or had other disturbance (agriculture, development, construction, lawn, burned, or grazed) from 1984-1997.

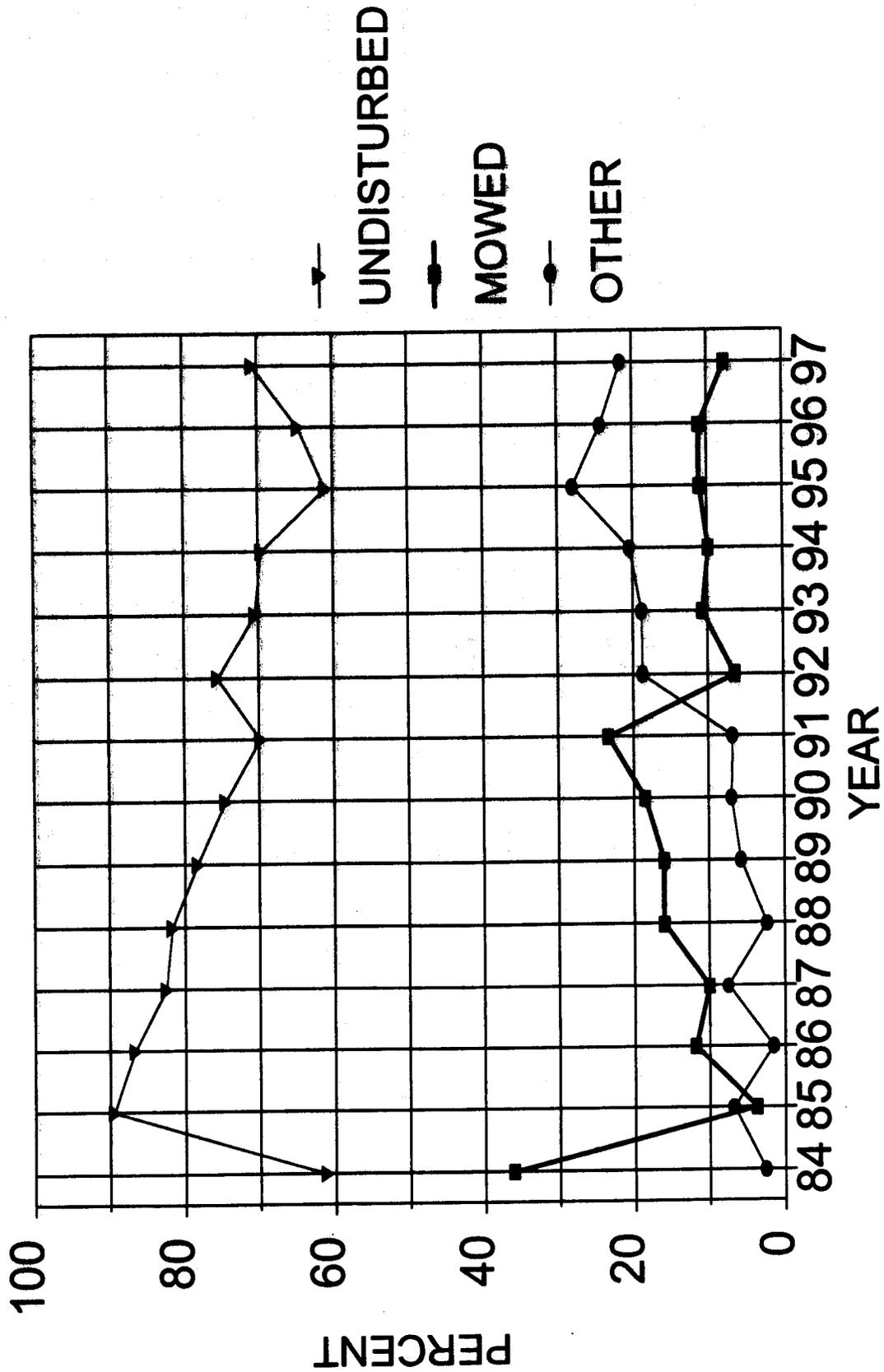


Figure 4.
 Percent of roadside vegetation in Minnesota's east-central region which was undisturbed, mowed, or had other disturbance (agriculture, development, construction, lawn, burned, or grazed) from 1984-1997.

