Mainely Composting

MEETING THE CHALLENGE

COMPOSTING FISH AND SEAFOOD PROCESSING RESIDUALS

Herring, dogfish, sea urchins, shrimp, groundfish, mussels, scallops and clams are among the feedstocks successfully being composted by Maine's creative facility operators.

Mark A. King

HISTORICALLY, Maine's commercial fishing and seafood processing industries have played a major role in the state's economy. In 1994, they produced $750 million in income — roughly three to five percent of the state total. Even so, these industries have faced many economic challenges over the years, including increasing competition for dwindling resources, keeping up with industry driven technological advancements, and most notably, dealing with the ever growing costs associated with disposal of seafood/fin fish processing residuals. In 1989, according to Bill Seekins of the Maine Department of Agriculture, 20 of Maine's fin fish processors accounted for 25,774 tons of processing waste — an increase of 20 percent over the 1986 reported figure. (A survey currently is underway to provide more current numbers.) This increase is partly attributed to the movement of the fisheries industry toward exploiting underutilized species, such as dogfish, in lieu of decreasing groundfish stocks. Since that time, more emphasis has been placed on exotic species including sea urchins, sea cucumbers, squid and whelks. This will undoubtedly create new disposal challenges for the industry.

With the mandated closing of municipal landfills and movement away from the wasteful and environmentally costly practice of ocean disposal, industry leaders have sought creative alternative disposal options to handle this increasing volume of residuals. If the waste stream is steady and volumes predictable, traditional outlets such as bait sales, fish meal and pet food rendering continue to work well for certain species. However, seasonal fluctuations and industry crises often overwhelm these outlets creating the need for backup options.

Composting offers a low tech, cost-effective approach to handle fish processing residuals. When done properly, composting can produce a beneficial fertilizer product which is stable, odor free, and easily stored. However, due to the highly putrescible nature of fish residuals, composting piles require diligent management to prevent problems with odors, leachate, and animal (vector) attraction. Additionally, composting should not be looked at purely as a money making venture, as most facilities — at least initially — often end up breaking even, at best.

Sea urchin residuals (above) and other available seafood by-products are recycled by commercial composters like Land and Sea Compost Company (below).

In Maine, all fish composting above 30 cubic yards in annual volume is regulated by the Department of Environmental Protection (DEP). Most seafood processing facilities fit under the Department's permit-by-rule (PBR) category, which allows the annual composting of up to 500 cubic yards of fish residuals without having to go through an extensive permitting process. Since 1990, the number of new compost facilities dedicated to fish and seafood waste processing in Maine has increased dramatically. Currently, 17 facilities compost fish/seafood processing organics, including herring, dogfish, groundfish, sea urchins, sea cucumbers, shrimp, lobster, crabs, mussels, scallops and clams — each of which poses a unique set of challenges. All these facilities are driven by tipping fees, with the composter receiving between $15 and $30 per ton of incoming organics on average. Landfilling averages between $35 and $50 per ton, and ocean disposal between $25 and $40 per ton, so when transportation costs are included, composting is approximately

equivalent in cost for generators. The following four successful operations demonstrate some of the creative ways operators have made their facilities work, even with especially difficult feedstocks.

MUSSELS ON FARM

Webb Family Farms of Pittston, Maine is licensed to compost up to 2,000 cubic yards of fish waste materials per year. The compost facility is owned and operated by Ronald Webb, who also manages a small dairy/cattle operation at the farm. The site was originally licensed as a permit-by-rule compost facility on August 20, 1991. Since then, the operator has experimented with many feedstocks including produce, crab, cafeteria, and mussel residuals; with varying levels of success. Webb currently composts ground mussel waste from Great Eastern Mussel Farms (GEM) located at the head of Long Cove in Tenants Harbor, Maine. GEM packages live mussels for shipment to supermarket chains, and generates approximately 750 cubic yards of residuals each year. After being ground, drained and bulked with sawdust at the GEM facility, 15 cubic yards of mussel waste is delivered to Webb Family Farms twice a week. After being unloaded on the asphalt surfaced site, the material is formed into windrows approximately six feet high by 10 feet wide by 100 feet long, which subsequently are turned as necessary using a Sittler turner.

