Prairie Agricultural Machinery Institute

# DETERMINING OPTIONS TO LOWER MECHANICAL OVERLAP IN SINUOUS RIPARIAN AREAS

## Control Area – No Obstacles

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## Introduction

Riparian areas and wetlands provide many benefits that work towards a balanced and healthy landscape, including water quality, biodiversity, reduced erosion, and wildlife habitat. Efficient agricultural crop production means effective use of time and resources to minimize overapplication of seed, pesticides, and fertilizers while also reducing fuel use. Environmental stewardship retains and properly manages riparian areas and wetlands in order to maintain their natural function.

Irregular shapes of a farmable area increase overlap (the amount of turning required during field operations) and can result in overapplication of seed, pesticides and fertilizers, increased fuel consumption (and thus emissions), and increased work time.

To aid professional staff and producers in selecting ways to minimize overlap without removing or reconfiguring critical natural elements, fact sheets were developed. This is one of a series of five fact sheets pertaining to unique riparian features. In this fact sheet, a control area with no obstacles is discussed and, to aid in overlap illustrations, a specific example is used.

## Glossary of Terms

**PERIMETER OVERLAP** – Mechanical overlap experienced on the headlands of cropland.

**OBSTACLE OVERLAP** – Mechanical overlap experienced as an implement traverses around an obstacle in its pass of travel.

**THEORETICAL OVERLAP** – The best case scenario for mechanical overlap on a parcel of land by assuming "**no**" overlap is seen per pass traveled on the land, and all overlap is associated with perimeter (headland) overlap.

## Control Field Description

The control agricultural cropland was a quarter section of land clear of obstacles. **Figure 1** represents the control field.

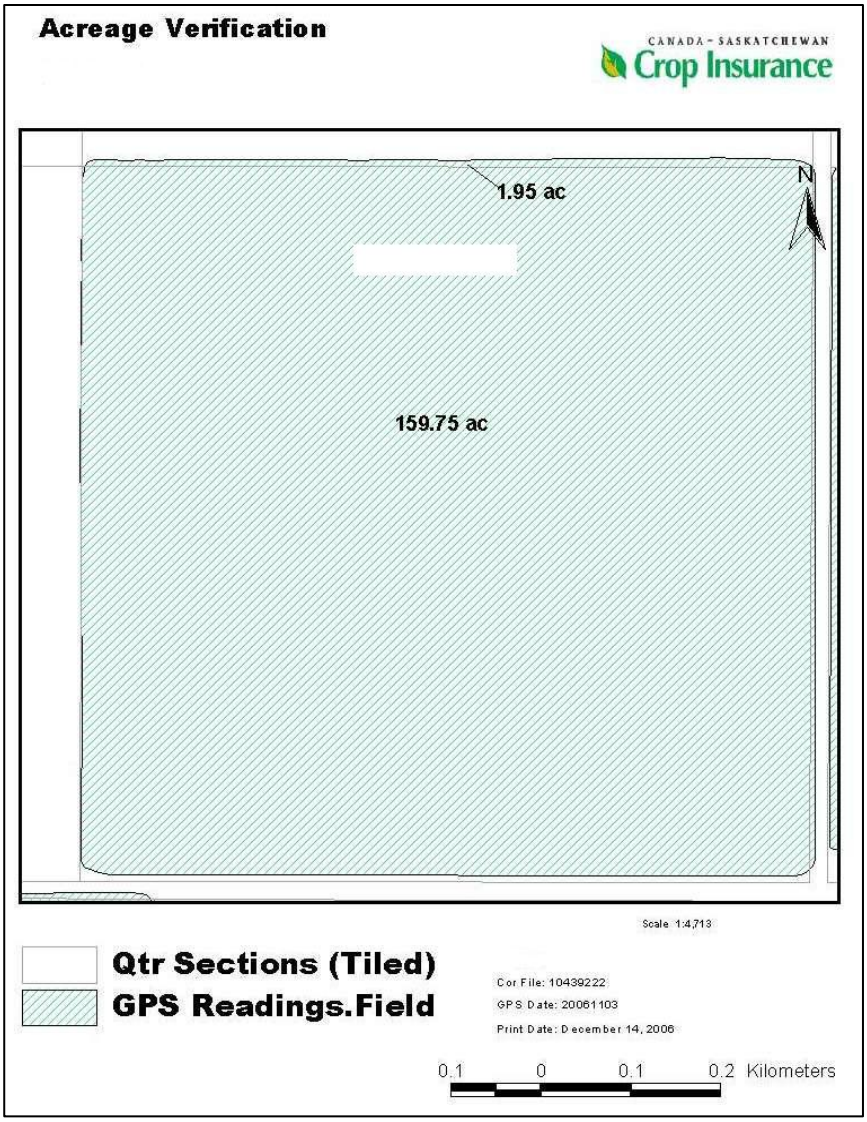


**Figure 1.** Case 1 - Control Field.

**Factors to note when calculating overlap and respective information regarding this study:**

- Farmable acres — 161.70
- Equipment — 47 foot air seeder
- Operation — no assisted tracking or auto steer
- Recorded acres traveled — 174.42
- Overlap acres — 12.72 (7.87%)

## Overlap-Reduction Options on the Control

### 1. Auto Steer

It was assumed that the use of a GPS unit with an auto steer system could be set to eliminate the overlap along each pass in the field, which would then equal the theoretical overlap calculation. The theoretical overlap utilizing a 47 foot implement on a quarter section of land with 160 farmable acres is 3.50%. Achievement of the theoretical overlap would yield an overlap improvement of 4.37% or seven acres. If an average variable production cost of $95/acre was used to calculate the cost of a crop on this control field, then an overlap reduction of seven acres yields a direct savings of $665 without realizing a loss to seeded acres or potential income from the quarter.

## 2. Equipment Size

The utilization of smaller equipment to reduce mechanical overlap, and as such reduce the overlap of seed, fertilizer, and chemical applications, introduces a time-management factor into the operation. The use of smaller equipment correlates to more time spent in the field; therefore, a balance is required between time, equipment cost, and potential variable cost savings associated with cropping the land.

The theoretical overlap utilizing an implement less than 47 feet in width is shown in **Table 1**.

**Table 1.** Implement Width vs Theoretical Overlap.

| Implement Width (ft) | Theoretical Overlap (%) |
|---|---|
| 47 | 3.5 |
| 38 | 2.84 |
| 32 | 2.39 |
| 28 | 2.1 |
| 22 | 1.65 |

The information in this table indicates that reducing the implement width by half also reduces the theoretical overlap by half. Using a 22 foot wide implement would theoretically decrease overlap by 6.22% or 10.06 acres. An overlap reduction of 10.06 acres yields a direct savings of $956 without a loss of seeded acres using an average variable production cost of $95/acre.

# Conclusion

Each producer will need to tailor these options to reduce overlap in his/her particular situation. However, in this example the most viable option for a producer to achieve as close to theoretical overlap as possible would be to employ GPS tracking technology with auto steer ability on the existing equipment owned. The employment of GPS tracking technology with auto steer ability was assumed to be the most cost-effective option for the producer for the following reasons:

- It allows for integration seamlessly into the existing business unit.
- It requires no investment into new cropping equipment by implementing a smaller equipment strategy.
- It is a technology investment that can be used on equipment at each stage of the cropping process so there is an option to compound its impact.
- It has the ability to assist in time management during each stage of the cropping process because field time can be extended if field conditions are favourable.
- It is a relatively low-cost investment as compared to alternatives.

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Saskatchewan Watershed Authority

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