AN ANALYSIS OF THE IMPACT OF FLOODPLAIN REGULATIONS ON RESIDENTIAL LAND VALUES: THE OAK GROVE, OREGON, CASE STUDY

by

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AN ANALYSIS OF THE IMPACT OF FLOODPLAIN REGULATIONS ON RESIDENTIAL LAND VALUES: THE OAK GROVE, OREGON, CASE STUDY

ABSTRACT: Flood damage mitigation by means of land use regulations, as mandated by the National Flood Insurance Act of 1968, has been controversial and slow in implementation, in part due to the conjecture that residential land values will be adversely affected in the regulated areas. There has been relatively little research to test this idea. This study tests the hypothesis that floodplain regulations significantly lower the appreciation rate of residential lots within the regulated area, when compared to adjacent similar unregulated lots. The study was done in the old residential neighborhood of Oak Grove, Clackamas County, beside the Willamette River. Assessed land values from 1958 to 1981 were examined. The study period includes a disastrous flood in 1964, and the adoption of floodplain regulations in 1971. Examination of the data indicated that the regulated lots need to be subdivided into three groups, based on water frontage, and each of these was tested against the unregulated control lots. Statistical testing shows that after implementation of flood plain regulations there was no significant reduction in appreciation rates of the regulated lots when compared to the control lots. Contrary to the hypothesis in several time intervals, lakefront and riverfront lots appreciated at faster rates than the control lots did. The results suggest that there are other factors that balance, and sometimes outweigh, any negative economic effects due to floodplain regulations.

INTRODUCTION

At least once a year the national press is full of news about a major flood disaster in some region, that has left thousands homeless, caused damages in the multi-millions, and brought all local economic productivity to a grinding halt. The region is labeled a disaster area by the Governor or the President, and the National Guard and the Red Cross are sent in. This spring the site was Fort Wayne, Indiana, but people in many regions can recall a similar incident in the past which seemed to break all records. The newspaper reader asks himself why people live in such a dangerous place, and why doesn't the government do something about it?

Floodplains have been a center for man's activities since pre-history.[1] The earliest agrarian civilizations and the first cities were located beside rivers and coasts. The land was flat, the soil was rich and easily worked, and irrigation water was easily obtained.

As Europeans settled North America, riverine lands were the location of most of the major towns, partly because of the agricultural advantages, and partly because they were the natural transportation routes. Railroads and highways were developed, following the path of least resistance, the river lowlands. Industry followed closely, using this distribution system. It often demanded much water for its processes, and needed power, first mechanical waterwheels, and later hydroelectric power. Developing concurrently were all the support services required by industry: land transport routes, the residential areas needed to house all the industrial workers and support activities for all these people.

Naturally, the most desirable land for development was in the flat floodplain, where a structure could be built with the least expense and effort. While some activities can safely, sometimes beneficially, be located in areas where flooding is frequent, many anthropogenic activities involve permanent structures which can be severely damaged in a flood. It is relatively easy to recognize and avoid the areas of annual or frequent flooding, but time and again, man has been caught unprepared by the low-frequency, extreme-height flood, and suffered great loss of life and property. The national bill for flood damage has been increasing dramatically over the last several decades, as the population has moved to growing urban areas. However, much urban expansion has gained no special benefits from its floodplain location, and could as easily have been located on higher land.

Major approaches to flood hazard mitigation can be divided into three types: 1) structural: modify the flooding by keeping water away from man. 2) non-structural: modify the susceptibility to flooding, by keeping man and his enterprises away from the water. This includes flood-proofing. 3) modify the impact of flooding through relief and insurance.[2] In the period from 1936 to 1966, structural measures received almost the entire Federal expenditure for flood hazard mitigation. However, lulled by a false sense of security, urban and suburban land uses increasingly encroached on the flood plains, with a corresponding increase in flood damage and flood disaster relief (the third approach). It became evident that structural methods alone were insufficient to prevent flood loss. Although the Federal govern-

ment has spent over ten billion dollars on structural measures, it is estimated (in 1975) that flood damage cost the nation three billion dollars annually in property damage, disaster relief, and loss of productivity, not to mention the loss of hundreds of lives.[3]

The third approach, in the form of public and private disaster relief, always has been, and always will be with us. Flood insurance, another form of this approach, was never widely available until 1968. Until 1968, the second approach had rarely been attempted.

The National Flood Insurance Program

In 1968, Congress passed the National Flood Insurance Act, which established the National Flood Insurance Program.[4] This program is administered by the Federal Insurance Administration, within the Federal Emergency Management Agency (FEMA). The program enables property owners to buy flood insurance at reasonable cost. In return, local communities (cities and counties) are required to carry out floodplain management measures, usually through zoning, to protect lives and new construction from future flooding. (The program contains elements from both the second and third approaches to flood hazard mitigation.) Initially, the program was voluntary, and few communities participated. In 1973, Congress enacted the Flood Disaster Protection Act, which made participation virtually mandatory for all flood-prone communities.

The program has two phases. The community first enters the Emergency Phase by adopting preliminary floodplain management measures. FEMA provides a preliminary map that shows the boundaries of the flood-prone areas within the community. Subsidized insurance rates are

charged for all structures, regardless of their flood risk, but the total amount of coverage available is limited: $35,000 for a single-family residence, and $10,000 for its contents.

The community must then enter the Regular Program as soon as FEMA completes a detailed map of the community (Flood Insurance Rate Map), which shows flood elevations and risk zones used for insurance purposes. To qualify for this second phase, the community must adopt and administer more comprehensive floodplain construction measures. A homeowner can then buy up to $150,000 additional coverage, but the premiums for this second layer of insurance is based on risk. The regulations apply only to new construction, major improvements to existing buildings, and significant repair of damaged buildings. The owner of an older home in a high-risk location may continue buying the first layer of insurance at subsidized rates, but must pay full actuarial rates for any additional second layer insurance coverage.

The minimum Federal guidelines require that all new construction and all substantial improvements (and repairs) to existing structures must be elevated or flood-proofed to the elevation of the base (100 year) flood. Local communities may set higher standards, and zone more restrictively.

In Clackamas County, before any development can take place on the property within the 100 year flood level, it must be approved by the Clackamas County Hearings Officer, based on the following criteria: 1) The lowest floor must be elevated at least one foot above the 100 year base flood level. 2) The structure will cause no danger to life or property because of increased flood heights or velocity or

because materials may be swept onto other lands. 3) Water supply and sanitation systems must be designed to prevent any subsurface or river contamination during floods. 4) The development must not result in an increase in flood heights for any property either up or down stream. 5) The development must not impede access needed for emergency vehicles during floods.[5]

The primary purpose of floodplain regulations is to minimize danger to public health and safety. A secondary purpose is to improve the general welfare by reducing economic loss, including disaster relief expenses. The management alternatives are to either allow only activities that are compatible with flooding, such as agriculture, parks, and natural areas; or to allow properly flood-proofed structures that don't obstruct flood water or otherwise further endanger existing structures. The intention is to limit new development to that which "a reasonable and prudent person would allow, based on a knowledge of the conditions that prevail. A use that may be hazardous or economically damaging to the land owner, occupant, or subsequent purchaser is not considered reasonable."[6] Federal floodplain regulation guidelines set as a "reasonable" limit the calculated elevation of a flood with a one percent return interval. This is referred to as the base flood, the 100 year flood, or the intermediate regional flood. Commonly, local regulations require that the lowest livable floor of a house be built at least one foot above the elevation of the projected 100 year flood. This arbitrary level does not guarantee that a higher flood will not occur, but the risk of future loss is reduced to the point that insurance should be readily available (i.e., reasonably priced)

to cover the relatively small remaining risk.

One of the major obstacles to implementation of the National Flood Insurance Program at the local level is the supposition that the regulation of land use by the government will reduce the economic opportunity of the landowners. This study seeks to determine whether any economic loss occurs to landowners by placing their land under floodplain regulations. It is not within the scope of this paper to argue whether such economic deprivation to the individual is justified; only whether or not it occurs.

Related Research

There has been much speculation but little research concerning this possible adverse economic impact. This problem is one of several research needs identified at a workshop on the reorientation of water resources research sponsored by the Office of Water Research and Technology, U.S. Department of the Interior.[7] Moore and Cost (1973) analyzed five Ohio communities and predicted that floodplain regulations could be expected to cause negative impacts on property values because of restrictions on development, increased building costs and increased perception of the risks involved. They noted, however, that eligibility for Federal flood insurance could have positive impacts on property values.[8] Damianos (1975) used multiple regression analysis to study the possible impact of floodplain zoning regulations on land values in Alexandria, Virginia.[9] He concluded that these restrictive zoning measures apparently did not reduce the residential land values, although he was not able to isolate the effect of regulation from other factors: a) variability of perception of hazard; b) the fact that the study

area was completely developed, so that the regulations did not impose severe restraints on future land use; and c) the possibility that the market mechanism of land prices may have taken the effect of flood hazard risk into account, masking the effect of regulation.

This study is part of a larger study of six communities in the Willamette Valley.[10] At the other five sites little significant difference in appreciation rates between regulated and unregulated areas was found, although blanket assessment methods at four of these sites made detailed analyses impossible. The study briefly discusses some other research efforts at various sites around the country, some of which gave negative conclusions, and others which gave positive conclusions.

Warnick (1977) did an analysis similar to mine in the same Oak Grove neighborhood.[11] Unlike this study, he found that zoning regulations significantly lowered appreciation rates of lots within the regulatory boundary, compared to adjacent unregulated lots.

