

# THE ATMOSPHERIC RESERVOIR

*Examining the Atmosphere and Atmospheric Resource Management*

## Cloud Seeding 401: Economic Impacts

By Aaron Gilstad

In previous articles on cloud seeding, I described the inner workings of cloud development, how cloud seeding operations are done, and the reasoning behind targeting as it is done on the North Dakota Cloud Modification Project (NDCMP). In this final article of the series, I will attempt to shed some light on the costs and benefits of cloud seeding, especially on the NDCMP.

The costs associated with the NDCMP are easily measured; eight aircraft and pilots, seeding agent, four meteorologists, two intern meteorologists, two radars, and a radar technician account for the vast majority of the budget of approximately \$668,000 for the six counties included in the 2004 NDCMP,

a significant amount by any standard. But, when one considers that over 6.6 million acres are covered, 24 hours a day for the entire three months of operations. This works out to a cost of approximately ten cents per acre, a small expense in when compared to several dollars per acre crop insurance, for example.

The NDCMP and the observed effects have been the subject of several studies over the years. One study (Smith et al., 1997) evaluated the effect on crop hail losses in the target area over a 13 year period. The study showed a 45 percent reduction in crop hail losses within the target areas, with strong statistical confidence.

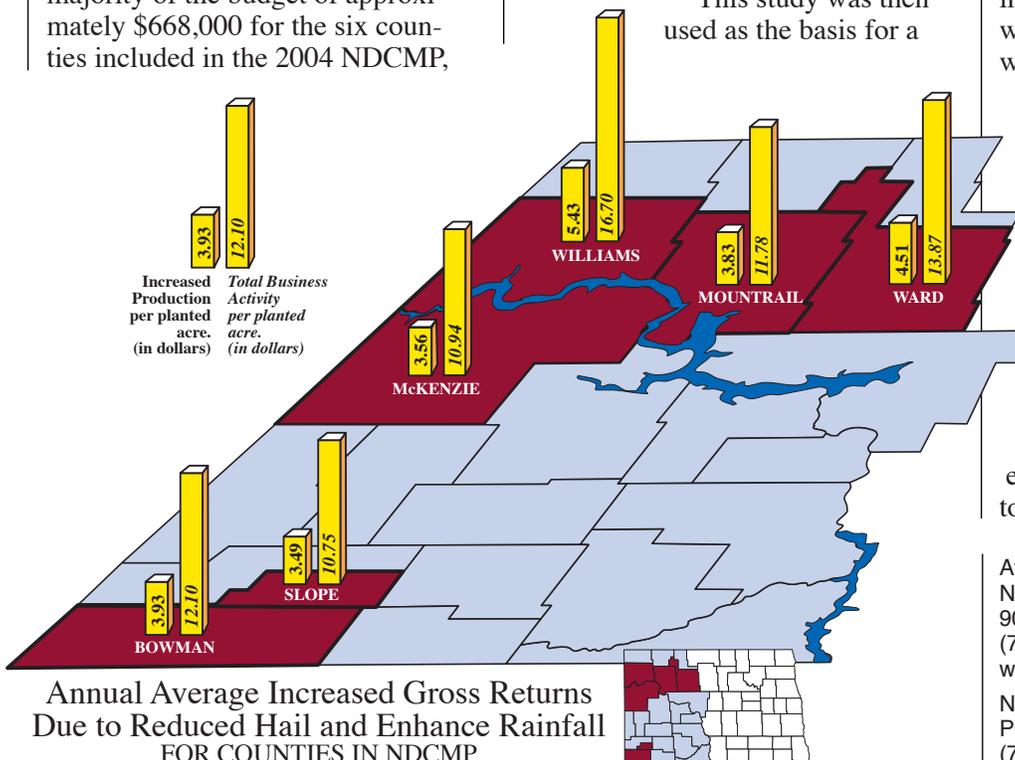
1998 evaluation of the economic benefits to the project area. The study (Sell and Leistriz, 1998) found an estimated direct economic increase of \$8.1 million to farmers in the seeded areas per year. Going further, the study found that total business activity in the target counties affected an estimated increase of \$24.7 million to area businesses as a result of the additional income to farmers per year. These benefits equate to a benefit to cost ratio of 37 to 1. With benefits like this it is easy to see why the NDCMP has enjoyed such a long history in western North Dakota.

The reasoning as to why projects are conducted in North Dakota and elsewhere throughout the world comes down to helping the people in the project area. Cloud seeding, whether increasing snow or rain for water and/or hydroelectric power, or decreasing hail to protect crops and/or property, is done for the economic benefit to those areas.

I hope these articles have helped to answer some of the questions and clear up some of the misconceptions associated with cloud seeding. Cloud seeding has successfully operated for nearly 50 years in North Dakota, and with benefits like these it is expected to carry on for many years to come.

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This study was then used as the basis for a



Annual Average Increased Gross Returns Due to Reduced Hail and Enhance Rainfall FOR COUNTIES IN NDCMP