

# Undergraduate Range Management Exam: 1999-2014

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## On the Ground

- The Undergraduate Range Management Exam (URME) has been administered to undergraduate students at the Annual Meeting of the Society for Range Management since 1983, with students demonstrating their higher order learning skills and synthesis knowledge of the art and science of rangeland management.
- The multiple-choice exam is composed of six subject categories: 1) Range Ecology; 2) Grazing Management; 3) Range Improvements; 4) Range Regions; 5) Range Inventory and Analysis; and 6) Multiple-use Relationships on Rangelands.
- Topics of changing climate and weather variability (including extreme events), and the associated adaptive management strategies employed by land managers to reduce risk and increase resilience will be highlighted in future years. Increasing emphasis on ecosystem restoration (including mechanisms, processes and pathways), animal grazing behavior, pyric herbivory (patch burn grazing), soil microorganisms, greenhouse gases, and human dimensions should be expected as well.

**Keywords:** critical thinking, education, rangeland management, rangeland science, Student Activities committee, synthesis of knowledge, undergraduate education, undergraduate students.

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*The Undergraduate Range Management Exam (URME) is easily the most comprehensive range related exam I have taken. Throughout college I participated in study groups to prepare for the exam. During those study sessions and through reading some of the reference books from which URME questions are derived from, I gained knowledge that I may not have otherwise learned. I took the URME four times and each time the exam covered mostly new material.*

– Shelly Kelly, South Dakota State URME participant

## What is the Undergraduate Range Management Exam?

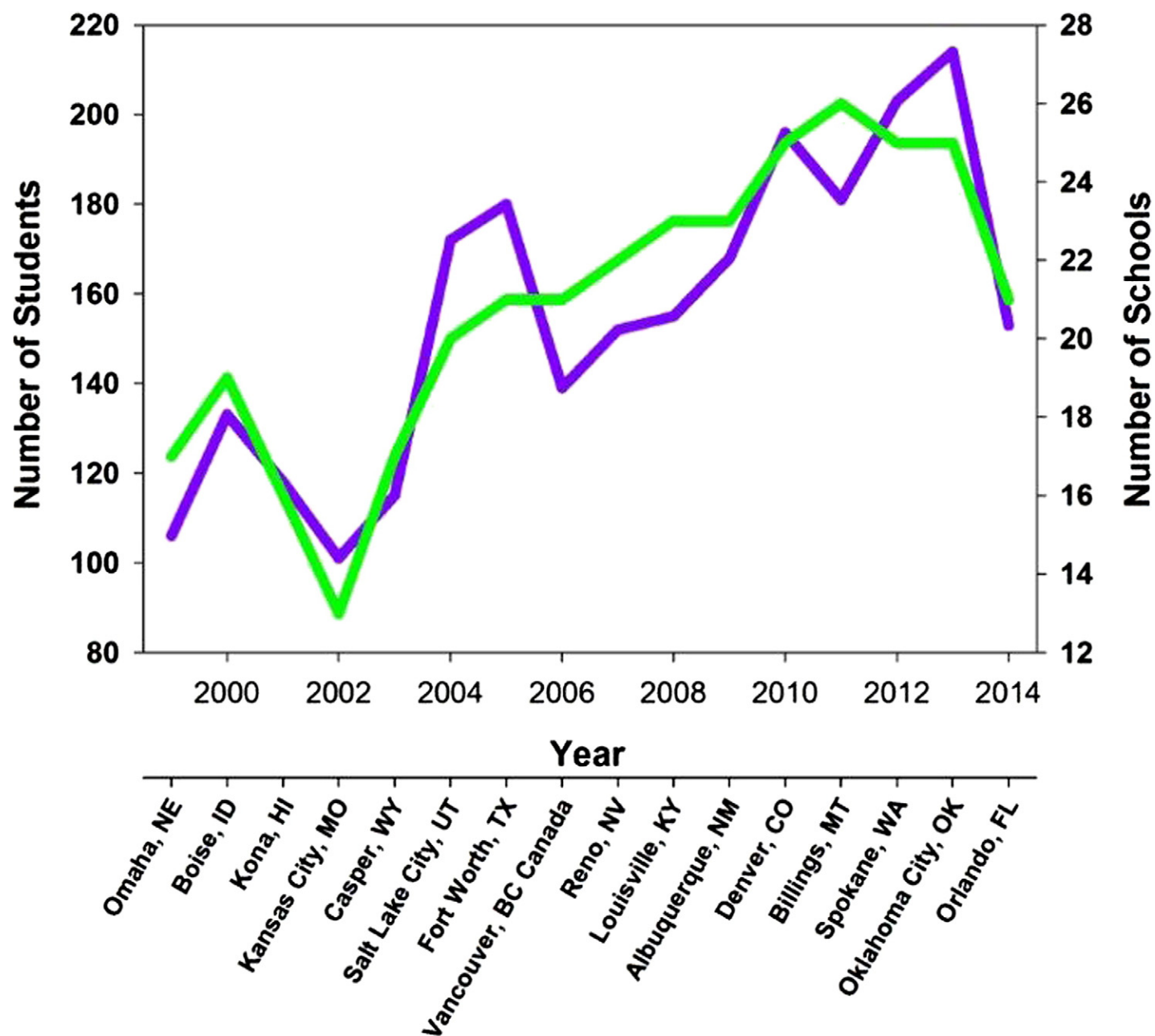
The URME, first given at the 36th Annual Society for Range Management (SRM) meeting held in Albuquerque, New Mexico in 1983, and administered through the Student Activities Committee of SRM, provides an opportunity for undergraduate students to demonstrate higher order learning skills and synthesize knowledge of the art and science of rangeland management (Fig. 1). The URME, started as a complementary activity to the Plant Identification contest for undergraduate students to increase student participation, is composed of six subject categories: 1) range ecology (20% of the total score); 2) grazing management (20%); 3) range improvements (20%); 4) range regions (10%); 5) range inventory and analysis (20%); and 6) multiple-use relationships on rangelands (10%). The goal of URME is to encourage student involvement in the annual meeting of SRM through an activity that provides the opportunity to showcase understanding of the art and science of range management. Students benefit from participating in URME by improving their knowledge of the six subject categories, increasing their higher order learning skills, establishing friendships with cohorts from other universities/colleges, and developing contacts with professionals in SRM for valuable networking.

