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ADJUSTABLE FLOATING OPEN-WATER EVAPORATION PAN

STATEMENT OF GOVERNMENT INTEREST

The invention described herein may be manufactured and used by or for the Government of the United States of America for governmental purposes without payment of any royalties thereon or therefor.

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention relates in general to measuring evaporation rates in bodies of water, more particularly to using evaporation pans to measure evaporation rates, and most particularly to evaporation pans employed within the body of water to measure evaporation rates.

2. Description of the Related Art

It is important for maintenance of wetlands and certain waterways to periodically obtain estimates of evaporation for these open waters. Most often the biggest source of error in a lake, wetland, or lagoon is the estimate of evaporation. Currently, there are numerous methods of obtaining such estimates of evaporation. One inexpensive method is to put water in an evaporation pan near the water body being evaluated. As the water evaporates from the pan, measurements are taken to determine the evaporation rate.

However, there are several problems associated with obtaining accurate evaporation rates using this method. First, due to the pan being placed on land, the water temperature within the pan could be far greater than the water temperature in the water body being evaluated, causing evaporation to be over estimated. Second, vegetation, wind patterns, soil type, and moisture content on land also greatly affect evaporation rates.

One method developed to alleviate these problems is to place the evaporation pan in the actually water body being measured by placing the pan on a raft anchored with ropes tied to land or weights placed in bed sediment. However, accuracy problems still exist using this method. Because the raft is normally constructed of wood or plastic, these materials absorb heat and transfer the heat to the pan/water, raising the water temperature in the pan to above that of the water body. Also, the raft raises the pan so the water level in the pan is much higher than the water body being evaluated, again, potentially affecting the evaporation rate determination. Still further, attaching a rope to one side of the raft has a tendency to make the raft tilt in one direction, causing the pan and water to be tilted, yet again, potentially affecting the evaporation rate results.

Therefore, it is desired to provide an apparatus and method to obtain a more accurate evaporation rate in open bodies of water that is inexpensive and easily deployed in the field.

SUMMARY OF THE INVENTION

The invention proposed herein comprises a floating evaporation pan that can be adjusted so that the level of water in the pan is at the same level as that in the body of water being measured. In this manner, one can provide evaporation estimates that closely approximates the conditions of the body of water being evaluated, increasing the accuracy of the evaporation rate determination.

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Accordingly, it is an object of this invention to provide an improved evaporation pan assembly that allows for a more accurate evaporation rate calculation than current evaporation pans.

It is a further object of this invention to provide an improved evaporation pan assembly that maintains a reasonable cost compared to current evaporation pans.

This invention meets these and other objectives related to measuring evaporation rates in open bodies of water by providing an improved evaporation pan assembly comprising at least three float assemblies located every 120 degrees on the outer side wall of the pan. An anchor assembly consist of a steel pole driven into the bed sediment and a ring guide attached to one of the three float assemblies. The ring guide slips over the driven steel pole. This design allows the floating evaporation pan to move freely in a circular path around the anchor assembly due to wind currents. This allows the pan to maintain a level position upon the water body surface and will allow the pan to raise and fall with the larger body of water due to precipitation events and/or discharge events. A user may fill the floating evaporation pan with water to a desired height in the pan. Depending upon the buoyancy provided by the floats, water or sand can be added inside the float assemblies so that water levels inside the pan can be set equal to the surface of the body of water being evaluated. Because the rate of the evaporation in the pan will be, basically, equivalent to the body of water, the water level in the pan should remain substantially equal to that of the surface of the body of water. Thus, an extremely accurate measurement of the evaporation rate within the body of water may be obtained.

BRIEF DESCRIPTION OF THE DRAWINGS

The accompanying drawing, which is incorporated in and constitutes a part of the specification, illustrates an embodiment of the invention, and, together with the description, serves to explain the principles of the invention.

FIG. 1 is an angled view of an embodiment of the invention.

DESCRIPTION OF PREFERRED EMBODIMENTS

The invention, as embodied herein, comprises an improved evaporation pan assembly. At least three float assemblies are attached at 120 degree increments to the outer walls of a container ("evaporation pan" hereinafter) allowing the evaporation pan to float in a body of water in which evaporation is to be quantified. The buoyancy provided by the three float assemblies is calculated so that the floating evaporation pan will never sink (barring any holes or leaks to floats). This extra buoyancy provided by the floats causes the water level in the pan to be higher than the surrounding body of water being evaluated. The floats are designed so that weight (water or sand) can be added inside the floats so that water levels inside the pan can be set equal to the surface of the body of water being evaluated. Because the evaporation pan is actually within the body of water being evaluated and water levels inside and outside the pan are equal, the water within the pan is subjected to the same environmental conditions as the body of water being evaluated. Therefore, the evaporation rate within the pan should be substantially equal to the evaporation rate at the surface of the body of water.

An anchor assembly is included which anchors the evaporation pan, but allows for level movement of the pan due to