Besides having opposite findings, this study differs from Warnick's in that: a) it discovered significant differences between three areas within the regulatory boundary, and compared each of these sets of lots separately with the unregulated lots; b) it looked at differences in value per square foot of lot, in addition to value per lot; c) it extended the study another six years, from 1975 to 1981, which is the most significant time interval of the study; and d) it examines a larger number of time intervals to more accurately separate the effects of flood hazard zoning from flood hazard perception due to the 1964 flood. This study draws heavily on the raw material assembled by Warnick.

THE STUDY HYPOTHESIS

The study hypothesis is that the implementation of floodplain regulations depresses the rate of appreciation of assessed residential land values relative to similar, adjacent land not so regulated. Thus, lots within the regulatory floodplain are expected to have a lower rate of appreciation than lots outside of the regulatory flood boundary, commencing with the year the community entered the Program. The study hypothesis is illustrated in Figure 1.

THE STUDY SITE

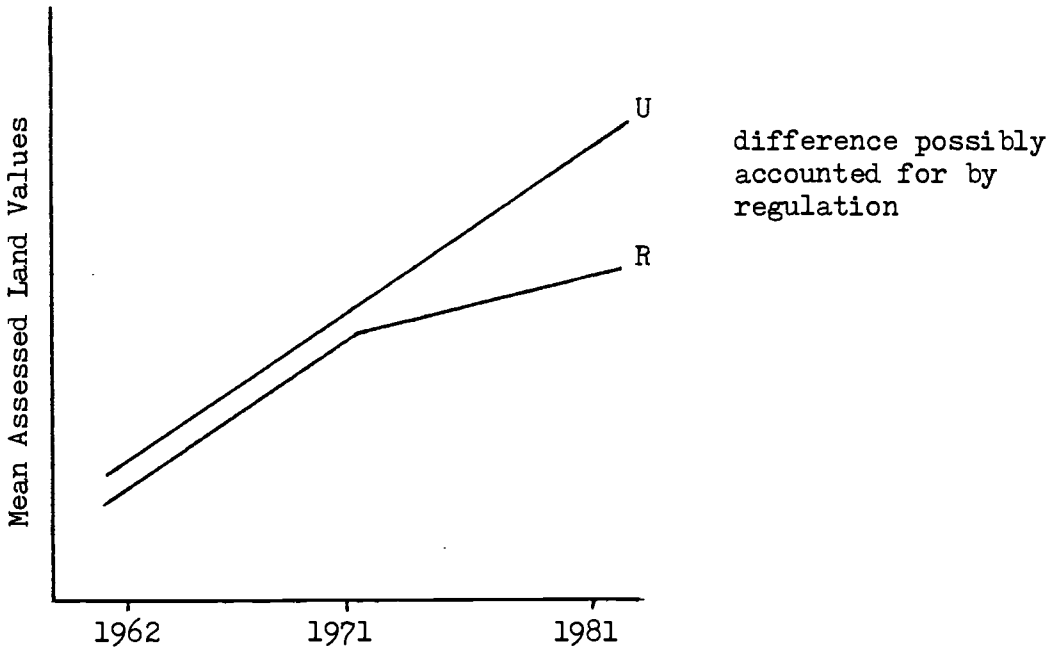
General Description

The study site is located in the northwest corner of Clackamas County, on the east side of the Willamette River, in the unincorporated community known as Oak Grove. It lies between the cities of Gladstone and Milwaukie, near southeast Portland, about 20.5 river miles from the Columbia River (Figure 2).

This is an old residential neighborhood which has been slowly developed over the last ninety years. An estimated 90% of all houses were built before 1960, with a few dating prior to 1900. There are presently twenty vacant tax lots, most of which have been "annexed" to adjacent development lots, and are unlikely ever to be developed. Only six tax lots appear to be vacant and readily developable.

There is a wide range of lot sizes, but all are well landscaped and maintained, and the houses on them are generally of high quality, indicating a socio-economic homogeneity in the neighborhood. The streets are generally of similar width and condition, paved but without curbs. Oak Grove Boulevard (see Figure 3), the main connection

