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PROFESSIONAL EXPERIENCE *(short version)*

Dates	Organization	Position
JUL/21-Present	Rife Technology	Business Owner
AUG/19-JUL/21	Panama Fresh Organic	Owner/Operator-Farm
MAR/17-APR/19	Self-Employed	Writer/Researcher
JAN/2011-Mar/17	Spirit Sustainable Resources	Scientist/Shareholder
JAN/2010-JAN/2011	Self-Employed	Owner
MAY/05-JAN/2010	SeaArk Africa (RSA)	Managing Director of R&D
SEP/05-NOV/05	SeaView (AUST)	Consultant
SEP/03-JUN/04	Zonda Resources (NZ)	Consultant/Prod. Super.
JUL/03-AUG/03	NOVA SE University (USA)	Consultant
JUN/03-JULY/03	The Seahorse Farm (NZ)	Consultant
MAY/03-JUN/03	Prawn Park (NZ)	Consultant
OCT/02-NOV/02	HB Shrimp (FL) USA	Consultant
JUL/02-SEP/02	Phycotransgenics (USA)	Post Doc. Shrimp Disease
JAN03-MAY/06	Taste of the Ocean (AUS)	Consultant
JAN/02-DEC/03	Indian River Com. College (USA)	Teaching: Adjunct Professor Science
JAN/01-JUN/02	Harbor Branch Ocean Inst. (USA)	Post Doc. Research: Minimum ions
JUL/00-DEC/00	Auburn University (USA)	Post Doc. Research: Shrimp low salinity
JUL/00-SEP/00	Auburn University (USA)	Teaching: Fish Nutrition Lab
MAY/99-NOV/99	Auburn University (USA)	Research Assoc1: Shrimp Pond Mgmt

EDUCATION

College / University	Dept /Major	Dates Attended	Degree
Auburn University	Aquaculture	6/96-6/00	Ph.D.
Clarion University of Pa.	Biology/Biology	6/94-6/98	M.Sc.
Marywood University	Biology/Env. Sc.	6/88-6/94	B.Sc.

AWARDS AND ORGANIZATIONS

Best Oral Presentation (2nd Place), World Aquaculture Society (US Chapter) meeting 2000, New Orleans, Louisiana

Best Abstract, Best Oral Presentation (2nd Place), World Aquaculture Society (US Chapter) meeting 1999, Tampa, Florida

World Aquaculture Society member since 1994, Aquaculture Engineering Society 2002, International Water Association 2007

PROFESSIONAL EXPERIENCE *(long version) & PUBLICATIONS*

Description of Consultancy, Research, Writing, Teaching and/or Related Activities

1) **Rife Technology (PAN)** (AUG/19-PRESENT)

Owner/Operator

Treat, consult, write, create videos and teach for a Rife Technology company that I own here in Panama.

2) **SELF-EMPLOYED (PAN)** (AUG/19-JUL/23)

Owner/Operator

Design, construct and manage a zero water exchange aquaculture farm in Panama.

2) **SELF-EMPLOYED (PAN)** (MAR/17-APR/19)

Writer/Researcher

Publish articles on the world's number one website for aquaculture, thefishsite.com as well as many other local and international sites such as caribbeannewsnow.com, sevenseasmedia.com etc., averaging one article per month also conducting research in various areas of agriculture in Panama. Write a book on mercury toxicity.

3) **SPIRIT ENERGY LLC (PAN)** (JAN/10-MAR/17)

Scientist/Shareholder

Develop business plans, build research facility, conduct research, implement pilot project and full scale commercial designs for integrated shrimp aquaculture in Panama.

4) **SELF EMPLOYED (RSA)** (JAN/10-JAN/11)

Director & Chief Executive Scientist

Design fully integrated zero water exchange prawn/shrimp production and separate aquaponics farm systems, produce business plans, developed logistics and planning for international investment opportunities

5) **SEAARK AFRICA (RSA)** (FEB/06-12/09)

Managing Director R & D

Designed from startup, implement, manage and control shrimp production research in minimal exchange tanks and raceways. World records attained for most biomass produced globally.

