

## **CONSERVATION COMPLIANCE ON HIGHLY ERODIBLE LAND: PART 2 – CONTROLLING EPHEMERAL EROSION**

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### **CONSERVATION COMPLIANCE**

- ✘ Conservation compliance on highly erodible land was first addressed in the 1985 Farm Bill.
- ✘ Conservation requirements for highly erodible land are found in the National Food Security Act Manual (NFSAM).

## NFSAM REQUIREMENTS

### Sec. 512.01 B - Standards for a Conservation System

A conservation system that is being used when planting agricultural commodities on HEL cropland must meet one of the following definitions:

- ✘ Provide for a substantial reduction in soil erosion where a prior cropping history has been established.
- ✘ Permit no substantial increase in erosion on HEL cropland converted from native vegetation after December 23, 1985.

## NFSAM REQUIREMENTS

### Sec. 512.0 C - Conservation System Requirements

A conservation system shall include all treatments and measures needed to meet HELC requirements including treatment required for the control of –

- ✘ Sheet & Rill Erosion
- ✘ Wind Erosion
- ✘ Ephemeral Gully Erosion

## WHAT IS EPHEMERAL EROSION?

- ✘ Ephemeral means seasonal or temporary.
- ✘ Ephemeral gullies occur at the same place on the landscape year after year.
- ✘ Ephemeral gullies usually occur in areas of the field where runoff water concentrates.
- ✘ By definition an ephemeral gully can be crossed or filled with normal tillage equipment but cannot be totally “erased”.









## EPHEMERAL EROSION: TREATMENT

- ✘ In general, Residue Management (no-till) is an acceptable treatment method for ephemeral erosion only for concentrated flow areas with very small contributing drainage areas (less than 7 acres)
- ✘ Shaping ephemerals after harvest, preferably using a blade to minimize soil disturbance, and seeding them with an annual cover crop is also effective for small drainage areas.











## EPHEMERAL EROSION: TREATMENT

Other treatment options include:

- ✘ Critical Area Seeding
- ✘ Grassed Waterways
- ✘ Water and Sediment Control Basins
- ✘ Terraces

## GRASSED WATERWAYS



## WATER & SEDIMENT CONTROL BASINS



## TERRACES



## DETERMINING TREATMENT OPTIONS

- ✘ NRCS has developed an Ephemeral Gully Modeling Tool to aid in identifying effective treatment options.
- ✘ Information needed to use the tool:
  - + Crop rotation, tillage system, residue levels
  - + Bed slope and top width at 6" flow depth of the concentrated flow area
  - + Area of the contributing watershed
  - + Hydrologic group of the dominant soil in the contributing watershed
  - + Soil erodibility in the concentrated flow area.



