

1. Comparison: With and Without Lake Frontage.

Some striking differences emerge when these two groups are compared. 72.5% of those with lake frontage said there had been some deterioration in water quality over the past 25 years, as opposed to 49.2% of those without frontage. Thus it would seem that those closest to the lake perceive a greater water quality problem. Concerning the aquatic vegetation issue, 88% of those with lake frontage said there was a weed problem as opposed to 69.8% of those without frontage. There were no significant differences between those who believed there is a weed problem, over its seriousness. (see Figures 2 and 4).

Rating the lake for swimming, fishing, and boating there are few differences between the groups. They both follow the pattern of rating the lake best for boating and worst for fishing, though in all cases a large percentage of respondents rated the water quality as good or excellent.

2. Comparison: Member of KLSPO Assco. v Non-member.

Both members and non-members rate lake water quality for swimming, boating, and fishing highly, but in general non-members are less inclined to mark the quality as "Excellent" and more inclined to see it as "Good". For instance, only 32.6% of non-members rated water quality as excellent for swimming as opposed to 45.3% of members. Yet 50.6% of non-members rated it as good compared to only 42.6% of members. Again the pattern of seeing lake water quality highest for boating and lowest for fishing is followed.

On Question 6 (Deterioration in Lake Water Quality) fewer members of the Association marked that there had been no deterioration (28%) than non-members (41%). Both groups had the largest percentage of respondents indicating that deterioration had occurred in the last five years, 33.3% for members and 24.6% for non-members.

When asked whether there was a weed problem 88.3% of members and 77.5% of non-members said there was a problem. Of these, over one fifth in each group rated the problem as serious. Thus it would appear that people are separating the issue of lake water quality from that of aquatic vegetation (or weeds).

3. Comparison: Recent Arrivals v. established residents

There are few differences between these groups on rating the lake for swimming, boating, and fishing. If anything the more recent arrivals rate the lake slightly higher. Slightly fewer of the new residents see a deterioration in lake water quality, 39.4% said that there had been no deterioration compared to 35.2% of old residents. Of those who saw deterioration, a higher percentage of new residents see the decline in quality as more recent. For example 8.2% of new residents see a deterioration in the past year compared to 1.4% of old residents. Almost 23% of old residents have seen a decline in the last 10 to 25 years. This would indicate that any deterioration in water quality has been ongoing for some time and is not just a recent phenomenon.

Large percentages of both groups rated said there was a weed problem and that it was serious.

3. ATTITUDES TO REGULATIONS TO PROTECT LAKE WATER QUALITY

This section consists of five questions (Questions 9, 10, 11, 12, and 16) asking about a variety of issues from attitudes to regulations, to the best ways of dealing with protection.

Question 9 asked respondents whether they would be in favour of specific regulations for households to control the nutrient loading to the lake. 73.2% of total respondents said they would favor or strongly favor such regulations. The mean response for the watershed as a whole was 3.97, indicating that overall, people would be in favor of such regulation.

Question 10 addressed the issue of dealing with excessive nutrient loadings to the lake. In the watershed as a whole the most preferred method was "Increased Regulation of Lakeshore Property Septic Systems", which received an average score of 4.2. The second most preferred method was "Place Stricter Controls on Development Near the Lake", (average score of 3.9) and least preferred was the use of weed killing chemicals, with an average score of 1.7. "Mechanical Harvesting of Weeds" received a score of 3.5.

Question 11 asked about adequacy of present regulations to protect the lake water quality. Figure 5 shows that 41% of the sample feel the regulations are inadequate, with

almost as large a proportion being undecided. Only 9.5% rated the present regulations as adequate.

Question 12 is the Likert Scale question measuring respondent's attitudes to land use regulations for protecting lake water quality. Respondents scored individually on a 1 to 5 scale, where 1 represented strong disagreement with the item and 5 meant strong agreement with it. The items were written to assess whether respondents agreed or disagreed with land use regulations as a means for protecting lake water quality. Each respondent's scores for the 14 items were then summed and averaged to give a mean scale score between 1 and 5 on the attitude continuum. Two items, (a) and (d), were dropped from the final scale as analysis revealed that they did not correlate well with the other items. Indications are that the wording is ambiguous. Thus the final scale consists of 12 items. An Alpha of 0.9 was attained. This is a measure of reliability of the scale. The Alpha level is essentially a measure of internal consistency, assessing whether all the items are measuring the same thing. Alpha values run from 0 to 1, with an Alpha of 0.7 and above generally considered as acceptable.

