

INTRODUCTION:

There are countless numbers of pipes across irrigation districts and individual irrigation farming enterprises that do not run full all the time. Whilst from a measurement perspective it is preferable to measure flow in a full pipe, from a practical viewpoint it is often either difficult to achieve full flow under all conditions or just not economic to change.

With the use of a MACE combined depth/velocity sensor the MACE AgriFlo allows the user to measure flows in pipes from 6" to 100" in diameter (150 to 2.5 m). When coupled with the patented MACE polypropylene mounting strap, a sensor can be installed in literally seconds. This enables the user to use the AgriFlo for permanent metering or for more temporary monitoring.

With the ability to measure flow in multiple pipes, the MACE AgriFlo is an even more affordable option where the user needs to measure flow in different pipes at the same time.

THE PROBLEM:

A mosaic of lagoons and ponds important to several species of migratory wading birds and water fowl is centered around Los Banos, California, USA. Under the auspices of the California Department of Fish and Game and Grasslands Water District, these ponds are managed with water releases from various sources.

A project to determine the efficacies of various filling/emptying regimes was instigated. One of the primary concerns for the studies was to be able to measure flows through several pipes (generally 18" (450 mm) diameter) that both deliver and drain water to/from the ponds. The study called for a remote, cost-effective solution of measuring these flows, that could also be tied into existing telemetry networks.



Figure 1: An outlet of a pond near Los Banos, CA. Note the headwall of the 18" pipe.

The MACE solution is on the following page

THE MACE SOLUTION:

The California Department of Fish and Game installed a mix of 15 Series3 AgriFlo and FloPro units on various outlet pipes within the mosaic. Some 15 Series II AgriFlo's were installed on inlet pipes in previous seasons.

Each AgriFlo/FloPro was equipped with a combined depth/velocity sensor mounted in the pipe using a MACE polypropylene mounting strap. Each unit was also fitted with a FloSI card so that SDI-12 data could be transferred to a web-based telemetry device.



Figure 2: The MACE combined depth/velocity sensor on the right of the picture.



Figure 3: A Series3 AgriFlo installed on the outlet of a lagoon.

THE MACE AGRIFLO BENEFITS:

- 1 With MACE continuous wave advanced spectrum Doppler processing, each sensor "sees" velocities through the whole cross-section of the pipe and calculates the true average flow rate.
- 2 The MACE combined depth/velocity sensor provides very little obstruction to the flow and has no moving parts. With the high trash/weed loads in the inlet and outlet pipes the whole system is virtually maintenance free.
- 3 The versatile nature of the combined depth/velocity means it can be mounted off the invert of the pipe away from the effects of silting.
- 4 The Series3 AgriFlo/FloPro's were fitted with a MACE FloSI telemetry card which allowed data to be remotely accessible. Furthermore, should a power failure occur that prevents the telemetry package from being operational, the Series3 device will continue to calculate the flow and the onboard data logger can be downloaded to analyze and totalize these flows during the power outage.
- 5 The installation of the combined depth/velocity sensors on polypropylene straps meant that the whole flow meter was extremely quick and economic to install.
- 6 Because the same sensor can be used in any pipe sized from 6" to 100", when the studies on particular lagoons are finished, it will be possible to move the instrumentation to different sites.
- 7 At inlet/outlets where multiple pipes are present, the Series3 AgriFlo/FloPro with the ability to accept multiple flow sensors is an extremely cost-effective solution to the monitoring problem.