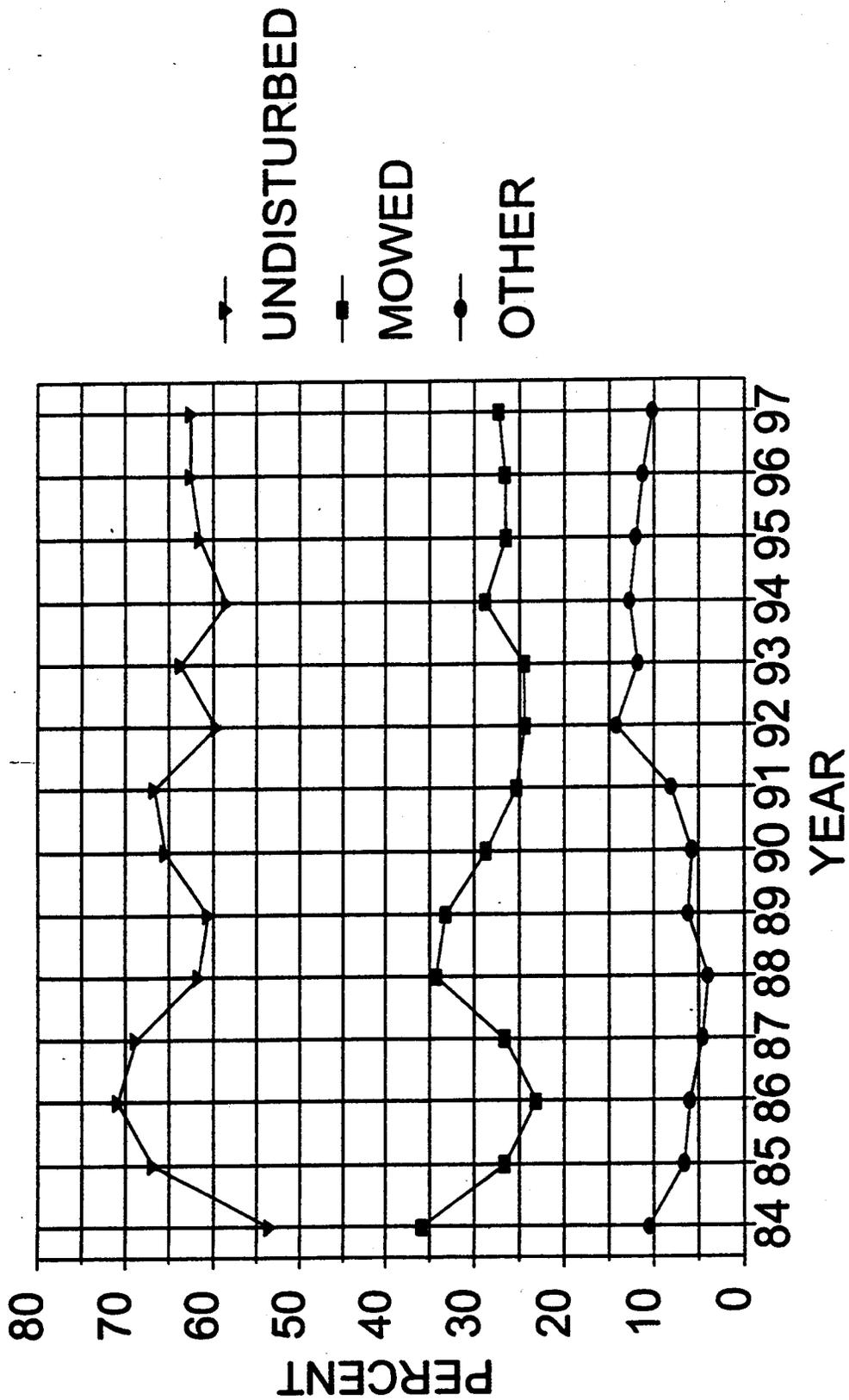


Figure 5.
 Percent of roadside vegetation in Minnesota's central region which was undisturbed, mowed, or had other disturbance (agriculture, development, construction, lawn, burned, or grazed) from 1984-1997.

