

# Nitro Factors



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## YUMMY BITES...

Edmonton Aquaponics Society  
First Annual General Meeting  
Thursday February 2, 2012  
ACT Rec. Center (Rundle Park)  
7:00PM – 9:00PM in the Atrium

EAS **Pledge-A-Part** Donor Page  
Coming Soon to our Website

Edmonton Aquaponics Society  
Breakfast Television Segment  
February 15 at 7:10 AM (Tentative)  
Updates on [Website](#) and [Facebook](#)

## ABOUT THE EAS...

Aquaponics, a simple constructed wetland, mimics natural biodiversity through a nexus of microorganisms, aquaculture, and hydroponics.

The Edmonton Aquaponics Society (EAS) will nurture healthy, local food, educational opportunities, forums to nurture an awareness of shifting paradigms, and tons of fun.

We formed a board of directors in September 2010, and became a non-profit Society in January 2011.

Our project will be a family sized version of the commercial system developed by Dr. Nick Savidov's team in Brooks, Alberta at the Crop Diversification Center, South.

Contact us at:  
[info@edmontonaquaponics.org](mailto:info@edmontonaquaponics.org)

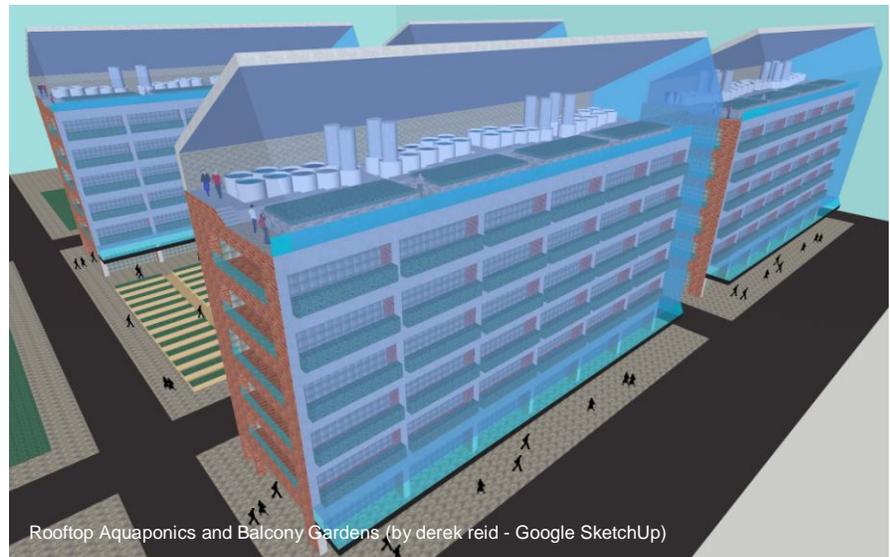
## LOCAVORES Chew On It

By Derek Reid

In November of 2011 Katie Soles of Soles and Company and Debbie Hubbard of the Greater Edmonton Alliance (GEA) invited input from local food advocates for the City Center Redevelopment project.

with target groups, and one on one strategic interviews", Katie says.

Debbie Hubbard is well known within the community through her work with the [GEA](#). Debbie is the



Soles and Company is a well-established, highly regarded company that has spent the last 20 years enabling organizations to fulfill their vision and mandate.

Based in Edmonton, company president Katie Soles is known for designing processes and facilitating contentious and complex issues, creating triple win resolutions. She has a Masters Degree in Applied Behavioural Science (University Associates California).

"We are working hand in hand with the architectural design team to gather input from a number of stakeholders on the redevelopment of this historic property. These consultations will range from public workshops, specific discussions

chairperson for the GEA Board.

The people that Debbie and Katie invited to the meeting are a good sampling of whom you'd want on your team if you were planning a new urban paradigm. The following introductions only touch on their efforts.

Monique Nutter: co-chair of the Local Food Team for the GEA. She has a huge interest in urban agriculture and the preservation of agricultural land in the northeast for peri-urban agricultural activities.

Marc Legault: bio-industrial engineer with Alberta Agriculture. He is developing a scalable aquaponics operating manual based on the Brooks template.

*Locavores continued...*

Sonja Myllymaki: an urban farmer who utilizes a SPIN system. Sonja has also worked as a heritage gardener at Fort Edmonton.

Joylyn Teskey: architect with [Group 2 Architects](#). Joylyn collaborates with Perkins+Will and Katie on the City Center project.

Nick Savidov: research scientist with Alberta Agriculture. Nick has been tweaking the commercial scale aquaponics system in Brooks, Alberta for 10 years.

Derek Reid: [Edmonton Aquaponics Society](#) president. I have also been a lifelong student of alternative building, energy, and transportation technologies.

