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**Oregon Wasted Food Study:
Measurement, motivations and opportunities
to waste less food**

**Report on Task 1, Qualitative Interviews
Accepted by DEQ: May 26, 2017**

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INTRODUCTION

The Oregon Department of Environmental Quality partnered with Portland State University's Community Environmental Services to conduct a five-part study¹ on wasted food generation in the State of Oregon. The main research objectives for this study are:

- Understand the informational, psychological, socio-economic, and structural drivers that contribute to the generation of preventable wasted food;
- Collect reliable data on wasted edible food, including loss reasons and reporting biases; and
- Provide the state, cities, counties, and consumer-facing businesses, such as grocery retailers and restaurants, with basic methods of establishing their own wasted food baselines and assessing shifts in waste prevention behaviors or levels of awareness.

The first part of this larger effort is a qualitative study, consisting of open-ended interviews with 32 Oregon residents. This qualitative study was conducted at the start of the broader study in order to inform later tasks, specifically a statewide telephone survey, a residential tracking of wasted food using a kitchen diary method and waste audit, and case studies of the institutional, commercial, and industrial sector (ICI), especially the consumer-facing aspects of wasted food generation in this sector. The findings reported below will help shape survey content, illuminating new areas unexamined in previous surveys and highlighting important drivers that have been explored outside of the Oregon context that merit continued investigation here². Conclusions from each task will be used to improve the initial design of the subsequent tasks, resulting in a better-informed series of studies and analysis than had these tasks been conducted as stand-alone studies.

Research objectives of this qualitative study include, identifying:

- Self-reported reasons for wasting food
- Barriers to reducing waste
- Engagement in alternative behaviors that may increase or reduce waste
- Underlying socio-economic, psychological, and structural factors that motivate wasting of food that emerge in an analysis of qualitative interviews.

METHODOLOGY

The data for this research was collected between March 21 and April 19 of 2017, from a non-proportional quota sample of 32 volunteers who participated in open-ended interviews. Criteria for inclusion required that the interviewees be residents of the state of Oregon and at least 18 years of age. The sample was recruited to meet non-proportional or 'soft' quotas, in order to get representation from several sub-populations including rural households, young professionals, and households with children. These quotas are considered non-proportional as they do not match the exact proportions in the population but are meant to approximate them and ensure

representation from groups of interest that would likely be under- or unrepresented in a small, random sample. These recruitment goals included ten rural participants³, five households with children, five lower income households, and two higher income households. The sample was also selected with the aim of having some diversity of race and age as well. All of these goals were met.

Recruitment consisted of ads posted online using regional Craigslist sites (online platform for advertising jobs, items for sale, and other miscellaneous tasks) across the state of Oregon, as well as emails sent by the research team to known contacts, asking them to forward on information about the study to any Oregon residents who might be willing to participate. The ad described the study as generically as possible as being about food, with no reference to waste, to reduce self-selection bias from those with high levels of awareness about wasted food. The ads on Craigslist and through email contained a link to the demographic survey, which was also used to qualify participants and stratify the sample. A \$30 Amazon gift card was offered as an incentive to those who completed a phone interview. Shortly after completing the demographic survey, participants were contacted by the research team via email to schedule a phone interview. As this was an opportunity sample, rather than a random sample, there is likely to be some bias from self-selection and the internet based recruitment strategies, resulting in a sample of respondents that may be more digitally-savvy and potentially more interested in food than a random sample. Some noteworthy characteristics of the sample are the high proportion of females to males (26:5), the number of participants aged 25 - 44 (22), and the number of individuals with at least a bachelor's degree (20).

In total, 40 interviews were scheduled and 32 were completed, offering an 80% interview completion rate (see Appendix A, Table 1 for a summary of participant demographics and Figure 1, a map of participant locations). Interview questions focused on a range of topics surrounding wasted food, including questions about shopping, cooking, eating, storage, and composting habits, household make-up and dynamics, knowledge and perspectives on food waste. Several interview questions also inquire about the thought processes behind the aforementioned habits. All 32 interviews were performed via telephone and were approximately one hour long. The interviews were analyzed using Grounded Theory. Grounded Theory is a qualitative data analysis technique that generally aims to identify and explain patterns of behavior. Groups of people are identified and compared in terms of their behaviors to identify trends and themes. For this research study, the qualitative interviews on food and waste served as the data to identify these trends and themes. Specifically, interview transcripts were coded (key trends and topics were identified) in the interviews and those codes were clustered into concepts or themes that are identified in the following report. Grounded theory was chosen as the method of analysis because it allows for large amounts of qualitative data to be analyzed without preexisting hypotheses. Rather, the theories are emergent, based on the codes and themes found in the interviews. In the discussion of findings that follows, the number of participants who conveyed information about behaviors or attitudes that fit a given theme is not specified. This is a common practice in

qualitative data analysis as the themes and codes are not used in a quantitative manner to compare to the larger population, or to identify statistically significant differences of any sort. Additionally, while a set of questions was used for each participant, follow-up questions varied and could lead to other questions not asked of every participant. This also makes quantitative comparisons within the sample infeasible as participants are not necessarily responding to the same questions.

KEY FINDINGS

The following findings illuminate key themes that are applicable to the larger topic of wasted food and related behaviors in households. While the findings cannot be “generalized” across all of Oregon’s residents, they represent major themes that recurred in the 32 qualitative interviews. As recurrent themes, they suggest these categories of beliefs, values, attitudes and behaviors are relevant throughout a substantial part of the state’s population. Further research will be conducted to better understand the specifics of the identified themes and to create more generalizable results in the subsequent survey and diary tasks of the larger study. Note that the term “food waste generation” in this report includes food that was discarded to trash, down the drain, fed to animals, and organics recycling such as composting or anaerobic digestion.

