

METHODS

The San Diego County Bird Atlas resembles other bird atlases in that it is based on data recorded in the framework of a grid system over a five-year period, March 1997–February 2002. It differs in that it addresses winter distributions as well and presents substantial data on migrants, especially spring migrants. It is founded on databases of nearly 400,000 records, supplied by hundreds of observers (Table 3). At the outset of the project, I defined coverage goals for each of the 479 squares of the grid, and these goals were met in 97% of the squares for both winter and the breeding season. Thus the birds of San Diego County are now among the best known in the world.

ORGANIZATION

The idea of proposing a bird atlas for San Diego County first came to me over Memorial Day weekend in 1996, as the San Diego Natural History Museum reformulated its research division as the Biodiversity Research Center of the Californias. A bird atlas is about as fundamental as biodiversity research gets. The concept was also an outgrowth of some ideas Michael A. Patten, Richard A. Erickson, and Kurt F. Campbell and I addressed in a commentary in *Western Birds* in 1995 (Patten et al. 1995a). Of course, breeding-bird atlases had been around for years, so there were many models. I believed, however, that the method could accomplish much more with a level of investment higher than it usually received. Examples of failure haunted me as much as examples of success encouraged me. I was certain that both institutional backing and broad community support were vital to success. Therefore, I sought and won the confidence of the San Diego Natural History Museum administration. I recruited a group of key advisers from the community of leading birders and professional biologists. Initially, the group consisted of Michael U. Evans (then with the U.S. Fish and Wildlife Service), Paul D. Jorgensen (California State Parks), Karen Messer (Buena Vista Audubon Society and California State University, Fullerton), Conrad Sankpill (San Diego Audubon Society), Michael R. Smith (then with the U.S. Fish and Wildlife Service), and Kenneth L. Weaver (Palomar Audubon Society). Conrad and Mike Smith left San Diego during the project, but Ann Klovstad (project assistant and San Diego Audubon Society), Kirsten J. Winter (U.S. Forest Service), and Barbara E. Kus (U.S. Geological Survey and San Diego State University) joined us. Each of these served as an ambassador for the project to a key constituency and supported the effort in diverse and vital ways (see also Acknowledgments), as well as keeping me firmly focused on the goal and grounded in reality.

During the fall and winter of 1996–97, I scheduled several meetings for recruiting participants, speaking to

the San Diego Field Ornithologists, all three San Diego County Audubon societies, U.S. Fish and Wildlife Service biologists, and at the Salton Sea bird festival. The word was circulated through these organizations' newsletters as well, and over 100 prospective participants attended a kickoff meeting at Mission Trails Park in February 1997. By this time, we had established the grid system and the coverage goals, and each participant received a packet of maps, lists, forms, and instruction handbook.

The initial concept was that one observer or team "adopt" one or more squares, committing to covering it until the criteria for completeness were met (see Coverage). This technique was the backbone of our effort, and many squares were covered by this method. After the first breeding season, though, it became clear that certain regions of the county remained poorly covered, and we instituted a supplementary strategy, "blockbuster weekends." In these, we targeted a region, recruited observers for one or both days of the weekend, reserved a convenient campsite for Saturday night, and divided into teams to survey usually 10 to 12 squares over the two days. Besides covering areas that would otherwise go unvisited, these events attracted some observers who preferred this mode of participation, helped train less experienced birders by teaming them with the more experienced, and built team spirit, a factor vital to our success.

In 2000, Conrad Sankpill suggested an additional strategy, the "attack squad." In this, attack squad members notified Ann and me when they were able to go into the field, or how many days they could devote in a season, and we directed them to the squares most needing attention for our coverage goals to be met. Because we kept data entry current with incoming reports, and because our facility with the databases had reached the point where we could extract lists of species recorded and confirmed breeding in each square, and usually e-mail the lists to the observers, by summer 2001 we could send our observers to where attention was most needed day by day. Thus the attack squad proved extremely effective in speeding us to the coverage goals.

Funding from the California Department of Transportation, California State Parks, and U.S. Forest Service enabled us to hire part-time field assistants for the last three and a half years of the project. Joseph R. Barth, Lori J. Hargrove, M. Brennan Mulrooney, Geoffrey L. Rogers, and David C. Seals helped us in this capacity at various times. Each had proved his or her skills as a volunteer. The field assistants proved critical, especially in remote areas of the Anza-Borrego Desert and in squares that were entirely private property, requiring that we befriend landowners to achieve adequate coverage. Thus by the end of the project our strategy had four comple-

TABLE 3 Observers Contributing Data to the San Diego County Bird Atlas

All observers are listed here, whether they contributed directly or indirectly to the atlas database. Indirect contributors include those reporting to the San Diego rare bird hotline (compiled since 1999 by Michael U. Evans). Principal participants, reporting 10 or more hours in the field for the atlas or contributing a substantial block of data, are in **bold**. The list of participants in Christmas bird counts follows the main list.

Paulette D. Ache, Donald K. Adams, R. J. Adams, Douglas W. Aguillard, **Judy Aguirre**, Eva Aiken, Daniel Aklufi, **Kathy Aldern**, Andrew Aldrich, Lisa Ale, **Frank Aleshire†**, Matthew Alexander, Monica Alfaro, Amy Allen, Chuck Allen, D. W. Allen, Larry Allen, Linda Allen, Jake Allsop, Marian Alter, **Barbara Anderson, Candy Anderson**, Pat Anderson, **Caron Andregg**, Frances Armstrong, B. Arnold, **Evelyn Ashton**, Jim Asmus, **David W. Au**, Terri Ayers

Maryanne Bache, Lee Backstrand, Nancy Backstrand, Hank Baele, Jane Baele, David Bainbridge, C. Bandy, **Richard L. Barber**, Brad Barker, **James D. Barr**, Lariann Barretta, **Joseph R. Barth, Cyndee Batzler, David Batzler**, Jim Bauer, **Mona Baumgartel**, Michael Beck, **Peter P. Beck**, Frederick A. Belinsky, **Barbara E. Bell**, Susan Bell, J. Benet, **Jemila Bennett**, Tom Benson, Jim Berg, **Sue Berg**, Paul Bergford, **Ruth Bergstrom**, **Erik Berndes, Jon Berndes, Kai Berndes**, Faith Berry, Eric Bertic, Deborah Bieber, Mark Billings, **David Bittner**, Mitch Bixby, C. D. Black, Lynn Blackman, Richard Bledsoe, David V. Blue, John Boaz, Steven Bobzien, Beth Boekel, Josh Boggs, Sean Bohac, John Boland, Suzanne I. Bond, Brian Bonesteel, Jane Booth, Chuck Border, Dave Born, Katie Boskoff, Chloe Bostic, **Brian Bothner**, Randy Botta, Larry Bottroff, Bill Bourdeau, C. W. Bouscaren, Cheryl Boyd, **Steve Brad**, Terry Brashear, Thad Braun, **Richard Breisch, Susan L. Breisch**, Kevin Brennan, Terry Brewer, Dan Brimm, Maury Brucker, **Sean Buchanan**, Slader Buck, Andy Burbrough, Milo Burcham, Carl Burgess, Jim Burke, Doug Burley, **Kevin J. Burns, Timothy A. Burr**, Ken Burton, Gale Bustillos, Karen Butler, Peter Butler, **Dan Bylin, Debi Bylin**, Dick Byrne

Nigel Calder, Donna Calvao, **Stephen D. Cameron, Alan Campbell**, Bruce Campbell, Kurt F. Campbell, Patricia A. Campbell, **Rita Campbell**, Sonia Cardinal, David Carlson, John Carson, Nigel Carter, **Orval Carter**, Michelle Carvana, Therisa Cash, Tim Cass, **Michael Cassidy, Susan Cassidy**, Joanne Casterline, Bob Cazin, Richard Cerutti, Frank Cervantes, Paul Chad, Matt Chadwick, Elsie Chan, George Chaniot, Bob Chaney, Kay Charter, Jim Charter, Janet Chenier, Amie Childs, **Sunny Christensen**, Ross Christie, R. Church, **Joni Ciarletta**, Mary Clark, Dale Clark, Sandy Clark, Therese Clawson, **James F. Clements, James L. Coatsworth**, Coralie Cobb, **Jeff Coker**, Luke Cole, Shane Coles, Jim Colclough, **Andrea Compton**, Robert Compton, Lyann Comrack, Heath Conkle, **Tammy Conkle**, Virginia Conway, Craig Cook, Jason Cook, **Daniel S. Cooper**, Elizabeth Copper, Chris Cornett, Maureen Corrigan, Stephanie Costelow, Warren Cotton, George Courser, Susan Coyne, **Allen Craft**, Ed Craven, William Craven, Matt Cuny

Evelyn Dalby, Amanda Dall, Sharon Dall, **Wendy Dallas**, Bernard Dambron, Jeannette D'Angelis, Joyce M. Dart, Jonathan Daubin, **Cory Davis**, Liam Davis, James Dayberry, John DeBeer, **Alice DeBolt, Joe Decanio**, Bill Decker, Ann Dempsey, Bill Denton, **James Determan**, Henry Detwiler, Cheryl DeWitt, Anna Dietrick, **John A. Dietrick**, Monique Digiorgio, James Dineen, **Vesta Dineen**, Jeannie Dolan, Joe Donner, Leroy Dorman, **Thomas W. Dorman**, Rod Dossey, Darlene Dougan, **Maxine Dougan**, Bill Doyle, Jeanine Dreifuss, Kyle Drob, Joan Dudley, Doug Dunn, James Dunn

Dick Eales, Nancy Eales, Bettina Eastman, Bob Ebersol, Karen Ebersol, Harry Eckstein, Peggy Eckstein, Nancy Ede, Steve Ede, **Claude G. Edwards**, Alan M. Eisner, **Lisa Ellis**, Rosemary Emberger, Judy Endeman, Norman Engvall, Leonard Enos, **Kathy Estey, Jane Evans**, Jordan Evans, **Michael U. Evans**, William T. Everett, Exequiel Ezcurra

Peter Famolare, Matt Farley, **Samuel L. Farrow, Sandra J. Farrow, Meryl A. Faulkner**, Mike Feighner, Corey Ferguson, Erica Fielder, Elizabeth Fink, Dee Finkbinder, John Finkbinder, **Roberta E. Fischer**, Kylie Fischer, **John Fitch, Pat Flanagan**, Amber Fogarty, Karin Forney, Ron Forster, Ken Fortune, Brian Foster, **Joan Fountain**, Ed Fox, **Nova Fraser**, Jim Freda, **Marjorie Freda**, Steve Fretwell, Julie Frietas, Mike Frietas, Bob Frishman, Christine Collier Fritz, **Michael Fugagli, Sachiko V. Fukuman**, Terry Fulcher, Erik Funk, Dave Furseth

