

**Attachment 1**  
**Fortification Elk Cumulative Impact Assessment**

**Big Game Cumulative Effects**  
**Elk**

The purpose of cumulative effects analysis is to ensure that Federal decision-makers consider the full range of consequences of actions (the proposed action and alternatives, including the No Action Alternative).<sup>1</sup> The Cumulative Impact Assessment Area (CIAA) is the Fortification elk herd yearlong range as defined by the Wyoming Game and Fish Department (WGFD), which consists of 122,930 acres.

The WGFD defined two types of important wildlife habitats that are located within the yearlong range; crucial winter range (CWR) and parturition range (PR). Both provide important seasonal habitat functions during sensitive periods for elk (Figure 1).

**Table 1 Fortification Creek Elk Ranges**

Range	Size (Acres)
Yearlong	122,930
Crucial Winter	38,233 (31% of Yearlong Range)
Parturition	59,291 (48% of Yearlong Range)

For the purposes of this analysis, the BLM selected three factors and corresponding metrics to evaluate cumulative effects upon elk. These factors (and metrics) are (1) habitat condition and availability (security habitat and connectivity), (2) pattern of elk use (collaring data), and (3) population objectives (number of elk).

**Past and Present Actions Resulting in Effects to the Fortification Elk Herd**

To disclose the past and present actions within the CIAA (1) Wyoming Oil and Gas Conservation Commission (WOGCC) well data were obtained, (2) Federal wells were verified with Automated Fluid Minerals Support System (AFMSS), and (3) an updated GIS layer displaying existing oil and gas access roads<sup>2</sup> were used. The CIA provides a reasonably complete assessment of current oil and gas development on fee, state, and federal lands including the Augusta Unit Zeta POD, the Carr Draw III West POD, and Carr Draw V Add II POD.

Past and present actions for this analysis include wells and associated infrastructure that are authorized. The Augusta Unit Zeta POD, the Carr Draw III West POD, and Carr Draw V Add II POD were authorized under full force and effect with separate decision records, subsequent to an environmental assessment and Finding of No Significant Impact (FONSI) for each. As a result of the full force and effect decisions, many of the wells have been constructed and are operating at this time.

Impacts to elk habitat and elk have already occurred during construction and drilling (refer to EA at page 54). The Buffalo Field Office's ability to rescind Applications for Permit to Drill and mandate wells already drilled to be plugged and abandoned is limited (thus, the No Action Alternative must include these wells). Future Environmental Assessments (EAs) for new Plans of Development (PODs) will consider cumulative impacts to elk within the entire yearlong range, or other appropriate CIA boundary.

Regardless if the Augusta Unit Zeta (AUZ) wells drilled as of December 15, 2009 were included as past & present OR reasonably foreseeable future actions, the decision-maker is still provided (in sum) a description of the impacts within the CIAA to elk, thereby allowing an informed decision regarding cumulative impacts. However, the selected actions and effects will be represented here and below as part of the past and present actions.

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<sup>1</sup> H-1790-1, BLM NEPA Handbook Page 57

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<sup>2</sup> During the 2009 field season, BLM BFO staff conducted field verification of “existing oil and gas roads” within the CIAA. View shed analysis, utilizing GIS models and the best available data, continue to be utilized by the BFO to determine security habitat effectiveness within the CIAA. The results of the most current analysis reflect statistics that differ from those documented in the original environmental analyses.

**Security Habitat and Connectivity**

Security habitat occurs throughout the yearlong range and, subsequently, throughout the crucial winter and parturition ranges (Figure 2). WGFD 2009 Strategic Habitat Plan defines elk security habitat areas as any areas that, because of geography, topography, vegetation, or a combination of these features, will hold elk during periods of stress, especially during hunting season. Security habitat is typically further defined as nonlinear blocks of hiding cover greater than a minimum size (250 acres for elk) and a specific distance from disturbance sources ( ½ mile from any open road). Elk security habitat areas are important to minimize stress to elk related to human disturbance as well as providing fair chase during recreation big game hunting recreation. The most common impact to security cover is open roads.

Modeling used to identify the security habitat was defined at more than one-half mile or not visible from an existing oil and gas road.

Prior to federal and non-federal CBNG developments in 2009, there were approximately 60,000 acres of security habitat present within the CIAA. Table 2 shows the amount of security habitat within the elk range designations prior to 2009 development. Population monitoring conducted by WGFD as disclosed in the annual Job Completion Reports suggests connectivity between remaining security patches was relatively unimpeded prior to 2009 (WGFD 2008)<sup>3</sup>.