Claudia Bolli: coordinates the [Little Green Thumb](#) program for Sustainable Food Edmonton. Claudia also operates Wild Green Garden Consulting and is very interested in permaculture.

Jessie Radies: co-owner of [The Blue Pear](#) restaurant, and founder of [Live Local](#). Jessie is passionate

about improving our community's local economy.

Eva Bogdan: [Just Food Edmonton](#). Eva is interested in food security.

Areni Kelleppan: executive director of [Sustainable Food Edmonton](#). Areni works on community gardens and kids growing projects.

Andy Smith: senior building engineer with [AECOM](#), past chair of the [Solar Energy Society of Alberta](#), and Edmonton Aquaponics Society board member. Andy is also part of a charrette optimizing a greenhouse design for our climate.

We began the meeting with Katie and Joylyn provided an overview of the project. Then Katie asked us to brainstorm issues important to each of us as Joylyn feverishly scribbled down what she could. We launched into a lively discussion of many things locavore and beyond.

Educational models unlike anything we've seen before. Producing as much food in the community as possible on rooftops, in community gardens, vertically, and as part of

the landscape. Effective transit systems, low-income housing, and smart zoning to rainwater capture, snow windrows, and solar orientation; but the purpose wasn't to build an EcoSimCity in one night. The idea was the ideas; the story was the people who attended!

Perhaps it was Claudia who best summed up the mood of the meeting. She suggested that this development might start out with the best of intentions, but questioned whether pressure from the usual suspects would derail the process. Katie and Joylyn assured us that there was an intensely sincere resolve on the part of the city to stay the course and make this process work.

Regardless of whether you think there should be a mopane worms stand on every corner, a root cellar in every building, or low-rental units in every penthouse, all of our opinions matter. Please read the "City Center Redevelopment" article below for more information about how to get involved.

## THERMAL FOOD: From Poop To Pump

By Marc Legault

In days gone by, people used manure-heated hot beds to grow



Jerome Relocation Center Hot Beds, Ark. (from Wiki Commons)

year around vegetables.

Hot beds are basically glass-covered pits where the heat generated from buried manure is used to keep plant roots warm and viable.

Geothermal heat could be used to heat modern day cold frames and thereby allowing year round production of cool weather crops of salad greens, cole vegetables (broccoli, Brussels sprouts, cabbage, and cauliflower) and even carrots. Using today's advances in construction materials, hotbeds

would be robust, aesthetically pleasing, and energy efficient food production centers.

There's also the potential of using a geothermal underground piping system to over winter tender fruit trees such as peaches by keeping their roots warm.

*Marc Legault is a Bio-Industrial Engineer with Alberta Agriculture*

*He suggests this [link](#) for more info on the history of hotbeds.*

(Editor's note: Marc's thoughts led to info about the [Pain method](#) of tapping into the heat from a compost pile.)

"You, as a food buyer, have the distinct privilege of proactively participating in shaping the world your children will inherit." Joel Salatin (from *Holy Cows and Hog Heaven*)

## CITY CENTER REDEVELOPMENT: The Way We Group!

By Derek Reid

“Some people might consider this to be one of the most studied issues in Edmonton's history”, the City's website says. That may be a wee bit of an understatement.

‘Tumultuous’ might be too tame. Yet, despite the efforts of a handful of special interest stakeholders, 30,000 future residents won the day. And those lucky folk that get to live in a world-class community are just the tip of the ice sculpture. Staff will be required for schools, restaurants, offices, light -industrial, retail, and municipal services. They too will enjoy the aesthetic of their surroundings while contributing to significant tax revenues.

That is a question that City leaders, an expert team of professionals, major local stakeholders, and Edmonton citizens have been formally working on for over 4 months. But, we need to step back 4 years to establish an historical frame of reference.

In early 2008, City of Edmonton Councillor Tony Caterina wondered about the pros and cons of the City Center Airport. From June 2008 to July 2009 “a detailed review was undertaken addressing: historical importance, economic impact, market feasibility, medevac services, and public consultation”. The consultations included public

edge sustainability strategies, liveability, and world-class amenities. Initially there were 33 international submissions. These were short-listed later that year.

“The City asked citizens to provide observations on design concepts and videos from 5 international teams to redevelop the airport lands. These submissions, which include 8 display boards and a 5-minute video, represented each teams' vision for redeveloping the lands, based on the [“Master Plan Principles”](#) approved by City Council.” The opening paragraph of this 23 page document states, “The ECCA lands will be home to 30,000 Edmontonians living, working and learning in a sustainable community that uses 100% renewable energy, is carbon neutral, significantly reduces its ecological footprint, and empowers residents to pursue a range of sustainable lifestyle choices”.