Melvin L. Gabel, Terri Gallion, **Laurie Gammie, Emily Garnica**, P. Galvin, **Anna Gateley-Stanton, Donald P. Geiger**, Ivan Getting, Bud Getty, Justine Gibb, Dan Gibbs, Judy Gibson, Tom Gilleland, June Ginger, **Peter A. Ginsburg**, Lori Glehorn, Enid Gleich, Margaret A. Godshalk, **Ted A. Godshalk**, David Goldberg, Scott Golden, Mike Goldhamer, Jerry Golub, Kelly Goocher, Alice Goodkindt, **C. C. Gorman**, Carole Gormley, **Donna Gould, Bill Graffiis**, Irja Graham, Lloyd Graham, **Shirley Grain**, Ruth Gransbury, **Gary Grantham**, Ed Greaves, **Dorothy Green**, Juan Green, Jane Griffith, John Griffith, **Donald R. Grine**, Joan Grine, Jesse Grismer, Mary Grishaver, Judy Guilmette, Jim Gustafson, Andy Guss

William E. Haas, Steve Haber, Alan Hagen, **Charity Hagen**, Kem Hainebach, **Robin Halford, Edward C. Hall, Freeman Hall**, Steve Hall, Worth Hall, Barbara Hallman, **Robert A. Hamilton**, Jeanne Hammond, **John Hammond**, Pat Hanley, **James Hannan**, Ann Hannon, Bruce Hanson, George Hanyo, **Beverly Hargrove**, Jim Hargrove, **John M. Hargrove, Lori J. Hargrove**, Wayne Harmon, Georgia Harper, **Jan Harrell**, Michelle Hartmann, **Don Hastings, Marjorie Hastings**, Bob Hatch, Nancy Hawkins, Steve Hayden, Ruth Hayward, **Gjon C. Hazard**, Bob Hazen, G. Heck, M. Heilbron, Patricia Heinig, Steve Helm, Eleanor Henchy, Tom Henchy, Holly D. Henderson, Charles Hendew, **Bonnie Hendricks**, Larry Hendrickson, Linda Henry, **Penny Hernandez**, Michelle Herring, Diana Herron, **Joan M. Herskowitz**, Charles Herzfeld, **Arthur W. Hester**, **Dorothy S. Hester**, Cliff B. Hewitt, Robert Hewitt, Patty Heyden, Mel Hinton, Ruby Hjorth, Linh Hoang, Richard Hodges, **Mark David Hoefer**, Gus Hollenbeck, Bill Holst, **Linda M. Holt**, David Holway, Irene Horiuchi, Pierre Howard, **J. Dennis Huckabee**, Ron Huffman, Lauren Hughes, Debbie Hui, **Ruth Hummel**, Bill Hunter, John E. Hunter, **Laura Hunter**, Liz Hutson

Yasuhiro Ikegaya, Marshall Iliff, **Hank Ingersoll**, Chuck Inman, **Nancy Inman**, Ben Innes, M. Ireland, John Irvine, Pam Isaacs

Diane Jadlowski, Robert James, Hal Jameson, L. Louise Jee, G. T. Jefferson, Sue Jobe, Stefan Johansson, Arvilla Johnson, Larry Johnson, **Linda D. Johnson**, Paul Johnson, **Ron Johnson**, Ruth Johnson, **Virginia P. Johnson**, Willard Johnson, Andy Jones, Bernice Jones, **Cindy Jones**, Deborah Jones, Robert Jones, **Evan Jorgensen**, Jack Jorgensen, Kelley Jorgensen, **Mark C. Jorgensen, Paul D. Jorgensen, Steve Jorgensen**, Doug Julian, Joann Julian

Terese Kastner, Isabelle Kay, **Ann P. Keenan, Thomas E. Keenan**, Joanne Kellogg, Liz Kellogg, Keith Kendall, **Bonnie Kenk, Kerry Kenwood**, Nancy Kenyon, Abby King, **Steve Kingswood**, David Kisner, **Michael W. Klein**, Deirdre Klevski, **Ann E. Klovstad**, Brian Knott, Jamie Knowles, Peter Kochavar, John Konecny, Sandy Koonce, Jeremy Krefft, **Anja Kroon, Gerard Kroon**, Jason Kurnow, **Barbara E. Kus**

(continued)

TABLE 3 (continued)

Ed Lamb, **Phillip Lambert, Nola E. Lamken**, Dale Laney, Ken Lange, Dan Langhoff, **Dick Lantz**, Leslie Lara, **Jane Larson**, Marilyn Lawry, Mark Lawry, Jamie R. Lawson, Andy Lazere, Mike LeBuffe, Eugene Lee, **Lucy Lee**, Paul E. Lehman, Vic Leipzig, Jesse Lenaker, Joan Lentz, **Margaret Lesinsky**, Jayne Lesley, Tom Leslie, John Lewis, Karina Leyva, Pam Libby, Alisa Light, Jim Lightner, Jeffrey L. Lincer, Roger Linfield, Terri A. Lisman, Ilene Littlefield, Brian Loly, Peter Lonsdale, **Kim Lopina**, Aaron Lotz, Paul Lovehart, **John C. Lovio**, Michael Lubin, Erik Luedke, Lynn Lunceford, Carolyn Lundberg, Jeff Lyon

Gerald MacNamara, Kevin Maconbrie, Andrew MacRae, Connie Madia, Frank Madia, **Clark R. Mahrdt, Cheryl L. Mann**, Marcia Dustin Mann, **Carol McKie Manning**, Jeff Manning, Jerry Manning, **Barbara Marino, Viviane Marquez**, Cindy Martel, Barry Martin, John A. Martin, Linda Martin, Scot Martin, Corrie Martinez, Mike Martinez, Paul Marvin, Barbara W. Massey, **Michael G. Mathos**, Kim Matzinger, **Andrew Mauro, Kathy Mauro**, Dave Mayer, Scott McArthur, William McBlair, John McCarthy, Jim McCarty, **Guy McCaskie**, Jack McCleod, Bill McCausland, Gerard J. McChesney, Peter McDonald, Dave McFarland, John McGowan, Vernie McGowan, **Bert McIntosh, Margaret McIntosh**, Sharon McKelvey, Mike McNew, Mac McWhorter, **Esther Jane McNeil**, Chris Meador, Jim Meier, Jim Melli, Cheryl Melban, A. J. Mercado, Anthony Mercieca, Gary Meredith, **Karen Messer**, Sara Meyers, Tom Meyers, Linda Michael, Ed Midsey, Barbara Middlebrode, **Bob Miller**, Laurie Miller, Nancy Miller, Ray Miller, **Ed Mirsky**, Stella Mitchell, **Bill Mittendorff**, Patrick J. Mock, Joann Mockbee, Marie Molloy, **Edith Helen Monsees**, Jean-Pierre Montagne, David Mooney, **Barbara Coffin Moore**, Bob Moore, Joanne T. Moore, Lynette Moore, **Virginia S. Moran**, Earl Moree, Don Moreland, **Gillian Moreland**, Rosalyn Moreland, Amy Morice, Joseph Morlan, **Arthur G. Morley**, Jim Morris, Gretchen Morse, **Mary B. Mosher**, Jon Muench, **Kamal Muilenburg, M. Brennan Mulrooney**, Tim Murray, Barry Mussen, Jean Murton, Mike Muse, **Tom Myers**, Leif Myklebust

Patricia Nance, Laura Nass, Lucinda Navarre, Jerusha Matsen Neal, **Karlene Neal**, Heather L. Nelson, Michael Nelson, **Philip K. Nelson, Nancy Nicolai**, Joan Nimick, Julie Nin, Richard Norgaard, Garry Norris, Bob Norton, Dick Norton, R. J. Norton, Sue Novaks, Zach Nowak, Bill Nutter, Christine Nyhan

John Oakley, Thomas Oberbauer, Fergal O'Doherty, Diane O'Keeffe, **Bryan O'Leary**, Cliff Oliver, **Barbara J. Orr**, Regena Orr, Brock Ortega, **N. (Oz) Osborn**, Quinn Osborn, Chris Otahal

Patricia Page, Joyce Page-Breyer, Melody Padget, Amber Pairis, Eugenia Palmer, Carol Paquette, Jenny Park, Carol M. Parker, Dennis M. Parker, Robert Parks, Patricia Parris, Caryl Parrish, Grace Bell Parsons, Will Parsons, **Michael A. Patten**, Cam Patterson, **Robert T. Patton**, Sharon Paulin, Ann Paynet, **Richard Payne**, Evelyn Peaslee, Rachel Pence, Todd Pepper, Grady Perkins, **Nicole Perretta**, Karen Perry, Shannon Peters, **Andrea Peterson, Bonnie L. Peterson**, Mary Peterson, Stan Peterson, **Barbara J. Peugh, James A. Peugh**, Susan Morse Pfaff, Jialin Phillips, Roberta Phillips, Reed Pierce, James E. Pike, Kelly Pinion, Mary F. Platter-Rieger, **Tim Plunkett**, Pavana Plunkett, Aaron Polichar, **Leslie Polinsky, Mark Polinsky**, Al Ports, **Ed Post**, Mary Post, Susan Potts, Dave Pound, Geoff Pouwels, **David W. Povey**, Rob Power, **Wayne Pray**, Jason Price, Jennifer Price, Jennifer Pritchett, Mike Pritzl, **Philip R. Pryde**

David Quady, **Ingri S. Quon**

Patti Raffelson, Russ Railsback, Ruben S. Ramirez, Judy Ramirez,

Kesler Randall, G. Randolph, George Ravenscroft, **David Rawlins**, Nathan Ray, Carolyn Raynesford, Amadeo M. Rea, Jon Rebman, **Ginger A. Rebstock, Craig H. Reiser†**, Paul Remeika, John Reseck, **Carol Reynolds**, Bill Ridell, **Christine Rideout**, Douglas Rideout, Katie Rideout, Royce B. Riggan, Don Riley, Jim Roberts, **Joan M. Roberts**, Steve Roberts, Joe Robinson, Mary Ann Robinson, Tina Robinson, Mark Rochefort, Joyce Rodgers, Raymond Rodgers, **Richard Roedell, Geoffrey L. Rogers**, Jon Rogers, Lindsay Romo, Kim Ronin, Rob Ronin, **David Rorick†**, Jorge Rosales, Joan Rosen, Curtis Ross, Danny Russen, Jim Rowoth, Ced Ruano, Betsy Rudee, John Rudley, Dennis Ruggles, Ann Rumsey, **Jim Russell**, Will Russell