Questions are multiple choice, with two or four point values. Four point value questions involve computations (e.g., stocking rate calculations) or interpretations from tables, graphs, and figures. Larger point value problems are given in the grazing management (10 points), range improvements (10 points), and range inventory and analysis (20 points) categories to provide more comprehensive questions for students (see online supplemental material at <http://dx.doi.org/10.1016/j.rala.2014.12.001> for example questions). The total possible score for the exam is 300 points, with exams generally composed of about 100 questions. Students have 120 minutes to complete the exam (100 minutes prior to 2004).

Questions are selected from material submitted by university faculty members, government agency personnel, industry personnel and ranchers. Reference material includes



**Figure 1.** Students taking the Undergraduate Range Management Exam in 2009 (Albuquerque, NM; Albuquerque was also the site of the first URME in 1983).



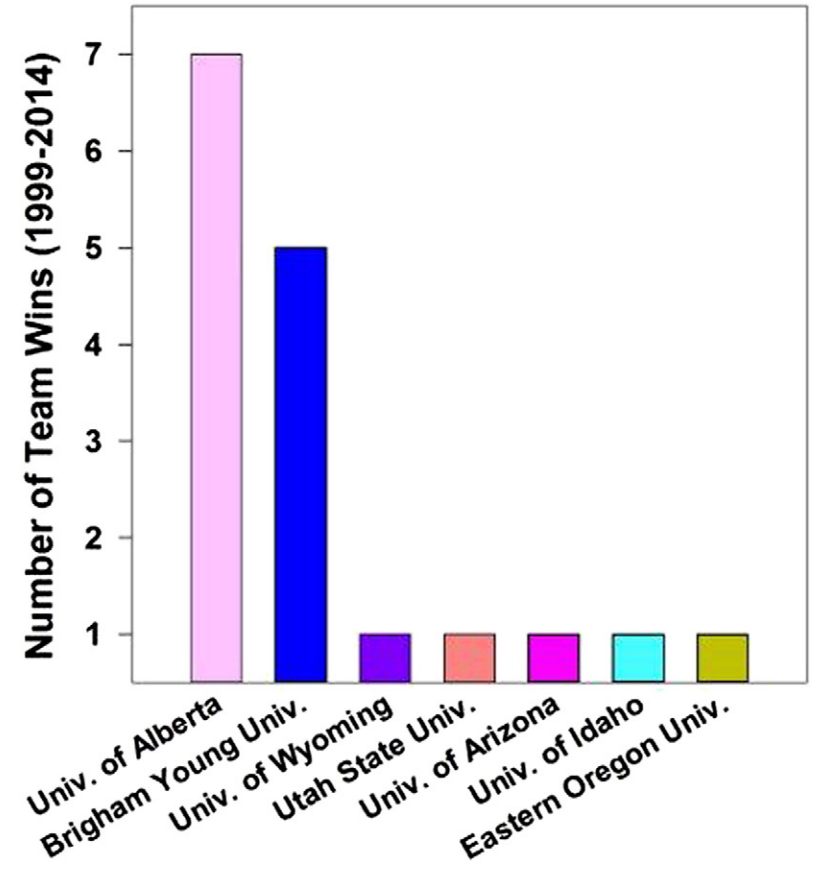
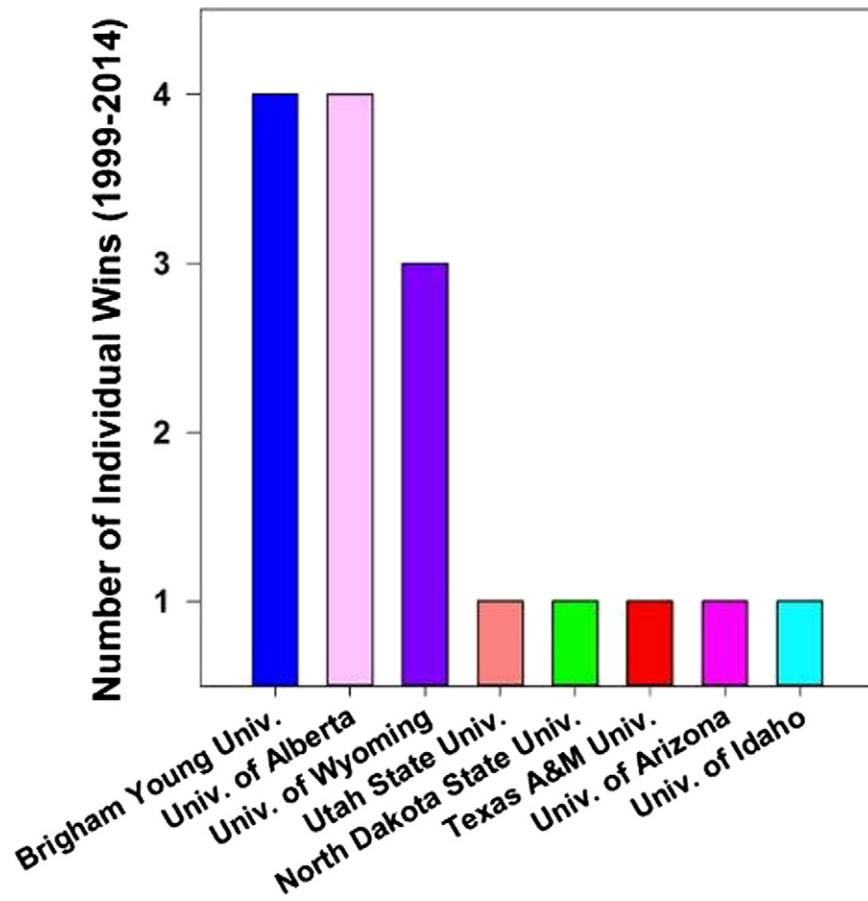
**Figure 2.** Number of students (purple line, left y axis) and universities/colleges (green line, right y axis) that competed in the Undergraduate Range Management Exam between 1999 and 2014.