**Table 2 Elk Security Habitat within the Fortification Creek Elk Ranges**

Range	Security Habitat (Acres)
Yearlong	60,000
Crucial Winter	23,150 (39% of security habitat)
Parturition	33,770 (56% of security habitat)

As of December 15, 2009, WOGCC reports 493 existing federal and nonfederal oil and gas wells (including 10 oil, 55 conventional gas, and 428 CBNG wells) at 346 locations within the entire yearlong range, distributed in a non-uniform manner (Figure 3). The majority of these existing wells are concentrated in developed CBNG and conventional oil and gas fields across roughly 48,000 acres within the elk Yearlong range. This includes 122 existing well locations within the CWR and 139 existing well locations within the PR. The proportion of existing federal well locations that are within the CWR and PR are 90% and 62% respectively. At this time one well at each of the approved AUZ locations has been drilled.

**Pattern of Elk Use**

Radio-telemetry and GPS collaring data collected by BLM and WGFD since 2005 have shown that the Fortification elk tend to avoid oil and gas development by moving to less developed areas. Disruptive activity is usually temporary in nature, however, and some studies have shown that elk returned to the area of disturbance once the source of disturbance and human presence was gone (Gussey 1986, WGFD 2000), albeit at 50% of the previous levels in forested environments (Hayden-Wing Associates 1990).<sup>4</sup>

Sawyer (2005) observed similar response of elk within the more open terrain of the Jack Morrow Hills of Wyoming. The literature consistently shows a correlation between elk avoidance response and the level of human activity associated with oil and gas development.

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<sup>3</sup> Wyoming Game & Fish Department. 2008. Job Completion Report; Fortification Creek (EI 320) Hunt Area 2 2009 Hunting Season.

<sup>4</sup> Hayden-Wing Associates. 1990. "Response of Elk to Exxon's Field Development in the Riley Ridge Area of Western Wyoming 1979-1990." Final report prepared for Exxon Company, USA and Wyoming Game and Fish Department. 33 pp.

Table 3 details the percentage of documented elk collar locations in each of the defined ranges within the CIAA. Elk use of the identified range focused on the time period when the elk are most apt to be utilizing the given range. BLM and WGFD assume a period of 2 weeks for elk to acclimate to reduced oil and gas activity during the timing limitation stipulations periods. Therefore Table 3 observations within the Parturition range occurred May 15-June 30<sup>5</sup>. Observations within the Crucial Winter range were recorded December 1-April 30<sup>6</sup> of the corresponding year. Similarly, Figure 4 represents yearlong use, Figure 5 represents winter use, and Figure 6 represents parturition use as captured from the radio-telemetry and GPS collaring data.

**Table 3 Percent of documented elk collar locations in each of the defined ranges within the CIAA.**

<b>Year / Range</b>	<b>Total observation points</b>	<b>Total observation points within respective range</b>	<b>% use of respective range</b>
<b>2008 Yearlong</b>	<b>32,709</b>	<b>28,257</b>	<b>86%</b>
<b>2009 Yearlong</b>	<b>49,604</b>	<b>43,839</b>	<b>88%</b>
<b>2008 Crucial Winter Season</b>	<b>6,203</b>	<b>4,615</b>	<b>74%</b>
<b>2009 Crucial Winter Season</b>	<b>27,125</b>	<b>19,119</b>	<b>71%</b>
<b>2008 Parturition Season</b>	<b>7,626</b>	<b>5,594</b>	<b>73%</b>
<b>2009 Parturition Season</b>	<b>8,955</b>	<b>5,948</b>	<b>66%</b>

<sup>5</sup>Timing Limitation Stipulation (TLS) for elk Parturition range is May 1 – June 30

<sup>6</sup>Timing Limitation Stipulation (TLS) for elk Crucial Winter range is November 15 to April 30.

**Population Objectives**

This small elk herd grew well above objective from 1995 to 1999, after which, regular harvest began to reduce the elk numbers and return the herd to slightly above objective. The post-hunt population objective, established by WGFD, for the Fortification elk herd is 150 animals. There are approximately 219 animals within this herd unit (WGFD post-season 2008). Their documented distribution in each of the ranges is identified in Figures 4 through 6 and Table 3(above). This herd has been somewhat controlled by annual harvests. Thus far, changes in environmental factors seem to have little impact on this elk herd, and currently the population is estimated to be above the management objective. The WGFD 2008 Job Completion Report for the Fortification elk herd indicates that the current population trend is stable to decreasing.

**Reasonably Foreseeable Future Actions (RFFA) Resulting In Effects to the Fortification Elk Herd**

One hundred percent of the Federal mineral estate within the CIAA, excluding the Wilderness Study Area (WSA), has been leased, therefore additional Application for Permit to Drill (APD) filings are expected in the future. WOGCC and BLM data were used to predict the RFFA within the CIAA. Oil and gas wells were considered reasonably foreseeable if the WOGCC data showed the locations as AP status (Approved Permit) for state & fee locations, or if the BLM had received an APD. Access roads to Federal locations have been submitted with the APDs, and these alignments were used to predict future disturbance (assuming an average short-term disturbance width of 50 feet) and arrangement of disruptive activities within the CIAA. BLM has utilized the best available data collected in the field as well as data received from various operators that includes road alignments to both federal and non-federal locations. However access road alignments to all non-federal locations are not known, and so not all are included in this

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analysis. The reasonably foreseeable future development within the CIAA as proposed within these parameters consists of 520 CBNG additional well locations, 436.2 miles of new roads resulting in approximately 2,644 acres of surface disturbance (Figure 7).