Gail Sabbadini, Scott Sabbadini, **Matt Sadowski**, Tanja Sagar, Bonnie Salbach, Ron Saldino, Donna Sams, James R. Sams, Marty Samse, Mike San Miguel, **Gerald Sanders**, Al Sandlin, Carol Sandlin, **Robert C. Sanger, Conrad Sankpill**, Paul Saracini, Kathleen Satterfield, Julie Savaryt, Bill Savory, Sue Scatolini, Betty Scheible, Bill Scheible, Frank Scheible, Vince N. Scheidt, **Rick Schiller**, Dianne Schilling, Jeanne Schinto, Jack W. Schlotte, Annette Schneider, John Schneider, Julie Schneider, **Claudine H. Schork**, Casey Schroeder, Brad Schram, Suzanne Schultz, Elizabeth Schweizer, Lou Schweizer, Tina Scruggs, **David C. Seals, David G. Seay**, Carolyn Secor, Mike Sellors, Pat Sena, **Lisa Seneca**, Leigh Sevy, Leslie Sewell, Erik Sgariglia, David Shaari, K. Shank, Paul Sharman, Bryan Sharp, **Frances Shaw**, Joe Shelton, Gaynell Schenk, Linda Shipman, Tom Shipman, Phil Siefert, **Betty Siegel**, Barbara Simon, **Jamie Simmons**, Ann Sixtus, Fran Skillman, John Skirgandas, Pam Skirgandas, **Keith Smeltzer**, Holly Smitt, **Carrie Smith**, Chris Smith, Gary Smith, **Jerry Smith**, Jim Smith, **Margaret Smith**, **Michael R. Smith, Mike Smith, Susan E. Smith**, Tricia Smith, Winona Smith, Vic Snider, Craig Snortland, Mark K. Sogge, Liz Sorenson, Steve Sosensky, John Spain, Larry Spann, Susan Spann, Caleb Spiegel, Markus Spiegelberg, **Fred Sproul**, Mike Spurrier, J. St. John, Mike Stalder, **Todd Stands, David Stanton**, Peter St. Clair, Barbara Stegman, Linda Stehlik, Nick Stehly, Jr., Greg Steinbach, Bill Stepe, Gregg Stiesberg, Deborah Stilman, Drew Stokes, Barbara Stone, **Herb E. Stone**, Ralph Stone, **Mary Beth Stowe**, Carol Strilich, Dianne Strzelinski, Brian L. Sullivan, Gary Sullivan, Norma Sullivant, Carol Sunlight, Sage Swain, Larry Sward

Victor Talbott, Ed Tandelfino, Claudia Taylor, **Lee E. Taylor**, Naomi Taylor, Scott Taylor, Stacey Tenant, Jill Terp, **Robert Thériault**, Patricia Thompson, **Kemer Thomson**, Don Tomlinson, Chris Tratnyek, **Brian Travis**, Scott Tremor, Tres Trestrail, David Trissel, Rich Trissel, M. Trotter, Andy Truban, Joe Trudel, Tommy Tucker, **Jennifer Turnbull, Robert Turner**

Philip Unitt, Frank L. Unmack

Charles E. Van Tassel, Dean Vanier, Tom Vaught, Bob Vinton, Paul Vircsik, **Phoenix M. von Hendy**

E. Waardenburg, Robyn Waayers, Don Waber, Dorothy Wadlow, Edge Wade, John Wagoner, Stan Walens, David Waller, **Ed Wallace**, Kyle Wallace, Lauren Wallace, **Pat Walsh†, John F. Walters**, Brian Walton, **Ron Warren**, Paula Watson, Donna Weaver, Kaitlin Weaver, **Kenneth L. Weaver, Richard E. Webster**, Ian Weeks, **Jeffrey M. Wells**, Mike Wells, Pat Wells, Roy Wells, Randy West, David S. Wheeler, Rick Wheeler, Paula White, Pete Wickham, Harold A. Wiert, Dan Williams, **Herbert H. Williams**, Katherine Williams, **Kathy S. Williams**, Doug Willlick, Peter Willmann, Teresa Wilks, Ken Wilson, **James K. Wilson**, Jeff Wilson, Julie Wilson, Michael Wilson, Mike Wilson, Jerry Wilson, Mark Wimer, Clark Winchell, **Kirsten J. Winter**, Rami Wissa, **Shauna M. Wolf**, A. Wolfe, Rachel Woodfield, Bruce Wollitz, **Catherine Woodruff**, John Woodward, **Joseph**

(continued)

TABLE 3 (continued)**C. Worley, Keith Wrestler, Gail Wynn, Roger Wynn, Carol Wysong, Dennis Wysong**

Susan Yamagata, Emiko Yang, Tim Youmans, Crystal Young, **Arnold Young, Herbert L. Young**, Rebecca Young, Ruth Young, Matt Yubas

Sheldon Zablow, Jimmie Zabriskie, Dave Zeiss, Richard Zembal, Jeri Zemon, Barbara Zepf, Paul Zepf, Nancy Zevallos, Barry Zimmer, **James O. Zimmer**, Carolyn Zuker, **Paul Zucker**, Bambi Zuehl, Jimmie Zuehl

ANZA-BORREGO DESERT, COMPILED BY ROBERT THÉRIAULT

Paulette Ache, David W. Au, Maryanne Bache, Joseph R. Barth, Peter P. Beck, Tom Belzer, James Berg, Sue Berg, Carol Black, Harlan Boucher, Helen Boucher, Dahlia Boyarsky, George Breunig, Kathy Bussey, Ted Caragozian, Jan Clark, Phil Clark, Mike Clayton, Hal Cohen, Joanne Cohen, Jeff Coker, Evelyn Dalby, Alice DeBolt, Phil Decker, Jim Determan, Marilyn Dickson, Marilyn Dudley, Claude G. Edwards, Ron Forster, Melvin L. Gabel, John Guelke, Valerie Guelke, Robin Halford, Lori J. Hargrove, Fiona Harrison, Marjorie Hastings, Chuck Hatch, Tootie Hatch, Joe Hopkins, Bill Hunter, Laura Hunter, Nancy Inman, Don Irwin, L. Louise Jee, Linda Johnson, Ron Johnson, Jack Jorgensen, Mark C. Jorgensen, Paul D. Jorgensen, Steve Jorgensen, David Kisner, Michael W. Klein, Chuck Knight, Barbara E. Kus, Nancy Lee, Kurt Leuschner, Bonnie Loizos, Carol McKie Manning, Donalee Mattson, Mac McNair, Anne Mendenhall, Bob Miller, Virginia Moran, Gretchen Morse, Mary Mosher, M. Brennan Mulrooney, Heather Nelson, Philip K. Nelson, Bonnie Nielson, Ruth Olsen, N. (Oz) Osborn, Verlene Ota, Ann Payne, Paula Payne, Richard Payne, Barbara Perdue, Doug Perdue, Bonnie L. Peterson, Ed Post, Mary Post, Allan Power, Priscilla Price, Philip R. Pryde, Raylene Remeika, Royce B. Riggan, Royce P. Riggan, Geoffrey L. Rogers, Judy Rose, Curtis Ross, Patricia Ruston, Tom Ruston, Tarja Sagar, Weena Sangkatavat, Conrad Sankpill, Jack W. Schlotte, Tom Schwend, Erik Sgariglia, Bryan Sharp, Betty Siegel, Tom Simpson, Marjorie Sinel, Keith Smeltzer, Susan E. Smith, Winona Sollock, Alexander Spacek, Ed Spacek, Jackie Spacek, Deborah Sperberg, Catherine Stone, Geoff Stone, Herb E. Stone, Joe Stone, John Strong, Robert Thériault, Homer Townsend, Tina Townsend, Philip Unitt, Don Waber, Harold A. Wier, Peter Willmann, Tiffany Woznicki, James Wycoff, Julie York, Herbert L. Young.

ESCONDIDO, COMPILED BY KENNETH L. WEAVER

Lisa Ale, Barbara Anderson, Steve Anderson, Richard L. Barber, Joseph R. Barth, Cyndee Batzler, Dave Batzler, Peter P. Beck, Barbara E. Bell, Paul Bergford, Ruth Bergstrom, Deborah Bieber, Crystal Bingham, Justin Box, Timothy A. Burr, Orval Carter, Michael Cassidy, Susan Cassidy, Sunny Christiansen, Jim Coatsworth, Jeff Coker, Maureen Corrigan, Ruth Cramer, Susan D'Vincent, Alice DeBolt, Joe Decanio, Vesta Dineen, Marilyn Dudley, Claude G. Edwards, Lisa Ellis, Don Evans, Michael Falina, Tracy Falina, Sam Farrow, Sandy Farrow, Elizabeth Fink, Mel Forman, Eleanor Foulke, Jim Freda, Marj Freda, C. C. Gorman, Shirley Grain, William E. Haas, Edward C. Hall, Jeanne Hammond, John Hammond, Doug Hansen, Lori J. Hargrove, Charles Harman, Sue Harman, Ann Harmon, Penny Hernandez, Donna Hilliard, Kay Hubson, Dennis Huckabay, Lauren Hughes, Ruth Hummel, Liz Hutson, Pamela Isaacs, Pat Jensen, Linda Johnson, Ron Johnson, Priyantha Karunaratne, John Klavzar, Michael W. Klein, Chuck Knight, Susan LaJoie, Cheryl Learn, Emerson Learn, Mike LeBuffe, Janet Lipham, Tom Loeber, John C. Lovio, Nancy MacGillivray, Clark R. Mahrdt, Julie Manglicmot, Michael G. Mathos, Jim McCarty, Bill McCausland, John McColm,

Esther Jane McNeil, Karen Messer, Barbara Middlebrook, Dan Miller, Gillian Moreland, M. Brennan Mulrooney, Ben Nasserly, Ellie Newcomb, Barbara Orr, N. (Oz) Osborn, Bonnie L. Peterson, Wayne Pray, Kristine Preston, Maren Preston, Melissa Preston, Priscilla Price, Philip R. Pryde, Ingrid S. Quon, Linda Rasmussen, Christine Rideout, Doug Rideout, Robin Ronin, Jim Russell, Conrad Sankpill, Jack W. Schlotte, Suzanne Schultz, Cecilia Secor, Ed Sher, Betty Siegel, Shari Sitko, Keith Smeltzer, Susan E. Smith, Tina Somers, Margie Stinson, Mary Beth Stowe, Brian Swanson, Lee E. Taylor, Kemer Thomson, Chuck Tralka, Andy Truban, Robert Turner, Philip Unitt, Andrea Vedanayagam, Phoenix von Hendy, Kenneth L. Weaver, Herb Williams, Kirsten J. Winter, Kathy Wohlhieter, Mike Wohlhieter, James O. Zimmer.