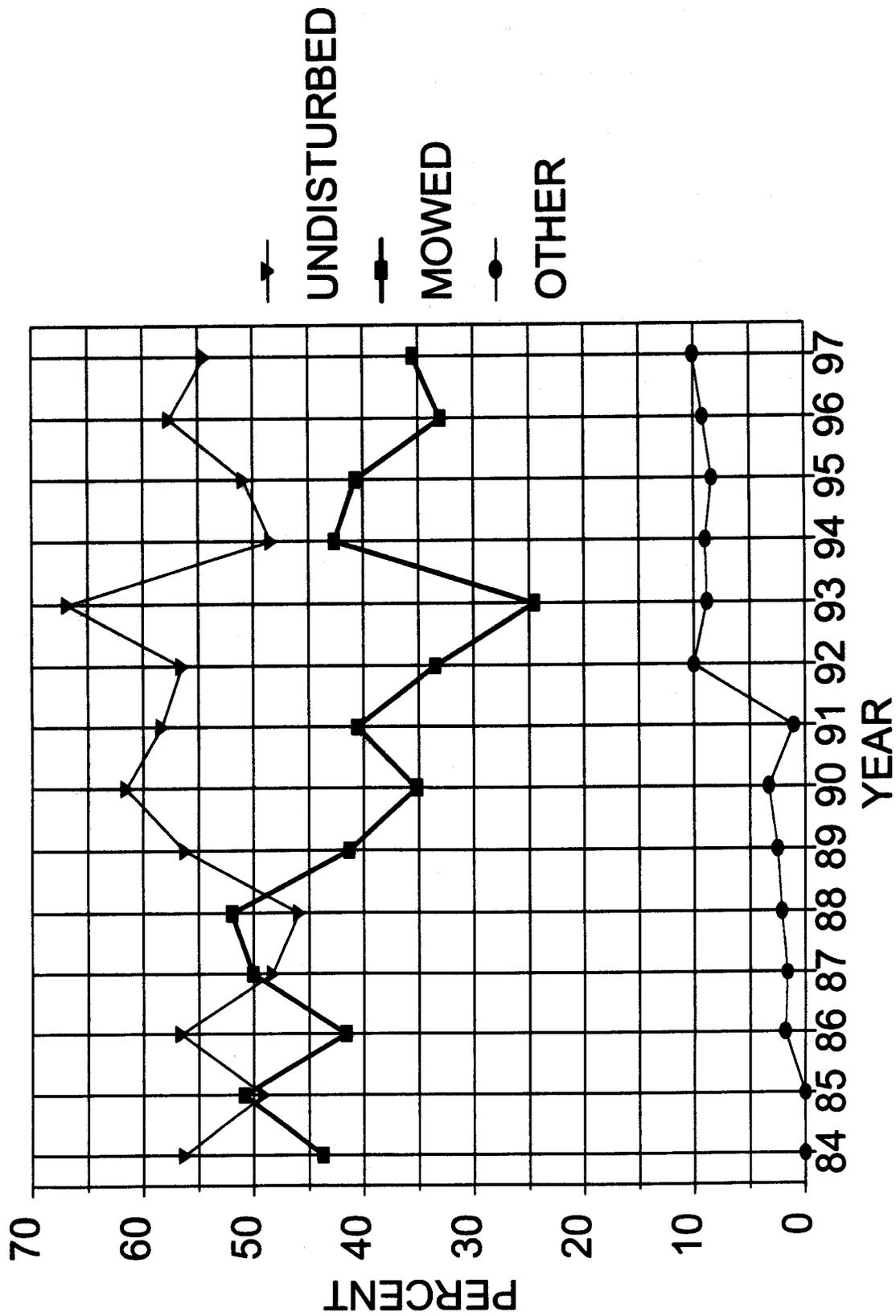


Figure 6.
 Percent of roadside vegetation in Minnesota's south-central region which was undisturbed, mowed, or had other disturbance (agriculture, development, construction, lawn, burned, or grazed) from 1984-1997.