## SOIL MAP UNITS

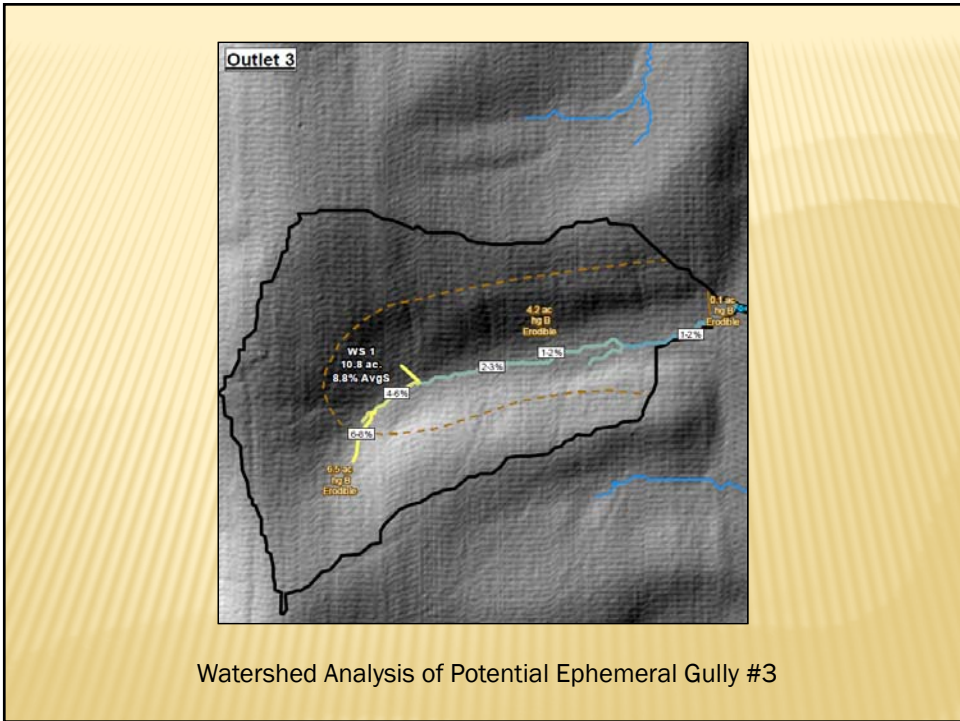
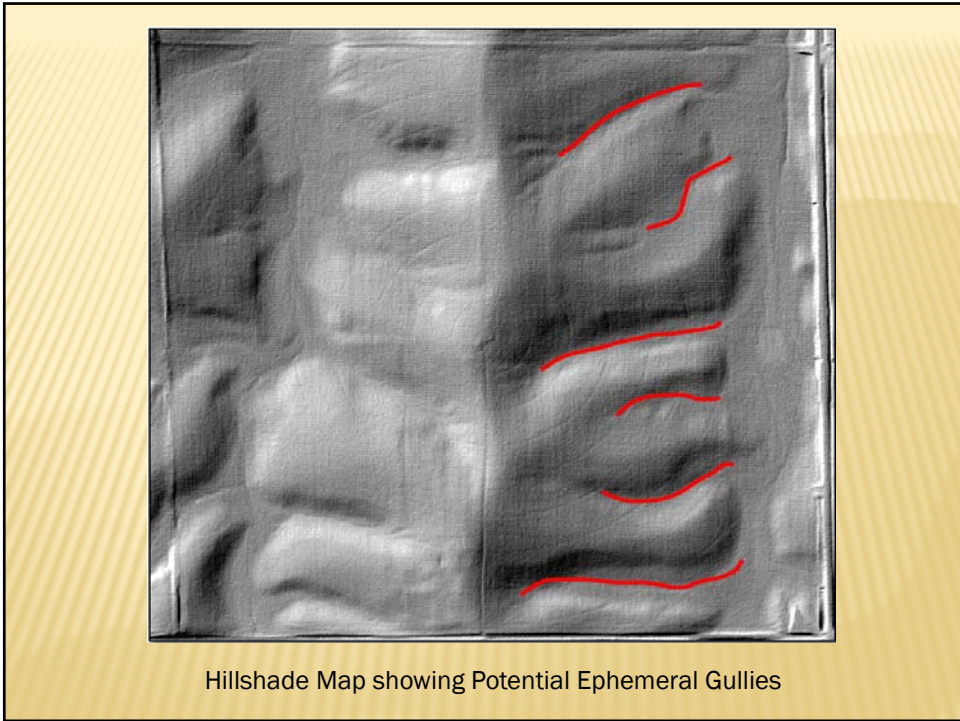
| Map Unit Symbol                    | Map Unit Name  | Acres in AOI | Percent of AOI |
|------------------------------------|--|--------------|----------------|
| 2533                               | Coly silt loam, 11 to 30 percent slopes                      | 18.8         | 12.1%          |
| 2537                               | Coly silt loam, 6 to 11 percent slopes                       | 98.3         | 63.5%          |
| 2544                               | Coly, Uly and Hobbs soils, 3 to 30 percent slopes            | 14.0         | 9.1%           |
| 2671                               | Holdrege silt loam, 3 to 7 percent slopes, eroded            | 0.9          | 0.5%           |
| 2843                               | Uly, Holdrege and Coly soils, 6 to 11 percent slopes, eroded | 0.3          | 0.2%           |
| 3562                               | Hobbs silt loam, occasionally flooded, cool                  | 20.3         | 13.1%          |
| 8872                               | Hord silt loam, 3 to 6 percent slopes                        | 2.2          | 1.4%           |
| <b>Totals for Area of Interest</b> |  | <b>154.9</b> | <b>100.0%</b>  |