“On May 18, 2011, the competition was narrowed to three teams and on June 22, Perkins+Will was endorsed by City Council to lead this land transformation. On August 31, 2011 the City signed a contract with Perkins+Will to carry out the master plan.” Thus began a “15-month planning process, which will further define roads, subdivisions, land uses, green amenities, etc. The observations from citizens, as well as additional public involvement, will be used during this 15-month process.”

Katie Soles, of Soles and Company, recently contracted by Perkins+Will, the lead design team, began an extensive community engagement process for the project. She provided the following synopsis of progress thus far.



View of City Center Redevelopment Site (by derek reid)

The dust had yet to settle, but the next logical question begged an for an ear: how do you incorporate an eco-friendly, walk able, connected neighbourhood complete with sustainable housing, lots of green space, community gardens, and accessible transportation into the largest development that most planners will see in their lifetime?

hearings, stakeholder involvement, and input to councillors.

In July 2009 council voted for a phased closure of the airport.

The next step in the redevelopment timeline was the announcement in early 2010 of a worldwide competition for an urban design that would fulfill rigorous guidelines. Among these criteria were cutting

*City Center Redevelopment continued...*

“This is a once in a lifetime opportunity to build a leading edge community and have it serve as a model for other cities when it comes to creating new urban developments in the heart of a city. Council hopes it will show the world how innovative Edmonton can be when it comes to developing sustainable, family friendly, affordable communities.”

“It also addresses the City’s need to create more compact form and increase density in its neighbourhoods as laid out in The Way We Grow strategic plan and addresses sustainability and preserving our environment as laid out in The Way We Green strategic plan.”

“City Council has a vision of an environmentally sustainable, transit-oriented, mixed-use development for up to 30,000 people - taking the very best of Edmonton’s neighbourhoods and putting that together with the best ideas from around the world. It will be rich in public parks and amenities and addresses winter and summer through climate oriented design principles.”

“In terms of land size, this is the biggest urban design competition held in Canadian history. The site is over 500 acres, with over half of that devoted to green space— parks, lakes, ravines and urban agriculture.”

“The City and Perkins+Will are committed to developing and delivering on a 15 month long planning process which will involve significant public involvement to

engage citizens, the community and stakeholders as part of the statutory process to redevelop this site.”

“The first phase of the public engagement process consisted of 3 large public meetings as well as consultations with dozens of stakeholder clusters that offer specific insight into the development of the lands. These clusters include, but are not limited to the Arts community, Housing bodies, Social agencies, Builders, the Business community, Sustainable Food interests, Community Safety organizations, and the Inter-faith community.”

“In addition, a Stakeholder Advisory Group, led by Councillor Kim Krushell plays an active and ongoing role in the development of the Master Plan. This group is made up of the community leagues adjacent to the development, NAIT, Kingsway Business Association, the Aviation Museum, and Kingsway Garden Mall.”

“The results of the first round of consultations have provided significant input into the design. The majority of participants are excited and enthusiastic about the plan, acknowledging the transformative nature of the project. Some people question whether the concept of a transit oriented development and mixed density housing will work in a city where the emphasis traditionally seems to be on developing the outer fringe suburbs.”

“A second round of public consultations will occur in February where the plans reflecting the

results of the first round of consultations will be presented” Katie advises.

So, friends of Edmonton, it’s time to roll up your sleeves. The [website](#) the City has set up for this project is a font of information with links to all manner of background bites for you to digest. This should be required reading for anyone of voting age.

There is little doubt that Perkins+Will and their varied partners are good at what they do. But, as smart as they are, the real dreaming is actually your job! As citizens and stakeholders impacted by this development, we need to ask ourselves what kind of world we want to live in. We need to think long and hard about that! Then we need to get involved!

The louder and clearer our pulse, the better able the City and its team will be able to hear it.

If we can provide these folks with meaningful input, founded on having done our homework and within the parameters as set out in the process, then they can do their job by facilitating and amplifying our many and varied voices.

The way we green and grow are nice catch phrases. Perhaps the prime focus of an urban life should be making a connection with our neighbours. Cities the world over are revisiting this notion.

The consultation process for the City Center Redevelopment is going to continue for a few more months. Get on it !!!

Roxanne Christensen of Philadelphia, co-author of the SPIN farming publications, reports that her and Wally Satzewich of Saskatoon have recently launched SPIN-farming 2.0. For more info, check out their new book [page](#).

## OPTIONS IN BLOOM Greenhouse (1996 – 2011)

By Susan Bonin

In the fall of 1996, Val Mayes, Program and Marketing Coordinator for the ACT Aquatic and Recreation Center in Rundle Park, began the process of developing a joint project with the Good Samaritan Society (GSS) to restore the ACT greenhouse space. This project would become a volunteer job placement site for GSS Options for Employment clients with high behaviour needs that required a safe and friendly environment where they would be welcomed and accepted.