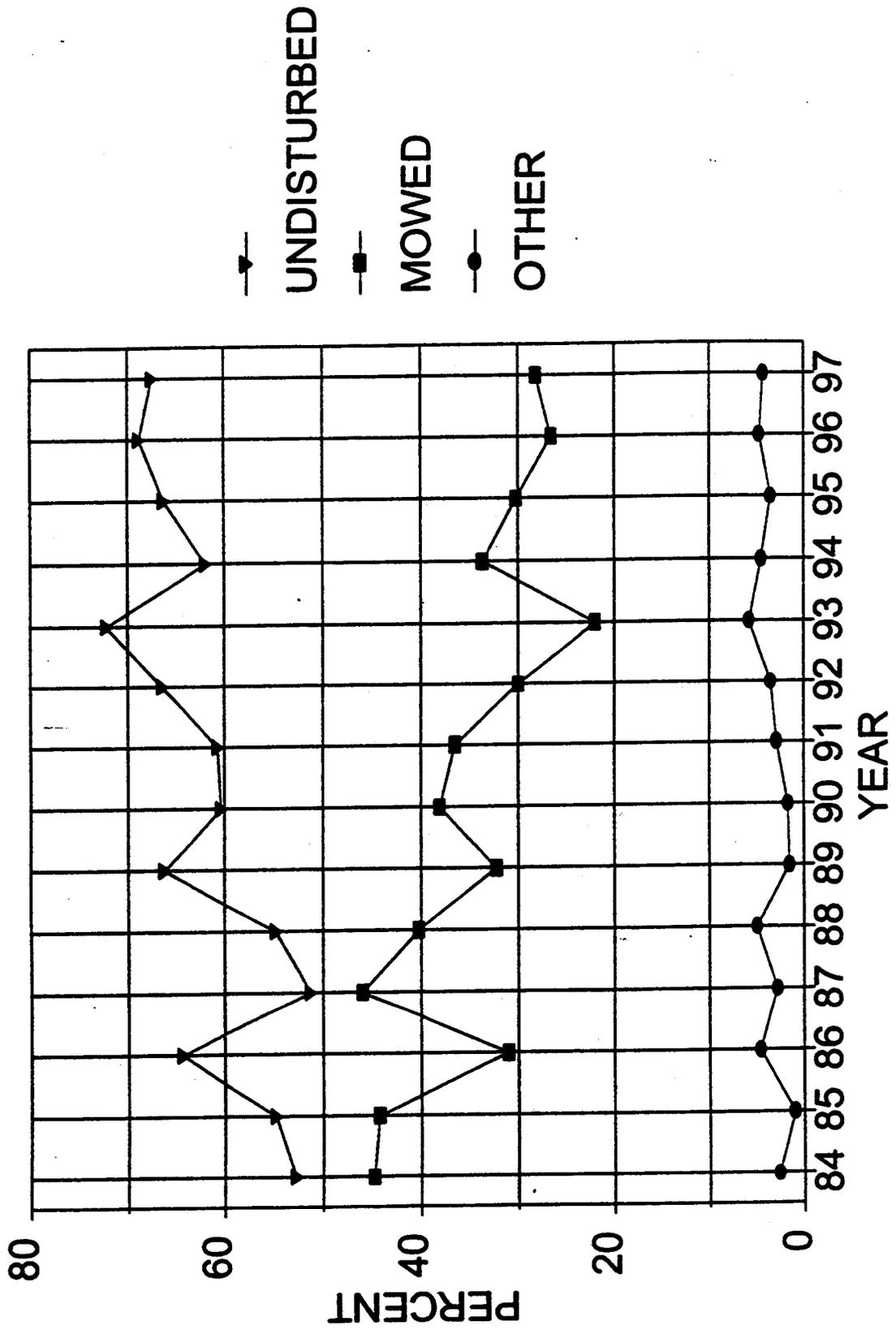


Figure 7.
 Percent of roadside vegetation in Minnesota's south-west region which was undisturbed, mowed, or had other disturbance (agriculture, development, construction, lawn, burned, or grazed) from 1984-1997.

