

# 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.

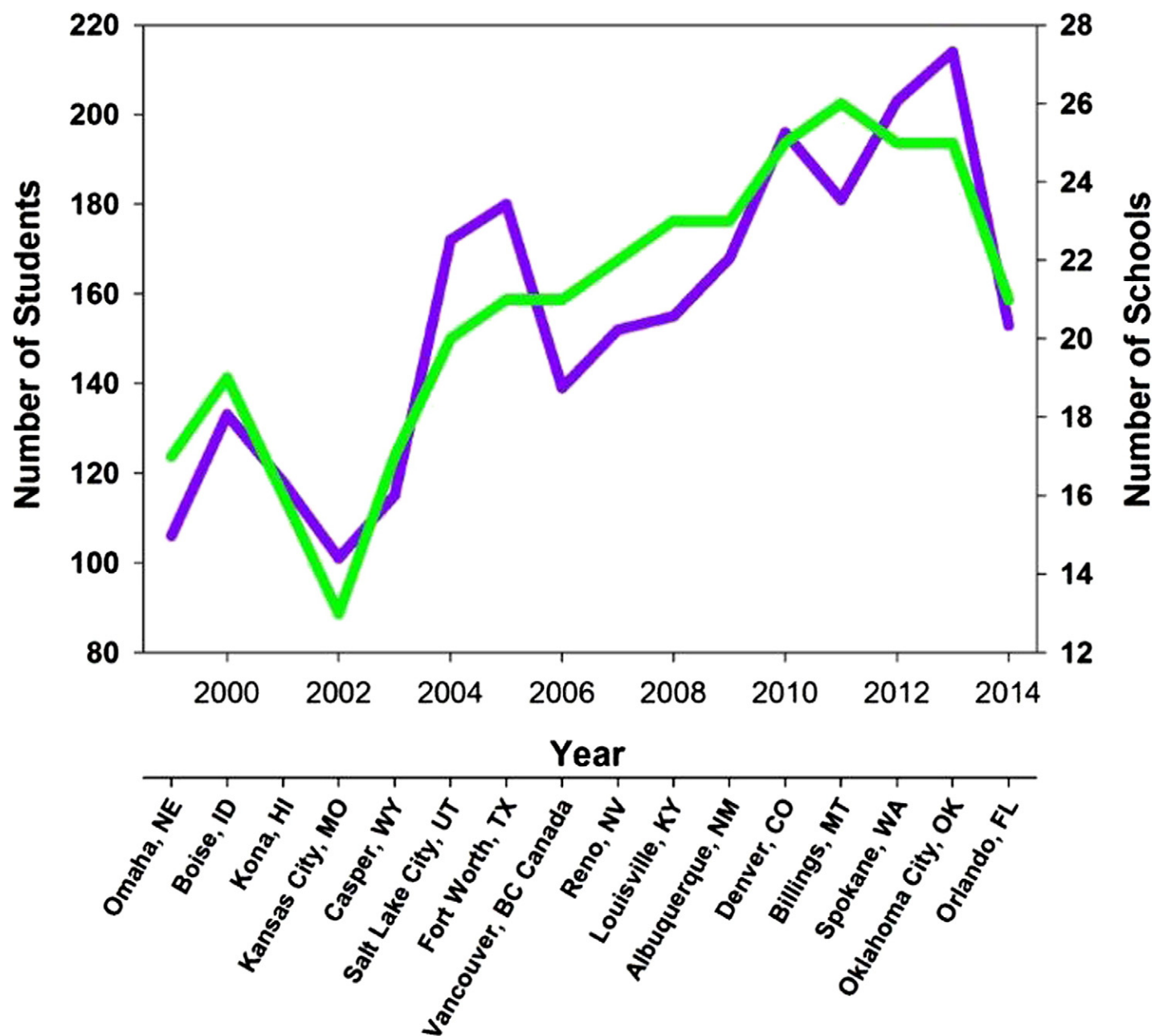
Questions are multiple choice, with two or four point values. Four point value questions involve computations (e.g., stocking rate calculations) or interpretations from tables, graphs, and figures. Larger point value problems are given in the grazing management (10 points), range improvements (10 points), 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).