**Table 1. Alphabetical listing of universities/colleges that have competed in the Undergraduate Range Management Exam from 1999-2014.**

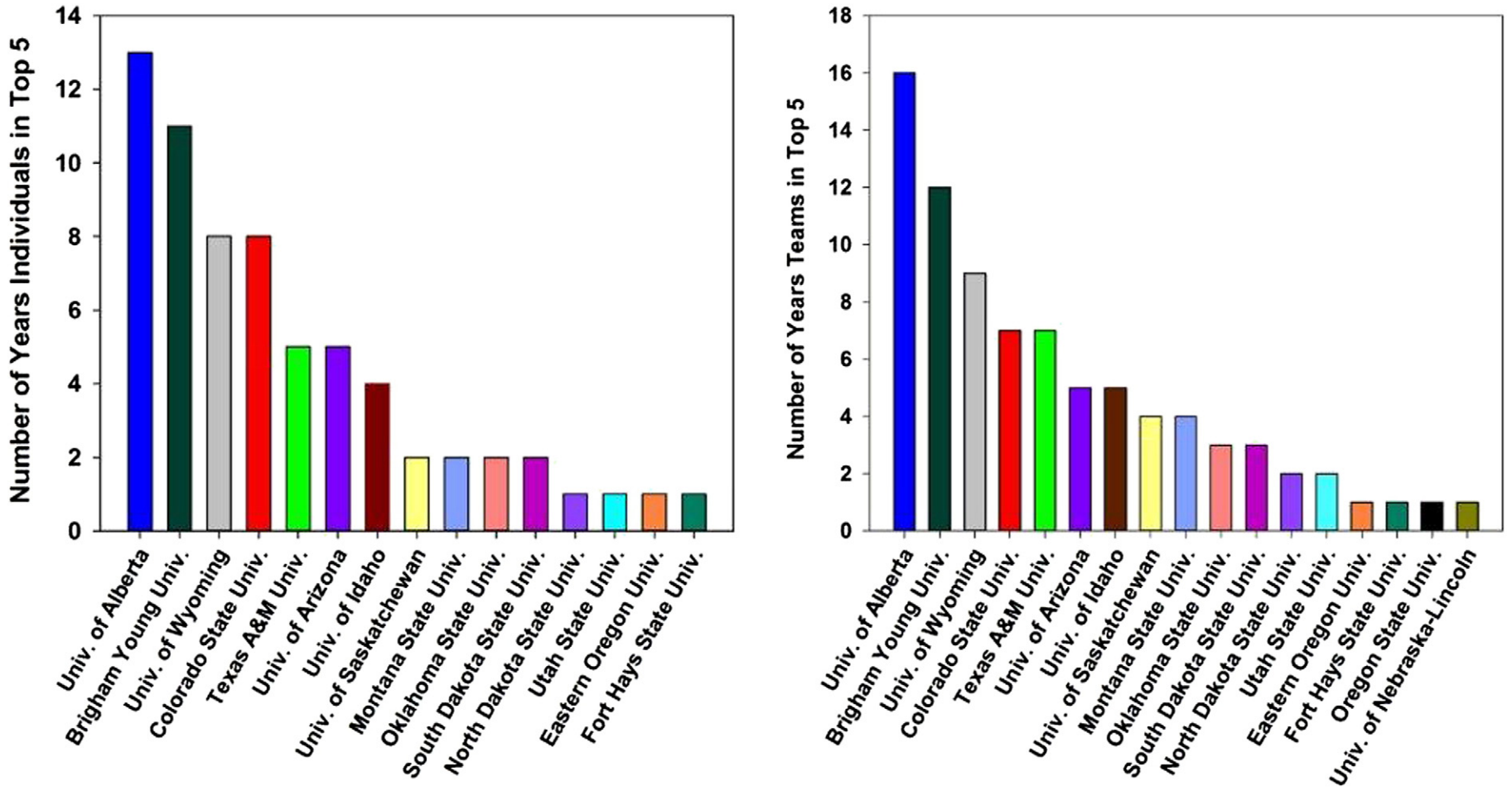
| University/College                | Years Competed (max = 16) | Years of Competition    |
|-----------------------------------|---------------------------|-------------------------|
| Antonio Narro                     | 1                         | 2002                    |
| Arizona State University          | 3                         | 2008-10                 |
| Brigham Young University          | 16                        | 1999-2014               |
| Chadron State College             | 16                        | 1999-2014               |
| Colorado State University         | 16                        | 1999-2014               |
| Dickinson State University        | 4                         | 2011-14                 |
| Eastern Oregon University         | 10                        | 1999-2000, 2007-14      |
| Fort Hays State University        | 4                         | 2010-13                 |
| Humboldt State University         | 15                        | 1999-2001, 2003-14      |
| Montana State University          | 15                        | 1999-2000, 2002-14      |
| New Mexico State University       | 16                        | 1999-2014               |
| North Dakota State University     | 15                        | 1999-2001, 2003-14      |
| Northeastern Junior College       | 1                         | 2013                    |
| Northwest College                 | 1                         | 2013                    |
| Oklahoma State University         | 13                        | 1999-2000, 2004-14      |
| Oregon State University           | 16                        | 1999-2014               |
| Sheridan College                  | 2                         | 2013-14                 |
| South Dakota State University     | 16                        | 1999-2014               |
| Southern Utah University          | 3                         | 2011, 2013-14           |
| Texas A&M University              | 16                        | 1999-2014               |
| Texas A&M-Kingsville              | 1                         | 2004                    |
| Texas Tech University             | 9                         | 2000-2, 2003-5, 2008-12 |
| Thompson Rivers University        | 6                         | 2006-11                 |
| Universidad Autonoma Agraria      | 1                         | 2003                    |
| University College of the Cariboo | 1                         | 2005                    |
| University of Alberta             | 16                        | 1999-2014               |
| University of Arizona             | 14                        | 1999-2001, 2004-14      |
| University of Idaho               | 16                        | 1999-2014               |
| University of Manitoba            | 1                         | 2010                    |
| University of Nebraska-Lincoln    | 16                        | 1999-2014               |
| University of Nevada-Reno         | 9                         | 2005-13                 |
| University of Saskatchewan        | 11                        | 2003-14                 |
| University of Wyoming             | 15                        | 2000-14                 |
| Utah State University             | 15                        | 1999-2001, 2003-14      |
| Utah Valley State College         | 5                         | 2007-8, 2011-13         |
| Washington State University       | 1                         | 2003                    |

range textbooks (Heady and Child, 2006; Heitschmidt and Stuth, 1991; Holechek et al., 2011; Stoddart and Smith, 1955; Vallentine, 1989) as well as journal articles (e.g., highlighting *Rangeland Ecology and Management*), and web available

literature syntheses such as the *Conservation Benefits of Rangeland Practices: Assessment, Recommendations, and Knowledge Gaps* NRCS. Other reference material may also be used. Undergraduates, enrolled in the current or prior



