

that those without frontage are much less interested in paying. Only 3.1% would pay over \$100/yr. and only 8.9% would pay greater than \$50/yr. Also, only 11% of those with frontage said they would pay nothing compared to 30% of those without frontage.

Question 15, the effects of water quality on property value revealed that a greater proportion of lake front owners (51.7%) said they were very much affected compared to those without frontage (29.7%).

It is clear that those with lakefront property feel that their property values are linked more directly with lake water quality. The fact that lakefront owners are willing to pay more for keeping the lake clean may reflect this concern (i.e. a desire to protect their investment), but it may also be a reflection of higher average income and education levels of this group.

2. Comparison: Members of KLSPO Assoc. v Non-members.

On Question 13, these two groups showed similar characteristics to the groups described above. Again the most favored tactic, by both groups, was to make the polluters pay. There was a similar disparity over making everyone in the watershed pay; members gave this item a score of 3.00 and non-members gave it 2.5, indicating again that those not intimately connected to the lake feel they should pay less.

On the contingent payment question over 55% of members indicated they would pay over \$50 per year while only 23.9% of non-members would do the same. Members were more aware of water quality affects on property values, almost 54% indicating they would be very much affected, compared to 37% for non-members.

3. Comparison: Length of Residence.

Question 13 revealed the same pattern as in the other groups where it was felt polluters should pay most and lake association members should pay least.

The contingent payment question showed less of a disparity between groups, 36.3% of new residents compared to 31.2% of old residents are prepared to pay over \$50 per year for a clean lake. This perhaps is due to the fact the the proportion of lake front owners is similar in both groups.

