

AN ANALYSIS OF POTENTIAL
"SWAMPBUSTER"
WETLAND PROTECTION IN THE
TUALATIN VALLEY, OREGON

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ABSTRACT: The loss of wetlands in the United States has been widely publicized. Wetland conversions to agricultural production have been responsible for a large percentage of wetland losses. Partially in recognition of the agricultural cause for this wetland loss, Congress promulgated the "swampbuster" provisions of the Food Security Act of 1985. The potential effects of these provisions were analyzed in the Tualatin River Valley, Oregon. The resulting data indicate that approximately 11% of the non-linear wetlands, and approximately 8.9% of wetland acres may be potentially protected by the provisions from agricultural conversion to commodity crop production. This relatively small number of potentially protected wetlands, however, may affect the operations of 47% of the farms operating in the area.

I. INTRODUCTION

Wetlands have been frequently conceived as conveniently located wastelands ripe for conversion to other human uses. Conversely, wetlands have been recognized by many throughout prehistory and during the historic era as a major natural provider for human needs.

Despite the recognized natural values of wetlands by many, wetlands in the United States (U.S.) have significantly decreased in

number and area since the arrival of Euroamericans. Conversions of wetlands to agricultural uses have accounted for a significant loss of wetland area. Agricultural technology, a deep belief in the Jeffersonian agrarian and work ethic ideals, and many economic forces and government programs favoring agricultural expansion have contributed to official sanctions of wetland conversion through much of the Nation's history.

Nonetheless, since the 1960's, the rise in the general public's awareness of wetland values developed coevally with the rise in environmental and ecological concerns. Concern has been developed in private and governmental sectors for the preservation or conservation of wetlands and their intrinsic values through private and public protection programs.

The rise in public concern over wetland protection developed along with a concern over the federally subsidized agricultural commodities surplus. In response to the combination of agricultural conversions of wetlands and the agricultural commodities surplus, the United States Congress enacted a wetland protection and commodities surplus control provision in the Food Security Act of 1985 (U.S.P.L. No. 99-198). The "swampbuster" provision denies farm assistance benefits to farm operators who convert wetlands to commodity crop production after December 23, 1985. This paper addresses the potential for the "swampbuster" provision to protect wetlands from agricultural conversion in the Tualatin Valley of Washington County, Oregon. The potential effect of the provisions on farm operations will also be addressed.

The paper is organized into four main sections. First, a brief discussion of the nature of the problem, wetland assessment, implementation measures of the "swampbuster" provision, and a description of the study area are presented. The research objectives and methodologies are then addressed. Third, the results of the research are presented. The last section provides the conclusions of the research.

II. BACKGROUND INFORMATION

A) Wetland Loss Trends and Agricultural Conversion

Numerous publications have assessed either directly or indirectly the degree of wetland loss in the United States (ASAE, 1946; Frayer, et al., 1983; Gray, 1924; OTA, 1984; Roe and Ayres, 1954; Shaw and Fredine, 1956; USDA, 1982; Wright, 1907;). While the historical documentation of wetland loss trends has lacked uniformity, it is very evident that the long term trend has been toward tremendous loss of the nation's wetlands. By the mid 1970's, approximately 99 million acres of the 215 million acres of wetlands present in the U.S. when the colonists arrived, had been converted to other uses. This represents a 54 percent loss of wetlands, of which 93.7 million acres were palustrine wetlands. Palustrine wetlands generally include inland, non-tidal wetlands dominated by trees, shrubs, persistent emergents, emergent mosses, or lichens (Cowardin, 1979). Approximately 9 million acres of wetlands were converted between the mid 1950's and mid 1970's. This figure represents an annual conversion of approximately 460,000 acres of wetlands. Of this number, approximately 440,000 acres involved

palustrine wetlands. Agricultural development involving drainage of wetlands accounted for 87 percent of the 20 year loss of all wetlands (Frayer, et al., 1983), nearly all of which were palustrine wetlands (Heimlich and Langner, 1986a and 1986b).

Little research has been conducted on the degree of wetland loss in Oregon. Oregon's most significant wetland losses have been due to agricultural conversions (Oregon DSL, 1988). Within a 10 year period, 78 percent of the natural riparian vegetation loss in the Willamette River Greenway resulted from conversion of these areas to agricultural production (Frenkel, 1984). In a study related to the current research, Mitchell (1989) reported that between 1975 and 1988 approximately 10 percent of the wetlands in the Tualatin River Valley were lost. Over 85 percent of the reduction was in the emergent class of wetlands, for which 75 percent was attributed to agricultural conversion or alteration (ibid.).

Many institutional, socio-economic, and technological factors have contributed to the significant loss of wetlands by agricultural enterprise. Early wetland conversions were encouraged by the Swamp Land Acts of 1849, 1850, and 1860 which granted wetlands to states to be drained for private enterprise agriculture. The granted lands usually were placed in private ownership. Over 286,108 acres of such lands were granted to Oregon, most of which was located in the Klamath Basin and estuarine areas (Oregon DSL, 1988). Government price-support and credit programs, and high commodity prices probably were important incentives to convert wetlands to agricultural uses in the 1970's (Heimlich and Langner, 1986b). Research organizations and extension engineers

published numerous circulars and provided field demonstrations for wetland conversions in the earlier half of this century (Roe and Ayres, 1954).

Technological innovations have contributed to the ease of wetland conversions to agricultural uses. The installation of the first draintiles in U.S. in 1835 was followed in 1848 by the invention of the draintile machine (Roe and Ayres, 1954). The efficient use of the large machinery now frequently used in large-scale agricultural enterprises often demands the conversion of wetlands.

While appreciation of wetland values has increased with the rise of environmental awareness, the threat of wetland conversion remains. An estimated 300,000 acres of wetlands are converted annually, of which 80 percent are unregulated wetlands (OTA, 1984). The 1982 Soil Conservation Service's (SCS) National Resources Inventory (NRI) estimated that there are approximately 117,500 acres of Oregon wetlands that have a high or medium potential for conversion (Heimlich and Langner, 1986b; U.S. Code Cong. & Ad News, 1985). While the NRI does not provide enough resolution to determine the number of acres or location of threatened wetlands in Washington County, much less the study area, the U.S. Environmental Protection Agency's (EPA) Priority Wetlands Threat Assessment for Region X has identified the Washington County area as an area in which wetlands are threatened by growth pressures (Oregon DSL, 1988). In the Tualatin River Valley of Washington County, Oregon, an estimated 67 percent of wetlands may be threatened by potential conversion to agricultural use (Mitchell, 1989).

Numerous publications review the various incentive and regulatory programs that have been developed to protect wetlands (Oregon DSL, 1988; OTA, 1984; USFWS, 1987a). A detailed discussion of these is beyond the scope of this paper. The protection measures afforded by the "swampbuster" provisions are discussed below.