THE STUDY HYPOTHESIS

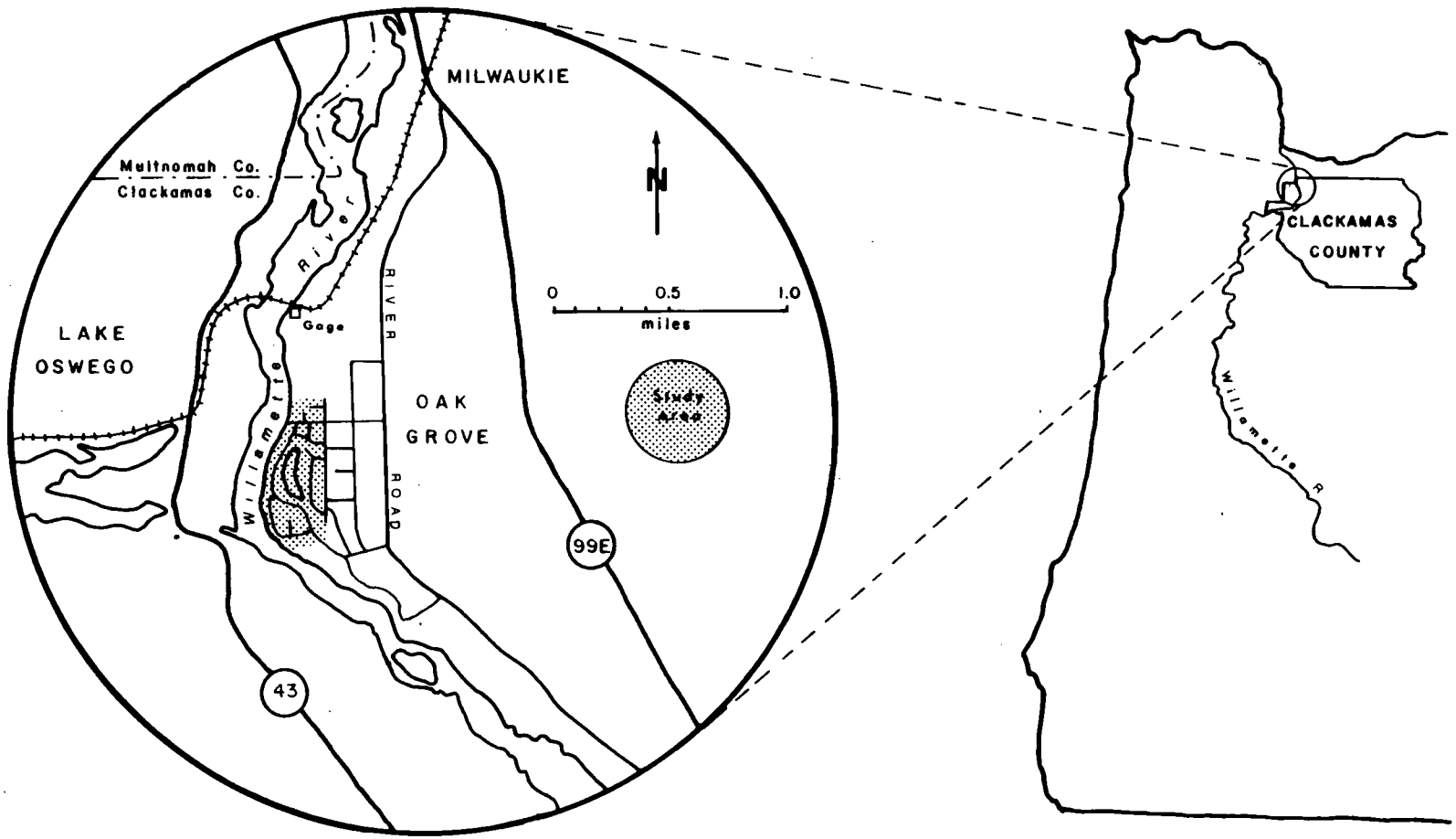


R = Properties that lie within the regulated area

U = Unregulated control properties

1971 = Inception of floodplain regulations

FIGURE 1



GENERAL LOCATION MAP

FIGURE 2

OAK GROVE STUDY SITE

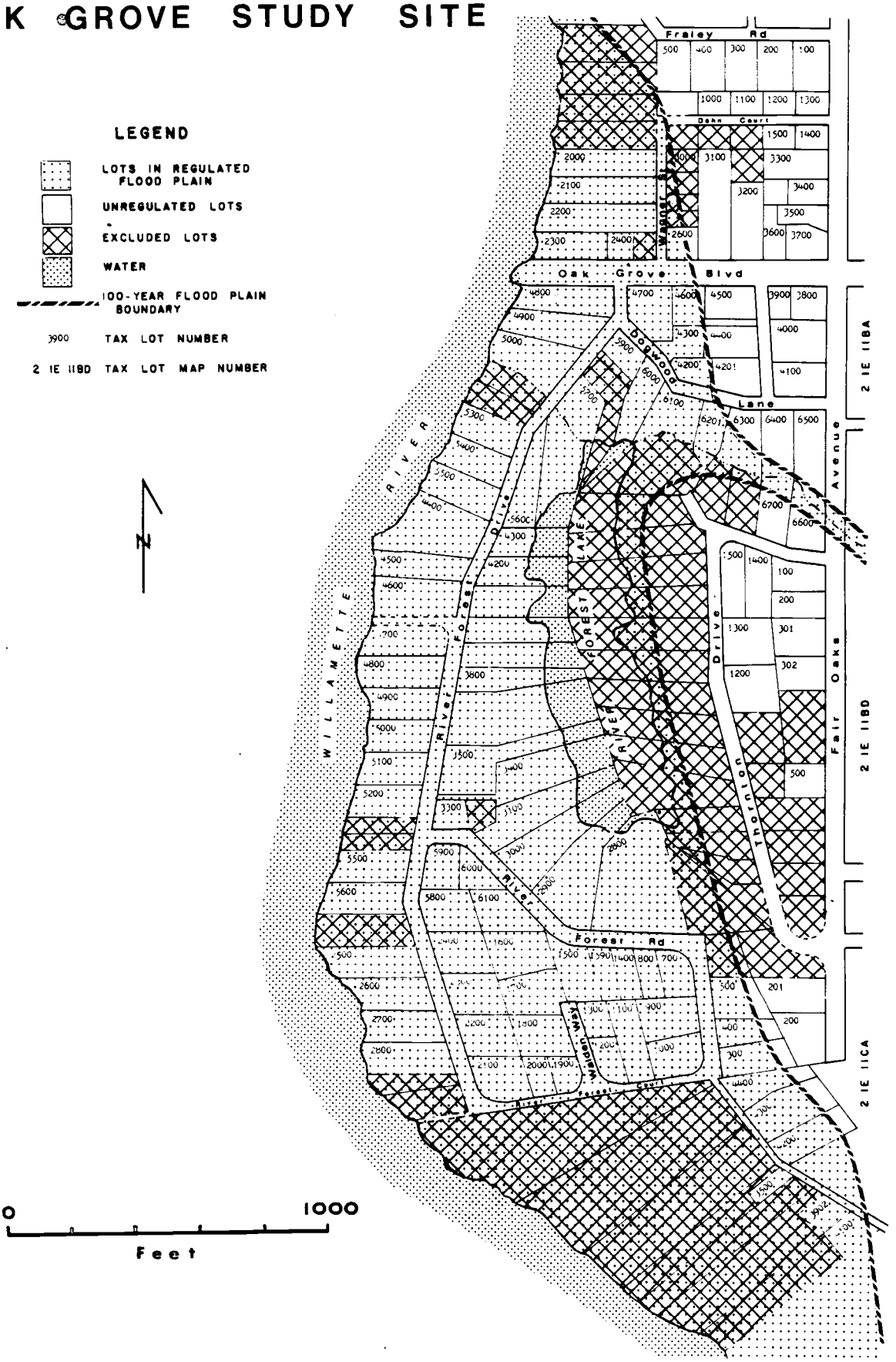


FIGURE 3

to River Road and other communities, has a greater paved width. Walden Way and Dogwood Lane are unpaved, and Dohn Court is paved with crushed rock.

Apart from size and location, the lots differ by having frontage on the Willamette River, or frontage on River Forest Lake, or no water frontage at all. There is a public boat ramp on the river at the end of Oak Grove Boulevard, which serves the entire neighborhood. The two other rights-of-way to the river are narrow and undeveloped. There is no public access to the lake. This water frontage difference is discussed further under Methodology.

Flooding History

The Willamette River is the twelfth largest river in the United States, as measured by total annual discharge. It drains 11,200 square miles, with most of the runoff coming from the Cascade Mountain Range to the east (up to 80 inches of precipitation per year) and from the Coast Range to the west (up to 110 inches of precipitation per year). The valley floor averages around 38 inches of precipitation per year. Most of the precipitation falls in the winter, with flooding generally occurring between December and February, especially when rain falls on snow, which is common in this mild climate.

The Oak Grove study site is downstream from all major tributaries, virtually at sea level. At the nearest river gage, half a mile down stream from the study site at river mile 20, the river has gone over its banks (at sixteen feet above mean sea level) 114 times between 1884 and 1967.[12] At Oak Grove the banks are somewhat higher, but ther have been numerous minor floods and a few major floods in that same period.

In December, 1964, the Willamette River rose to its highest level of this century, in spite of nine functioning flood control dams on its upstream tributaries. This flood crested at the gage at 39.6 feet, or 23.6 feet above the banks. Extensive damage was done throughout the Willamette Valley, including at Oak Grove. Land values and appreciation rates were depressed for several years.[13] The market does not appear to have returned to normal until 1972, although it started recovering around 1969.

With the subsequent addition of three more upstream flood control dams, a similar set of climatic events would now create a flood crest four feet lower than before, at 35.6 feet. This has been accepted as of the level of the intermediate regional flood, which would be caused by 385,000 cubic feet of water per second. Because of the slightly sloping topography, only six or seven additional properties at the study site have been protected from a 100 year flood by the construction of these newer dams.

The Administrative Boundary for Floodplain Regulations

The administrative boundary between regulated and unregulated areas is the projected elevation of a 100 year flood as shown on official maps. The boundary was first mapped in 1971, by the Army Corps of Engineers.[14] It was slightly altered at the northern end of the study site by the 1978 Flood Insurance Rate Maps, which transferred several properties into the regulated area. The county is now in the process of obtaining more precise, larger scale maps of all flood hazard areas.

Suitability of this Site for Testing the Study Hypothesis

In testing the study hypothesis, there are several criteria that ideally should be satisfied by the study site. The Oak Grove site satisfies the following criteria to varying degrees.

1. Availability, completeness, and relative accuracy of county assessor records. This criterion is met adequately. It would have been useful, however, if on-site adjustments had been noted more frequently and in more detail by the assessors.

2. The area should be (and is) zoned residential.

3. Floodplain regulations enacted and enforced for at least several years. The stringency of regulations were increased incrementally: Clackamas County joined the National Flood Insurance Program in 1971; adopted the Comprehensive Plan of the Floodplain Management District in 1974, and later amended it in 1976 and 1978; in 1978 it entered the second (Regular) phase of the Program, upon the completion of the Flood Insurance Rate Maps. These phases are described in detail on pages 4 and 5.

4. The site should be subdivided into residential lots, but a majority of the lots should still be vacant. The National Flood Insurance regulations apply mainly to vacant land, in order to prevent future abuses, not to rectify past abuses. Therefore, this must be a study of land values, not structural values. In spite of almost complete development of the study site, the study remains valid for two reasons. First, while the regulations do not affect existing land use, they do impose restrictions on any change in land use, and on any major improvements to structures or land. Second, in Oregon, assessors

are required to split real estate into two components, assessing land and structures separately.

5. The study area should be (and is) homogeneous. There are no land uses within the study site or within several blocks of it that might affect adjacent land values (of only part of the study site) either positively or negatively. There are no schools, churches, stores, or industries nearby. The nearest main road, and grocery store, is three blocks east of Fair Oaks Avenue at River Road. The study site also has an internal socio-economic homogeneity, with no shanties and no mansions.

6. For statistical comparison, there should be (and are) a similar number of lots in the regulated and unregulated portions of the study site. The Warnick study used many unregulated lots east of Fair Oaks Avenue, that were not included in this study. A different set of control lots were used in this study for the following reasons. First, there are sufficient unregulated lots west of Fair Oaks Avenue, once it is seen that the regulated lots fall into three separate populations. Second, the eastern lots are further from the regulatory boundary, and less suitable to testing the study hypothesis.

7. There should be no sharply noticeable topographic change between the regulated and unregulated portions of the study site. The land should rise gently and smoothly from the bottom to the top of the study site. The slope is most gentle and continuous at the southern end of the study site. In the northern end, the slope steepens near the regulatory boundary, but not enough to preclude the building of houses. In the center, on the east side of the lake, there is a steep

bluff, well above the floodplain boundary. The banks of the river are steep, and capped with a slight natural levee, so that the river-front lots, at their highest points, are several feet higher than the western lakefront lots across the road. The unregulated lots tend to be perceptibly higher than the regulated lots.

METHODOLOGY

Collection of Data

Land values rather than property values were used for three reasons. First, housing characteristics are much more variable than land characteristics. While it may cost more to build a house in the floodplain than out of it, because of required flood-proofing measures, it would be difficult to separate this increment from all the other variables in house construction. Second, floodplain regulations apply primarily to the land and how it may be used or developed, and not on the structure that is developed. Third, the land values, separate from the value of structures, are readily available at the County Tax Assessor's office.

While many studies utilize sales data, this research is based on tax assessment values. Assessment figures are readily available; reassessments are done at fairly frequent intervals; they include all properties, not just those recently marketed; assessors are mandated (since 1976) to recognize a possible difference between regulated and unregulated lots; and they represent a close approximation to true market values, which many sales figures do not.

The 1981 data on land values and much of the 1975 data were obtained from the records at the Clackamas County Assessor's Office, in Oregon

City. The remaining data were taken from the work of Warnick, with a few spot checks for accuracy.[15]

Clackamas County Assessment Procedures

Since 1968, Oregon law requires that all tax appraisals are to be taken at 100% of market value, with a maximum allowable error of $\pm$ 5%. Prior to 1968, properties were assessed at approximately 25% of market value. These values were multiplied by four before being used in this study. The 1968 state law also tightened up all assessment procedures, so that all later values were assumed to be more accurate.

Assessments are based on the current market value of properties that have recently sold. All lots in the regulated areas are supposed to be compared to recent sales within the regulated area. According to the County Chief Appraiser, all of these index sales are confirmed by contacting buyer, seller, and/or real estate broker to insure that the buyer and seller are reasonably well informed of the limited potential uses of the property.[16]

In assessing land, the appraiser starts with an idealized lot, typical for the neighborhood, and then adds and/or subtracts adjustments that apply to a specific lot. Adjustments are made for the presence (or absence) of municipal water and sewer service, paved streets, curbs, sidewalks, lot size and shape, and occasionally such amenities or disamenities as "view" or "low ground". The various assessors in the study area were inconsistent at noting adjustments on their sheets, frequently lumping everything together as "on site amenities". Therefore, readjustment of the values to make all the assessed land values

more equivalent could not be made. For example, since an exact dollar value was not noted for the lack of paving for any lot on Walden Way, that value can not be added to a lot assessment there to make it more equivalent to those lots that face paved streets. This does not appear to be a significant problem since there are few major differences in amenities. The unpaved roads are short, and close to paved ones, and none of the streets have sidewalks or curbs. All lots have had access to municipal utilities for at least twenty years. Sewer lines were installed in 1961, which probably accounts for the sharp jump in lakefront lot values at the 1962 assessment.