FIGURE 1: PROPERTY OWNER CHARACTERISTICS
TOTAL WATERSHED

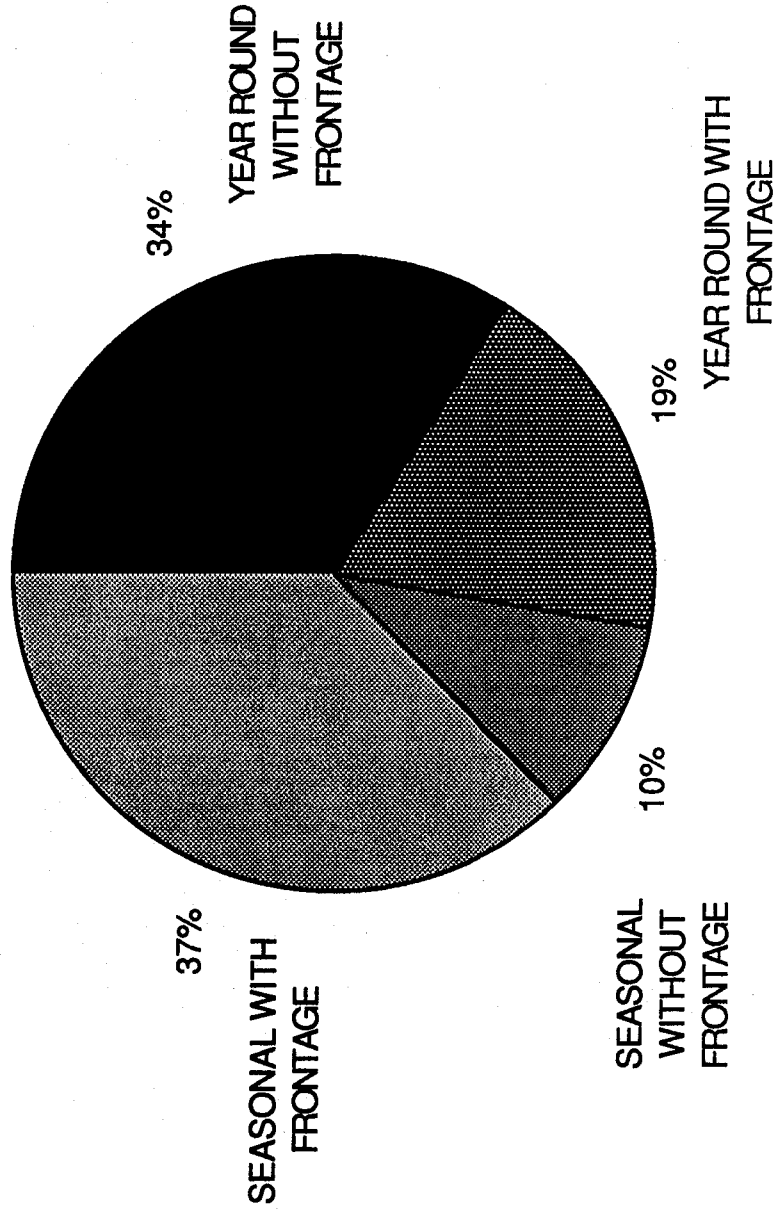


FIGURE 3: MEMBERSHIP IN KEUKA LAKESHORE PROPERTY OWNERS ASSOCIATION - TOTAL WATERSHED

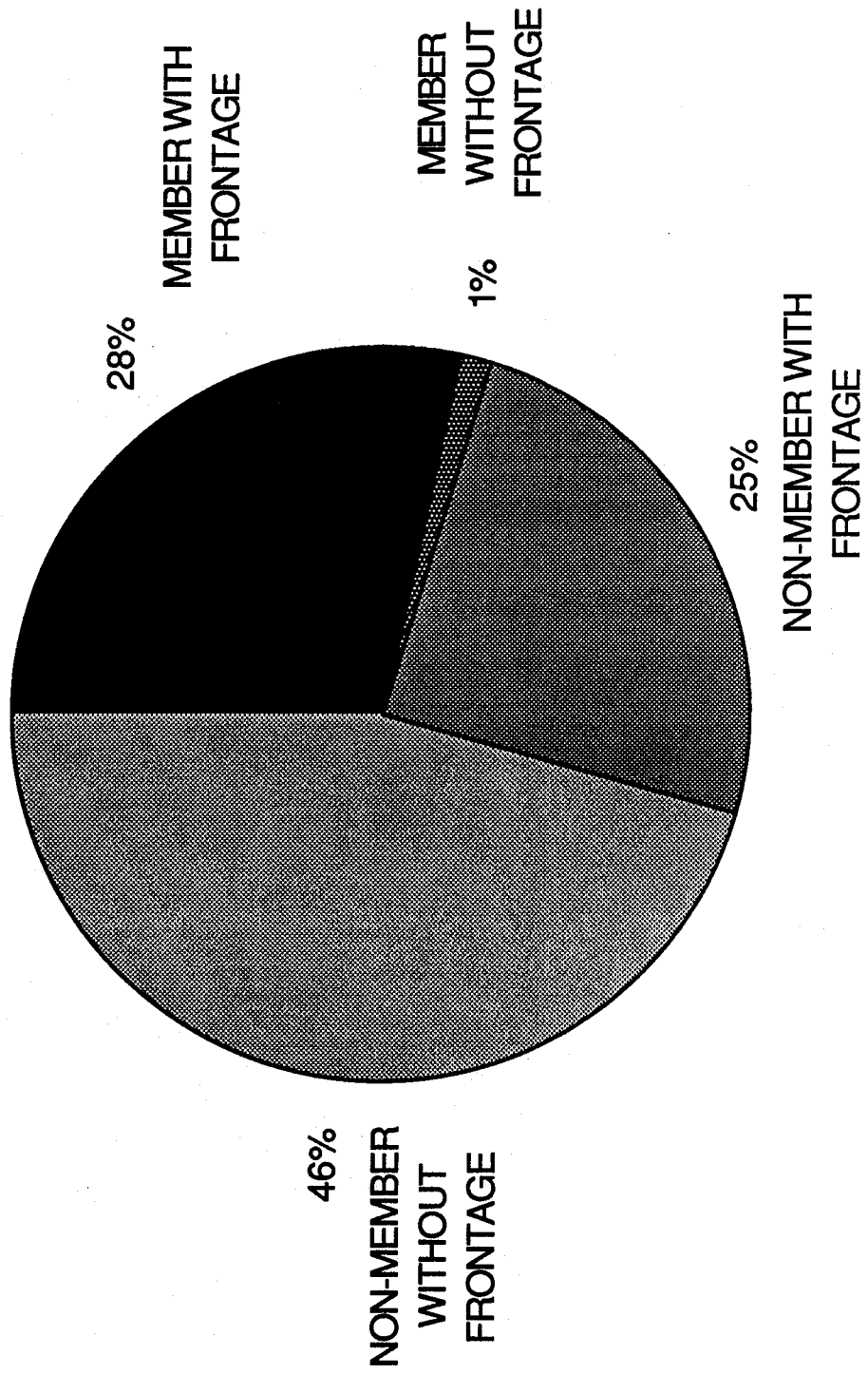


FIGURE 7: DETERIORATION IN LAKE
WATER QUALITY - PERCENTAGE OF
TOTAL WATERSHED

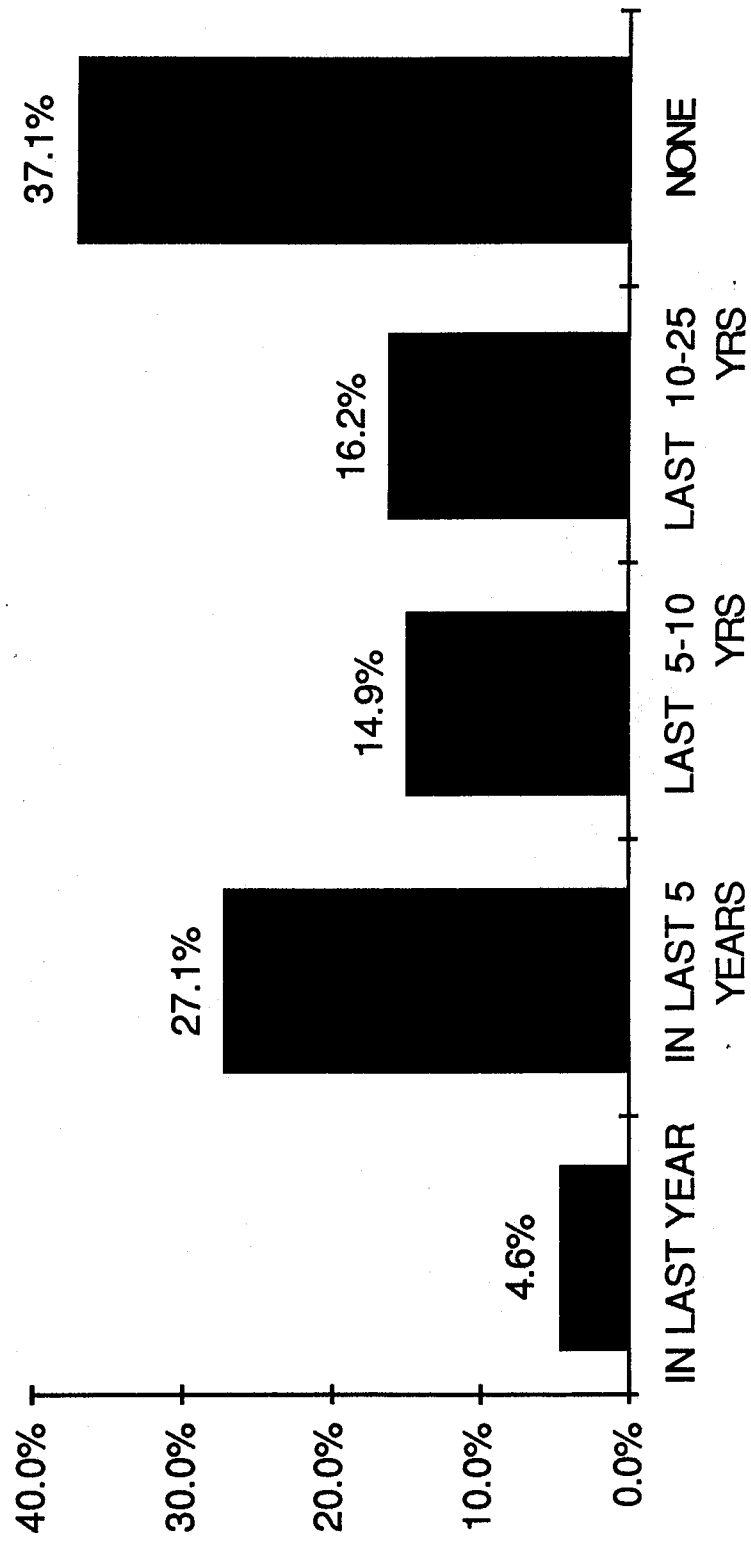


FIGURE 11: PERCEIVED SERIOUSNESS OF WEED PROBLEM -
PERCENTAGE OF TOTAL WATERSHED

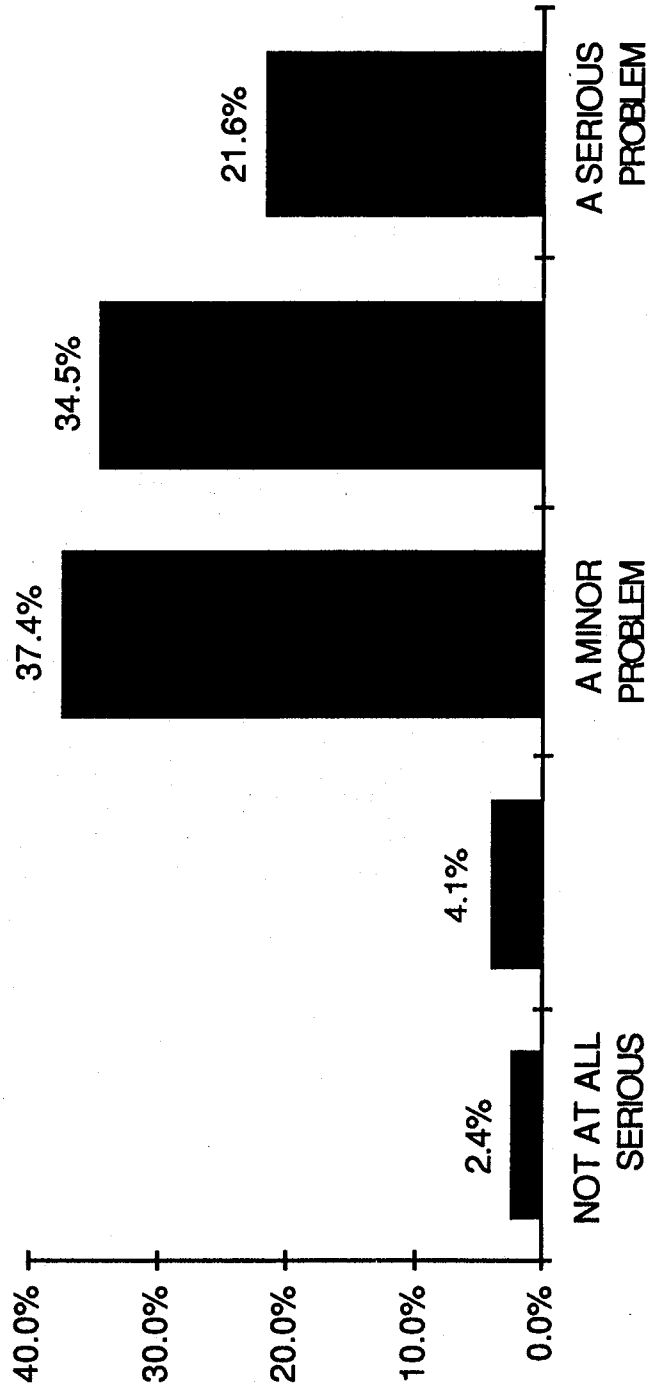


FIGURE 13: ATTITUDE TO SPECIFIC REGULATIONS FOR HOUSEHOLDS TO CONTROL NUTRIENT LOADING TO THE LAKE