6) **SEAVIEW (NZ)** (SEP/05-NOV/05)

Consultancy

Install recirculation system for aquarium ornamental fish sales.

7) **ZONDA RESOURCES (NZ)** (SEP/03-JUN/04)

Consultancy/Production Supervisor:

Solve problems in producing bio-control insects for agriculture

8) **NOVA SOUTH EASTERN UNIVERSITY (USA)** (JUL/03-AUG/03)

Consultancy:

Develop production plan for pink shrimp (Farfantepenaeus dourarum) hatchery and research ponds

9) **THE SEAHORSE FARM (NZ)** (JUN/03-JUL/03)
Consultancy:
Develop algae and artemia production plan, advise on general aquaculture issues

10) **PRAWN PARK (NZ)** (MAY/03-JUN/03)
Consultancy:
Develop production plan and economic analyses to increase yield on macrobrachium farm

11) **TASTE OF THE OCEAN PTY LTD (AUS)** (FEB/03-MAY/06)
Consultancy:
Contribute production plans for recirculating system for shrimp (business plan)

12) **HARBOR BRANCH SHRIMP (USA)** OCT/02-NOV/02)
Consultancy:
Define Ion profile requirements and supplement levels for freshwater shrimp recirculating system

13) **PHYCOTRANSGENICS (USA)** (JUL/02-SEP/02)
Research:
Develop a vaccine for white spot virus (WSV), Post Doctorate Fellowship

14) **INDIAN RIVER COMMUNITY COLLEGE (USA)** (JAN/02-DEC/02)
Teaching:
Science Lecture+Lab x 3 - General Biology Lecture and Lab, Life Science Lab

15) **HARBOR BRANCH OCEANOGRAPHIC INSTITUTE (USA)** (JAN/01-JUN/02)
Research:
Minimum ion concentrations for the freshwater culture of L. vannamei (shrimp/prawns)

16) **AUBURN UNIVERSITY (USA)** (JUL/00-DEC/00)
Research:
Low Salinity aquaculture
Post Doctorate Fellowship

17) **AUBURN UNIVERSITY (USA)** (JUL/00-SEP/00)
Teaching:
Fish Nutrition Lab
Post Doctorate Fellowship

18) **AUBURN UNIVERSITY (USA)** (MAY/99-NOV/99)
Research:
Shrimp Pond Management
Research Associate I

PUBLICATIONS

Publications from February 2016 to August 2019

Shrimp Investment in Panama

https://thefishsite.com/articles/the-many-sides-of-sustainability-in-aquaculture

https://thefishsite.com/articles/how-can-we-save-the-global-shrimp-industry-from-devastating-diseases

http://www.thefishsite.com/fishnews/28218/panama-the-best-opportunity-for-aquaculture-investment/

https://www.undercurrentnews.com/2016/09/23/scientist-panama-ready-for-aquacultureinvestment/?utm_source=Undercurrent+News+Alerts&utm_campaign=40f04589f9-Americas_briefing_Sep_23_2016&utm_medium=email&utm_term=0_feb55e2e23-40f04589f9-92440017

http://www.caribbeannewsnow.com/headline-Panama%3A-The-best-opportunity-for-aquacultureinvestment-31876.html

New Shrimp Technology

https://thefishsite.com/articles/how-a-new-breed-of-breeder-is-transforming-us-shrimp-production

http://www.massivevybz.com/news/new-technology-for-shrimp-farming-in-panama/

https://thevisitorpanama.com/issues/visitor22-11/index.html

http://ambergriscaye.com/forum/ubbthreads.php/ubb/showflat/topic/69095/gonew/1.html

https://www.undercurrentnews.com/2016/02/10/new-technology-against-ems-tested-in-panama/

http://fishfarminginternational.com/new-technology-aims-to-prevent-ems-outbreak-in-panama/

http://www.caribbeannewsnow.com/headline-New-technology-for-shrimp-farming-in-Panama-29262.html

http://www.newsroompanama.com/business/panama-4/panama-based-scientist-beats-shrimp-killerdisease-2 http://www.efeedlink.com/contents/02-15-2016/887e0d93-0d51-4521-91f2-680906964ccb-d003.html http://www.thefishsite.com/fishnews/27415/new-technology-for-shrimp-farming-in-panama/