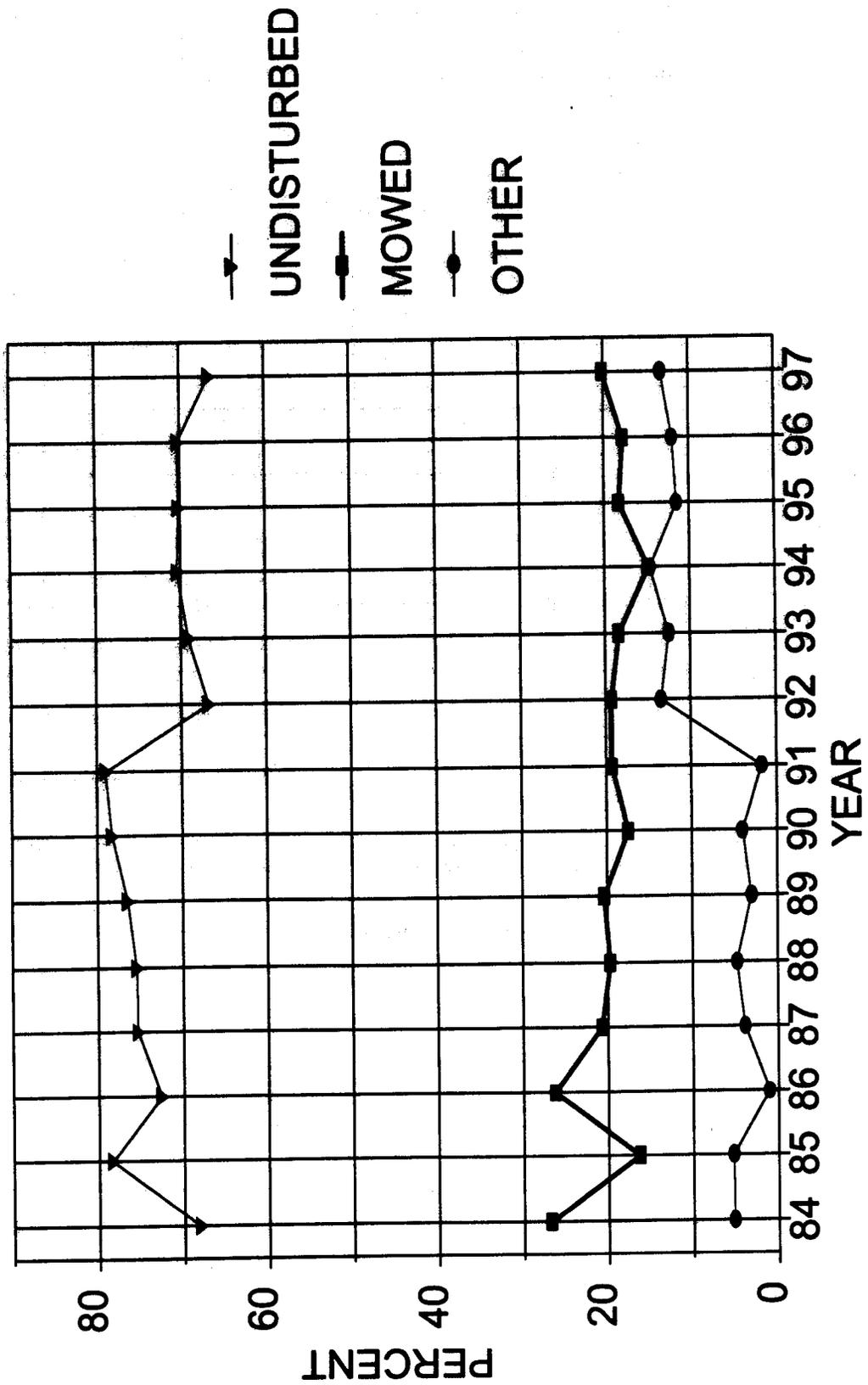


Figure 8.
 Percent of roadside vegetation in Minnesota's south-east region which was undisturbed, mowed, or had other disturbance (agriculture, development, construction, lawn, burned, or grazed) from 1984-1997.