Assessments are now being done every six years, but used to be done every three or four years. This neighborhood was reassessed in 1958, 1962, 1965, 1969, 1972, 1975, and 1981. Usually these assessments are first applied to the following year's tax bill.

Sub-Grouping of Regulated Properties

One of the guidelines of this study is that the properties should be similar in all ways except floodplain regulation. As mentioned in the description of the study site, three types of properties are apparent: riverfront, lakefront, and non-waterfront. All unregulated properties are non-waterfront. The regulated lots fall into all three categories. Even a quick scan of the lot values, especially in 1975 and 1981, indicated economic dissimilarities also. To determine whether they should be considered separate populations, these three regulated groups were statistically compared with each other, using the Student's t test, in terms of mean size per lot, mean price per lot,

and mean price per square foot of lot. A description of each group is shown in Table 1.

The riverfront properties are significantly larger than the non-waterfront group. They are significantly more valuable than either of the other groups in every assessment year, both by lot and by square foot values.

The lakefront lots are harder to compare with the other groups, since the property lines run to the center of the lake. Therefore, a large portion of the lots are under water. The exposed acreage varies with the season. The average platted acreage is significantly greater than that of the riverfront group, but the average usable acreages of the two groups are similar. The mean value per lakefront lot is significantly greater than the non-waterfront regulated group in 1962, 1972, 1975, and 1981. It is slightly larger in 1965 and 1969. The mean value per square foot of lot is significantly lower than the other two groups in all years. The number of lakefront lots is much smaller than in any other group, and the standard deviation of lot size is much greater, so that statistical comparisons with other groups are not very powerful. See Figures 4 and 5 for a graphic picture of the relationships of values between the groups.

Only the regulated non-waterfront group has an average acreage similar to that of the unregulated group. These two groups also have similar sample sizes, and standard deviations of acreage.

Conclusion: It is statistically justifiable to subdivide the regulated properties into three groups. Because the non-waterfront lots are most similar to the unregulated lots, these two groups will give the best comparison in examining the effects of floodplain regulations on land values.

TABLE 1: SELECTED CHARACTERISTICS OF THE LOTS

Category	No. of Lots	$\bar{X}$ (sq. ft.)	s	Median(sq. ft.)
Unregulated	27 (42)[a]	16,116	6,198	17,139
Regulated				
Non-waterfront	22 (41)[a]	16,383	6,305	14,702
Lakefront	13	36,508[b]	18,792	32,400
Riverfront	25	23,072	6,038	21,000

a. Larger sample size for the 1975-81 interval

b. Includes the area within the lake

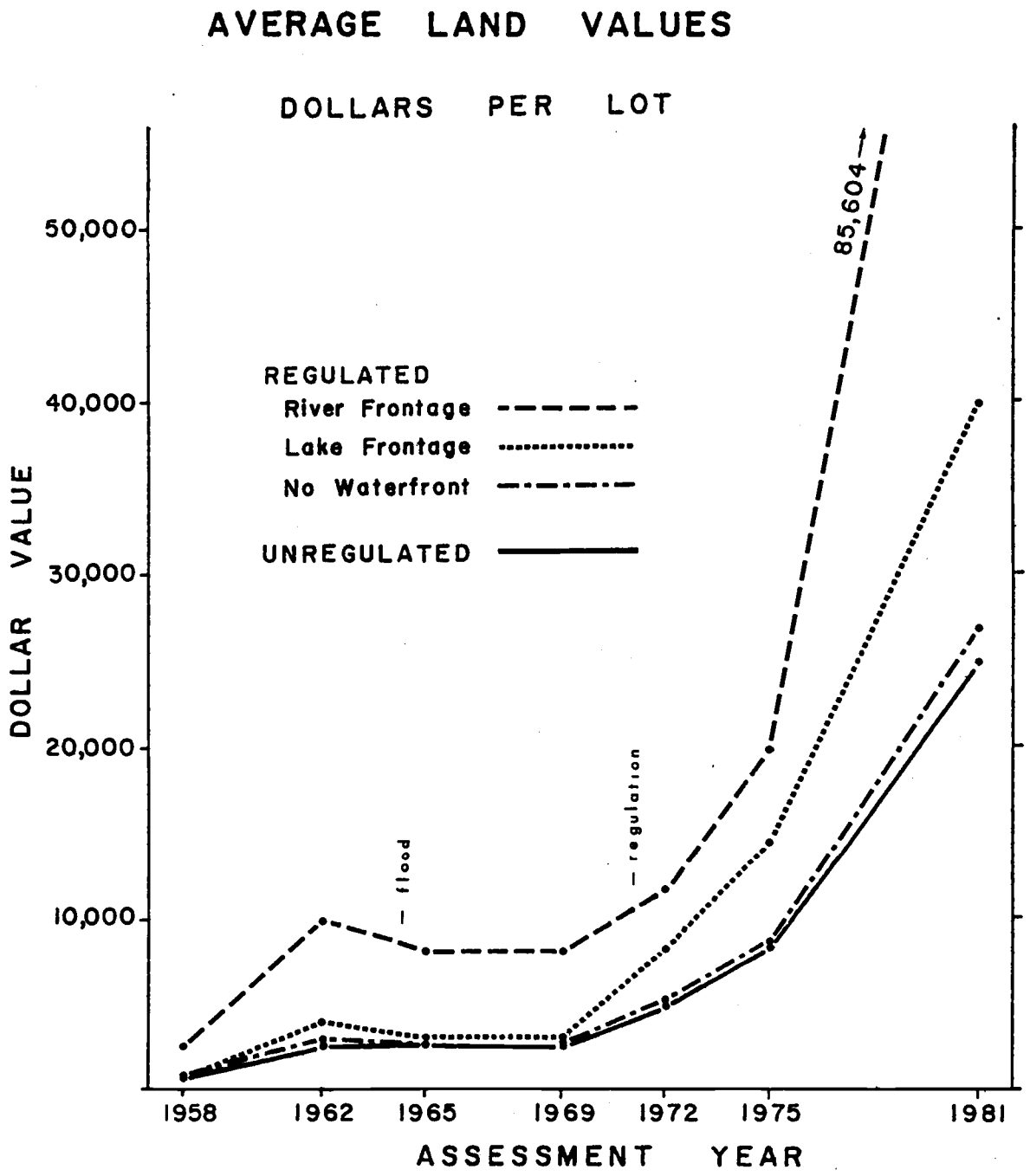

AVERAGE LAND VALUES
DOLLARS PER LOT
DOLLAR VALUE
50,000
40,000
30,000
20,000
10,000
85,604
REGULATED
River Frontage
Lake Frontage
No Waterfront
UNREGULATED
flood
regulation
1958
1962
1965
1969
1972
1975
1981
ASSESSMENT YEAR