**Figure 3.** Number of individual (left panel) and team (right panel) URME wins by the schools between 1999 and 2014.

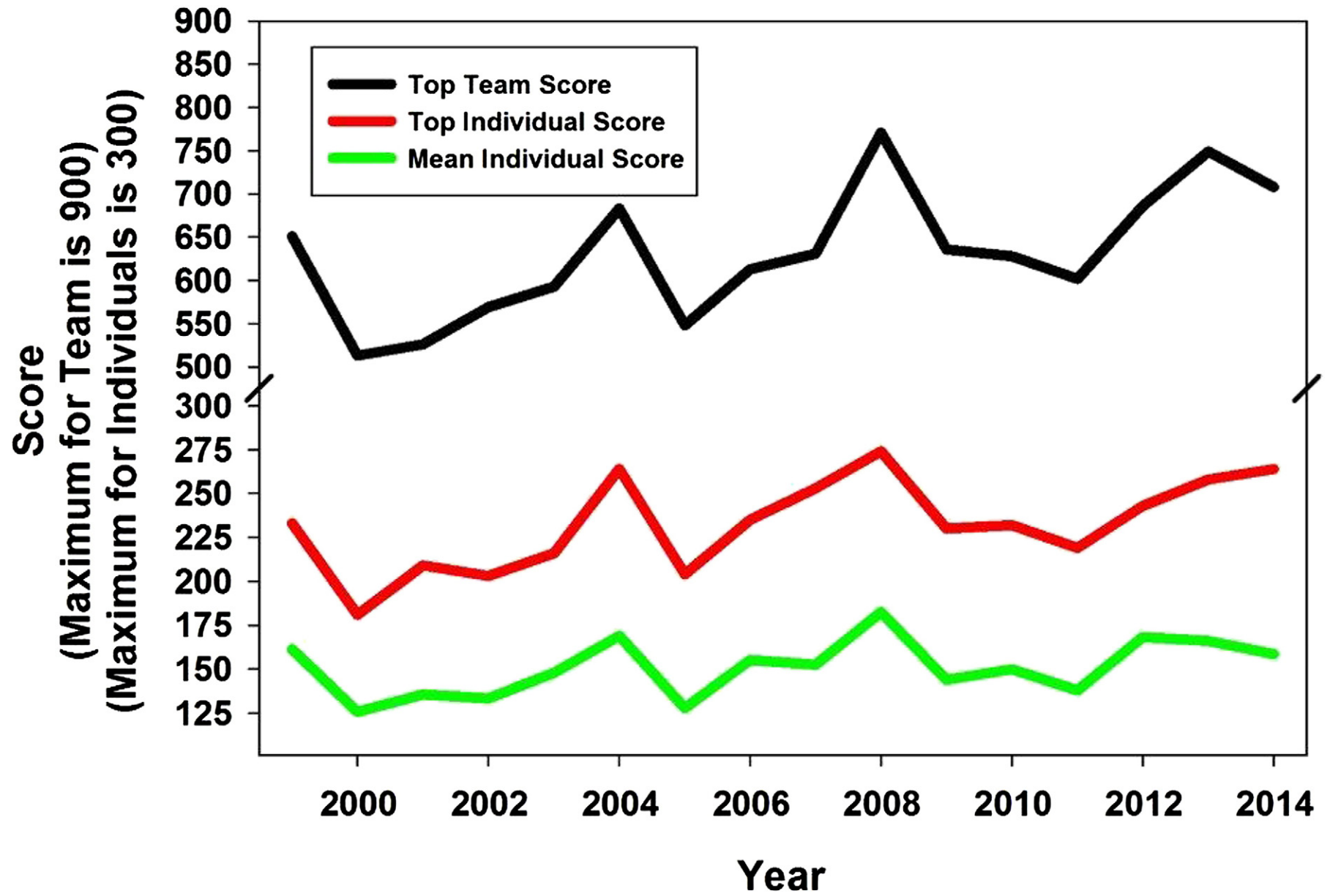


**Figure 4.** Number of years individuals placed in the top 5 (left panel) and number of years the team placed in the top 5 (right panel) for the schools completing in the URME between 1999 and 2014.