B) Wetland Assessment

The intrinsic values of natural wetlands, and the complexities of their valuation have been addressed in numerous publications (Greenson et al., 1978; Oregon DSL, 1988; Tiner, 1984; USFWS, 1987a). These wetland values juxtaposed to development pressures have led to a need to assess wetland values and assign priorities for preservation. Wetland value assessment requires wetland classification. Wetland classifications rely on explicit definitions of what constitutes a wetland. Many classifications have been developed largely to address limited sets of wetland values or regional settings (e.g., Golet and Larson, 1974; Martin et al., 1953; Stewart and Kantrud 1971). Many wetland classifications now rely on multiparameter definitions of wetlands that require that wetlands contain hydrophytic vegetation, hydric soils, and a hydrology involving frequent flooding of soils (Cowardin, 1979; EPA, 1989). The Cowardin (1979) Classification developed for the USFWS, is based on such a multiparameter approach and has been used in developing the National Wetlands Inventory (USFWS, 1987b).

Numerous wetland assessment methods have been developed (Adamus and Stockwell, 1983; Larson, 1976; USFWS, 1980). Most have been developed to assess wetland contributions to limited sets of values. Critiques of assessment methodologies provide valuable insight into the

methods (e.g., Demgen, 1985; Lonard et al., 1981). Several priority ranking methods and risk assessment methods have been developed (Fried, 1987; Office of Policy Analysis, 1987; Oregon DSL, 1988; USFWS, 1987).

C) "Swampbuster" Provisions

In response to the increasing recognition of wetland values and a desire to curb federal subsidies to agricultural commodity producers, the U.S. Congress enacted the "sodbuster" and "swampbuster" provisions of the Food Security Act of 1985 (the Act) (U.S.P.L. 99-198). While the "Legislative History" of the Act dealt exclusively with the conservation benefits of the "swampbuster" provisions (U.S. Code Cong. & Ad News, 1985), the limitation of the Act's provisions to farms that produce annually tilled crops, or commodity crops, reveals an economic impetus behind the enactment of the Act. Nonetheless, the non sequitur "swampbuster" provision provided a unique marriage between conservation and conservative, laissez faire forces.

The Rules and Regulations of the Act (Federal Register, 1987), provide the procedures that the responsible federal agencies must follow in implementing the Act. The U.S. Agricultural Stabilization and Conservation Service (ASCS) and the SCS are the lead agencies responsible for implementing the "swampbuster" provisions of the Act.

The Act provides for wetland conservation by denying federal assistance to any farm operator who converts a jurisdictional wetland to commodity crop production after December 23, 1985. Federal assistance includes any type of price support, farm storage facility loans, disaster payments, crop insurance, or farm loan. This applies to the conversion of any portion of a wetland on any portion of a farm

operation. Conversion of a single wetland to commodity crop production renders the entire farm, and any other farm enterprise with which the farm operator is part owner, ineligible for federal assistance.

The jurisdictional definition of a "swampbuster" wetland involves a multiparameter definition of wetland. The primary natural parameters considered in identifying wetlands are the presence of hydric soils and hydrophytic plants. Hydrologic regime is indirectly considered in that the USFWS, which uses a hydrologic parameter in their wetland classification system and the National Wetland Inventory (NWI), must be consulted in defining wetland locations. The effects of conversion must be more than "minimal" to the hydrological and biological values of a wetland before a farm operator becomes ineligible. If the SCS determines that the effects of producing an agricultural commodity in a wetland area are "minimal", the farm operator may obtain an exemption from the "swampbuster" provisions. The definition of "minimal" is derived on a case-by-case basis.

A critical jurisdictional parameter of the Act is that the operator must have grown a commodity crop on a converted wetland. Commodity crops are defined by the Act as crops requiring annual tilling, such as wheat, corn, cereal grains, or clover. Certain other tilled crops such as grass seed, however, have been granted exemptions (Hecker, 1988).

The SCS is the lead agency responsible for making wetland determinations. The ASCS is responsible for determining if the converted wetland is or was planted to an agricultural commodity during the year for which the farm operator requests benefits. The farm

operator must supply the pertinent crop, production, and wetland conversion information on a form submitted to the ASCS (Form AD 1026). Generally, if the farm operator has converted a wetland after December 23, 1985, and he subsequently grows a commodity crop on the converted acreage, he then becomes ineligible for federal farm assistance.

The effectiveness of the Act is in question. Heimlich and Langner (1986a, 1986b) discuss the economic parameters of the Act's effectiveness. Additionally, many SCS and ASCS district personnel have questioned the potential effectiveness of the program, particularly in the Willamette Valley. Several agency representatives expressed concern that time and effort is being spent by agency staff performing duties the of "wetland cops" when the more important land use issues relate to soil loss from noncommodity crop production.

D) Study Area

The primary criteria in choosing a study area for this research were the known presence of numerous wetlands, the importance of agriculture to the local economy, the diversity of agricultural production, and the proximity to the study's base of operations. The Tualatin River Valley in southeastern Washington County, Oregon met the criteria (Fig. 1). The study area encompasses approximately 110 square miles of the river's broad valley. Urban areas were excluded from the study area which is bounded on the north by the Forest Grove to Beaverton urban growth boundary, on the east by the Beaverton to Tigard urban growth boundary, on the south by the Washington, Clackamas, Yamhill County lines, and on the west by the Coast Range foothills (Figure 1).

The broad valley formation combined with a narrow gorge in the Tualatin River serves to create a terrain hosting numerous wetlands. While no wetlands in the study area are listed in the EPA's Region 10 Priority Wetland List (Kunz, 1987), the USFWS includes the entire Willamette Basin as a waterfowl habitat area of major nation concern (Tiner, 1984).

In 1980, the County's agricultural community produced over \$81 million (Washington County Planning Dept., 1981). Crop diversity is indicated by over 60 agricultural crops that are produced in the county on a regular basis (ibid.). In 1987 approximately 81,400 acres of the County were harvested cropland, of which approximately 20,400 acres comprising 481 farms produced non-pasture and non-grazing or cover crops (U.S. Dept. of Commerce, 1987). Approximately 90 percent of the study area is in farm use (Mitchell, 1989). The area contributes significantly to the County's agricultural economy.

III. RESEARCH DESIGN

A) Objectives

The study's objective is to analyze the potential effects of the "swampbuster" provisions on wetland preservation in the study area. A full analysis of the potential effects is beyond the scope of this paper: For example, determinations of prior conversions are not attempted. Several components of the "swampbuster" jurisdictional criteria, however, are addressed.

