

# LATE COMMENT

Attention: Jeanine Townsend,  
Clerk to the Board  
State Water Resources Control Board  
1001 I Street, 24th Floor  
Sacramento, CA 95814



Good Afternoon Mrs. Townsend,

Our project proposal for climate mitigation and Salton Sea revitalization is attached to this email. It gives a brief description of what the restoration of the Salton sea could be for the community and the environment. It is our long term goal of a vibrant an healthy ecology and economy with the added benefit of development and recreation. To those ends we would like to introduce our self and our partnering companies.

We firmly believe that the IID is playing a major role in partnering with our group and others to assist with funding of viable solutions and we support their intentions for the request to have the state help fund revitalization efforts.

If the content of the attached proposal can be summarized it would attempt to bring water from the Gulf of Coast of Mexico or from California Coast in San Diego and utilize Sea Water Farms to recharge aquifers, grow food, grow fuel and create a new economy of untreated sea water in the desert between the source and eventual destination of the Salton Sea. This creates new jobs and can also mitigate exposed playa while reducing average temperatures.

The other companies we are partnering with have systems for waste water treatment and nutrient removal at a low cost which would allow the opportunity to not have to remove water from the Salton Sea but treat the nutrients that are suffocating fish populations. Algae harvesting & cultivation is also intended to remove nutrients from the water and have productive income generating opportunities.

**Our clients Information:**

Nutrient Removal: <http://www.floatingislandswest.com/customer-guide/products/105-the-leviathan->

Waste Water Treatment: <http://www.gulpclearwater.org/>

Sea Water Landscapes: <http://h2ofutures.net/projects.html>

Would greatly appreciate your feedback and support of a comprehensive environmental restoration initiative that could overt ecological / health disaster while improving local / regional economies.

Best,

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# PROPOSAL SOLICITATION PACKAGE for Salton Sea Revitalization



**Prepared For:**

**Agency Name:** Bureau of Reclamation

**Description:** WaterSMART: Development of Feasibility Studies under the Title XVI Water Reclamation and Reuse Program for Fiscal Year 2015

**Link to Additional Information:** <http://www.usbr.gov>

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**Funding Opportunity Number:** R15AS00015

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## ***1.0 Technical Proposal***

### ***1.1 Executive Summary***

This project represents a collective effort of AGESS Incorporated and its consultants to remediate the economy and environment at the Salton Sea and other waterways in California. The main focus of the project is to reduce salinity levels, extract “nutrients” by harvesting algae, and using biomimicry to purify agricultural wastewater in order to cultivate salt water aquaculture and agriculture. AGESS, Inc. is a management company that will deploy technologies available in the market to provide clean water, create productive farming operations, concentrate salt, remove nutrients and establish wetland reservoirs. Carbon sequestration is an added byproduct of algae cultivation and harvesting. Our team’s objective is to function as a project management company to secure funds and deploy different technologies that restore, revitalize and create new habitat ultimately helping resorting the Salton Sea. We will focus on seawater, grey water, black water, and green water treatment and processing to generate energy and create new jobs. We will add support and technological applications through a comprehensive revitalization strategy to aid in the reinforcement and creation of new revenue streams to the local economy while concurrently remediating the environmental degradation to the adjacent Salton Sea. If funds are granted, this project will be on schedule to finish construction and to become operational within a nine month period.

### ***1.2 Technical Study Description***

The extreme degradation of the Salton Sea can be directly attributed to the eutrophication of the aquatic ecosystem. A body of water is considered to be of eutrophic status when nutrients such nitrogen and phosphorous are elevated beyond their natural levels. As a result of the excess nutrients in the system, opportunistic species such as algae can leave a wake of problems if left uncontrolled. As algae growth takes over on the surface, an increased amount of algal biomass enters the ecosystem. As algal cells naturally die off, the aerobic bacteria involved in the decomposition process must consume an increased amount of dissolved oxygen. As oxygen is depleted below the surface of the water, a hypoxic environment is created and fish begin to die off. The Salton Sea has known “dead zones” in which anaerobic bacteria thrive on the high amount of decaying detrital biomass and produce smelly hydrogen sulfide gas as a byproduct. The nutrient in-flow to the sea has been occurring since the sea was formed more than one hundred years ago, and has never had any source of nutrient out-flow. Establishing a nutrient extraction mechanism is the key to the decontamination of the waters. For many years, the restoration of the Salton Sea has been focused on eliminating the nutrient in-flow, however this has failed to be an effective method to remove the nutrients. Our team is proposing to both effectively remove nutrients from the drainage water leading to the sea , as well as to utilize the extracted nutrients as a raw material for a second series of production through aquaculture and agriculture. With the future commercial expansion we will also remove nutrients for the Salton Sea itself to reuse the nutrients for algae harvesting and biomass processing as an income stream.

To create an outflow of nutrients, it is necessary to determine the point at which eutrophication occurs and what variables can be removed. Nutrients cycle through the food chain from producers to consumers, and are then made available to the producers again through decomposition. The inorganic nutrients nitrogen and phosphorous in an aquatic ecosystem will be consumed by the pri-



primary producers such as algae and other plants. In turn, algae and plant populations are then controlled by primary consumers such as fish, shrimp and clams. Fish, shrimp, and clam populations are then controlled by secondary consumers such as animals and humans. This is how nutrients are removed from the aquatic ecosystem and flow into the regional food chain. Animal and human waste (in the form of waste water treatment plant effluent) is then degraded by bacteria and nutrients are stored in the soil. Rainwater will carry these nutrients back to the waterway to start a new cycle. In the case of eutrophication, the nutrient in-flow exceeds the consumption capacity of regular algae. The excess nutrients promote an abrupt and unhealthy growth of algae in the system. If marine animals cannot deplete the algal cells, for any reason, bacteria will flourish on the debris of algal cells. The rapid growth of bacteria exhausts the dissolved oxygen in water and suffocates all plants and animals in the water forming the “dead zone.” The only survivors in a “dead zone” are anaerobic bacteria, which release the rotten smelling gasses.

To prevent eutrophication requires slowing down the nutrient in-flow or accelerating the nutrient out-flow. By removing the algae, or the food source of the aerobic bacteria, the aerobic bacteria will then become a variable that can be removed or controlled. By harvesting the flourishing algae, the oxygen-depleting aerobic bacteria, or even the smelly anaerobic bacteria, the progression of eutrophication can be stopped at any of these stages by creating an outflow for the excess nutrients. For example, the removal of nutrients could prevent algae growth, which stops eutrophication from starting. This removal of algal biomass could cut off the food supply for aerobic bacteria preserving dissolved oxygen for aquatic life and saving the environment. Controlling the aerobic bacteria will in turn maintain the growth of anaerobic bacteria, stopping further deterioration of the ecosystem. In practice, removing nutrients can only be achieved by harvesting the algae and limiting the bacteria growth. If the right technology is adopted, both of these goals can be completed in one procedure.

Grant funds totaling \$150,000 will be allocated in the following ways:

- \$30,000 will be allocated to mobilization, design & construction documents, lease of excavation / rental equipment, concrete water intake structures from the river and other miscellaneous purchases for project set-up. We will also purchase Geo-Tube material for artificial wetland construction. A portion of this amount will also be allocated to the research, proving each system is working to which their standards have been set.
- \$20,000 will be allocated to the purchase and installation of algae cultivation & harvesting systems, including, but not limited to, AGESS algae proliferator system, algae photo bioreactors and Water Wagon from, Eco Pond Rescue Dewatering systems. Also maintenance and operation.
- \$35,000 will be allocated to the purchase and installation of a Leviathan unit from Floating Islands West, LLC. To be installed in an artificial wetland filtering Salton Sea water.
- \$30,000 will be allocated to the construction and site preparation for constructed wetland and H2O Futures, Sea Water Farming systems.
- \$30,000 will be allocated to the Gulp Clear Water, LLC. Waste water treatment systems.
- \$50,000 is an In-Kind Contributions from the Imperial Irrigation District will include long term land lease, permitting, monitoring, and environmental reports.
- \$25,000 Additional In-Kind Contributions will be provided by AGESS, Inc and consultants for design, construction documents and project management services.



## *1.3 Evaluation of Criteria*

### **1.31 Statement of Problems and Needs**

In the last thirty years, the Salton Sea has been a well-documented problematic environment in Southern California. The fundamental problems in the sea are high amounts of nutrient and salt loadings. This has been a result of the accumulation of agricultural and river run-offs in the Salton depression since the sea was formed more than one hundred years ago. However the in-flow of nutrients and salts has never stopped, and no drainage outlets in the Salton basin have ever existed. Eutrophication used to be the only problem in the sea causing concerns of deteriorated water quality and damaged environment for the locals, but in recent decades additional complex problems have arisen in the region as a result of the sea's deterioration.

Due to climate changes induced by global warming, long lasting droughts have plagued the region. Accompanied by an exploding population growth and an increasing presence of large agriculture operations, the Salton Sea has since developed even more complex problems than just nutrient overloading. Water shortages are leading to habitat loss for the migratory birds that utilize the sea as a stopover point on the Pacific Flyway. Human health is also being affected by the drying of the seabed. As the water level decreases, the seabed sediment is exposed and dries up; creating ultra fine particulates that can be carried away in windy conditions and spread across Southern California. The effects of this desert dust is now being observed by the increased occurrence of respiratory system diseases in children of the Coachella and Imperial Valley. Any large-scale dust storms in the future will potentially raise health concerns spanning farther than just Southern California, into Arizona and Mexico. In addition, agricultural operations will be severely damaged if the water level continues to diminish. The Salton Sea currently serves as the thermal energy reservoir that controls the microclimate in the surrounding areas. This unique microclimate is what allows Imperial Valley farmers to grow crops in the winter that can't be grown anywhere else in the country.

### **1.32 Water Reclamation and Reuse Opportunities**

## **2.0 AGESS, Inc.**

**Our Mission:** To develop and implement proven ideas at the Salton Sea. **Our goal is** to help solve the problems surrounding the sea by combining various innovative technologies. By utilizing a project management background, AGESS will help coordinate the multitude of technological efforts required to prevent environmental **degradation**. By integrating these systems, we will be able to create a self sustaining revitalized sea, ultimately restoring the environment **ecology and economy**.