Early in the process, Webb realized that an important component was missing from the compost recipe. No matter how optimally he mixed the sawdust and mussel waste, the resultant windrows would become anaerobic. Odors were generated that were severe enough to upset neighbors well over 1,500 feet away from the compost site, resulting in odor complaints to DEP's Augusta office. To address the odor issue, Department staff and members of the Maine Compost Team worked with Webb Family Farms to enhance aerobic composting conditions within the windrows. After reviewing the mussel waste nutrient analyses, it was discovered it contained a high amount of ground shell and a low amount of organic matter. One thought was to increase the amount of sawdust in the recipe. Although that approach would increase the percentage of organic matter and porosity, it was decided there would not be sufficient nitrogen remaining to support adequate composting.

The solution turned out to be a simple one: adding another nitrogen containing feedstock, rich in organic matter to the recipe. After careful deliberation, chicken manure was chosen due both to its availability, and positive effect on jump starting the compost process. Once the manure was incorporated, the windrows began to compost effectively and odors reduced significantly. As an extra level of odor control protection, however, Webb covers the composting windrows with

The 17 composting facilities accepting fish/seafood processing organics charge tip fees of $15 to $30 per ton. Landfilling averages between $35 and $50 per ton, and ocean disposal between $25 and $40 per ton.

HOW TO KEEP HERRING OUT OF THE LANDFILL

STINSON Seafood has found alternatives to landfilling the fish residuals produced at its processing plant in Bath, Maine. The company cans only the tail portion of herrings. For the past year, none of the remaining residuals has been landfilled. Instead, the by-products are sold to lobster fisherman for bait (60 percent of total generated), as well as to fish meal plants (25 percent), pet food manufacturers (10 percent) and mink ranchers. For the past five years, approximately five percent has been composted, producing 300,000 to 600,000 cubic yards of finished compost annually. Michael Howland, Stinson's by-products manager, says that all of the disposal alternatives are profitable except composting. He adds that about 13,500 tons of herring by-products will be generated in 1996.

Composting is done off site by J&L Composting in Washington, Maine and Browning Ferris Industries (BFI) in Knox, Maine, both of whom charge Stinson a tip fee. "We don't have the facilities and don't want to make the capital expenditures it would take to do composting on-site," Howland notes. Stinson buys back a portion of the compost produced by J & L and sells it at its processing plant for $30 per cubic yard or $6 for a 50-pound bag.

A small landscaping company in Rockport, Maine is composting mussel waste, fish residuals, municipal leaves, grass clippings and animal manures.

a four to six inch layer of finished compost during the first two weeks of the active compost phase. This combined effort has worked well at the site and there have been no odor complaints attributed to the facility operation since.

In exchange for an exclusive marketing agreement, GEM paid for the installation of an asphalt pad at Webb Farms. Finished compost from Webb is taken to the GEM Coast of Maine bagging facility in Brewer (located in an old rock salt bagging plant). It is then mixed with compost from the Washington County facility (see below) and compost from Maine Wild Blueberry to produce "Penobscot Blend," which GEM then markets regionally.

SALMON MORTALITIES AND OFFAL

The Washington County Commissioners operate a permit-by-rule compost facility in a sparsely developed region adjacent to the community of Marion Township's transfer station. Originally licensed in October, 1993, the facility composts between 400 to 500 cubic yards per year of salmon mortalities and offal (entrails and racks) from two coastal salmon processors: R. J. Peacock Canning Company of Lubec, Maine and Atlantic Salmon of Maine, in Machiasport. Both companies process pen raised salmon into filets and steaks that are flash-frozen and sent to retail markets. Art Glidden, a production supervisor from R.J. Peacock, indicates that roughly 20 percent of the volume of salmon processed by his company ends up as offal. Incoming material is mixed with sawdust and formed into windrows (six feet high by 12 feet wide by 40 feet long) on the surface of a compact, 5,000 square foot gravel pad. Turning is done with a bucket loader.

One immediate challenge facing this facility is the extremely wet, oily nature of salmon residuals, which greatly re available pore spaces within the win and interferes with maintaining prope obic conditions. As a result, intense tu is necessary throughout the process. O lution that has been suggested is to inc rate a bulking agent, such as wood chi help prevent pore space collapse. This however, necessitates a screening proc recover the partially composted chips the finished compost — a cost that cur ly is not feasible for the facility. An problem is improper mixing. Becaus piles are mixed and turned by bucket lo clumping and heterogeneity of material problem during the initial mixing/win construction phase.