The mean score for the watershed for the 12 item scale is 3.57, indicating that in general, people agree rather than disagree with such regulations, though there is certainly not strong agreement.

Question 16 asked about the type of government that would be best for controlling land use in the watershed. Average scores for the entire watershed show that by far the most suitable level of government is the "Watershed-wide District", with a score of 3.9. The least suited government entity was held to be the "Local (Town)" level which has a mean score of 2.7.

1. Comparison: With and Without Lake Frontage.

In general those with lake frontage are more favorable towards regulations for protecting lake water quality. Those with lake frontage (ave. score of 4.12) favor specific regulations (Quest. 9) slightly more than those without frontage (ave. score of 3.77). Both groups find that "Increased Regulation of Lakeshore Property Septic Tank Systems" is the most preferred method of dealing with nutrient loading.

When asked about adequacy of present regulations, those without lake frontage tend to be more undecided as to their adequacy. Overall those with frontage rated them as less adequate (ave.= 2.6) compared to those without frontage

(ave.= 2.9). The Likert Scale showed that those with frontage have a more favorable attitude to land use regulations for water quality protection than those without frontage. The mean scores were 3.8 and 3.3 respectively.

Both groups favor the watershed-wide district as most suited to dealing with the problem.

2. Comparison: Member of KLSPO Assoc. v Non-member

These two groups show similar characteristics to the previous two. Members tend to be more in favor of specific regulations (Quest. 9) and find the present regulations as less than adequate. For both groups regulating lakeshore septic systems is the most preferred method of dealing with the problem and "Place Stricter Controls on Development near the Lake" is also rated high (4.2 and 3.8 for members and non-members respectively). Members have a higher Likert score (3.9) than non-members (3.4), but both favor the watershed-wide district for controlling land use.

3. Comparison: Length of Residence

In general newer residents tend to be more in favor of specific regulations (Quest.9) to control nutrients and find the present regulations less than adequate, than older residents. Both groups favor increased regulation of lakeshore septics however. Recent residents have a slightly more favorable attitude to land use regulations for protecting lake water quality with a Likert score of 3.6, as opposed to a score of 3.5 for old residents, not a large difference. And both groups had average scores of 3.9 for the the watershed-wide districts.

4. PAYING THE COSTS OF WATER QUALITY PROTECTION.

Three questions were of a monetary nature. Question 13 asked who should pay for the cost of keeping the lake clean. This question did not reveal any strong preferences among the sample. For each item a large proportion of respondents marked 3 on the scale, indicating that this group should pay "some of the costs" of keeping the lake clean. However the "All Polluters Pay" category received the highest average score, 3.9, suggesting that respondents

feel those who cause the problems should be made to pay for the clean-up. "Lake Association Members" scored lowest out of the nine items with an average score of 2.3.

Question 14 asked for willingness-to-pay to keep the lake clean. One fifth of the sample said they would pay nothing, but one third would be willing-to-pay over \$50 per year. The mean willingness-to-pay can be calculated two ways, first by ignoring those who did not respond to this question, and second by including them assuming that a non-response is equivalent to a zero payment. There were a total of 143 non-respondents for this question (approx 15.4% of total respondents). The first method of calculation involves taking the mid-point of each payment category, multiplying by the number of people in that category to obtain a contingent payment figure which is then divided by the total number of respondents (768). This gives a figure of \$36.23c. per respondent per year. Using the second method, non-respondents are considered as paying zero, the figure obtained is \$30.54c. per respondent per year. If we assume that each respondent represents a household, then by multiplying one of these figures by the number of households in the watershed we can arrive at a total willingness-to-pay on an annual basis for keeping the lake clean. Taking the more conservative figure, and assuming approximately 6,000 households in the watershed, the willingness-to-pay is \$183,240 per year.

Question 15 asked for perceptions on water quality effects on property values. 73% said that property values were much affected or very much affected. The mean score for the watershed was 4.0. Thus there is a realisation that water quality can have financial impacts on the area.

