

Waste Vegetable Oil Survey Report



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WVO Report

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Abstract

Due to increased local interest in biodiesel production, a study was conducted to estimate potential sources of the necessary feedstock cooking oil, or waste vegetable oil. The survey was conducted part time over a period of several months, gathering information about rates of oil throughput, collection practices and gauging interest in local initiatives. After compilation and analysis, this information revealed a projected waste vegetable oil (WVO) throughput of 27571 L per month. The information gathered also showed an overall general interest in contributing feedstock for a local biodiesel production initiative.

Introduction

With the demand for bio-products and renewable resources increasing, there is a great demand for raw materials. This being the case, it is essential that those raw materials at our disposal be quantified. The Waste Vegetable Oil survey was designed to fill that need with respect to feedstock for biodiesel production.

Starting in August of 2008, members of private enterprise, local government and non-profit economic development collaborated to create a survey that would answer the questions most important to quantifying the waste vegetable oil (WVO) resources in the Algoma District. The focus was initially directed at used cooking oil and abattoir trimmings as a yellow grease profile. Due to lack of available information on animal fat trimmings, the study was scaled back to include only used cooking oil, or WVO, as it will be referred to throughout the report.

The survey captured as many facets of WVO handling as possible. These ranged from the very basic, like the volume of oil consumed in one week, or one month of operation, to more in depth issues surrounding an establishment's interest in supporting local initiatives that would use the waste oil. It is hoped that this report will be of use to those with an interest in local waste vegetable oil resources, primarily, that the general trends developed from the survey data can be utilized in business planning and decision making.

Methodology and Time Line

The concept of quantifying WVO output by survey was conceived in August of 2008. At that time, a WVO survey was introduced as a sub-component of a larger biomass inventory study, and was established as an early deliverable of the larger biomass inventory study. Over the next month, a distribution list was compiled based on chamber of commerce restaurant listings and known locations outside of Sault Ste. Marie. A catchment area was established ranging from Blind River, in the East, to Wawa in the North and West. This area was defined based on generalized estimates of the distance that WVO could be economically transported for local uses.

By mid-September, the survey was finalized and distributed. Based on input from private enterprise, city government and non-profit economic development, a list of questions was developed to generate the data of most value (a copy of the survey with all questions contained in the final copy, is included in appendix A). Questionnaires were delivered by hand, facsimile, or e-mail as convenience and necessity dictated. Distribution was carried out only after an initial telephone call to prospective survey participants to confirm their willingness to participate. Surveys were sent only to those who could be contacted and who also indicated a willingness to participate. However, those who refused to participate were not removed from the survey, but their response was noted and this will be reflected in the results and discussion.

One week was provided for survey return. After one week, follow-up calls were made to each participant to ensure that they had received the survey and to remind them of the

final due date. Initial calls and distribution took approximately two weeks, with a third week added for response time. A second week was provided after follow-up calls for responses and an additional week was added after the second round of follow-ups, closing the survey on October 24, 2008. With the availability of additional man-power, the survey was re-opened in mid-December, for two weeks, with a number of facility visits. The data gathered was then compiled according to restaurant type and type of oil used. Some of the general trends explored could not be adequately quantified in chart form and are better represented in the discussion section and the survey contact list as seen in Appendix B.

Results

The main focus of the survey was to obtain an estimate of WVO resources in the Algoma district. It was decided to break these data up by type of restaurant for a more thorough understanding of the waste vegetable oil profile. This information can be most clearly seen in Table 1.