To further complicate this problem salmon residuals frequently contain w salmon mortalities which are initially r tant to breakdown and very attractive t resident scavengers. The piles are const ly being ravaged by gulls, crows and ea looking for an easy meal. Rotting sal carcasses also are very attractive to flies the windrows often contain significant ulations of fly larvae at various stages o velopment, especially during the hot s mer months of June, July and August address this problem, the facility atten has been covering the piles with finis compost to help keep the putrescible w from being exposed to flies and other vect

Because improper mixing is a theme c mon to all of these problems, the Washin County Commissioners are working v DEP to add a mixing area to the site. Fe stocks will be received on a concrete p mixed as thoroughly as possible, and t windrowed on the compost pad. This a tional step should produce a more thoro homogenous mix, keep the composting a clean and reduce the amount of leachate t sits on the pad. Future applications will p vide for a mechanized windrow turner thoroughly mix the materials during the tive compost phase. The addition of a tur most likely will solve all of the proble mentioned above, especially the issues of proper mixing and size reduction. As no above, finished compost is mixed with e product from two other operations at GEM Coast of Maine facility in Brewer a marketed as "Penobscot Blend" compost.

SEA URCHIN PROCESSING RESIDUALS

In Montville, Maine, C. B. Company co posts sea urchin processing waste from Ea ern Horizons Seafood in Rockland, Mai The permit-by-rule facility operated by W ter and Darcie Lamont received DEP proval in September, 1995. During sea urc season (from August through May in Mair Eastern Horizons extracts live urchin (egg mass) for shipment to Asian markets. had been discarding the remaining portion the organism, amounting to approximat 800 to 1,000 cubic yards of urchin waste p year. Today, the bulk of that material goes the Lamont site for composting. where it mixed with sawdust using a commerc

bucket loader and formed into piles eight feet tall by 16 to 18 feet in diameter. Piles on the surface of the 100 foot long by 100 foot wide compact gravel pad are turned frequently throughout the active compost phase using the same bucket loader.

Due to the unpredictability of catch success and roe quality, C. B. Company may receive anywhere from 14 to 80 cubic yards of urchin residuals per week during the height of the season. As a result, the Lamonts have developed techniques to head off crises and optimize proper composting conditions. First, all incoming deliveries are deposited on a bed of sawdust to ensure that any nutrient containing leachate that has settled out during transport is adequately amended. Second, all incoming loads are incorporated immediately into compost piles to reduce the chances of odor generation and vector attraction. When the urchin residuals were analyzed, their composition was found to be similar to mussel waste, in that the shell content is high and the organic matter content very low. To address this issue, the Lamonts have begun experimenting with additional nitrogen feedstocks — most recently cow manure.

Finished compost is mixed 50:50 with loam to form a high quality topsoil which is used in the Lamont's landscaping business. Darcie Lamont reports that they have had significant success using this mixture to reseed disturbed sites. As a final note, because the Lamonts live adjacent to the compost site, and thus are the first home impacted by any nuisance odors, they are especially sensitive to any changes in compost pile dynamics and respond quickly!

SEAFOOD RESIDUALS AND MANURES

In Rockport, Maine, the small Land and Sea Compost Company is operating below the DEP's annual license exemption limit of 30 cubic yards. Owner/operator Chris Smith currently composts mussel waste, fish residuals, municipal leaves, grass clippings and cow, horse and hen manures. The idea to begin composting originally developed out of a need to obtain low cost, high quality, loam-like material for his primary business, a landscaping and gardening company called Seasons Downeast.Windrows are initially formed on a vegetated field surface in a layered format using a small farm tractor. Completed windrows, measuring approximately eight feet wide by five feet high by 100 feet long, are subsequently turned using a Wildcat turner as frequently as necessary throughout the active compost phase.

The compost site is located in the heart of a fairly well developed rural neighborhood, making proper site management and compost process control a necessity. Smith has never had a single odor complaint from any of his surrounding neighbors. As an extra public relations measure, he holds open houses annually to help educate the community about composting.

Early compost efforts using varied feedstocks produced a beneficial and useful fertilizer product. Out of these initial experiences, Smith developed the impetus for establishing a compost bagging/sales operation, which has resulted in sales of more than 40,000 bags of finished compost since 1991. Land and Sea's markets range from local feed stores to large scale corporate users, extending as far as Delaware. Future plans include upgrading his operation to a permit-by-rule level to allow him to process volumes of fish and seafood residuals up to 500 cubic yards per year. ■

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Incoming loads of urchin residuals are incorporated immediately into compost piles to reduce the chances of odor generation.