**Security Habitat and Connectivity**

As stated, the reasonably foreseeable future actions within the CIAA as proposed within the parameters above consists of 520 CBNG additional well locations, 436.2 miles of new roads resulting in approximately 2,644 acres of surface disturbance. Of those 520 proposed well locations 70 are within elk CWR resulting in approximately 199.8 miles of new roads and 1,211 acres of surface disturbance and 145 are within PR, resulting in approximately 146.1 miles of new roads and 885 acres of surface disturbance (Figure 7). Ranching, hunting and various other recreational activities are also expected to occur within the CIAA, but are not anticipated to differ from historic levels previously identified in 2003 PRB EIS and 1985 RMP. Large expanses of yearlong range containing security habitat without any oil and gas development will still remain following the foreseeable development (Figure 7).

Table 4 summarized the security habitat projected to remain following reasonably foreseeable future actions within the elk yearlong range.

**Table 4 Elk Security Habitat Remaining Post RFFA**

Range	Security Habitat (Acres)
Yearlong	44,484 (74% of 2009 security habitat, Table 2)
Crucial Winter	20,533 (89% of 2009 security habitat Table 2)
Parturition	27,295 (81% of 2009 security habitat Table 2)

**Pattern of Elk Use**

Fortification Creek radio-telemetry and GPS collaring data collected since 2005, have shown elk avoid oil and gas development by moving to less developed areas. Disruptive activity is usually temporary in nature, however, and some studies have shown that elk returned to the area of disturbance once the source of disturbance and human presence was gone (Gussey 1986, WGFD 2000), albeit at 50% of the previous levels in forested environments (Hayden-Wing Associates 1990).

Continued use of radio-telemetry and GPS collaring data will show changes to the pattern of elk use arising from oil and gas development, natural causes, and from other land uses within the Fortification elk herd yearlong range. Projected loss of habitat and connectivity will affect past patterns of use, however due to the projected amounts of remaining security habitat and the imposed timing limitation stipulations (TLS), it is anticipated that the elk usage patterns will decrease initially in areas of development and then gradually return to 50% pre-disturbance levels after the facilities are constructed. However, since it is anticipated that big game will avoid those areas frequented by human activity during the production phase of the CBNG development; the level of human activity will determine the level of elk return.

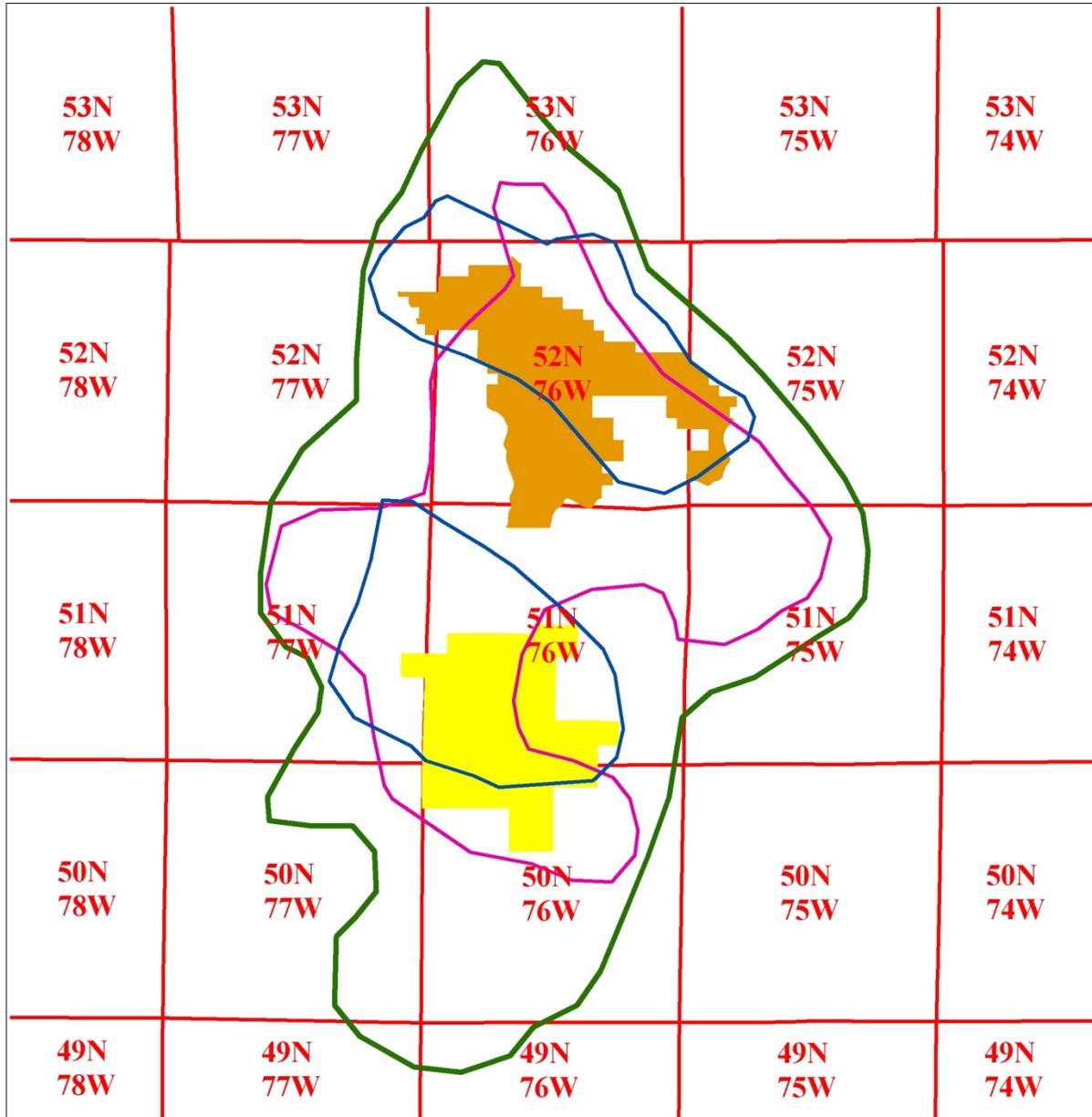
As more information is gathered about the foreseeable future development (new APDs not received to date or permits relinquished etc), it is likely the foreseeable future development could change. As additional data is collected with the continued use of radio-telemetry and GPS collaring data, future site specific analysis will need to be done.