Table 1: Waste Vegetable Oil Survey Results Categorized by Type of Establishment

Business Type	Total Population	Number of Respondents	Average Waste Oil Generated by Respondents (L/month)	Projected Waste Oil Generated (L/month)
Restaurant & Pizzeria	6	2	132	789
Fast Food	20	12	262	5233
Italian Restaurant	14	5	278	3892
Bar & Grill	18	6	211	3792
Mexican Restaurant	1	1	5	5
Sandwich Shop	10	8	0	0
Coffee Shop	4	4	0	0
Pizzeria	5	2	0	0
Steak House	3	2	320	960
Oriental Restaurant	10	0	N/A	N/A
Unspecialized Restaurant	60	10	215	12900
Total	151	52	1422	27571

This table shows not only the average volumes for each type of restaurant, but also, the number of respondents for each business type and the corresponding proportion of the population. It also shows a projected oil throughput based on the average WVO generated and the total number of establishments of that type in the population. When combined, these numbers show a projected WVO accumulation of 27571 L/month across Algoma. To better understand the relation of each of the restaurant types to the whole profile, please refer to Figures 1 & 2 in Appendix B.

In addition to quantifying WVO generation by restaurant, it was quantified by type of oil used. Since this can only be completed for actual respondents, the number of restaurants here is noticeably smaller than the total population (approximately one third). These results are shown in Table 2.

Table 2: Waste Vegetable Oil Survey Results
Categorized by Type of Oil

	Number of Respondents	Average Generated (L/month)
Vegetable Oil	7	169
Non-Trans fat Oil	3	229
Liquid Shortening	6	223
Sunflower Oil	1	412
Corn/Soy Oil	1	588
Canola Oil	17	224
Corn/Canola Oil	1	300
None	16	0
Total	52	2145

These results show a fairly broad distribution of different oils being used across the response group. Most establishments seem to favour canola oil, while unspecified vegetable oil and liquid shortening bring up a distant second and third respectively. The survey showed that vegetable oils like sunflower oil and corn-mixes were the least common types of oils being used in the group. Low responses in the Sunflower Oil, Corn/Soy Oil and Corn/Canola Oil categories produced exceptionally high averages, skewing the data and producing a total average volume significantly higher than the total average volume by restaurant type.

Table 3 shows the relative response rate, level of interest in local initiatives and reasons for level of interest. Level of response was not based on a comparison to the total population, but to the number of restaurants contacted. Those who were unreachable cannot be assessed for their level of response.

Table 3: Level of Response and Interest by Type of Establishment

Business Type	Number of Respondents	Total Population	Interest in local initiative	Reason
Restaurant & Pizzeria	2	6	high	no contract
Fast Food	12	20	low	chain/contract
Italian Restaurant	5	14	medium	contract
Bar & Grill	6	18	medium/high	no contract
Mexican Restaurant	1	1	low	little oil
Sandwich Shop	8	10	none	no oil
Coffee Shop	4	4	none	no oil
Pizzeria	2	5	none	no oil
Steak House	2	3	medium	contract
Oriental Restaurant	0	10	none	none given
Unspecialized Restaurant	10	60	high	negotiable
Total	52	151		

This data shows a wide variation in response rate, local initiative interest and reasons referencing interest in a local initiative. A numerical reflection of the response rate compared to the total population and the number of establishments contacted (sample size) can be seen in Figure 3 in Appendix B.

A number of the questions were not so easily quantified or visually represented. None of the respondents were seasonal businesses. The cost of removal of the WVO varied greatly, was unknown, or that question was incomplete. The same was true for responses pertaining to waste oil removal companies, or methods of waste oil disposal.

Discussion

A number of trends can be seen in the collected data. Steak House, Fast Food and Italian establishments generated the largest portion of WVO amongst the survey respondents (as seen in Figure 1), but when the average results of each restaurant type were projected over the total population, Unspecialized Restaurants held the most WVO by sheer number of establishments alone. These restaurants were followed distantly by Fast Food eateries, which had only a marginally higher throughput than Italian restaurants and Bar & Grill establishments.

Surprisingly, the highest response rate came from establishments with little or no oil consumption. This is most likely due to the ease of answering (no waste oil negates the need to fully complete a survey, or, in some cases, even to take the survey at all). It is also noteworthy that the majority of respondents had contracts with Rothsay Recycling, a rendering company with locations in eastern and central Canada. Those with no contracts were, by far the most interested in supporting a local biodiesel initiative. Waste (used) vegetable oil seems to be quickly turning from a waste by-product into a commodity. This changes the market dynamic in such a way that there may be competition for this resource. Rothsay's current involvement indicates that they will be involved as a potential competitor for this resource, as an established company, willing to renegotiate contracts to secure their resource supply. At the same time, Rothsay may prove to be a valuable partner in collecting used cooking oil if such arrangements can be negotiated.