The following key themes are explored in the following section:

1. Aspirational Relationships with Food
2. Location of Food Provisioning: Grocery Stores vs. Farmers’ Markets, Farm Stands, and Gardens
3. Appropriate Quantities of Food for Single-Person and Small Households
4. Commonly Discarded Items (Self-Reported)
5. The Role of Composting in Food Waste Prevention

1. Aspirational Relationships with Food

Many respondents expressed stress and anxiety related to food in terms of health, convenience, waste, and money. To mitigate these negative relationships with food, many respondents sought to alter their habits and routines related to meal planning, what types of food are purchased and eaten, and saving food. Many people set goals, but were not able to effectively follow-through with them due to convenience, lack of predictability in their schedule, food preference, stressful life events, or guilt alleviation. Not following through with these goals may lead to an increase in food waste generation in these households. Specifically, people often purchase their food based on their aspirations (e.g. purchasing more vegetables to be healthier), however may not follow-through with preparing or eating the food. Their inability to follow-through thus results in the discard of food. The main aspirational relationships that were identified to result in increased wasted food were:

- Healthy Eating;
- Meal Planning and Preparation; and
- Waste Aversion and Delaying Food Disposal.

While these three relationships can be viewed separately, they are often linked in terms of what goals are trying to be met. For instance, some respondents started meal planning to waste less and eat healthier food in addition to spending less money on food and beverages. For all of these relationships, their success in meeting their goals is often reflected in their perceived “stability” and stress. For instance, people associated a busy and stressful time in their life with less healthy food, wasting more, and/or lack of planning. Achieving their aspirational relationship with food not only meant meeting their food-related goals, but also reflected that they were in a better part of their life.

Healthy Eating

Many respondents noted that they strive to eat healthier for both themselves and their family, either as a result of a health issue or as a general life goal. They associated healthy eating with their “body feeling better” or “more energy.” To achieve this goal most people desired to cook more for themselves at home instead of eating out, ordering in, or eating pre-made meals as well as purchasing healthier foods, often fruits, vegetables, and meats. One respondent noted *“When I’m shopping, I get, you know how you get these bright ideas, I’m going to do this, I’m going to eat healthy this week and you buy all this produce.”* However, many people also noted that the healthy food was not eaten because of stress, lack of time, or food preferences. As a result, the healthy food is often discarded when they decided to eat something that tastes better to them or eat something else in a time crunch.

Representative Quotes:

- *“It’s always a struggle between what I think I should do because it’s never driven by, you know pleasure or anything, it’s all what I should do versus our slovenly ways of cheese and pasta and wine.”*
- *“There’s this weird middle zone where you want to have healthy food around, but it kind of goes to waste.”*
- *“I want to like bell peppers, but I don’t like them as much as I should like them and they don’t get eaten ... so they often tend to get wrinkly and squishy before I [can] eat them.”*

Meal Planning and Preparation

While successful meal planning was noted to result in less wasted food, many respondents noted that they were not able to meal plan successfully which resulted in increased waste. The generation of wasted food is a result of not being able to adhere to the plan for a variety of reasons, including impulse purchasing. One of the reasons respondents gave for why meal planning was not always successful is lack of schedule predictability and stress. Many people plan multiple meals for their ideal week, but unplanned social events and stress at work or home can lead to increased eating out, ordering in, and pre-made meals. One respondent noted that *“planning for stuff is fun, execution is another thing.”* Another respondent noted that when she plans too many meals per week it feels restrictive to her schedule, which can lead to increased waste and stress.

Another reason why the intention to meal plan can result in wasted food is purchasing items not included in the meal plan. Despite intentions to adhere to meal planning, some respondents noted that they purchased something that was outside of their meal plan because it looked good or was from a place they don't normally get food. As a result of the food not being part of the meal plan, it would be forgotten and later discarded.

The main cause for wasted food related to meal planning is straying from the plan, thus eating unplanned food and discarding planned food. However, it is also important to note that some respondents who did not regularly meal plan expressed a desire to do so and recounted events of trying (and often failing) to successfully meal plan. Respondents expressed a desire to plan and sometimes prepare their meals in advance to save money, eat better food, reduce stress relating to cooking, and increase convenience. Additionally, respondents linked being able to plan their meals to a less stressful part of their life. One respondent noted *"I feel better when I do meal prep stuff. I feel physically better because I'm eating better food. But I also feel like ... I'm in a not stressful part of my life because I'm having time to do all that. But I also just feel like I have everything together when I'm not running around eating frozen food and stuff like that."* For some, meal planning is an aspirational goal for them to have a better relationship with food, thus some people may try to meal plan even if their lifestyle or preferences may not easily accommodate it. Thus, providing more flexible meal planning tools may help reduce food wasted as a result of not completely sticking to the plan for those that "rigid" meal planning is not successful.

Representative Quotes:

- *"If it's not necessarily a part of my week meal plan, then it often gets forgotten about. I'll buy something that looks really tasty and wonderful, and you have a recipe in mind, but you don't have the other ingredients that need to go with it, so that requires another trip to the grocery store, and then that takes another week, by then maybe your produce that looked really good at the farmers' market no longer looks good."*
- *"I think there are times where something goes bad and I just hate that. If I planned, I probably wouldn't over-purchase, if I did plan."*

Waste Aversion and Delaying Food Disposal

A vast majority of respondents mentioned an aversion to wasting food and shared their efforts to reduce how much is thrown away in their household. Respondents mentioned that they didn't like wasting food or took steps to avoid it for several reasons. The main reasons are wasting money, time, and environmental resources by throwing away food. Others mentioned that it was morally wrong to waste food or linked it to hunger. Several respondents specifically linked wasted food to the waste stream and the larger food system. One respondent noted that they *"don't want to be...throwing money away"* while another mentioned specifically that they hated the idea that *"a whole chicken lives its whole life just to be thrown away ... a waste of life, a*

waste of resources, and the farmer spent so much time and effort.” One respondent said that “most people when they look at food, they don't think about where it came from, everything that went into it ... all the shipping, and the driving it to a place, and everything that it goes through. That's all just wasted now. It wastes money and time and just everything ... that just bothers me.”

In response to not wanting to discard food, people mentioned techniques they undertake to reduce how much is thrown away. Two methods undertaken with the purpose of reducing wasted food – freezing and saving leftovers – often resulted in food being saved, but not necessarily eaten. To reduce their guilt and anxiety related to wasting food, they put their excess food in the refrigerator or freezer to save the food until they were ready to eat it. However, the saved food was frequently forgotten or neglected and slowly decayed or got freezer burn rendering it inedible. For some households, the refrigerator or freezer is an intermediate disposal destination for food prior to actually being thrown out during a clean out. However, by not discarding the food directly to trash or compost and instead saving it for later, some guilt around wasting food is alleviated.