A corollary objective of the study is to shed light on the potential effects of the "swampbuster" provisions on farming operations in the study area and beyond. The intention here is to provide basic information on the number of farm operations and farm acres that may be effected by the "swampbuster" provisions.

B) Methods

The basic concept of the study involved screening wetland classes in the study area through jurisdictional criteria screens (Fig. 2). Each of the screening criteria involves a "swampbuster" jurisdictional parameter. A total number of inventoried wetlands was derived from existing data and consisted of the first criterion screen. Following this, the presence of hydric soils in all of the wetlands in the study area was tabulated. This information was developed as an overall indication of the association of wetlands with hydric soils in the study area, and is not a criterion screen for this analysis. The second criterion screen was whether or not a wetland was located in a farm tract which was enrolled in an applicable federal assistance program during 1987. The farm tracts are referenced as ASCS farm tracts. The Presence of hydric soils in wetlands within ASCS farm tracts served as the third criterion screen. The last criterion screen was whether or not the wetland was in an ASCS farm tract that produced commodity crops. If a wetland met the criterion of the screen (e.g., it contained hydric soils), then the wetland would fall through to the next screen. Those wetlands that failed to meet the criterion of the screen, were "removed" by the screen and were assumed to be not subject to the "swampbuster" provisions. This tiered screening process was intended to provide

information on the numbers and acres of wetlands per class that may be protected, or not protected, by the "swampbuster" provisions.

Numerous map sources were used for the study. All analytical maps prepared for this study were in either 1:24,000 or 1:64,500 scales, which correspond to the scales of those used for the NWI maps.

Eight NWI maps provided the data base for the first step of the study, determining the number of wetlands. The Cowardin (1979) wetland classification system used in the NWI provides hundreds of possible permutations of wetland types based on system, subsystem, class, subclass, water regime, and special modifier criteria (USFWS, 1987b). A simplified classification scheme based on vegetative and hydrologic regime information derived from the NWI was used to reclassify NWI wetlands (Griffith, 1988). Seven vegetative types were identified including: forested; emergent; scrub-shrub; open water; riverine (upper perennial); riverine (lower perennial); and, aquatic bed. Hydrologically, each of these primary types were divided into permanent and nonpermanent subtypes. Within the project area no open water nonpermanent or scrub-shrub permanent wetlands were noted. An overlay map was created with the re-classified wetlands identified by a wetland class pattern code and individual wetland number. The number and acres of each wetland class in the project area was calculated (Mitchell, 1989). The original calculations were used for this study rather than the modified calculations used by Mitchell (ibid.).

A list of hydric soils present in the study area was obtained from the official hydric soils list for Oregon (USDA, 1985, 1987). Based on the SCS soil survey of the study area, the hydric soils found in the

project area were: Cove silty clay loam; Cove clay; Dayton silt loam; Delena silt loam (3 to 12 percent slope); Labish mucky clay; Verboort silty clay loam;, and, Wapato silty clay loam (Green, 1982). The hydric soil units were identified on the 1:20,000 scale soil survey maps and then transformed using a zoom transfer scope to scales matching the NWI maps. The hydric soil units formed a series of hydric soils overlay maps that were used in combination with other project maps.

A caveat must be explained here. For purposes of this study, only non-linear wetlands containing in part, or in whole, hydric soils were tabulated after application of this criterion screen. For example, if only one-tenth of a wetland contained hydric soil, the wetland was included in the tabulation of wetlands potentially protected by the "swampbuster" provisions. The tabulated acreage of the wetland included only that area of the wetland that contained hydric soils. Wetlands lacking hydric soils according to the map overlays, were assumed not to be potentially protected by the "swampbuster" provisions. The application of the "swampbuster" provisions is not based solely on the correlation of mapped hydric soils and wetland locations. The rules provide for in-field investigations by the SCS in consultation with the USFWS to determine if hydric soils and hydrophytic plants are present. Therefore, the number of wetlands, and the acres of wetlands that contain hydric soils may be larger than that indicated by this study.

The 1:20,000 scale 1987 Washington County SCS farm program tract maps were used to identify ASCS farm tracts in the project area. At the time these data were collected, approximately 95 percent of the farm tracts that were enrolled in federal programs for 1987 had been placed

on this map series. A series of map overlays of the tracts was then produced at the appropriate scales using an AutoCad system.

Associated ASCS farm tract, farm operator, farm number, commodity crop information, and acreage data (total and cropped) for each ASCS farm tract was obtained from the program files maintained by the Washington County ASCS. Tract anonymity is presented in this study by using independently generated ASCS tract numbers.

The series of wetland, hydric soils, and ASCS farm tract map overlays were then variously overlaid to obtain the relational information needed for the study (Fig. 3). Area measurements relating to hydric soils were obtained by using a land locator template, which required estimating acreage based on the acreage squares that are calibrated to appropriate map scales on the template. The information was initially tabulated per tract on sheets containing the information obtained from the ASCS records.

Several methodological procedures should be noted. Areas were not calculated for linear wetland units that either bisected or bordered ASCS farm tracts, or for non-linear wetlands that only bordered ASCS farm tracts. Linear measurement estimates were made for linear wetlands occurring on ASCS farm tracts. Hydric soil associations of the linear wetlands were not noted because frequently the linear wetlands appeared to include very narrow strips of land that, because of the minimum mapping unit size of the hydric soil maps, probably precluded hydric soil mapping. Linear wetlands that meet the "swampbuster" definition of a jurisdictional wetland (i.e., that contain hydric soils and hydrophytic plants, are used to grow commodity crops, were converted

prior to December 23, 1985, and are more than minimally effected by commodity crop production) would receive protection from the provisions of the Act.

Additionally, because of the varied mapping techniques and area measurement techniques that were used in the study, an untested degree of mapping error undoubtably affects the accuracy of the study's results and conclusions. Therefore, statistical information should be used for general comparison purposes rather than for specific numerical references.

IV. RESULTS

A total of 401 wetlands were identified in the study area (Table 1). Three wetland classes dominate the wetland distributions, representing a combined total of 89% of the total number of wetlands: Emergent Non-Permanent, 37.7%; Open Water Permanent, 30.7%; and, Forested Non-Permanent, 20.9%. While these three wetland classes remain dominant in acreage, representing approximately 93% of the total 2,551 acres of wetlands, their rank ordering in terms of acreage is different from their numerical ordering: Emergent Non-Permanent, 42.8%; Forested Non-Permanent, 39.7%; and, Open Water Permanent, 10.2%. During the calculations, it was noted that many of the Open Water wetlands were very small and isolated wetlands, which probably accounts for their lower acreage ranking. The number and acreage of the other wetland classes are summarized in Table 1.