Another issue involves franchise restaurants. In most restaurant categories, particularly Fast Food, the response of franchise restaurants, while high showed markedly low levels of interest in local initiatives. This trend was similar in locations with little or no oil, such as sandwich and coffee shops, where franchise establishment responses were even higher. A probable explanation for the lower interest in local initiatives is the fact that many of these establishments have their waste oil removal contracted by their head office, which would complicate negotiations for local entrepreneurs.

There are also a number of areas in which this survey could use improvement. The first area is distribution. Although the method of distribution was the most convenient for the majority of establishments, several could only receive surveys by hand or by mail. In this case, due to time and budget constraints, many could not be reached. Also, while fax and email were by far the easiest method for distribution, they were also the easiest to dismiss

by establishments. In-person visits to restaurants elicited a better response, but the manpower required to conduct these visits was limited. An over-the-phone survey may have generated greater results, since the time devoted to this by the establishment may have been less. However, many establishments expressed an aversion to telephone surveys, further indicating that there are limitations in that format as well.

Another area that could use improvement is the actual geographical range and the scope of the survey. Cafeteria style establishments were not well represented (two cafeterias are included in the unspecialized restaurants category) as were any establishments in Sault Ste. Marie, Michigan, which is within a short distance (~5 km) from Sault Ste Marie, Ontario. Sault Ste. Marie, Michigan has the potential to increase the amount of available waste vegetable oil by a substantial amount, provided that there are no restrictions regarding the transport of this substance.

A second deficiency is a total lack of information on animal fats, which, while not WVO, can be rendered and the grease used a number of processes involving lipids. This lack of information is due to the total absence of any information from the meat processors. Since animal fat trimmings are waste, they have not been quantified, leaving a substantial knowledge gap. In addition, estimates, while available, are inaccurate due to the wide variance in terms of what waste is renderable (estimates include bone). A close estimate values animal fat trimmings for the Algoma District at approximately 14451.2L per month in an unrendered state. This estimate attempts to eliminate bones, but may still be higher than the actual volume of animal fat trimmings.

Conclusion

Over all, this survey provides a working profile of available waste vegetable oil sources in Algoma. It has also identified a generally positive public response to the idea of a local biodiesel initiative. More over, it has defined its own limitations, namely a lack of available resources (funding, information, time, etc.) and some oversight in terms of geographic area and food services establishments (i.e. Cafeterias) covered. To ensure better data collection, this study would require a larger staff than was available on the limited resources within the budget of the larger Biomass Inventory Project. There is definitely room for improvement, but this survey does provide a good basis for future study of this resource.

Acknowledgements

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Appendix A

Survey questionnaire



Waste Vegetable Oil Survey

Please fill out the following survey regarding waste vegetable oil used in your establishment. Your time and input is very valuable to us as we attempt to quantify this resource. This survey is completely voluntary, but the larger the sample size, the better the results. We would like to have all surveys back by October 24, 2008.

1. Name and address of business

2. How much waste oil is accumulated in one week or in month of operation?
 - a. How many deep fryers do you have in your business?

