Oregon Wasted Food Study: Institutional and Commercial Sector Case Studies

Case 14
Reducing wasted fish with pre-processing upstream in a small, hotel restaurant

This report was prepared for
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Introduction

This is a report on the methods and results of one of 15 food service business case studies, as part of the institutional and commercial (IC) sector portion of the Oregon Wasted Food Study. This study is funded by the Oregon Department of Environmental Quality and conducted by Community Environmental Services (CES) at Portland State University.

The research objectives for the IC portion of this study are to:

- Understand components of wasted food in IC sector
- Highlight causes of commercial wasted food and key opportunities for waste prevention
- Test wasted food reduction best practices and quantify their effectiveness
- Promote wasted food reduction best practices for application at commercial food service institutions

Focus of study

This case study examines the waste associated with the processing of fish, both on-site and off-site. The study relies on a waste assessment and interviews with a restaurant manager and a fish supplier to understand how waste from whole fish purchasing and fillet purchasing might differ, both on site and up the supply chain. The results suggest that **a shift towards pre-processed fish fillets likely reduced edible wasted fish overall.**

Business context

The business participant in this case study is small restaurant located in a hotel in Portland, OR. The restaurant serves lunch and dinner seven days a week and prioritizes local, organic and sustainable products.

Methods

Study design

The study was conducted over a seven month period from January 2018 to July 2018. It involved a targeted waste assessment and interviews with employees from the restaurant and the restaurant's fish supplier.

Interviews

Two employees were interviewed for this study, including an employee from the restaurant, who was familiar with purchasing practices and a representative from the national fish supplier from which the restaurant was purchasing their fish during the later part of the case study. The interviews were conducted in January and July 2018.

Employees were asked by researchers to voluntarily participate in brief interviews. Interviews were conducted with willing employees over the phone and via email. The interviews were semi-structured; standard interview questions were asked of each employee with additional questions asked that either responded to employee answers or pertained to their specific role.

Waste assessment

The waste assessment was conducted in mid-January 2018. Mixed food scraps, from both front and back-of-house, had been set aside from a 24-hour period, representing a regular business day. Only fish trim was assessed in this assessment, with all fish trim removed, weighed and photographed.

Observed practice

This case study sought to observe how purchasing practices may impact waste on- and off-site. Originally, the goal was to examine waste prevention practices aimed at improving the utilization of fish through knife skills training and repurposing opportunities associated with expanded menu items. Before these practices could be deployed the business switched their ordering from whole fish to fish fillets, due to seasonal availability, eliminating the need for these practices. Accordingly, the case study sought to quantify the impact of this purchasing decision on waste generation, food costs and environmental impact.

Results

Waste assessments

The waste assessment focused only on fish scraps because the rest of the food scraps were not pre-segregated by point of origin (i.e., back-of-house or front-of-house), making it difficult to draw significant conclusions from an assessment. The assessment found 8.41 pounds of salmon fillets (Figure 1), likely too small for the salmon portions served in the restaurant, and salmon carcasses (Figure 2).

Figure 1: Salmon fillets found in the waste assessment.

Figure 2: Salmon carcasses found in the waste assessment.

Interviews

Restaurant employee

Interviews with the restaurant employee suggested that whole salmon were purchased from a local Native American tribe that supplied the fish during the salmon season. At the beginning of the study the restaurant was purchasing this fish. When asked about the fish waste found in the waste assessment, the employee said it was surprising and thought it occurred from a lack of oversight and training. Later in the study, when interventions to reduce this waste were discussed, the employee said that salmon season had ended, and the restaurant was now purchasing pre-processed salmon fillets from a commercial supplier. "We purchase salmon sides from the [supplier name], so basically it comes to us already processed so less waste at our location," the employee said.

Seafood supplier

The representative from the new, commercial seafood supplier indicated that the company effectively utilizes "as much of the fish as possible for consumption, but the amount varies widely by species." Parts that cannot be used for consumption are further processed for use in a variety of industries. "Our meal plants process nearly 100% of our fish waste into fish meals, fish bone meal, and oils, which are then used as ingredients in the pet food, animal feed, aquaculture feed, fermentation, and beauty industries. . . we also produce fish and shellfish-based organic fertilizers," the representative said. In total, **the company recovers 80 million pounds of fish by-product by focusing on whole carcass utilization**. When asked for more information about waste and about utilization metrics, the representative said these were not publicly available. **Specific information on edible consumption percentages by species also was unavailable**.

Limitations

This study looked at a single business day and cannot extrapolate to understand the cost or environmental impacts of edible wasted fish generated by using whole fish. The claims of the fish supplier also could not be verified by a third party.