Table 2 provides information concerning the correlation of NWI wetlands with hydric soils. The percentage of wetlands that contain hydric soils (64%) is higher than the acres of wetlands that contain hydric soils (52%). This is true of the three largest wetland classes, and is particularly noticeable with the Forested Non-Permanent wetland class in which 72% of the wetlands contain some hydric soil, but hydric soils underlie only 36% of these wetland areas (a 36.5 percentage point difference). The Scrub-shrub Non-Permanent, Emergent Permanent, and Aquatic Permanent wetland classes do not conform to this trend. In that only 25 wetlands are represented by these three wetland classes, sampling error may account for the difference between these three smaller classes and the dominant classes.

This information is somewhat surprising. One would expect a higher correlation between hydric soils and NWI wetlands. Wetlands should exist in hydric soils, assuming a multiparameter wetland definition including hydric soils was used in mapping and classifying wetlands. Short of field testing the relationships, explanations must remain hypothetical. Different hydric soil classifications may have been used between the current hydric soils list and that used by the NWI in determining wetland presence. Mapping errors or different methodologies used between the 1975 NWI mapping and the 1975 soil survey mapping may account for the differences; for example, the differences may be accounted for by differences in minimal mapping unit size, different interpreters, or differences between the hydric soil parameters used for soil survey mapping and maximum vegetative summer

growth parameter used for identifying wetlands in the NWI (Green, 1982; USFWS, 1987).

The data concerning wetlands that lie within ASCS farm tracts enrolled in 1987 federal assistance programs are provided in Table 3. A total of 71 wetlands, or 17.7% of the total wetlands in the study area, lie within ASCS farm tracts. Approximately 12.1% of the total wetland acres in the study area lie within ASCS farm tracts. All of the Aquatic Non-Permanent and Emergent Permanent wetlands are removed from the "swampbuster" protective shield by the ASCS farm tract criterion. That is, none of these wetlands occur in ASCS farm tracts. The relative wetland class ranking in both percentage of total wetland number and wetland acres for ASCS farm tracts are consistent with the total study area proportions: Emergent Non-Permanent wetlands rank first with 7.7% of the total number of wetlands and 7.0% of the wetland acres; Forested Non-Permanent wetlands rank second with 5% of the total number of wetlands and 2.7% of the wetland acres; and, Open Water Permanent wetlands rank third with 3% of the total number of wetlands and 1.3% of the wetland acres.

Whereas only 9.8% of the Open Water Permanent wetlands in the study area fall within ASCS farm tracts, compared to 17.7% total wetlands within ASCS farm tracts, 12.3% of the wetland acres of this wetland class fall within ASCS farm tracts, a figure very close to the 12.1% total wetland acres that fall within ASCS farm tracts. In relative terms, a higher percentage of Open Water Permanent wetlands are removed by the ASCS farm tract screen and fall outside the "swampbuster" provisions than is the case with the other dominant classes; however,

relative to the total wetland acres within ASCS farm tracts, the class is consistent. The converse is somewhat true of the Forested Non-Permanent class in which 23.8% of the wetlands fall through to the next criterion screen (6.1 percentage points greater the 17.7% total wetlands passing through the screen), but only 6.9% of the class total acreage in the study area fall through to the next criterion screen (5.2 percentage points less than the total wetland acres passing through the screen).

Table 4 provides information on linear wetlands at the ASCS farm tract level of screening. Riverine Lower Permanent includes the largest portion of the total number (16 segments) and meters (17,464). Much of this portion is accounted for by ASCS farm tracts that border either the Tualatin River or its major tributaries. While difficult to measure, the significance of these wetland features and the potential impacts of agricultural activities on them should not be disregarded. The linear wetlands provide the major feeding link to most of the major wetland bodies in the project area. While all of the linear wetlands feed into wetland bodies, not all of the wetland bodies in the project area, however, have linear wetlands tributary to them. Therefore, the linear wetlands should be viewed as significantly contributing components of the Tualatin River Valley wetlands system.

Linear wetlands, partially because of their diminutive size and easily altered nature, are perhaps one of the more agriculturally sensitive wetland classes. Shallow, ephemeral wetlands often bisect farm tracts and are relatively easily filled to create additional farm land and more efficient farm operations. One Oregon State Division of State Lands representative stated that one of the more pernicious and

undetectable types of wetland conversion occurring in the Willamette Valley results from farmers attempting "to put the creek where it belongs" (anonymous, 1988).

The 71 non-linear wetlands passing through the ASCS farm tract level of criteria screening are located in 46 ASCS farm tracts that consist of 4,579 acres. These ASCS farm tracts partially comprise 23 farm operations that total 15,495 acres in Washington, County. This represents 31% of the total ASCS farm tracts in the study area, 47% of the ASCS farm tract acres in the study area, and 40% of the ASCS farms operating in the study area. Approximately 67% of the total acres farmed by ASCS farms operating in the study area fall through this farm program screening criterion to the next screening criterion. Therefore, approximately 15,495 acres, or 67% of the total farm acres farmed by ASCS farms operating in the study area, are potentially effected by the "swampbuster" provisions.

Sixteen of the 23 ASCS farm operations containing wetland acreage also contain 23,645 meters, or 88%, of the total linear wetlands. An additional 11 linear wetland segments occur in 10 ASCS farm tracts that lack non-linear wetland acreage; this occurrence adds 3,139 meters of linear wetlands, 8 additional farm operations, and 1,630 acres of farm operation acres into the potential jurisdiction of the "swampbuster" provisions. This total, then, represents 31 farm operations and 17,125 farm operation acres, or 54.4% and 74% (respectively) of the farm operations and farm operation acres represented by farm operations farming in the study area.

Table 5 identifies the statistics for wetlands that occur in ASCS farm tracts and have hydric soils. Approximately 11.5% of the total number of wetlands and 9.1% of the total acres of wetlands in the study area pass through this screening criterion. Hydric soils occur in 65% of the wetlands and 75% of the wetland acres in ASCS farm tracts in the study area. Therefore, approximately 35% of the wetlands and 25% of the wetland acres that passed through the previous screen have been removed by this hydric soils criterion screen. The actual number of wetlands and wetland acres that may pass through this criterion screen may be considerably greater in that the figures presented above may not reflect the actual occurrence of hydric soils in wetlands and may, rather, reflect differences in survey and mapping conventions. For any single wetland, a lack of correlation between the hydric soil and NWI wetland overlay maps does not mean that the NWI wetland would fail to receive protection from the "swampbuster" provisions. The SCS in cooperation with the USFWS can more explicitly define wetland perimeters by field investigations or by using additional data that better define hydric soil units.