3. Is your business seasonal? If yes, what are your months of operation?

4. What type of cooking oil do you currently use?

5. Who collects the waste oil you generate now?
 - a. How often is the waste oil collected?

6. What is the current cost to have this oil removed?

7. Do you have a contractual agreement for this service?

8. Would you be interested in supporting a regional initiative that collects waste vegetable oils to be used in the production of biodiesel? (Biodiesel would then be used by the municipality to reduce environmental emissions)

9. Would you be willing to allow someone to come to your business to draw a sample of your oil?

For more information, please contact:
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Appendix B

Figures

Figure 1: Average Waste Vegetable Oil Generated (L/month) by Restaurant Type

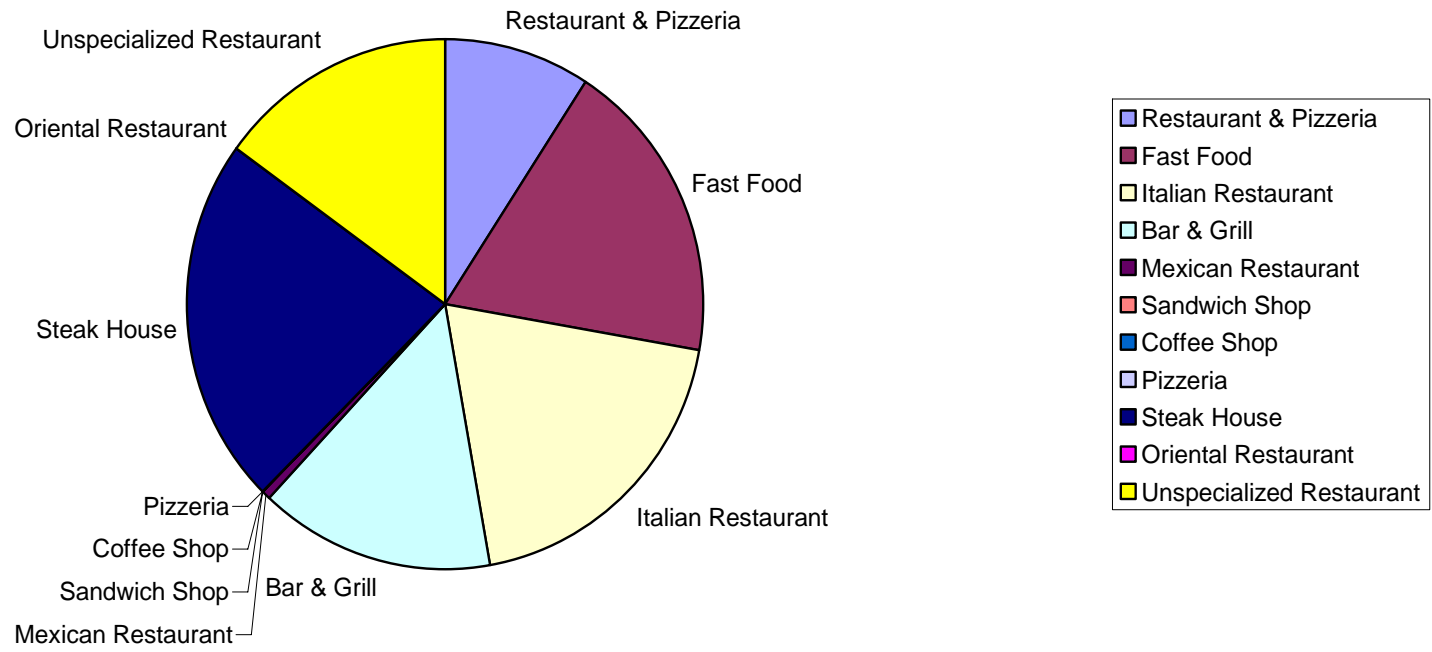


Figure 2: Projected Waste Oil Generated (L/month) by Restaurant Type

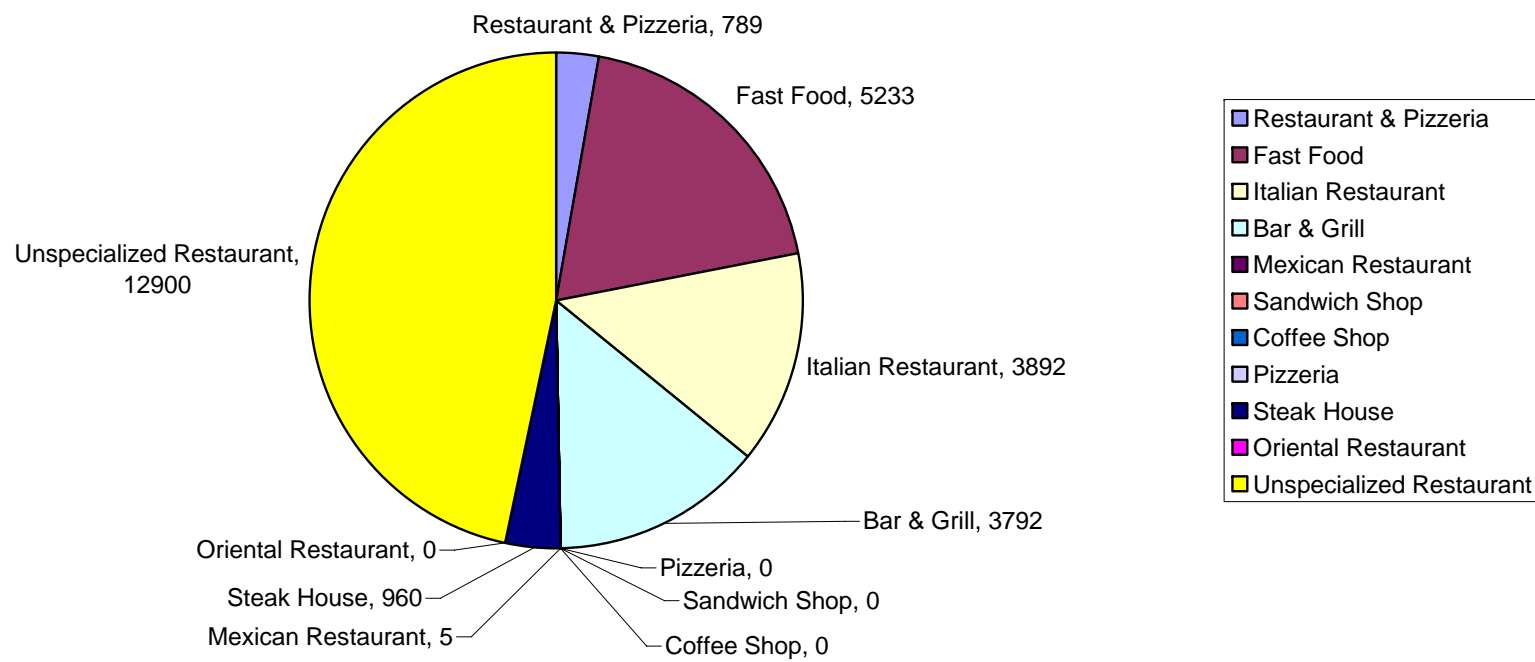
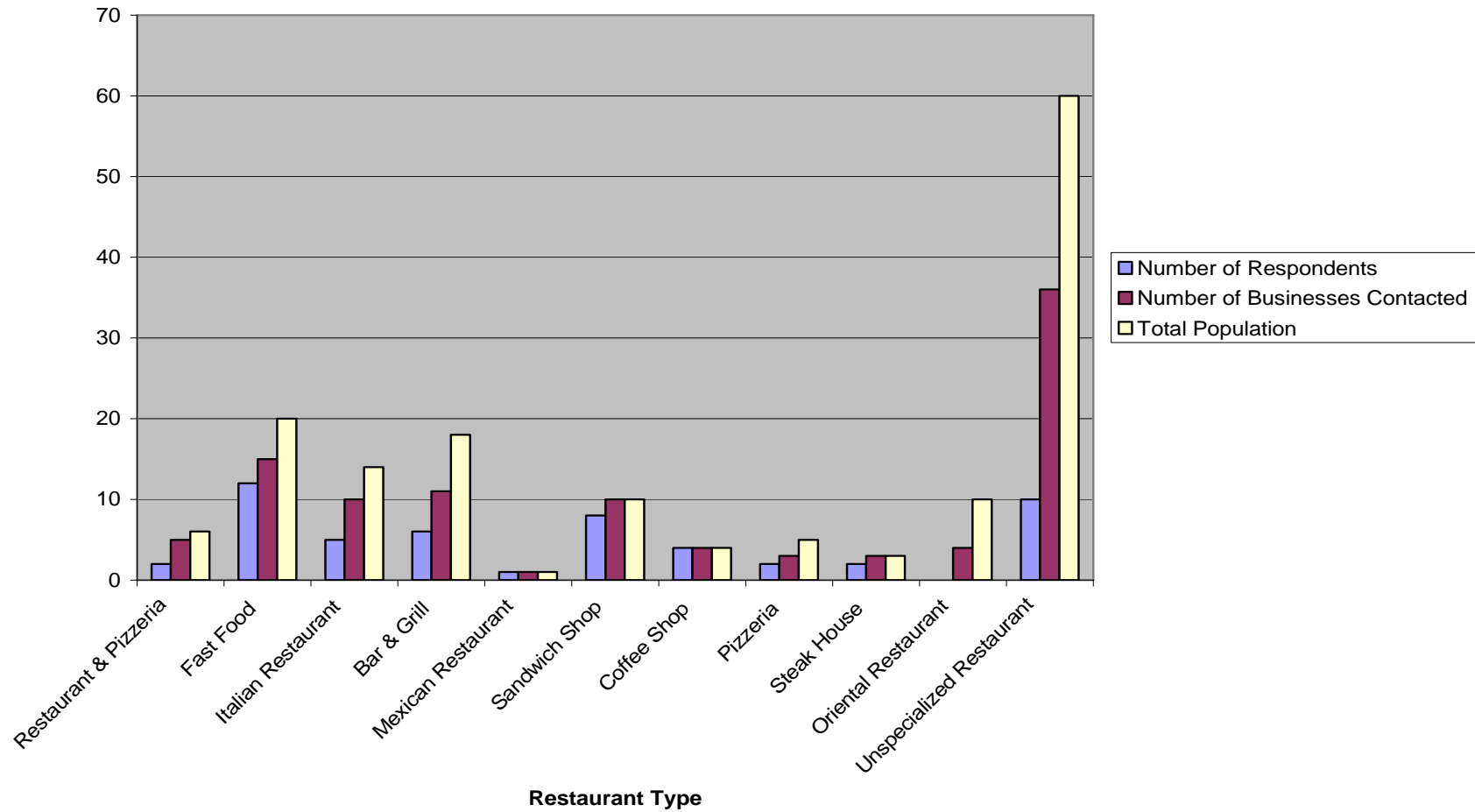