**Current Focuses:** Provide solutions to nutrient pollution and carbon sequestration at the Salton Sea. Strategies include habitat restoration, aquaculture, salt water agriculture and aquaculture implementation.

**Moto:** "Professional management, for a better environment."

**2. Suffocation at the Salton Sea:** In the last thirty years, Salton Sea has been a well known problematic spot in southern California. Eutrophication used to be the only problem in the sea causing con-



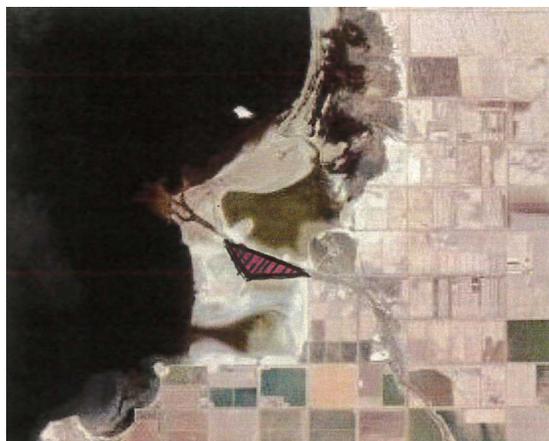
cerns of deteriorated water quality and damaged environment for the locals. However, over the years more problems have developed, such as high salt concentrations and a shrinking water supply. As the sea continues to dry up, the dust created by the exposed seabed sediment can be carried away in windy conditions and spread across southern California. The majority of the fine dust particles measure less than 10 microns in diameter and have already been targeted as the main culprit behind increased occurrences of respiratory system diseases of children in the Coachella and Imperial Valley. Any large-scale dust storms in the future are of great health concern to not only Southern California, but expanding to regions in Arizona, Nevada and Mexico.

**3. Eutrophication is the untargeted problem:** The eutrophication of the Salton Sea has led to the formation of “dead zones” in the water, which has resulted in fish die-offs, and ultimately the inescapable odor of gaseous hydrogen sulfide that is created as a byproduct of anaerobic decomposition. The nutrient in-flow to the sea has been occurring since the sea was formed more than one hundred years ago, and has never had any source of nutrient out-flow. Establishing a nutrient extraction mechanism is the key to the decontamination of the waters.

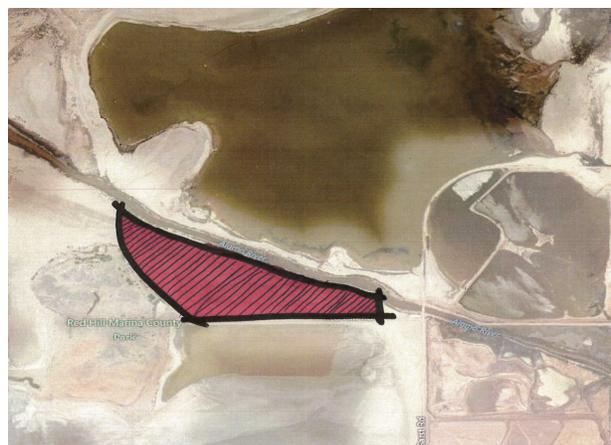
#### 4. Current Progress

For the pilot project, the total cost will consist of the material, construction and in-kind services to total cost of \$300,000. We will be securing additional contributions to cover maintenance and operation expenses. The initial labor cost will be at \$100,000 dollars for the first year to employ two full time and two part time workers.

The site location has been specified for our teams use by the Imperial Irrigation District and is adjacent to the Red Hill Bay Restoration Project as well as two operational geo-thermal power plants. This is an ideal location due to its adjacency to the Alamo River. The high nutrient content will be a valuable feed source for our algae cultivation systems.



Pilot Project Vicinity Map



Pilot Project Site Location



## 5. Harvesting microorganisms can prevent eutrophication

To prevent eutrophication requires slowing down the nutrient in-flow or accelerating the nutrient out-flow. By removing the algae, or the food source of the aerobic bacteria, the aerobic bacteria will then become a variable that can be removed or controlled. By harvesting the flourishing algae, the oxygen-depleting aerobic bacteria, or even the smelly anaerobic bacteria, the progression of eutrophication can be stopped at any of these stages by creating an outflow for the excess nutrients. For example, the removal of nutrients could prevent algae growth, which stops eutrophication from starting. This removal of algal biomass could cut off the food supply for aerobic bacteria preserving dissolved oxygen for aquatic life and saving the environment. Controlling the aerobic bacteria will in turn maintain the growth of anaerobic bacteria, stopping further deterioration of the ecosystem. In practice, removing nutrients can only be achieved by harvesting the algae and limiting the bacteria growth. If the right technology is adopted, both of these goals can be completed in one procedure.

## 6. Prevention Plan

AGESS has developed a three-step strategy to recycle nutrients to in order to prevent eutrophication.

In the first step, all natural-growing algal cells in the polluted water are harvested using dewatering mechanisms. By removing algal biomass away from the body of water, two goals can be achieved; namely reducing nutrient existing nutrient loads in the water body, and creating a better living condition for aquatic life with more light and oxygen under the surface. The algal biomass can then be digested to generate biogas and the residue could be utilized as organic fertilizer.

In the second step, AGESS will grow algae directly in the body of water and produce algal biomass in a large quantity. Naturally, it is hard, if not possible, to stop the growth of algae in any environment including most of lakes, rivers and oceans. But it might be necessary to create artificial conditions in order to produce algal biomass in large quantities. For this purpose, AGESS applies Algae Proliferators, Photo Bio Reactors (PBR) and High Density Photobioreactors (HDP). Depending on the species of algae to be cultured, the algal biomass could be used for the production of biogas and fertilizers, or other purposes such as making food additives and biofuels.

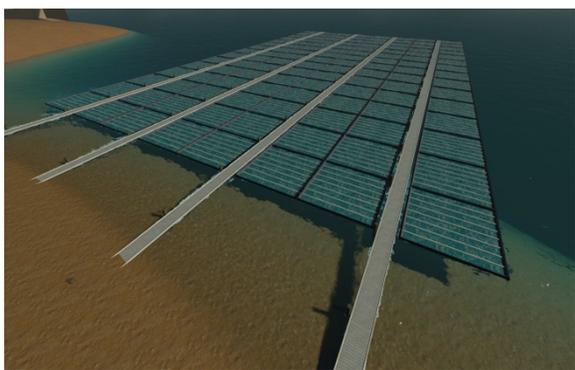


Fig 3: Algae Proliferator Dock, All Rights Reserved ©AGESS, Inc 2014



Fig 4: Algae Proliferator Barge, All Rights Reserved AGESS, Inc. 2014

In the third step we will construct wetlands for habitat creation, restoration and playa dust control mitigation. These constructed wetlands will implement H2O Futures Sea Water Farming systems, Floating Islands West Leviathan systems and a multitude of other small sensors to activate algae harvest once optimal growth rates are detected.



## 7. Carbon dioxide mitigation and harvesting microalgae

By harvesting the algae, not only are we able to extract nutrients from water, but the algae also enables the ability to sequester carbon dioxide from the air. Algae cells fix one molecule of carbon dioxide to produce one molecule of oxygen while carrying out the photosynthesis. Algae provide more than 50% oxygen on the earth. If carbon dioxide has too much concentration in earth's atmosphere, the earth's natural reaction is to promote the growth of algae through photosynthesis. Growing and harvesting algae is an effective way to protect the environment as well as reduce the concentrations of carbon dioxide, a known greenhouse gas. .

## 8. Project Finance

AGESS, Inc. will generate revenue streams from four additional operations:

- 1) Removing the nutrient pollution and the excess selenium contents from the Salton Sea has been invested into by Government agencies for new technology applications to clean up lakes and rivers, such as Salton Sea, but the problems remain. Now, AGESS, Inc. offers a realistic solution to the problems; Nutrient harvesting.
- 2) Extracting nutrients from farming runoffs and municipal wastewater has been proven difficult, whose consequence is over 80% of rivers and lakes in the US are nutrient polluted. Currently there is no reliable method to deal with this problem. For the first time in history, AGESS, Inc. will provide a solution to the difficult problem and partner with local municipal waste water treatment facilities and businesses.
- 3) Producing valuable algae-based products using resources from the Salton Sea and its surrounding areas. By design, AGESS, Inc. will produce a large quantity of algal biomass from this operation. The algal biomass can be sold as high value algal products, such as food additives, industrial raw materials as well as organic fertilizers.
- 4) Carrying out large scale carbon dioxide mitigation in the newly developed carbon credit market, carbon credits are traded at prices between 10 dollars per ton and 50 dollars per ton of carbon dioxide. AGESS, Inc. will market its ability to remove carbon dioxide from flue gases to carbon dioxide emitters such as power plants to help with carbon dioxide mitigation. For example, SoCal Gas is looking for a new way to complete carbon dioxide mitigation for its more than one hundred operational power plants.

In addition, AGESS, Inc. will also provide algae cultivation services to customers who demand a large quantity of algal biomass of special strains for specific purposes, for example, Sapphire Energy, Inc., Solazyme and Synthetic Genomics. Other non-monetary effects of this project are the creation of employment opportunities in a new industry that will promote the future economic development in the region, adding benefits to one of the most economically depressed regions in California. By having onsite education and employing local residents, as opposed to outsourced labor, this project will also empower and benefit the local community by learning new trades at a higher than average pay scale.



## 9. Self Evaluation-

Quantitatively, the best way to evaluate the project is to measure the weight of algal biomass. Every gram of algal biomass represents 0.86 grams of carbon fixed from the carbon dioxide in the air, and 0.13 grams of nitrogen and 0.008 grams of phosphorus extracted from the water in the lake, which is calculated following the Redfield ratio (C:N:P =106:16:1). Other observable parameters include water quality, the disappearance of algae blooms, the abundance of fish and birds, odor emissions, and the increased employment and new economic opportunities. Due to the reduced amount of nutrient loading in the lake, there is a decreased chance for both the algae blooms to occur and bacterial infestation. In addition, the oxygen levels in the healthy zones (refer to part 3) are restored to healthy levels. The environmental changes will result in protection of fish and birds and the removal of unsavory odors from the lake, which is a concern for the residents in the immediate vicinity as well as Los Angeles. At the same time, this algae production operation can generate hundreds of tons of algal biomass annually. The algae production will create a new industry to process the algal biomass and will provide hundreds and eventually thousands of jobs to the region.