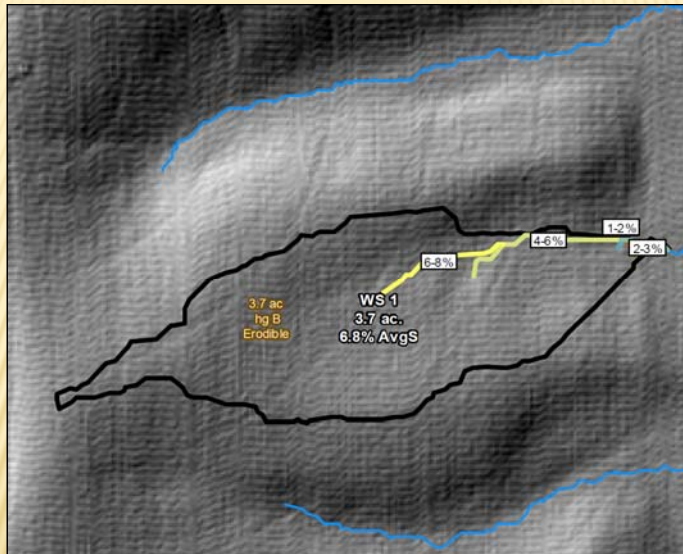
## HYDROLOGIC SOIL GROUPS

| Map unit symbol                    | Map unit name  | Rating | Acres in AOI | Percent of AOI |
|------------------------------------|--|--------|--------------|----------------|
| 2533                               | Coly silt loam, 11 to 30 percent slopes                      | B      | 18.8         | 12.1%          |
| 2537                               | Coly silt loam, 6 to 11 percent slopes                       | B      | 98.3         | 63.5%          |
| 2544                               | Coly, Uly and Hobbs soils, 3 to 30 percent slopes            | B      | 14.0         | 9.1%           |
| 2671                               | Holdrege silt loam, 3 to 7 percent slopes, eroded            | C      | 0.9          | 0.5%           |
| 2843                               | Uly, Holdrege and Coly soils, 6 to 11 percent slopes, eroded | B      | 0.3          | 0.2%           |
| 3562                               | Hobbs silt loam, occasionally flooded, cool                  | B      | 20.3         | 13.1%          |
| 8872                               | Hord silt loam, 3 to 6 percent slopes                        | B      | 2.2          | 1.4%           |
| <b>Totals for Area of Interest</b> |  |        | <b>154.9</b> | <b>100.0%</b>  |

## SOIL ERODIBILITY

| Erosion Categories for Grassed Waterways (NE)-Buffalo County, Nebraska |                  |                  |
|--|------------------|------------------|
| Map unit symbol and soil name  | Pct. of map unit | Erosion Category |
| 2533—Coly silt loam, 11 to 30 percent slopes                           |                  |                  |
| Coly   | 85               | Erodible         |
| 2537—Coly silt loam, 6 to 11 percent slopes                            |                  |                  |
| Coly   | 85               | Erodible         |
| 2544—Coly, Uly and Hobbs soils, 3 to 30 percent slopes                 |                  |                  |
| Coly   | 55               | Erodible         |
| Hobbs  | 20               | Erodible         |
| Uly  | 20               | Erodible         |
| 2671—Holdrege silt loam, 3 to 7 percent slopes, eroded                 |                  |                  |
| Holdrege   | 93               | Erodible         |
| 2843—Uly, Holdrege and Coly soils, 6 to 11 percent slopes, eroded      |                  |                  |
| Uly  | 45               | Erodible         |
| Holdrege   | 30               | Erodible         |
| Coly   | 20               | Erodible         |
| 3562—Hobbs silt loam, occasionally flooded, cool                       |                  |                  |
| Hobbs  | 85               | Erodible         |
| 8872—Hord silt loam, 3 to 6 percent slopes                             |                  |                  |
| Hord   | 100              | Erodible         |





Watershed Analysis of Potential Ephemeral Gully #4

## EPHEMERAL WATERSHED ANALYSIS

| Watershed | Area | Watershed Average Slope | Max Channel Grade | Dominant Soil | Hydrologic Group |
|-----------|------|-------------------------|-------------------|---------------|------------------|
| 1         | 8.3  | 7.4%                    | 6%                | 2537          | B                |
| 2         | 7.3  | 6.6%                    | 6%                | 2537          | B                |
| 3         | 10.8 | 8.8%                    | 6%                | 2533          | B                |
| 4         | 3.7  | 6.8%                    | 7%                | 2537          | B                |
| 5         | 6.7  | 7.8%                    | 6%                | 2533          | B                |
| 6         | 8.4  | 9.2%                    | 6%                | 2533          | B                |