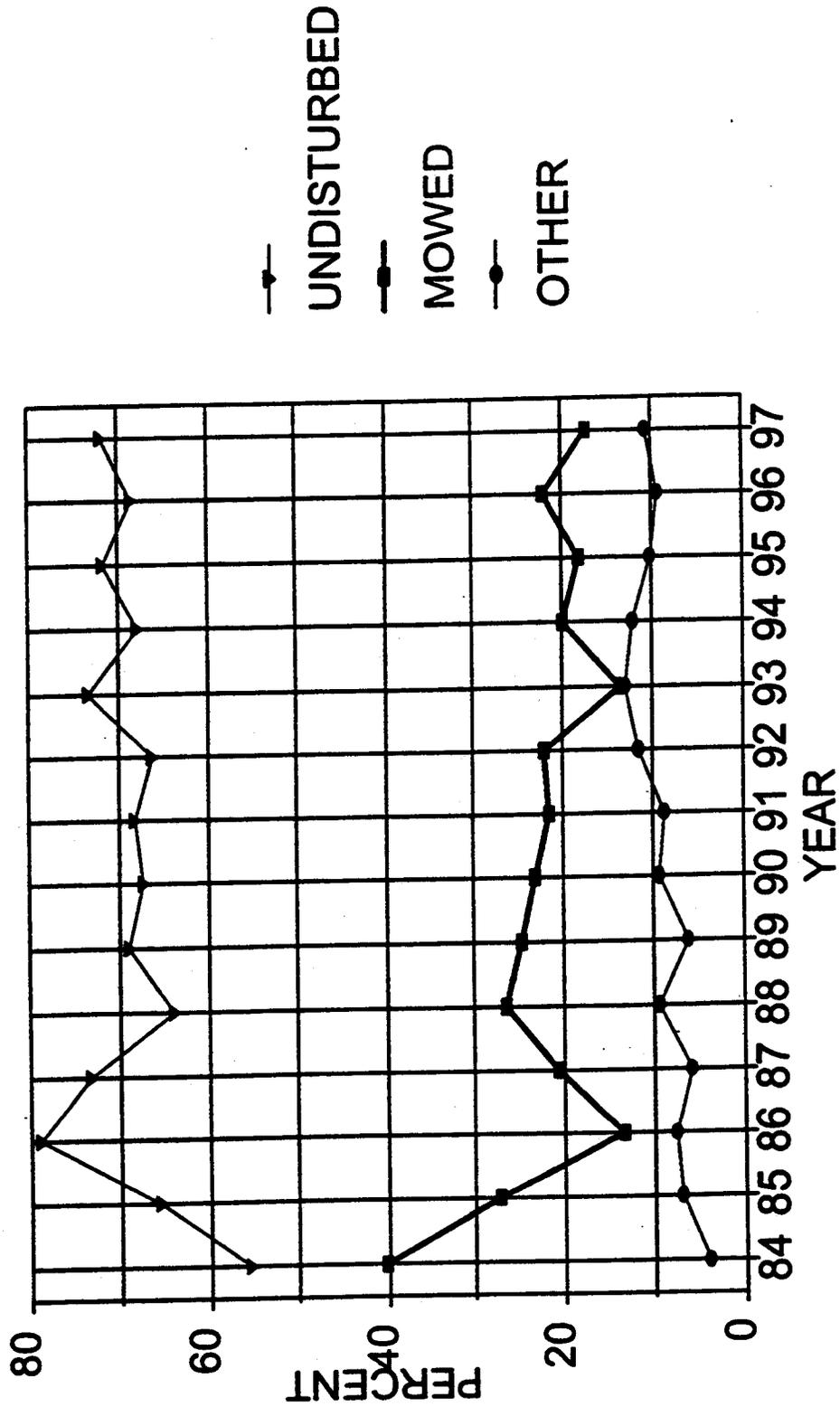


Figure 9. Percent of roadside vegetation in Minnesota's west-central region which was undisturbed, mowed, or had other disturbance (agriculture, development, construction, lawns, burned, or grazed) from 1984-1997. Figure 9. Percent of roadside vegetation in Minnesota's west-central region which was undisturbed, mowed, or had other disturbance (agriculture, development, construction, lawns, burned, or grazed) from 1984-1997.