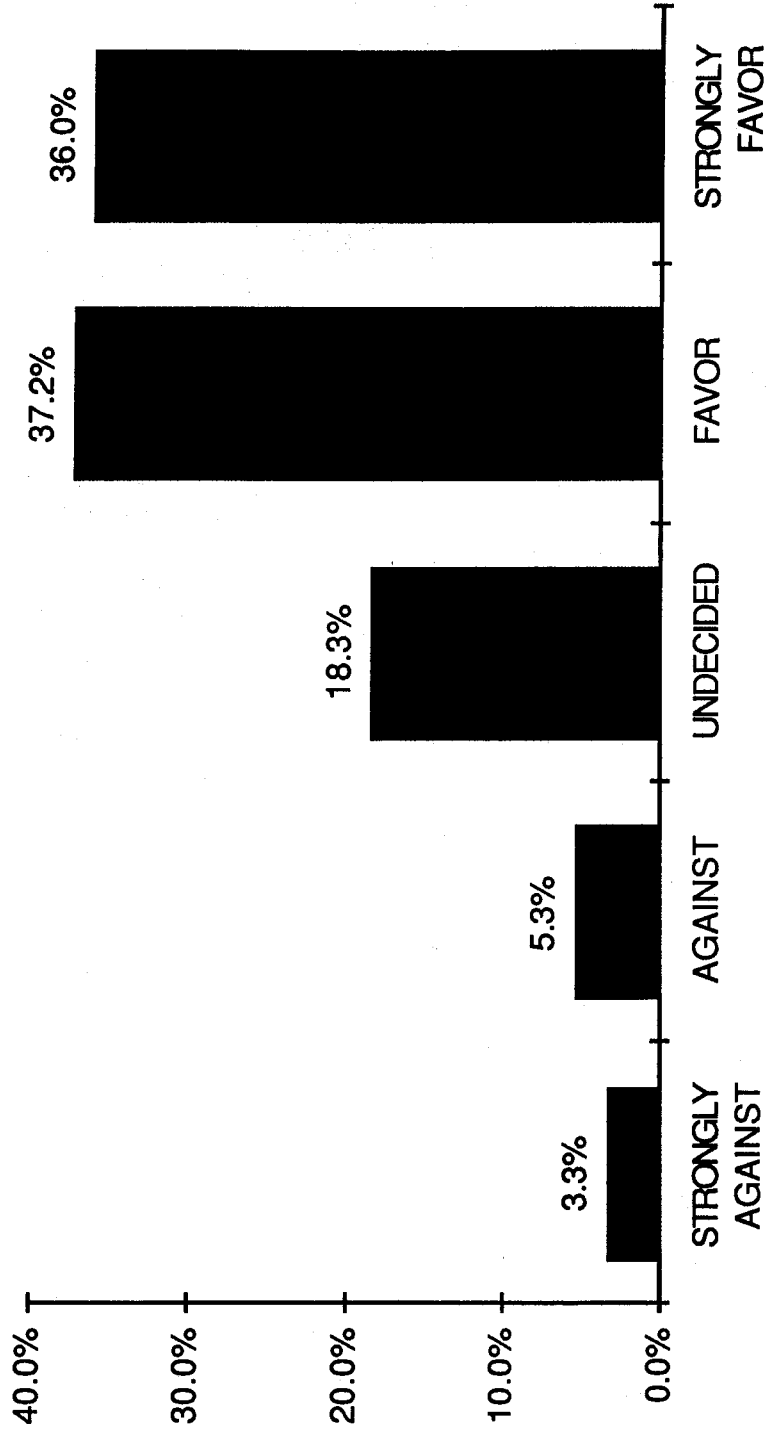


FIGURE 15: ATTITUDE TO PRESENT REGULATIONS FOR PROTECTING LAKE WATER QUALITY - PERCENT OF TOTAL WATERSHED

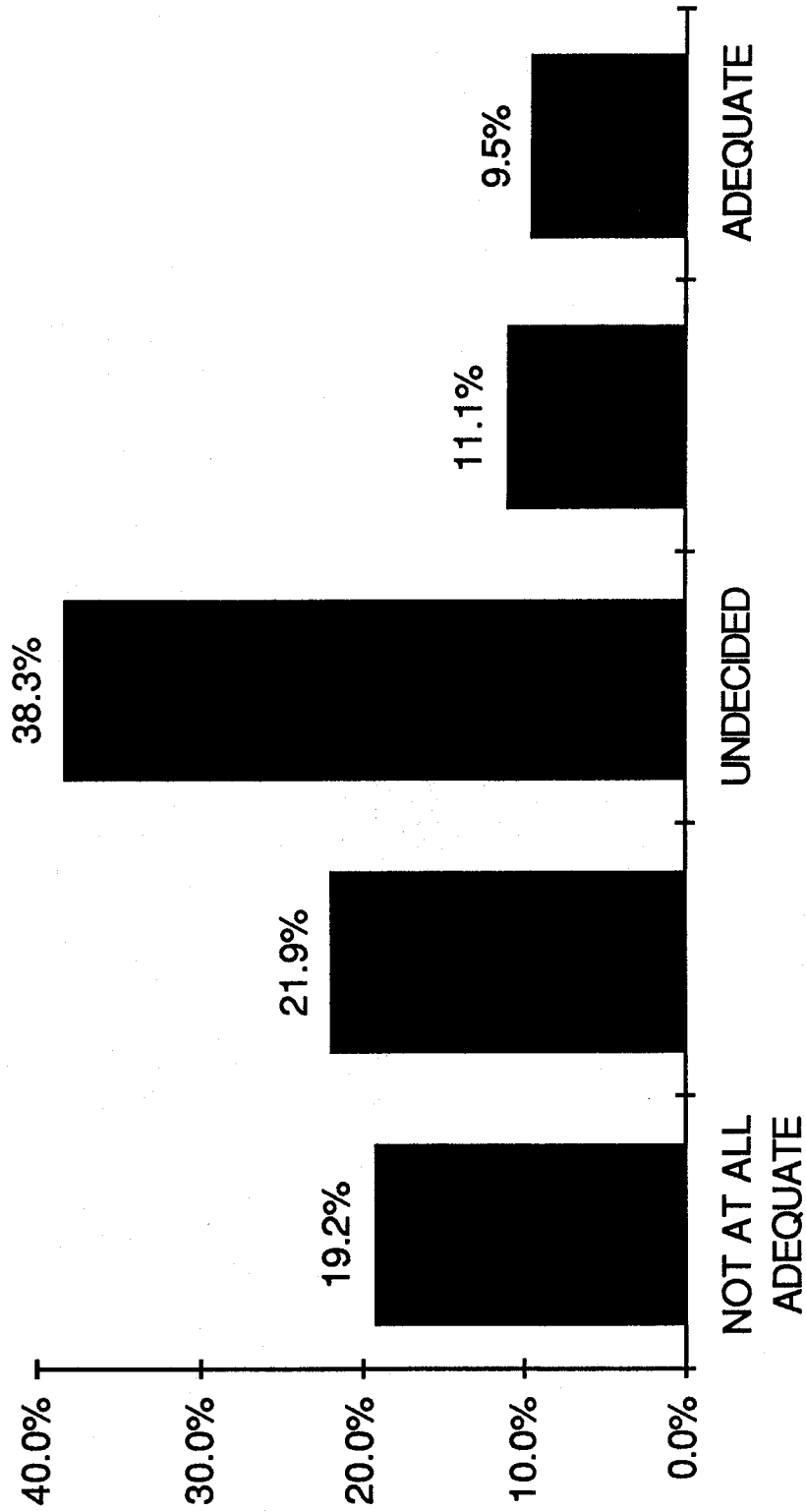
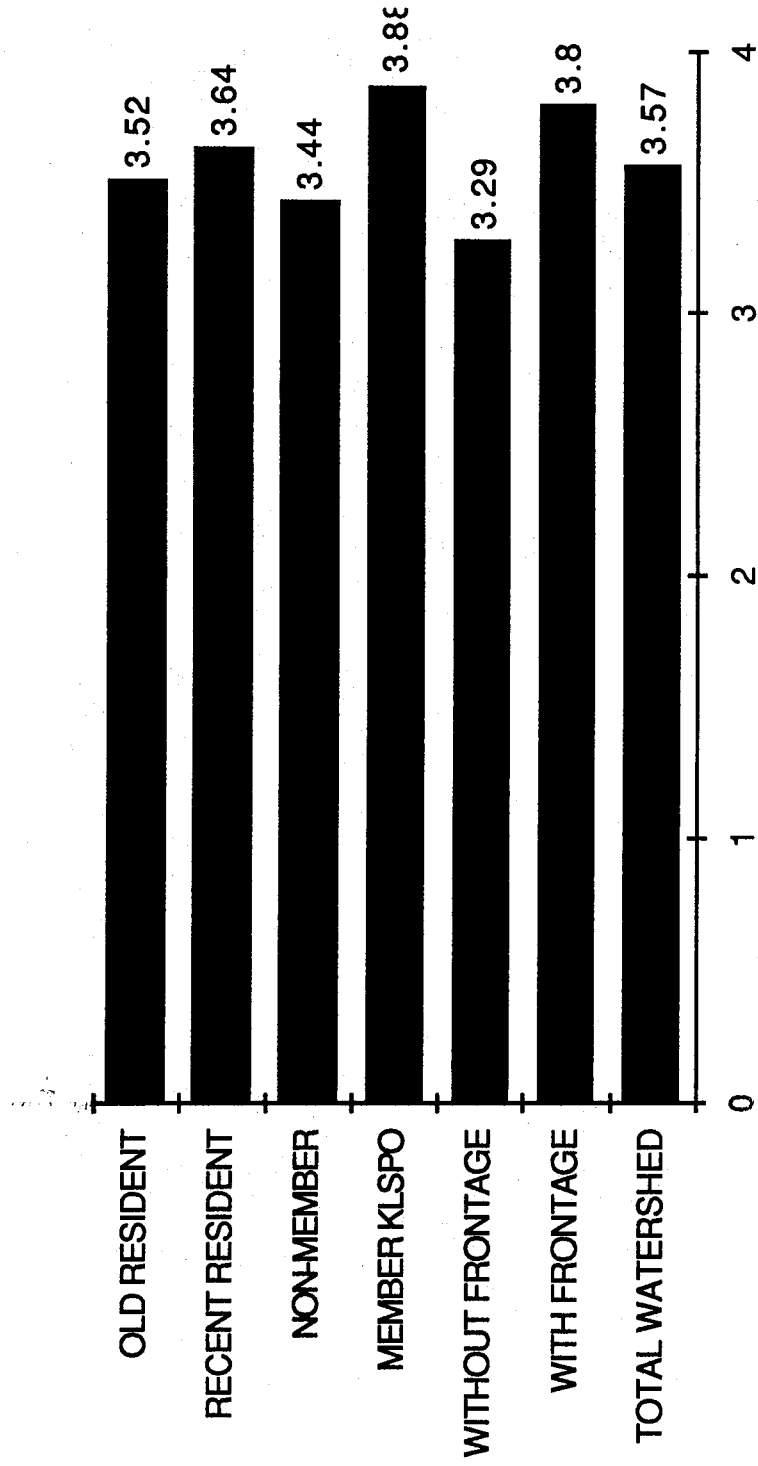


FIGURE 17: ATTITUDE TO PRESENT REGULATIONS FOR PROTECTING LAKE WATER QUALITY - GROUPS WITH AND WITHOUT LAKE FRONTAGE



APPENDIX A: RESULTS FROM WATERSHED SURVEY - ALL RESPONDENTS

KEUKA LAKE WATERSHED SURVEY.

1. Does your property have lake frontage?

YES 53.7%
NO 46.3%

If 'NO' then give approximate distance of your house from the lake:

Mean = 0.99 mile

2. What is your average length of residence per year in the Keuka Lake watershed (check one):

WEEKENDS ONLY.....	_____	}	46.7% SEASONAL
PART OF SUMMER ONLY.....	_____		
PART OF SUMMER PLUS SOME WEEKENDS..	_____		
WHOLE SUMMER.....	_____		
WHOLE SUMMER PLUS SOME WEEKENDS....	_____	}	53.3% YEAR ROUND
YEAR AROUND.....	_____		

3. What is the average number of people in residence?:

Mean = 3.02

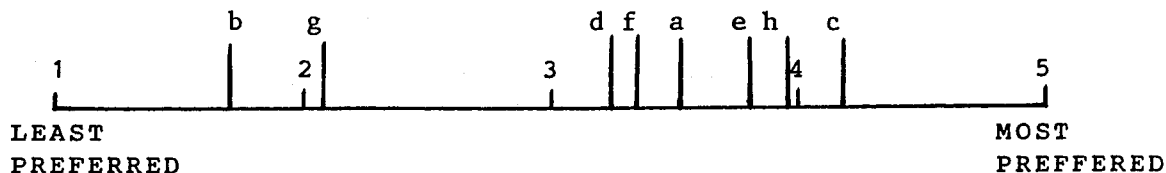
4. Are you a member of the Keuka Lakeshore Property Owners Association?