## 5. References-

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### 3.0 Floating Islands West, LLC

LEVIATHAN™ Treatment Wetland Floating Island International offers a variety of products incorporating patented BioHaven® technology, none more powerful than the Leviathan. Leviathan uses integrates high-volume, low-head circulation with matrix surface area for maximum wetland performance. Its efficient air-driven directional diffuser draws in and aerates in excess of ten thousand gallons of water per minute, pushing it through the BioHaven matrix and plant roots. A key innovation is the floating streambed, which contributes to the aeration and nutrient uptake. In a standard Leviathan configuration, nutrients and contaminants are exposed to over 1,000,000 square feet of sticky, biofilm-laden surface area; however, Leviathan is scalable. In fact, those now being designed are large enough to circulate up to 10,000 gallons of water every minute. This makes Leviathan floating treatment wetlands the most promising biological tool for lake restoration and cleaning up the damage caused by oil spills and other man-made and natural disasters. Leviathan floating treatment wetlands can be complemented with conventional BioHaven floating islands, optimizing the opportunity to provide a landscaped habitat for fish and wildlife while cleaning polluted water. - See more at: <http://www.floatingislandinternational.com/products/leviathan-technology/#sthash.3l6VfQuL.dpuf>



Fig 1: Floating Island leviathan technology

#### Applications for Salton Sea Revitalization:

The Leviathan water treatment & nutrient removal: 11,520,000 gallons per day if based on 8,000 gallon per minute factors gives us a factor of annual treatment of 4,204,800,000 gallons. If we calculate Salton Sea 6,000,000 Acre Feet x 325,853 gallons per acre foot then we get 1,955,118,000,000 gallons. If we divide gallons in Salton Sea by annual treatment of 4,204,800,000 gallons it would take 465 years for one Leviathan system to treat the entire Sea or one year for 465 Leviathan modules to treat the sea's nutrient overloading. The high end cost of one module is 50k a piece this system and can be installed for a cost of \$23,248,644. Including power and operation expenses would double the hard cost to 47 million dollars to treat 7,500,000 acre feet of water.



## 1. Case Study:

### **Floating Treatment Wetlands to Mitigate Lake Eutrophication:** Enhanced Circulation and Nutrient Uptake Expand Fish Habitat

#### **Project Location:** Research Lake near Shepherd, MT, USA

Simple, cost-effective water treatment strategies such as low-pressure pumping and directional air diffusers show the ability to transform agricultural effluent into world-class fish habitat. This case study tracks an ongoing experiment to monitor the efficacy of a floating treatment wetland (FTW) that incorporates air diffuser technology to lift and circulate water through floating stream beds within the FTW. This combination of FTW and efficient water circulation/aeration is trade-named Leviathan™, a model of BioHaven floating island, and represents a novel approach to address nutrient loading.

- 1. A. Overview:** The need to reduce nutrient levels in wastewater is increasingly critical as rivers, lakes and coastal waters become more nutrient-loaded worldwide due to pervasive human activity around water. This creates a niche for cutting-edge, “green” technologies such as FTW. Determining whether biofilm-based microbes can set the stage for high fish productivity along with nutrient removal was a primary objective of this test.

Wetland areas have been reduced worldwide while human-caused nutrient loading has expanded with growing human populations; hyper-eutrophic waterways occur more and more frequently across the world. Developed countries are not immune to this phenomenon; severe nutrient loading associated with mass-production agriculture as practiced in many developed nations has contributed to numerous cases of hyper-eutrophication in bodies of water that were previously low in nutrient concentrations (“oligotrophic”). In fresh water, partly as a result of normal seasonal stratification, nutrient loading can deplete oxygen levels within the livable temperature zone for cold-water fish species.

Floating Island International (FII) is a private research and development-focused business. Over the last 11 years, FII has developed an embodiment of FTW technology called BioHaven floating islands, which mimic the ability of natural peat-based wetlands to purify water. The BioHaven variation called Leviathan maximizes surface area and circulation, which are key components of wetland effectiveness. The islands are also designed to provide optimal perennial plant habitat. The Montana Board of Research and Commercialization, along with FII, funded the work described in this case study.

- 1. B. System Background:** Dissolved oxygen and temperature measurements taken on a 6.5-acre lake outside of Shepherd, Montana indicated that stratified water near the surface was too warm to sustain a trout fishery. While a temperature zone below the stratified warm water was sufficiently cool for trout, that zone contained low dissolved oxygen (DO) levels. During late summer at this lake in south-central Montana, no strata of water could consistently provide the cool-water, high-DO environment demanded by fish such as rainbow, brown and, especially, Yellowstone cutthroat trout.



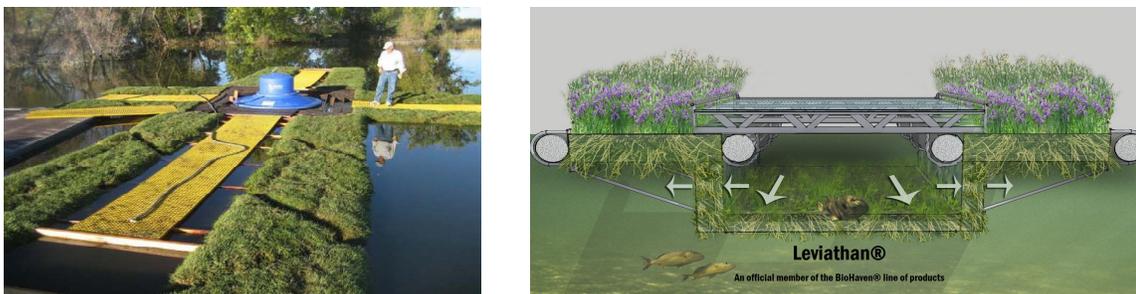


Fig 2: Leviathan Water Circulation System, August 2010  
(5000 ft<sup>2</sup> of FTW surface area = 29 acres of effective surface area)

Groundwater, which contains variable nutrient concentrations associated with agricultural activity, enters the lake at an average rate of 80 gpm. Additional surface water, which also occasionally experiences agricultural-based nutrient loading, enters the waterway in random volumes. Evaporative loss and outflow are manipulated to maintain the lake level at full pool, which ranges between 29 and 30 feet of depth.

As the lake was filled, a series of BioHaven floating islands covering 5200 square feet of lake area and providing over one million square feet of saturated surface area was installed. A number of these islands were positioned next to the inflow to maximize exposure to the highest nutrient concentrations. These islands, in combination with the Leviathan system, were designed to maximize microbial biofilm production and move nutrients into and through the food web as organisms attached to underwater surfaces (“periphyton”).

**Results:** The Leviathan system, incorporating floating streambeds and grid-powered water circulation, was installed in the lake in April 2009. This system circulates up to 2000 gallons per minute (gpm) through the stream channels within the island. The 1250-square-foot Leviathan was constructed of post-consumer polymer “matrix,” averaging 25 inches in thickness, with each cubic foot of matrix providing 375 square feet of surface area. The Leviathan pump enabled personnel to pull water from any depth and move it through the stream channels, exposing it to the concentrated surface area (containing a microbial biofilm) and atmospheric oxygen.

After 17 months of operation, water clarity had improved from a low of 14 inches of visibility to as much as 131 inches. Simultaneously, the water temperature gradient was reduced, creating a larger zone of “livable” water for fish. Two age classes of Yellowstone cutthroat trout were introduced 13 and 14 months into the test. Through the summer of 2010, a favorable temperature/dissolved oxygen strata ranging from the water surface down to a depth of at least 12 feet was maintained as habitat for the cutthroat. One-year-old and two-year-old black crappie were also introduced two months into the test, and naturally-occurring northern yellow perch were present in the lake when it was filled. All three species have flourished.

The chart above shows the shaded area that provides favorable conditions (DO and temperature) for cold-water fish, with much better results in 2010 after the Leviathan design was enhanced and additional aeration was installed. The following chart shows that a much larger zone of cool, high-DO water was available for fish in 2010.



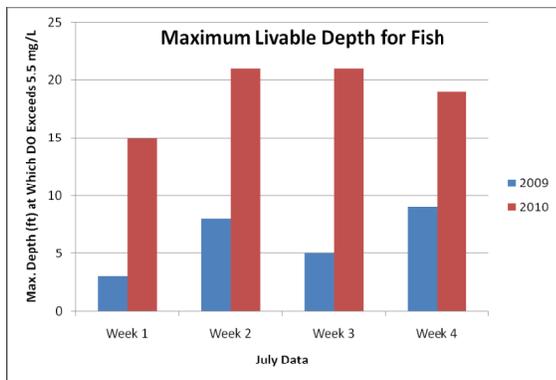


Chart 1: Maximum Livable Depth for Fish

Fish catch rates and growth rates are now being monitored at the lake. Initial data show that experienced fishermen can catch up to one perch per minute. Visual observations from diving and an underwater viewing station indicate that perch approaching or exceeding the Montana state record of 2 pounds 2 ounces now inhabit the lake.

The research lake is relatively unique in that it supports fish accustomed to cold water (Yellowstone cutthroat trout), temperate water (perch) and warm water (crappies). Montana officials have made two unsuccessful attempts at sustaining cutthroat populations in an adjacent stretch of the Yellowstone River, which is located a half - mile away from the research lake.

The new aeration scheme in the lake improves water quality by incorporating dissolved phosphorus and nitrogen into the aquatic food web, in the form of periphyton, while limiting the growth of deleterious algae. Total phosphate concentrations are reduced from about 0.6 mg/L to 0.2 mg/L, while total nitrogen concentrations decrease from about 0.5 mg/L to 0.1 mg/L.



