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Stream contamination by herbicides after fall rains on forest land.
Norris, Logan A. Previous studies have shown that in some cases fall rains do not introduce measurable quantities of herbicides into streams flowing by or through forest areas treated with herbicides. As part of a continuing study of this aspect of environmental contamination, two streams were monitored for herbicide residues in western Oregon in the fall of 1967.

Cape Creek Watershed. This study area is located 13 miles south of Yachats, Oregon in the Siuslaw National Forest. It is a 7,850 acre watershed covering portions of townships 16 and 17 S and ranges 11 and 12 W. W.M. One pound each of 2,4-D and 2,4,5-T in 10 gal of oil per acre was applied to 476 acres by helicopter. One spray unit containing 423 acres is adjacent to the stream for 2.3 miles and extends from 200 to 400 yards up slope from the stream. The remaining acreage is scattered in four small units. Water samples were collected by U. S. Forest Service personnel just downstream from the lower edge of the large unit.

Green Creek Watershed. This watershed is located in the Mapleton Ranger District of the Siuslaw National Forest and covers parts of townships 16 and 17 S and range 9 W W. M. One pound each of 2,4-D and 2,4,5-T in 10 gal of oil was applied by helicopter in late March to a total of 407 acres in 25 treatment units in this 2880 acre watershed. Treatment units are scattered over most of the watershed. Water samples were collected by Forest Service personnel in Green creek about one mile upstream from the confluence with Lake Creek.

Water samples were collected and stored in gallon glass jugs which contained 75 grams of sodium hydroxide to prevent microbial degradation and to aid in hydrolysis of the ester. The herbicide was removed from the water after acidification by liquid-liquid extraction with benzene. After esterification with 10% BF_3 methanol, the herbicide was determined by gas chromatography using the Dohrmann detection system. The analytical method is quantitative to 1 part per billion acid equivalent of herbicide in the water.

Measurements of rainfall were made near Yachats about nine miles north of the Cape creek watershed, and at Mapleton which is about four miles southwest of the Green creek watershed. The following table shows the rainfall pattern and the dates water samples were collected in the study areas.

Rainfall pattern and sample collection dates

Date	Cape Creek Watershed		Green Creek Watershed	
	Rainfall (inches)	Sample collected	Rainfall (inches)	Sample collected
9/29	0.52	no	0.57	no
9/30	0.43	no	0.43	yes
10/1	0.64	no	0.97	yes
10/2	0.68	no	0.56	yes
10/3	1.18	yes	3.12	yes
10/4	0.06	yes	0.05	no
10/5	0.17	yes		
10/6	----	yes		
10/9	----	yes		

Measurable concentrations of 2,4-D and or 2,4,5-T were not found in any of the samples collected in this study. In earlier studies with both phenoxy and amitrole herbicides, fall rains did not introduce measurable herbicide into streams flowing through small scattered treatment units. The present study has expanded the scope of this concept to include cases where a fairly large portion of a watershed is treated and where the treatment unit is oriented for a considerable distance along the stream. On the basis of this and previous studies it is concluded that fall rains will not result in appreciable contamination of streams flowing through forest areas treated with phenoxy or amitrole herbicides in spring or early summer. Unless heavy application is made directly to the stream, the major potential for stream contamination is from heavy rain or land movement resulting in heavy overland (surface) flow of water and sediment shortly after application.

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