The relative ranking of the wetland classes in almost all of the columns in Table 5 indicates that after applying the hydric soils screen, the Emergent Non-Permanent wetland class is predominant in terms of numbers and acreage, with Forested Non-Permanent and Open Water Permanent being second and third. A higher proportion of the total number of Aquatic Permanent wetlands fall through this screen, however, than of the Open Water Permanent wetlands. Again, the relative number of Forested Non-Permanent wetlands (17.9%) is considerably larger than

the classes' acreage percentage (5.0%) that passes through this criterion screen.

The 46 non-linear wetlands passing through the hydric soils level of criteria screening are located in 29 ASCS farm tracts that consist of 3,094 acres. These ASCS farm tracts partially comprise 18 farm operations that total 10,648 acres in Washington County. Non-linear wetlands occur in approximately 19.5% of the total ASCS farm tracts, 32.6% of the ASCS farm tract acres, and 31.6% of the ASCS farms operating in the study area. Approximately 46% of the total acres farmed by ASCS farms operating in the study area fall through the hydric soils screening criterion to the next screening criterion. The application of the hydric soils criterion results in reductions of 38% of the ASCS farm tracts, 32% of the ASCS farm tract acres, 22% of the ASCS farm operations operating in the study area, and 31% of the total ASCS farm acres that are subject to the "swampbuster" provisions.

If ASCS farm operations containing only linear wetlands are also considered, then the potential effects of the provisions on farms are considerably greater. In this case, 28 ASCS farm operations consisting of 14,541 acres, or 49.1% of the total ASCS farm operations and 62.8% of the total ASCS farm operation acreage, are potentially effected by the "swampbuster" provisions.

As Table 6 indicates, the next screen, which applies the annually tilled crop criterion to ASCS farm tracts that contain wetlands with hydric soils, does not greatly affect the number of wetlands or wetland acres that are afforded potential protection by the "swampbuster" provisions. This finding is not too surprising in that most farm tracts

are registered with the ASCS only if they have been, or are planned to be, planted in commodity crops. Only two farm tracts were not growing commodity crops, although they were registered by the farm operator to maintain his farm base acreage. Approximately 11.0% of the total wetlands and 8.9% of wetland acreage in the study area pass through this final screening criterion. Emergent Non-Permanent, Forested Non-Permanent, and Open Water Permanent, in that order, remain the predominate wetland classes that pass through the criterion screening process and are potentially protected by the "swampbuster" provisions from conversion to commodity crop production. Approximately 14% of the number and acres of Emergent Non-Permanent wetlands in the study area pass through the criterion screen. Approximately 16.7% of the wetlands and 4.5% of the acres of the Forested Non-Permanent wetland class in the study area pass through the criterion screen. Approximately 4.1% of the wetlands and 5.2% of the acres of the Open Water Permanent wetland class in the study area pass through the criterion screen. Aquatic Permanent wetlands are unaffected by the screen. Significantly, the 14.4% of the Emergent Non-Permanent wetland acres that pass through the criteria screening, represent 70.1% of the total wetland acres in the study area that pass through the criteria screening and are potentially protected by the "swampbuster" provisions.

Only one ASCS farm operation involving a single 20 acre ASCS farm tract is potentially removed from the "swampbuster" jurisdiction by the commodity crop criterion screen. The subject ASCS farm tract, however, does contain a linear wetland. After all criteria screens are applied, 27 ASCS farm operations, or 47.4% of all ASCS farm operations farming in

the study area contain either non-linear wetland acreage or segments of linear wetlands. These farms encompass 14,507 acres, or 62.7% of the total ASCS farm acres of ASCS farms operating in the study area.

Therefore, these farm operations may be affected if they were to convert a wetland to agricultural commodity crop production.

V. CONCLUSIONS

The wetlands in the study area appear to be afforded a limited amount of protection by the "swampbuster" provisions of the Food Security Act of 1985. The initial jurisdictional criterion, wetland presence in an ASCS farm tract, passed only 17.7% of the non-linear wetlands and 12.1% of the wetland acres in the study area. The hydric soils criterion screen reduced these figures to 11.5% of the non-linear wetlands and 9.1% of wetland acres; however, this reduction may be a result of mapping errors that fail to truly indicate the presence of hydric soils in wetland areas. Additionally, if other factors indicate the presence of a wetland in an area, field checks by the SCS and USFWS could verify the presence of hydric soils, thereby placing the wetland in the "swampbuster" jurisdiction.

The production of commodity crops did not significantly decrease the number of wetlands or wetland acres. The study indicates that 11% of the wetlands and 8.9% of the wetland acres in the study area pass through the screening criteria and, therefore, potentially fall under the "swampbuster" provisions. Emergent Non-Permanent wetlands in the study area are afforded the greatest relative potential protection from agricultural commodity crop conversions with 6.2% of the total acres of

the wetland class passing through the criteria screens. This finding is important in light of the findings by Mitchell (1989) that this was the wetland class most affected by agricultural conversions between 1975 and 1988. Conversely, less than 1% of the Aquatic Permanent, Aquatic Non-Permanent, Open Water Permanent, Forested Permanent, Emergent Permanent, and Scrub Shrub Non-Permanent wetlands in the study area are apparently afforded protection by the "swampbuster" provisions from agricultural conversions.

While few wetlands appear to be protected, these wetlands potentially affect the operations of a relatively large number of farm operations farming in the study area. If both non-linear and linear wetlands are considered, 47% of the farms operating in the study area must comply with the "swampbuster" provisions and not convert wetlands on their farm tracts, or jeopardize their potential eligibility for federal farm assistance. Therefore, those few wetlands identified as falling under the "swampbuster" provisions may be afforded substantial protection based on the potential negative impact that their conversion to commodity crop production may have on many farm operations. This finding, however, is largely dependent on the ease of converting the remaining wetlands, and on each farm operator's cost/benefit analysis of converting wetlands to commodity crop production.

While the "swampbuster" provisions might potentially provide protection to wetlands from conversion to commodity crop production, the provisions provide no protection to wetlands from agricultural conversion to non-annually tilled crop production. This caveat is particularly poignant considering that 82.3% of the wetlands in the

study area lie outside of ASCS farm tracts (Tables 1 and 2) and are mostly in farm use areas potentially subject to agricultural conversion pressures (Mitchell, 1989). Additionally, wetlands in the study area are not subject to many other wetland protection programs that effectively address wetland conversions to agricultural uses.

While Policy 11(e) of the Rural/Natural Resource Element of the Washington County Comprehensive Plan (1983) directs the County to "limit development and alteration of natural vegetation in riparian zones and in locations identified as significant water areas and wetlands," Policy 11(g) provides an exemption to "activities customarily conducted in conjunction with commercial farm and forest practices in areas designated as Significant Natural Areas where the land use plan designation and implementing code provisions allow farm and forest activities as primary uses." Therefore, because a large majority of the study area is zoned for agricultural use, and most of the farm operations are located in the agricultural zones, wetlands in those zones and in most of the study area are not protected by County ordinance from agricultural conversion.

