Argenta Cooperative Monitoring Group
Issue Resolution Documentation – Section 13.1 of Settlement Agreement
Interpretation of Upland Utilization Data
NRST Response 4.29.16

1. Brief Description of Situation

The annual report uses invalid criteria to determine success and failure to meet allowable use criteria set in the Settlement Agreement at upland sites. Where monitoring showed that the 40% herbaceous utilization criteria was exceeded the report indicates that the utilization criteria was not exceeded because the confidence interval dipped below 40%. The report should reflect that the allowable use levels set in the Settlement Agreement were exceeded where the average utilization of the key species was greater than the 40% criteria in the Settlement Agreement.

2. Issues among parties

For example, on the Horse Haven Use Area, the average utilization was 48.2% for POSE but the report goes on to state:

> *When the 95% confidence interval is used to evaluate annual use, this site had moderate use (48.2% +/- 14.8%) that still was within the allowable use levels set in the Settlement Agreement. The monitoring data indicate with a 95% confidence interval that actual use was from 33.4% to 63%. Because part of this range is below the 40% allowable level, the monitoring information is interpreted as being within the allowable level.*

Stated simply, the utilization at the Horse Haven Use Area site was 48.2%, not 33.4% and not 63%. It exceeded the 40% utilization standard in the settlement agreement which simply states:

> *The End of Season use levels for upland areas (except for the Mule Canyon Use Area will be light use, i.e. 30% use for key woody species and 40% use for key herbaceous species, respectively (not a combined average use of the two), as measured at Key Areas.*

The report should reflect that the use exceeded the allowable level set in the Settlement Agreement for the Horse Haven Use Area.

Mill Creek Use Area

The same criteria were used at the Mill Creek Use Area site. For ACLE9 the average utilization was 44.7% and the average utilization for BRMA4 was 41.2%. For both of these species, the 40% utilization criteria was exceeded. It doesn't matter what the confidence interval is for these species, yet, the report goes on to state:

> *Use on the key species is moderately high; however, when the 95% confidence intervals are accounted for, the use is within the allowable level set in the Settlement Agreement. With an abundance of desirable, highly-palatable, native, deep-rooted perennial grasses,*

this should be a site that receives close attention during the grazing period to ensure the allowable limits are not exceeded.

The report should reflect that the use exceeded the allowable level set in the Settlement Agreement for the Mill Creek Use Area.

North Fork Mill Creek Use Area

For the North Fork Mill Creek Use Area, the report shows that for BRMA4 the average utilization was 55.6%, ELEL5 the average utilization was 35.8%, and for FEID the average utilization was 43.1%. When the three species are averaged, the average utilization was 44.8% yet the report falsely states:

When use on the three key species is averaged, the use is within the allowable level set in the Settlement Agreement.

The report should reflect that the use exceeded the allowable level set in the Settlement Agreement for the North Fork Mill Creek Use Area.

3. Options for Resolution (Minimum of two)

1. The report should reflect that the use exceeded the allowable level set in the Settlement Agreement for the Horse Haven Use Area, Mill Creek Use Area, North Fork Mill Creek Use Area.

2. The report should reflect that the use exceeded the allowable level set in the Settlement Agreement for all of the Use Areas where the upper confidence interval extends above the 40% utilization standard set in the Settlement Agreement.

4. NRST Recommendation to Field Manager

Background

The dispute WWP raises concerning interpretation of utilization levels is essentially the same as was made with respect to stubble-height measurements. The question in both is whether confidence intervals matter. To explore this in-depth, we will examine and report the numbers as if confidence intervals matter, confidence intervals do not matter (a practice used by the BM office and requested by WWP), and by an approach that treats statistically ambiguous or uncertain measurements as "not failing." A discussion of confidence interval has been included in the NRST response to WWP's dispute over stubble height. Rather than repeating that discussion here, the interested reader should consult the NRST response to the stubble-height dispute.

If we use confidence intervals in our analysis of upland utilization estimates at the 19 upland monitoring sites, we have the following results:

- 4 sites (Slaven, Lewis, Sansinena, and Trout Creek) definitively (at the 95% confidence interval) exceeded the upland thresholds;
- 9 sites (Corral Canyon, Maysville N, South Flat, Fire Creek, Harry Canyon, Indian Creek, Mule Canyon, West Flat, Winter) definitively (at the 95% confidence interval) meet the upland thresholds; and
- 6 sites (Maysville S, Horse Haven, East Flat, North Fork, Mill Creek, and Whirlwind) are ambiguous because the confidence interval straddles the upland thresholds and the use may or may not have met the use levels.