Representative Quotes:

- *“I haven't really perfected the fine art of eating all my stuff in the freezer before it gets freezer burnt.”*
- *“But then I think about that time that I cleaned out my freezer and that was food waste ... there was some freezer burn and there was some stuff that I knew we weren't going to eat.”*
- *“Honestly, there are a couple pieces of pork chops that have been in there for a while that my boyfriend put in there. They're just in [plastic] baggies. I don't have the heart to throw them away yet because I'm sure I can find something to use them with.”*
- *“I kinda hate to throw it out, but I know that it's probably going to get thrown out ... And I have this friend down the road that comes by once in a while and goes ‘you got something to eat?’”*
- *“Honestly, I think I probably do it relatively often. Because I'll pack up some of the food that the boys don't eat, I'll be like “I'm gonna make them eat it for lunch tomorrow!” And then ... Either, I don't have the heart to force it upon them the next day, or I'll realize there's no way they're gonna eat that. I guess I do that pretty often with their leftovers.”*
- *“We kinda have designated one of the shelves as the, the place where leftovers go to die, and, it'll sit there until it spoils and then we'll clean it out.”*

2. Location of Food Provisioning: Grocery Stores vs. Farmers' Markets, Farm Stands, and Gardens

Many respondents provision food in multiple places depending on preference, available options, convenience, and price. All respondents purchase at least a portion of their food at grocery stores, but many also provision food from their own gardens, food banks, hypermarkets, trading with neighbors, farmers' markets, and

farm stands. In terms of the food provisioning, many respondents view grocery stores differently than gardens, farm stands, and farmers' markets (see Appendix A, Table 2 for some key differences).

Grocery stores were described as more convenient than gardens or farmers' market because they are open more frequently, provide a larger selection of food items, and aren't subject to seasonality to the same extent. However, farmers' markets and gardens were generally preferred as a source of fresh food and were perceived as more connected to nature. The perceived differences between the locations generally revolve around the experience of provisioning food, convenience, and the food itself.

Many respondents perceived food purchased at the grocery store differently than food from their garden or farmers' market. In general, food at the farmers' market is considered to have a closer connection to the grower, to be more "natural," and taste better. Some respondents even value the food from a farmers' market more highly than food purchased at the grocery store. Some of these differences may lead to increased food waste generation through preferential consumption of some food, getting more of an item than desired, and infrequent shopping trips due to the stress of provisioning.

Some respondents noted that they preferentially consume food from farmers' markets and gardens, including an increased willingness to use all parts of food (e.g. more likely to use carrot tops if from garden or farmers' market). However, another respondent noted that they savor farmers' market food more and try to make it last longer. Since people generally get food from multiple locations, including the grocery store, the preferential consumption of food from one location can lead to the increased waste of food from another. Additionally, because farmers' markets are perceived more as an outing or experience than a shopping trip, it was noted that food from farmers' markets is sometimes not integrated into the weekly food plan.

Another key difference between grocery stores and gardens or farmers' markets is the quantities that are available for purchase. In general, grocery stores are perceived to have more limitations in terms of desired quantities. Specifically, the quantities purchased at a grocery store are often described as too large or more than wanted, whereas, gardens and farmers' markets are perceived to provide food in more flexible quantities.

Some respondents claimed to enjoy shopping at grocery stores, but many respondents indicated that grocery shopping caused them stress and anxiety as a result of the number of people in the store, the copious amount of options, and the time required. However, this same level of stress and anxiety was not expressed about gardens and farmers' markets. As a result, people indicated that they buy items in significant quantities to avoid trips to the grocery store. This can lead to

increased waste of food items as a result of changes in preferences or unpredictability in schedule.

Representative Quotes:

- *“When I buy [carrots] from the grocery store, I don't tend to consume [the carrot tops]. I don't know why. Occasionally I'll use them as a little art piece or table setting or something like that. I will throw them in if I'm pickling carrots, just put them [in] ... [from the garden] though, I use those things. I make pestos. So, I don't know what the disconnection is from the grocery store to home.”*
- *“We've created this zone of high expectations in the grocery store. And, at home in the garden, I'm very appreciative and curious, so I'll go out of my way to try things and when they're not ripe, when they're overripe ... I'll try the shoots and the leaves and try things that maybe I hadn't tried before ... The grocery store, it seems so comfortable with waste. I think that it has created a subconscious association with that.”*
- *“I think the connection and appreciation with the people that grow [food] is a huge part of [the farmers' market]. If somebody gives you a gift of food, you get excited about it. Grocery stores have this, maybe, stress associated with them. We're in a stressful state of mind and less an appreciative state of mind.”*
- *“And so sometimes stuff goes to waste because you have to buy it if you're gonna buy it, and you're not buying it in bulk where you can weigh it and decide how much you want. You gotta buy it in the quantities that are available. On the other hand, if you grow it or you make it, then you can decide how you want it and you can put it in whatever container you want that you can reuse over and over again.”*
- *I usually eat [farmers' market produce] right away you know, and I think, I think it's because I feel better about eating it. Maybe I feel like it's healthier for me [than grocery store produce].”*
- *“Our weekly routine with food is we usually put off grocery store, as much as possible.”*
- *“Mainly because if it's at the grocery store and I think it has a bruise then I'm gonna think that it's because somebody was throwing it in their truck on the however many miles it has to get to the grocery store, whereas in the other case I'm like oh, it's probably just a natural part of a vegetable. Yeah, so if anything, I'd be more forgiving at the farmers' market.”*
- *“I still do buy produce at the grocery store wherever I go but that's because I tend to run out ... If I could, I'd rather have good old farmers' market all the time. But the staples just aren't as available.”*
- *“I think, if I'm really honest, a lot of it comes down to taste and just wanting things that are really delicious. I can buy a hothouse tomato in my grocery store and know it's gonna taste fine but not really good. But I also know that if I spend a little bit more money or if I go and get one of those really nice heirloom tomatoes or a thing of cherry tomatoes, it's just gonna taste that much better. I may not eat them as quickly or whatever. I might savor them a little bit more but I just enjoy it a lot more.”*

3. Appropriate Quantities of Food for Single-Person and Small Households

Many single-person and small households indicated that getting or preparing the correct portions of food for their needs could be difficult, especially when they do not enjoy eating the same meal as leftovers for several days. In terms of eating at restaurants or ordering food, it was mentioned that there can be a delivery minimum that must be met or food comes in large quantities resulting in waste at the household level.