The clients were offered meaningful placements in a recreational environment that facilitated their integration into the community. The space was perfectly suited for wheelchair access that persons with high support needs required. Initially, the greenhouse pilot project was negotiated for a one-year partnership that received a "unanimous endorsement to continue growing." (Journey, the GSS Feb – Aug '97 pp 7)

Individuals and local businesses were approached for donations. The team received \$200 in initial funding and a monthly donation to offset costs for day-to-day operations from the Alberta Association of Dependently Handicapped. Generous donations (gifts in kind) were received from Holes, Wal-Mart (Londonderry), the Muttart Conservatory and many individuals.

By the end of January 2007, the greenhouse began to function. Golden Acres Greenhouses provided a workshop on growing houseplants to the volunteers and offered to discount all plants and materials purchased from them. The Associated Canadian Travelers Club (ACT) paid for a

phone line installation in order to ensure effective communication between the community resources and staff. A YukYuks fundraising event paid for a CD/cassette player that was purchased for clients to play music. Classical music was often left on during off hours to benefit the plants.

In August of 2007, the team sponsored a contest to name the greenhouse project. The winning entry was, "Options in Bloom." A sign was painted on the large window at the entrance to the room to identify the space.



Decorated Sidelite at Entrance (by derek reid)

Volunteers watered, re-potted, propagated, started seeds, decorated pots, completed special projects, and sold plants at dances. The plant cart was popular for clients at the dances.

Volunteer employment opportunities steadily expanded as the years went by. Eventually, the greenhouse team included staff and volunteers from other PDD agencies throughout the city. Seedlings were grown and plants were donated from the Muttart Conservatory and a partnership

was established with several businesses. Donations were received weekly. Plants thrived.

Plants were sold to raise funds for operating costs, or donated to the residences of lower income people with disabilities and organizations that provided them services.

Within a couple of years it was determined that the greenhouse needed a focus. It was decided that houseplants would be more successful. Bedding plants were too difficult, due to the aphids and other pests. Quarantined plants seldom survived. Eventually, we stopped starting plants from seeds as well. Far too many died from well intentioned, over loving, over watering volunteers.

For every sale, care instructions were provided with each plant. The Muttart permitted copying and distribution of their plant care info. A resource book was available on site for customers concerned whether a plant was poisonous.

The greenhouse was often an oasis of Christmas cacti, crown of thorns, streptacarpella, African violets, and others. They provided a colourful and peaceful setting for all to enjoy.

Decorating unique pots was a great project for individuals that needed to keep occupied on cold or dreary days. Colourful tissue was glued onto pots, outlined, shellacked, and used for plants. Sponged painted wrapping paper was done hand over hand. It was a great way to involve people waiting for the next activity or DATS.

Several watering methods were developed. A hose with a large wand was used hand-over-hand to spray the entire greenhouse. Other smaller spray cans were used outside of the greenhouse. A bin

*Options in Bloom continued...*

was filled with water to push around the facility.

Watering was the one task that everyone wanted to do, but some volunteers needed help to understand the plants' needs. So the colors, blue, green, yellow, and red became a tool to identify the plants watering needs. Coloured sticks and signs identified its common name - water - light, and propagation requirements.

Tree seedlings were cared for and planted in assigned areas to naturalize the park as part of a partnership with the City of Edmonton Community Services, ACT staff, and the Options greenhouse team.

The Muttart donated plants that were re-potted and wrapped for ACT's volunteer recognition and other functions. Tables of plants were made available to the public during Christmas craft sales. The day program was Monday to Friday, but staff often volunteered beyond that.

Options in Bloom was an interactive site for school children on fieldtrips to learn not just about gardening, but about how people with physical and mental challenges can and do continue to enrich society with their contributions. Playgroups toured the facility, learning about composting, stages of plant growth, and how growing things can change and enrich their environment.

During one Family Day, ACT introduced Gilligan and Ginger's family (alligator mascots with *Gilligan's Island* characters). A number of children planted their very own bean in a pot while a storyteller spun the tale of "Gilligan and the Beanstalk."

Collection bins for empty cans and bottles left over from ACT functions

promoted aphids. Volunteers were needed to clean the bins and bottles, and recycle them.

In November of 1997 Val received a Certificate of Recognition from the city for her contribution to the Options in Bloom project. Two Community Support Workers also received honourable mention. In 1998 the GSS recognized the efforts of the greenhouse team by rewarding them the Pillar Award for Excellence in Service in Teamwork. In 2003 Lois received the Katie Bladon Memorial Volunteer of the Year Award from the ACT for her work on the windows and her dedication to the greenhouse. The greenhouse team received the same award in 2005.