LAKE HENSHAW, COMPILED BY CLAUDE G. EDWARDS AND GRETCHEN MORSE

Donald K. Adams, Daniel Aklufi, Julie Alpert, Byron Anderson, David W. Au, Leticia Azala, Maryanne Bache, Richard L. Barber, Lariann Baretta, Joseph R. Barth, Mike Barton, Barbara E. Bell, Jemila Bennett, Fred Beretta, Sue Berg, Hank Bower, Bill Box, Justin Box, Eleanor Briefer, Nelson Briefer, Timothy A. Burr, Gale Bustillos, Dan Carlton, Orval Carter, Robin Church, Jeff Coker, Evelyn Dalby, Alice DeBolt, Thomas W. Dorman, Kathi Dudgeon, Claude G. Edwards, Charlotte Farrell, Sam Farrow, Sandy Farrow, Kylie Fischer, Ron Forster, Brian Foster, Jim Freda, Marjorie Freda, Melvin L. Gabel, Laurie Gammie, Ivan Getting, Peter A. Ginsburg, William E. Haas, Edward C. Hall, John Hammond, Lori J. Hargrove, Chip Hatch, Susan Hector, Wendy Hein, Art Hester, Dorothy Hester, Annie Hollenbeck, Gus Hollenbeck, Bill Hunter, Laura Hunter, Hank Ingersoll, Pam Isaacs, Linda Johnson, Ron Johnson, Robert Jones, Ann Keenan, Tom Keenan, Michael W. Klein, David Kniffing, Chuck Knight, Adam Koltz, Jason Kurnow, Dale Laney, Kathy Lapinsky, Tom Leslie, Joe Liebezeit, Jeffrey L. Lincer, Eileen Littlefield, Brian Lohstroh, Brian Loly, Clark R. Mahrdt, Julie Manglicmot, Pauline Matthews, Rich Matthews, Jim McCarty, John McColm, Judy McIntosh, Thane McIntosh, Esther Jane McNeil, Bill Mittendorff, Gretchen Morse, M. Brennan Mulrooney, Thomas Myers, Doug Nail, Bryan O'Leary, N. (Oz) Osborn, Marjorie Oslie, Dennis M. Parker, Robert T. Patton, Nicole Perretta, Ed Post, Mary Post, Clint Powell, Wayne Pray, Priscilla Price, Philip R. Pryde, Ingrid S. Quon, Jeanne Raimond, Anita Reith, David Reith, Christine Rideout, Royce B. Riggan, Royce P. Riggan, Claire Roberts, Ron Roberts, Geoffrey L. Rogers, Robert C. Sanger, Juliette Savary, Jack W. Schlotte, Betty Siegel, Susan E. Smith, Fred Sproul, Mary Beth Stowe, Robert Thériault, Lee Thornton, Earl Towson, Philip Unitt, Don Waber, John F. Walters, Kenneth L. Weaver, Mark Webb, James K. Wilson, Lynn Wilkinson, Kirsten J. Winter, Shauna M. Wolf, Gary Wood, Janet Worts, Stephanie Worts, James O. Zimmer.

OCEANSIDE–VISTA–CARLSBAD, COMPILED BY DENNIS WYSONG, FREEMAN HALL, AND CHRISTINE RIDEOUT

Donald K. Adams, Allen Alexander, Doug Alexander, Jane Alexander, Richard L. Barber, Joseph R. Barth, Cyndee Batzler, Dave Batzler, Mona Baumgartel, Barbara E. Bell, Deborah Bieber, Hank Bower, Curt Bruce, Timothy A. Burr, Alan Campbell, Rita Campbell, Orval Carter, Michael Cassidy, Noby Cederholm, Joni Ciarletta, Jim Coatsworth, Ron Collins, Warren Cotton, Allen Craft, Dan Daniels, Alice DeBolt, Jim Determan, Vesta Dineen, Claude G. Edwards, Nancy Ferguson, Pete Fitzpatrick, Scott Fleury, Ken Fortune, Joan Fountain, Jim Freda, Marj Freda, Steve Fretwell, Michael Fugagli, Sachiko Fukuman, Emmy Garnica, Donald Geiger, C. C. Gorman, Carol Gormley, Irja Graham, Lloyd Graham, Shirley Grain, Ruth Gansbury,

(continued)

TABLE 3 (continued)

Andy Guss, Edward C. Hall, Freeman Hall, Gjon C. Hazard, Ann Hegwer, Linda Holt, Darold Holten, Virginia Holten, Robert Hoover, Rachel Hopkins, Dennis Huckabay, Liz Hutson, Linda Johnson, Ron Johnson, Taryn Johnson, Michael W. Klein, Chuck Knight, Michael LeBuffe, Mary Patricia Lemon, Margaret Lesinsky, Jayne Lesley, Ilene Littlefield, Eric Lodge, Brian Loly, John C. Lovio, Clark R. Mahrdt, Carol McKie Manning, Jerry Manning, Andrew Mauro, Roxanne McAndrew, Jim McCarty, Josh McLean, Esther Jane McNeil, Melissa Mersy, Karen Messer, Dan Miller, Nancy Miller, Gillian Moreland, M. Brennan Mulrooney, Herbert Nierman, Bryan O'Leary, N. (Oz) Osborn, Jan Owen, Caryl Parrish, Robert T. Patton, Brandon Percival, Andrea Peterson, David W. Povey, Allan Power, Terri Reinhard, Carol Reynolds, Christine Rideout, Geoffrey L. Rogers, David Rorick, Conrad Sankpill, Tara Schoenwetter, Jack W. Schlotte, Claudine H. Schork, Brenda Senturia, Betty Siegel, Vic Snider, Bob Stephenson, Marlin Stephenson, Debra Stillman, Don Stillman, Ralph Stone, Mary Beth Stowe, Pete Suffredini, Naomi Taylor, Andy Truban, Robert Turner, Philip Unitt, Stan Walens, Norman Walker, Kenneth L. Weaver, Peter Willman, Kirsten J. Winter, Shauna M. Wolf, Carol Wysong, Dennis Wysong, Arnold Young, Herbert L. Young, James O. Zimmer, Paul Zucker.

RANCHO SANTA FE, COMPILED BY ROBERT T. PATTON

Kathy Aldern, Monica Alfaro, Jeff Allen, Barbara Anderson, Stan Arnold, Maryanne Bache, Richard L. Barber, Joseph R. Barth, Mona Baumgartel, Timothy A. Burr, Orval Carter, Sunny Christiansen, Joni Ciarletta, Maureen Corrigan, Alice DeBolt, Joan DeCarli, Jim Determan, Claude G. Edwards, Audrey Elliott, Kathy Estey, Michelle Evancho, Matt Farley, Neil Fergusson, Brian Foster, Ed Fox, Emmy Garnica, Anna Gateley-Stanton, Dorothy Green, William E. Haas, Edward C. Hall, Freeman Hall, Worth Hall, Lori J. Hargrove, Gjon C. Hazard, Susan Hector, Penny Hernandez, Joan Herskowitz, Liz Hutson, Linda Johnson, Ron Johnson, Taryn Johnson, Oliver Jones, Julie Jones-Putnam, Isabelle Kay, Michael W. Klein, Chuck Knight, Gerard Kroon, Jayne Lesley, Joe Liebezeit, Brian Loly, Clark R. Mahrdt, Carol McKie Manning, John A. Martin, Andrew Mauro, Scott McCarthy, Bert McIntosh, Margaret McIntosh, Alden Miller, Barbara Coffin Moore, Bob Moore, Cindy Moore, Gillian Moreland, Bonnie Mulrooney, M. Brennan Mulrooney, Brian O'Leary, Brock Ortega, William Ostheimer, Dennis M. Parker, Robert T. Patton, James Peugh, Wayne Pray, Ingri S. Quon, Joan Roberts, Richard Roedell, Martin Rosen, Jim Russell, Luis Santaella, Jack W. Schlotte, Brenda Senturia, Frances Shaw, Linda Shipman, Thomas Shipman, Betty Siegel, Jonathan Snyder, Todd Stands, David Stanton, Denise Stillinger, Tim Stillinger, Ralph Stone, Philip Unitt, Phoenix von Hendy, Stan Walens, Ron Warren, Kirsten J. Winter, Shauna M. Wolf, Paul Zucker.