If we base a met/did-not-meet determination on only the definitive results, we find that 4 of 13 sites (31%) clearly exceeded upland use thresholds and 9 of 13 sites (69%) clearly met upland use levels, i.e., use was less than the thresholds.

In the approach advocated by WWP and used by the Battle Mountain office in previous monitoring reports, confidence intervals are not used. Instead, the parameter estimate is treated as a very definitive and certain number (which it isn't) for determination of meeting/not meeting use levels. Using this approach, we find the following results:

- 7 of 19 sites (37%) are interpreted as having exceeded the use levels, and
- 12 of 19 sites (63%) are interpreted as having not exceeded the use levels.

Finally, the approach the NRST took was the most liberal in interpreting the results. This approach was discussed during the Settlement negotiations when different parties asked how monitoring data would be interpreted in those inevitable situations where confidence intervals would straddle the use thresholds. The NRST explained that given the statistical uncertainty involved with those situations where the parameter estimate is so close to the use threshold that the confidence interval straddles the use threshold (whether it is under or over the threshold), 'These situations would not be considered to have definitively exceeded the use levels.' What probably wasn't explicit in this discussion is whether these ambiguous cases should be treated as passes if they are not clear exceedances. In this approach the benefit of doubt and uncertainty is afforded the permittees for implementing management that was so close to the use thresholds that it met the spirit and intent of the Settlement Agreement. Under this approach, we have the following results:

- 4 of 19 sites (21%) definitively (at the 95% confidence level) exceeded the use levels, and
- 15 of 19 sites (79%) either met or did not definitively (at the 95% confidence level) exceed the upland use thresholds.

Rational for NRST's CI Interpretation

In accordance with section 6.9.1, the NRST used the methods prescribed in the Interagency Technical Reference 1734-1 (Coulloudon et al. 1999). Both the height-weight method and the key species method specifically call for the calculation of confidence intervals. This practice is reiterated in the CMG methods (CMG 2015a). Also, in the BLM Technical Reference 1730-1,

Elzinga et al. (1998) pointed out that when the parameter estimate exceeds the threshold value, but the lower bound of the confidence interval does not exceed the threshold value (as is the case in the disputed examples cited by WWP), the true population parameter can be anywhere inside of the confidence interval.

The NRST has used the guidance of Elzinga et al. (1998) to interpret only those situations where the parameter estimate and the entire confidence intervals exceed the use threshold as compelling evidence that the use threshold was exceeded. Furthermore, the NRST has taken a view that when the monitoring data are ambiguous and the confidence intervals straddle the use thresholds, there cannot be a definitive conclusion that these data "failed" or exceed the threshold. Some of these monitoring sites may have exceeded the use threshold, but given that the parameter estimate is so close to the threshold that a definitive conclusion could not be reached, the NRST chose a less draconian interpretation and gave the benefit of doubt and uncertainty to the permittees in the "scorecard."

The purpose of the Settlement Agreement was to implement an interim management plan, not to create another enforcement tool. The real focus should be on adaptive stockmanship plans and more intensive within-season monitoring efforts to improve the overall success of parties, and more importantly to implement practices that are more likely to improve rangeland conditions. NRST has required adaptive management and additional monitoring actions for sites that clearly exceeded and for all those sites that were statistically uncertain. The team believes that this interpretation meets the spirit and intent of the settlement, which is less focused on keeping score and more focused on taking adaptive actions to improve resource conditions over time.

NRST Recommendation Regarding CI Interpretation

In the explanation above, three approaches are summarized:

1. A conservative interpretation on only the definitive data (4 exceeds, 9 passes situations) generates a scorecard of 69% pass and 31% exceed.
2. A WWP/BM approach (which ignores statistical practices and the guidance of Elzinga et al. (1998) and Coulloudon et al. (1999) to use confidence intervals) in which the parameter estimate is treated as a certain, absolute, and true estimate of the population mean, generates a scorecard of 63% pass and 37% exceed.
3. And a liberal interpretation in which 4 definitive exceeds and 15 definitive meets
4. or ambiguous situations generates a scorecard of 21% exceed and 79% either definitively pass or did not clearly and unambiguously exceed the upland use thresholds.