**Table 2. URME scores for the top five individuals from 1999-2014.**

| Year | Placing | Score | Name                     | Team                      |
|------|---------|-------|--------------------------|---------------------------|
| 1999 | 1       | 233   | <b>Gwen Oldham</b>       | Univ. of Arizona          |
|      | 2       | 229   | Jon Stone                | Univ. of Arizona          |
|      | 3       | 227   | Kate Hoffman             | Univ. of Idaho            |
|      | 4       | 222   | Scott Beard              | Colorado State Univ.      |
|      | 5       | 216   | Sean Kelly               | Colorado State Univ.      |
| 2000 | 1       | 181   | <b>Erik Sorensen</b>     | North Dakota State Univ.  |
|      | 2       | 179   | Kate Hoffman             | Univ. of Idaho            |
|      | 3       | 178   | Julie Morrison           | Eastern Oregon Univ.      |
|      | 4       | 177   | Zola Gibson              | Eastern Oregon Univ.      |
|      | 5       | 173   | Mae Elsinger             | Univ. of Alberta          |
| 2001 | 1       | 209   | <b>Kurtiss Schmidt</b>   | Texas A&M Univ.           |
|      | 2       | 194   | Kate Hoffman             | Univ. of Idaho            |
|      | 3       | 187   | Mae Elsinger             | Univ. of Alberta          |
|      | 4       | 184   | Sanoy Gimenez            | Univ. of Arizona          |
|      | 5       | 180   | Valerie Oriole           | Univ. of Arizona          |
|      | 5       | 180   | Libby Noall              | Brigham Young Univ.       |
| 2002 | 1       | 203   | <b>Jeff Taylor</b>       | Brigham Young Univ.       |
|      | 2       | 197   | Brent Finnestad          | Univ. of Alberta          |
|      | 3       | 187   | Rachel Fugal             | Brigham Young Univ.       |
|      | 4       | 182   | Chris Stefner            | Univ. of Alberta          |
|      | 5       | 179   | Tiana Matheson           | Brigham Young Univ.       |
| 2003 | 1       | 216   | <b>Rachel Fugal</b>      | Brigham Young Univ.       |
|      | 2       | 202   | Grant Chapman            | Univ. of Alberta          |
|      | 3       | 196   | Tiana Matheson           | Brigham Young Univ.       |
|      | 4/5     | 189   | Julie Korol              | Univ. of Saskatchewan     |
|      | 4/5     | 189   | Joanne Kelly             | Colorado State Univ.      |
| 2004 | 1       | 264   | <b>Jordge LaFantasie</b> | Univ. of Wyoming          |
|      | 2       | 230   | Cody Wahirniak           | Univ. of Alberta          |
|      | 3       | 229   | Dannielle Gabruck        | Univ. of Alberta          |
|      | 4       | 227   | Eric Gardner             | Brigham Young Univ.       |
|      | 5       | 225   | Seth Rotering            | Colorado State Univ.      |
| 2005 | 1       | 204   | <b>Dean Hystad</b>       | Univ. of Alberta          |
|      | 2       | 194   | Austin Sewell            | Oklahoma State University |
|      | 3       | 190   | Bob Wesley               | Montana State Univ.       |
|      | 4       | 178   | Jeremiah Armstrong       | Brigham Young Univ.       |
|      | 5       | 176   | Liz Wertz                | Colorado State Univ.      |
| 2006 | 1       | 235   | <b>Dean Hystad</b>       | Univ. of Alberta          |
|      | 2       | 223   | Nadia Mori               | Univ. of Saskatchewan     |
|      | 3/4     | 211   | Eric Gardner             | Brigham Young Univ.       |
|      | 3/4     | 211   | Josh Peterson            | North Dakota State Univ.  |
|      | 5       | 205   | Jennifer Williams        | Oregon State Univ.        |
| 2007 | 1       | 253   | <b>Tanner Pollack</b>    | Univ. of Alberta          |

| Year | Placing | Score | Name                   | Team                  |
|------|---------|-------|------------------------|-----------------------|
|      | 2       | 216   | Merritt Carpenter      | Univ. of Wyoming      |
|      | 3       | 213   | Tim Hoelzle            | Colorado State Univ.  |
|      | 4       | 210   | Sara Hanlon            | Univ. of Wyoming      |
|      | 5       | 208   | Amber Greenall         | Thompson Rivers Univ. |
| 2008 | 1       | 274   | <b>Alicia Entem</b>    | Univ. of Alberta      |
|      | 2/3     | 257   | Heath Starns           | Texas A&M Univ.       |
|      | 2/3     | 257   | Jonathan Kelly         | Oklahoma State Univ.  |
|      | 4       | 254   | Ian Levitt             | Univ. of Alberta      |
|      | 5       | 244   | Sara Hanlon            | Univ. of Wyoming      |
| 2009 | 1       | 230   | <b>Sara Hanlon</b>     | Univ. of Wyoming      |
|      | 2       | 228   | Teressa Van Diest      | Univ. of Arizona      |
|      | 3       | 226   | Daniel Zvirzdin        | Brigham Young Univ.   |
|      | 4       | 224   | Christiane Catellier   | Univ. of Saskatchewan |
|      | 5       | 222   | Jessica Humes          | Brigham Young Univ.   |
| 2010 | 1       | 232   | <b>Daniel Zvirzdin</b> | Brigham Young Univ.   |
|      | 2       | 221   | Lindsey Seastone       | Colorado State Univ.  |
|      | 3/4     | 220   | Kailee Bickford        | Montana State Univ.   |
|      | 3/4     | 220   | Andrew Telander        | Univ. of Wyoming      |
|      | 5       | 210   | Andy James             | Texas A&M Univ.       |
| 2011 | 1       | 219   | <b>Julia Workman</b>   | Univ. of Idaho        |
|      | 2       | 212   | Jordan Burke           | Univ. of Alberta      |
|      | 3       | 208   | Bryan Tarbox           | Texas A&M Univ.       |
|      | 4       | 205   | Jolene Noble           | Univ. of Alberta      |
|      | 5       | 201   | Katie Nelson           | Univ. of Wyoming      |
| 2012 | 1       | 243   | <b>Sage Askin</b>      | Univ. of Wyoming      |
|      | 2       | 241   | Kristen Oles           | Colorado State Univ.  |
|      | 3       | 239   | Julia Workman          | Univ. of Idaho        |
|      | 4       | 234   | Bridger Skaarer        | Univ. of Arizona      |
|      | 5       | 233   | Chelsea Geiger         | Univ. of Alberta      |
| 2013 | 1       | 258   | <b>Lara Kitchen</b>    | Utah State Univ.      |
|      | 2       | 256   | Adam Rusk              | Fort Hays State Univ. |
|      | 3       | 254   | Hannah Ricks           | Brigham Young Univ.   |
|      | 4       | 252   | Julia Workman          | Univ. of Idaho        |
|      | 5/6     | 251   | Megan Lewis            | Univ. of Alberta      |
|      | 5/6     | 251   | Kelsey Hawkes          | Univ. of Arizona      |
| 2014 | 1       | 264   | <b>Hannah Ricks</b>    | Brigham Young Univ.   |
|      | 2       | 255   | Jeff Hogberg           | Univ. of Alberta      |
|      | 3       | 248   | McKenna Brown          | Montana State Univ.   |
|      | 4       | 234   | Leah Rodvang           | Univ. of Alberta      |
|      | 4       | 234   | Morgan Hughes          | Utah State Univ.      |
|      | 5       | 229   | Kate Richardson        | Univ. of Wyoming      |



**Figure 5.** Top team (black), top individual (red), and mean individual URME scores (green) from 1999-2014. Note the break in the y-axis between the individual scores (red and green lines) and the team scores (black line).

semester as full-time students, compete for individual honors. Team scores are the sum of the top three individual scores for each university/college. The top five teams and individuals are recognized at each annual meeting awards ceremony.