For people cooking at home, portion sizes available at grocery stores, quantities provided in recipes, and the size of cookware were all mentioned as barriers to preparing a smaller amount of food. Recipes often provide instructions to prepare many portions of food. Even though someone can divide a recipe for a single person, it is perceived as a barrier due to convenience or difficulty. Additionally, it was noted that cookware is generally provided in sizes for several portions and are not always easy to cook with when trying to prepare a single portion. One respondent noted that *“if you think about your standard size casserole pan, it will feed a family of 5 ... 'Cause you try to fill up the pan that you're using, 'cause that's just what you do, you fill up the pan, you don't fill only half the pan ... If you have smaller portion sizes, like a single serve pan and also smaller portions of things that are offered, it would be so much easier to cook for one and not be so wasteful on the food.”*

Several respondents living alone or with one other person considered the portion sizes sold at stores a barrier to reducing how much food is discarded in their household. Both packaged items as well as produce (e.g. cabbage, herbs, or broccoli) were mentioned as being provided in sizes that are too large for one person unless they want to eat the same food item for an entire week. However, many people preferred more variation in their diet leading to the over-purchasing and sometimes over-preparation of certain food items. While some respondents noted that some produce items are naturally too large for one person, it was also mentioned that allowing respondents to have certain produce items cut in half would be beneficial. For instance, the ability to purchase half of a head of cabbage instead of a whole one would reduce how much is wasted as a result of over-purchasing in households with one or two people. Additionally, items like salad kits were preferred to avoid having to purchase every item you want in a salad separately in quantities that are too large, however, the lack of choice in what goes into the salad kit was also mentioned as a deterrent. One respondent noted that *“I waste so much food because I'm by myself and I don't have the opportunities to buy single serve portions unless it's been pre-cooked and packaged and flash frozen for one person, but I don't wanna do that. It's just not a healthy way to eat.”* The lack of ability to get preferred items in preferred quantities was expressed as a main contributor to food waste generation in households with one or two people.

Representative Quotes:

- *“Then, when you're buying at the store, vegetables and stuff, that's kind of hard to purchase just for one person and try to make it last throughout the week,*

portions of some ... a head of broccoli is just huge ... you have to eat that only in like a week and you won't have anything else just to finish it. That's what I really run into when I do buy vegetables, I can't get through them before they start going bad."

- *"That was a big adjustment was learning how to portion things only for one person, but it's kind of impossible to do in the way that things are portioned. They sell ... Things that you buy are meant to be, it's just too big of a portion size for one person."*
- *"The problem with a lot of recipes is that it makes a big portion, so sometimes it's really hard to use recipes if you're planning on cooking something and you're going to make a big meal out of it."*
- *"If I have all the ingredients for one meal, then one meal isn't gonna get rid of them all because it's only me eating it. So it'll take like a week of me eating that meal and I wanna use the ingredients up."*
- *"It's not really on purpose, 'cause there's like a minimum for delivery. You gotta order a pizza and a side."*
- *"Because you can't use a whole can for one person. Then, you wait a week or so and by that time you want to make spaghetti again, it's gone bad. So there are some canned things that you can only use once before it goes bad if you're just feeding yourself."*

4. Commonly Discarded Items (Self-Reported)

Respondents were asked what food items were most commonly discarded in their household, including anything fed to animals, put down the drain, composted, or thrown in the trash. *Note: These are self-reported and are not based on any measurement at the household level. Meat, dairy products, produce, beverages, and bread were the most commonly reported discarded items.*

When asked why they were discarded, the following were common reasons cited by respondents:

- Items "lost in refrigerator" or "forgotten in the back of the fridge": It was noted by several respondents that items often get forgotten in the back of the refrigerator. One respondent noted that they *"probably throw away a little bit more sometimes, you know, it gets way in the back of the fridge."*
- Partially-consumed beverages left out too long: Milk and milk-like products were mentioned as a commonly wasted food item as a result of "going bad." However, other beverages, notably coffee and soda, were also mentioned but were discarded because they had become cold (coffee), were left out too long, or had lost carbonation (soda). One respondent noted that they *"say the number one thing would be cans of Dr. Pepper that [her] husband drinks... an obsessive amount of Dr. Pepper, but he'll, have cans around the house, and so, that's probably the number one thing that goes down our drain and, coffee."*
- Things are purchased in sizes that are larger than desired (see previous sections on Appropriate Quantities of Food for Single-Person and Small

Households and Location of Food Provisioning: Grocery Stores vs. Farmers' Markets, Farm Stands and Gardens)

- Items purchased for specific meals or recipes: Some food items that are purchased for a specific recipe or meal are wasted frequently because they are not incorporated into other meals. One respondent noted that they *"almost always throw away a part of like almond milk or soy milk 'cause I just can't [drink it], I just use it for certain recipes and it's always too much."*
- Items purchased to eat healthier (see section above on Aspirational Relationships with Food)
- Items purchased in bulk or large quantities: Items purchased in bulk were commonly mentioned because they are purchased in sizes larger than needed. However, it was also mentioned that portions of bulk mixed-flavor packs are regularly wasted if household members dislike a specific flavor. One respondent noted that they waste significant amounts of *"yogurt, the kinds in the bulk packages that my kids don't like. I always throw away cherry yogurt."*
- Leftovers (see previous section on Aspirational Relationships with Food)
- Items that are wasted at the end of food phases or fads: One reason for over-purchasing is that households go through food fads and phases (e.g. eating a lot of one type of food for a period of time). A fad can end somewhat abruptly and as a result the item may still be purchased in significant quantities out of habit, but not actually eaten. One respondent noted that at the end of their phase, they *"buy like [they] have been and then all of a sudden, "nah, we're not touching that no more."*
- Kids' portions: Households, especially those with young children, noted that the most commonly wasted items were portions of the children's meals. They noted that both the preferences and appetites of their children often vary widely making it difficult to predict how much and what they will eat. One parent mentioned that *"with kids, it's really hard because they're like snakes. Sometimes they won't eat for 4 or 5 days and then they'll just eat a ton."*