NRST firmly recommends the use of confidence intervals in data interpretation and analysis and does not support approach 2. Beyond that, the NRST does not really care how the scorecard is calculated. In year one of the interim management plan, upland success was 69% on definitive data or 79% determination of sites that did not definitively fail. The NRST is far more interested in taking actions than in keeping score. Neither of these numbers (69% or 79%) changes the focus NRST placed on 2016 stockmanship plans and 2016 within-season monitoring practices.

The changes to stockmanship and monitoring are intended to improve resource conditions. The numbers used to generate the upland scorecard will not affect those plans. Also note that approaches 1 and 3 require adaptive actions on 10 monitoring and use areas; whereas the WWP/BM approach would have only required adaptive action on 7 monitoring sites.

If a decision is made to interpret and portray the results in the final 2015 monitoring report differently than they were portrayed in the draft report, the NRST recommends including a comprehensive discussion of the original interpretation, as well as the alternative interpretations and results (similar to how the information is summarized within this dispute document).

NRST Recommendation Regarding 2016 Monitoring

The NRST agrees with WWP that those sites, where the utilization estimates span the use thresholds set in the Settlement Agreement, should receive more attention in the 2016 and 2017 grazing seasons. However, the NRST approach applies the greater scrutiny to all ambiguous sites, including those where the estimated parameter is both over and under the use thresholds. In contrast, the WWP dispute only covers the ambiguous sites where the estimated parameter is above the use thresholds. This issue was raised during the CMG 3/9-3/10 meeting and the group recognizes that these borderline cases require increased vigilance. The CMG discussed the value of a more-frequent, within-season monitoring program so utilization at these sites does not cross the threshold in 2016 and beyond.

CMG agreed that for those KMAs, or monitoring sites, where the annual-use estimates did not meet the prescribed use levels (Slaven, Sansinena, Lewis, and Trout) or where the estimates are uncertain and "spanned" the annual-use thresholds (East Flat, Horse Haven, Mill Creek, North Fork Mill Creek, South Maysville, and Whirlwind), the within-season monitoring attention will be intensified. When a parameter estimate is at or near the annual-use threshold, it might be a matter of only a few days or couple weeks of additional grazing for the site to exceed an annual-use limit. The NRST believes that particular caution should be used at such sites. The sites that WWP identified in this dispute are among those that were at the "cautionary" level. Therefore, to ensure continued success, these KMAs need to be monitored frequently within the grazing season.

The CMG collaboratively developed a plan to monitor utilization monthly, and when the utilization estimate reaches 20% or more the monitoring frequency would be reduced to 14 days; and when the utilization estimate reaches 30%, the permittees would prepare for a move from the use area or portion of the use area represented by the KMA. These recommendations should be treated as guidelines and not standards. Some allowance might be made for season of use, regrowth potential, antecedent and current weather conditions, soil moisture, etc. The NRST recommends adhering to this agreement.

In addition, the NRST recommends that efforts should be made to reduce the width of the confidence interval of utilization data so that fewer monitoring data fall in the ambiguous range. To do this, field crews should calculate the width of the confidence interval in the field while

utilization measurements are being made. If the confidence interval is greater than 10% (and many in the ambiguous group were), the crews should decide if more samples should be collected to bring the confidence interval under 10%. This might mean increasing sample size from 10 to 20 samples for underrepresented key species, or from 20 to 25 or more for more abundant key species at a site.

Finally, NRST's recommendations apply only to implementation of the Argenta settlement agreement.

Citations

Cooperative Monitoring Group 2015a. Herbaceous Removal Methods: Modifications to the Key Species Plant Method and Height Weight Method.

Coulloudon et al. 1996 (revised 1999). Utilization studies and residual measurements, Interagency Technical Reference 1734-3, Bureau of Land Management, National Business Center, Denver, CO.

Elzinga, C.L., D.W. Salzer, and J.W. Willoughby 1998. Measuring and monitoring plant populations. BLM Technical Reference 1730-1. U.S. Department of Interior, Bureau of Land Management, Denver, CO.

