What is claimed is:

CLAIMS

1. A system for treating brackish water, the system comprising:

a first electrochemical separation stage having a dilution compartment inlet fluidly connectable to a source of brackish water, a concentration compartment, a diluate outlet, and a concentrate outlet;

a second electrochemical separation stage positioned downstream of the first electrochemical separation stage and having a dilution compartment inlet fluidly connectable to the diluate outlet of the first electrochemical separation stage, a concentration compartment, a product water outlet, and a concentrate outlet, the concentrate outlet of the second electrochemical separation stage fluidly connectable to the concentration compartment of the first electrochemical separation stage; and

a control system configured to regulate a volume of make-up feed directed to the concentration compartments of the first and the second electrochemical separation stages when an ionic concentration of a concentrate from the concentrate outlet of the first electrochemical separation stage and/or the concentrate outlet of the second electrochemical separation stage or product water from the product water outlet reaches a predetermined threshold in order to maintain an overall product water recovery rate of greater than about 90% having a concentration of dissolved salts of less than about 500 ppm,

wherein the source of brackish water is further fluidly connected to the concentration compartment of the second electrochemical separation stage; and

wherein the make-up feed is any concentrate from the second electrochemical separation stage, a diluate from the first electrochemical separation stage, and brackish water from the brackish water feed.

2. The system of claim 1, further comprising a break tank fluidly connectable between the concentration compartments of the first and the second electrochemical separation stages.

3. The system of claim 1, further comprising a sensor fluidly connectable to the concentrate outlets of the first and the second electrochemical separation stages, the sensor configured to measure at least one of the total dissolved salt (TDS) concentration and flow rate.

4. The system of claim 3, wherein the control system is electrically connected to the sensor and configured to regulate a volume of concentrate from the second electrochemical separation stage in response to the sensor measurement of the concentrate from first electrochemical separation stage.

5. The system of claim 3, wherein the control system is electrically connected to the sensor and configured to regulate a volume of diluate from the first electrochemical separation stage in response to the sensor measurement of the concentrate from the second electrochemical separation stage.

6. The system of claim 3, wherein the control system is electrically connected to the sensor and configured to regulate a volume of brackish water feed from the source of brackish water in response to the sensor measurement of the concentrate from the second electrochemical separation stage.