Fig 3: Representation of high fish populations

**2. Underlying Technology:** The underlying technology of the Leviathan FTW is comprised of several elements:

- a) Floating Treatment Wetland platform;
- b) Nutrient remediating microbial biofilm integrated into the platform;
- c) Airlift low-head high-volume pump mechanism and collection tube.



**3. The Floating Treatment Wetland platform:** Comprised of modular non-woven recycled polymer fiber matrix sections that can be constructed to any size, in any shape, and engineered to achieve any positive, neutral, or negative buoyancy. The non-woven matrix and the engineering design of the FTW is the result of extensive public and privately funded research and development over the past 12 years. The feasibility of the technology has been proven, with over 3,500 islands launched worldwide. The largest island launched thus far is 40,000 ft<sup>2</sup> and was installed by order of the U.S. Army Corps of Engineers in Sheepy Lake, CA.

**4. Remediating microbial biofilm:** Surface area/circulation is key to maximizing microbial processes that clean water. The Leviathan FTW brings this concentrated wetland effect to any water body, providing at least 375 ft<sup>2</sup> of surface area per cubic foot of FTW matrix. Millions of dollars of collaborative research have been conducted by Floating Island International (FII) together with one of the world's leading biofilm research organizations, Montana State University's Center for Biofilm Engineering (CBE). The Leviathan FTW, designed using this advanced technical understanding of microbial biofilm engineering, is well positioned to incorporate an NCP-listed bioremediation microbial agent such as "Pristine Sea II". These bioremediating microbes were developed by researchers at Louisiana State University, approved in tests by EPA's RREL Laboratory and are licensed to TMD Technologies Group, LLC/Advanced BioSystems, LLC of Lafayette, LA.

**5. The Airlift Pump/Oil Recovery Tube System:** A subsurface fluid extraction apparatus comprised of a proven liquid transport technology and an appropriate conveyance conduit. Airlift pumping has been thoroughly tested in both laboratory and field applications and is currently a common alternative to traditional pumping methods, yielding greater efficiencies. Additionally, the airlift pump system could result in reduced fouling due to the lack of contact between moving mechanical parts and seawater. Alternatively, the Leviathan FTW platform could utilize traditional impeller pump systems to move oil-laden water from depth to the floating channel positioned within the FTW platform. Existing embodiments of the Leviathan FTW utilize both technologies.

**6. How it will work:** When addressing low contaminant concentration plumes, the likely objective would be on-site treatment. In this application the recovered oil/water mixture would be pumped to the surface and circulated through the vast amount of surface area provided by the FTW platform, pre-inoculated with bioremediation microbes. The floating stream channel design of the Leviathan FTW also allows for the integration of mechanical oil separators and/or absorbent materials when required. In this situation, the flow rate of the airlift pump/oil recovery tube system could be monitored and adjusted accordingly to allow for adequate detention time for the contaminated water to reach desired treatment levels.

**7. When addressing higher contaminant concentration:** plumes the likely objective would be recovery for off-site treatment and disposal. In this application the recovered oil/water mixture would be pumped from the channel on the FTW surface into containment vessels for transport to treatment. In this situation, the flow rate of the airlift pump/oil recovery tube system could be set to achieve maximum flow rate to optimize the pace of contaminated seawater extraction.

**8. Advantages:** One of the premier features of the Leviathan system is that inflow volumes never rise appreciably above the water's surface. This results in remarkable efficiency -- efficiency that has been measured and established in existing embodiments of the system. The flexible modular design



of the Leviathan enables supplementary airlift systems to be added to existing Leviathan FTWs, thus providing a multiplier effect. Other benefits of Leviathan FTWs include, but are not limited to, scalability, maneuverability, and availability. Leviathan FTWs can be transported, towed, anchored, expanded and repositioned indefinitely. And finally, the uniquely flexible Leviathan FTW design operates using already tested and proven technologies.

**9. Complementary Processing:** This system offers a unique blend of benefits that concurrently provide a means to mediate nutrients while also providing a platform from which to collect contaminated water/oil. FII and its licensed manufacturers have the proven experience to build Leviathan FTWs big enough and durable enough to function in a marine environment. In the past fifteen months, the FII group has launched five FTW systems in excess of 20,000 ft<sup>2</sup>. With sufficient contracting arrangements and strategic deployment partners in place, our nationwide network of licensees and suppliers would begin production of the required quantity of Leviathan FTWs to ship to the Delta region with the first units available for deployment within 60 days of contract.

**10: Unit Cost:** The cost of the total effort depends upon: the method of deployment, location and number of installations, duration of operation, and whether the operation objective is to collect or treat oil-laden water. However, immediate initial investment in Leviathan FTWs would provide returns long after the British Petroleum Deepwater Horizon Oil Spill disaster is mitigated. Post-catastrophe, FTWs could be left in place or strategically repositioned to operate as originally designed, destratifying hyper-eutrophic deoxygenated water and rehabilitating “Dead Zones”.

#### SECTION B: Rough Order of Magnitude (ROM)

Estimated cost of one 2,500 ft<sup>2</sup> (approximately: 40' x 60' x 4')  
10,000 gpm Leviathan FTW delivered to water's edge: \$50,000  
Cost per square foot: \$20.83

This technology is remarkably straightforward. Operations and maintenance is truly minimal relative to the volume of uptake potential. The system is not motorized; it requires positioning and maintenance of that position. The system can be designed to be self-anchored, tethered to an existing vessel, or tethered to a platform. We anticipate that a two-person team would be able to monitor and maintain the Leviathan FTW during operation.

**11. Deployment:** The Leviathan FTW is designed to be eminently flexible. The Leviathan FTW can be constructed to any size, dependent upon the deployment strategy deemed most strategic (i.e. large versions or multiple smaller versions). It can operate in the open ocean or it can operate in in-shore waters. The system design can be adjusted to pull water from depth or to operate in shallow-water conditions. The modularity of the design also reduces costs and shortens response time because it allows for rapid expansion of existing units already placed in strategic locations.

Pumping rate conversions 10,000 gpm = 14,400,000 gpd, or 44.2 Acre-ft/day, or 457,142 Barrels (US liq.)/day, or 342,857 Barrels (US petro)/day, or 54,509,760 l/day, or 54,504 m<sup>3</sup>/day



## ***4.0 Gulp Clear Water, LLC-***

**ABOUT US:** We are the FUTURE of water

**1. Our mission-** To establish a new quality and standard for water purification and conservation through the Gulp Clear Water System. By utilizing a proprietary and programmable blend of advanced purification media, along with the next generation of germicidal technology, we are able to deliver pure, inexpensive water from any source.

Gulp Clear Water LLC is the most technologically advanced water purification company in the world. Combining the most cutting edge technologies available, we are able to purify millions of gallons per day, without the use of harmful chemicals, reverse or forward osmosis, ozone treatment, outdated UV technology, or heat. This technology also renders desalination obsolete.

In the 1970's and 80's, the early technology pioneers changed the efficiency of the world forever, yet in America, drinking water standards have not improved since 1975. We are currently experiencing one of the worst drought and pollution crisis situations in national history. Our reservoirs are drying up quicker than can be calculated and the majority of the clean water that we do have, we treat by adding harmful chemicals and use energy intensive processes to "purify".

For the first time in history, we are integrating an Aqua Structure Technology Upgrade for all of humanity. We have finally cracked the code of the technology/water conservation interface and cannot wait to share it with the world. Utilizing this approach, we can inexpensively deliver the purest water on the planet to every person and every industry. Whether it is drinking water, agricultural, aqua culture, semi conductor grade, pharmaceutical grade, or industrial, we are officially setting the new standard of water purification and sustainability. In today's world of water scarcity, crisis, and insecurity, Gulp Clear Water LLC will bring stability, purity, and security to our water sources, in a way never imagined.

**2. Systems-** With the world's first fully integrated system of advanced hardware, software, and purification technologies, we are able to offer the template that will combat the global water crisis. This is the first and only computational, systematic, precision set of technologies that is completely configurable, scale-able, compatible, and up gradable.

One of the cutting edge technologies for killing microorganisms that we utilize is our advanced Ultra-Violet Wavelength C (UVC) Germicidal LED's at the precise wavelength 275 nanometers. This is the optimal germicidal wavelength, ensuring that even the worst microorganisms are precisely disassembled at the thiamine base level. This wavelength of light also breaks down chemicals into less harmful sub-components in a process known as Photochemical Oxidation. This process utilizes both FDA approved technologies and the United States CDC (BAT) Best Available Technologies for water purification.

All current technology rates poorly in efficacy and efficiency, ranging from 254-256 nanometers. UVC LED Germicidal Technology is only one component of our advanced purification process.





**Figure 1 (above) depicts the GCW 705 Water Purification Unit**

**3. Mobile Applications-** The Gulp Clear Water System has been specifically designed with the ability to be deployed as a single mobile unit or an integrated fleet for humanitarian aid or disaster relief. Constructed for easy transport, the system can be calibrated and monitored via satellite anywhere in the world to deliver pure water for proactive situations and disaster recovery. These systems can be placed on docks or on barges as well, for purification of early onset algae blooms or other pollution inflow to minimize contamination before it has a chance to spread.

**4. Removing Contaminants-** By utilizing a proprietary and programmable blend of advanced purification media, along with the next generation of germicidal technology, we are able to deliver pure water from any source of contaminated water. This process utilizes a unique blend of both FDA approved technologies and the United States CDC (BAT) Best Available Technologies for water purification.

The result? The following are examples of contaminants removed, but are not limited to:

- Fertilizers ex: Nitrates and Phosphates
- Pesticides ex: Organophosphates and Carbamates
- Pharmaceuticals ex: Antibiotics and Hormones
- Heavy Metals ex: Lead and Mercury
- Industrial Pollutants ex: Benzene, Hexavalent Chromium, Fluoride
- Microbial Cysts examples Cryptosporidium and Giardia
- Bacteria ex: E. coli and Legionella (Legionnaires)
- Viruses ex: Malaria and West Nile
- Polychlorinated Biphenyl (PCB's) ex: Dielectric and Coolant Fluids
- Radioactive Isotopes ex: Radium and Strontium
- Volatile Organic Compounds (VOC's) ex: Total Trihalomethanes (TTHM) and Chlorinated Byproducts and MORE

### **5. Contaminated Drinking Water-**

- 780 million people lack access to safe drinking water, that's approximately 1 in 9 people.