YES 29.9%
NO 70.1%

5. How would you rate the water quality in Keuka Lake for:
(Figures as % of total)

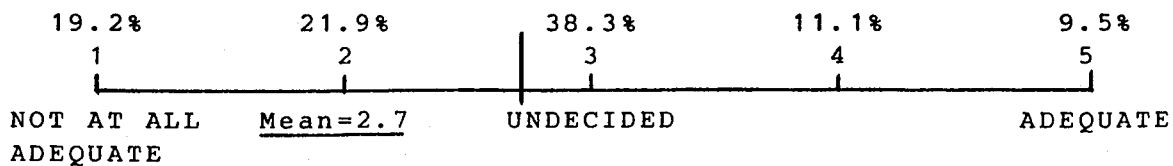
	EXCELLENT	GOOD	FAIR	POOR	NOT APPLICABLE
SWIMMING	36.8	48.0	11.5	2.9	0.8
BOATING	52.4	40.0	5.3	1.0	1.3
FISHING	25.1	42.9	22.5	7.2	2.3

10. If an excessive loading of nutrients to the lake from a variety of sources were discovered, what do you feel would be the best way to deal with the problem. Circle one number for each alternative:



- a. MECHANICAL HARVESTING OF WEEDS.....1 2 3 (3.5) 4 5
- b. USE WEED KILLING CHEMICALS.....1 (1.7) 2 3 4 5
- c. INCREASED REGULATION OF LAKESHORE PROPERTY SEPTIC SYSTEMS.....1 2 3 4 (4.2) 5
- d. REQUIRE ALL LAKESHORE PROPERTIES TO HAVE HOLDING TANKS FOR WASTE WATER.....1 2 3 (3.2) 4 5
- e. REQUIRE ALL FARMERS IN THE WATERSHED TO USE SOIL CONSERVATION METHODS.....1 2 3 (3.7) 4 5
- f. RESTRICT USE OF FERTILIZERS IN THE WATERSHED.....1 2 3 (3.3) 4 5
- g. PLACE LIMIT ON NUMBER OF YEAR ROUND RESIDENCES ON THE LAKESHORE.....1 2 (2.1) 3 4 5
- h. PLACE STRICTER CONTROLS ON DEVELOPMENT NEAR THE LAKE.....1 2 3 (3.9) 4 5

11. Do you feel that present land use regulations are adequate to protect water quality in the lake? (circle one number)



13. Who do you feel should pay for the cost of keeping the lake clean? Circle one number for each line:

	1	2	3	4	5
	-----		-----		-----
SHOULD PAY	SHOULD PAY			SHOULD PAY	
NONE	SOME			ALL	
FEDERAL GOVERNMENT.....	1	2	3	4	5
STATE GOVERNMENT.....	1	2	3	4	5
LOCAL GOVERNMENT.....	1	2	3	4	5
LAKE ASSOCIATION MEMBERS.....	1	2	3	4	5
LAKE USERS.....	1	2	3	4	5
LAKESHORE PROPERTY OWNERS.....	1	2	3	4	5
EVERYONE IN THE WATERSHED.....	1	2	3	4	5
THOSE WHO CAUSE THE POLLUTION..	1	2	3	4	5
FARMERS IN THE WATERSHED.....	1	2	3	4	5

14. If you were asked to pay for keeping the lake clean, how much would you be prepared to pay per year? (check one).

NOTHING.....	19.8%
\$0 - .99.....	1.4%
\$1 - 4.99.....	6.0%
\$5 - 9.99.....	11.3%
\$10 - 24.99.....	14.6%
\$25 - 49.99.....	13.8%
\$50 - 100.....	19.5%
OVER \$100.....	13.5%

15. How much do you think that the value of property near the lake is affected by the water quality in Keuka Lake? (circle one number).

2.1%	10.3%	14.6%	31.0%	42.0%
1	2	3	4	5
-----		-----		-----
NONE	VERY LITTLE	SOMEWHAT	MUCH	VERY MUCH
			AFFECTED	AFFECTED
			<u>Mean=4.0</u>	

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28 Sep 87

INTRODUCTION

The Septic System Survey began in early spring of this year and to date five of the six towns with Keuka Lake shoreline have been investigated, the town of Wayne being the only one that has not consented to assist with the survey. The information has been gathered from the inspection records of the relevant watershed inspectors in the Keuka Lake basin. Records for Jerusalem, Milo, Barrington, and Urbana all reside in the office of the watershed inspector for Penn Yan (Bill Marht). These inspection records go back to 1952 (except for Urbana which did not join the district until 1964), the year that the watershed district was established. Records for Pulteney were obtained from the watershed inspector for Pulteney (Herb Clark) and go back to 1964.

The inspection records vary greatly in clarity and quantity of information provided. In general the more recent entries contain more information and are accompanied by diagrams of septic systems as well as color photographs of installation. Thus although the data consists of a 15% sample (694 records) many of the items contain missing values.

DATA COLLECTION

Data were collected by a systematic random selection procedure, every sixth inspection record was selected for the sample. This has resulted in a sample size of 694 records to date (we are still optimistic about the Town of Wayne). From each inspection record data were collected on:

- Town in which property is located
- Year round or seasonal residence
- Type of toilet(s)
- Number of toilets
- Type of sewage disposal system
- Size of septic tank
- Whether or not there is a separate system for grey water
- Source of water supply
- Date of last inspection of septic system
- Date of installation of septic system

All of these contain missing values except for the first, town location.

The data were supplemented by information from conversations with the relevant watershed inspectors who freely gave of their time to help us.

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DATA ANALYSIS

The data were entered into a micro-computer and analysed using a Minitab Statistics package. As a systematic random sample was collected it is assumed that the data sample is a true representation of the population of the Keuka Lake Watershed subject to the data limitations of the Watershed Inspectors records. These could be biased towards year round residents as they are more likely to come to the inspectors attention.

TOTAL WATERSHED

Figure 1 shows the division of the sample data by town from which it is apparent that Jerusalem is by far the largest township represented being over twice as large as the next town, Urbana.

Table 1 divides the data into Year Round and Seasonal residents, showing that 58% of the properties are year round residences and approx. 42% are seasonal. It is difficult to know if this is an accurate representation as it is unknown if seasonal resident historically, have received as much attention from the watershed inspector, as year round residents. We suspect not. This information will be compared to data from the Keuka Lake Survey (carried out in July 1987) for verification.

Table 2 reveals that approximately 85% of the residences have one toilet while 12.5% have two.

Table 3 and Figure 2 illustrate the sources of water supply in the watershed. The two main sources are the lake (46.6%) and private wells (40.4%). A further 10.4% are on village supplies. The data also suggest that a small proportion of the residents use bottled water for a primary water source (reasons unknown).