Sadly, in June of 1997, the Options program closed due to budget cuts and duplication of services. Most staff were transferred into GSS group homes. Clients with other agencies had to find other day programs. GSS clients were provided day program activities by home support staff rather than from the former community support staff. The greenhouse did not continue as a volunteer placement site by the GSS staff and clients and was abandoned. For several months after, volunteers from Chrysalis continued to care for the plants in the facility, as they were familiar with its needs. I returned to work in the greenhouse as a volunteer.

When effective stewardship of the greenhouse space and resources became a concern the City advertised for a new agency to take over. In the spring of 2011 we were informed that the Edmonton Aquaponics Society (EAS) would be moving into the greenhouse space. During August, the entire plant population was adopted out for a donation, repotted for ACT's facility, or recycled. ACT's staff was extremely helpful by taking the donations for the plants displayed on the cart at the front desk and

adopting numerous plants. Mike McCann, the ACT custodian, assisted with cleaning, clearing, and hanging plants in the various other rooms in the facility. Volunteers continued to assist with their weekly watering, pest control, and propagation. Art supplies were donated to craft classes.

In September, I handed over the funds acquired through the donations from the plant adoptions. Over \$450 was to be distributed to ACT's Sensory Room, Craft Classes, Rock'n Rundle, plant maintenance, and the EAS.

The Options in Bloom project had proven to be an effective stewardship of the time, talents, and resources of the core team. Its dramatic growth was a result of the co-operative efforts forged between the Options project and the business community. The staff and volunteers managed the entire greenhouse operation from seeding to funding. The core team was responsive to the needs of the consumers and the overall day-to-day operations. Each dedicated individual was committed to the continuing success of this worthwhile project that truly made a difference within the community for so many.

Over the years we had a number of tourists that saw our plants through the windows walk-in to visit our greenhouse. If someone wanted a plant, and only had a handful of change (or less), they were never turned away empty-handed.

The greenhouse thrived for fifteen years and change happened. I'm so very glad to have been a part of it all. It was a success story; such as it was.

*Susan Bonin continues to care for her beloved plants on a volunteer basis at the ACT!*

## THE DACHA: Fruitful Thinking

By Derek Reid

At a recent gathering of foodies to brainstorm on visions for the City Center Redevelopment project Dr. Nick Savidov, research scientist with Alberta Agriculture, suggested that the city incorporate apple trees within the garden landscape to provide a communal food source.

Areni Kelleppan of Sustainable Food Edmonton cautioned against the use of apples. Her experience, while living in the Okanagan, was of folks having to cut down their trees due to struggles with pests like the codling moth.

In response, Nick offered an example of how to possibly mitigate this concern. He mentioned that he had spent much of his youth in the former Soviet Union in a place called a Dacha, or a community garden in our lexicon. The orchard was part of this diverse garden. The fact that you were managing the place in a holistic manner, as opposed to the monoculture of commercial fruit production, was the key to the health of the Dachas.

This sounded like the writings of authors such as Joel Salatin, Darrell Frey, John Jeavons, and others who talk about integrated food production. How could the history of the Dacha inform us about growing food within an unforgiving northern climate? And what about the apple issue?

I contacted Nick a few days later and asked him to elaborate on his experience. “‘*Dacha* is a word for a relatively small plot of arable land located in a rural area used by the population for a local food supply”, he said. “Not too many people in the West are aware that Russians had a very well established community gardens system called ‘gardeners’ partnership’, perhaps the best in the world. Their

experience can be very informative for local food supply development.”

Nick continued, “The reason for setting up the community gardens on so massive a scale was a state failure to provide a food supply for the population of the former Soviet Union through state-organized farms. The numbers were staggering. For example, 50% of all potatoes produced in the USSR were grown in community gardens

“A new dacha farm usually started from planting fruit trees and then dedicating the rest of the area to vegetable production. The orchards created a microclimate and were the necessary “backbone” for the community gardens”, Nick said.

In Stephen Lovell’s 2003 treatise, *Summerfolk: a History of the Dacha, 1710-2000*, he begins in the time of Peter the Great when the Dacha was a gift from the Tsar



Dachas Outside Kirov, Russia (from Wiki Commons)

that occupied a fraction of the total agricultural production area. The USSR had a population of 282 million people, with 66% of them living in cities by the end of the eighties in the last century. It is estimated that up to 50% of families living in urban area had dachas. This means 100 million people in the country were involved in community gardens! I spent all of my childhood and considerable portion of my youth growing fruits and vegetables in our dacha located near Moscow.”

to a loyal supporter. The origin of the word Dacha may be from “something given” as it can be defined in archaic Russian. He continues to trace the evolution of Dachas through the ages. Russia, like many other European countries, became heavily urbanized during the industrial revolution. Combine the choking pollution and unsanitary conditions that characterized their urban life with being cooped up during long, cold winters, and it’s no wonder

*The Dacha continued...*

folks wanted to get out of the city during the summer.