National Riparian Service Team 2016. Argenta year end monitoring summary.

USDA Natural Resources Conservation Service 1999. Plant Guide: Management and Use of Crested and Siberian Wheatgrasses, Boise, ID, 5 p.

USDA Natural Resources Conservation Service 2001. Plant Guide: Crested Wheatgrass *Agropyron cristatum* and *Agropyron desertorum*.

USDA Natural Resources Conservation Service 2006. Plant Guide: Crested Wheatgrass *Agropyron cristatum*. Idaho State Office, Boise, ID, 6 p.

5. **Field Manager – Acceptance with of NRST recommendation (yes X no_____).**
   Date Received 4/30/2016
   Date of Decision 5/13/2016 **Signature of FM** [signature]
   Comments:

After carefully considering the recommendations and rationale provided by the NRST on this dispute, and in careful coordination with the Regional Office of the Solicitor, National Upland Monitoring Lead, National Operations Center, and the Nevada State Office, I recommend to adopt the recommendations provided by the NRST pursuant to and in accordance with the MLFO responses to both NRST recommendations and the accompanying rationale provided in the attachment (see attachment "MLFO Response to Dispute Resolution: Upland Utilization Confidence Intervals").

6. **District Manager – Acceptance of NRST recommendation, if needed (yes_____ no____)**
   Date Received _____
   Date of Decision _____ **Signature of DM**_____
   Comments:

7. **State Director – Final Determination**
   Date Received_____
   Date of Decision_____ **Signature of SD**_____
   Comments:

Instructions/intent for Issue Resolution Document

Purpose of Document – This tool is intended to provide a record of how decisions are made on various issues that might arise within the CMG, including how and at what level those issues are resolved. This tool will provide transparency to options and possible consequences, including the rationales for which choices are made, and specific record of the timing and outcomes of issue resolution. It will also establish a record and help create consistency in the face of changing players over time. Close communications and an environment for resolving issues at the lowest level is encouraged. Minor issues/disagreements that are easily handled in the normal team situation will not be documented in this manner; this is intended for substantive issues that affect intended outcomes under the settlement agreement.

1. *Document the situation surrounding CMG disagreement on a given issue, including if possible, the location, essential time frames, background (including reference to Settlement Agreement section if applicable), and potential scope of consequences.*

2. *Who are the parties in disagreement; what are the differing positions and the basis for each differing side?*

3. *At least two options for resolution must be described, even if one is "no action". The CMG will be expected to problem solve and raise other possible solutions to the issue to assist the parties in disagreement. Each option will be briefly documented.*

4. *Following the problem solving activity (where needed), the NRST will select, document and provide rationale for a recommendation to the Field Manager.*

5. *If accepted, this will end the issue resolution process; if not, the NRST recommendation will be forwarded to the DM promptly, accompanied by written rationale by the FM for not agreeing to the NRST recommendation.*

6. *The DM will review the recommendation by the NRST along with the rationale statement by the FM for his/her disagreement. The DM will accept or reject the NRST recommendation; again, discussion between NRST and DM is strongly encouraged prior to determination. If the DM disagrees with the NRST, rationale should be documented and provided to the State Director along with resolution deemed more suitable by the DM.*

7. *The State Director will review the recommendation by the NRST and information in support of the differing position of the DM, and promptly render a final determination.*

Other – At each step in the process, the parties will be provided electronic copies of the various documents and determinations. The BLM Battle Mountain District Office will maintain the official record of transactions for the issue resolution process.

MLFO Response to Dispute Resolution

Upland Utilization Confidence Intervals

Summary of WWP Dispute: The annual report uses invalid criteria to determine success and failure to meet allowable use criteria set in the Settlement Agreement at upland sites. Where monitoring showed that the 40% herbaceous utilization criteria was exceeded the report indicates that the utilization criteria was not exceeded because the confidence interval dipped below 40%. The report should reflect that the allowable use levels set in the Settlement Agreement were exceeded where the average utilization of the key species was greater than the 40% criteria in the Settlement Agreement.

MLFO Response Coordination: The MLFO response was developed in coordination with the Regional Office of the Solicitor, the National Rangeland Inventory and Monitoring Lead, the National Operations Center and the Nevada State Office.