Aquaculture and Nutrition

http://www.thefishsite.com/articles/2225/mineral-deficiencies-and-aquaculture/

http://www.caribbeannewsnow.com/topstory-Mercury-in-seafood%2C-from-contamination-to-elimination32082.html

https://www.guyanadailynews.com/articles/2016/10/07/mercury-seafood-contamination-elimination

GMO

http://advocate.gaalliance.org/genetically-modified-foods-a-brief-history-of-the-technology/

The Spiny Lobster (New Species for Aquaculture)

http://www.thefishsite.com/articles/2215/the-status-of-spiny-lobster-aquaculture-with-emphasis-on-thepotential-of-the-pacific-spiny-lobster-in-panama/

https://www.thevisitorpanama.com/2016/07/panama-lobster-farming/

The Sea Hare of Panama (New Species for Aquaculture)

http://advocate.gaalliance.org/the-odd-wedge-sea-hare-is-useful-as-an-algae-cleaner/

http://www.thefishsite.com/articles/2204/sea-hare-one-of-the-fastest-growing-utilitarian-additions-to-clearwater-marine-aquaculture-systems/

Effects of the El Nino, Harmful Algae and Corals 2015-2017

https://sevenseasmedia.org/toxic-algae-blooms/

https://sevenseasmedia.org/saving-coral-reefs-with-biosecure-zero-water-exchange-aquaculture/

https://thefishsite.com/articles/how-sponges-adapt-to-climate-change

http://www.caribbeannewsnow.com/headline-The-success-of-coral-sponges-in-Panama-is-due-to-morethan-the-absence-of-El-Nino-34730.html

https://www.thevisitorpanama.com/2016/08/fish-coral-secas-islands/

http://www.thefishsite.com/articles/2252/surviving-el-nino-corals-at-coiba-island

http://www.newsroompanama.com/travel/panama-2/pearl-islands-underwater-paradise-survives-el-nino

http://www.caribbeannewsnow.com/headline-Toxic-algae-blooms---the-worst-from-the-strongest-El-Ninoever%3F-29822.html http://www.ieyenews.com/wordpress/toxic-algae-blooms-the-worst-from-the-strongest-el-nino-ever/ http://www.thefishsite.com/fishnews/27434/toxic-algae-blooms-the-worst-from-the-strongest-el-nio-ever/

http://www.worldfishing.net/news101/industry-news/rising-temperatures-due-to-el-nino-resulting-in-coralbleaching

http://www.thefishsite.com/articles/2195/rising-sea-water-temperatures-due-to-el-nio-causing-coralbleaching-in-seca-islands-chiriqui-bay-pacific-panama/

http://www.caribbeannewsnow.com/headline-Rising-sea-water-temperatures-due-to-El-Nino-cause-coralbleaching-30014.html

https://www.thevisitorpanama.com/2016/06/el-nino-affects-chiriqui-corals/

http://www.thefishsite.com/fishnews/27637/a-closer-look-at-sea-temperature-increase-and-loss-of1billion-in-farmed-salmon/

Tilapia

https://sevenseasmedia.org/saving-coral-reefs-with-biosecure-zero-water-exchange-aquaculture/

http://www.caribbeannewsnow.com/headline-Are-tilapia-safe-to-eat%3F-31727.html

http://advocate.gaalliance.org/biofloc-systems-viable-for-tilapia-production/

Marine Fish

https://thefishsite.com/articles/blue-by-name-green-by-nature

Recirculating Aquaculture Systems

https://thefishsite.com/articles/secondary-school-learning-to-utilise-waste-in-ras

https://thefishsite.com/articles/hyper-drive-the-pros-and-cons-of-intensive-ras-production-in-the-us