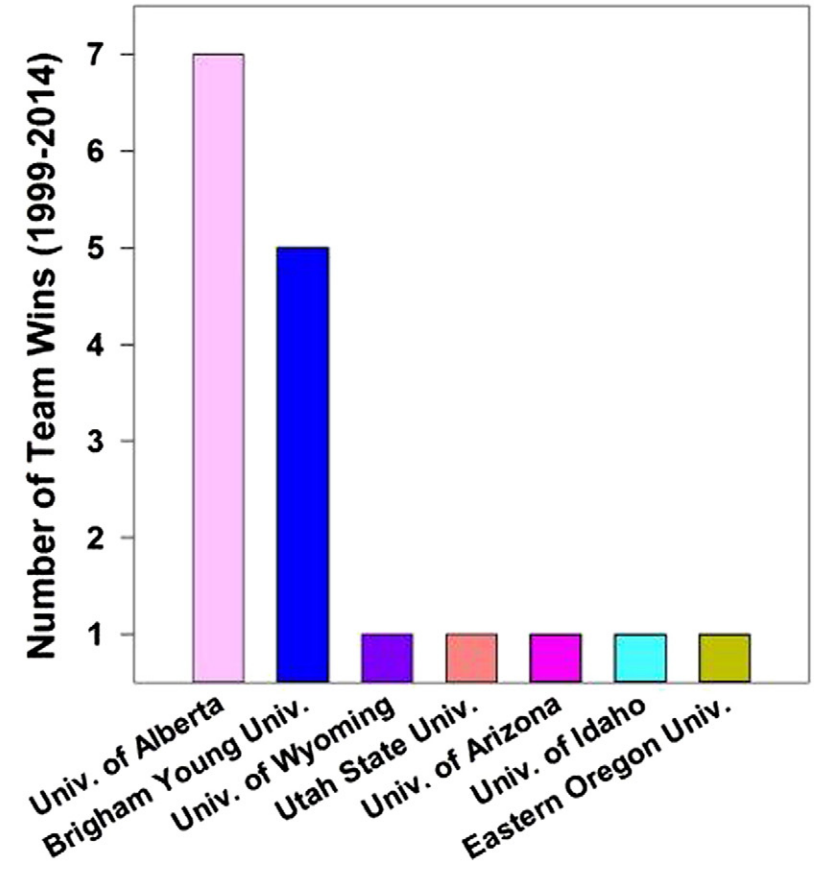
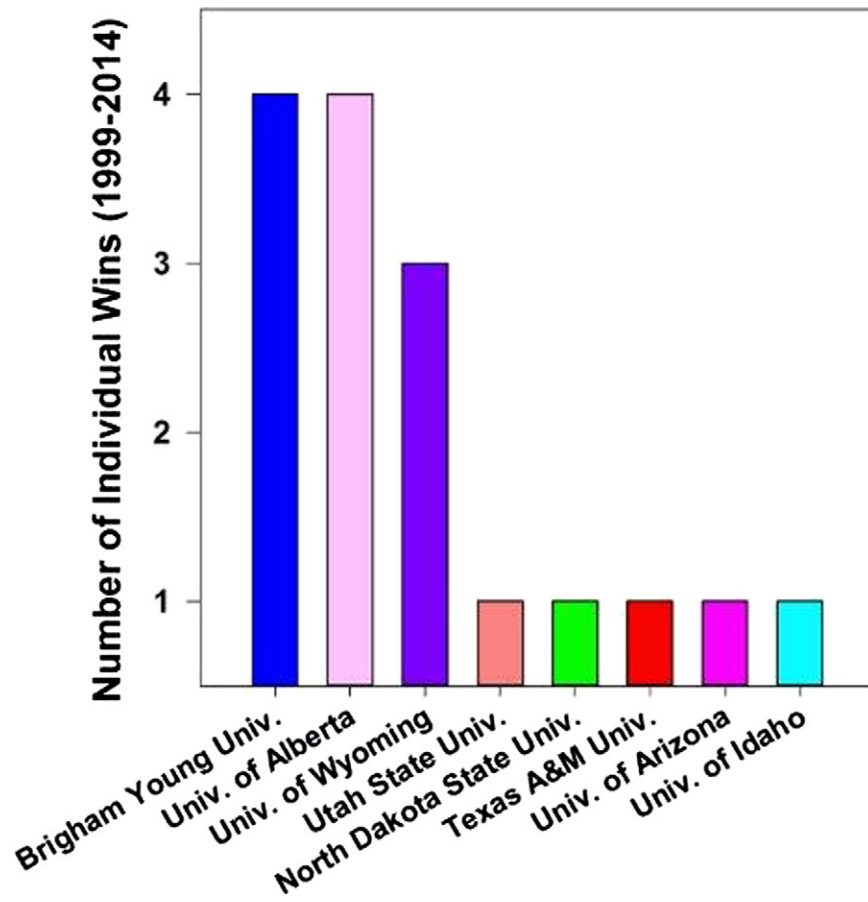
**Figure 2.** Number of students (purple line, left y axis) and universities/colleges (green line, right y axis) that competed in the Undergraduate Range Management Exam between 1999 and 2014.