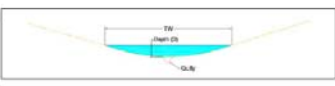
USDA NRCS NR-6CS

**Ephemeral Gully Modeling Tool v. 2, 2017-8-21**

Completed by: **Buffalo County Example** Date: \_\_\_\_\_ Office: \_\_\_\_\_  
 Cooperator: \_\_\_\_\_ Town: \_\_\_\_\_ Field: **Outlet #3**

Frequency: **2** Year - 24 Hour Rain Fall Amount  
 County: **BUTTA** 2.74 inch  
 Soil Map Code: **2227**  
 Hydrologic Group: **B**  
 Drainage Area: **10.8** ac-ft  
 Ave Watershed Slope: **0.8** %  
 Watershed Length: **330** feet

Actual Bed Slope at Gully Location: **6** %  
 Soil Erodibility at Gully Location: **Erodible**  
 Gully Section Top Width @ 0.5' Depth (Select): **15' TW** (feet)  
 (Measured to be parabolic)  
 Measure flow depth and top width of concentrated flow area as though gully were NOT present.



Watershed Cropping System (Select): **High Res. No-Till**  
 Maximum Allowable Bed Slope: **1.3 %**  
 Cropping System selected is not adequate to control ephemeral gully erosion.

| Cropping System               | Runoff Curve Number | Peak Discharge (cfs) | Erosion Resistant or Very Erosion Resistant Soil<br>In Flow Area<br>(Max. Soil Stress = 0.05 psf) |        |        | Erodible Soil in Flow Area<br>(Max. Soil Stress = 0.03 psf) |        |        |
|-------------------------------|---------------------|----------------------|---|--------|--------|---|--------|--------|
|                               |                     |                      | 10' TW  | 15' TW | 20' TW | 10' TW  | 15' TW | 20' TW |
| Clean Till                    | 80                  | 12.2                 | - %   | - %    | - %    | - %   | - %    | - %    |
| Conventional Till             | 85                  | 19.9                 | - %   | 0.2 %  | 0.2 %  | - %   | - %    | - %    |
| Mulch Till / Low Res. No-Till | 83                  | 17.4                 | 0.4 %   | 0.6 %  | 0.8 %  | 0.2 %   | 0.3 %  | 0.3 %  |
| <b>High Res. No-Till</b>      | <b>74</b>           | <b>8.7</b>           | 1.9 %   | 2.7 %  | 3.4 %  | 0.9 %   | 1.3 %  | 1.6 %  |
| Cover Crop                    | 77                  | 7.1                  | 4.0 %   | 7.0 %  | 12.0 % | 1.8 %   | 3.5 %  | 6.0 %  |

Gully Treatment Option (Select): **Cover Crop**  
 Cover crop stem height = 6 inches; Cover crop stem density = 30 stems per square foot; Vegetal Cover Factor = 0.5 (representative of typical annual crop stubble)

Watershed Cropping System (from Above): **High Res. No-Till**  
 Watershed Peak Discharge into Gully: **8.7** cfs  
 Maximum Allowable Bed Slope: **3 %**  
 Gully Treatment selected is not adequate to control ephemeral gully erosion.

| Gully Treatment               | Peak Discharge (cfs) | Erosion Resistant or Very Erosion Resistant Soil<br>In Flow Area<br>(Max. Soil Stress = 0.05 psf) |        |        | Erodible Soil in Flow Area<br>(Max. Soil Stress = 0.03 psf) |        |        |
|-------------------------------|----------------------|---|--------|--------|---|--------|--------|
|                               |                      | 10' TW  | 15' TW | 20' TW | 10' TW  | 15' TW | 20' TW |
| Clean Till                    | 8.7                  | - %   | - %    | 0.2 %  | - %   | - %    | - %    |
| Conventional Till             | 8.7                  | 0.3 %   | 0.4 %  | 0.6 %  | - %   | 0.2 %  | 0.3 %  |
| Mulch Till / Low Res. No-Till | 8.7                  | 0.8 %   | 1.2 %  | 1.5 %  | 0.4 %   | 0.5 %  | 0.7 %  |
| High Res. No-Till             | 8.7                  | 1.9 %   | 2.7 %  | 3.4 %  | 0.9 %   | 1.3 %  | 1.6 %  |
| <b>Cover Crop</b>             | <b>8.7</b>           | 3.0 %   | 6.0 %  | 10.0 % | 1.5 %   | 3.0 %  | 5.0 %  |