Mercury Toxicity

https://bda27aef-07c2-4d7e-bbf2-95ff68a1f182.filesusr.com/ugd/98c15b_4da10131a6844136a5fa3eda25c16921.pdf

https://www.animals24-7.org/2019/04/07/mercury-toxicity-as-a-cause-for-stranded-marine-mammals-isnot-a-mystery/

https://www.caribbeannewsnow.com/2019/04/05/mercury-in-the-caribbean/

https://sevenseasmedia.org/mercury-toxicity-as-a-cause-for-stranded-marine-mammals-is-not-a-mystery/

Publications from 2001-2004

1) McGraw, W.J. and J. Scarpa. 2004.
Mortality of freshwater-acclimated Litopenaeus vannamei associated with acclimation rate, habituation period, and ionic challenge.
Printed: Aquaculture 236. 285-296.

2) McGraw, W.J., D.B. Rouse, D.R. Teichert-Coddington, and C.E. Boyd. 2003.
Effects of maintaining minimum dissolved oxygen concentrations on nitrogen and carbon content in shrimp pond soils.
Aquacultural Engineering. (accepted)

3) McGraw, W.J., D.R. Teichert-Coddington, D.B. Rouse and C.E. Boyd. 2003.
Comparison of shrimp production and water and soil bottom quality in ponds with different types of aerators.
Aquacultural Engineering. (accepted)

4) McGraw, W.J. and J. Scarpa. 2003.
Minimum environmental potassium for the survival of Litopenaeus vannamei (Boone) in freshwater.
Printed: Journal of Shellfish Research. 22. 263-267.

5) Laramore, S., J. Scarpa and B. McGraw. 2003.
Concentration de ions requerida para el cultivo de Litopenaeus vannamei en agua dulce. *Printed: Panorama Acuicola Magazine. 8.2. 60-63.*

6) Hoagland, R.H. III, Davis, D.A., Nguyen, A.H. and W.J. McGraw. 2003.
Evaluation of practical bluegill diets with varying protein and energy levels.
Printed: North American Journal of Aquaculture. 65. 2. 147–150.

7) McGraw, W.J. 2002.
Utilization of heterotrophic and autotrophic bacteria in aquaculture. *Printed : Global Aquaculture Advocate. 5.6.82-83.*

8) McGraw, W.J. 2002

Minimum ions for the culture of marine shrimp in freshwater. Volume 10. pg 18-19. *Printed : Fish Farming News. 2002.*

9) McGraw, W.J. and J. Scarpa. 2002.
Marine shrimp (Litopenaeus vannamei) culture in freshwater: determining minimum ion concentrations.
Printed : Global Aquaculture Advocate. 5.3.36-38.

10) Davis, D. A., Saoud, I. P., McGraw, W. J., Rouse, D. B., 2002. Considerations for Litopenaeus vannamei reared in inland low salinity waters.
Printed: Cruz-Suárez, L. E., Ricque-Marie, D., Tapia-Salazar, M., Gaxiola-Cortés, M. G., Simoes, N. (Eds.). Avances en Nutrición Acuícola VI. Memorias del VI Simposium Internacional de Nutrición Acuícola. 3 al 6 de Septiembre del 2002. Cancún, Quintana Roo, México.

11) McGraw, W.J., D. Allen Davis, D.B. Rouse, and D.R. Teichert-Coddington. 2002.
Acclimation of the Pacific white shrimp to various salinities: influence of age, salinity endpoint and acclimation rate.
Printed : Journal of the World Aquaculture Society. 33.1.78-84 .

12) McGraw, W.J., D.R. Teichert-Coddington, D.B. Rouse and C.E. Boyd. 2001.
Higher minimum dissolved oxygen concentrations increase shrimp yields.
Printed : Aquaculture.199. 311-321.