

Environment and Natural Resources Trust Fund  
2014 Request for Proposals (RFP)

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**Project Title:**

Victus Farms: Expanding in New Directions

**Category:** F. Methods to Protect, Restore, and Enhance Land, Water, and Habitat

**Total Project Budget:** \$ 356,000

**Proposed Project Time Period for the Funding Requested:** 2 Years, July 2014 - June 2016

**Other Non-State Funds:** \$ 200,000

**Summary:**

Victus Farms demonstrates an innovative approach to sustainable food and fuel production. We propose to improve our existing system and expand into waste water purification and salt-water system design

**Name:** Lana Fralich

**Sponsoring Organization:** Silver Bay, MN

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Silver Bay MN 55614

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**Email:** lfralich@silverbay.com

**Web Address:** www.silverbay.com

**Location**

**Region:** Northeast

**County Name:** Lake

**City / Township:** Silver Bay, MN

**MP:** 0613-2-069-proposa

**Budget:** 0613-2-069-bud

**Qual:** 0613-2-069-qualifi

**Map:** 0613-2-069-map-F

**Resolution:** 0613-2-06

**List:**

_____ Funding Priorities	_____ Multiple Benefits	_____ Outcomes	_____ Knowledge
Base			
_____ Extent of Impact	_____ Innovation	_____ Scientific/Tech Basis	_____ Urgency
_____ Capacity Readiness	_____ Leverage	_____ Employment	_____ TOTAL

**PROJECT TITLE: Victus Farms: Expanding in New Directions**

**I. PROJECT STATEMENT**

Victus Farm’s, located in the Silver Bay Eco-Industrial park, is a new partnership between the City of Silver Bay and UMD aimed at proving the economic viability of producing organic food and fuel using a method that integrates fish, plants and algae in a closed loop system. Our goals are to create a new sustainable industry with living wage jobs, to diversify the employment sector, and to expand the tax base. The facility also provides ongoing educational and systems research, student & future workforce training, and environmental benefits. The 8600+sq. ft facility is fully renewable, using biomass for heat, sunlight, recycled rainwater, and a future wind turbine for electricity. The concept has been evolving daily, and has already exceeded expectations. New innovative approaches have evolved that will not only lower costs and increase revenues, but create new ways to help eliminate the environmental problems associated with conventional agriculture, treat numerous sources of wastewater, and improve agricultural land use planning. The new concepts will also create a new revenue stream for Minnesota’s fish hatcheries and other businesses that have wastewater issues. This proposal is a request to expand research and demonstration into (1) Wastewater purification, (2) Conceptual salt-water system design, and (3) Continued improvements and expansion of our existing fresh-water system. All three project activities can be completed within Silver Bay’s existing \$1.5 million facility while providing continued research and education within the university system. The City is now developing the existing freshwater system into a commercial scale for private investment. If we can demonstrate the concept’s economic potential, and a commitment to continued public research, the private sector will duplicate these systems across Minnesota.

**II. DESCRIPTION OF PROJECT ACTIVITIES**

**Activity 1: Wastewater Purification and Feed Production**

**Budget: \$120,000**

Meeting environmental standards of point-source wastewater discharge are a challenge for Minnesota communities. High-cost organic fish feed (\$2/lb) is the most expensive input for aquaponic systems. We have learned that our production system can use algae and duckweed to treat nutrient rich wastewater while generating fish feed. This fish feed can be combined with locally available feed-stocks (ie., brewery waste) to create high-protein animal feed. Oil can also be extracted from algae to produce bio-diesel. Our goal is to design a system to determine its capacity for nutrient removal from wastewater and cost-savings as an animal protein source. Treating wastewater in this manner generates no wastes or emissions, creates local, sustainable jobs and reduces feed costs. The proposed system scaled to our existing operation alone would treat millions of gallons of wastewater annually, and save \$18,000 in annual feed costs (approximately 50%).

<b>Outcome</b>	<b>Completion Date</b>
<i>1. Identify and secure low-cost local feed stocks</i>	<i>July 2015</i>
<i>2. Develop low-cost methods for growing algae and duckweed on nutrient rich wastewater</i>	<i>July 2015</i>
<i>3. Determine low-cost feed, quantify savings and potential for wastewater treatment</i>	<i>July 2016</i>

**Activity 2: Developing a Conceptual Plan for a Salt Water System**

**Budget: \$60,000**

We propose to design a salt-water system that incorporates all the environmental and resource conservation successes we have achieved form our existing freshwater system. In designing such a system we propose to determine the best species to include (biologically and economically), an efficient production system, the facility to contain it, the equipment to be used, the required capital and operational costs (including labor), and annual production/revenue estimates. We believe an economically viable salt water system can be developed/built in the Silver Bay Eco-Park to demonstrate to communities across Minnesota how to provide sustainable jobs, improve local food quality, variety and value while reducing transportation costs and fossil fuel use.