Conclusion and future directions

Key findings

A substantial amount of wasted edible fish occurred from the use of whole fish at this restaurant. This was due to poor knife skills and a lack of established opportunities for reutilization. **A shift towards pre-processed fish fillets likely reduced edible wasted fish overall**. This was because the large fish processor had created secondary markets for fish byproducts and claimed a high re-utilization rate.[1] While this change in purchasing was seasonal, the results of this study **suggests the business, if returning to whole-fish purchasing, could benefit from improved knife-skills trainings and repurposing to minimize wasted edible food.**

In a study of waste along the seafood supply chain, researchers found that, while overall waste is high (40-47% of total pounds of fish caught), the processing stage was found to have by far the lowest amount of waste. Consumption waste represented the most waste (51-63% of total waste), followed by bycatch discarded by fishermen (16-32% of total waste) and retail operations (13.16% of total waste).[2]

By extrapolating the amount of edible fish waste found in the waste assessment (to represent a standard salmon fishing season), this case study estimates that **the restaurant was wasting 686 pounds of salmon per year, worth a total of $1,351** (see Appendix for full methodology). This represents 0.96 metric tons of greenhouse gas equivalents per year, **equating to 108 gallons of gasoline burned.**

Restaurants may reduce wasted edible fish trim product by purchasing pre-processed ingredients because suppliers enjoy economies of scale and re-utilization strategies unavailable to smaller food service businesses.

Strategies for edible trim reduction and utilization

Reducing waste is not the only priority of restaurants and may not be important enough to encourage a switch towards pre-processed ingredients. **If whole fish are used, though, some strategies should be deployed to reduce the amount of edible trim and under-utilized product and maximize the profit from each whole fish purchased**. These strategies include purchasing standards, knife skills training, complementary menu items, and repurposing of trim.

Purchasing standards

Enforcing high product quality standards to your supplier can avoid spoilage and wasting on-site. **Suppliers are more likely to have strategies for utilization of low-quality product than restaurants**. See, also, Case Study 13 for more information on this strategy.

[1] For a detailed list of the many uses for industrial fish waste, including those mentioned by the seafood supplier, see, Arvanitoyannis, I. S., & Kassaveti, A. (2008). Fish industry waste: treatments, environmental impacts, current and potential uses. *International Journal of Food Science & Technology*, *43*(4), 726-745.

[2] Love, D. C., Fry, J. P., Milli, M. C., & Neff, R. A. (2015). Wasted seafood in the United States: Quantifying loss from production to consumption and moving toward solutions. Global Environmental Change, 35, 116-124.

Knife skills training

As seen in this case study, poor knife skills can lead to substantial wasting of edible (and expensive) product. **Chefs should support employees through routine trainings and check-ins to ensure trimming processes are efficient and reduce wasted food**. (See Case Study 10 for more information on knife skills training.)

Complimentary menu items

Chefs should build menus around repurposing. For example, much of the edible trim product found in this case study **could have been repurposed into salmon pate, smoked salmon dip, salmon cakes, salmon burgers or meat for salmon chowder**. Especially for high value items, intentional menu planning can **increase profit and reduce food costs**. (See Case Study 13 for more information on this strategy.)

Repurposing

While edible fish trim can be used directly for other menu items, **inedible parts of the fish carcass can be re-utilized for stocks and soup**. For some oily fish, like salmon, additional steps may need to be taken (like skimming oil off the top as it simmers, or pre-baked to remove some oil), or they can be used for their own chowders.

Appendix

Cost and greenhouse gas impacts

Cost savings were estimated by extrapolating the waste assessment data from one business day to the six months that the river and offshore salmon season generally runs in Oregon.[3] To calculate a cost per pound, we used an estimate of $1.97 per pound average wholesale value of wild-caught, whole fish chinook salmon in 2017 from the Alaska Department of Fish and Game.[4] No Oregon equivalent was readily available and the business declined to provide the price they pay from their supplier.

Table A1: Costs savings analysis

	Sampled Day		Yearly Estimate	
	Pounds	*Costs*	*Pounds*	*Costs*
Salmon	3.77	$7.43	686.14	$1,351.70

Assumes a cost per pound of $1.97, a 7 day week, and 26 weeks in a salmon season

Greenhouse gas impacts were calculated using the total per year estimates of salmon waste calculated above. They were calculated using an estimated LCA factor provided by Bruguera, et, al, who found that wild-caught salmon represented 3075.62 kilograms of carbon dioxide equivalents per ton of salmon,[5] Greenhouse gas equivalencies were calculated using the US EPA's *Greenhouse Gas Equivalencies Calculator*.[6]

Table A2: Greenhouse gas calculations for yearly salmon waste

	Tons source reduced	Change in MTCO2E (compared to composting)
Salmon	0.3431	0.9572
Equivalencies		
Passenger vehicles	0.2	
Gallons of gasoline	108	

[3] Oregon Salmon Commission. (2015). Salmon Seasons. Retrieved from http://www.oregonsalmon.org/seasons.html
[4] Alaska Department of Fish and Game. (2018). Commercial Salmon Fishery Wholesale Prices. Retrieved from www.adfg.alaska.gov/index.cfm?adfg=commercialbyfisherysalmon.salmoncatch_wholesale
[5] Bruguera, M., Limso, C., Lopez, S., Resnick, J., & Tadlaoui, A. Final Paper: Lifecycle Analysis of Farmed Salmon vs. Wild-Fished Salmon Environment 159 Prof. Deepak Rajagopal.
[6] U.S. Environmental Protection Agency. (September 2017). Greenhouse Gas Equivalencies Calculator. Retrieved from https://www.epa.gov/energy/greenhouse-gas-equivalencies-calculator