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The two groups show similar scores for Question 13, asking who should pay to keep the lake clean. The largest difference is on the item "Everyone in the Watershed", where those with lake frontage gave an average score of 2.9 and those without gave a score of 2.3. This indicates perhaps that those without lake frontage feel that they derive fewer benefits from the lake and thus should bear less of the burden of keeping it clean. Those without frontage also felt that "Farmers in the Watershed" should bear less of the burden.

The willingness-to-pay question found that 22.6% of those with lake frontage would pay over \$100/yr. and over half would be willing-to-pay over \$50/yr. Figure 6 reveals

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.

In the property value effect question new residents were slightly more concerned about the affects of water quality, 47.9% as opposed to 37.1% said property values would be very much affected.

GENERALISABILITY OF THE DATA

It is felt that the survey data gives a relatively accurate description of conditions in the Keuka Lake watershed and as such the findings can be generalised from the sample to the whole watershed. Indications are that the information may be useful for other lakes in the Finger Lakes Region. Many of these lakes have similar morphology, are facing similar problems of aquatic vegetation growth. They reflect the same kinds of land use (for the most part), many have high levels of lakeshore development, and draw their seasonal residents from a similar geographic area. Thus these results could be generalised to the Finger Lakes Region with a high degree of validity. It is doubtful however if these results could be used outside of this region, where population characteristics may differ markedly, and physical parameters of the lake may result in the need for other solutions to problems.

CONCLUDING COMMENTS

In general there appears to be more concern on the part of those with lakefront property over the water quality and aquatic vegetation issues. At the same time this group is favorable towards land use controls and to being regulated to protect water quality in the lake. The data also indicate that these people are willing to pay more, on average, to protect lake water quality.