<b>Outcome</b>	<b>Completion Date</b>
<i>1. Identify best species combination for a salt water system</i>	<i>July 2015</i>
<i>2. Develop low-cost methods for system and building design</i>	<i>July 2015</i>

3. Develop capital cost, operational cost and production revenue estimates	July 2016
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**Activity 3: Improving and Expanding Existing Fresh-Water System**

**Budget: 176,000**

Currently, we are using a ‘raft-aquaponic’ method in our greenhouse, and large (2,000 gallon) fish tanks in the attached building. We have conceptually planned a new approach (using vertical systems) to plant and fish growth that would decrease water volumes, square footage, plumbing needs hence capital costs while increasing production capacity for fish and plants. We have also developed ways to better use the greenhouse space, improve nutrient removal and waste-water cleansing, and create additional sources of revenue just by incorporating new plant species (i.e. tomatoes, strawberries, mushrooms and sprouts). Our goal is to demonstrate/quantify the potential to increase system production, improve system economics/efficiencies, reduce water use while identifying local markets for additional products. We expect these advancements will double our annual production, increase the popularity and variety of our food offerings, support our goal of being the leader in research for private business expansion, and serve as a better model for others to follow.

Outcome	Completion Date
1. Developing more efficient infrastructure for fish and plant growth	July 2015
2. Developing an effective method for growing each of the varieties above	July 2015
3. Developing a local market for the sale of each of the varieties above	July 2015
4. Developing and achieving annual increased production/revenue targets	July 2016

**III. PROJECT STRATEGY**

**A. Project Team/Partners**

Lana Fralich, City Administrator, Silver Bay, MN will oversee project and reporting. Dr. Mageau, UMD Assistant Professor, and Baylor Radtke, UMD Researcher, will coordinate work with new species introductions, changes to growth methodologies, local feed selection and algae and duckweed growth. Research assistants and students from UMD will help with all proposed activities as directed. Bruce Carman, Silver Bay Eco-Park Project Coordinator, will coordinate salt water design and reporting, and assist with project direction and waste water treatment. Dan Popehn will assist with salt water system design. All contracted partners are proposed to receive money from this Environment and Natural Resources Trust Fund request.

**B. Timeline Requirements**

Each Project activity will occur simultaneously. We need two years to complete project outcomes.

**C. Long-Term Strategy and Future Funding Needs**

The City of Silver Bay has taken a non-conventional approach to economic development by being the developer. Typical municipalities wait for a business to come into their community, Silver Bay is creating the businesses that can co-locate within our 110 acre Eco-Industrial Park. In today’s tough economy, businesses are not willing to invest in the time and cost of research just to prove a concept. If the public takes the role as the researcher, the private sector is more likely to invest in actual business thus forming a positive public-private partnership. However, by taking on the role as the developer it is important for our City to align itself with researchers, educators, and financial partners to help prove the concepts identified in order to entice the private investor. The long-term strategy is to build out the park, expand Victus Farms throughout the state, and secure the University educational system as the leader in innovative research. Each of the project activities identified in this proposal is an extension of the initial proven concept of a closed loop system using renewable energy sources and creating food and fuel for local consumption. Future funding needs will be important to continue researching new ways to improve efficiencies, develop new concepts, and enhance student and workforce development especially during these start up years. We expect that as the private sector expands these proven concepts, they will invest in research and development funds to the University in exchange for the knowledge obtained. This provides the private sector current University research findings at an annual fixed cost.