**Population Objectives**

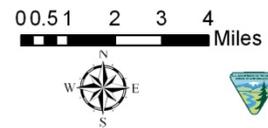
Through on-going research with BLM’s partners (WGFD and University of Wyoming); the impacts of development on the Fortification elk population will continue to be monitored. Response of elk to development will be evaluated and BLM will coordinate with WGFD to identify objectives for future management decisions.

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Figure 1. Cumulative Impacts Assessment Area

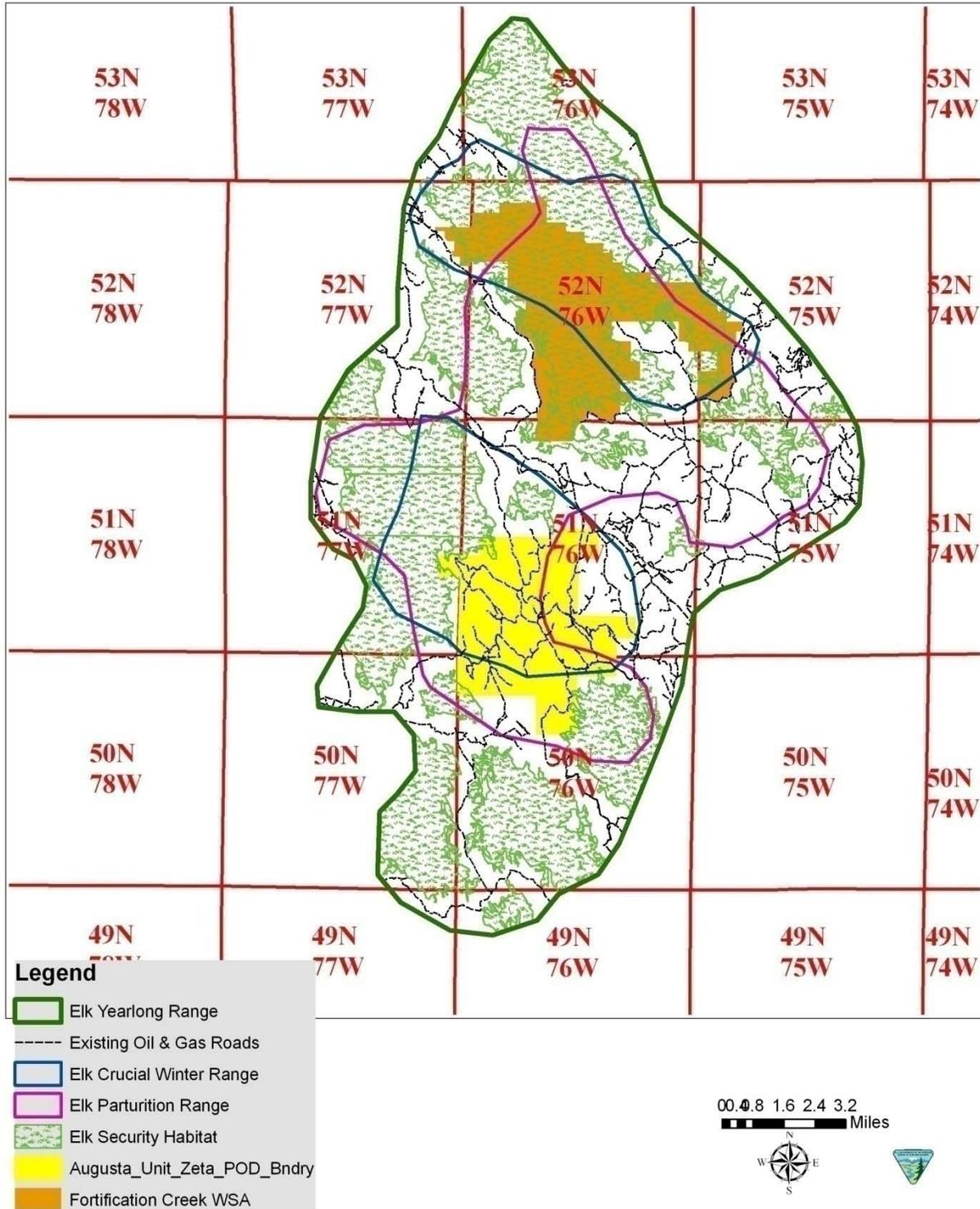


- Legend**
- Elk Yearlong Range
  - Elk Crucial Winter Range
  - Elk Parturition Range
  - Augusta\_Unit\_Zeta\_POD\_Bndry
  - Fortification Creek WSA



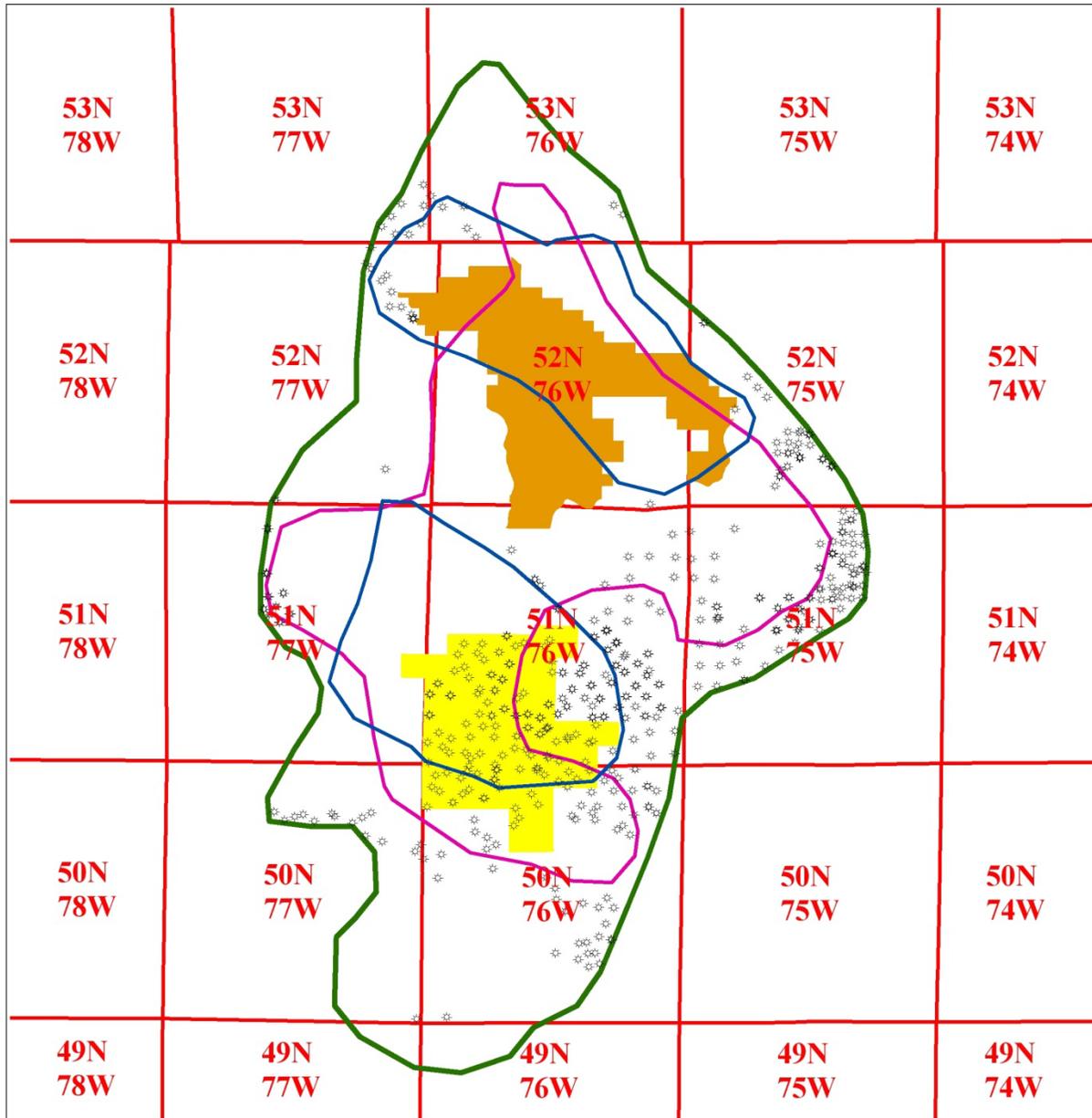
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**Figure 2. Elk Security Habitat Remaining within the CIAA  
(as of December 2009)**