**FIGURE 1: PROPERTY OWNER CHARACTERISTICS
TOTAL WATERSHED**

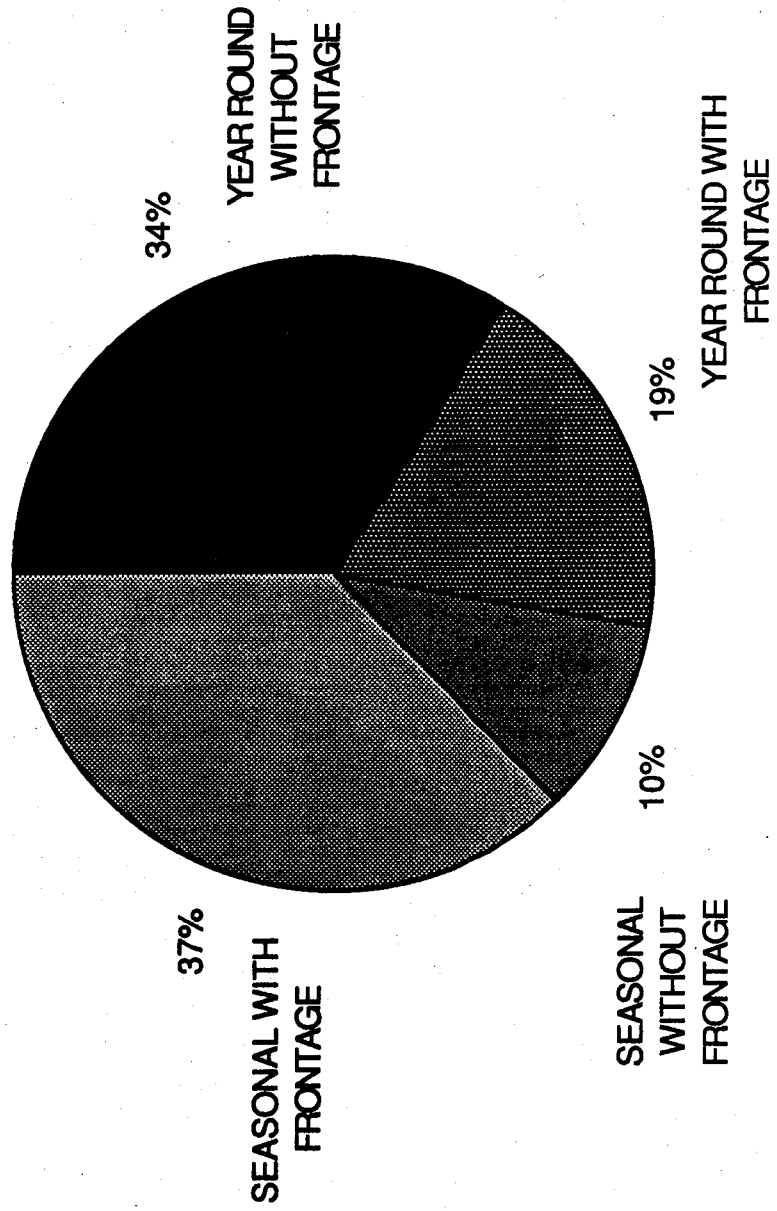


FIGURE 2(A): SEASONAL PROPERTY OWNERS

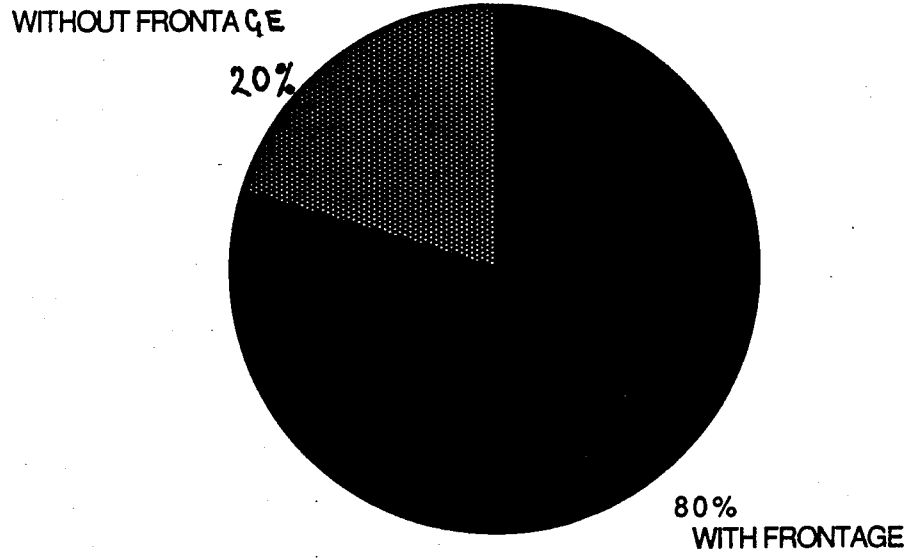


FIGURE 2 (b): YEAR ROUND RESIDENTS

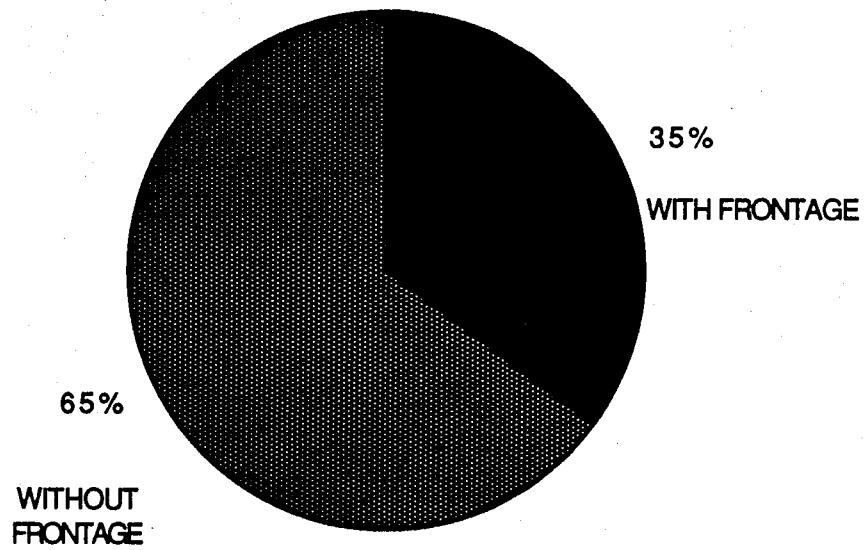


FIGURE 3: MEMBERSHIP IN KEUKA LAKESHORE PROPERTY OWNERS ASSOCIATION - TOTAL WATERSHED