- 3.4 million people die each year as a result of unclean drinking water. That is almost the entire city of Los Angeles.
- 1 child dies every 21 seconds from a water related disease.
- "[The water and sanitation] crisis claims more lives through disease than any war claims through guns."

Source: <http://water.org/water-crisis/water-facts/water/>

**6. Recycled Water and Purification-** The Gulp Clear Water purification system has teamed up with electrocoagulation experts to produce the highest quality of pure recycled drinking water ever achieved. When the Gulp System is placed directly following a high-powered electrocoagulation unit, even wastewater can become pure drinking water. The Gulp Clear Water System revolutionizes water treatment processes, such as treating leachate (the ground water runoff from landfills) and frack water in an environmentally sustainable way, at a fraction of current cost. It can also be utilized to purify rainwater, greywater, and groundwater for re-use. In addition, the Gulp System is made of 100% recyclable materials.

**7. Electrocoagulation-** The process of passing an electrical current through metal plates into water to destabilize and aggregate suspended, emulsified or dissolved contaminants in the water, thereby enabling them to be subsequently removed by sedimentation and/or filtration. It's an extremely effective alternative to chemical coagulation that's been around more than 100 years, but has only recently been perfected for high-volume applications. This Pre-treatment process sends water to the Gulp System with low solids, ready to be fully purified.

**8. Municipal Purification-** By placing The Gulp Clear Water System alone within existing municipal water treatment facilities, we will provide a non-chemical, low cost alternative to produce the purest water to every household and business. Whether it is used for drinking, bathing, or watering the garden, the purest water will be used.

**9. Environmental Purification-** Due to severe environmental conditions, several of the world's largest lakes are currently dwindling and more toxic than ever. By implementing the Gulp Clear Water System, even the most contaminated lakes can be restored to their natural, life giving state.

**10. Water Quality Monitoring-** "World Water Web"

As the number of Gulp Clear Water Systems increase, it is our goal to instate the Global Water Quality Monitoring Mission.

Utilizing a patented laser photo diode water quality monitoring system, dedicated satellite, and remote monitoring software, we offer 24 hour live monitoring and support for each and every system. If it's 1 gallon, 100, 1,000, or several hundred million gallons per day, we provide laser precision, part per billion accuracy, with results accessible from your mobile device, every second of the day.

This system is the first of its kind and will undoubtedly be the template for the future of protecting the world's water. With our advanced satellite software technology, we have developed an integrated



system to monitor global geographic trends and features. This will allow us to record, locate and improve the quality of each location, while monitoring water and pollution flow for the entire planet.

## 11. Team Members-

Keith Ervin- Chief Technology Officer/Co-founder

Jerry Hagemann- Chief Executive Officer/Co-founder

Milt Stewart- Chief Financial Officer

Chad Ervin- Vice President of Sales

Manufacturing: <http://dcfabinc.com/>

## 5.0 H2O Futures- Sea Water Farming

### 1. Introduction- What is an Integrated Sea Water Farm? (ISWF)

A seawater farm is a farm that uses clean, untreated seawater to raise its crops instead of freshwater. This represents the second invention of agriculture based this time on the almost infinite supply of water that resides in the world's oceans.

An integrated farm is a farm that combines the growing of saltwater tolerant field and orchard crops with the husbandry of animals. Until the advent of factory farming in the last century, almost all freshwater agriculture integrated the breeding and raising of animals with the cultivation of green crops. In the case of integrated seawater farming, the animals we raise are shrimp and fish. The green crops are salt loving edible plants and trees.

Since integrated seawater farming has been developed in our time, we have engineered it to address the problems of our time —world hunger, environmental degradation, rising temperatures, drought and desertification, collapsing fisheries, shrinking cropland, disappearing forests, the loss of plant and animal species, poverty, and indirectly, the growth of population.

**2. Process-** Nutrient-rich seawater from the adjacent Salton Sea is captured and employed in two ways. Firstly, it is brought directly onto the pilot project site through a 'seawater river' that meanders from a shoreline inlet and, secondly, naturally filtered underground seawater is pumped to the site surface from an on-shore well. The direct, unfiltered seawater is used for aquaculture production. The mechanically and biologically subsurface filtered seawater from seawater wells, designed to specific standards, is used in research and limited production areas (e.g. hatchery phases, etc.).

It is the nutrient laden 'waste' water from these uses that provides irrigation for the *Salicornia* plantings. The water may be blended with bioremediated New River or Alamo River water and brought to the farm plots from the aquaculture in two seawater rivers located at the higher end of the fields. The fields are then flood irrigated and the resulting drainage water collected in a halophyte-lined 'drainage river' that flows to the wetland. Seawater is temporarily retained here, before evaporating, percolating back underground into the seawater wedge, or prior to going to salt crystallization ponds. Besides use for blending Salton Sea water, the cleaned freshwater from the rivers can be returned to the Salton Sea to help in reducing its salinity.



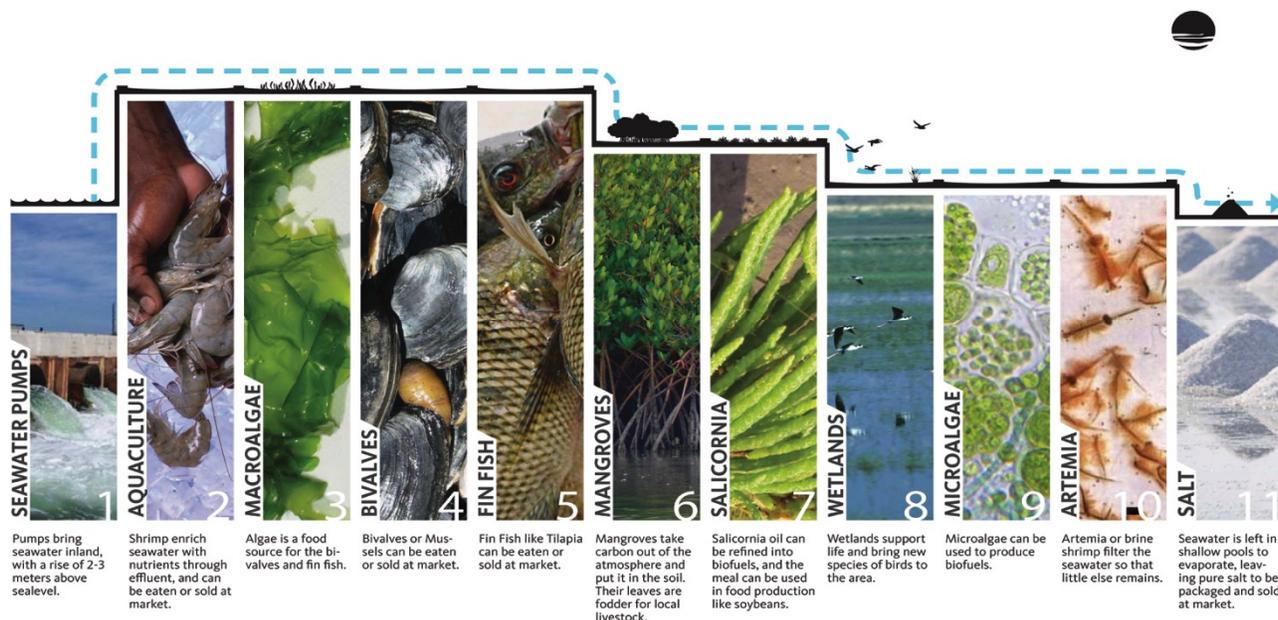


Figure 1: Saltwater Farming: Integrated Sea Water Agricultural Solutions (ISAS) Diagram © 2007 The Seawater Foundation

**3. Aquaculture-** The aquaculture system will contain an indoor hatchery for breeding, raising of post larval shrimp, and algae research / grow-out. Outdoors, a greenhouse as well as tanks and / or ponds will be built for raising larger shrimp and fish. Both indoor and outdoor facilities will be equipped with research capabilities and monitoring hardware / software for projects such as feeding trials, environmental stress evaluations, oxygenation regime analysis, etc.

**4. Halophyte Production-** In addition to research and development of ornamental halophytes for seawater landscaping, commercial agronomic crop research will be a primary focus. A halophytic terrestrial agronomic crop, *Salicornia Bigelovii* is the centerpiece of the seawater farming commercial activity. This versatile plant yields high-grade vegetable oil, protein meal and large quantities of biomass. At the Sea Water Farm, productivity and palatability optimization trials (i.e. to enhance oil yield and taste) will be conducted in plots that are carefully managed and documented. A research greenhouse will augment growing fields and provide essential environmental control capability.

**5. Proven Technology-** The comprehensive, integrated system is the basis for economic, environmental and social benefits. The whole system is built on non-arable and freshwater starved land, obviating competition with traditional food production. The technologies underlying Integrated Sea Water Systems (ISAS) have been proven to be sustainable for over thirty years in Mexico and are endorsed by leading scientific authorities, including Dr. Nina Fedoroff, President of the American Association for the Advancement of Science and former Science & Technology Advisor to Secretary of State Hillary Clinton. Moreover, the ISAS™ technology has been designed and prototyped by Global Seawater, Inc. and The Seawater Foundation on two sites: Seawater Farms Eritrea, in Eritrea, East Africa, on 2,500 acres of land on the Red Sea containing all production and processing components; and in Bahia Kino, Sonora, Mexico, on a 150 acre ISAS™ technologies R&D center.



## 6. Services-

- Assess water availability and use
- Analyze opportunities for integrating available water, energy, sunlight and carbon sequestration
- Design and engineer solutions for optimizing resources
- Guide plans through regulatory processing
- Administer construction and manage contracts
- Create maintenance protocols
- Monitor living systems for safety and effectiveness
- Conduct public and educational outreach

### *Our three proprietary methodologies for creating water abundance*

#### **1. Fresh Water Works**

Remove contaminants from stormwater, runoff and/or wastewater, for use in irrigation, toilets, air conditioners and even drinking. Unlike mechanical treatment processes, our systems are organic, dynamic, self-organizing, and resilient, so they can adapt to changing effluent quality better than mechanical/chemical systems

**Step 1-** Pipe stormwater, gray water and/or wastewater into a decentralized water remediation system, adapted to meet local health & water quality standards.