Conformance to Food Loss and Waste Reporting Standard

The Food Loss & Waste Protocol[7] is a multi-stakeholder partnership, which has developed the global Food Loss and Waste Accounting and Reporting Standard – also known simply as the FLW Standard. Launched in 2013, the Food Loss & Waste Protocol's mission is to ensure wide adoption of the FLW Standard so companies, governments, cities and others are better informed about food loss and waste and motivated to curb this inefficiency.

The graphic below describes the scope of Case Study 14 of the institutional and commercial sector assessment of the Oregon Wasted Food Study using the FLW Standard.

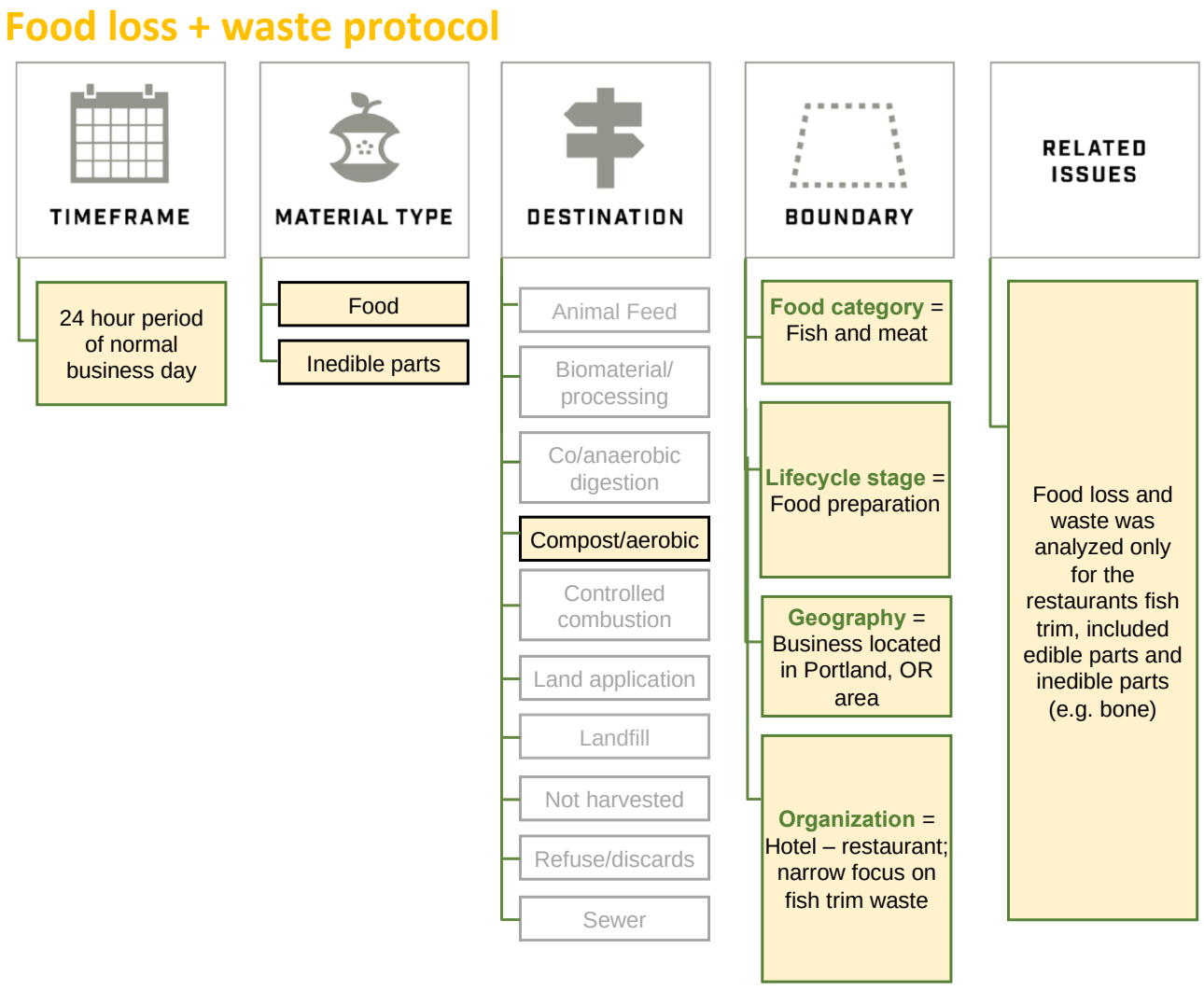

Figure A1: Scope of Case Study 14 as it relates to the Food Loss and Waste Reporting Standard

[7] See, http://flwprotocol.org