FIGURE 4

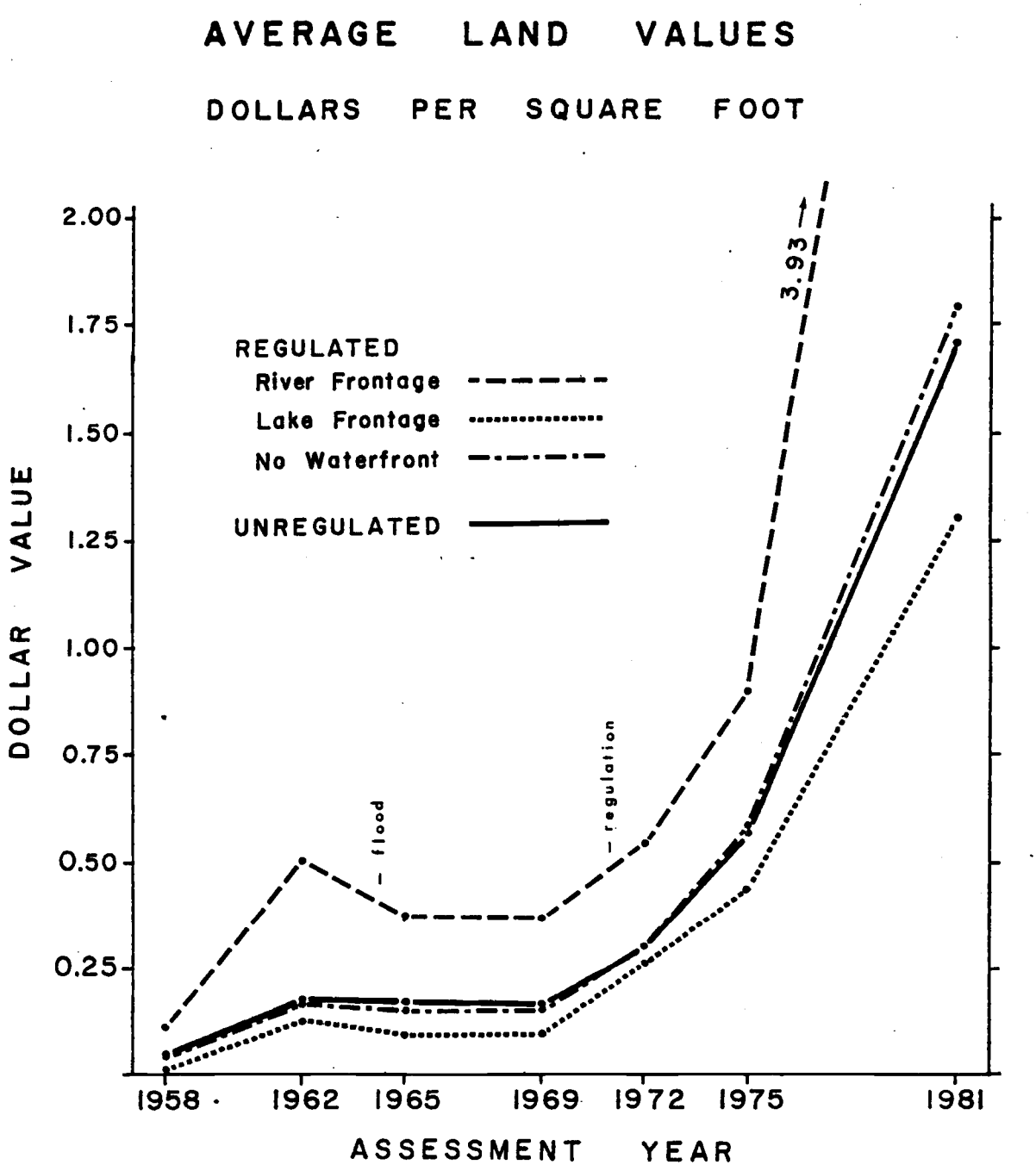

AVERAGE LAND VALUES
DOLLARS PER SQUARE FOOT
DOLLAR VALUE
2.00
1.75
1.50
1.25
1.00
0.75
0.50
0.25
REGULATED
River Frontage
Lake Frontage
No Waterfront
UNREGULATED
3.93
- flood
- regulation
1958
1962
1965
1969
1972
1975
1981
ASSESSMENT YEAR

FIGURE 5

Elimination of Lots From the Study

To make the analysis as precise as possible, lots were removed from the study for the following reasons.

1. Extreme lot size. Lots were excluded if they were more than double or less than half the mean size of their group. This was not done with the lakefront lots, since they were so variable in size that over half of the lots would be eliminated that would otherwise be eligible.

2. Vacant lots that were being used by the owners who had built on the adjacent lot. In this case, lots were assessed as additional acreage, rather than as independent lots waiting to be developed. Most of the vacant lots in the study area were thus excluded.

3. Changed lot size. Many lots couldn't be used since they had changed in size during the study period, especially by subdivision. However, thirty-four lots from this category which had been changed in size in the early part of the study period were included in the 1975-1981 analysis, in the unregulated and regulated non-waterfront groups, to give greater precision in testing the hypothesis.

4. Lots were eliminated if it was not obvious whether they were regulated or unregulated. This was done by visual examination of the 1978 FIRM maps. If less than 25% of a lot is within the regulatory boundary, it was considered unregulated. If at least 50% was within the boundary, it was considered regulated. The few remaining lots were excluded.

5. The few properties that were shifted into regulation by the adoption of the 1978 FIRM maps were excluded.

6. Lots on the east shore of River Forest Lake were all eliminated. With a steep bluff running north-south through the middle of each lot, the only buildable area is high above the regulatory level, while more than half of each lot (including water) is below this level.

Important Time Intervals

It is important to separate the effects of floodplain zoning from the effects of actual flooding on property values. It was necessary to extend the study period back more than a decade before the inception of regulation to determine at what point the after-effects of the 1964 flood became negligible. The fluctuations of the land market could only be approximated, since appraisals were only done every few years, and of course, are limited by the perceptions of the assessors. The market appears to have recovered to normal sometime between 1969 and 1972.

The data for 1958 is also included, but not used in calculating appreciation rates, since sewer line installation in 1961 greatly affected many property values. Also, the 1958 land values are so low that a small variation in 1958 assessed value would greatly alter the growth rate measured in 1962 or later.

The percent growth rates were calculated between each consecutive assessment, and also between several pairs of non-consecutive assessments spanning key time intervals, in order to compare: a) long term trends, b) change due to the 1964 flood, and c) changes due to floodplain zoning regulations. In comparing the value percent growth rates of the unregulated control lots with each of the three groups of regulated lots, these six time intervals were most significant:

1. 1962-81, to show the long-term increase of land values, over a period that included both a major flood, and the introduction of floodplain regulations.

2. 1962-69, to show the full effect of the 1964 flood on land values. The flooded lots depreciated immediately, but the proximate unflooded lots did not show depreciation until after the 1965 assessment.

3. 1969-75 shows the preiod in which the National Flood Insurance Program was first entered (1971) and the Comprehensive Plan was adopted (1974). However, assessments in this period may have been still influenced by the flood.

4. 1969-81 covers the entire period of regulation, including amendments to the Comprehensive Plan in 1976 and 1978, and entry into the Regular phase of the Program in 1978. The early part of this period may have been influenced by the 1964 flood.

5. 1972-81 shows the entire period of regulation after the effects of the flood on land values had probably disappeared.

6. 1975-81, the most recent interval, with floodplain regulations in full force. By 1981, any lag time in the response of the real estate market to the imposition of floodplain zoning, especially the more stringent Regular Program requirements, should have occurred. Also, 1981 is the first assessment since the assessors were mandated (in 1976) to look for possible differences between regulated and unregulated lot values.

Since the last period is the most definitive test of the hypothesis, and since the data was available, the number of lots was approximately doubled for this one time interval, in both the regulated

non-waterfront and unregulated categories. This greater sample size gives greater statistical accuracy.

Analysis of Data

This study examines differences between groups of lots, not between individual lots. The data was analyzed in three ways: average value per lot in a given year; average value per square foot of lot in a given year; and percent change in lot value between two given years, also referred to as percent rate of appreciation. For each of these ways, the group mean and standard deviation was found for each group, and then each regulated group was compared with the unregulated group. Each group mean is found by summing up the values for each lot in the group, and then dividing by the number of lots in the group.

$$\overline{X} = (\Sigma X_i) / n$$

Next, the pairs of groups were compared, using the test statistic shown below, and evaluated for significant difference using the Student's t Test, a one-sided test, $\alpha = .05$ was used. A Z-score test could have been used, but it was felt that the t-test was more conservative.

Of the three relationships, the most significant is the third one, comparison of percentile growth rates between two given years. For an individual lot this is calculated by:

$$\text{Individual Lot Growth Rate} = \frac{\text{Year 2 Value} - \text{Year 1 Value}}{\text{Year 1 Value}} \times 100\%$$

The answer is the same whether one uses value per lot, or value per square foot of lot. The group mean growth rate is calculated as described on the previous page.[17]

The Test Statistic

A one-sided test, $\alpha = .05$, was used to test the null hypothesis:

H_o: $\bar{X}_1 = \bar{X}_2$ $\quad$ H_a: $\bar{X}_1 > \bar{X}_2$ $\quad$ 1 = unregulated, 2 = regulated

The test statistic: $$t = \frac{(\bar{X}_1 - \bar{X}_2) - 0}{\sqrt{s_p^2 \left(\frac{1}{n_1} + \frac{1}{n_2}\right)}}$$

where $$s_p^2 = \frac{(n_1 - 1)\, s_1^2 + (n_2 - 1)\, s_2^2}{n_1 + n_2 - 2}$$

$\bar{X}_1$, $\bar{X}_2$ = sample population means

n_1 , n_2 = number of lots in each sample

s_1 , s_2 = standard deviation of each population

s_p = pooled sample standard deviation

Reject the null hypothesis (H_o) if the test statistic value is greater than the value in the t-table for $(n_1 + n_2 - 2)$ degrees of freedom.[18] To reject the null hypothesis is to accept the study hypothesis.

TEST RESULTS

As stated earlier, in testing the study hypothesis, the main comparison is between the unregulated lots and the regulated non-waterfront lots, since they are most similar. The comparisons of the unregulated lots with the regulated riverfront lots and the lakefront lots are also included in this discussion, although they are not as

reliable due to dissimilarities. A summary of the statistical analysis is given in Table 2.

The Effect of Regulation on Percentile Appreciation Rates

In the five key time intervals that examine the effect of regulations, the percentile growth rate of assessed land values of regulated non-waterfront lots is never significantly less than the percentile growth rate of the unregulated lots (Figures 6a and 6b). In most cases, the regulated non-waterfront lots had a slightly higher (not significant) value growth rate, which is the converse of the study hypothesis. Thus, in all time intervals the study hypothesis is rejected.

The comparison of unregulated lots with lakefront and riverfront lots gives varied results. For the riverfront lots, the study hypothesis is accepted for the time intervals of 1962-81 and 1969-75. However, in the other three time intervals that extend to 1981, the study hypothesis is rejected. Indeed, the riverfront lots percentile growth rate appears to have accelerated since regulation began in 1971, when compared to the unregulated lots. In the 1972-81 and 1975-81 intervals, the riverfront lots appreciated at a significantly greater percentile rate than the controls.

For the lakefront properties, the study hypothesis is rejected for all the key time intervals, except 1962-69. Since 1972 the percentile growth rate has slowed down to slightly less (insignificant) than the percentile growth rate of the unregulated lots.