NRST Recommendations	MLFO response to NRST Recommendations
In the explanation above, three approaches are summarized: 1. A conservative interpretation on only the definitive data (4 exceeds, 9 passes situations) generates a scorecard of 69% pass and 31% exceed. 2. A WWP/BM approach (which ignores statistical practices and the guidance of Elzinga et al. (1998) and Coulloudon et al. (1999) to use confidence intervals) in which the parameter estimate is treated as a certain, absolute, and true estimate of the population mean, generates a scorecard of 63% pass and 37% exceed. 3. And a liberal interpretation in which 4 definitive exceeds and 15 definitive meets 4. or ambiguous situations generates a scorecard of 21% exceed and 79% either definitively pass or did not clearly and unambiguously exceed the upland use thresholds. NRST firmly recommends the use of confidence intervals in data interpretation and analysis and does not support approach 2. Beyond that, the NRST does not really care how the scorecard is calculated. In year one of the interim management plan, upland success was 69% on definitive data or 79% determination of sites that	MLFO recommends to adopt approach #1, with one modification, namely that the monitoring report explain that the KMA's that have monitoring data that falls within the confidence interval be characterized as either "more likely than not" to have "met" or "not met," depending on where the data falls within the confidence interval. The report should also more clearly explain that for purposes of the adaptive management process described in the Settlement Agreement flow chart, NRST has adopted the as approach described in Elzinga (page 262) which states that "one approach is to decide that if any part of the confidence interval crosses the threshold you will take action, based on the possibility that the true parameter has crossed the threshold. This minimizes the risk to the plant resource for which you are managing." The MLFO supports this approach, which is reflected in NRST's recommendations for adaptive management, despite classifying data falling within the confidence interval as "met." NRST's recommendations describes Approach #2 (the WWP/BM approach) as "A WWP/BM approach (which ignores statistical practices and the guidance of Elzinga et al. (1998) and Coulloudon et al. (1999) to use confidence intervals) in which the parameter estimate is treated as a certain, absolute, and true estimate of the population mean." While the MLFO cannot speak for WWP, the MLFO notes that NRST's characterization of the "BM" (Battle Mountain) approach is not accurate. The MLFO is not advocating to "ignore statistical practices", or never use confidence intervals. Confidence intervals can

did not definitively fail. The NRST is far more interested in taking actions than in keeping score. Neither of these numbers (69% or 79%) changes the focus NRST placed on 2016 stockmanship plans and 2016 within-season monitoring practices. The changes to stockmanship and monitoring are intended to improve resource conditions. The numbers used to generate the upland scorecard will not affect those plans. Also note that approaches 1 and 3 require adaptive actions on 10 monitoring and use areas; whereas the WWP/BM approach would have only required adaptive action on 7 monitoring sites. If a decision is made to interpret and portray the results in the final 2015 monitoring report differently than they were portrayed in the draft report, the NRST recommends including a comprehensive discussion of the original interpretation, as well as the alternative interpretations and results (similar to how the information is summarized within this dispute document).	be a useful tool, especially if enough samples can be taken so the confidence interval is small. The MLFO has never stated that it disagrees with the use of confidence intervals as a general matter. Instead, the disagreement is with characterizing all data that falls within a confidence interval as having "met" the objectives, when data within the confidence interval could actually exceed the objectives. The MLFO believes that it is more appropriate (when confidence intervals are used), to acknowledge that it cannot be definitively determined whether the data falling within the confidence interval meets the objectives, although some data will have a "more likely than not possibility" of either meeting or exceeding the threshold that was set.
The NRST agrees with WWP that those sites, where the utilization estimates span the use thresholds set in the Settlement Agreement, should receive more attention in the 2016 and 2017 grazing seasons. However, the NRST approach applies the greater scrutiny to all ambiguous sites, including those where the estimated parameter is both over and under the use thresholds. In contrast, the WWP dispute only covers the ambiguous sites where the estimated parameter is above the use thresholds. This issue was raised during the CMG 3/9-3/10 meeting and the group recognizes that these borderline cases require increased vigilance. The CMG discussed the value of a more-frequent, within-season monitoring program so utilization at these sites does not cross the threshold in 2016 and beyond.	The MLFO agrees with this discussion and notes that as NRST has pointed out, NRST's adaptive management actions apply to some sites that would not have been covered by WWP's approach of solely considering whether the monitored utilization was above or below the threshold, because adaptive management has been applied to all sites where the measured utilization falls within the confidence interval. Thus, although sites within the confidence interval were characterized as having "met" the end-of-season utilization levels, the adaptive management actions show that management changes were applied to those sites – which is an appropriate response where it is unknown whether those sites met or did not meet the objectives.
CMG agreed that for those KMAs, or monitoring sites, where the annual-use estimates did not meet the prescribed use levels (Slaven, Sansinena, Lewis, and Trout) or where the estimates are uncertain and	The MLFO agrees with the NRST's recommendations for adaptive management at sites where utilization fell within the confidence interval as also discussed previously.