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

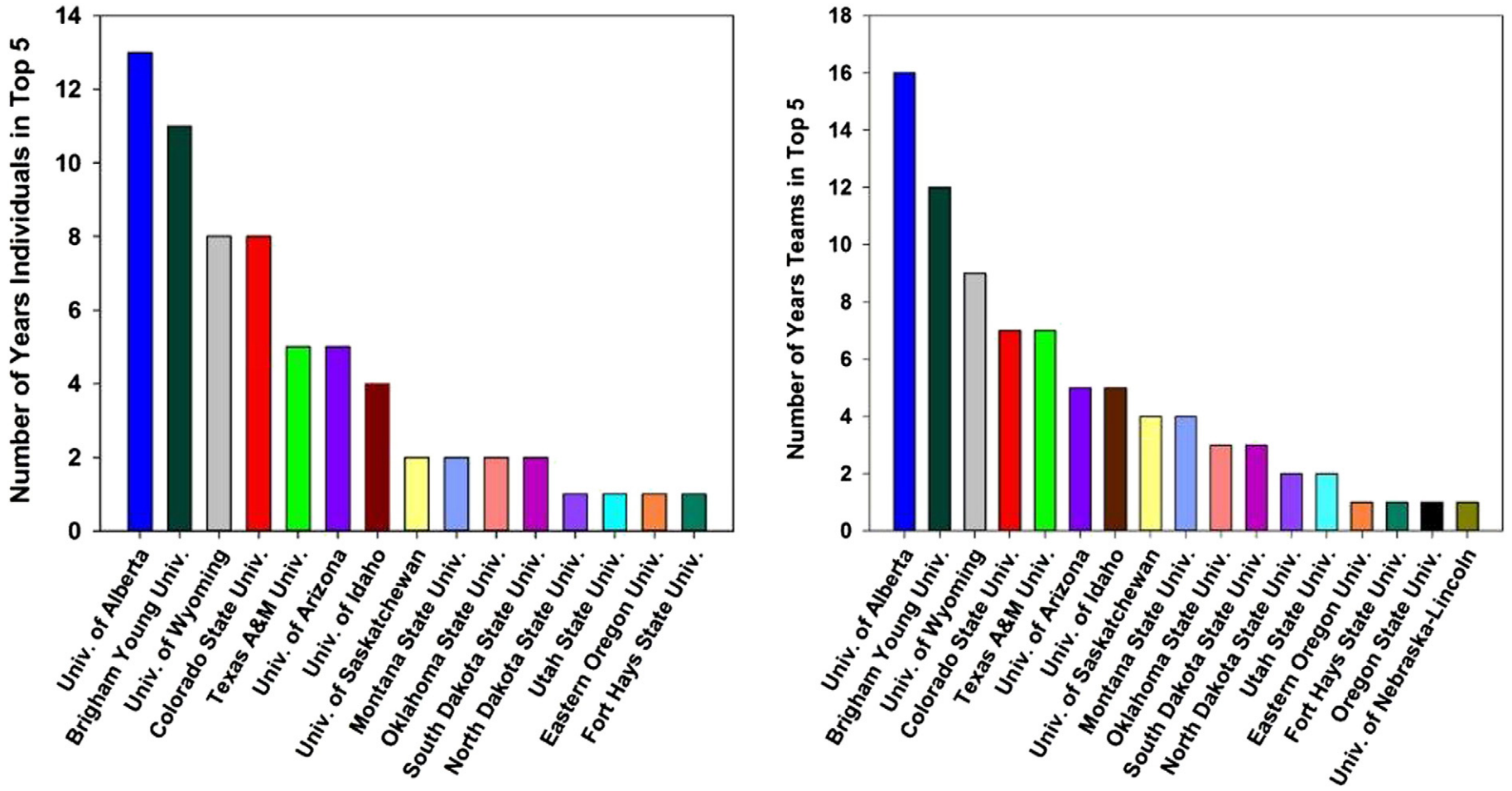
University/College	Years Competed (max = 16)	Years of Competition
Antonio Narro	1	2002
Arizona State University	3	2008-10
Brigham Young University	16	1999-2014
Chadron State College	16	1999-2014
Colorado State University	16	1999-2014
Dickinson State University	4	2011-14
Eastern Oregon University	10	1999-2000, 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.