SAN DIEGO, COMPILED BY CLAUDE G. EDWARDS, ANN E. KLOVSTAD, AND PHILIP UNITT

Donald K. Adams, Douglas W. Aguillard, Marya Ahmad, Daniel Aklufi, Kathy Aldern, Monica Alfaro, Doug Allen, Jake Allsop, Fred Andrews, Maryanne Bache, Mike Barbee, Joseph R. Barth, Patricia Beard, Ruth Bergstrom, Richard Bledsoe, Andrea Bond, Andy Bradvica, Richard Breisch, Susan L. Breisch, Sarah Brooks, Tom Carnes, Orval Carter, Lisa Chaddock, Ross Christie, Therese Clawson, Jim Coatsworth, James Colclough, Elizabeth Copper, David Crabb, Evelyn Dalby, Bernard Dambron, Alice DeBolt, Bev Detrez, Anna Dietrick, John Dietrick, Thomas W. Dorman, Penny Drozd, Claude G. Edwards, Fred Esparza, Michael U. Evans, Peter Famolaro, Ruth Finnegan, Kylie Fischer, Joyce Forester, Ron Forster, Brian Foster, Nova Fraser, Jack Friery, Anna Gateley-Stanton, Marc Gehr, Ivan Getting, Peter A. Ginsburg, Paul Gobel, Ted Godshalk, Wendy Goldfinger, Mike Goldhamer, Debbie Good, C. C. Gorman, Judith Guilmette, William E. Haas, Lori J. Hargrove, Peggy Harmon, Wayne Harmon, Don Hastings, Marjorie Hastings, Gjon C. Hazard, Bonnie Hendricks, Annette Henry, Art Hester, Dorothy Hester, Mel Hinton, Richard Hodges, Anna Hollenbeck, Gus Hollenbeck, Lauren Hughes, Liz Hutson, Yasuhiro Ikegaya, Linda Johnson, Ron Johnson, Virginia P. Johnson, Bernice Jones, Deborah Jones, Ann Keenan, Tom Keenan, Kerry Kenwood, Jan Kitchel, Michael W. Klein, Ann E. Klovstad, David Kniffing, Chuck Knight, Debbie Knight, Fernand Kuhrt, Chuck Lapinsky, Kathy Lapinsky, Bob Laymon, Brian Lohstroh, Shannon Lounsbury, Connie Madia, Frank Madia, Cheryl Mann, Viviane Marquez, John A. Martin, Michael G. Mathos, David Mayer, Guy McCaskie, Bill McCausland, Judy McIntosh, Esther Jane McNeil, Anthony Mercieca, Bob Miller, Ed Mirsky, Bill Mittendorff, Joann Mockbee, Anne Monsees, Edith Helen Monsees, Barbara Coffin Moore, Joanne Moore, Gillian Moreland, Gretchen Morse, M. Brennan Mulrooney, John Murphy, Ed Myers, Tom Myers, Gretchen Nell, Philip K. Nelson, Bryan O'Leary, Jerry Oldenettel, Ruth O'Rourke, Barbara Orr, N. (Oz) Osborn, Carol Parker, Holly Parker, Robert T. Patton, Josephine Payne, Barbara Peugh, Jim Peugh, Leslie Polinsky, Mark Polinsky, Ed Post, David W. Povey, Allen Power, Wayne Pray, Priscilla Price, Philip R. Pryde, Susie Qashu, Ingri S. Quon, Jeanne Raimond, Kesler Randall, Craig H. Reiser, Christine Rideout, Royce B. Riggan, Clare Roberts, Ron Roberts, Geoffrey L. Rogers, Allison Rolfe, Diane Rose, Curtis Ross, Phil Rouillard, Jay Rourke, Jorge Sanchez, Weena Sangkatavat, Conrad Sankpill, Kathie Satterfield, Jack W. Schlotte, Carrie Schneider, Valerie Schwartz, David C. Seals, David G. Seay, Dennis Selder, Frank Siebenborn, Betty Siegel, Arsenio Sierra, Ann Sixtus, Keith Smeltzer, Gary Smith, John Spain, Peter St. Clair, Anna Stalcup, Todd Stands, David Stanton, Mary Beth Stowe, David Sweig, Jill Terp, Earl Towson, Sharon Towson, Sally Trnka, Philip Unitt, Stan Walens, Ed Wallace, Lauren Wallace, David Waller, John F. Walters, Kristen Ward, Samantha Weber, Richard E. Webster, Peter Willman, James K. Wilson, Mayda Winter, Shauna M. Wolf, Catherine Woodruff, Joseph C. Worley, Betty Wotton, Bob Wotton, Susan Yamagata, Pete Yingling, Arnold Young, Herbert L. Young, Paul Zepf, James O. Zimmer.

mentary prongs; we maintained a spreadsheet tracking how each method would serve to reach the goal for each square.

GRID SYSTEM

Bird atlases are commonly based on a grid system of squares 5 kilometers or 3 miles on a side. With a grid of this scale, I estimated that the resulting number of squares could, in concept, be covered adequately by San Diego County's birders over the projected five years. Therefore, we adopted this system, basing the grid on the public land survey of townships, ranges, and sections. This survey has been used heavily for defining property boundaries; roads often follow section boundaries, and the lines are represented on U.S. Geological Survey topographic maps, the Cleveland National Forest map, and the Thomas Brothers road atlas. Therefore it was convenient for our observers to use in the field. An additional benefit was that township lines correspond with the county's boundary with Imperial and most of Riverside County. Thus most of the atlas squares represent one-quarter township or nine sections and average three miles on a side. Along the coast and along the Mexican border, some grid cells that would have been much smaller than nine square miles were combined with neighboring cells (usually the one directly north) to make the size of our sampling units more uniform. Another complication was that the ranchos and pueblo lands granted during the era of Mexican rule in California were never part of the public land survey. Michael R. Smith interpolated the atlas squares in these areas for us by means of a computerized geographic information system (GIS). The atlas grid thus consists of 479 cells averaging 8.84 square miles or 22.9 square kilometers each. Each square was designated by an alphanumeric code (alphabetically north to south, numerically west to east) and by a name recalling the best known or most colorfully named location in the square (Table 4).

COVERAGE

How to balance the conflicting goals of breadth and depth of coverage has vexed organizers of bird atlases since their inception. Another challenge was finding a workable balance between the uniformity of standards needed for a scientific study and the flexibility needed for a study relying largely on volunteers. After studying the standards set by various other atlases, I decided on a threshold defined by multiple criteria, all of which needed to be met for the threshold in that square to be cleared. I figured it was best to set the bar high initially, because it could be lowered if necessary, but raising it would be impossible. Fortunately, only minor fudging of the criteria proved necessary (see below).

For the breeding season, I originally established five criteria constituting the goal for each square:

1. Minimum 25 observer-hours from March to August (could be satisfied in one year or spread over the 5-year life of the project at the participating observers'

discretion). There was no maximum; observers gave some squares far over the minimum.

2. Every accessible habitat be visited at least once (observers received a computer-generated habitat map courtesy of Ogden Environmental and Energy Services; evaluating accessibility was left to the observers' judgment).
3. At least two visits in June for the coastal slope, two visits in May for the desert slope. This criterion was meant to encourage observers to schedule time in the field in the month when they would be most likely to encounter fledglings and to ensure they got into the field after all summer visitors had arrived. As it proved cumbersome to track and not essential to criteria 4 and 5, I did not maintain this criterion through the study. Nevertheless, 84% of the squares were visited at least twice during the target month, and 97% were visited at least once during that month.
4. At least 90% of the number of species on a "target list" tailored for the square be identified as at least possibly breeding. I devised the target lists by outlining on a digital map of the county an estimate of each species' breeding range; a program devised by Michael R. Smith then converted these maps into a database containing the lists by square. Note that the criterion for the threshold was based on the number of species, not the composition of the list. Nevertheless, the observers received the lists so as to call their attention to species likely in the area. Sometimes the target numbers proved low; in these cases, I did not revise the number upward but relied on the 25-hour criterion to ensure the comparability of these squares with the others. In desert squares that lacked oases or developed areas, though, the original target lists soon proved unrealistically high and were reduced by a uniform factor to 75% of the original.
5. At least 50% of the number of species on the target list actually be confirmed as breeding. For most species this meant by observing nest building, distraction displays, aggressive defense, active or used nests, fledglings still dependent on their parents, adults disposing of nestlings' fecal sacs, or adults carrying food to young. For some species, these behaviors needed to be interpreted more narrowly, especially for the terns, whose dependent young follow their parents many miles from their natal colony. Observations of pairs, courtship displays, or copulation counted only as probable breeding and thus did not contribute to satisfying this criterion.

For the winter, the criteria were parallel to those for the breeding season:

1. Minimum 25 observer-hours in December, January, or February.
2. The square be surveyed in at least three of the project's five winters. This criterion was an attempt

- to encompass the irregularity of some winter visitors, amply demonstrated between 1997 and 2002.
3. Every accessible habitat be visited at least once.
 4. At least 90% of the number of species on the target list be identified. I devised target lists for each square for the winter by the same procedure I used for the breeding season. The 90% could include early spring migrants like swallows or *Selasphorus* hummingbirds. The same desert squares whose original breeding target numbers were reduced had their winter target number reduced by the same 75% factor. A few other squares that were covered almost entirely by chaparral also proved to have inappropriately high initial goals for winter; here the winter target was reduced to either 75% or 90% of the original.

Results of San Diego County's six Christmas bird counts were integrated into the winter database, thanks to the coordination of the count compilers, all of whom were key atlas participants. Each count circle has a diameter of 15 miles (Figure 2) and was covered by about 20 to 30 parties of observers. Each count was run annually on one date between the third Saturday of December and the first weekend of January. Count participants generally recorded their observations by atlas square, and the goals for winter coverage were met in several squares largely through Christmas bird counts.

All the criteria for the breeding season threshold were met in 465 squares, 97% of the total (Figure 3). In four squares (M13, S12, S13, U10) the number of hours formally reported was under 25, but observers living and/or working in these squares sent data sufficient to demonstrate that they had spent well over 25 hours observing birds there. The 25-hour criterion could not be met in

seven other squares (C17, C23, D13, G14, H14, O25, S28) as a result of difficult access. In six squares in the Anza-Borrego Desert (C25, C26, F22, O26, O28, Q29) the goal for number of confirmed breeding species could not quite be met in spite of at least 25 hours of effort. In one square with extremely difficult access (O25) the goals for numbers of possible and confirmed breeding species were met with under 25 hours field time. Only one square (C4, lying entirely within bombing range on Camp Pendleton) went completely uncovered.

All the criteria for the winter threshold were met in 467 squares, 97.5% of the total (Figure 4). In four squares (D13, G14, H14, N18) with poor access neither the goals for number of hours or number of species could be achieved. In two squares (I14, I19) the goal for number of species could not be reached in spite of at least 25 hours. Three squares with difficult access (C26, C27, O25) had all the criteria for their thresholds met but were visited in only two winters. Again, only square C4 was unvisited in winter.

Nevertheless, the results have limitations and biases. For a project based largely on the dedication and judgment of volunteers, standards had to be flexible. Because observers determined their own field schedules within the guidelines of the project, we did not capture year-to-year variability uniformly for each square. Some squares thus missed being covered in the wet El Niño spring of 1998 or in winters when Mountain Bluebirds or Cassin's Finches invaded. Thus the observed nesting schedules of more localized species may be skewed. We had no standards for nocturnal coverage, so the distributions we recorded for night birds are considerably less complete than those for diurnal species. As always, observers' ability to detect a species varies with experience and acuity of eyes and ears—the reason for establishing coverage criteria based on number of species as well as number of hours. Each square was covered to a varying degree beyond the minimum 25 hours—sometimes far beyond. Therefore the distribution of some rare species, especially winter visitors, still reflects observer effort to some extent.