"spanned" the annual-use thresholds (East Flat, Horse Haven, Mill Creek, North Fork Mill Creek, South Maysville, and Whirlwind), the within-season monitoring attention will be intensified. When a parameter estimate is at or near the annual-use threshold, it might be a matter of only a few days or couple weeks of additional grazing for the site to exceed an annual-use limit. The NRST believes that particular caution should be used at such sites. The sites that WWP identified in this dispute are among those that were at the "cautionary" level. Therefore, to ensure continued success, these KMAs need to be monitored frequently within the grazing season.	
The CMG collaboratively developed a plan to monitor utilization monthly, and when the utilization estimate reaches 20% or more the monitoring frequency would be reduced to 14 days; and when the utilization estimate reaches 30%, the permittees would prepare for a move from the use area or portion of the use area represented by the KMA. These recommendations should be treated as guidelines and not standards. Some allowance might be made for season of use, regrowth potential, antecedent and current weather conditions, soil moisture, etc. The NRST recommends adhering to this agreement.	The MLFO agrees that the proposed adaptive management actions would help ensure that livestock are moved before thresholds are exceeded as required under the Settlement Agreement at paragraphs 3.18 and 6.8.1. While some allowance might be appropriate in some circumstances, the MLFO believes adhering to these recommendations is important to ensure that utilization objectives are met and that overgrazing does not occur.
In addition, the NRST recommends that efforts should be made to reduce the width of the confidence interval of utilization data so that fewer monitoring data fall in the ambiguous range. To do this, field crews should calculate the width of the confidence interval in the field while utilization measurements are being made. If the confidence interval is greater than 10% (and many in the ambiguous group were), the crews should decide if more samples should be collected to bring the confidence interval under 10%. This might mean increasing sample size from 10 to 20 samples for underrepresented key species, or from 20 to 25 or more for more abundant key species at a site.	The MLFO agrees with this recommendation. The MLFO would like to see the width of CI's as small as possible; because of limited samples at some sites it may be necessary to consider using a 90% confidence interval instead of the 95%. If comparisons are needed to previous year's data, the raw data are available to recalculate a previous years CI at the 90% level. The absence of sufficient key species is another reason why it is important to err on the side of greater, rather than lesser, protection of the range where data falls within the confidence interval.
Finally, NRST's recommendations apply only	The MLFO agrees that NRST's approach to

to implementation of the Argenta settlement agreement.	characterizing data that falls within the confidence interval as meeting utilization objectives should not be applied to characterize whether management changes are needed in other grazing management contexts.
NRST Rationale for Recommendations	**MLFO Response to NRST Rationale**
Background on use and interpretation of confidence intervals – NRST provided a general explanation regarding: (1) the importance of using CIs when interpreting data, (2) the various interpretations (definitively not met, definitively met, and 'unknowns'), and (3) guidance for handling statistically uncertain situations (i.e., Elzinga et al. 1998).	In general the MLFO agrees that confidence intervals serve a useful purpose in interpreting data that are collected and believes that it is appropriate to use confidence intervals in many cases. While use of confidence intervals when analyzing monitoring data is not required, it can be a useful tool, especially where a sufficient number of samples have been taken and results in a smaller confidence intervals. When confidence intervals are too large, they are of less value to those interpreting them, as noted in BLM's Technical References. Given the above, the MLFO wants to clarify that: (1) Confidence Intervals are not required or mandated to be used by BLM when interpreting monitoring data. Technical References are not policy documents and do not impose mandatory duties on the BLM. As explained in Instruction Memorandum (Washington Office IM 85-151), "Technical references are guides to completing a task and should not be construed as directives". The Technical References that apply to BLM's Rangeland Management program provide useful guidance and discussion about confidence intervals; they do not require that BLM always apply confidence intervals nor do they imply that not using confidence intervals is contrary to accepted practice norms. (2) NRST rationale states that TR 1734-3 "calls for the measurement of at least 20 height-weight samples along a monitoring transect". This statement should be clarified, in that; the Technical Reference advises to "measure at least 20 ungrazed plants to obtain a reliable cross section of ungrazed plant heights." There is no specific recommended number of samples in the Technical Reference to estimate utilization. (3) NRSTrationale states that it is "inappropriate to use the parameter estimate alone to draw conclusions." This statement is not an accurate