The Oregon Removal-Fill Law (ORS. 541.605 - 541.695) requires that any activity that proposes removal, filling, or alteration of more than 50 cubic yards of material within the waters of the State, including wetlands as defined by the Oregon DSL, requires a permit from the Oregon DSL. The Removal-Fill Law does not provide exemptions for agricultural activities. As previously noted, agricultural conversions of wetlands are recognized by Oregon DSL staff as a serious threats to wetland

preservation; however, agricultural conversions are among the more difficult conversions to detect and enforce.

Based on the results of this study, the potential effectiveness of the "swampbuster" provisions in the study area is expected to be limited to a relatively small number of wetlands. There are a large number of farms and farm acreage that are registered in ASGS programs and that contain potential jurisdictional wetlands, that may be potentially effected by the provisions. The overall effectiveness of the "swampbuster" program in protecting wetlands, however, must be determined by also addressing the economic, technological, and social pressures to convert wetlands to agricultural uses. The effectiveness of any wetland protection provision can be assessed from the perspective of how much the provisions alleviate the vulnerability of wetlands to agricultural conversions. Such an approach has been developed (Office of Policy Analysis, 1987), and is beyond the scope of this paper. However, the data prepared for this study and others (Mitchell, 1989), may provide valuable data for the application of a vulnerability index in the study area, from which the overall effectiveness of the "swampbuster" provisions can be assessed.

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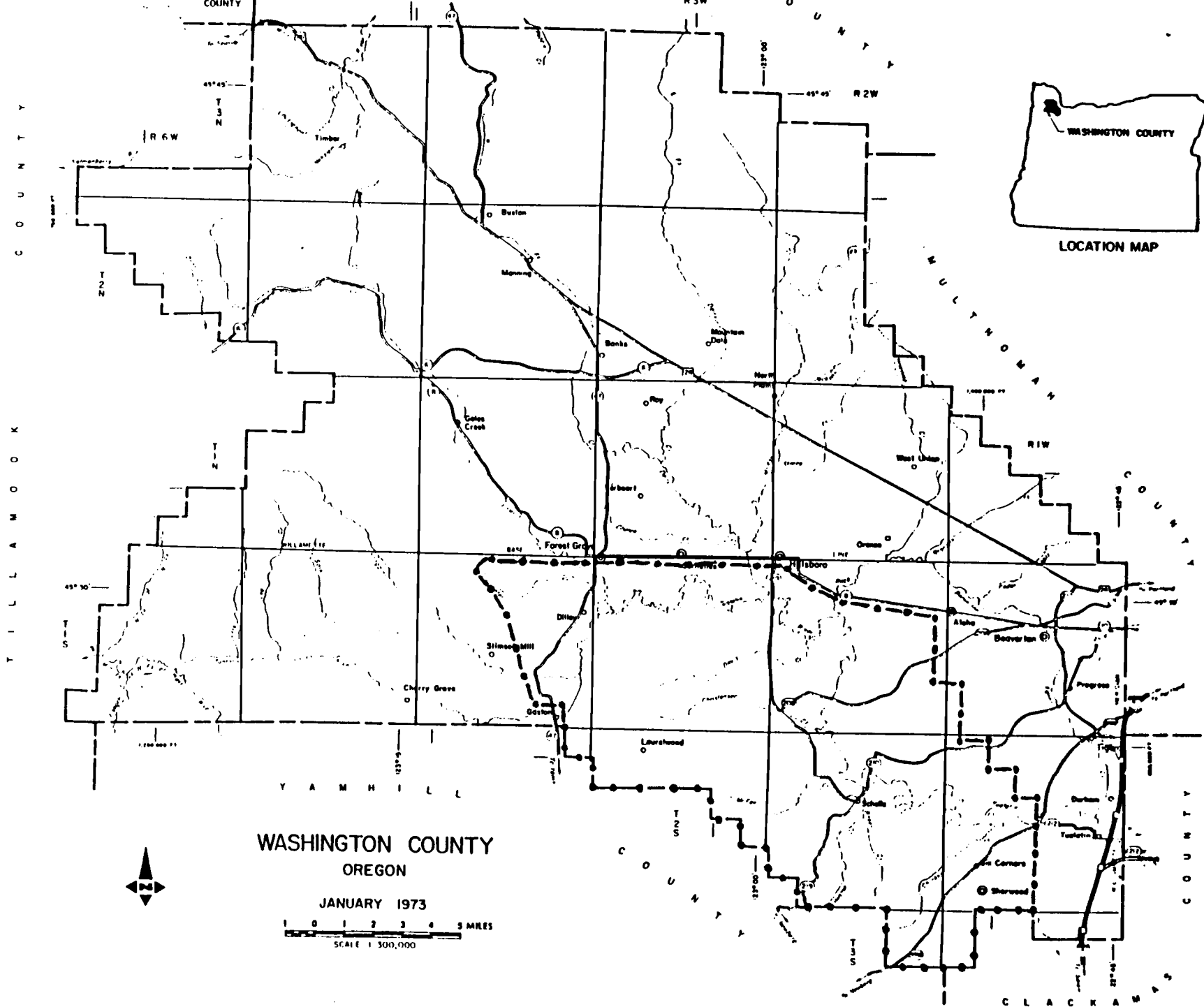
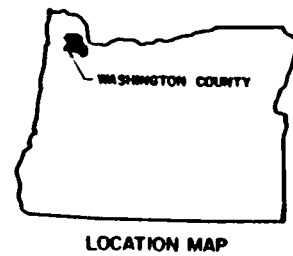