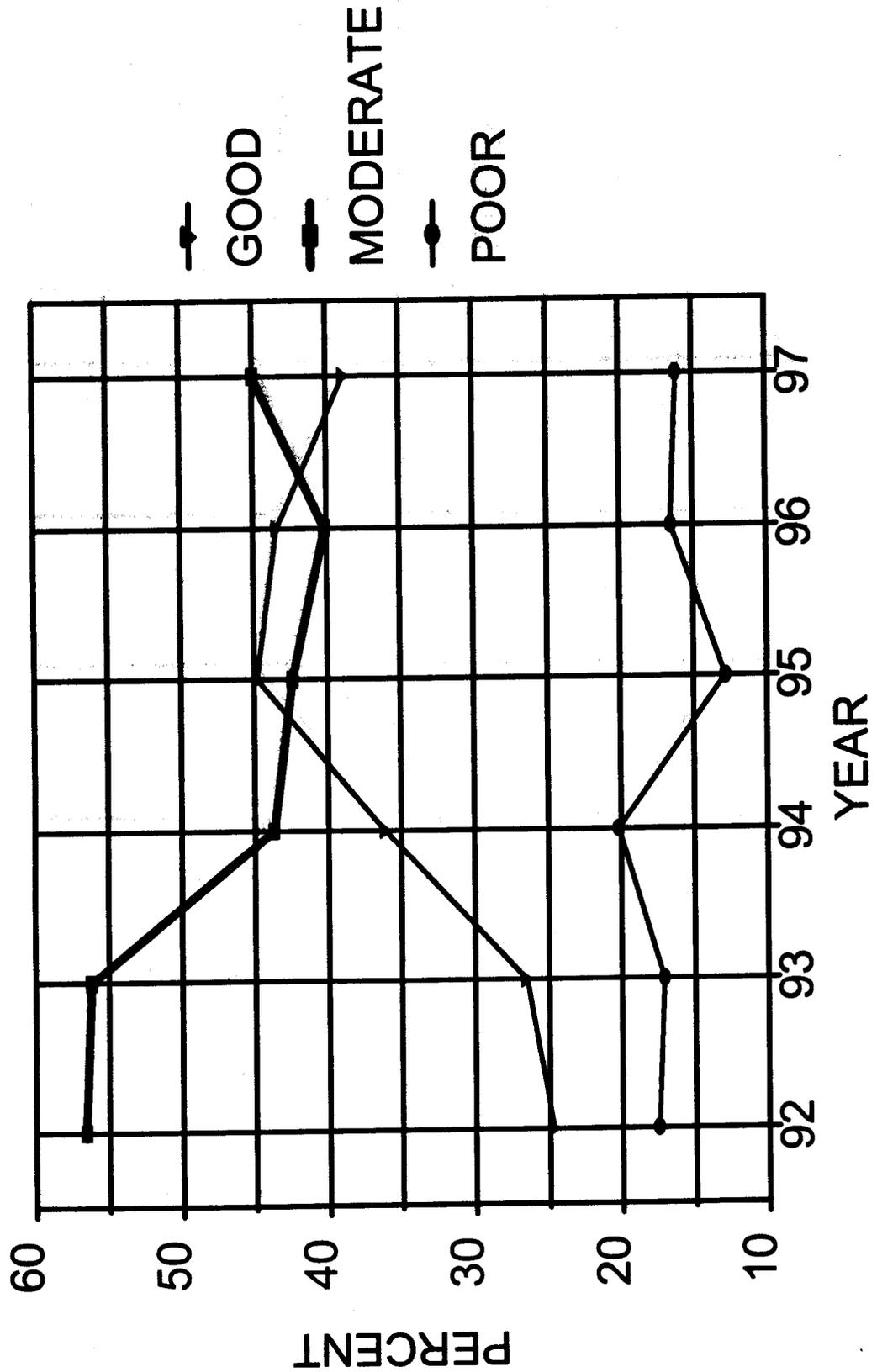


Figure 10.
 Relative "quality" of undisturbed roadside nesting cover in Minnesota's pheasant range, 1992-1997. Cover was rated according to nesting requirements of ring-necked pheasant and/or mallards.