The introduction in 1958 of the *cooperative for dacha construction* in the Soviet Union was originally intended to allow a small shack on the Dacha so you could store tools and have a place to duck out of a storm. The increasing appearance of permanent buildings that went beyond these basics resulted in an “uneasy association” with private property and was contrary to soviet philosophy. Official dacha policy and the degree of tolerance of this association, was tied to whoever was Premier. Lovell reports, “The most acceptable way of reconciling the aspiration to acquire a plot of land with the ideological animus against individual property was to promote the garden plot movement”. The result was the ‘staggering’ numbers Nick related above.

The popular dacha fruits included “apple, blackcurrant, redcurrant, gooseberry, raspberry and strawberry (sometimes also sour cherry, downy cherry, plum, pear, sea-buckthorn, Actinidia kolomikta, black chokeberry, serviceberry, sweetberry honeysuckle, grape, and blackberry, but many of them are either rare or not hardy enough and require winter protection). Popular vegetables and herbs are potato, cucumber, zucchini, pumpkin, tomato, carrot, beetroot, cabbage, cauliflower, radish, turnip, onion, garlic, dill, parsley, rhubarb and sorrel” according to a Wikipedia post (and *Summerfolk*). Now THAT would be a garden! It would be a wonderful addition to any neighborhood.

This concept of diversity came up again when I asked Angela Reid, a Kelowna resident for over 20 years, about the health of the Okanagan apple industry. “It could be suggested that part of the problem is that massive plantings of apple orchards in the Okanagan, rather than a more diversified ‘food forest’, or permaculture type of planting, make it really easy for a pest to take advantage and become a menace”, she said. Angela spent much of her youth and early adult life living on an orchard. As CEO of Kelowna’s [GreenStep Sustainability Coaching](#) that helps businesses develop profitable sustainability strategies, Angela remains passionate about sustainable agriculture.

“People in the Okanagan aren’t ripping out orchards because of the codling moth, it’s because subsidized apples are being imported from New Zealand and Washington and farmers are losing their shirts. The price a farmer can get for one pound of apples hasn’t really changed in 30 years! Of course, the labor, chemical, and fuel costs have all increased significantly, so it’s now cheaper for farmers to let the fruit rot on the trees, or cut them down all together”, Angela adds.

The issues affecting Okanagan orchards’ is the topic of Marc Arellano’s documentary, *Strange Fruit: A Changing Landscape in the Central Okanagan*. “It’s a feature length, 88 minute look at the transition that local, family-run, orchards are experiencing in and around Kelowna due to Globalization and pressures from land, labor and water management”, his website says.

“Marc, a Professor of Communications at Okanagan College, is an award-winning poet and filmmaker, and is based in Kelowna, BC. Marc views film and video as opportunities for raising social issues and creating community.”

“Food sovereignty is a top issue with people these days because we can finally see that the science and economics that have supported the *green revolution* can only go so far,” he says in an Okanagan College media release. “If you ask some European countries to give up their food sovereignty, they’ll just laugh at you and it’s because they experienced real starvation just after WWII. They know the value of local food production.”

Nick’s suggestion of incorporating fruit into our landscape speaks to a simple question, “how SHALL we feed ourselves”? Surely, regional commercial enterprises, like some of the vendors at the farmer’s market will be part of the solution. Diverse Dacha-like gardens in our neighbourhoods may also be of great significance. *Dreaming the Biosphere* by Rebecca Reider suggests that each society takes credit for reinventing the wheel. Food systems that mimic natural biodiversity aren’t “modern”, but have been around for a long, long time. ‘There is nothing new under the sun’ Ecclesiastes tells us. Perhaps the answer to our question is right in front of us, or, behind us.

*For a lively re-thinking of agriculture, check out CBC’s Ideas episode [Feeding Ten Billion](#) by Raj Patel.*

*Marc Arellano has a documentary in the works called [Spinning Green](#) which looks at Curtis Stone’s SPIN farming experience; all done by bicycle!*

Stuff in the Oven: Commercial Scale Aquaponics in Prince George, B.C. ☼ Mega Aquaponics in the Desert  
 ☼ ECA’s Hobby System Update ☼ Hand Painted Windows at the ACT Greenhouse ☼ City Center Update  
 ☼ Brooks and Beyond ☼ ECA Fundraising Update ☼ High School Aquaponics ☼ Powerless in the Kootenays

## ALTERNATIVE FISH FEED For Aquaculture

By Sharon Durham



*Fish nutritionist Marty Riche feeds juvenile Florida pompano during studies to determine appropriate feeds and feeding-management practices for profitable inland production of saltwater fish.*

Imagine you are invited to a buffet lunch and the only thing on the menu is a food you don't enjoy. How much do you think you will eat? While it may qualify as a wonderful, nutritious food, you won't necessarily partake.