Figure 3 is a graph of the percentage of residences with septic tanks of varying size. The most popular size by far is the 750 gallon tank (45% of residences) while only about 15% have larger tanks. More striking is the fact that over 40% of the residences have tanks smaller than 750 galls. (mainly 500 and 300 gallon capacities). The data reveal that the majority of these belong to seasonal residents (this is discussed in detail later in this paper).

Tables 4 and 5 give some indication on septic system type and whether or not there is a separate system for grey water. Overall 98.6% of the residences have septic tanks and only 11.47% have separate grey water systems. The most common system is a 750 gall. septic tank with a drywell and/or leachfield. Few residences have holding tanks (3.2%) which is a surprise given the density of development along the lakeshore. This section of the data was weakest in the records with much missing information, particularly in the older records.

Tables 6 and 7 refer to times since most recent septic system inspection and installation. Table 6 reveals that in the watershed as a whole only 35.26% of the systems have been inspected in the past 10 years. This means that 64.74% have not been inspected for at least 10 years, almost one quarter (23.27%) have not been inspected for 20 years, and one tenth (10.55%) have not been inspected for over 25 years.

Table 7 shows that slightly over 30% of the septic systems are less than 10 years old while nearly one third (32.06%) are over 20 years old and approximately one sixth (16.83%) are over 25 years old.

These two tables also indicate some differences between year round and seasonal residents. In Table 6 more seasonal residents have not been inspected for longer periods of time than year round residents; for instance only 5.5% of year round residents have not had an inspection for 25 years or more whereas the figure for seasonal residents is 16.36%. Table 7 reveals a similar pattern where 64.53% of septic systems are over 10 years old for year round residents while the figure is 75.24% for seasonal residents. This suggests that either year round residents get more attention from the watershed inspector than seasonal residents or that, historically, the data is biased towards year round residents.

Figure 4 is a graph of date of last inspection plotted against date of installation of septic system. This illustrates the fact that last inspection and installation coincide in a large number of cases, i.e. once a system is installed it is not inspected until it fails or the property changes hands.

Figure 5 is a graph of septic tank volume plotted against date of installation. This shows a slight trend to larger tank sizes over time which may perhaps be a reflection of the trend to converting seasonal homes to year round residences.

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TABLE 1: TYPE OF RESIDENT

	<u>PERCENT OF TOTAL</u>
YEAR ROUND RESIDENT	58.02
SEASONAL RESIDENT	41.98

(Missing values - 39)

TABLE 2: NUMBER OF TOILETS IN RESIDENTIAL PROPERTY

<u>NO. OF TOILETS</u>	<u>PERCENT OF TOTAL</u>
1	85.23
2	12.56
>2	1.93

(Missing values - 19)

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TABLE 3: TYPE OF WATER SUPPLY

<u>TYPE OF SUPPLY</u>	<u>PERCENT OF TOTAL</u>
LAKE	46.61
WELL	40.41
SPRING	1.92
VILLAGE	10.47
BOTTLED	0.44
STREAM	0.15

(Missing values - 16)

TABLE 4: TYPE OF SEWAGE DISPOSAL SYSTEM

<u>SYSTEM TYPE</u>	<u>PERCENT OF TOTAL</u>
SEPTIC TANK	98.60
WITH: DRYWELL	57.14
LEACHFIELD	33.07
HOLDING TANK	3.21
SAND FILTER	1.44
TO SURFACE	0.32
SEWER	0.31
CESSPOOL	0.62

(Missing values - 124)

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TABLE 5: RESIDENTIAL PROPERTY WITH SEPERATE^a GREY WATER WASTE SYSTEM

<u>SEPERATE SYSTEM</u>	<u>PERCENT OF TOTAL</u>
YES	11.47
NO	88.53

(Missing values - 40)

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TABLE 6:

TIME SINCE MOST RECENT SEPTIC TANK INSPECTION: PERCENTAGE OF TOTAL

<u>SAMPLE</u>	<u>>10 YRS AGO (pre-1977)</u>	<u>>15 YRS AGO (pre-1972)</u>	<u>>20 YRS AGO (pre-1967)</u>	<u>>25 YRS AGO (pre-1962)</u>
WATERSHED	64.74	45.52	23.27	10.55 (not inspected)
YEAR ROUND	62.80	37.73	14.51	5.54
SEASONAL	62.27	54.91	34.91	16.36
PULTENEY	60.36	37.84	11.71	*****
JERUSALEM	64.95	47.08	25.43	14.78
MILO	64.79	53.52	40.85	25.35
BARRINGTON	62.92	42.70	26.97	13.48
URBANA	69.23	46.15	16.15	*****

NOTE:

***** Refers to missing data in towns which did not join the watershed protection district until after 1962.
WATERSHED - refers to the data averaged over all five towns in the watershed.
YEAR ROUND - refers to year round residents of the Keuka Lake watershed.
SEASONAL - refers to seasonal residents of the Keuka Lake watershed.

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TABLE 7:

TIME SINCE SEPTIC TANK INSTALLED: PERCENTAGE OF TOTAL

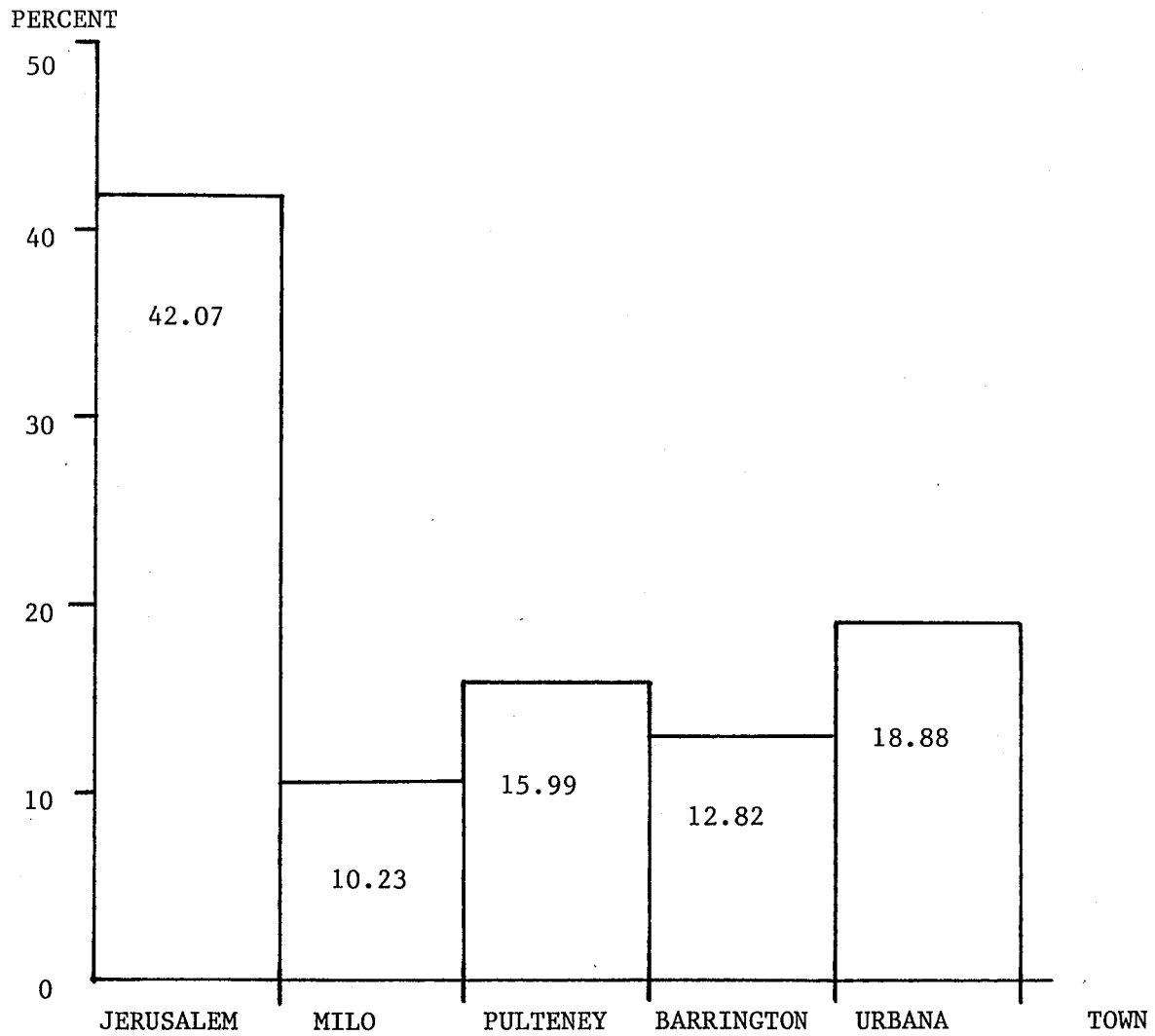
<u>SAMPLE</u>	<u>>10 YRS AGO</u> <u>(pre-1977)</u>	<u>>15 YRS AGO</u> <u>(pre-1972)</u>	<u>>20 YRS AGO</u> <u>(pre-1967)</u>	<u>>25 YRS AGO</u> <u>(pre-1962)</u>
WATERSHED	69.54	52.71	32.06	16.83
YEAR ROUND	64.53	40.00	18.11	8.30
SEASONAL	75.24	67.48	46.12	27.18
PULTENEY	67.09	45.57	18.99	*****
JERUSALEM	68.00	54.00	34.50	22.50
MILO	75.86	66.40	56.00	39.66
BARRINGTON	70.51	53.85	38.46	20.51
URBANA	71.43	46.43	17.86	*****