Effect of Flooding on Appreciation Rates

The 1964 flood had a negative effect on assessed land values in

TABLE 2: SUMMARY OF APPRECIATION RATES AND TEST RESULTS BY INTERVAL

Interval	Category	$\overline{\Delta X}$ (%)	s	Test Results[b]	Study Hypothesis
1962-69	Unregulated	-2.5	10.5	--	--
	Regulated				
	Non-waterfront	-8.9	12.6	1	a
	Lakefront	-25.5	4.8	1	a
	Riverfront	-19.1	11.5	1	a
1962-81	Unregulated	902.5	162.9	--	--
	Regulated				
	Non-waterfront	916.6	226.8	3	reject
	Lakefront	955.2	246.5	3	reject
	Riverfront	783.8	135.7	1	accept
1969-75	Unregulated	247.9	56.8	--	--
	Regulated				
	Non-waterfront	264.4	84.1	3	reject
	Lakefront	385.2	75.3	4	reject
	Riverfront	155.1	44.0	1	accept
1969-81	Unregulated	927.0	142.9	--	--
	Regulated				
	Non-waterfront	1044.4	331.0	3	reject
	Lakefront	1339.8	327.6	4	reject
	Riverfront	1015.3	253.0	3	reject

TABLE 2 : (continued)

Interval	Category	$\overline{\Delta X}$ (%)	s	Test Results [b]	Study Hypothesis
1972-81	Unregulated	440.2	59.9	--	--
	Regulated				
	Non-waterfront	456.9	85,2	3	reject
	Lakefront	417.2	127.6	2	reject
	Riverfront	643.3	122.0	4	reject
1975-81	Unregulated	208.7	56.9	--	--
	Regulated				
	Non-waterfront	213.2	36.5	3	reject
	Lakefront	194.6	69.9	2	reject
	Riverfront	336.2	45.3	4	reject

a Study hypothesis is not applicable, because the interval is prior to floodplain regulations.

b 1. Percent increase of regulated lot values significantly less than unregulated lots.

2. Percent increase of regulated lot values slightly less than unregulated lots.

3. Percent increase of regulated lot values slightly greater than unregulated lots.

4. Percent increase of regulated lot values significantly greater than unregulated lots.

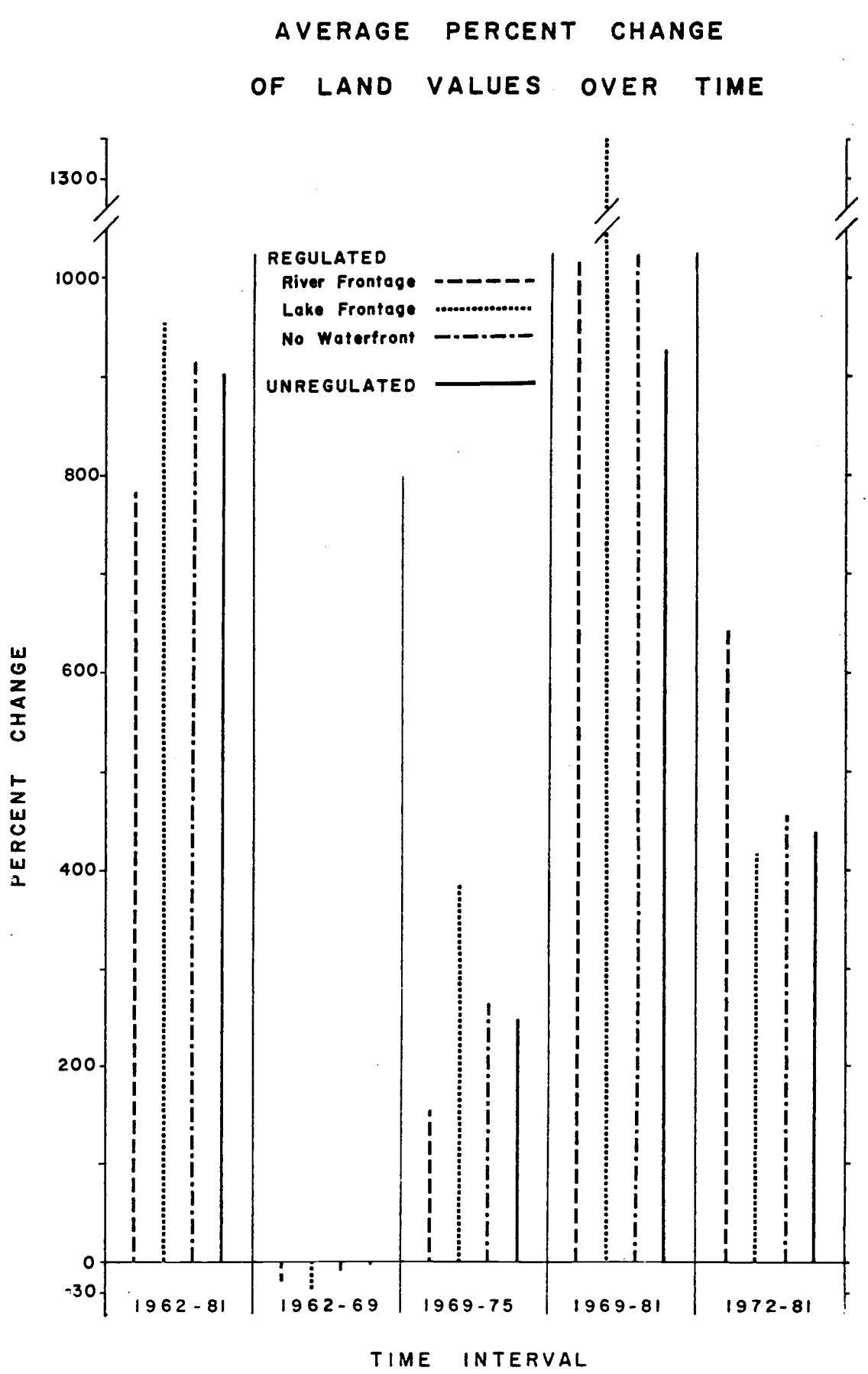

AVERAGE PERCENT CHANGE
OF LAND VALUES OVER TIME
1300
1000
800
600
400
200
0
-30
PERCENT CHANGE
REGULATED
River Frontage
Lake Frontage
No Waterfront
UNREGULATED
1962-81
1962-69
1969-75
1969-81
1972-81
TIME INTERVAL

FIGURE 6a

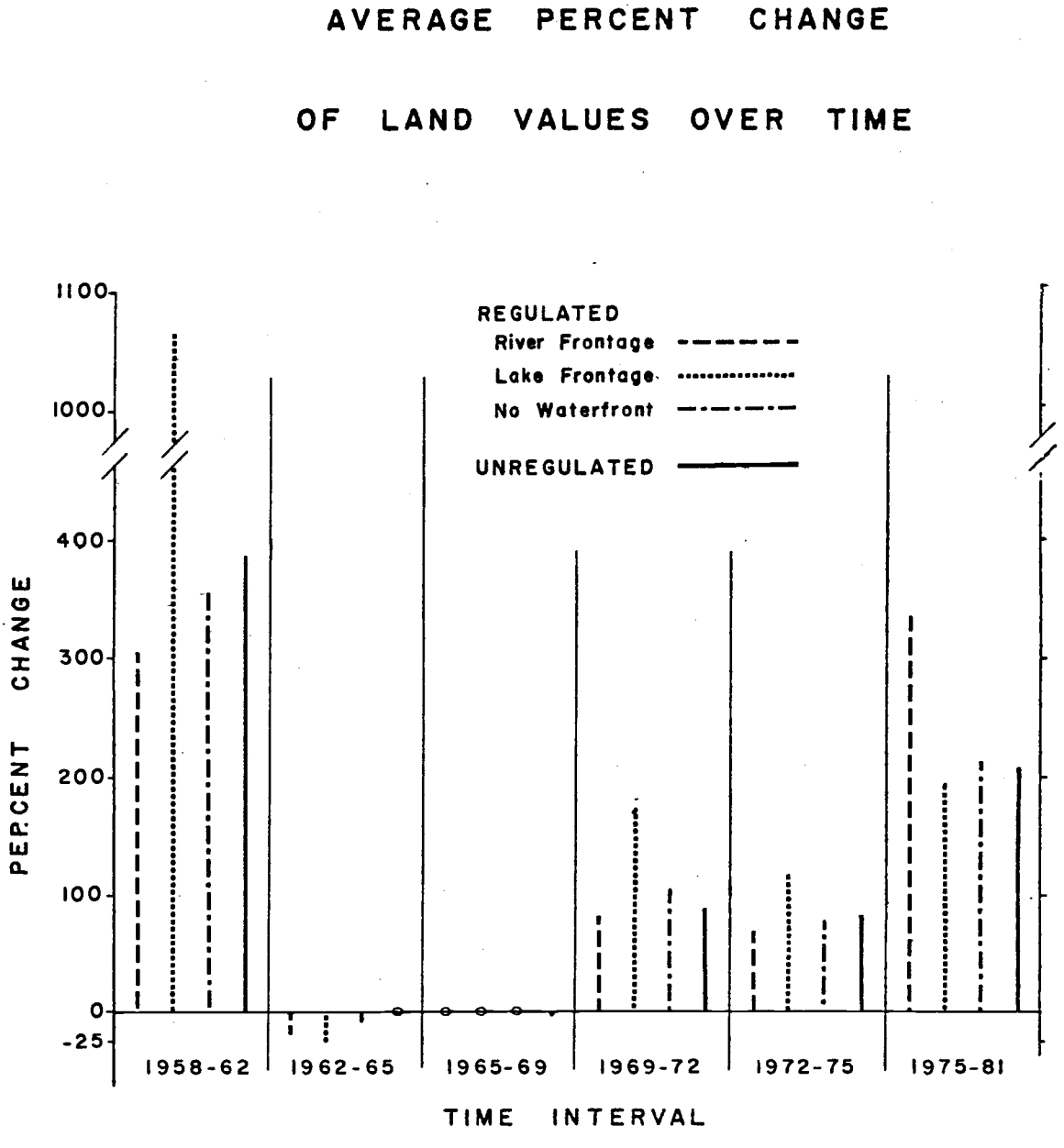

AVERAGE PERCENT CHANGE
OF LAND VALUES OVER TIME
REGULATED
River Frontage
Lake Frontage
No Waterfront
UNREGULATED
PERCENT CHANGE
1100
1000
400
300
200
100
0
-25
1958-62
1962-65
1965-69
1969-72
1972-75
1975-81
TIME INTERVAL

FIGURE 6b

all lot categories, including those above the flooding (now referred to as "unregulated"). The flooded lots depreciated immediately, as shown by the 1965 appraisal. After some lag time, the unflooded lots showed a small depreciation, shown by the 1969 appraisal. The study hypothesis is not applicable for this time interval, since the county had not entered the Program in 1969. The non-waterfront lots depreciated at the least rate of the three flooded categories.