Now, imagine you are a fish in a tank full of feed you won't touch.

Reducing reliance on captured marine fish proteins and oils for fish feeds is an important goal in aquaculture. But fish are picky about their feed, and fish nutritionists need to find nutritious feeds, low in fishmeals and oils, that fish will eat.

### A Growing Demand

Feed provides the nutrients required for building and sustaining life. If fish don't eat well, they won't grow and thrive. Commercial fish farms rely on feeds that now include fishmeal as a major source of protein and oil. The protein- and lipid-rich feed pellets used for farmed fish have traditionally been made in part from small, bony fish species, like menhaden, herring, and capelin.

Pet food and diets for swine and poultry have also traditionally used fishmeal and oil. And as more people around the globe turn to fish as a source of lean protein, they drive the growth of aquaculture worldwide; aquaculture now supplies half of the seafood produced for human consumption.

Thus, the demand for proteins and lipids for fish diets has increased while the supply of marine fishmeal has not increased, causing more pressure and price increases on the limited supply of fishmeal. Replacements for fishmeal and fish oil are needed to support sustainable aquaculture.

[Agricultural Research Service](#) (ARS) aquaculture scientists are working to develop fish feeds that don't include fishmeal. Since November 2007, the U.S. Department of Agriculture (USDA) and the National Oceanic and Atmospheric Administration have been engaged in the Alternative Feeds Initiative to accelerate development of other feeds for aquaculture. The initiative's purpose is "to identify alternative dietary ingredients that will reduce the amount of fishmeal and fish oil contained in aquaculture feeds while maintaining the important

human health benefits of farmed seafood."

Developing alternative ingredients that are produced in sufficient quantities to become standard components of diets is a key research priority, requiring understanding of an ingredient's nutritional value, its ability to blend with other ingredients, its effect on pellet stability, and, of course, its appeal to fish.



*Fish nutritionist Rick Barrows examines flax oil that will be infused into pellets for rainbow trout feed.*

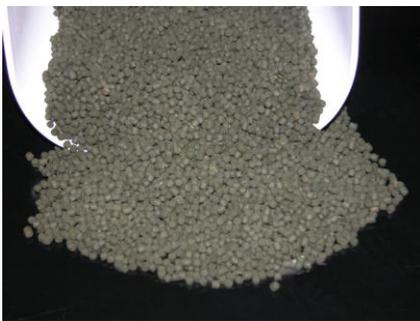
### Different Fish, Different Food

Different species of fish not only have different nutritional requirements, but they also seem to have different palate requirements. In Hagerman, Idaho, ARS fish physiologist Rick Barrows is tasked with formulating and manufacturing feeds for several fish species, including trout, salmon, white seabass, and yellowtail. Barrows and his ARS collaborators have developed many different formulations for these fish depending on their stage of development, from fry (baby fish) to adults. Barrows produces the feed himself using a piece of food-manufacturing equipment called a "cooking extruder."

"My colleagues and I are open to looking at a variety of ingredients for fishmeal replacement, including plants, animal processing products,

*Alternative Fish Feed continued...*

and even single-cell organisms like yeast and bacteria,” says Barrows. “We conduct not only growth studies but also palatability studies to ensure fish will eat the nutritious feed.”



*Fishmeal-free diet for California yellowtail containing 30% spirulina.*

### Feeding Salmon

William Wolters, research leader and director of the ARS National Cold Water Marine Aquaculture Center in Franklin, Maine, is collaborating with Barrows to develop diets for Atlantic salmon using concentrated plant proteins. Protein levels in most grain and oilseed sources are low and need to be concentrated to reach the high protein requirements of fish. Current studies are evaluating six experimental diets, containing combinations of alternative proteins, and a fishmeal control diet being fed to fish in 15 tanks with automatic feeders.

“While the studies are still ongoing, it certainly seems that the modern alternative diets work better than previous alternative diets,” says Wolters. “When top-performing low-fishmeal feeds in these studies are identified, they will be further evaluated in two separate studies.”

Salmon spend 1½ years in the hatchery and then 1½ to 2½ years growing to adult size. According to the Maine Aquaculture Association (MAA), there are about 1,300 acres of marine waters leased in the state

for aquaculture purposes—600 acres for finfish. Salmon is a large commodity in Maine aquaculture—annually producing between 25 and 35 million pounds.

“The issue of substitutes for fishmeal and oil as feed ingredients is a very important one that cuts across many finfish species,” says MAA executive director Sebastian Belle. “The work that Dr. Wolters is doing on salmon feeds, in cooperation with Dr. Barrows, is groundbreaking and, if successful, will be very helpful to domestic growers in meeting the challenge of limited fishmeal and oil supplies. Worldwide, these supplies are limited, and as aquaculture increases we must find alternative feed ingredients that satisfy the fishes’ nutritional needs while resulting in a product with the appropriate nutritional qualities for humans.”