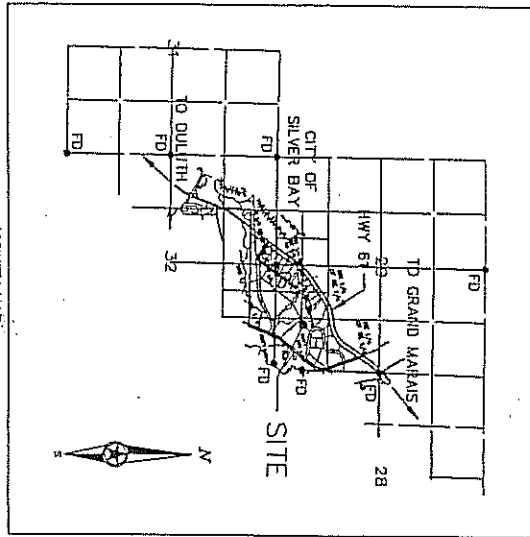
## 2014 Detailed Project Budget

Project Title: Victus Farms: Expanding in New Directions

### IV. Total ENRTF Request Budget: 2 years

<u>BUDGET ITEM</u>	<u>AMOUNT</u>
<b>Contracts:</b>	
<b>UNIVERSITY OF MN, DULUTH</b>	<b>\$ 296,000.00</b>
<b><u>Labor</u></b>	
Dr. Michael Mageau (UMD) (20% FTE plus 44% Fringe)	\$ 36,000.00
Baylor Radtke (UMD) (50% FTE plus 14% fringe)	\$ 58,000.00
2 UMD Research Assistants (50% FTE plus 14% fringe)	\$ 90,000.00
UMD Students (2000 hrs @ \$10/hr)	\$ 40,000.00
<i>total labor</i>	<b>\$ 224,000.00</b>
<b><u>Equipment/Tools/Supplies</u></b>	
PVC plumbing, supports and pumps	\$ 6,000.00
Seeds, spores, algae cultures and seedlings	\$ 2,000.00
columns, troughs, drying racks and vertical walls	\$ 8,000.00
Heating Pellates	\$ 8,000.00
Nutrient and fish feed	\$ 26,000.00
LED Lights	\$ 8,000.00
computer/software	\$ 2,000.00
<i>Total Equip/tools/supplies</i>	<b>\$ 60,000.00</b>
<b><u>Travel</u></b>	
UMD (Duluth) to Silver Bay	\$ 12,000.00
<b>CEDARTREE ENTERPRISES, INC.</b>	<b>\$ 60,000.00</b>
Bruce Carmen (35% FTE)	\$ 36,400.00
Dan Popehn (20% FTE)	\$ 20,800.00
Travel	\$ 2,800.00
<b>Total Env and Natural Resources Trust Fund Request</b>	<b>\$ 356,000.00</b>
<b>OTHER FUNDS</b>	
<b>Other Non-State \$</b> (Victus Farms Production Revenues)	\$ 200,000.00
<b>In-Kind Services</b> (volunteers - 1000 hrs@\$20/hr)	\$ 20,000.00
<b>Funding History</b>	\$ 1,660,000.00
(MN DEED = 600K; IRRRB = 350K; UMD = 40K; MN State Legislature = 300K U of MN IREE = 100K; St. Louis County = 50K; Silver Bay = 100K; MPCA = 40K Lloyd K. Johnson Foundation = 50K; MN LSCP = 30K)	