The Long Term View of Appreciation Rates

In the nineteen year period of 1962-81 the percentile growth rate of appraised land values in the regulated non-waterfront lots has slightly exceeded that of the unregulated lots, in spite of a near-record flood and the imposition of flood plain regulations. This is also the case for the regulated lakefront lots.

The assessed value of the riverfront lots in the 1962-81 period appreciated at a significantly lower percentile rate than the unregulated lots. However, the gap is closing, since recent riverfront appreciation rates have been so great. The 1962-87 interval, when it arrives, shouls show no significant difference between riverfront and unregulated lot appreciation rates.

Other Analyses

While the previous analyses test the differences between the groups in terms of average value changes over given periods of time, these last two analyses test the differences between the groups in terms of average values at given points in time. Figure 4 illustrates graphically the average values of each of the four groups of lots, for

each assessment year, on a value per lot basis. The unregulated lots were always statistically similar in value to the non-waterfront regulated lots for all assessment years. Figure 5 shows graphically the average value per square foot of lot in each of the four groups. Again, the unregulated lots are statistically similar to the non-waterfront regulated lots.

In both of these analyses, riverfront lots are always significantly more valuable than unregulated lots. After 1969, the lakefront lots were significantly more valuable per lot than the unregulated lots. On a dollar per square foot of lot basis, the lakefront lots were always significantly less valuable than the unregulated lots.

DISCUSSION

Since the study hypothesis is rejected, it is implied that either: a) the implementation of flood zone regulations had negligible impact on appreciation rates, or b) there are other unmeasured factors that counterbalance the hypothesized effect of regulation.

In the first case, there would be no significant effect of regulation shown if the county assessors ignored, intentionally or unintentionally, the regulated zone and compared regulated lots to unregulated lots in developing their price curves. In addition, Damianos suggests that developed land values might be less sensitive than undeveloped land values to the restrictions contained in the zoning regulations.[19] The small sample populations with large standard deviations cannot be blamed for causing the test statistic to fail to find a significant difference in this study since the regulated appreciation rates were almost always greater than the unregulated rates.

Moore and Cost speculated that floodplain zoning increased the awareness of a potential hazard.[20] Is it possible that the insurance program lowers appreciation rates because it causes an increased perception of hazard, more than because of its restrictions on land use? This is not apparent at Oak Grove, especially since the study hypothesis was rejected.

There are several factors that might counterbalance any negative effects of regulation. 1) There is a strong neighborhood unity, both social and structural. Socially, Oak Grove is regarded as an upper-class desirable place to live, which might have driven up lot values in the regulated zone to equal the unregulated lot values. Land is available in many other parts of Clackamas County, implying that people live in this neighborhood by choice, not by necessity. There is also an intangible structural unity among the parts of the neighborhood. Thus, when values of flooded lots dropped after the 1964 flood, this depreciation was echoed in the 1969 assessment by the upper lots that were untouched by the flooding. Thus, land values throughout the neighborhood share the same trends.

2) The availability of flood insurance is a positive benefit of the program, especially to a developed lot, because the owner can continue to get first layer coverage at low, subsidized rates.

3) The past two decades in America have shown a strong surge in interest in outdoor recreation, and with "living the good life." The lots close to water are more scenic, and the access to river recreation is more convenient, which makes them more desireable, commanding a higher price. This is illustrated in Figures 4 and 5, by the relatively

rapid appreciation of riverfront lots in the last assessment interval.

4) Related to the last points is the extraordinary clean up of the Willamette River. Mainly in the decade of 1957-67, the lower river was transformed from a malodorous sesspool back into a river suitable for contact sports.[21] In 1973, the E.P.A. commissioned a national study on the benefits that accrue to residential properties near to water bodies due to water pollution abatement.[22] One of the study sites included Oak Grove. The E.P.A. study team concluded that real property benefits extended up to 4000 feet from the river. Benefits range from 24.9% at the riverside, to 10.7% at 100 feet, to 4.6% at 2000 feet from the river, compared to similar properties away from the river. These values are probably unrealistically large, however, since they apparently ignore the effect of the 1964 flood on land values over the same time period. However, the general conclusion of the entire study still appears valid: pollution abatement positively affects property value, inversely proportional to the distance from the water body. Their questionnaire results indicate that there can be a long lag time before some people become aware of the change, so that the effects of the clean up on appreciation rates might have lasted well into the Seventies.

CONCLUSIONS

In the ten year period since Clackamas County first adopted flood-plain regulations, the lots in the regulated area of this Oak Grove neighborhood have the same or greater average appreciation rates as adjacent unregulated lots. It is tentatively concluded that floodplain regulations have no significant negative effect on land

appreciation rates. If floodplain regulation does slow appreciation rates, the effect is counterbalanced by other factors encouraging people to pay for amenities associated with living in the floodplain.

FOOTNOTES

1. These three paragraphs are drawn from several sources, especially an April 1, 1982 lecture by Dr. Keith W. Muckleston, in the Oregon State University Water Resources Seminar Series.

2. Keith W. Muckleston, "The Evolution of Approaches to Flood Damage Reduction", Journal of Soil and Water Conservation, Vol. 31, No. 2 (1974), pp. 53-59.

3. United States Water Resources Council, A Unified National Program for Flood Plain Management, (Washington, D.C., U.S. Government Printing Office, 1979), p. A-1.

4. The information in the following four paragraphs is summarized from a pamphlet: Federal Emergency Management Agency, "Questions and answers: National Flood Insurance Program", (Washington, D.C., June, 1980.)

5. Clackamas County Planning Division, "Flood Plain Development Permit Fact Sheet".

6. Bureau of Governmental Research and Service, School of Community Service and Public Affairs, University of Oregon, Flood Plain Management for Oregon Cities and Towns, Planning Bulletin No. 10, (revised, Jan., 1978), p. 6.

7. David H. Howells, "Urban Flood Management: Problems and Research Needs", Journal of the Water Resources Planning and Management Division, A.S.C.E., Vol. WR2 (1977), pp. 207-8.

8. John L. Moore, and Betty W. Cost, Development and Applications of a Methodology for Estimating the Impact on Local Land and Property Values from Flood Plain Regulations in Ohio, Technical Report No. 1, (Columbus, Ohio Dept. of Natural Resources, 1973), p. 16.

9. Demetrios Damianos, The Influence of Flood Hazards Upon Residential Property Values, (Washington, D.C., National Technical Information Service, PB-251 942, 1975)

10. Keith W. Muckleston, Michael F. Turner, and Richmond T. Brainerd, Floodplain Regulations and Residential Land Values in Oregon, (Water Resources Research Institute, Oregon State University, Corvallis, Oregon, 1981)

11. Larry James Warnick, Analysis of Growth Rates of Residential Land Values On and Near the Regulated Flood Plain, unpublished research paper, Dept. of Geography, Oregon State University, 1977.

12. United States Army Corps of Engineers, Portland District, Flood Plain Information: Willamette River, Johnson, Kellogg, and Mt. Scott Creeks, Milwaukie-Oak Grove-Lake Oswego, Oregon, (May, 1970) pp. 11-15.

13. Illustrated in Figures 4, 5, and 6.

14. U.S. Army Corps of Engineers, op. cit., footnote 12, Plate 9.

15. Warnick, op. cit., footnote 11, Appendix B, pp. 28-34.

16. Jack Jordan, Clackamas County Chief Assessor, Reply to a survey of all Oregon County Assessors, conducted by Carol Mitrani, August, 1980.

17. Note that this is not the same as the growth rate between two means. This measurement was not used.

18. James L. McClave and Frank H. Dietrich, Statistics, (SanFrancisco, Dellen Publishing Co., 1979).

19. Damianos, op. cit., footnote 9.

20. Moore and Cost, op. cit., footnote 8.

21. A good review of the history of pollution abatement on the

Willamette River is in: Council on Environmental Quality, "Cleaning Up the Willamette," Fourth Annual Report of the C.E.Q. (1973), pp. 43-71.