FIGURE 1: Location of study area

approximate boundary of study area

FIGURE 2

STUDY'S CONCEPTUAL DESIGN

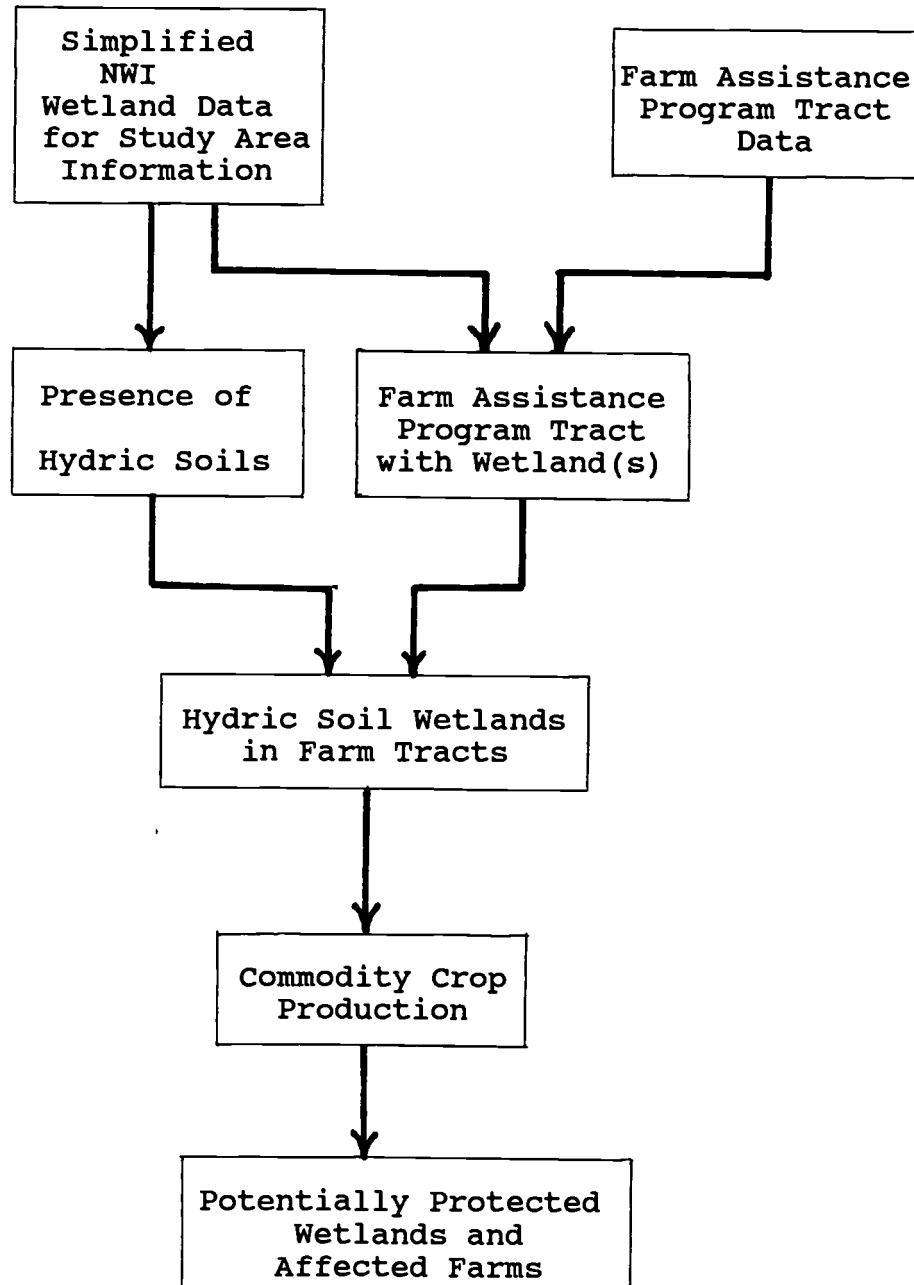
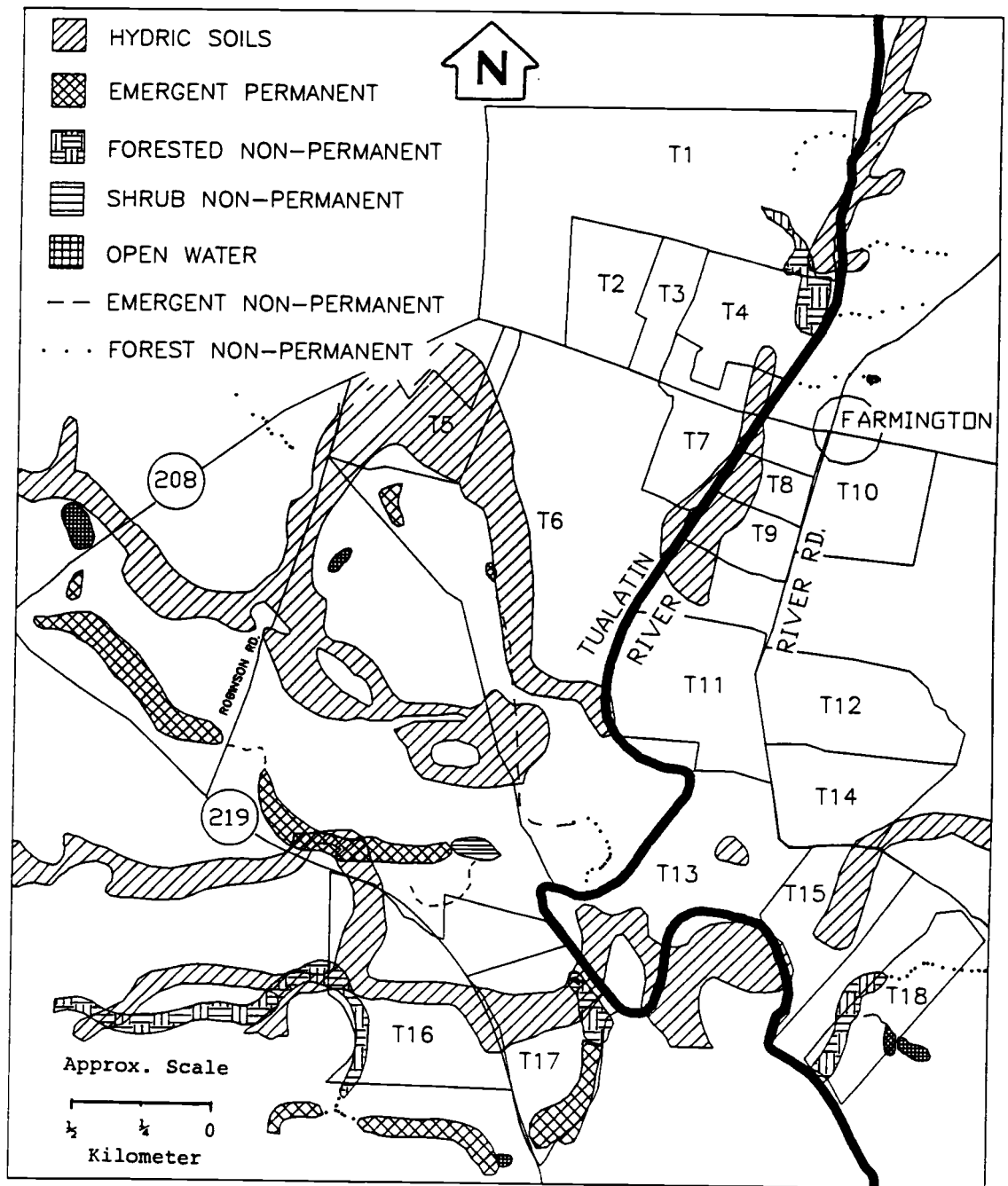


FIGURE 3
EXAMPLE OF COMBINED MAP OVERLAYS



Sources: NWI, Scholls; SCS Soil Survey of Washington County; SCS Program Tract Maps.