	restatement of BLM guidance. It may be useful or helpful to apply confidence intervals, when such information is available and sufficiently reliable, but it is not "inappropriate" not to do so, for example, where there is too small a sample or other factors lead to the confidence interval being too large to provide meaningful information. (4) NRST's rationalestates that per Elzinga et al. (1998), "a threshold . . . cannot be considered to be exceeded until both the parameter estimate and the confidence intervals all exceed the threshold." While Elzinga does say that Example (D) shows the threshold is definitively crossed, Elzinga does not state or imply that a threshold "cannot be considered to be exceeded" if it is within the confidence interval. Instead, Elzinga states that if the data falls it is within the confidence interval (e.g., Examples (B) and (C) at pages 261-262) then there is a "possibility that the true parameter has crossed the threshold," and explains that in this situation, it can be appropriate to decide that "if any part of the confidence interval crosses the threshold then action should be taken . . . [as] This minimizes the risk to the plant resource for which you are managing." Although NRST states that Examples (B) and (C) in Elzinga are characterized as "met" in the 2015 monitoring report, the fact that NRST has recommended that adaptive management actions be taken, reveals that NRST has actually treated those areas as having potentially crossed the utilization threshold. (5) The recommendations infer that only those situations where the parameter estimate and the entire confidence intervals exceed the use threshold as definitive evidence to state that thresholds are exceeded. This is true. However, Elzinga leaves the interpretation of actions needed to be taken up to the discretion of the Authorized Officer and clearly suggest that caution for the vegetative resource should be taken. John Willoughby (a co-author of Elzinga) takes the position that the prudent conclusion for Examples (B) and (C) would be that the utilization level *does not* meet the prescribed use level. Elzinga et al. (1998, page 262), state that one approach to dealing with situations B and C (in Figure 11.22 on page 261) "is to decide that if any part of the confidence interval crosses the threshold you will take action,

	based on the possibility that the true parameter has crossed the threshold. This minimizes the risk to the plant resource for which you are managing." Action in this case would be measures to decrease the grazing pressure on a site, such as those recommended by NRST to minimize the potential for exceeding the utilization threshold in this grazing year. The Adaptive management flow chart provided in the settlement agreement asked the question "were end of season use levels met?" In the answer responding "Yes" in the flow chart the recommendation is to "Continue Current Management?" In the answer responding "No" in the flow chart the recommendation is to make changes to the next years if livestock grazing was a factor. Stating that a location did not exceed the threshold, but then finding that changes were warranted is not consistent with the adaptive management flow chart in the Settlement Agreement, and reveals that while NRST categorized monitoring results within the confidence interval as "met" that it is actually recommending management consistent with thresholds not being met. The MLFO agrees that the adaptive management actions recommended for those use areas is appropriate, based on a finding that data within the confidence interval may not have met the established threshold objectives.
Comparison of different CI interpretations – NRST re-calculated % success based on varying interpretations. <u>Upland Utilization</u> 9 sites definitively met upland thresholds 6 sites are statistically uncertain 4 sites definitively exceeded upland thresholds NRST interpretation – 15 of 19 (79%) sites either met or did not definitively exceed; 4 of 19 (21%) sites definitively exceeded WWP interpretation – (does not consider CIs) 12 of 19 (63%) sites met; 7 of 19 (37%) sites exceeded. Considering unknowns – 9 of 13 (69%) sites definitively met; 4 of 13 (31%) definitively exceeded. Six sites are statistically uncertain and not figured into calculations.	(6) It is important to clarify that MLFO does not take the position that confidence intervals "do not matter" or that they should not be used. Confidence intervals can be useful tool and provide useful information. It should also be noted that using confidence intervals could result in the need for <u>more</u> grazing management changes (under the Elzinga approach and consistent with the adaptive management table), because some utilization that falls below the threshold, but within the confidence interval, could actually exceed the threshold. So values both below and above the threshold could lead to management changes, and if the confidence interval is large, this could overstate the amount of remedial management action needed, as compared to just using the utilization level to determine whether it is exceeded or not, without applying a confidence interval. (7) It should be noted that some data points within