5. The Role of Composting in Wasted Food Prevention

Most respondents who are either currently diverting discarded food to compost, or who have in the past, indicated that they prefer to compost instead of throwing food in the trash. This is true for households that have a backyard composting system as well as those that have access to curbside collection of organic materials. A sentiment frequently shared was that composting wasted food instead of throwing it in the trash is a *"way to use the [wasted food] and not be totally throwing it away."*

Composting has been successfully marketed as a more environmentally appropriate alternative to landfilling food waste as represented by the general support and excitement that people expressed about composting. While it may be contributing to increased diversion of discarded food, it may also contribute to increased food waste generation through guilt alleviation. As mentioned previously, most respondents noted an aversion to wasting food and explained that throwing away

food makes them feel guilty. However, people also expressed that they felt much better about discarding food to compost and others justified their over-purchasing with the fact that they could compost the material if it didn't get used. One respondent explained that they generally buy the tub of salad greens that has the greatest value per quantity and they *"buy the great, big tub because it still turns out cheaper even if part of it ends up in compost."* The act of composting instead of throwing food in the trash alleviates guilt associated with discarding food, which may result in increased generation of wasted food.

In addition to guilt alleviation, composting may be seen by some as something different from "wasting food" either by throwing something down the drain or in the trash. When specifically questioned about how much food was discarded in their household, including to compost, many respondents noted that they didn't really waste food. When further probed about what was put in their compost bin or curbside collection bin, they would provide information on what food was composted. This may represent a cognitive disconnect in how people perceive how much food they discard. Since composting is seen as something separate from trash, the amount of food that is discarded to compost may be effectively "hidden" from the view of the household members. As a result, this may prevent people from accurately characterizing their discarded food and thus their ability to identify methods to reduce overall generation.

Representative Quotes:

- *"You either use it or compost it, or it goes to the dogs. So nothing ever really gets wasted."*
- *"The worst thing we have trouble with here is produce on the green side. You end up getting too many greens sometimes and sometimes you can't eat the greens fast enough and they get slimy. But those just go in the compost, so it's not really considered waste."*
- *"You know that's probably the biggest, I try to do all the vegetables, but you know I'm not great. And we don't have compost pile, so I feel bad about it."*
- *"I will admit, when I take something out to the compost, it always gives me a good feeling. I don't feel as wasteful, I feel like 'okay, it's not garbage' ...I didn't get to eat this, but at least it's going to be recycled."*
- *"I love [composting]. It's so much better. It makes the trash way less heavy when you take it out and less smelly. And it's cheaper in terms of paying for your trash service. And it's, you know, there's a serious problem with how we deal with our trash all over the world. So it's like a drop in the bucket in terms of dealing with that."*
- *"I would feel better about the vegetables and stuff that are going bad because I can put it back into the earth and not just throw it into the trash."*

OTHER NOTABLE FINDINGS

The following were notable findings that may have implications for further research on wasted food, but were not explored as key themes identified in the interviews.

Organic vs. Conventional Products: Differing Aesthetic Expectations and Contradictory Messaging

Many respondents expressed a preference for organic foods, especially if they were cost competitive or only slightly more expensive than the conventional option. Organic foods were preferred for health, safety, taste, and environmental reasons. Organic foods were often described as being more nutrient-dense, better tasting, and not having chemicals on them. In addition, some respondents characterized organic foods as more “natural” and thus were more likely to be accepting of aesthetic issues in produce, such as blemishes and oddly shaped items. One respondent noted that *“sometimes with organic vegetables, it might have a few brown specks on it, but that's actually nothing ... organic vegetables can have blemishes on them, and be odd shaped.”*

Additionally, some people mentioned that when they purchase conventional produce, some items need to be peeled and scrubbed to reduce exposure to chemicals. The messaging about peeling some produce may be contradictory to suggestions for food waste prevention that suggest eating the peels instead to reduce discarded food materials. In terms of messaging, some instructions provided about food safety may be contradictory to tips related to wasting food.

Representative Quotes:

- *“If the weirder looking apple is organic, I'd probably choose it over the really shiny good looking, conventional one.”*
- *“As long as it's not going bad, I would err on the side of organic produce rather than conventional, just for the appearance looks of it. I know a lot of things go into making some fruits and vegetables look better than they actually are. Like wax on the outside or exposing them to, I don't know, they do it with tomatoes or something, exposing them to some kind of gases to make them more red or something.”*

Using Date Labels

While some respondents claimed to use date labels to decide whether to throw away food, a larger majority of respondents claimed to use them when deciding which product to choose at the grocery store and as an indicator that they should smell or use their senses to determine if something is still good before consuming it. Several respondents noted when they are choosing a specific item, like milk, they look for the one that has a date label with the furthest date and choose that item. The behavior could potentially increase the amount of wasted food at grocery stores if the store is not able to sell the remaining product with a date label closer to the date of purchase. Additionally, many people expressed distrust of date labels on food and explained that they didn't actually mean food would be unsafe to eat.

However, respondents were much more likely to strictly use date labels when deciding if meat products were safe to consume.

Representative Quotes:

- *“When I go to the store, I’ll buy the one that might last longer by date. Say if it’s dated April 12, and there’s another one April 15th, you know, good through ... I’ll buy the April 15th one, make sure it’s going to last. Just in case I don’t ... It’ll be there for a few extra days.”*
- *“I think that food companies are probably trying to - you know - cover themselves - protect themselves in terms of the dates because they’re wanting to give you an earlier date that is maybe possible for the actual - you know - smaller than the actual consumable period of the product.”*
- *I do look at that pretty carefully [at the date label] for meat products, especially poultry and sometimes I’ll put it in the freezer even if I think I might use it through the next day or so just to be safe when it’s getting close to that use-by date.”*
- *“I look at the pull date and if it’s ridiculously out of date, I toss it. But, I use my smell and what I call common sense, ‘cause I don’t think the pull dates, I think the pull dates are suggestions and I almost feel like it’s a conspiracy against us consumers. I’ve read how much we throw away based on pull dates.”*

Feeding Animals

Most respondents that noted they have pets or animals feed at least some portion of their discarded food to them. Since the food is feeding animals, most respondents did not consider it a waste or a discard. One respondent noted that they “don’t feel like [they’re] throwing stuff away because [the chickens] are eating it.” Another said that they “either use [wasted food] for compost, or it goes to the dogs. So nothing ever really gets wasted in that sense.”