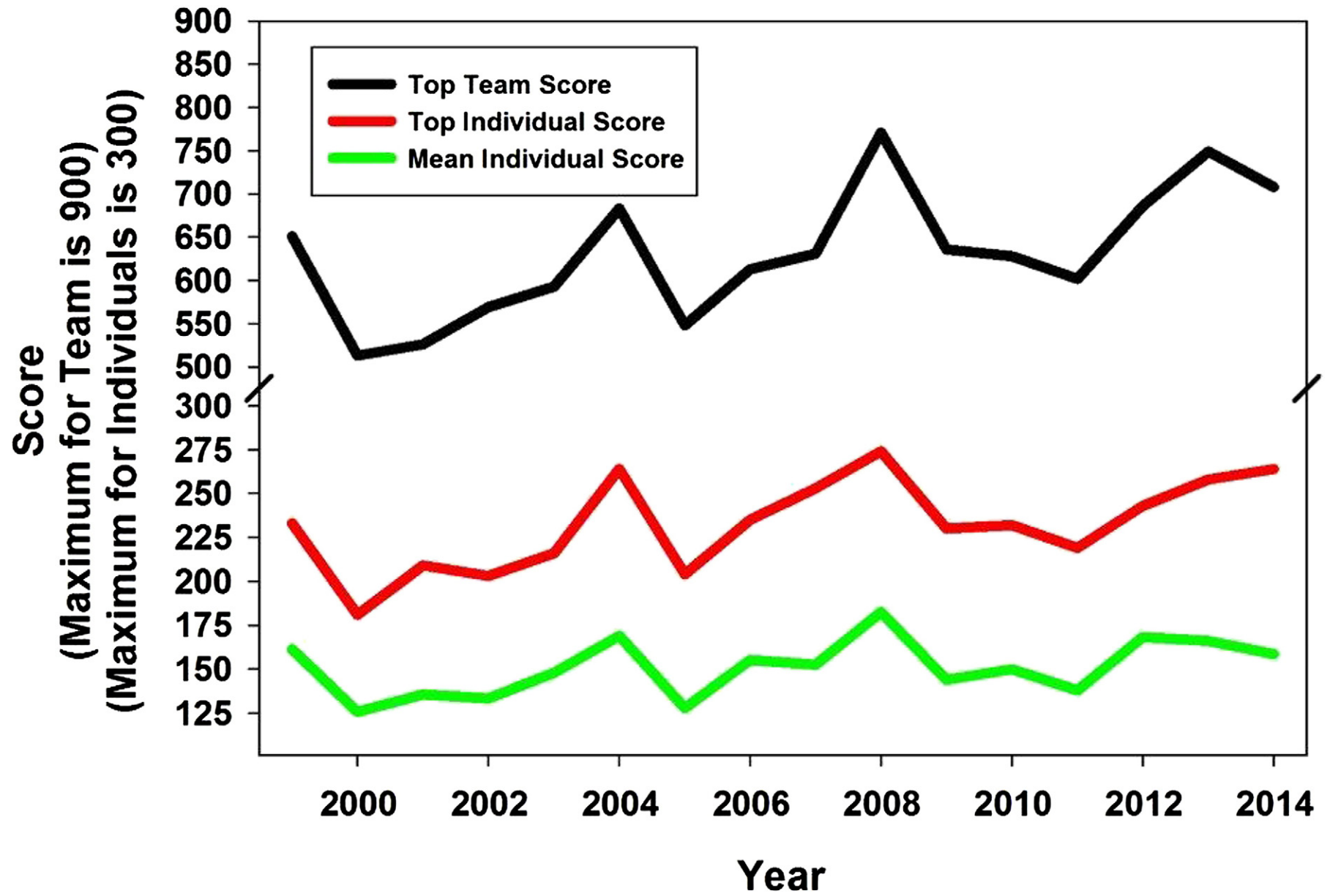
**Figure 4.** Number of years individuals placed in the top 5 (left panel) and number of years the team placed in the top 5 (right panel) for the schools completing in the URME between 1999 and 2014.

**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>  $\pm 75$  1SD.