	the confidence interval are more likely than not to have met or exceeded the threshold than others. It is true that rationale states it is unknown whether data within the confidence interval exceeded the use threshold; as the true value could either be above or below the threshold. However as Mike "Sherm" Karl (National Rangeland Inventory and Monitoring Lead) has stated, even when it is within the confidence interval it is possible to find that "there is a more likely than not possibility" that the residual stubble height was not achieved if the data is toward the lower end of the confidence interval, whereas data toward to upper end of the confidence interval has "a more likely than not possibility" that the residual stubble height was achieved. So it may not be appropriate to treat all data points within that confidence interval (especially where it is a large interval) equally unknown -- this could apply both to taking a "conservative" approach as well as to taking a more "liberal" approach of considering anything within the threshold. Each situation may require a case-by-case assessment of whether it is appropriate or useful (given sample size, or the size of the confidence interval) to use a confidence interval and how to treat data that falls within the confidence interval.
Rationale for NRST interpretation – NRST explained their rationale regarding the use of CIs and their selected interpretation in the draft year-end monitoring report. • NRST strongly supports the use of CIs in data analysis and interpretation, and has made this point since the beginning (documented in response). • For reporting purposes, NRST chose to include 'unknown' sites in the 'met' category because one cannot definitely say they exceeded. In this approach, the benefit of the doubt and uncertainty is afforded to the permittees for implementing management that was so close to the use thresholds that it met the spirit and intent of the settlement. • NRST believes the focus of the settlement is less about keeping score, and more about implementing adaptive management and monitoring to improve resource conditions over time. In the draft year-end monitoring report,	(8) The MLFO believes that there was not a clear consensus or "prior understanding" among members of the CMG (permittees, BLM, WWP, NRST and etc…) as evidenced by WWP's formal dispute and NRST's acknowledgement that its approach differs from that the MLFO would have taken. The dispute resolution discussion is helpful in that it articulates the approach used by NRST in presenting the monitoring data that was collected and why the adopted approach was taken; while acknowledging that other approaches could have also been taken. The MLFO cautions that although NRST rationale states (italics added) that "There should have been a broad understanding that *confidence intervals are required* and would be used for data analysis and interpretation," confidence intervals are <u>not required</u> to be used. To the extent that using confidence intervals is helpful -- which BLM agrees can provide useful information for interpreting data -- the MLFO would not have categorized all data that fell within the confidence interval as having "met" the threshold, and would instead have characterized it as either "more likely

the NRST required adaptive management and additional monitoring actions for sites that clearly exceeded AND for all sites that were statistically uncertain. (The agreed upon monitoring process from CMG March 2016 meeting is documented in response.)	than not" to have "met" or "not met," depending on where it falls within the confidence interval, and would have treated such data as "unknown" or "unable to conclude that it met the objectives." In reviewing the 2015 Monitoring Report, Michael "Sherm" Karl has pointed out that it is statistically incorrect to state "that if a portion of the 95% confidence interval is below the allowable use level, that the allowable use level is "achieved" since by definition, if any part of the confidence interval is above the allowable use level, then that level could also be "not achieved."
MLFO Recommendation to the Mount Lewis Field Manager for Dispute: After carefully considering the recommendations and rationale provided by the NRST on this dispute, and in careful coordination with the Regional Office of the Solicitor, National Upland Monitoring Lead, National Operations Center, and the Nevada State Office, the MLFO recommends that the field manager adopt the recommendations provided by the NRST pursuant to and in accordance with the MLFO responses to both NRST recommendations and the accompanying rationale that is specified above.	