Representative Quote:

- *“I think that if we didn’t have chickens and it wasn’t going to a purpose immediately, I think we would have our refrigerator full of a lot more things that weren’t gonna get eaten.”*

Seasonality of Wasted Food

The seasonality of the composition of the food waste stream has generally been considered in terms of what types of food are eaten, and thus discarded, during certain times of year. For instance, you might see a lot more produce in the spring and summer months or specific types of produce like watermelon may be more frequently discarded in summer while winter squash is more frequently discarded in the fall/winter. However, some respondents also noted they are more likely to compost discarded food, both in their own backyard compost bin and to their curbside organics collection bin, when it is not cold or rainy. As a result, there may be a seasonality in terms of diversion of food waste from landfill or drain disposal with a lower diversion rate in cold and rainy months.

Representative Quotes:

- *“We live in a duplex so the compost bin we use is on the other side, like in the other people's yard because we share the compost bin so we have to walk out of the house and into their backyard to throw away our compost. So we have like a mesh trash can in the backyard, which is where we will dump our compost in. And so sometimes if it's raining and dark outside I will just throw it away.”*
- *“In Portland, we have lovely rain all the time. So, running out to put things in the compost, sometimes it's a little inefficient.”*
- *“It started to get really cold and rainy out, we just stopped composting I guess out of laziness 'cause we didn't always want to be taking the compost outside.”*

Aesthetics: The Size of Produce

When asked about how they visually choose which produce items to purchase, several respondents mentioned the size of the produce as a main factor, especially items eaten raw like apples and bananas. Preferences were generally for smaller sized items because they were more “natural” or because they are a better portion size for eating, especially for children. One respondent noted that if she gets larger sized fruits for her children, most of it would be thrown away. If produce is not available in smaller sizes, it may lead to habitual wasting of a portion of that item. Additionally, preferential selection of small fruit/vegetables in the store may lead to increase waste in the store of unpurchased large items.

Representative Quotes:

- *“My general rule of thumb is that [produce] shouldn't be the size of my head if it ... A carrot shouldn't be the size of my arm. I look for things that appear as if they would come from my garden. We have these bulbous conventional foods, so I try to find things that ... oh, it's like \$2/pound, and it's \$4 to buy this apple because it's so massive. I mean, I've had that, I've had a \$3 apple ring up before because it was enormous. This doesn't feel right. I know there's varieties that do that, but, you know ... So, I try to choose food that looks as if it wasn't grown too fast or grown too big. I know there's a flavor balance.”*
- *“I do like smaller sized apples because I have a lot of kids and they are wasteful with it sometimes if it's a bigger one.”*
- *“Sometimes the vegetables might be a little too big. So like I'm not able to eat it all.”*

Informal/Formal Trading Networks

One rural respondent that started growing a significant portion of their food noted that they started a trading network with their neighbors using Facebook to exchange food items that they had in excess instead of throwing them away. This

may be a way for households, especially those in rural areas, to maximize the amount of fresh food that is consumed while minimizing waste. The respondent noted that they *“started with, ‘hey, I’ve got way too many green bean and does anybody else have things that they are growing or have too much of and want to trade?’ And we just kinda started like that. We ended up trading cookbooks, bread, eggs, beans, whatever, ya know, you just kinda post what you have and maybe what you’d kinda like to have or somebody would say, ‘oh I’d really like green beans I have this and this.’ And you know if you wanna trade then you trade.”*

Lack of Predictability in Schedule

Many respondents mentioned that lack of predictability in their schedule greatly impacted their food habits, including the amount of food discarded. Lack of predictability can be unintentional as a result of things such as a busy work schedule, stressful life events, or unplanned social events. However, others seem to prefer a lack of predictability in their food habits because planning may feel restrictive or they like a diversity of meals in their diet. People who enjoy cooking as a creative endeavor or experimentation seemed to plan unpredictability into their food habits to avoid monotony. For this population, messaging around planning may seem restrictive, however, their enthusiasm for cooking may be a better intervention point.

Representative Quotes:

- *“I was never a planner before. And to be totally honest, I used to do a lot of cooking that was more experimental. I would try different ingredients. I loved to try different recipes and all of that, and I don’t do that anymore. That’s a little sad that that piece is kind of missing, but there’s efficiency in its place.”*
- *“We recently had a discussion where I sat him down and said, ‘we’re at the point it’s feeling a little restrictive on my life these days,’ because Blue Apron gives you 3 meals ... That just ... It’s like, we have stuff we wanna do or whatever, if we wanna go out, it just felt a little restrictive. He likes bringing the food over and preparing it for me, but I’m much more of a ‘what do I have in the fridge, what can I make tonight?’ kind of person.”*

Ideas for Providing Tips to Prevent Wasted Food

Most respondents were interested in tips to maximize consumption of purchased food, for example, altering storage techniques or tools to generate recipes based on food available at home. Respondents provided the following suggestions as avenues to provide them information:

- Signs or pamphlets in grocery stores;
- Magnet or other items to put on refrigerator;
- Websites that provide recipes could also provide related tips;
- Social media including Pinterest and BuzzFeed;
- On products themselves, similar to a nutritional label;

- Orientations on college campuses with a special focus on cooking for one or two people; and
- Through community organizations such as libraries or community gardens.

Other issues that were noted by respondents regarding these tips were:

- Reliability of information, including ensuring it doesn't contradict other important sources or is corroborated by other sources;
- Comprehensiveness of information to avoid searching for tips in multiple locations; and
- Simplicity of information, especially any recipe suggestions.

Oregon Pride

Several respondents mentioned that Oregon and Portland have unique and positive characteristics in terms of both food and environmental issues. Additionally, there was a sense of pride the Oregonians may be leaders in the nation in terms of these issues. This sense of community and pride may be helpful for messaging related to wasted food.