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Figure 3. Existing Wells (as of December 15, 2009)  
within the CIAA



**Legend**

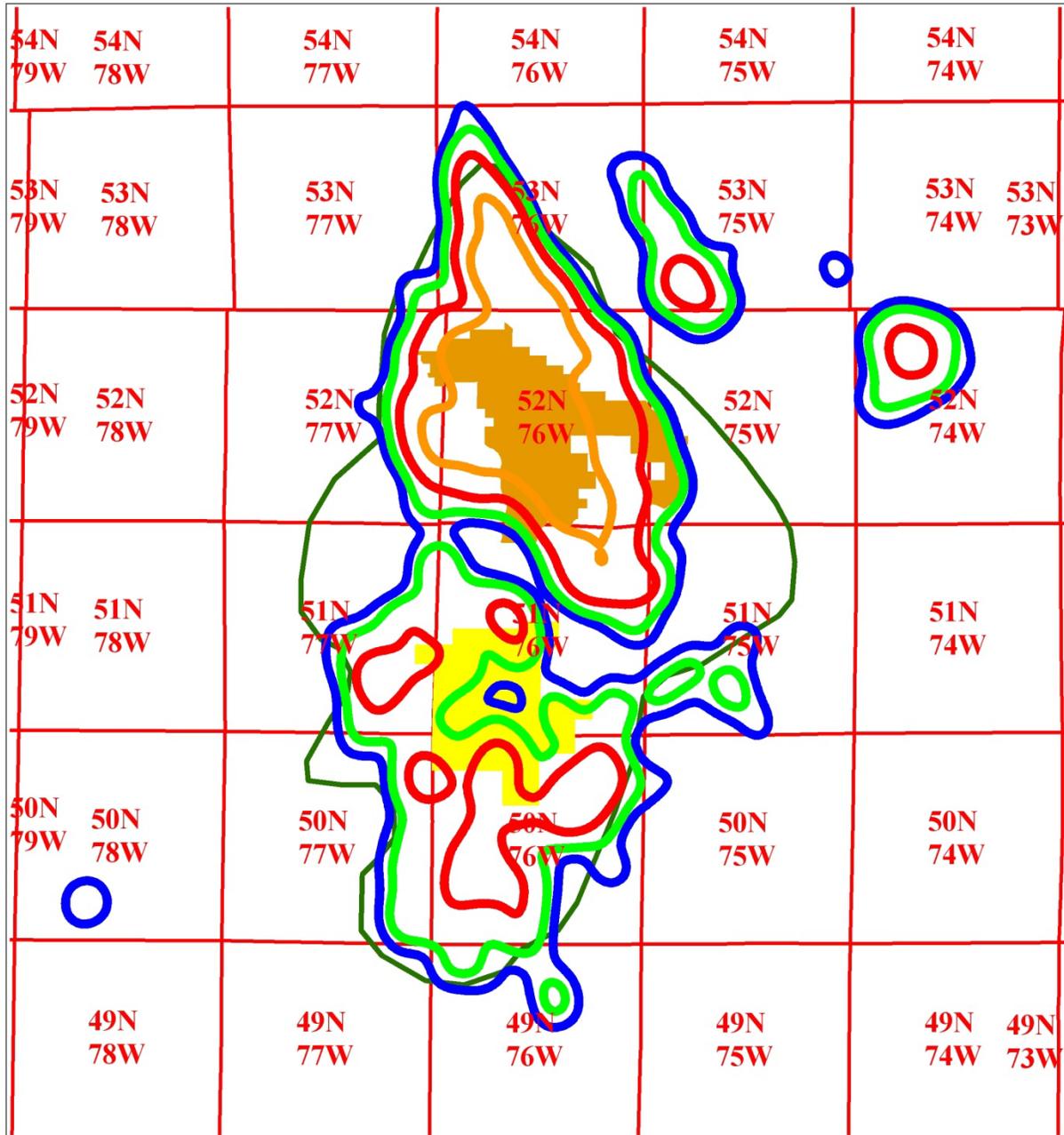
- ☆ Existing Wells
- █ Elk Yearlong Range
- █ Elk Crucial Winter Range
- █ Elk Parturition Range
- █ Augusta\_Unit\_Zeta\_POD\_Bndry
- █ Fortification Creek WSA

0 0.5 1 2 3 4 Miles

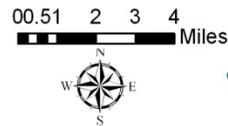
A scale bar showing distances from 0 to 4 miles, with a north arrow below it.