Early years of the exam involved countless hours by coaches and volunteers hand grading tests and tediously reviewing written work for the mathematical problems as partial credit was given. Following a successful tenure by Jack Butler, Justin Derner began administering the URME in 1999 (Omaha, Nebraska meeting) and arrangements were made with local universities/colleges in the general vicinity of the SRM meeting locations from 1999 to 2007 for reading scantron answer sheets to expedite grading of the exams. Notably, in 2001 (Kona, Hawaii) and 2007 (Reno, Nevada), local arrangements were unsuccessful and exams were hand graded. In 2008, the Range Science Education Council purchased a scanner that has been used since to facilitate on-site grading at the SRM meeting location. Here, with the collaborative efforts of Jessica Crowder and Mae Smith (both co-URME chairpersons), and the spreadsheet/graphic talents of Tami Plechaty, we present a summary of the results from the past 16 years. Results from years prior to 1999 are not electronically available.

## Who Competes?

An average of 155 students have competed in the URME each year for the past 16 years; the highest number of students was 214 in 2013 in Oklahoma City, Oklahoma, and the lowest number (101) occurred in 2002 in Kansas City, Missouri (Fig. 2). Both the number of students and number of universities/colleges competing have increased over the years, with a notable decrease in 2014 in Orlando, Florida.

Thirty-six universities and colleges have had teams compete during the 1999–2014 period, with an average of 21 competing each year, representing the entire North American continent (Table 1). Ten of those (Brigham Young University, Chadron State College, Colorado State University, New Mexico State University, Oregon State University, South Dakota State University, Texas A&M University, University of Alberta, University of Idaho, and University of Nebraska-Lincoln) fielded teams every year, and four universities missed only one year (Humboldt State University, Montana State University, University of Wyoming, and Utah State University). Eight schools have only competed in a single year. The Kansas City, Missouri, meeting in 2002 saw the lowest number of schools competing while the 2011 meeting in Billings, Montana, had the highest with 26 (Fig. 2).

## Who is Taking Home Top Honors?

Students from three schools (Brigham Young University, University of Alberta and University of Wyoming) have won 11 of the 16 individual honors from 1999–2014 (Fig. 3). Interestingly, all four of the individual winners from the University of Alberta occurred in consecutive years (2005–2008), with the only repeat winner (Dean Hystad) taking the top honors in 2005 and 2006.

The University of Alberta has had a student in the top five individuals in 13 of the 16 years, followed by Brigham Young University (in 11 years), and the University of Wyoming and Colorado State University (in 8 years each) (Fig. 4). Collectively, 15 different schools have had a student in the top five from 1999–2014. A complete listing of the top five individuals for each year can be found in Table 2. Top individual scores, out of a maximum 300 points, averaged 232 points<sup>i</sup> over the 16 years with a high of 274 points in 2008 (Fig. 5). Mean individual scores averaged 151<sup>ii</sup> points over this time period and were highly correlated with top individual scores.<sup>iii</sup> For students placing in the top 10% of each year's exam, the Certified Professional in Range Management (CPRM) exam is waived provided the student applies for the CPRM within five years of qualifying.

Over these 16 years, three students placed in the top five individuals in three different years: Kate Hoffman (University of Idaho) placed 3rd in 1999 and 2nd in both 2000 and 2001; Sara Hanlon (University of Wyoming) placed 4th in 2007, 5th in 2008 and 1st in 2009; and Julia Workman (University of Idaho) placed 1st in 2011, 3rd in 2012 and 4th in 2013. Six other students placed in the top five individuals in two different years: Mae Elsinger (University of Alberta) placed 5th in 2000 and 3rd in 2001; Tiana Matheson (Brigham Young University) placed 5th in 2002 and 3rd in 2003; Eric Gardner (Brigham Young University) placed 4th in 2004 and tied for 3rd and 4th in 2006, Dean Hystad (University of Alberta) placed 1st in both 2005 and 2006 (see above), Daniel Zvirzdin (Brigham Young University) placed 3rd in 2009 and 1st in 2010; and Hannah Ricks (Brigham Young University) placed 3rd in 2013 and 1st in 2014.

Seven different schools have taken home the top honors for team scores over the past 16 years, including a tie for top place in 2000 between Eastern Oregon University and the University of Idaho. Similar to the individual top honors, the University of Alberta (seven top places) and Brigham Young University (five top places) have dominated the team competition (Fig. 2). Both universities have repeated as top team twice—the University of Alberta in 2004 and 2005, and again in 2011 and 2012, and Brigham Young University in 2002 and 2003, and again in 2009 and 2010. In six years, the same school won both the team and individual top honors: Brigham Young University in 2002, 2003 and 2010; University of Alberta in 2005 and 2008; and Utah State University in 2013. A team from the University of Alberta has placed in the top five teams in all 16 years from 1999–2014, followed by Brigham Young University with 12 top five team finishes, the University of Wyoming (nine), and Colorado State University and Texas A&M University (seven each) (Fig. 4). Collectively, 17 different schools have had a team place in the top five from 1999–2014. A complete listing of the top five teams (with the top three individuals provided) for each year is shown in Table 3. Top team scores, out of a maximum 900 points per team,

<sup>i</sup>  $\pm 26$  1SD.

<sup>ii</sup>  $\pm 16$  1SD.

<sup>iii</sup>  $r = 0.83$ .