Representative Quotes:

- *"I think that has a regional influence ... a little bit more aware of you know food scarcity and food insecurity, so there's a lot less waste that goes on in this area in general, and I think our house definitely exemplifies that sort of mentality. But you know, I've lived in other places you know, over in Idaho, and I've seen tons of food waste."*
- *"I think that's a little more pride [in Portland]. City pride can be powerful, a powerful motivator."*
- *"I think that Oregon's just really interesting. Coming from Louisiana to seeing how much you all do care about the environment and food. And that's really refreshing."*

SYNTHESIS OF FINDINGS

The act of discarding food is simply the last step in a series of behaviors that may be spatially and temporally disconnected from this final step. As a result, understanding the "reason" why food is discarded can be difficult and involve a large variety of factors including a person's "relationship" with food, stressors in their life, and the options available to them for provisioning and storing food.

Given the findings from these interviews, the following appear to be major factors that lead to generating wasted food (or delaying the discard of food materials) in households:

1. Lack of follow-through with aspirational relationships with food
2. Provisioning too much food
3. Over-preparing food
4. Preferences for consumption
5. Time and convenience

6. “Invisibility” of some discarded food items

Understanding the underlying reasons for the above factors is critical to understanding what types of interventions may work to reduce the amount of food wasted in households. For instance, provisioning too much food is often cited as a reason for discarding food, thus a shopping list template or other planning tools may be provided to reduce over-purchasing. However, provisioning too much food is likely a result of many other issues (e.g. portion sizes ‘mismatch’ or ‘impulse purchases’) and providing a rigid planning tool may result in unsuccessful planning for households that are likely to stray from the plan even if they intend to follow it. For instance, some households indicated that they have previously tried to meal plan, but executing their plan had not been successful due to life circumstances. While they had purchased the items to cook a meal, they instead ordered food or heated up another pre-made meal because of time and convenience. This resulted in at least some items purchased to cook the planned meal being eventually discarded.

Lack of Follow-Through with Aspirational Relationships with Food

As mentioned in the findings, respondents often had aspirational relationships with food that may result in discarded food. The three relationships explored were healthy eating, wasting less, and better planning. These aspirational relationships are a result of desires to live in ways that increase healthfulness, increase efficiency (money and time), and/or reduce impacts on the environment. However, these goals may not be easy to execute given a person’s lifestyle, available resources, or other factors. Additionally, these aspirations may also simply delay or postpone the discard of food by freezing it or saving it as leftovers. This postponement is connected to guilt alleviation or creating mental and emotional distance from the undesirable behavior. Approaches being considered to intervene in reducing food waste should take into account these aspirational relationships with food to ensure that the intervention isn’t simply delaying the discard of food or increasing it by creating desirable behaviors that may not be attainable in the current situation. Since the ability to successfully achieve these aspirational goals seems to be linked to stress and stability, engaging people at times of low stress / high stability may be more likely to lead to success. Additionally, “good planning” may not be the same across all households, rather, what constitutes planning and a household’s capacity to follow through on a plan will vary based on many factors such as habits, lifestyles and internal household dynamics. Planning may also function in ways other than intended, creating wasted food when plans can’t adapt to household changes. Further research is needed to understand techniques to help people attain their aspirational relationships with food while not generating wasted food and understand if initiatives aimed at preventing wasted food need to be combined with health or other topics related to aspirational goals to be successful. Collaboration with nutritionists and public health experts may be necessary to ensure consistent messaging related to food as well as to leverage each others’ work.

Provisioning Too Much Food

Over-purchasing can occur for a variety of reasons and understanding these will allow for appropriate interventions to be developed and implemented. While planning tools will help for some households where lack of planning is the main driver behind over-purchasing, there are many other reasons for over-purchasing where planning tools are unlikely to be effective. Many respondents noted a dislike for shopping at grocery stores, which may lead to stockpiling of food to reduce the number of shopping trips. Lack of planning or deviation from a normal schedule may result in significant quantities of wasted food. Additionally, single-person and small households noted that 'portion size mismatch' or purchasing too large of a quantity because of how it is packaged or sold regularly resulted in wasted food. Another reason for over-purchasing foods is buying an item for one meal in a larger quantity than needed for that specific meal (e.g. purchasing spaghetti sauce for one dinner). Some respondents noted that items like this would regularly get wasted because there wasn't an obvious way to integrate it into another meal or they didn't want the monotony of eating that item again. Finally, purchasing items in bulk packages may result in habitual wasting of food items if the family dislikes one flavor or type in a package.

Preparing Too Much Food

Over-preparing food and meals is common, including purposefully preparing more food than needed for leftovers to save time. Single-person households were especially likely to mention over-preparation as an issue because recipes generally come in serving sizes that are too large, the size of cookware prompts a larger amount, or they had to purchase more than they wanted in the first place. Techniques specifically designed to help single-person or small households would likely help reduce food discarded as a result of over-preparation. Additionally, sometimes over-preparation can result in no discarded food because it is all consumed. However, at other times it may result in wasted food due to unpredictability in scheduling or eating preferences, including not wanting to eat the same meal repeatedly. For instance, some respondents noted that they didn't want to feel forced to eat the same item for multiple days because it felt monotonous or restrictive which would routinely prompt them to eat other food instead of eating food already prepared at home.

Preferences for Consumption

There are obvious issues with food, such as being too salty or burnt that result in households discarding food items due to preference. There are, however, other reasons why eating preferences may lead to wasted food. Disliking a food item or changing tastes, especially for children, was mentioned as a common reason why food is discarded. As mentioned above, intentionally preparing extra food for later meals or leftovers may result in wasted food when a person is craving another food or is tired of the monotony of eating the same thing. Additionally, many respondents noted that when they are stressed or busy, their food preferences tend

to shift to comfort foods or foods that can be quickly prepared, which can lead to the waste of already purchased items that may take longer to prepare or are more healthy.

Time and Convenience

Time availability and convenience was a significant factor for many respondents. Both the amount of time spent on meals (including planning, shopping and cooking) as well as the ability to shift tasks to more convenient times were barriers to people achieving their aspirational goals with food. Additionally, time and convenience affected the frequency of shopping trips and meals prepared at home. Most notably, stress and lack of stability in life were frequently linked to lack of time and convenience. Respondents noted that during stressful events or when time is limited, they are more likely to eat out, order in, or eat pre-made meals instead of preparing meals at home, even if they have food to eat at home. This can be a result of exhaustion or not realizing that they are hungry until it is an “emergency” and they do not have time to cook a meal. The amount of time or stress was also linked to healthy food with less healthy food being consumed during stressful or busy times.