22. David M. Dornbusch and Stephen M. Barrager, Benefit of Water Pollution Control on Property Values, Office of Research and Monitoring, U.S. Environmental Protection Agency (Washington, D.C., 1973)

APPENDIX A

STUDY PARCEL VALUES

Unregulated Lots

Lot #	Area (sq. ft.)	Lot Value ($) 1958	1962	1965	1969	1972	1975	1981
Tax Map 2 1E 11BA								
0100	17,930	920	2880	2880	2880	5200	8500	25,200
0200	17,930	800	2560	2560	2560	5200	8500	25,200
0300	16,300	760	2400	2400	2400	4800	8000	24,000
0400	17,278	760	2520	2520	2520	5200	8000	25,700
0500	17,278	760	2560	2560	2560	5200	8000	26,700
1000	7,300	---	----	----	----	----	3000	18,400
1100	7,300	---	1640	1640	1620	3200	7000	19,400
1200	7,300	---	1600	1600	1600	3000	7000	19,400
1300	7,300	320	1760	1760	1760	3200	7000	19,400
1400	7,300	560	1760	1760	1760	3200	7000	19,400
1500	7,300	560	1600	1600	1600	3000	7000	19,400
3000	7,000	---	----	----	----	----	7000	17,800
3100	33,977	1200	2520	2520	2520	5200	11,000	35,300
3200	24,394	---	----	----	----	----	8500	29,800
3300	18,000	640	2400	2400	2400	4800	8500	25,000
3400	10,000	---	----	----	----	----	7000	22,800
3500	9,860	---	----	----	----	----	7000	22,500
3600	10,360	---	----	----	----	----	7000	19,800
3700	13,260	---	----	----	----	----	8000	21,900
3800	11,655	---	----	----	----	----	7500	22,500
3900	7,770	1080	3120	3120	1500	3600	7000	19,000
4000	22,100	760	3040	3040	3040	5500	9000	29,100

Lot No.	Area (sq. ft.)	Lot Value ($) 1958	1962	1965	1969	1972	1975	1981
4100	17,325	760	2880	2880	2880	5000	8500	24,700
4201	14,700	---	----	----	----	----	8500	21,600
4400	19,000	---	----	----	----	----	7500	23,000
4500	17,400	1080	3000	3000	3000	4800	8500	24,400
6300	21,275	400	3000	2720	2720	5600	10000	26,000
6400	20,000	520	2720	2720	2720	5600	10000	25,000
6500	28,000	680	3160	3160	3160	5800	10500	30,000
6600	16,500	400	3200	3200	3200	5600	9500	27,300
6700	20,000	400	3000	3000	3000	5600	10000	28,000
Tax Map 2 1E 11BD								
0100	17,000	320	3080	3080	3080	4500	8000	26,200
0200	13,600	280	2240	2240	2240	4400	8000	23,800
0301	19,800	---	----	----	----	----	8500	27,800
0302	15,900	---	----	----	----	----	8500	25,600
0500	14,850	---	----	----	----	----	6000	24,700
1200	23,250	---	----	3160	3040	5600	9000	29,600
1300	22,500	---	----	3160	3160	5600	9000	29,400
1400	16,400	240	2360	2360	2360	4600	8000	25,900
1500	18,000	480	2400	2400	2400	4600	8000	26,800
Tax Map 2 1E 11CA								
0200	21,574	---	----	----	----	----	10500	32,700
0201	20,895	---	----	----	----	----	10,500	32,200

Regulated Non-waterfront Lots

Lot No.	Area (sq. ft.)	Lot Value ($) 1958	1962	1965	1969	1972	1975	1981
Tax Map 2 1E 11BA								
2400	6,800	---	----	----	----	----	6,000	19,500
2600	10,000	600	2200	1640	1640	3800	7,000	21,500
4200	9,375	---	----	----	----	----	7,500	20,300
4300	12,240	---	----	----	----	----	7,500	19,700
4600	18,700	---	1640	1640	1640	4600	8,000	24,900
4700	21,700	480	3520	2480	2480	5800	9,000	28,500
5900	11,050	---	----	----	----	----	6,500	18,600
6201	14,875	---	----	----	----	----	8,000	22,400
Tax Map 2 1E 11BD								
3300	10,500	360	2560	1920	1920	4000	8,500	21,400
5800	21,488	840	3320	3320	3320	5500	8,500	19,800
5900	14,700	---	----	----	----	----	10,000	24,700
6000	9,750	---	----	----	----	----	8,000	22,700
6100	20,800	760	3000	3000	3150	6200	10,000	28,500
Tax Map 2 1E 11CA								
0300	21,000	880	2840	2120	2120	5400	9,500	41,230
0400	14,720	400	2360	1760	1760	4800	9,000	28,400
0500	20,567	760	3080	2320	2320	5600	10,000	31,900
0700	14,200	640	2600	1960	1960	4800	9,000	27,600
0800	11,040	640	2000	1600	1600	4400	7,500	25,400
0900	22,550	---	----	----	----	----	10,000	33,000
1000	26,520	---	----	----	----	----	9,500	31,500
1100	13,200	760	3080	3080	3080	5000	9,500	32,300

Lot No.	Area (sq. ft.)	Lot Value ($) 1958	1962	1965	1969	1972	1975	1981
1200	12,400	440	2720	2720	2720	4500	8,000	24,500
1300	10,005	400	1880	1880	1880	2500	6,000	17,800
1400	11,550	---	----	----	----	----	7,500	25,400
1500	20,928	---	----	----	----	----	10,000	32,200
1590	10,200	---	----	----	----	----	6,000	16,640
1600	24,829	600	3240	3240	3240	5500	10,000	32,100
1700	23,520	680	3040	3040	3040	5000	10,000	30,500
1800	21,760	760	3000	3000	3000	5000	10,500	29,700
1900	9,450	---	----	----	----	----	7,500	24,000
2000	9,490	---	----	----	----	----	7,000	24,000
2100	22,950	880	4040	4040	4040	7000	10,500	33,300
2200	21,760	880	3760	3760	3760	7000	10,500	32,700
2300	21,760	840	3400	3400	3400	5500	9,000	28,700
2400	21,760	840	3400	3400	3400	5500	9,000	28,700
3500	7,280	---	----	----	----	----	6,500	21,700
3902	9,583	---	----	----	----	----	7,500	24,400
4100	10,019	520	1760	1760	1760	4500	7,500	24,500
4200	22,651	---	----	----	----	----	9,000	33,000
4300	30,492	---	----	----	----	----	10,000	36,300
4400	23,522	---	----	----	----	----	9,000	33,500

Regulated Riverfront Lots

Lot No.	Area (sq. ft.)	Lot Value ($) 1958	1962	1965	1969	1972	1975	1981
Tax Map 2 1E 11BA								
2000	27,200	2120	7,160	5,360	5,360	9,200	16,500	90,000
2100	27,625	2120	7,160	5,000	5,000	8,500	17,000	90,000
2200	28,050	2120	7,280	5,080	5,080	7,500	16,000	80,000
2300	19,125	2120	7,920	5,520	5,520	9,000	15,000	75,000
4800	25,500	2000	9,600	6,680	6,670	12,080	19,500	80,000
4900	27,450	2240	9,600	6,720	6,720	11,500	21,000	80,000
5000	37,500	2480	10,520	7,360	7,360	11,500	22,500	95,000
5300	20,000	2760	10,680	7,480	7,480	11,500	19,500	85,000
5400	20,000	2480	10,800	7,560	7,560	12,000	20,500	85,000
5500	20,000	2320	10,920	8,200	8,200	12,000	20,500	85,000
Tax Map 2 1E 11BD								
4400	39,000	3080	13,560	9,480	9,480	15,500	28,000	104,000
4500	20,020	1920	9,400	6,600	6,600	11,000	20,000	72,800
4600	27,500	3360	11,600	8,680	8,680	12,000	22,000	88,900
4700	25,000	2480	10,520	8,920	8,920	12,000	20,000	80,250
4800	25,000	2480	8,840	7,520	7,520	10,500	18,000	77,250
4900	20,000	2520	9,840	8,360	8,360	11,500	20,000	80,250
5000	20,000	2480	9,760	8,280	8,280	12,000	20,000	84,250
5100	13,332	2480	9,760	8,760	8,760	12,000	20,000	92,250
5200	16,362	2520	9,920	9,920	9,920	13,000	20,000	90,150
5500	16,665	2480	10,120	10,120	10,120	13,000	20,000	92,500
5600	18,000	2480	10,120	10,120	10,120	13,500	20,000	92,500

Lot No.	Area (sq. ft.)	Lot Value ($) 1958	1962	1965	1969	1972	1975	1981
Tax Map 2 1E 11CA								
2500	20,475	2480	10,240	9,240	9,240	13,500	20,000	85,000
2600	21,000	2480	10,280	9,240	9,240	13,500	19,500	85,000
2700	21,000	2480	10,320	9,280	9,280	13,500	19,500	85,000
2800	21,000	2480	10,400	10,400	10,400	12,500	20,000	85,000
Regulated Lakefront Lots								
Tax Map 2 1E 11BA								
5600	19,500	80	3600	2520	2520	6,500	9,500	35,000
5700	45,000	440	2360	1800	1800	5,000	10,000	42,000
6000	20,000	120	3120	2160	2160	7,000	11,000	38,100
6100	17,250	520	3640	2920	2920	6,500	10,000	40,800
Tax Map 2 1E 11BD								
2800	84,000	1600	6640	5000	5000	16,000	25,000	55,600
2900	50,000	800	5000	3760	----	----	20,000	42,900
3000	52,800	600	4240	3400	3400	8,000	18,000	43,900
3100	38,250	880	3960	3160	3160	8,000	18,000	39,500
3400	32,400	280	3360	2680	2680	7,000	13,000	37,900
3500	43,000	800	4560	3440	3440	9,780	14,000	40,400
3800	23,400	200	3200	2240	2240	7,500	13,000	33,900
4200	26,500	600	3920	2760	2760	8,200	13,000	35,700
4300	22,500	600	3720	2520	2520	8,000	12,500	33,900