# PLAT OF SILVER BAY BUSINESS PARK

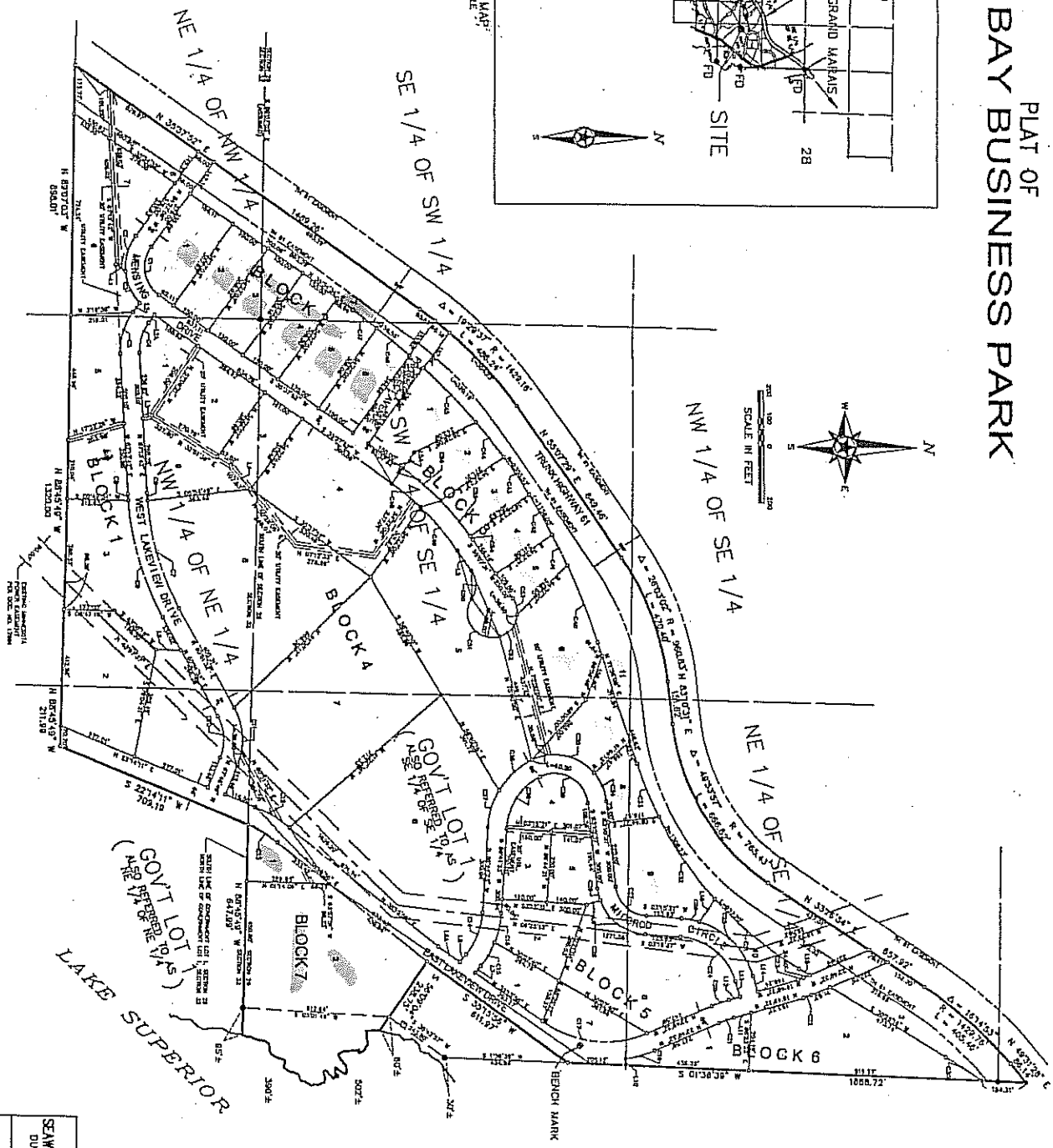


VICINITY MAP  
NO SCALE

- LEGEND**
- SET 5/8" x CAPED BENCH - BLS No. 15294
  - FOUND GOVERNMENT LAND CORNER
  - PLAT BOUNDARY
  - LOT LINE
  - ROW LINE
  - SECTION LINE

**BENCH MARK**  
20 BENCH MARK IN CAY POLE ON WEST SIDE OF GOLF CLUB ROAD AT CURVE (EAST LAKEVIEW DRIVE) ELEVATION 660.94'

**BASIS OF BEARING**  
BEARINGS ARE BASED ON INFORMATION PROVIDED BY LANDLOT THAT INDICATE A BEARING OF SOUTH 69° 07' 03" EAST AND A DISTANCE OF 100.00 FEET TO THE CENTER OF SECTION 28, TOWNSHIP 56, RANGE 7 WEST



PREPARED BY  
SEAWAY ENGINEERS  
DULUTH, MINNESOTA  
JAN. 1910  
3 OF 7

The history of Silver Bay goes back to the 1940's where taconite industry was being explored. Various researchers worked on the "proof of concept" for taconite processing, including Dr. E. W. Davis, a retiree from the University of Minnesota. It was he who convinced mining companies that it was possible to mine and process taconite at a profit. After years in the works, it was announced that Reserve Mining Company's new town on the shore would be called Silver Bay on May 1, 1954.

On October 16, 1956 the City of Silver Bay was incorporated, schools were built, homes were constructed, jobs were created, and a community was formed. In 1960, the community further expanded as the company expanded its production. Silver Bay was known as the "Taconite Capitol of the World" when Rocky Taconite came to symbolize the City and was dedicated in 1964.

The mining industry continues to support the Northeast area; however, it has had its share of volatility. It is with this volatility in mind that the City of Silver Bay today has a strong desire to diversify its employment base. The City has taken an aggressive approach to economic development by acting as its own developer and creating a new type of industry of growing locally organic foods fuel using sustainable and natural resources in an environment not typically known for agriculture. By doing so, they have partnered again with the University of Minnesota – Duluth's Center for Sustainable Community Development to create the first biofuel/food greenhouse "proof of concept" project.

The project manager, Lana Fralich, is the current City Administrator of Silver Bay. She has been the City Administrator for five years, has a B.A. degree in accounting from the College of St. Scholastica, is a certified housing finance professional from the National Development Council, a business retention and expansion consultant from the University of MN, and is a Certified Municipal Clerk through St. Cloud State University's Center for Continuing Studies League of MN Cities Municipal Clerks. She has experience in economic development, planning, and administration. Lana has been fiscally responsible for budgets ranging from \$5.9 million to \$73.2 million and has been successful in obtaining and administering over \$10 million for projects she has developed in communities she has served.

The biofuel/food greenhouse concept, known as Victus Farms, is the start of a new industry in our region. The goal of this new industry to diversify the employment base, expand the tax base, create living wage jobs, and create local organic foods and fuel in an effort to sustain our community and region. It is the same goals that Reserve Mining Company had when the community and taconite industry was developed and look at how that proof of concept expanded. It started with the University system and we again are partnering with the University system. It is history in the remake!