**Table 3. Top five teams and URME scores from 1999-2014, along with the highest three (four if a tie) individuals from each team.**

| <u>Year</u> | <u>Placing</u> | <u>Score</u> | <u>Team</u>                 | <u>Top 3 Individuals</u>                             |
|-------------|----------------|--------------|-----------------------------|------------------------------------------------------|
| 1999        | 1              | 651          | <b>Univ. of Arizona</b>     | Gwen Oldham, Jason Martin, Jon Stone                 |
|             | 2              | 634          | Colorado State Univ.        | Dana Gaige, Sean Kelly, Scott Beard                  |
|             | 3              | 621          | Univ. of Idaho              | Dan Patten, Amanda Helmer, Kate Hoffman              |
|             | 4              | 589          | Univ. of Alberta            | Laura Stepnisky, Brian Lambert, Carla Martin         |
|             | 5              | 572          | Texas A&M Univ.             | Paula Siems, Andy Murr, Kyd Kelley                   |
| 2000        | 1/2            | 513          | <b>Eastern Oregon Univ.</b> | Kirk Davies, Zola Gibson, Julie Morrison, Ryan Peila |
|             | 1/2            | 513          | <b>Univ. of Idaho</b>       | Kate Hoffman, Amanda Helmer, Matt Jones              |
|             | 3              | 505          | Univ. of Alberta            | Mae Elsinger, Chris Stefner, Carla Martin            |
|             | 4              | 471          | North Dakota State Univ.    | Erik Sorensen, Sarah Miller, Mike Gerbig             |
|             | 5              | 466          | Colorado State Univ.        | Sean Kelly, Amy Gonzalez, Amy Randell                |
| 2001        | 1              | 526          | <b>Univ. of Alberta</b>     | Mae Elsinger, Linda Hunt, Chris Stefner              |
|             | 2              | 521          | Univ. of Arizona            | Sanoy Gimenez, Valerie Oriole, Rachel Meade          |
|             | 3              | 517          | Brigham Young Univ.         | Libby Noall, Jeff Burnham, Danny Summers             |
|             | 4              | 504          | Texas A&M Univ.             | Kurtiss Schmidt, Theresa Swihart, Ryan Vice          |
|             | 5              | 494          | Univ. of Idaho              | Kate Hoffman, Leslie Ferguson, Amanda Helmer         |
| 2002        | 1              | 569          | <b>Brigham Young Univ.</b>  | Jeff Taylor, Rachel Fugal, Tina Matheson             |
|             | 2              | 541.5        | Univ. of Alberta            | Brent Finnestad, Chris Stefner, Grant Chapman        |
|             | 3              | 480          | Oregon State Univ.          | Jody Nartz, Casey Matney, Travis Miller              |
|             | 4              | 470.5        | Texas A&M Univ.             | Theresa Swihart, Noah Worley, Stephanie Doell        |
|             | 5/6            | 468          | Colorado State Univ.        | Ded Gonima, Jenny Woodward, Collin Ewing             |
|             | 5/6            | 468          | South Dakota State Univ.    | Luke Perman, Mike Wooters, Nicole Hansen             |
| 2003        | 1              | 593          | <b>Brigham Young Univ.</b>  | Rachel Fugal, Tiana Matheson, Tom Krebs              |
|             | 2              | 571          | Univ. of Alberta            | Grant Chapman, Danielle Gabruck, Adam Kilburn        |
|             | 3              | 563          | Univ. of Wyoming            | Curt Nixon, Jordana LaFantasie, Michael Wells        |
|             | 4/5/6          | 531          | South Dakota State Univ.    | Nicole Hansen, Derek Oliver, Kristin Malo            |
|             | 4/5/6          | 531          | Univ. of Nebraska-Lincoln   | Kristin Nollette, Johan Marquardt, Ben Keep          |
|             | 4/5/6          | 531          | Univ. of Saskatchewan       | Julie Korol, Alicia Hargrave, Steve Hankey           |
| 2004        | 1              | 683          | <b>Univ. of Alberta</b>     | Cody Wahirniak, Dannielle Gabruck, Kurtis Foquette   |
|             | 2              | 672          | Univ. of Wyoming            | Jordge LaFantasie, Nate Jorgenson, Fred Cummings     |
|             | 3              | 644          | Colorado State Univ.        | Seth Rotering, Jesse Dillon, Peter London            |
|             | 4              | 638          | Utah State Univ.            | Travis Mote, Morgan Mendenhall, Gary Brown           |
|             | 5              | 628          | Brigham Young Univ.         | Eric Gardner, Tina Ward, Ruth Walker                 |
| 2005        | 1              | 548          | <b>Univ. of Alberta</b>     | Dean Hystad, Cody Nahirniak, Rae Haddow              |
|             | 2              | 520          | Brigham Young Univ.         | Jeremiah Armstrong, Leland Roberts, Daniel Olson     |
|             | 3              | 512          | Montana State Univ.         | Bob Wesley, Amanda Wright, Jake Powell               |
|             | 4              | 507          | Oklahoma State Univ.        | Austin Sewell, Lauren Wilkerson, Kyle Whitmire       |
|             | 5              | 504          | Colorado State Univ.        | Liz Wertz, Joe Schoeder, Jesse Dillon                |
| 2006        | 1              | 613          | <b>Brigham Young Univ.</b>  | Eric Gardner, Dan Olsen, Jen Coleman                 |
|             | 2              | 599          | Univ. of Alberta            | Dean Hystad, Brenda Shaughnessy, Darin Sherritt      |
|             | 3              | 591          | Univ. of Saskatchewan       | Nadia Mori, Denise Benfield, Shannon Poppy           |
|             | 4              | 576          | Oklahoma State Univ.        | Kyle Whitmire, Lauren Wilkerson, Dane Varney         |