NOTE:

***** Refers to missing data in towns which did not join the watershed protection district until after 1962.
WATERSHED - refers to the data averaged over all five towns in the watershed.
YEAR ROUND - refers to year round residents of the Keuka Lake watershed.
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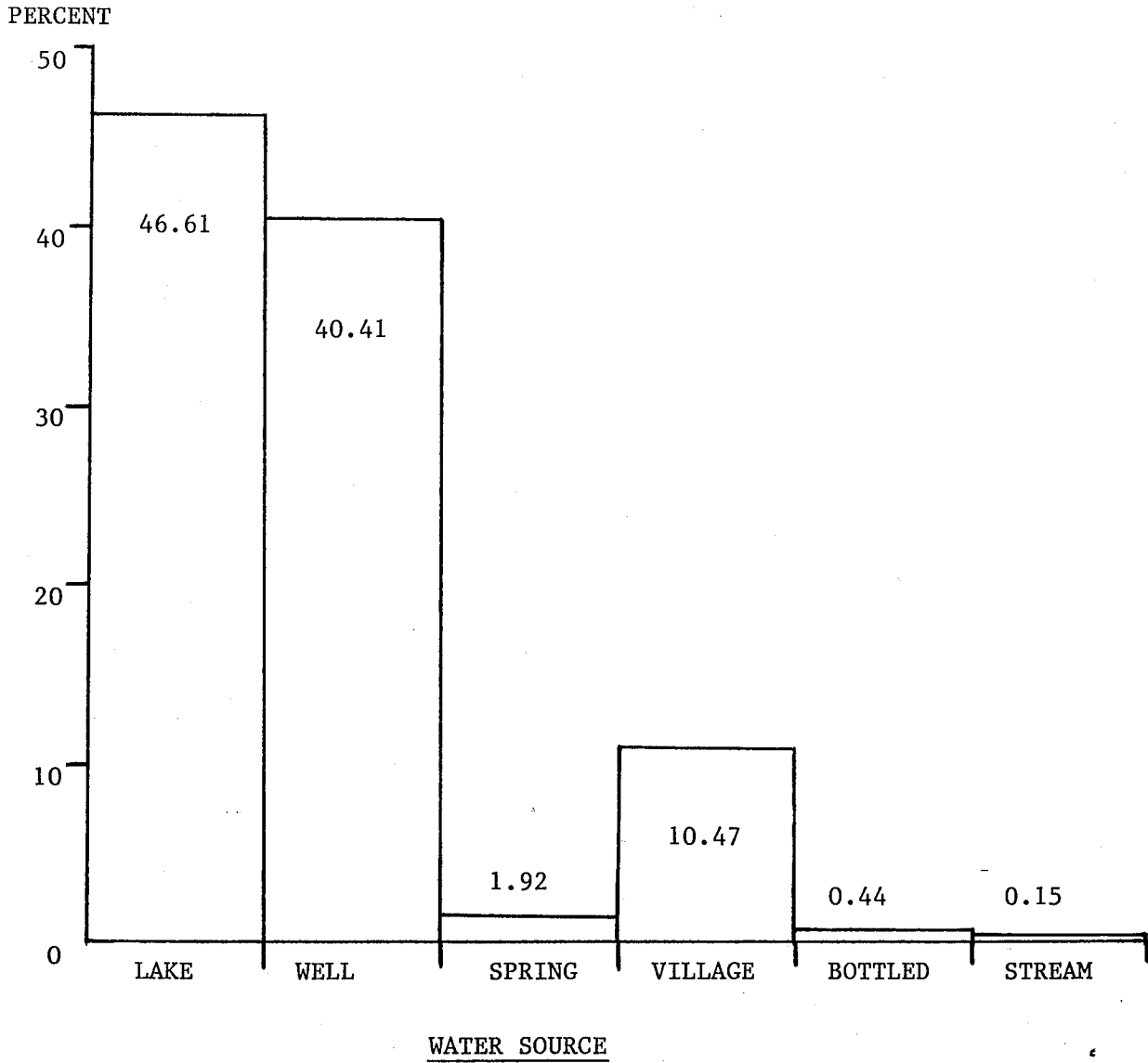
FIGURE 1: DIVISION OF SAMPLE DATA BY TOWN