REPORTING

Participants submitted their observations primarily on forms designed for the project, which asked the observers to supply a number of individuals estimated or counted on a specific date, as well as any breeding behavior observed on that date (see below). Our procedures thus differed from those of some atlas

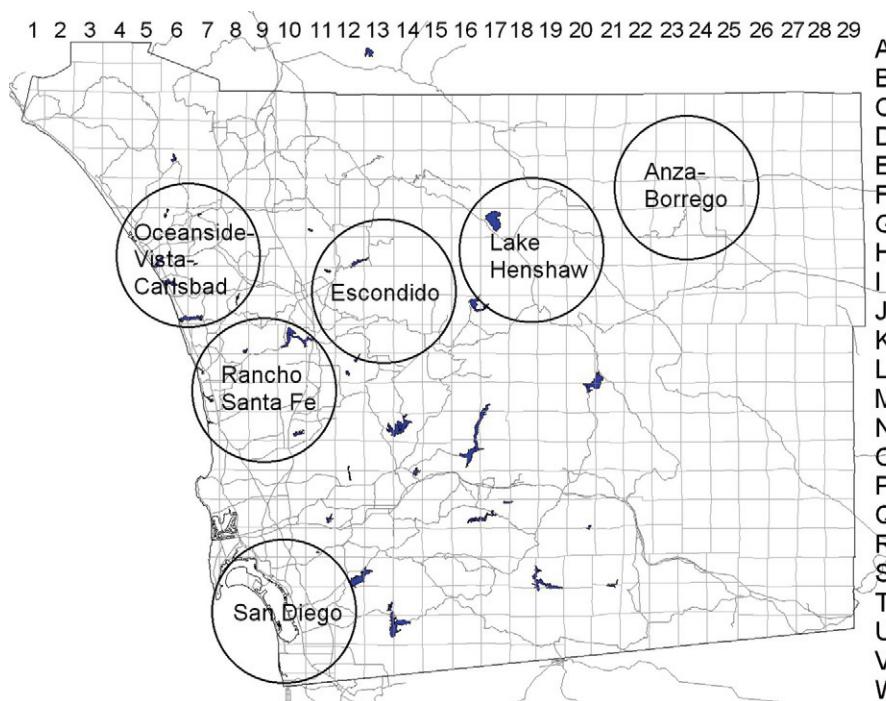
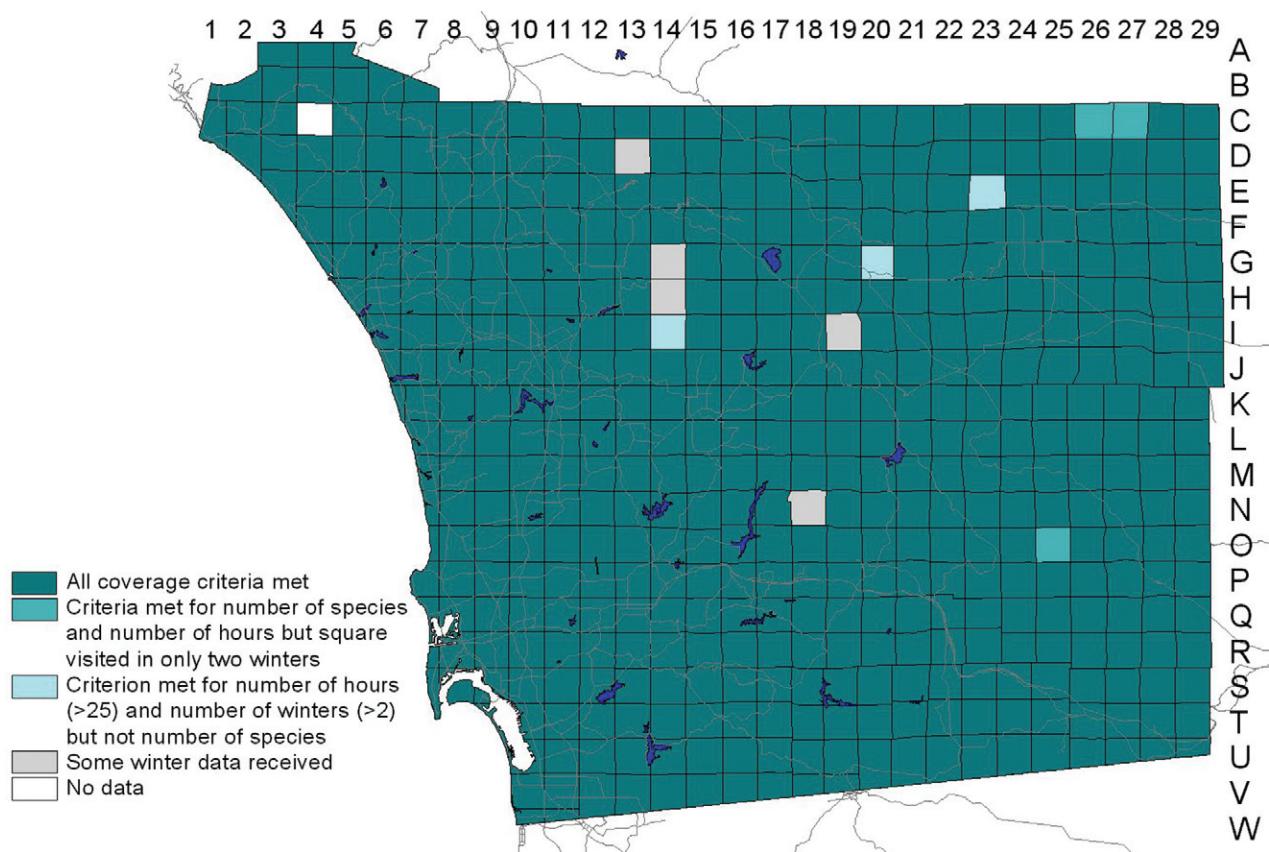
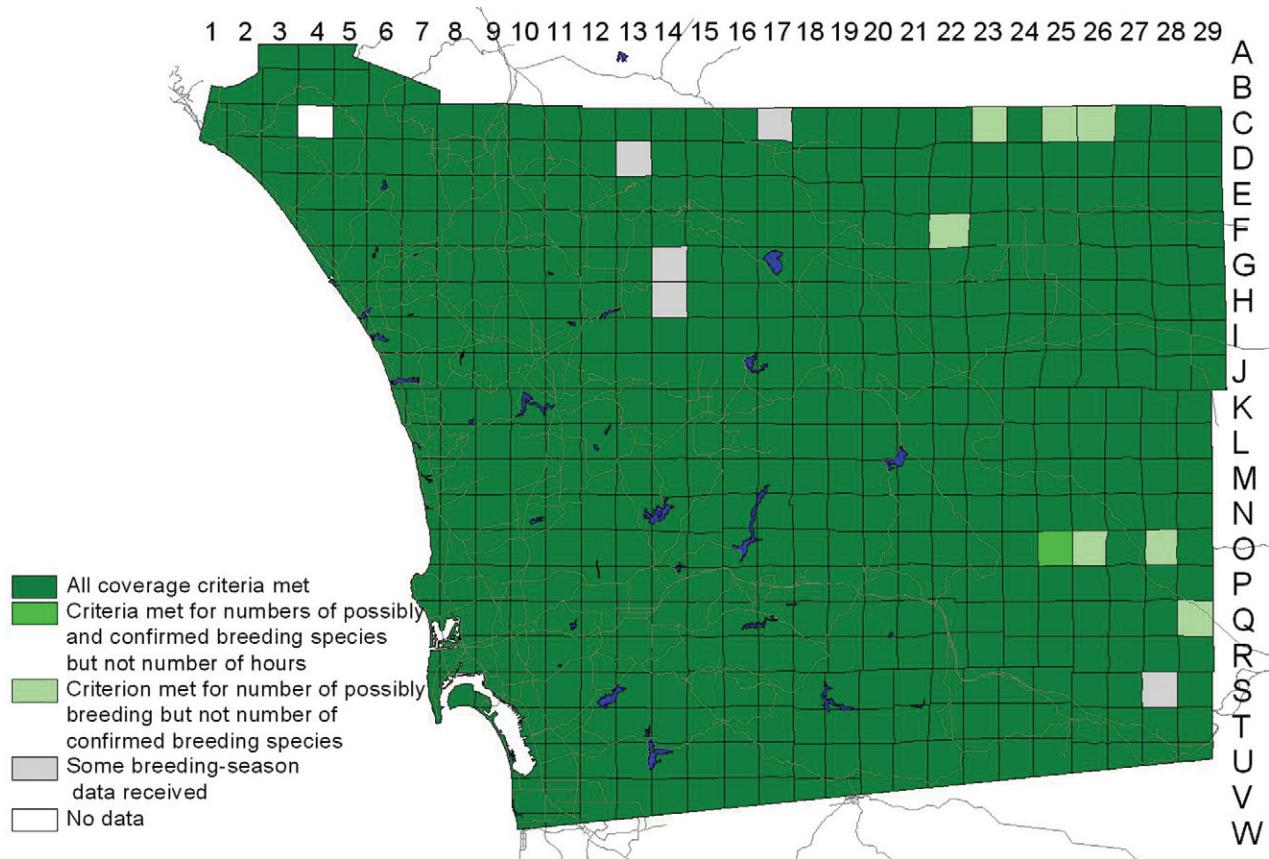


FIGURE 2. San Diego County Christmas bird count circles.



projects, which ask observers for only a summary of what they observed over a season. Some have called our procedures overkill, but they are no different from what any responsible birder does in his field notes. This level of detail was essential in distinguishing migrants from birds on breeding territory, especially relevant in an area like San Diego County where much of the breeding season for local birds overlaps with spring migration for those breeding farther north. Some observers nevertheless sent composite lists, but these were a tiny fraction of the total.

The forms for the breeding season asked for time in the field and had columns for both numbers of individuals observed and breeding behaviors. Observers could enter as many behaviors as were relevant for that species. The behaviors were coded in a system similar to those used for other bird atlases, especially that for Los Angeles County.

SH, species observed in habitat suitable for breeding during its breeding season.

SM, singing male in suitable breeding habitat during the species' breeding season.

JV, juvenile bird independent of its parents, in species where the young do not migrate or disperse while still in this plumage.

MM, multiple singing males in suitable breeding habitat within the square on a single day. Observers were asked to estimate a number of such birds. Unlike all the other behavior codes, which were represented in our database by true/false fields, the MM field contained a numeric value.

AB, agitated behavior or anxiety calls from adult birds.

PR, pair in suitable breeding habitat during breeding season.

TB, territorial behavior such as a dispute or chase by two individuals of the same species.

CB, courtship behavior such as courtship feeding, breeding displays, or copulation.

PN, probable nest, for use in cases where a nest was suspected but for some reason, such as accessibility, could not be confirmed.

PB, probably building a nest, for species like some wrens and the Verdin, which build roosting or dummy nests, or woodpeckers, which maintain holes as roost sites. If these species were paired while engaged in apparent nest building at the proper season, though, we used the following code.

NB, nest building or carrying nest material.

DD, distraction display by injury-feigning or aggressive defense of an unseen nest against predators such as corvids or raptors.

UN, used nest or eggshells found.

ON, occupied nest but contents unknown (nest inaccessible or brooding bird not disturbed).

FL, fledglings still dependent on their parents, in species where the family remains on its territory.

FS, adult carrying fecal sac.

FY, adult feeding young or carrying food to them.

NE, nest with eggs.

NN, nest with nestlings seen or heard.