## RESULTS FOR EPHEMERAL AREA #3

| Watershed Cropping System (Select)  |                      | High Res. No-Till   |   |        |   |   |        |        |
|---|----------------------|---|---|--------|---|---|--------|--------|
| Maximum Allowable Bed Slope   |                      | 1.3 %   |   |        |   |   |        |        |
| Cropping System selected is not adequate to control ephemeral gully erosion.  |                      |   |   |        |   |   |        |        |
| Cropping System   | Runoff Curve Number  | Peak Discharge (cfs)  | Erosion Resistant or Very Erosion Resistant Soil<br>In Flow Area<br>(Max. Soil Stress = 0.05 psf) |        |   | Erodible Soil in Flow Area<br>(Max. Soil Stress = 0.03 psf) |        |        |
|   |                      |   | 10' TW  | 15' TW | 20' TW  | 10' TW  | 15' TW | 20' TW |
| Clean Till  | 80                   | 12.2  | - %   | - %    | - %   | - %   | - %    | - %    |
| Conventional Till   | 85                   | 19.9  | - %   | 0.2 %  | 0.2 %   | - %   | - %    | - %    |
| Mulch Till / Low Res. No-Till   | 83                   | 17.4  | 0.4 %   | 0.6 %  | 0.8 %   | 0.2 %   | 0.3 %  | 0.3 %  |
| <b>High Res. No-Till</b>  | <b>74</b>            | <b>8.7</b>  | 1.9 %   | 2.7 %  | 3.4 %   | 0.9 %   | 1.3 %  | 1.6 %  |
| Cover Crop  | 77                   | 7.1   | 4.0 %   | 7.0 %  | 12.0 %  | 1.8 %   | 3.5 %  | 6.0 %  |
| Gully Treatment Option (Select)   |                      | Cover Crop  |   |        |   |   |        |        |
| Cover crop stem height = 6 inches; Cover crop stem density = 30 stems per square foot; Vegetal Cover Factor = 0.5 (representative of typical annual crop stubble) |                      |   |   |        |   |   |        |        |
| Watershed Cropping System (from Above)  |                      | High Res. No-Till   |   |        |   |   |        |        |
| Watershed Peak Discharge into Gully   |                      | 8.7 cfs   |   |        |   |   |        |        |
| Maximum Allowable Bed Slope   |                      | 3 %   |   |        |   |   |        |        |
| Gully Treatment selected is not adequate to control ephemeral gully erosion.  |                      |   |   |        |   |   |        |        |
| Gully Treatment   | Peak Discharge (cfs) | Erosion Resistant or Very Erosion Resistant Soil<br>In Flow Area<br>(Max. Soil Stress = 0.05 psf) |   |        | Erodible Soil in Flow Area<br>(Max. Soil Stress = 0.03 psf) |   |        |        |
|   |                      | 10' TW  | 15' TW  | 20' TW | 10' TW  | 15' TW  | 20' TW |        |
| Clean Till  | 8.7                  | - %   | - %   | 0.2 %  | - %   | - %   | - %    |        |
| Conventional Till   | 8.7                  | 0.3 %   | 0.4 %   | 0.6 %  | - %   | 0.2 %   | 0.3 %  |        |
| Mulch Till / Low Res. No-Till   | 8.7                  | 0.8 %   | 1.2 %   | 1.5 %  | 0.4 %   | 0.5 %   | 0.7 %  |        |
| High Res. No-Till   | 8.7                  | 1.9 %   | 2.7 %   | 3.4 %  | 0.9 %   | 1.3 %   | 1.6 %  |        |
| <b>Cover Crop</b>   | <b>8.7</b>           | 3.0 %   | 6.0 %   | 10.0 % | 1.5 %   | 3.0 %   | 5.0 %  |        |