Providing Nutrients for a Hungry Species

In Florida, there is interest in rearing saltwater Florida pompano in low-salinity water in order to diversify production to inland fish farms, bringing pompano fish stocks closer to consumers. Pompano, an active, fast-growing fish, is one of Florida’s highest valued fish. ARS fish biologist Marty Riche, at the Harry K. Dupree Stuttgart National Aquaculture Research Center’s facility in Fort Pierce, Florida, is developing the alternative feeds for this species.

Riche uses various ingredients, like corn gluten meal, soy proteins, and poultry-processing co-products, to develop feeds containing less fishmeal.

“Pompano are voracious eaters—especially larvae and juveniles,” says Riche, “so much so that they will eat beyond being satisfied. This

eating behaviour is reflected in larval and juvenile growth.”

Barrows, Riche, and other ARS researchers are developing a nutrient-availability database of different ingredients that have potential to replace fishmeal. “Nutrient availability” describes how much of the ingredient is available to the animal for sustenance. “There are currently 17 ingredients in the database for pompano,” says Riche.

While fishmeal can largely be replaced without harming fish health, fish oils are not so easily replaced. “Plant oils are now being identified that could possibly replace or substantially reduce the use of fish oils in feed products,” says Riche.

### Serving Up Algae

Algae may have the potential to replace fishmeal completely in some fish feed and perhaps replace some of the fish oils. Under a cooperative research agreement with Kent Bioenergy of San Diego, California, Barrows is investigating the use—in fish feed—of protein co-products that result from biodiesel production from algae.

Bioenergy production from algae is a growing industry: A few years ago there were 12 companies producing ethanol this way; last year there were 100, and 350 are projected to be in existence by the end of 2010.

Barrows and corporate collaborator Carbon Capture Corporation in Imperial Valley, California, are using algae to create fishmeal-free diets for California yellowtail and white seabass. “We are finding that algal feeds could be competitively priced, contain fewer contaminants, result in fewer nutrients in fish effluent, and be sustainable,” says Barrows.

*Alternative Fish Feed continued...*

Sometimes palatability is a hurdle when feeding a new type of feed to fish. "But," says Barrows, "it appears that dried algae as fish feed actually increases fish appetite. When we formulate a new feed, we test trout first in our palatability studies, since they are aggressive eaters. If trout eat the feed, we then test it on other species." This work is pivotal to the feed manufacturing business. According to Barrows, "ARS is exploring ingredients and combinations and developing gateway formulas to prove the concept of fishmeal-free feeds.

This eliminates the risk commercial feed developers would usually carry. Now feed companies can use ARS fishmeal-free feed as a basis for their own fish-feed formulas."

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## THE MOPANE WORM: Refining Local Food

By Rheka Sharma

Anyone who watches the Travel Channel, like the program Bizarre Foods, must have seen food that seems different to us, but is normal for the locals. One example of this was introduced to me when I was teaching in Botswana, a small country in southern part of Africa.

Motswana (people of Botswana) had a favourite food: mopane worms, known as "mopana" to the locals for generations

The mopane worm (*Gonimbrasia belina*) is probably the most important insect in southern Africa. Here it is well known as either Mashonzha, Masonja or Amasonja. It forms the basis of a multi-million rand (local currency) trade in edible insects, providing a livelihood for many harvesters, traders and their families.

However, the industry is not without problems. Droughts devastate the harvest on a regular basis and there are areas where over

exploitation has led to local extinctions.

In recent years, in the name of modernization, more and more people had been moving away from mopana to fast foods like burgers, French fries, pizza etc. This has not only put a strain on the industry's financial purse but has also led to health complications like diabetes, blood pressure, stomach ulcers, obesity etc.



Mopane Worm (provided by Rheka Sharma).

To reverse this trend, various actions were taken. Most important was re-educating the local people

of the advantages of this indigenous protein rich food source.

In our school, we introduced the life cycle of mopane worms as a curriculum item. Workshops and training camps were introduced in the community. The harvesters were also made aware of the benefits. Other steps were taken to improve the sustainable harvest of mopane worms by making interventions at the right stage of their life cycle.

In many regions positive changes were seen. An important sustainable source of protein was reintroduced, harvesters were rewarded and it became a source of income for many. A win-win for all!

Rheka Sharma is an Educator and an EAS board member.

That's it for this issue folks; hope you liked it. Please let us know what you think. We are always looking for good story ideas, articles, and letters. Please drop us a line if you have something to say or submit. We can be reached at [info@edmontonaquaponics.org](mailto:info@edmontonaquaponics.org) or leave us a comment on our [Facebook](#) page. Till later then...derek