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**Figure 4. Fortification Creek Elk Yearlong Range Use**

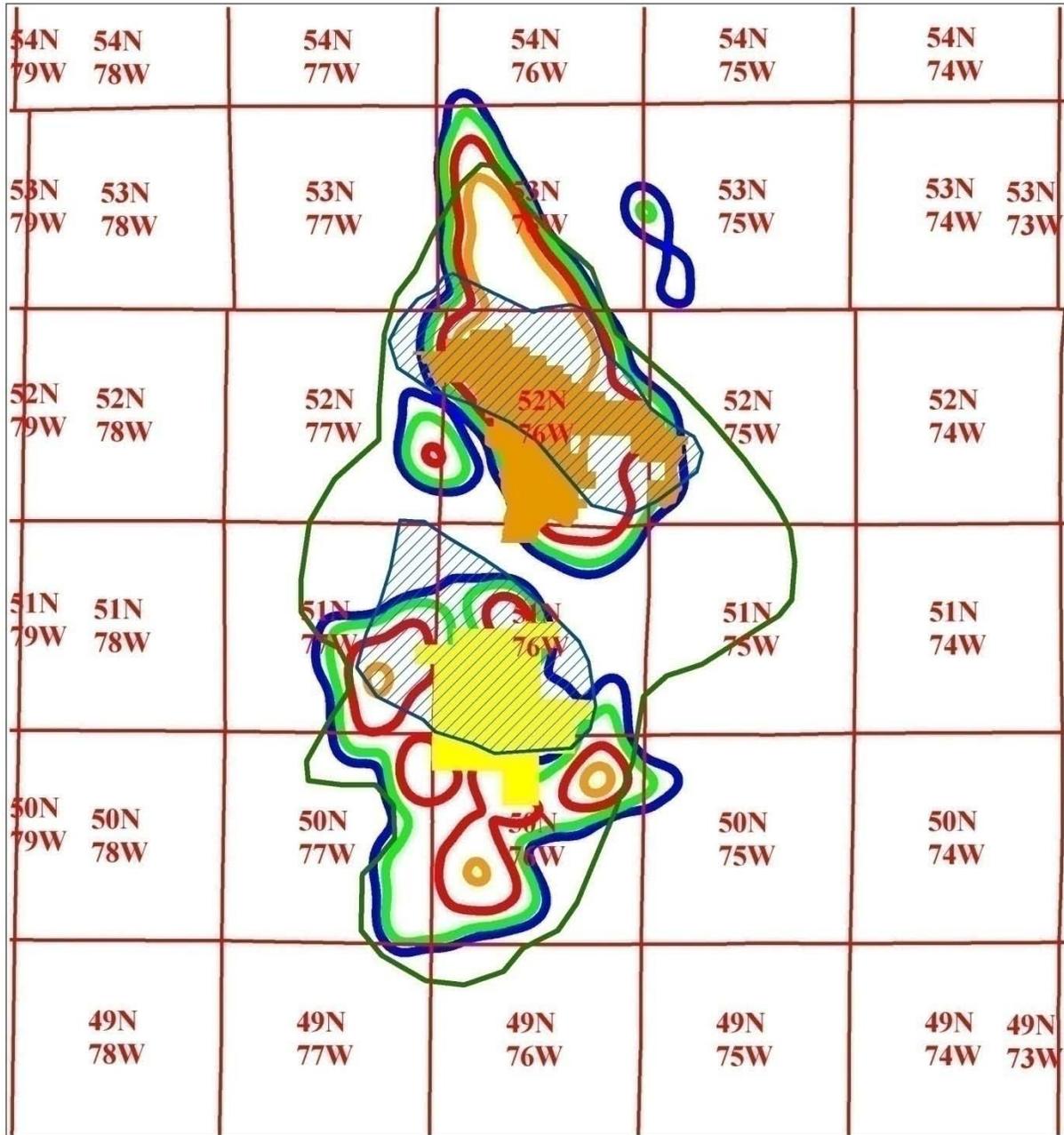


- Legend**
- Elk Yearlong Range
  - Augusta\_Unit\_Zeta\_POD\_Bdry
  - Fortification Creek WSA
  - 95% Yearlong Use
  - 90% Yearlong Use
  - 75% Yearlong Use
  - 50% Yearlong Use



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**Figure 5. Fortification Creek Elk Crucial Winter Range Use**