TOTAL SAMPLE SIZE =694

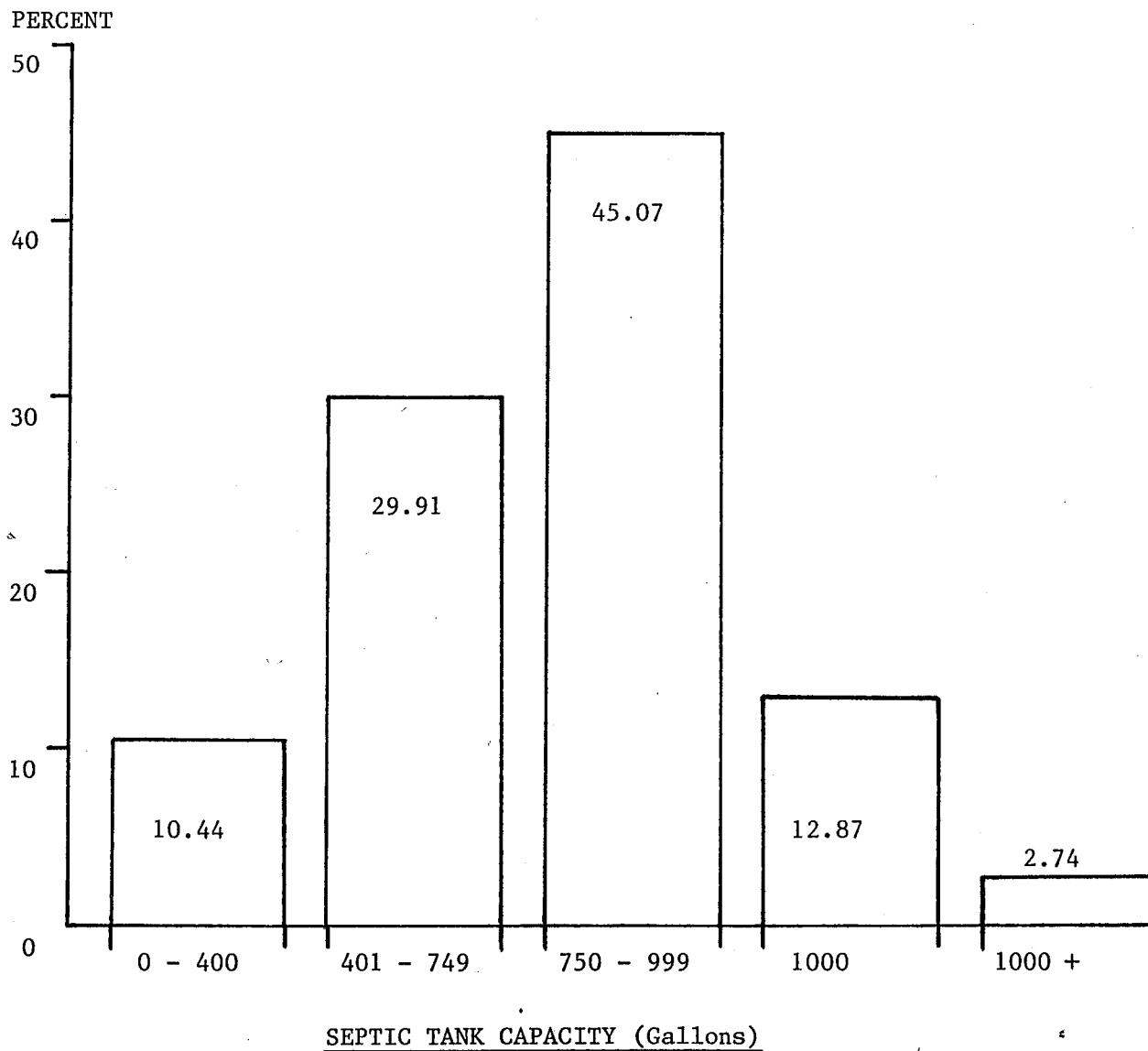
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FIGURE 2: PRIMARY WATER SOURCE - ENTIRE WATERSHED



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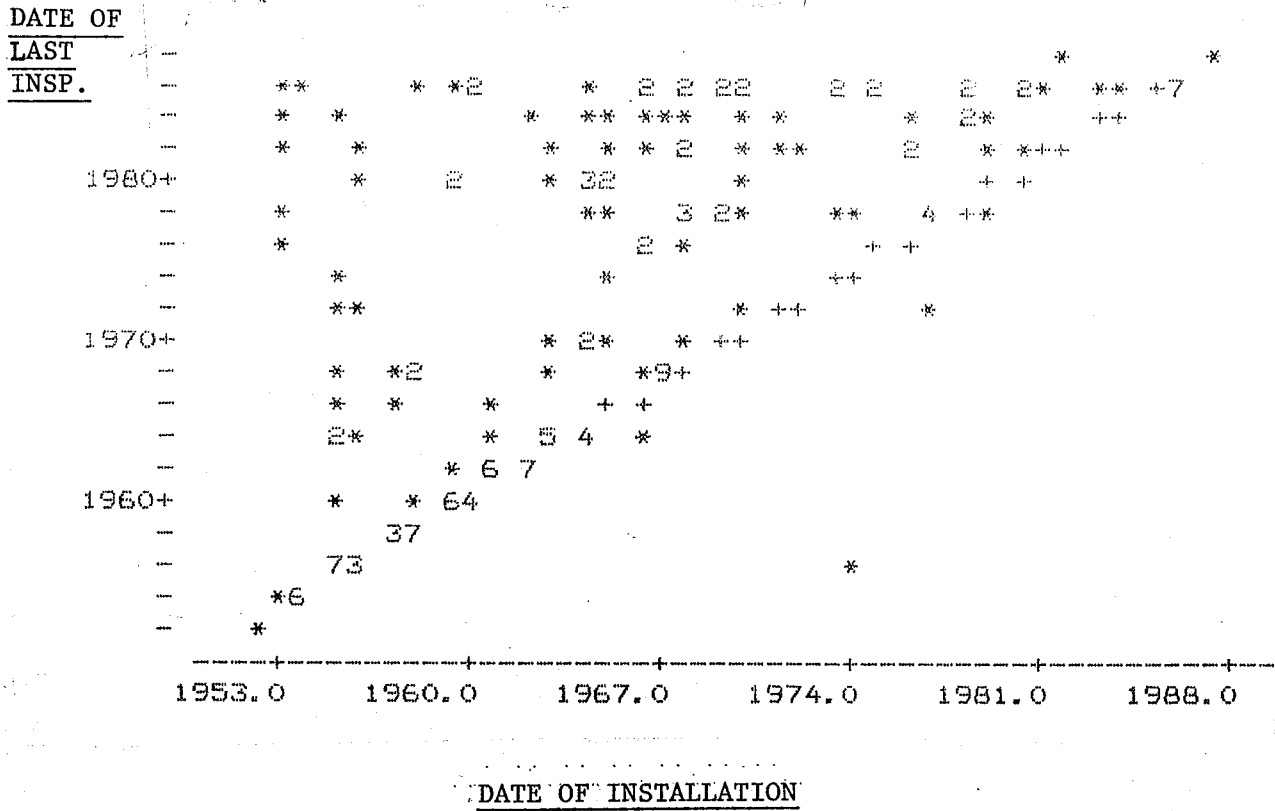
FIGURE 3: SEPTIC TANK CAPACITY - ENTIRE WATERSHED



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FIGURE 4: PLOT OF DATE OF LAST INSPECTION vs. DATE OF INSTALLATION OF

SEPTIC SYSTEM - ENTIRE WATERSHED



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KEUKA LAKE WATERSHED SURVEY

FINAL REPORT

BY

**JOHN POWELL
AND
JOHN HERRING**

APRIL 1988

**Commissioned by the Yates County Aquatic Vegetation
Committee, Penn Yan, New York.**

**Support for this research came from the Aquatic Vegetation
Project funds of Yates County which were provided by the New
York State Legislature.**

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