| <u>Year</u> | <u>Placing</u> | <u>Score</u> | <u>Team</u>                | <u>Top 3 Individuals</u>                                            |
|-------------|----------------|--------------|----------------------------|---------------------------------------------------------------------|
| 2007        | 5              | 561          | North Dakota State Univ.   | Josh Peterson, Miranda Vlamnick, Krista Berg                        |
|             | 1              | 631          | <b>Univ. of Wyoming</b>    | Merritt Carpenter, Sara Hanlon, Lucas Line                          |
|             | 2              | 617          | Univ. of Alberta           | Tanner Pollack, Brenda Shaughnessy, Darin Sherritt, Travis Lundberg |
|             | 3              | 580          | Colorado State Univ.       | Tim Hoelzle, Wendy McBride, Maureen Underhill                       |
|             | 4              | 561          | Oklahoma State Univ.       | Lauren Wilkerson, Justin Rader, Adam Gourley                        |
| 2008        | 5              | 552          | Texas A&M Univ.            | Rixey Jenkins, Heath Starns, Kimberly Haile                         |
|             | 1              | 771          | <b>Univ. of Alberta</b>    | Alicia Entem, Ian Levitt, Tisa Bevan                                |
|             | 2              | 702          | Univ. of Wyoming           | Sarah Hanlon, Mae Peterson, Reese Irvine                            |
|             | 3              | 696          | Montana State Univ.        | Jake Schmalz, Melissa Richert, Kailee Bickford                      |
|             | 4              | 688          | Univ. of Saskatchewan      | Kim Will, Andrew Reese, Kristin Bielefeld                           |
| 2009        | 5              | 682          | Brigham Young Univ.        | Ruth Walker, Daniel Zvirzdin, Stacey Strode                         |
|             | 1              | 636          | <b>Brigham Young Univ.</b> | Daniel Zvirzdin, Jessica Humes, Laura Marszalek                     |
|             | 2              | 630          | Colorado State Univ.       | Benjamin Wissinger, Marcos Roybal, Kristin Oles                     |
|             | 3              | 624          | Univ. of Alberta           | Tisa Bevan, Shauna Ritchie, Robert Oakley                           |
|             | 4              | 612          | Univ. of Saskatchewan      | Christiane Catellier, Amy Wheeler, Adrienne Tastad                  |
| 2010        | 5              | 610          | Univ. of Wyoming           | Sarah Hanlon, Lucas Bindel, Rives White                             |
|             | 1              | 678          | <b>Brigham Young Univ.</b> | Daniel Zvirzdin, Amy Johnson, Kevin Aaron Costa                     |
|             | 2              | 620          | Univ. of Wyoming           | Andrew Telander, Jordan Wambeke, Sage Askin                         |
|             | 3              | 596          | Univ. of Alberta           | Amanda Zapesocki, Tanner Broadbent, Kristyn Housman                 |
|             | 4/5            | 579          | Montana State Univ.        | Kailee Bickford, Daisy Garverich, Daniel Pratt                      |
| 2011        | 4/5            | 579          | Texas A&M Univ.            | Andy James, Jack Turney, Steven Goertz                              |
|             | 1              | 602          | <b>Univ. of Alberta</b>    | Jordan Burke, Jolene Noble, Kristine Dahl                           |
|             | 2              | 596          | Univ. of Wyoming           | Katie Nelson, Sage Askin, Patrick Toomey                            |
|             | 3              | 570          | Univ. of Idaho             | Julia Workman, Mike Johnson, Brooke Jacobson                        |
|             | 4              | 567          | South Dakota State Univ.   | Ben Lardy, Wyatt Kirwan, Harlan Bergeleen                           |
| 2012        | 5              | 552          | Brigham Young Univ.        | Austin Brewer, Bromwyn Maier, Tamara Watkins                        |
|             | 1              | 686          | <b>Univ. of Alberta</b>    | Chelsea Geiger, Nadine Clifton, Scott Dunn                          |
|             | 2              | 663          | Univ. of Wyoming           | Sage Askin, Tate Smith, Rick Comer                                  |
|             | 3              | 660          | Texas A&M Univ.            | Bryan Tarbox, Michael Legere, John Legere                           |
|             | 4              | 654          | Univ. of Idaho             | Julia Workman, Shawn Taylor, Mike Wilske                            |
| 2013        | 5              | 650          | Univ. of Arizona           | Bridger Skaarer, Evan Kipnis, Erin Boyd                             |
|             | 1              | 749          | <b>Utah State Univ.</b>    | Lara Kitchen, Shane Kitchen, Colton Grange                          |
|             | 2              | 735          | Univ. of Alberta           | Megan Lewis, Scott Dunn, Sean Surkan                                |
|             | 3              | 703          | Brigham Young Univ.        | Hannah Ricks, Alys DeFranco, Jocelyn Raphael                        |
|             | 4              | 695          | Univ. of Arizona           | Kelsey Hawkes, Alanna Riggs, Eric Wagner                            |
| 2014        | 5              | 693          | Fort Hays State Univ.      | Chandra Devine, Adam Rusk, Helena Harmison                          |
|             | 1              | 708          | <b>Univ. of Alberta</b>    | Jeff Hogberg, Leah Rodvang, Megan Rennie                            |
|             | 2              | 679          | Brigham Young Univ.        | Hannah Ricks, Amy Clark, Jacob Hall                                 |
|             | 3              | 664          | Montana State Univ.        | McKenna Brown, Susan Massar, Jarrett Payne                          |
|             | 4              | 659          | Univ. of Wyoming           | Kate Richardson, Eric Ramerth, Amanda O'Donnell                     |
|             | 5              | 644          | Univ. of Arizona           | Alanna Riggs, Anna Collins, Mike McIntire                           |

averaged 632 points<sup>iv</sup> over the 16 years with a high of 771 points in 2008 (Fig. 5).

### Which Sections of the URME are Easy or Hard?

Over the past 8 years, results by section of the URME showcase that there is remarkable similarity among sections in the average percent of questions answered correctly (50–60%). In increasing order of percentage of questions correct, the URME sections are Range Regions (50%), Range Improvements (53%), Range Inventory and Analyses (54%), Grazing Management (55%) Range Ecology (57%) and Multiple-use Relationships on Rangelands (60%). Results from the comprehensive problems in grazing management, range improvements, and range inventory and analysis (collectively 40 points or 13.3% of the URME score) have been variable over the years (28 to 55% of the points obtained), with a mean of 42% correct.

### What is the Future for URME?

The URME will remain steadfast to its traditions of embracing the principles and practices of rangeland management (the art and science), but continue to incorporate cutting-edge scientific findings, in an effort to emphasize higher order learning by undergraduates. For example, topics of changing climate and weather variability (including extreme events), and the associated adaptive management strategies employed by land managers to reduce risk and increase resilience will be highlighted. Increasing emphasis on ecosystem restoration (including mechanisms, processes and pathways), animal grazing behavior, pyric herbivory (patch burn grazing), soil microorganisms, greenhouse gases, and human dimensions should be expected as well.

Potential technological advances associated with mobile devices (e.g., iPad) provide the pathway forward to move from paper to interactive tests that incorporate pictures, videos and simulations/models. This technology would serve to coalesce the “art and science” of range management by providing real-life demonstrations/experiences to students. Furthering the team aspect of the competition could involve incorporating a problem solving component on a contemporary topic encompassing critical thinking.

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<sup>iv</sup> ±75 1SD.