# RESULTS FOR EPHEMERAL AREA #4

|  |                               |  |   |               |              |  |              |        |        |  |  |
|--|-------------------------------|--|---|---------------|--------------|--|--------------|--------|--------|--|--|
| Watershed Cropping System (Select)     | Mulch Till / Low Res. No-Till |  |   |               |              |  |              |        |        |  |  |
| Maximum Allowable Bed Slope            | 0.7 %                         | Cropping System selected is not adequate to control ephemeral gully erosion. |   |               |              |  |              |        |        |  |  |
| Cropping System                        | Runoff Curve Number           | Peak Discharge   | Maximum Allowable Gully Bed Slope, (percent)  |               |              |  |              |        |        |  |  |
|  |                               |  | Erosion Resistant or Very Erosion Resistant Soil in Flow Area (Max. Soil Stress = 0.05 psf)   |               |              | Erodible Soil in Flow Area (Max. Soil Stress = 0.03 psf) |              |        |        |  |  |
|  |                               |  | cfs   | 10' TW        | 15' TW       | 20' TW   | 10' TW       | 15' TW | 20' TW |  |  |
| Clean Till                             | 86                            | 8.0  | - %   | - %           | 0.2 %        | - %  | - %          | - %    | - %    |  |  |
| Conventional Till                      | 95                            | 7.6  | 0.3 %   | 0.5 %         | 0.6 %        | - %  | 0.2 %        | 0.3 %  |        |  |  |
| <b>Mulch Till / Low Res. No-Till</b>   | <b>83</b>                     | <b>6.6</b>   | 1.0 %   | 1.5 %         | 1.9 %        | 0.5 %  | 0.7 %        | 0.9 %  |        |  |  |
| High Res. No-Till                      | 74                            | 3.4  | 4.5 %   | 6.0 %         | 8.0 %        | 2.1 %  | 3.0 %        | 3.9 %  |        |  |  |
| Cover Crop                             | 72                            | 3.0  | 30.0 %  | 30.0 %        | 30.0 %       | 16.0 %   | 30.0 %       | 30.0 % |        |  |  |
| Gully Treatment Option (Select)        | Cover Crop                    |  | Cover crop stem height = 6 inches; Cover crop stem density = 30 stems per square foot; Vegetal Cover Factor = 0.5 (representative of typical annual crop stubble) |               |              |  |              |        |        |  |  |
| Watershed Cropping System (from Above) | Mulch Till / Low Res. No-Till |  |   |               |              |  |              |        |        |  |  |
| Watershed Peak Discharge into Gully    | 6.6 cfs                       |  |   |               |              |  |              |        |        |  |  |
| Maximum Allowable Bed Slope            | 5 %                           |  | Gully Treatment selected is not adequate to control ephemeral gully erosion.  |               |              |  |              |        |        |  |  |
| Gully Treatment                        | Peak Discharge                | cfs  | Maximum Allowable Gully Bed Slope, (percent)  |               |              |  |              |        |        |  |  |
|  |                               |  | Erosion Resistant or Very Erosion Resistant Soil in Flow Area (Max. Soil Stress = 0.05 psf)   |               |              | Erodible Soil in Flow Area (Max. Soil Stress = 0.03 psf) |              |        |        |  |  |
|  |                               |  | 10' TW  | 15' TW        | 20' TW       | 10' TW   | 15' TW       | 20' TW |        |  |  |
| Clean Till                             | 6.6                           | - %  | 0.2 %   | 0.2 %         | - %          | - %  | - %          | - %    |        |  |  |
| Conventional Till                      | 6.6                           | 0.4 %  | 0.6 %   | 0.7 %         | 0.2 %        | 0.3 %  | 0.3 %        |        |        |  |  |
| Mulch Till / Low Res. No-Till          | 6.6                           | 1.0 %  | 1.5 %   | 1.9 %         | 0.5 %        | 0.7 %  | 0.9 %        |        |        |  |  |
| High Res. No-Till                      | 6.6                           | 2.4 %  | 3.5 %   | 4.4 %         | 1.2 %        | 1.7 %  | 2.1 %        |        |        |  |  |
| <b>Cover Crop</b>                      | <b>6.6</b>                    | <b>9.0 %</b>   | <b>10.0 %</b>   | <b>10.0 %</b> | <b>2.5 %</b> | <b>5.0 %</b>   | <b>8.0 %</b> |        |        |  |  |

# QUESTIONS?