Figure 3: Response vs. Number Contacted vs. Total Population by Restaurant Type



Glossary

Abattoir: a slaughter house, or primary meat processing facility.

Biodiesel: a form of diesel fuel made using organic or biological feedstock.

Biomass: all raw materials derived from plant matter.

Biomass Inventory Project: an ongoing project directed at the quantification of biomass resources in the Algoma District.

Bio-Product: a product made from a biological feedstock. Usually used as a distinction from a similar product made from non-biological feedstocks.

Lipid: a fat soluble, naturally occurring molecule, namely any fat, oil, wax, cholesterol, sterol, or other fat soluble compounds.

Non-trans fat oil: oil that contains no Trans fats.

Raw material: substance that will be processed, or refined into another substance.

Renewable Resource: a naturally occurring resource that can be replenished by natural processes at a rate comparable to, or in excess of, the rate of human consumption of the resource.

Trans fat: a type of unsaturated fat that is not essential and does not promote good health.

Waste by-product: a substance, or product, created during the processing of raw materials into another product, which has no discernable use.

Waste vegetable oil: vegetable oil used in the cooking process that is discarded after the cooking is complete. This oil may alternatively be described as used cooking oil, but most of the oil used for cooking is of the vegetable variety (e.g. canola oil, soy oil and other vegetable oils). Liquid shortening is also used and, while not technically a vegetable oil can also be included in the category of used cooking oil.