**Step 2-** Effluent moves through aerated treatment biota. The system exploits sunlight, oxygen, bacteria, algae, plants, snails & fish that work symbiotically to purify the water. Aeration & mixing in the tanks keeps nutrients in suspension.

**Step 3-** Effluent flows to a lined marsh, where valuable accumulated nutrients grow landscape, food or other economically productive biomass, avoiding the environmental & economic inefficiency of conventional, centralized water treatment. Enhanced degradation results in fewer solids than conventional systems.

**Step 4-** Residual nutrients are exported as infrequently as once or twice a year, potentially for financial gain. Water, treated to a tertiary level or better, leaves the marsh for storage.

**Step 5-** Solar-powered or bio-fuel pumps transport the resultant clean water, entirely safe for reuse in Irrigation, interior uses like toilets, planters, air conditioning, & groundwater recharge.

#### **2. Salt Water Works**

At near-shore sites, untreated seawater achieves ornamental landscape and biofuel production, leaving fresh water supplies for drinking. This methodology greens otherwise non-arable land. Its lush vegetation reduces dissolved solids and contaminants, as it captures atmospheric carbon and deposits it in the soil.



**Step 1-** Solar, wind or biofuel-operated pumps convey salt water from onshore wells, ocean, bay, estuary, or other saline sources onto land. On shore, salt water moves into a series of ponds, fields or landscapes. Cultivating aquatic species makes the water nutrient-rich.

The nutrient-rich effluent then moves into production wetlands that hold halophytes (which grow in saltwater) and glycophytes (which grow in brackish water).

Step 2-Salt water irrigates species with commercial value such as:

- Exquisite seawater-loving ornamental plants, some with stunning flowers
- Delicious and nutritious food crops
- High oil-seed biofuel crops

### 3. Mixed water Works

At near-shore sites, mix pure, untreated seawater with treated wastewater, stormwater and runoff, to expand and fertilize landscape, without relying on imported potable water for irrigation. This broadens the plant palette for ornamental vegetation and can grow landscape, food or other economically productive biomass.

The approach mixes three water sources:

- Wastewater and stormwater, treated to tertiary standards
- Seawater from ocean, on-shore wells or another saline water body.
- This results in brackish water, an ideal medium for "glycophytes," plants that thrive in lightly saline conditions.

### Salton Sea Site Specific Studies



Figure 3: illustrates the saltwater agricultural that would be possible for rural Niland, CA.

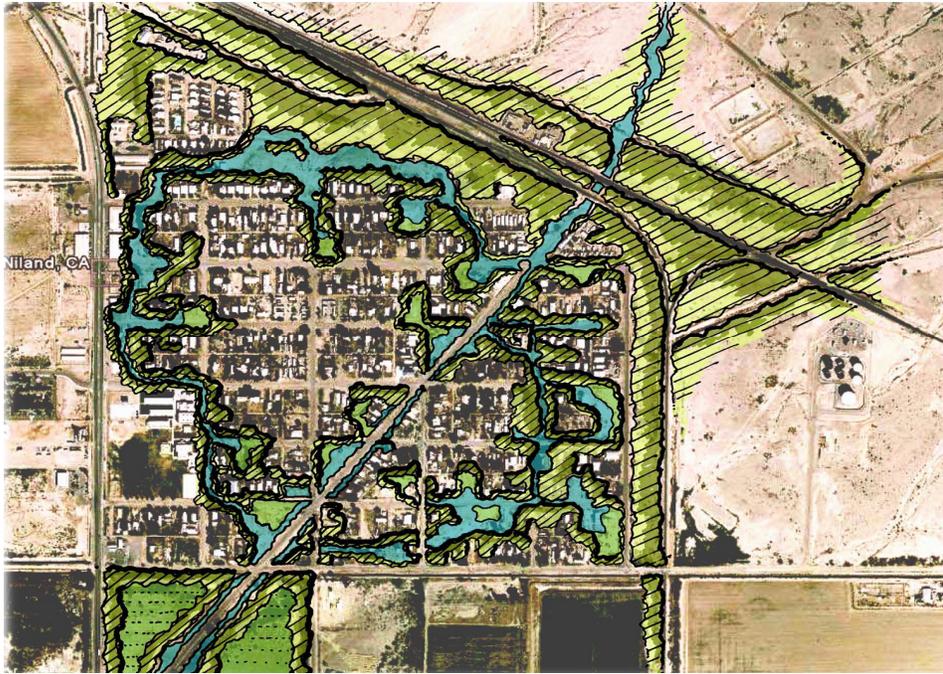


Figure 4 above illustrates the possible greening of urban Niland, CA

**Case Study:**

**1. Red Sea Community- Red Sea Coast, Egypt**

Planning and Design of a sustainable, integrated, 20,000 hectare coastal community using seawater technologies and on-site storm water / wastewater collection, treatment and reuse. Methodologies included: regenerative building materials, Solar Gradient Power, wind, and tidal kinetics.

Figure 6: Land use allocation plan of the Red Sea Community is depicted below

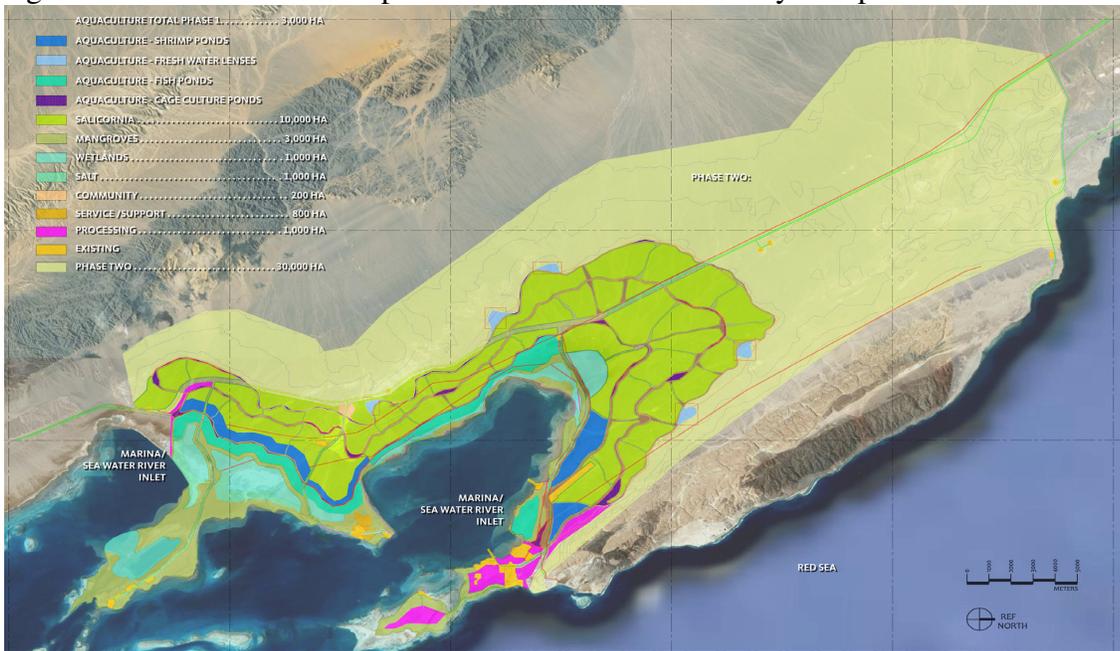




Figure 2: above depicts the aerial conceptual design

### 5.1 H2O Futures- Sea to Sea Inflow

The goal of utilizing Sea Water Farming Technologies would be to creating both new sources of fresh water for urban populations and more agriculture / aquaculture for food & wealth production while concurrently enhancing the environment. The location of this route was selected for several reasons, most notably is being able to activate new opportunities for farmers in both Mexico and Imperial Valley to have the option of switching to an alternative Sea water agriculture and aquaculture operation and resell their fresh water rights. Additionally this path would allow less construction cost since we could tie the sea water from the gulf into the New River and Alamo River. These could be dredged if necessary to refill the depleting Salton Sea.



Figure 1

**1. Conservation of Funds & Resources-** If the Imperial Irrigation District converted 12% of current fresh water agriculture to sea water agriculture and sold the fresh water at the same price they will sell half that much to San Diego, they would have an income of 100 million dollars per year from fresh water. And, they could increase their total irrigated agriculture by almost 30% with the use of seawater. Example areas are shown here in Figure 1

Figure 2 below depicts river supply and seawater agriculture zones



**2. Seawater Agriculture & Aquaculture-** Both the Environmental Defense Fund and the Sonoran Institute have concluded that 50,000 -acre feet per year of Colorado River flow into the delta will provide great economic and environmental benefits. Recent purchases of water to provide those benefits have been at the cost of \$300 per acre-foot. The cities of Phoenix and Tucson pay more than \$400 per acre-foot for Colorado River water.

The Yuma Seawater Agriculture project described here will provide the example for converting 10,000 acres of freshwater agriculture to seawater agriculture. This transition will be at no cost and great benefit. Additional fresh water for communities, the Colorado Delta, more total agricultural area for Mexico and the United States.



## 6.0 Applicant's Representatives -



### 1. *Alternative Generating Energies at the Salton Sea*

#### **Our Mission:**

To develop and implement proven ideas at the Salton Sea. We want to help solve the problems surrounding the sea by combining various innovative technologies. AGESS, by utilizing a project management background, will help coordinate the multitude of technological efforts required to prevent an environmental & health disaster. By integrating these systems, we will be able to create a self sustaining revitalized sea, ultimately restoring the environment and the community there as a whole. Moto: "Professional management, for a better environment."