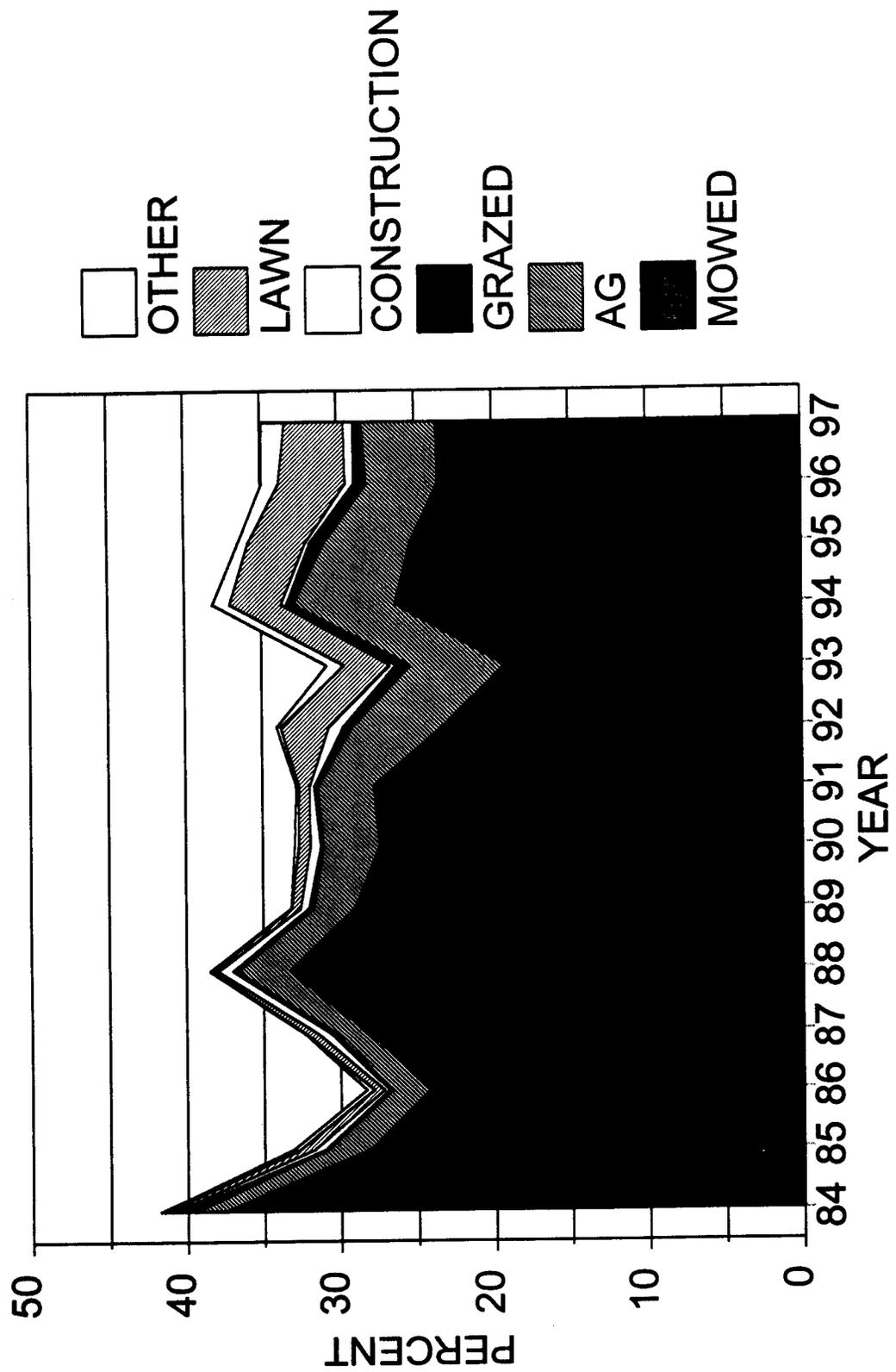


Figure 11. Percent of roadside vegetation in Minnesota's pheasant range which was disturbed by mowing, agriculture, grazing, construction, lawn, or other factors from 1984-1997.