TABLE 1
1975 NATIONAL WETLAND
INVENTORY WETLANDS WITHIN PROJECT AREA¹

CLASS	No.	% OF TOTAL (401)	Acres	% OF TOTAL (2551)
Aquatic Permanent	15	3.7	52	2.0
Aquatic Non-Permanent	2	.5	2	.07
Open Water Permanent	123	30.7	261	10.2
Forested Permanent	1	.2	5	.2
Forested Non-Permanent	84	20.9	1013	39.7
Emergent Permanent	6	1.5	20	.8
Emergent Non-Permanent	151	37.7	1092	42.8
Scrub Shrub Non-Permanent	19	4.7	106	4.1
TOTALS	401	100	2551	100

Source: National Wetlands Inventory Maps

¹Includes non-linear wetlands

TABLE 2 - WETLANDS CONTAINING HYDRIC SOILS¹

CLASS	No.	% of Class Total ²	% of Total Hydric (254)	% of Total ² (401)	Acres	% of Class Total ²	% of Total Hydric (1343)	% of Total Acres ² (2551)
Aquatic Permanent	7	46.7	2.7	1.6	25	48.1	1.9	1
Aquatic Non-Permanent	2	100.0	.78	.5	2	100	.2	.1
Open Water Permanent	57	46.3	22.4	14.2	105	40.2	7.8	4.1
Forested Permanent	0	0	0	0	0	0	0	0
Forested Non-Permanent	61	72.6	24.0	15.2	366	36.1	27.3	14.4
Emergent Permanent	4	66.7	1.6	1.0	18	90.0	1.3	.7
Emergent Non-Permanent	108	71.5	42.5	26.9	743	68.0	55.3	29.1
Scrub Shrub Non-Permanent	15	78.9	5.9	4.7	84	79.2	6.3	3.3
TOTALS	254	N/A	100	64.1	1343	N/A	100	52.7

Source: U.S. Soil Conservation Service, Soil Survey of Washington County Oregon

¹Includes wetlands with any hydric soils; acreage measurements include only acres of hydric soils within wetlands.

²Totals derrived from Table 1

TABLE 3 - WETLANDS WITHIN FARM TRACTS REGISTERED IN
FARM ASSISTANCE PROGRAMS¹

CLASS	No.	% of Class Total ²	% of Total Tract (71)	% of Total ² (401)	Acres ³	% of Class Total ²	% of Total Tracts (309)	% of Total Acres ² (2551)
Aquatic Permanent	4	26.7	5.6	1	15.7	30.2	5.1	.6
Aquatic Non-Permanent	0	0	0	0	0	0	0	0
Open Water Permanent	12	9.8	16.9	3	32.2	12.3	10.4	1.3
Forested Permanent	1	100	1.4	.2	4.5	90	1.5	.2
Forested Non-Permanent	20	23.8	28.2	5	70.3	6.9	22.8	2.7
Emergent Permanent	0	0	0	0	0	0	0	0
Emergent Non-Permanent	31	28.9	43.7	7.7	178.9	16.4	57.9	7.0
Scrub Shrub Non-Permanent	3	22.1	4.2	.7	7.45	7.0	2.4	.3
TOTALS	71	N/A	100	17.7	309	N/A	100	12.1

Source: 1987 U.S. Agricultural Stabilization and Conservation Service Program files; 1987 U.S. Soil Conservation Service tract maps.

¹Includes wetlands with any identifiable acreage in farm tract

²Totals derived from Table 1

³Includes acres of wetland within tracts

TABLE 4: LINEAR WETLANDS¹

	Riverine Lower Permanent	Riverine Upper Permanent	Riverine Lower Non- Permanent	Emergent Non- Permanent	Forested Non- Permanent	Scrub- Shrub Non- Permanent	Aquatic Bed Non- Permanent	Total
No.	16	4	6	6	11	1	1	45
Meters	17,464	1,387	983	2,164	4,298	244	244	26,784

¹Includes number of linear segments of each wetland type

TABLE 5 - WETLANDS WITHIN FARM TRACTS CONTAINING HYDRIC SOILS¹

CLASS	No.	% of Class Total ²	% of Total Hydric in Tracts (46)	% of Total ² (401)	Acres ³	% of Class Total ²	% of Total Hydric in Tract (231.4)	% of Total Acres ² (2551)
Aquatic Permanent	2	13.3	4.3	.5	4.3	8.3	1.9	.2
Aquatic Non-Permanent	0	0	0	0	0	0	0	0
Open Water Permanent	5	4.1	10.9	1.3	13.6	5.2	5.9	.5
Forested Permanent	0	0	0	0	0	0	0	0
Forested Non-Permanent	15	17.9	32.6	3.7	50.3	5.0	21.7	2
Emergent Permanent	0	0	0	0	0	0	0	0
Emergent Non-Permanent	23	15.2	50.0	5.7	159.2	14.6	68.8	6.2
Scrub Shrub Non-Permanent	1	5.3	2.2	.3	4.0	3.8	1.7	.2
TOTALS	46	N/A	100	11.5	231.4	N/A	100	9.1

¹Includes wetlands, lying in part or in whole in tracts and that contain, in part or in whole, hydric soils.

²Totals derived from Table 1

³Includes acreage of wetlands in tracts and containing hydric soils

TABLE 6 - WETLANDS WITHIN FARM TRACTS CONTAINING HYDRIC SOILS
AND THAT HAD 1987 COMMODITY CROP¹

CLASS	No.	% of Class ² Total	% of Total Tilled (44)	% of Total ² (401)	Acres ³	% of Class ² Total	% of Total in tract (231.4)	% of Total ² Acres ² (2551)
Aquatic Permanent	2	13.3	4.6	.5	4.3	8.3	3.6	.2
Aquatic Non-Permanent	0	0	0	0	0	0	0	0
Open Water Permanent	5	4.1	11.4	1.3	13.6	5.2	6.1	.5
Forested Permanent	0	0	0	0	0	0	0	0
Forested Non-Permanent	14	16.7	31.8	3.5	45.3	4.5	20.2	1.8
Emergent Permanent	0	0	0	0	0	0	0	0
Emergent Non-Permanent	22	14.6	50.0	5.4	157.5	14.4	70.1	6.2
Scrub Shrub Non-Permanent	1	5.3	2.3	.3	4.0	3.8	.4	.2
TOTALS	44	N/A	100	11.0	224.7	N/A	100	8.9

¹Includes wetlands lying in part or in whole in tracts containing in part or in whole hydric soils, and grew commodity crop in 1987

²Totals derived from Table 1

³Includes wetland acreage that contains hydric soils in tract that grew commodities in 1987.