**Legend**

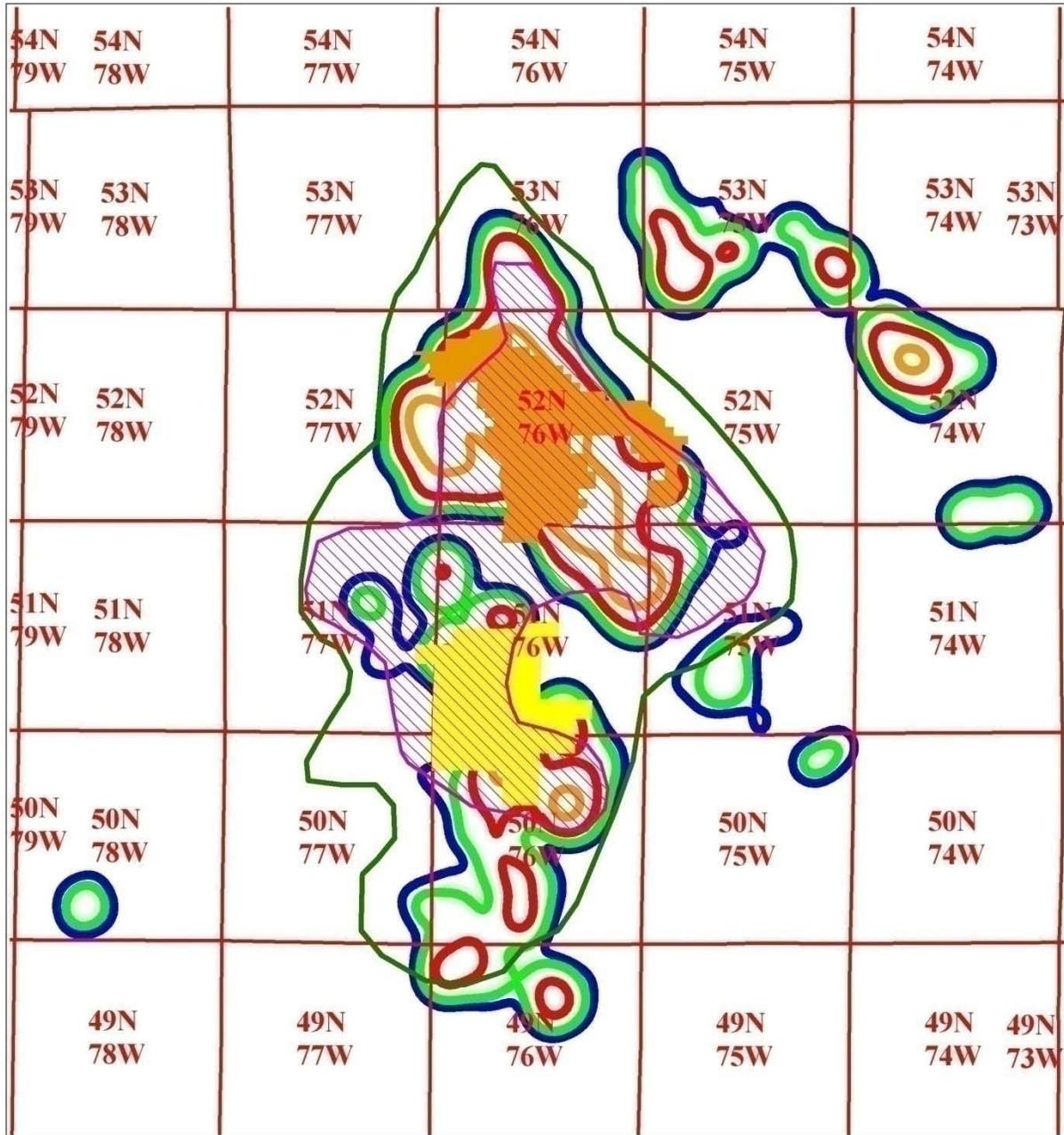
- Elk Yearlong Range
- Elk Crucial Winter Range
- Augusta\_Unit\_Zeta\_POD\_Bndry
- Fortification Creek WSA
- 95% winter use
- 90% winter use
- 75% winter use
- 50% winter use

0 0.5 1 2 3 4 Miles

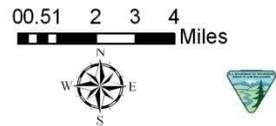
A scale bar showing distances from 0 to 4 miles. Below the scale bar is a north arrow with 'N', 'S', 'E', and 'W' labels. To the right of the north arrow is a small logo of a mountain range.

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**Figure 6. Fortification Creek Elk Parturition Range Use**



- Legend**
- Elk Yearlong Range
  - Elk Parturition Range
  - Augusta\_Unit\_Zeta\_POD\_Bndry
  - Fortification Creek WSA
  - 95% parturition use
  - 90% parturition use
  - 75% parturition use
  - 50% parturition use



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**Figure 7. Elk Security Habitat Remaining Post RFFA**