#### **Team Members:**

Nathan White, CEO /Co-founder  
 Aaron A. Borja, COO /Co-founder  
 R. Barrett Miesfeld, CTO  
 Albert Fabriquer, CDO  
 Mike Giannini, CCO



### 2. **Floating Islands West, LLC.**

Floating Islands West, LLC is the West Coast manufacturer and distribution center for BioHaven® Floating Islands. We provide an innovative approach to world water and habitat issues by providing a full range of services, including island design, co-design, installation, as well as training. As a license holder of BioHaven® Floating Islands we are able to custom create islands to your specifications. We are the single supplier of the smaller line of BioHaven products throughout the US and Canada; if you are short on space, but would like your own floating island, we can help. With products starting at 5 square feet in size, you'll be sure to find something that fits your needs.

Laddie Flock, CEO





### 3. **Gulp Clear Water, LLC**

Our mission is to establish a new quality and standard for water purification and conservation through the Gulp Clear Water System. By utilizing a proprietary and programmable blend of advanced purification media, along with the next generation of germicidal technology, we are able to deliver pure, inexpensive water from any source.

#### **Team Members-**

Keith Ervin- CTO/Co-founder  
 Jerry Hagemann- CEO/Co-founder  
 Milt Stewart- CFO  
 Chad Ervin- Vice President of Sales



### 4. **Landscape Architect Consultants-**

With decades of experience, H2O Futures revolutionizes water availability. Our unique design approach and our proprietary methods leverage systems have sustained ecologies on Earth for 3.5 billion years. They capture and clean existing wastewater, storm water, and/or seawater for reuse. Thus, land – whether urban or rural – becomes greener, more robust and more profitable.

#### **Team Members:**

Edwin F. Daugherty, Licensed Architect, Registered Landscape Architect  
 Norm Allenby, LLB, Onsite Water Treatment  
 Hany Elwany, Ph.D., Engineer, Oceanographer and Coastal Engineer  
 Barney P. Popkin, Cal/PG & REA, CHMM, Euro Geol, ex-BRAC contractor, Hydrologist  
 Chris Stransky, M.S., AMEC Earth & Environmental, Water and Sediment Quality Assessment

### 5. **Geo-Spatial Consultant-**



Established in 1991, Nag, Inc. (NAG) is a geospatial visualization consulting firm specializing in the development of products and services that enable real time intelligent mapping of actionable events viewable through an easy to use geospatial visualization interface. NAG currently supports bi-coastal operations within the United States, with offices in Los Angeles, CA and the Washington DC Metro area. Our core products and services are cloud based and accessible on any device, designed to leverage the power of existing client infrastructure to reduce costs and implementation times, and are configurable to enable use in almost any industry or customer need. Specialized versions of our products and services are available for U.S. Federal, State, Regional, and Local Governments agencies throughout the nation.



## 6.0 Project Budget-

| <u>Task</u>   | <u>Expense Details</u><br>(cubic yards= cy)   | <u>Funding</u>        | <u>Contributions:</u> |              |
|---|---|-----------------------|-----------------------|--------------|
|   |   | <u>Bureau of Rec.</u> | <u>IID</u>            | <u>AGESS</u> |
| <b>A. Construction (Soft Costs)</b>   |   |                       |                       |              |
| 1. Concept development, specific planning, feasibility studies architectural services | AGESS, Inc. proposal work, design development and construction docs                     | \$2,500               |                       | \$7,500      |
| 2.. Mechanical, Civil, Plumbing, & Electrical, Engineering drawings                   | Respective drawings and expertise   | \$2,500               |                       | \$7,500      |
| 3. Construction Management & Administration   | AGESS, inc. managing fee amount   |                       |                       | \$7,500      |
| <b>B. Construction (Hard Costs)</b>   |   |                       |                       |              |
| 1. Lease Heavy Equipment: BackHoe for Dig /Construct Artificial Wetlands.             | minimal grading to direct water to the desired area, fill geo- tube structures          | \$10,000              |                       |              |
| 2. Purchase Geo-Tube Structures   | purchase (2) 100' sections of Geo-Tube systems to create artificial wetland             | \$10,000              |                       |              |
| 3. Install Concrete Intake Structure  | Concrete intake structure and installation at Alamo River that connects to channel.     | \$10,000              |                       |              |
| 4. AGESS Algae systems  | Purchase and assemble (5) algae proliferators 10'x16' each (160sqft)                    | \$8,000               |                       |              |
|   | Purchase and assemble (2) Algae photo bioreactors 10'x16'                               | \$4,000               |                       |              |
|   | Purchase bio-mass skimmers  | \$2,000               |                       |              |
|   | Eco Pond Rescue Water Wagon Jr. Dewatering systems to extract algae biomass from water. | \$6,000               |                       |              |



|  |   |                  |                 |                 |
|--|---|------------------|-----------------|-----------------|
| 5. Purchase and Install Leviathan System                         | Purchase and Install (1) Leviathan system for nutrient removal                              | \$35,000         |                 |                 |
| 6. Purchase and Install Gulp Clear Water, LLC. Systems           | (1) GCW 705 Water Purification Unit   | \$30,000         |                 |                 |
| 7. Construct Sea Water Farming Solutions provided by H2O Futures | Sea Water Farm =100'L x 50'W = 5,000 sf @\$8 per sqft.                                      | \$30,000         |                 |                 |
| <b>Construction Subtotal</b>                                     |   | <b>\$150,000</b> |                 |                 |
| <b>C. Project Administration</b>                                 |   |                  |                 |                 |
| 1. Flow of administrative functions                              | Preparation of invoices, record keeping. 80 hrs @ \$22.5/hr and 80 hrs @ \$54/hr            |                  | \$7,000         |                 |
| 2. Reporting   | Documenting summaries of accomplishments, milestones. 40 hrs @ \$54/hr.                     |                  | \$7,500         | \$2,500         |
| <b>D. Land Lease</b>   |   |                  |                 |                 |
| 1. Acquiring long-term lease                                     | Refuge staff administrative time 40 hrs. @ \$54/hr. IID staff time 20 hrs. @ \$54/hr.       |                  | \$7,500         |                 |
| <b>E. Planning, Design, Engineering, Envir. Docs.</b>            |   |                  |                 |                 |
| 1. Environmental documentation                                   | Researching, investigating, writing 120 hrs. @ \$44/hr                                      |                  | \$7,500         |                 |
| 2. Permitting  | Researching, writing 60 hrs. @\$44/hr.  |                  | \$7,500         |                 |
| <b>F. Monitoring</b>   |   |                  |                 |                 |
| 1.Pesticides   | Analysis Alamo R.   |                  | \$3,500         |                 |
| 2.Selenium Analyses and Invertebrate Speciation                  | Quarterly SE Analysis (water, sediment, corixids, benthic inverts, gambusia) for two years. |                  | \$7,000         |                 |
| 3.Bird and Fish surveys  | FWS Staff time  |                  | \$2,500         |                 |
| <b>Total:</b>  |   | <b>\$150,000</b> | <b>\$50,000</b> | <b>\$25,000</b> |



### 7.0 Support Letters-

WASHINGTON OFFICE  
1605 LONGWORTH  
WASHINGTON, D.C. 20515  
(202) 225-8045  
FAX: (202) 225-9073

CHULA VISTA OFFICE  
333 F STREET, SUITE A  
CHULA VISTA, CA 91910  
(619) 422-5963  
FAX: (619) 422-7290

EL CENTRO OFFICE  
380 NORTH 8TH STREET, #14  
EL CENTRO, CA 92243  
(760) 355-8800  
FAX: (760) 321-9664

VARGAS.HOUSE.GOV



Congress of the United States  
House of Representatives

Juan Vargas  
51st District, California

COMMITTEE ON FOREIGN AFFAIRS

MIDDLE EAST AND NORTH AFRICA  
TERRORISM, NONPROLIFERATION, AND TRADE

COMMITTEE ON AGRICULTURE

GENERAL FARM COMMODITIES AND  
RISK MANAGEMENT

HORTICULTURE, RESEARCH, BIOTECHNOLOGY  
AND FOREIGN AGRICULTURE

COMMITTEE ON HOUSE ADMINISTRATION

JOINT COMMITTEE ON PRINTING

February 13, 2015

Ms. Maggie Dutton, Grant Program Administrator  
California Department of Water Resources  
Division of Integrated Regional Water Management  
South Central Region Office  
3374 East Shields Ave  
Fresno, CA 93726

**RE: Imperial Irrigation District Grant Proposal – Drainage Reuse Grant Program**

Dear Ms. Dutton:

I am writing to introduce you to the Imperial Irrigation District’s (IID) proposal for a Drainage Reuse Grant Program project. IID, which is located in my district, is submitting the aforementioned proposal, in partnership with Agess, Inc. and the Salton Sea Authority (SSA), to revitalize the Salton Sea through algal and other aquaculture processes.

If approved, the grant-funded project would provide the opportunity to evaluate an algae pilot treatment program to remove nutrients, reduce selenium concentrations and decrease salinity in agricultural return flow water. The project will also evaluate algaewell and High Density Photo Bioreactor technology to cultivate algae in enclosed environments at the Salton Sea. The project would be located on currently exposed Salton Sea playa land owned by IID. The high nutrient content will be a valuable feed source for our algae cultivation systems and cover exposed lakebed thus reducing the potential for particulate matter emissions for that area.

This project will help revitalize the Salton Sea while developing methods to reuse drainage water, optimize irrigation methods for source reduction, investigate salt tolerant plant species, analyzes market opportunities for harvested salts, and develop drainage treatment and salt separation technologies.

I respectfully urge you to give IID’s grant proposal full and fair consideration on its merits in compliance with all applicable laws and regulations. If you have any questions, please contact Rebecca Terrazas-Baxter of my staff at (760) 355-8800.

