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# **TECHNICAL NOTE**

**Subject: ECONOMICS**

**Series No.: 601**

**Reference: Adjustment of Crop and Pasture Damage for  
Recurring Flooding in Frequency Analysis**

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UNITED STATES DEPARTMENT OF AGRICULTURE  
SOIL CONSERVATION SERVICE  
South Regional Technical Service Center  
Engineering and Watershed Planning Unit  
Fort Worth, Texas

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EWP TECHNICAL GUIDE NO. 5

Re: WATERSHED PLANNING - Economics, Adjustment of Crop and Pasture Damage  
for Recurring Flooding in Frequency Analysis

In the states served by the Fort Worth Engineering and Watershed Planning Unit, the "natural series" or "historical series" approach to flood damage evaluation has usually been used when agricultural values have been involved. This has been due to the difficulty of making a realistic adjustment for recurring or sequential flooding of crops during a given growing season. Short-cut methods for adjustment for the historical series have been developed, as illustrated on Page 11, Chapter 3 of the Economics Guide.

The frequency analysis is somewhat shorter than the historical approach. In addition, the hydrologic data required is more adaptable to computer analysis when the frequency method is used. Therefore it was thought desirable to develop an adjustment approach that could be used in the frequency analysis.

Gage records covering flooding in 15 rather widely varying watersheds were analyzed flood-by-flood to determine the relationship when damageable values for a sequential flood were reduced by the damage resulting from previous flooding during the crop year. The results were plotted as in the accompanying chart. The vertical axis represents the ratio between the crop damage adjusted for previous flooding and the unadjusted damage. The horizontal axis is the ratio of the average acres flooded annually to the acreage flooded by the largest event in the evaluation period. An equation was derived to determine the curve that best described the relationship. This equation is  $1/Y = 1.0005 + 0.1193 X$  where X is the ratio of average acres flooded annually to the total flood plain area and Y is the adjustment required in the crop damage. Tests of reliability indicate that the equation would have a standard error of 3.67 percent; that is approximately two-thirds of the cases on which it is used should fall within 3.67 percent of the value indicated by the curve.

To illustrate its use, assume that the average annual flooding from all damaging floods is 1,500 acres on a 1,000-acre flood plain. The value on the horizontal scale would be 1.5. This would give a value of 0.85 on the vertical scale. Then if the unadjusted average annual crop and pasture damage from all floods were \$10,000, the adjusted damage would be \$10,000 x 0.85 or \$8,500.

It is believed that the general method shown here usually would be applicable to crop and pasture damage when the frequency approach is used. It will involve taking into account floods smaller than the annual event if such occur. It is suggested that if the states use this approach, they analyze data from within the State for possible modification of the general formula. As the equation was developed for the more common field crops, it could be expected that modification would be needed if tobacco, truck crops or similar specialized crops constituted a large part of the values subject to damage.

Attachment

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WO - DIR: Eng, WP, RB, AS Divs.

