described by the present inventors previously in U.S. Ser. No. 10/774,639, filed Feb. 3, 2004, now U.S. Pat. No. 6,988,394, the entire contents of which are hereby incorporated by reference. Particular reference is made to the example set forth from column 11, line 20 through column 19, line 33 and the referenced figures.

The system also preferably includes a communication device **85** configured to allow information, results, and/or instructions to be remotely communicated to a command center or other receivers used for monitoring, tracking or remediating incidents affecting water quality.

As depicted on FIG. **5**, the present invention may also be operatively deployed with a water quality sensor **90** and other prior art monitoring devices to be used in monitoring water quality as described in U.S. Pat. No. 6,988,394. While not explicated herein, one of ordinary skill in the art will readily appreciate the ability to use the features of the land-based monitoring systems discussed in U.S. Pat. No. 6,988,394 in connection with the present invention to monitor the desired parameters of a body of water and should be deemed to be within the scope of the present invention.

An additional feature depicted in FIG. **5** is the use of an aerator **95** to provide oxygen to the holding pens to aid the survival of their occupants in the event of an emergency. Any suitable prior art means for actuating the aerator in response to emergency conditions may be used with the present invention.

While the present specification has been written to highlight the discovery of how to make a biomonitoring system submersible for use in situ, one of ordinary skill in the art will appreciate the various features, operations, control systems, and other components disclosed in U.S. Pat. No. 6,988,394 are equally applicable in using the present invention to monitor and respond to changes in water quality. Furthermore, although shown and described is what is believed to be the most practical and preferred embodiments of the in situ components of the invention, it is apparent that departures from specific designs and methods described and shown will suggest themselves to those skilled in the art and may be used without departing from the spirit and scope of the invention. Accordingly, the present invention is not restricted to the particular constructions described and illustrated, but should be constructed to cohere with all modifications that may fall within the scope of the appended claims.

We claim:

1. A system for monitoring and evaluating water quality using ventilatory behavior and body movement of an aquatic organism in situ, comprising:

a submersible chamber, said chamber being submersed in a body of water to be monitored and including a plurality of holding cells for housing said aquatic organism in situ, said holding cells comprising a di-electric material,

at least one electrode disposed in said submersed chamber for receiving and transmitting electrical signals expressed by said aquatic organism in situ,

a pre-amplifier disposed in said submersed chamber and in communication with said at least one electrode for receiving said electrical signals and amplifying said electrical signals,

a tether in communication with said pre-amplifier on a first submersed end and in communication with a land-based receiver on a second end, whereby amplified signals from said pre-amplifier are communicated to said receiver, and

a processor for processing said amplified signals to determine water quality.

2. The system of claim **1**, wherein said holding cells comprise plastic.

3. The system of claim **1**, wherein said chamber includes eight holding cells having a length of about 6.75 inches.

4. The system of claim **3**, wherein said cells each include a respective front end cap and back end cap, said end caps configured to hold said aquatic organism adjacent said at least one electrode.

5. The system of claim **4**, wherein said end caps include passages that allow water to flow through the cells without stagnation.

6. The system of claim **1**, wherein said receiver comprises a land-based amplifier for amplifying said signal prior to communication with said processor.

7. The system of claim **1**, wherein said processor compares initial respiratory data of said aquatic organism with subsequent data communicated from said amplifier to determine when said organism suffers physiological stress from the water being monitored.

8. The system of claim **7**, further comprising a controller, said controller including said processor, wherein said controller initiates an alarm in response to a determination of physiological stress.

9. The system of claim **8**, further comprising a water quality sensor in communication with said controller for providing additional water quality data to be analyzed by said processor.

10. A method of monitoring a body of water comprising:

deploying a plurality of the systems of claim **1** in different areas of the body of water,

monitoring by said systems to determine if one or more moitored water in a vicinity of each os said systems is causing physiological stress to aquatic organisms, and

determining an area of exposure or path of exposure based on identification of locations and times the physiological stress is determined by said systems.

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