Sincerely,

JUAN VARGAS  
Member of Congress



RAUL RUIZ, M.D.  
36TH DISTRICT, CALIFORNIA

1319 LONGWORTH HOUSE OFFICE BUILDING  
WASHINGTON, DC 20515  
P: (202) 225-5330  
F: (202) 225-1238

<http://ruiz.house.gov>



**Congress of the United States**  
**House of Representatives**  
Washington, DC 20515-0536

777 EAST TAHQUITZ CANYON WAY, SUITE 338  
PALM SPRINGS, CA 92262  
P: (760) 424-8888  
F: (760) 424-8993

445 EAST FLORIDA AVENUE  
HEMET, CA 92543  
P: (951) 765-2304  
F: (951) 765-3784

45691 MONROE STREET, SUITE 2  
INDIO, CA 92201  
P: (760) 989-4111  
F: (760) 289-7234

September 21, 2014

Nathan White  
Development Director  
AGESS, Inc.  
640 W Beech St. Suite #4  
San Diego, CA 92101

Dear Mr. White,

As the Representative of California's 36<sup>th</sup> Congressional District, I am pleased to provide this letter of support for your research oriented operation along your determination to restore the Salton Sea. It is my understanding that AGESS, Inc. is knowledgeable of the nutrient pollution in the Salton Sea and is gearing towards a long term solution for a clean and safe environment in the Coachella Valley.

AGESS, Inc.'s efforts of restoring the Salton Sea through High Bio Density modules and Algae Well Systems is admirable. The use of such technology presents an innovative and mindful approach with a unique cost and benefit analysis. In addition, your use of this technology aims to have a cost effective purpose that will further save current investments on equipment and operational costs of power plants while preventing harmful chemicals to be released into the air.

As the Congressional Representative for the 36<sup>th</sup> District and a Coachella Valley native, I understand the intricacies involved with the Salton Sea Restoration. This restoration is crucial to our environmental and public wellness of Coachella Valley. Cleaning up California's largest lake is a significant step in all of California's environmental wellbeing. Your combined efforts, expertise and insight are appreciated. Best of luck in furthering your goals and efforts to alleviate the nutrient pollution we see today.

Sincerely,

Raul Ruiz, M.D.  
Member of Congress (CA-36)

PRINTED ON RECYCLED PAPER





June 10, 2014

Nathan White  
Development Director  
AGESS, Inc.  
640 W Beech St. Suite #4  
San Diego, CA 92101

Dear Members of AGESS, Inc.

The Salton Sea Authority is pleased to provide this letter in support of the AGESS, Inc. project proposal for the Salton Sea as outlined at the SSA TAC meeting on May 14, 2014. The combination of economic and environmental sustainability provided by your project proposal is an exciting prospect.

The Salton Sea Authority recognizes that innovative approaches may well be the solution to the complex problem of implementing a successful restoration program. Your approach has the potential to provide some of the economic development that will be key to developing a viable financial model to fund Salton Sea restoration. We appreciate the effort your team has contributed in the development of the project proposal and in taking the time to present it to us. Salton Sea Authority will continue to support this and like projects at the Salton Sea as we move forward with Salton Sea restoration.

Sincerely,

A handwritten signature in blue ink, appearing to read "Roger Shintaku".

Roger Shintaku, P.E.  
General Manager  
Salton Sea Authority

44-199 Monroe Street, Suite C, Indio, CA 92201  
760.863.2695 ~ 760.863.2696  
info@saltonsea.ca.gov ~ www.saltonsea.ca.gov



[www.iid.com](http://www.iid.com)

06 June, 2014

Nathan White  
Development Director  
AGESS, Inc.  
640 W Beech St.  
Suite #4  
San Diego, CA 92101

RE: Project support letter.

Dear Nathan.

The IID is pleased to provide this letter in support of the AGESS, Inc. proposal to the Salton Sea Authority. The combination of economic and environmental sustainability provided by your project proposal is an exciting prospect.

The IID has long been a proponent of Salton Sea restoration and recognizes that innovative approaches may well be part of the solution to the complex problem of implementing a successful restoration program. Your approach has the potential to provide some of the economic development that will be key to developing a viable financial model to fund Salton Sea restoration.

We appreciate the effort your team has contributed in the development of the project proposal and in taking the time to present it to us. IID will continue to support this and like projects at the Salton Sea as the State moves forward with Salton Sea restoration.

Bruce Wilcox  
Manager – Environmental Programs  
IID

IMPERIAL IRRIGATION DISTRICT  
OPERATING HEADQUARTERS • P.O. BOX 937 • IMPERIAL, CA 92251



# H2O FUTURES

REGENERATIVE DESIGN | LIVING INFRASTRUCTURE

May, 13<sup>th</sup> 2014

AGESS, Inc.  
640 W. Beech St. Suite #4  
San Diego, CA 92101

RE: Salton Sea Project Proposal

To whom it may concern,

As a registered Landscape Architect, licensed Architect, and CEO of H2O futures, I am supportive of the project being proposed at the Salton Sea by AGESS, Inc. The scope of work proposed aligns precisely with our experience. We look forward to participating, in advisory capacity, throughout the development and implementation phases of the project. We would also highly value an opportunity of collaborating with AGESS, Inc. on multiple levels to achieve positive outcomes. If the project is approved, it will offer an opportunity for our specialists to lend support in the areas of: landscape architecture; aquaculture; hydrology; cultural resources (including interpretation, education and public outreach); sustainable infrastructure and nature-driven water filtration technologies.

H2O Futures has over 30 years of experience in this arena, planning, designing and building similar projects around the world. The environmental engineering feat proposed by AGESS, Inc. is formidable, requiring vast collaboration that we fully support. We look forward to seeing their effort come to fruition.

On behalf of all those creating positive change, thank you for your consideration.

Sincerely,



Ned Daugherty, CEO  
H2O Futures





## Nag, Inc.

Wells Fargo Center, 25<sup>th</sup> Floor • 355 South Grand Avenue, Suite # 2450 • Los Angeles • California 90071  
Phone: (213) 625-7636 • Web: <http://nag.co>

May 23, 2014

The Torres Martinez Desert Cahuilla Indians  
66725 Martinez Rd,  
Thermal, CA 92274

The Salton Sea Authority  
44-199 Monroe Street, Suite C  
Indio, California 92201

RE: Salton Sea Project Proposal

Dear Sir/Madam:

I enjoyed talking with Nathan White about your proposed project. As CEO of NAG Inc., I am supportive of the Salton Sea Project proposed by Agess, Inc. and its partners. The nature of the algae well technology and Salton sea restoration efforts concept, as proposed or as some variant thereof, would likely be of interest to our participation. Should the Project be approved, we look forward to collaborating with them to achieve the outcomes since there may be potential opportunities for our scientists and engineers to support you in the field of geospatial technologies relating to water quality, water conservation, and hydrology. Our firm has over 22 years of public sector experience: <http://nag.co/Clients.php> that would be of value to the project.

Should funding be approved, we provisionally agree to participate in design and engineering phases, sufficient to assure that our objectives and infrastructure are upheld, particularly the flow-through seawater system.

Thank you for including us among the stakeholders.

Sincerely,  
Nag, Inc.

Swapan Nag, CEO

Federal, State, and Local Government Geospatial Consulting



# H2O FUTURES

REGENERATIVE DESIGN | LIVING INFRASTRUCTURE

May, 13<sup>th</sup> 2014

AGESS, Inc.  
640 W. Beech St. Suite #4  
San Diego, CA 92101

RE: Salton Sea Project Proposal

To whom it may concern,

As a registered Landscape Architect, licensed Architect, and CEO of H2O futures, I am supportive of the project being proposed at the Salton Sea by AGESS, Inc. The scope of work proposed aligns precisely with our experience. We look forward to participating, in advisory capacity, throughout the development and implementation phases of the project. We would also highly value an opportunity of collaborating with AGESS, Inc. on multiple levels to achieve positive outcomes. If the project is approved, it will offer an opportunity for our specialists to lend support in the areas of: landscape architecture; aquaculture; hydrology; cultural resources (including interpretation, education and public outreach); sustainable infrastructure and nature-driven water filtration technologies.

H2O Futures has over 30 years of experience in this arena, planning, designing and building similar projects around the world. The environmental engineering feat proposed by AGESS, Inc. is formidable, requiring vast collaboration that we fully support. We look forward to seeing their effort come to fruition.

On behalf of all those creating positive change, thank you for your consideration.

Sincerely,



Ned Daugherty, CEO  
H2O Futures



**"For Solutions Above & Below the Waterline"**

5001 Neilson Rd, Mokelumne Hill, CA 95245  
Mailing: PO Box 467, Mokelumne Hill, CA 95245  
Visit us online at: [www.floatingislandswest.com](http://www.floatingislandswest.com)  
Office: (866) 798-7086 & (209) 286-1445

Wednesday, January 21, 2015

AGESS, Inc.  
3777 Florida St.  
San Diego, CA 92104

RE: Salton Sea Pilot Project

Dear Members of AGESS, Inc.

As CEO, and representative of Floating Islands West, I'm pleased to provide this letter in support of the AGESS, Inc. proposal for a pilot project and commercial expansion at the Salton Sea. The combination of economic and environmental sustainability provided by your project proposal is an exciting prospect.

Nutrient removal and salinity restabilization are essential to remediate the ailments of the Sea. Over the past hundred years these levels have been steadily increasing. AGESS' unique approach to addressing these issues with reusing of agricultural drainage is truly unique and our office would like to give our support to ensure the pilot project can test these systems for a comprehensive revitalization strategy.

Our company, Floating Islands West, has long been a proponent of Salton Sea restoration and recognizes that a combination of innovative approaches may well be the solution to the complex problem of implementing a successful restoration program. The AGESS approach has the potential to provide some of the economic development that will be key elements to implementing a viable financial model to fund Salton Sea restoration. We appreciate the effort your team has contributed in the development of the project proposal, and in taking the time to present it to us. Our office will continue to support this and like projects at the Salton Sea as the State moves forward with Salton Sea Restoration.

We would be happy to provide AGESS, Inc any technical data needed in regards to our product; in doing so, AGESS would act as a management firm that will aid in installation, maintenance and operation of the Leviathan system for nutrient removal and aquatic revitalization at the Salton Sea and other areas affected by nutrient overloading.

Sincerely,

Laddie D. Flock, CEO  
Floating Islands West, LLC  
Direct: 209.772.1442  
Office: 209.286.1445  
Email: [laddie@floatingislandswest.com](mailto:laddie@floatingislandswest.com)