Observers who "adopted" a square also received a block-summary form allowing them to track their progress toward the coverage goals for that square, for both hours and species. As our capabilities with the databases improved, we were able to get the answers for which the block-summary forms were devised directly from the databases.

For winter the forms were simpler than for the breeding season, asking only for time in the field and number of individuals observed. Breeding behavior observed from December through February resulted in records entered in both the breeding and winter databases. The winter forms comprised a 12-column form for use in one square over the entire project and a 3-column form for use on blockbuster weekends, by the attack squad and field assistants, and for casual observations.

Participants also received incidental-observation forms, encouraging them to report observations apart from field trips made specifically for the atlas. We cast our net as widely as possible, attempting to draw in even casual birders, reasoning that such involvement could generate reports that could be checked out by experienced observers if necessary, could facilitate access, and could spark enthusiasm for the project in the broader community.

The forms were also available on the San Diego Natural History Museum's website, and an increasing fraction of observers submitted their results via this medium. Data transmission over the Internet became more important toward the end of the project when continuous updating of the database became critical to ensuring that the coverage goals were met in the largest possible percentage of squares. Nevertheless, reports via the website were treated the same as reports on paper, being reviewed and entered by Ann Klovstad and me rather than going directly into the databases.

In addition to forms, participants received maps. Varying according to availability and appropriateness for the area, these included topography, vegetation communities, roads, and/or land ownership. The availability of topographic maps on compact disks enabled us to generate such maps by atlas square. Using GIS files based on mapping done in the early 1990s, Ogden Environmental and Energy Services kindly generated vegetation maps

by atlas square, the vegetation types simplified from the originals for appropriateness for birds. Michael R. Smith kindly provided a GIS file outlining publicly owned lands as of 1990. Observers also received enlarged photocopies of 1:100,000-scale topographic maps for plotting the areas they covered on each field trip and the locations of rare or sensitive species. Species for which we requested plotted locations were designated with asterisks on the forms. In addition to generating more precise locations for species of conservation concern, the mapping helped ensure that observers knew where they were with respect to our grid system and that they reported their results in that framework. Although not all observers followed the mapping procedures completely, the effort still generated several thousand point localities for the targeted species.

DATA REVIEW

The quality of observational data is always a concern. Especially when habitats surveyed may be degraded or destroyed, getting the story right the first time is essential to using the data as a standard for gauging changes. I reviewed all reports as they came in, before Ann Klovstad entered them in the database. Ann caught further errors as well. I contacted the observers for clarification, or arranged for independent verification, if reports deviated from established patterns. Another round of editing took place at the end of the five years of data recording. As I generated the maps, I looked for outlying records that might be suspect. The common error picked up by this means was the coding of a species as in suitable breeding habitat when it was recorded in the square during the species' migration period only. A parallel procedure with the charts of breeding behavior by date also revealed some misinterpretations needing correction. My standards were conservative, and I believe all the extensions reported in this atlas are well founded. I refer to specimen data fre-

quently: specimens are the skeleton, sightings the flesh of our understanding of bird distribution.

My conservatism risked our nearly missing some notable discoveries. On 6 May 2001, during a "blockbuster weekend" to southeastern San Diego County, Ginger Rebstock and Jim Determan reported in the Manzanita Indian Reservation agitated behavior of a Brewer's Sparrow, suggesting a possible nest. Because the species had never been found nesting as far south as San Diego County, and because in 1999 migrants had remained until the end of May, I brushed this idea aside. The following weekend, I found a Brewer's Sparrow nest myself at Ranchita and had to eat crow. Shortly thereafter, Joe Barth saw a Brewer's Sparrow carrying a white object, in retrospect an insect, in upper McCain Valley just east of the Manzanita Reservation; on 11 and 13 June 2001 Joe and I saw two independent juveniles.

HISTORICAL DATA

Because one of the most important roles of a bird atlas is to address change, the distribution maps illustrate past distributions where these differ appreciably from those we observed from 1997 to 2002. The data on which these historical distributions are based are far from complete, consisting primarily of the San Diego Natural History Museum's specimen collection, the Western Foundation for Vertebrate Zoology's egg collection, published literature, and my own field notes. An exhaustive search of all sources, especially environmental impact reports, proved impractical. Many early locations are too imprecise for the location to be fixed to the proper square of our atlas grid. No matter how exhaustive a historical database could have been assembled, it would have been far patchier than the database we amassed during the atlas' term. Despite these shortcomings of the historical data, I believe they are vital to putting the current view in proper context.

TABLE 4

Square	Species ^a	Breeding Season			Species ^b	Hours	Primary observer(s)	Winter	
		Hours	Primary observer(s)						
A-3	White Oak Springs	60	36.25	L.J.Hargrove, J.M.Wells, K.J.Winter, P.Unitt	50	36.00	L.J.Hargrove, B.E.Bell, J.M.Wells, K.J.Winter, P.Unitt		
A-4	Cold Spring Canyon	53	75.00	J.&B.Hargrove, J.R.Barth, K.J.Winter	49	44.00	J.R.Barth, J.M.Wells, K.J.Winter, C.Ferguson, J.&B.Hargrove		
A-5	Tenaja	61	26.50	K.J.Winter	60	25.58	K.J.Winter, J.R.Barth, J.&B.Hargrove		
B-2	Talega Canyon	64	44.50	S.Y.Fukuman, P.Unitt	69	32.00	P.Unitt, S.Y.Fukuman, B.E.Bell		
B-3	San Mateo Canyon	64	37.91	J.R.Barth, P.Unitt	55	29.83	J.R.Barth, P.Unitt		
B-4	Case Spring	79	52.80	P.A.Ginsburg	76	23.50	P.A.Ginsburg		
B-5	Margarita Peak	58	32.67	E.C.Hall, J.O.Zimmer, J.R.Barth, L.J.Hargrove	72	28.75	W.E.Haas, E.C.Hall, J.O.Zimmer, J.&B.Hargrove, L.J.Hargrove		
B-6	De Luz	75	27.90	K.L.Weaver	77	30.01	K.L.Weaver, W.E.Haas		
B-7	Ross Lake	76	25.45	K.L.Weaver	82	26.71	K.L.Weaver		
C-1	San Mateo Point	74	89.50	M.Lesinsky, L.Ellis	128	100.25	M.Lesinsky, L.Ellis, J.&B.Hargrove, M.B.Stowe		
C-2	San Onofre Creek	65	36.25	S.Brad, L.J.Hargrove, L.Lee	73	32.25	S.Brad, L.Lee, L.J.Hargrove, J.R.Barth		
C-3	Jardine Canyon	64	28.50	P.Unitt, J.R.Barth	69	26.42	P.Unitt, J.R.Barth, L.J.Hargrove		
C-5	Roblar Creek	69	161.08	J.M.Wells, J.Turnbull, P.P.Beach, L.J.Hargrove, D.C.Seals	62	25.50	B.E.Kus, L.J.Hargrove, D.C.Seals		
C-6	De Luz Creek	74	27.05	K.L.Weaver	67	25.15	K.L.Weaver		
C-7	Sandia Canyon	85	58.80	K.L.Weaver	81	27.10	K.L.Weaver		
C-8	Upper Santa Margarita	91	101.55	K.L.Weaver	79	32.60	K.L.Weaver, L.Ale, E.Ashton		
C-9	Rainbow	73	30.80	K.L.Weaver, D.C.Seals, P.Unitt	72	25.70	K.L.Weaver, D.C.Seals, J.Ciarletta		
C-10	Mt.Olympus	66	32.85	K.L.Weaver, D.C.Seals, P.Unitt, J.Ciarletta	61	26.15	K.L.Weaver, L.J.Hargrove, D.C.Seals		
C-11	Trujillo Creek	69	111.25	J.&B.Hargrove	53	40.75	J.&B.Hargrove		
C-12	Agua Tibia	62	66.00	J.Determan	50	30.56	J.Determan		
C-13	Eagle Crag	70	93.83	J.&B.Hargrove, K.J.Winter, L.Hoang, J.M.Wells	53	41.00	J.&B.Hargrove, R.C.Sanger, K.S.Williams, J.M.Wells		
C-14	Cutca Valley	64	174.83	J.&B.Hargrove	51	43.00	J.&B.Hargrove		
C-15	Dameron Valley	86	51.40	K.L.Weaver	79	26.44	K.L.Weaver		
C-16	Oak Grove	85	29.60	K.L.Weaver	103	25.60	K.L.Weaver, J.K.Wilson, P.Unitt, L.&M.Polinsky		
C-17	Dick Spring	38	18.75	J.&B.Hargrove, J.K.Wilson	59	27.75	B.&M.McIntosh, H.E.Stone, P.D.Jorgensen, P.Unitt, J.&B.Hargrove		
C-18	All One God Faith Rainforest	72	38.66	B.&M.McIntosh, J.&B.Hargrove, A.Mauro, P.K.Nelson, J.K.Wilson, P.Unitt	65	31.45	J.K.Wilson, B.&M.McIntosh, A.Mauro, H.Ingersoll, N.Fraser, P.Flanagan, J.R.Barth, P.Unitt		
C-19	Chihuahua Valley E	54	43.34	J.R.Barth, R.C.Sanger, K.S.Williams, P.D.Jorgensen, P.Unitt, K.J.Burns, K.L.Weaver, J.Hargrove	54	39.00	J.R.Barth, K.J.Burns, E.C.Hall, C.R.Mahrdt, P.Unitt, J.B.Hargrove		
C-20	Bucksnort Mt.	51	53.83	L.J.Hargrove, P.Flanagan, G.A.Rebstock	37	53.66	L.J.Hargrove, P.Flanagan, R.C.Sanger		
C-21	Alder Canyon	57	48.50	G.A.Rebstock, L.J.Hargrove, P.D.Jorgensen, B.Bothner	47	54.50	L.J.Hargrove, J.Determan, R.C.Sanger, P.D.Jorgensen, B.Bothner		
C-22	Collins Valley	52	60.50	P.D.Jorgensen	53	26.00	P.D.Jorgensen		
C-23	Box Canyon (Coyote Cr.)	26	21.25	D.C.Seals, M.B.Mulrooney, J.R.Barth	33	31.33	J.R.Barth, K.J.Winter, C.Van Tassel, D.C.Seals		
C-24	Butler Canyon	23	25.00	K.J.Winter, C.Van Tassel	26	25.50	K.J.Winter, C.Van Tassel, R.Thériault, D.C.Seals, S.Peters		
C-25	Clark Valley N	20	40.80	D.C.Seals, S.Peters, H.E.Stone, J.R.Barth	23	38.67	H.E.Stone, M.B.Mulrooney, J.R.Barth, D.C.Seals, P.D.Jorgensen		
C-26	Santa Rosa Mts. NW	19	25.00	H.E.Stone, J.&B.Hargrove	18	37.58	J.&B.Hargrove, H.E.Stone		
C-27	Villager Peak	32	57.31	R.Thériault, P.Unitt, P.D.Jorgensen	30	50.25	P.Unitt, R.Thériault		
C-28	Santa Rosa Mts. NE	24	34.00	R.Thériault	21	30.75	R.Thériault		
C-29	Travertine Palms Wash	24	31.00	R.Thériault	29	25.25	R.Thériault		