“Invisibility” of Some Discarded Food Items

When talking about “wasted food,” some items are not equally seen as waste compared to food that is thrown in the trash or down the drain. Food that was composted or fed to animals was often not considered to be “waste” and thus might be “hidden” from view when people are evaluating their own waste and the ways they can reduce it. Additionally, many respondents mention that they will freeze foods to elongate their shelf-life or save leftovers instead of discarding them. For some households, putting leftovers in the refrigerator or putting food in the freezer may render the food “saved” thus the guilt of wasting is avoided. However, saving the food may just delay the wasting of the food until the less-frequent refrigerator or freezer cleanouts. This process can also render the amount of food wasted in households as a result of these cleanouts “invisible” on a day-to-day basis. These “invisible” or “hidden” food items may result in an underestimation of how much food is regularly wasted in households. Based on anecdotal evidence, it has been claimed that source separation of discarded food drives wasted food reduction by making the amount of wasted food “more visible.” One recommendation may be to talk about “food that does not get eaten” rather than waste, which is associated with guilt and anxiety and sometimes has a moral connotation. Further research is needed to understand if shifting perceptions to make these “invisible” food items more visible will increase awareness and/or increase guilt and anxiety around wasted food.

Techniques to Reduce Wasted Food (As Mentioned by Respondents)

Respondents mentioned several techniques that they are undertaking to reduce how much food is discarded in their households and also mentioned potential ideas to decrease the amount of food discarded in their home. The following are the main ideas mentioned by respondents:

1. Variety or customization of portion sizes at point of purchase; and
2. Formal or informal sharing networks for food via Facebook or other avenues.

Additionally, apps, more information, or tools to help with the following food waste related issues were also mentioned:

1. Storage techniques to elongate the shelf-life of fruits and vegetables (and other types of food);
2. Techniques to reduce freezer burn or icing of frozen items;
3. Tools for “planning” given the variety of ways that people may want to plan (including planning for unpredictability);
4. Techniques to prepare the proper portion sizes, especially for single-person households; and
5. Tools to help design simple meals based on what is available at home.

RECOMMENDATIONS (for other research tasks)

The findings from the qualitative interviews can be used to better understand the limitations of using surveys and kitchen diaries to understand how much and why food is wasted as well as provide guidance on what types of motivations, perceptions, and behaviors might be most relevant.

Surveys

The key limitation of surveys that is illuminated by the interviews is that a person’s perception of how much wasted food is generated in their household may not accurately reflect what is actually wasted because some items may be “hidden” from view or not considered “waste.” Food that is composted, fed to animals, saved as leftovers, or frozen are items that fit in the category of potentially “invisible” food items. This may result in some items being underestimated in terms of “waste” while others are overestimated because they are more visible.

Survey questions and topics that are potentially important to overall generation of wasted food related to the qualitative interviews are:

1. Schedule predictability;
2. Aspirational goals related to food;
3. Impacts of purchasing options (e.g. portion sizes) on total waste;
4. Qualitative information on refrigerator/freezer cleanouts that may not be captured in a kitchen diary;
5. Portion of “saved” food that is eaten compared to discarded at a later date; and
6. Perception of control over food-related habits and practices.

Kitchen Diaries

One of the key limitations of the kitchen diary as illuminated by these interviews is that the kitchen diary is unlikely to capture food that is “saved” through freezing or as leftovers, but is not eaten because these items may only be captured as part of a larger refrigerator/freezer/cabinet cleanout. These large cleanouts are generally unlikely to happen during a short reporting period because it would be onerous to

measure and report all of those food items. Additionally, kitchen diaries are generally a week or two in duration and thus may not capture the seasonality in the generation and disposal of wasted food. For instance, several respondents noted that they are less likely to compost during the rainy and cold months, thus a larger proportion of their wasted food would end up in the trash. These seasonal variations are unlikely to be captured in a kitchen diary of short length.

Kitchen diary topics that are potentially important to overall generation of wasted food related to the qualitative interviews are:

1. Disposal destinations (including compost and feeding animals) to understand the proportions of wasted foods that end up in compost and feeding animals and thus may be “invisible.” Additionally, understanding if households that partake in these behaviors are more or less likely to generate more wasted food than households that do not compost or feed their animals discarded food.
2. Respondents claim that many behaviors help them minimize the amount of wasted food, including planning and eating all parts of fruits and vegetables. However, it is not known whether these self-reported behaviors result in less generation of wasted food. Linking the kitchen diary to the survey results can help understand which behaviors may be more successful or correlated with less wasted food.

¹ This research is foundational to DEQ's 2050 vision and strategy to prevent wasted food, which is a top priority of the materials management program. This research will fill existing research gaps that would otherwise inhibit the state, regional, and local governments from taking action to prevent wasted food and measure success. The research methodology includes:

- ☒ Conducting 32 qualitative interviews with individuals across the state;
- ☒ Collecting detailed food waste information through approximately 250 residential and commercial kitchen diaries and a statistically valid study of food waste from individual waste generators in urban and rural areas of the Portland metropolitan area and Lane or Marion County;
- ☒ Developing Commercial Case Studies that test the cost savings and environmental benefit of several waste prevention better practices, such as smaller plate sizes and more variety in portion sizes, in 15 food service, catering and retail establishments; and
- ☒ Completing a statewide survey of approximately 768 households is required to ensure the research study is statistically representative of rural and urban areas across the state of Oregon and to create a reliable baseline of wasted food that includes validated drivers leading to preventable wasted food, specific to Oregon.

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³ Definitions of rural areas used by The Oregon Office of Rural Health (accessed 5/19/17 <http://www.ohsu.edu/xd/outreach/oregon-rural-health/data/rural-definitions/index.cfm>) served as the basis for our rural/urban classifications. Their map showing urban, rural and frontier areas is a useful point of comparison to our participant map (Accessed 5/19/17 <http://www.ohsu.edu/xd/outreach/oregon-rural-health/data/rural-definitions/upload/orh-rural-map.png>).