D-2	San Onofre Beach	64	35.50	R.Fischer,L.Ellis,P.D.Jorgensen	89	52.67	R.Fischer,J.R.Barth,P.D.Jorgensen,L.J.Hargrove,L.Ellis,P.Unitt
D-3	Horno Canyon	66	58.25	R.&S.Breisch,D.Gould,K.Perry,D.C.Seals	70	55.45	R.&S.Breisch,D.Gould,K.Perry,G.L.Rogers
D-4	Horno Summit	63	37.25	B.O'Leary,P.Unitt,P.A.Ginsburg,B.E.Bell	74	37.00	B.O'Leary,L.J.Hargrove
D-5	Upper Las Pulgas Canyon	65	48.25	R.Fischer,J.R.Barth,P.Unitt,D.C.Seals	69	38.83	D.Gould,R.&S.Breisch,G.L.Rogers
D-6	Middle Santa Margarita	78	206.75	B.E.Kus,J.M.Wells,J.Turnbull,P.P.Beck,W.E.Haas, D.C.Seals	72	25.25	B.E.Kus,P.A.Ginsburg,G.L.Rogers,P.Unitt
D-7	Fallbrook	89	51.30	K.L.Weaver	104	36.35	K.L.Weaver
D-8	Live Oak Park	77	61.75	M.Freda	86	34.75	M.Freda,E.Ashton,K.L.Weaver
D-9	Monserate Mt.	70	25.00	E.C.Hall	75	25.00	E.C.Hall
D-10	Gomez Creek	87	58.75	K.Aldern,M.Bache,E.C.Hall,J.O.Zimmer	73	29.50	K.Aldern,M.Bache
D-11	Pala	81	28.25	V.Dineen,K.L.Weaver,L.J.Hargrove	108	37.50	V.Dineen
D-12	Wilderness Gardens	84	56.95	K.L.Weaver,G.Moreland,V.Dineen	74	39.90	B.Orr,K.L.Weaver,G.Moreland,W.E.Haas
D-13	Frey Creek	31	7.83	R.C.Sanger	32	16.75	R.C.Sanger
D-14	French Valley	71	116.50	P.D.Jorgensen	61	51.00	P.D.Jorgensen,K.J.Winter,J.Hargrove
D-15	Palomar Observatory	70	66.90	K.L.Weaver	60	27.50	K.L.Weaver,J.M.Wells,K.J.Winter
D-16	Rattlesnake Creek	72	64.60	J.R.Barth,K.L.Weaver,J.Fitch,K.J.Winter, G.L.Rogers,J.Hargrove,J.M.Wells	60	26.50	R.C.Sanger,K.S.Williams,M.G.Mathos,P.Unitt,J.M.Wells, K.J.Winter,J.K.Wilson
D-17	Sunshine Summit	69	29.16	J.K.Wilson,A.Mauro,P.K.Nelson,P.Unitt,M.B.Stowe	60	25.00	J.K.Wilson,H.Ingersoll,J.Fitch
D-18	Cow Canyon	55	45.00	M.B.Stowe,E.C.Hall,C.R.Mahrt,L.J.Hargrove,	42	38.00	M.B.Stowe,A.Craft,L.J.Hargrove,P.Unitt,B.O'Leary
D-19	Indian Flats	63	42.58	J.Determan,P.Unitt	49	62.33	K.J.Burns,J.M.Wells,J.R.Barth,J.Determan,J.K.Wilson,L.J.
D-20	Lost Valley	73	52.25	K.J.Burns,L.J.Hargrove,J.R.Barth,J.Determan, J.&B.Hargrove,W.E.Haas	50	27.75	Hargrove,K.J.Winter
D-21	Shingle Spring	61	25.00	K.J.Winter	50	31.50	J.&B.Hargrove L.J.Hargrove,J.&B.Hargrove,P.D.Jorgensen,R.C.Sanger, J.Determan
D-22	Sheep Canyon	36	27.50	P.D.Jorgensen,P.Famolario	39	37.00	P.D.Jorgensen,E.Jorgensen,A.G.Morley
D-23	Lower Willows	61	138.25	M.L.Gabel,B.L.Peterson,R.&S.Breisch,A.G.Morley	55	60.16	B.L.Peterson,M.L.Gabel,P.R.Pryde,A.G.Morley
D-24	Alcoholic Pass	35	63.70	P.D.Jorgensen	39	25.41	M.B.Mulrooney,K.J.Winter,C.VanTassel,M.&D.Hastings, P.R.Pryde,R.B.Riggan
D-25	Clark Valley W	25	28.80	K.J.Winter,M.B.Mulrooney,D.C.Seals,P.Unitt	33	26.57	K.J.Winter,C.VanTassel,E.Post
D-26	Clark Valley Central	21	26.92	P.K.Nelson,J.R.Barth	37	28.77	E.Post,P.K.Nelson,M.B.Mulrooney
D-27	Santa Rosa Mts SW	25	27.25	R.Thériault,L.J.Hargrove,J.R.Barth	29	26.00	R.Thériault,L.J.Hargrove,J.R.Barth
D-28	Santa Rosa Mts SE	27	31.25	L.J.Hargrove,R.Thériault,J.R.Barth	24	34.25	L.J.Hargrove,R.Thériault,P.D.Jorgensen,J.R.Barth
D-29	Wonderstone Wash	23	31.00	R.Thériault,P.D.Jorgensen	27	31.75	P.D.Jorgensen,R.Thériault
E-3	Agra	83	97.90	R.&S.Breisch	95	37.40	R.&S.Breisch
E-4	Lower Las Pulgas Canyon	70	57.70	P.A.Ginsburg,P.Unitt,S.Brad	69	26.50	P.A.Ginsburg,B.E.Bell,P.Unitt,L.J.Hargrove,C.Smith
E-5	Camp Pendleton Airfield	83	57.65	P.A.Ginsburg,B.E.Bell	100	27.50	P.A.Ginsburg,B.E.Bell,S.Buck
E-6	O'Neill Lake	101	201.95	P.A.Ginsburg	145	99.50	P.A.Ginsburg
E-7	Morro Hill N	86	79.75	P.A.Ginsburg	101	37.70	P.A.Ginsburg
E-8	San Luis Rey Heights	84	72.60	P.A.Ginsburg	114	47.80	P.A.Ginsburg
E-9	Pala Mesa	81	54.75	D.&C.Wyson,C.M.Manning	94	29.25	D.&C.Wyson,C.M.Manning,E.C.Hall,P.Raffelson
E-10	Couser Canyon	85	49.75	M.Bache,K.Aldern	94	26.33	M.Bache,K.Aldern
E-11	Pala Mt.	68	30.50	D.C.Seals,E.C.Hall	69	25.00	D.C.Seals,M.Bache,K.Aldern
E-12	Pauma Valley	70	25.75	A.Mauro,L.J.Hargrove,J.O.Zimmer,J.Determan, P.Unitt,E.C.Hall	78	25.33	R.T.Pattton,S.M.Wolf,A.Mauro,M.Mosher, K.Fischer,J.R.Barth

(Continued)

TABLE 4 (Continued)

Square	Species ^a	Breeding Season			Species ^b	Hours	Primary observer(s)	Winter	
		Hours	Primary observer(s)						
E-13	Nate Harrison Grade	79	96.50	C. Sankpill		75	51.25	C. Sankpill, E. C. Hall, P.D.Jorgensen, R. Breisch, J. M. Wells, K.J. Winter, J.O. Zimmer, P.Unitt	
E-14	Boucher Hill	77	70.25	K. Messer, R. Turner, D. S. Cooper, O. Carter, E. C. Hall, J. R. Barth, G. & A. Kroon, M. Sadowski, P. Unitt		74	32.33	J. & B. Hargrove, A. Mauro, J.K.Wilson, G.L.Rogers, E.C.Hall, P.Unitt	
E-15	Mendenhall Valley	78	66.08	E.C.Hall, C.R.Mahrdt		68	25.00	E.C.Hall, C.R.Mahrdt, D.C.Seals, K.J.Winter	
E-16	Barker Valley	61	89.75	D.Rawlins, R. Bergstrom, J.M.Wells, J.Turnbull, P.Unitt		55	50.75	J.O.Zimmer, E.C.Hall, R.B.Riggan, R.Bergstrom, J.M.Wells, K.J.Winter	
E-17	Aguanga Ridge	73	45.75	J.O.Zimmer, E.C.Hall, C.R.Mahrdt, J.D.Barr, J.R.Barth, J.M.Wells, K.J.Winter		54	34.75	J.D.Barr, J.M.Wells, A.Mauro, J.R.Barth, E.Wallace, E.C.Hall, J.O.Zimmer	
E-18	Puerta La Cruz	67	27.75	P.K.Nelson, A. & T. Keenan, P.Unitt, L.J.Hargrove		69	32.75	A. & T. Keenan, P.K. Nelson, R. & S. Breisch, N. Fraser, M. B. Stowe, E.Wallace, J.M.Wells	
E-19	Ward Canyon	59	59.30	O.Carter, W.Pray		60	61.35	W.Pray	
E-20	Hot Springs Mt. W	58	55.60	K.L.Weaver, C.R.Mahrdt		43	26.50	K.L.Weaver, C.R.Mahrdt	
E-21	Hot Springs Mt. E	70	34.65	K.L.Weaver, C.R.Mahrdt		63	44.35	K.L.Weaver, C.R.Mahrdt, P.D.Jorgensen	
E-22	Palm Mesa	55	29.16	J.R.Barth, D.C.Seals, M.B.Mulrooney, P.Unitt		48	31.82	P.D.Jorgensen, M.B.Mulrooney, J.R.Barth	
E-23	Henderson Canyon	31	40.25	R.Thériault, L.J.Hargrove		28	48.50	R.Thériault, M.B.Mulrooney, M.G.Mathos, J.R.Barth, P.D.Jorgensen, P.Unitt, C.Border	
E-24	Borrego Valley N	45	41.50	P.Ache, J.Fitch, P.D.Jorgensen, P.K.Nelson, L.& M.Polinsky, R. & S. Breisch		76	34.16	J.Fitch	
E-25	Coyote Mt.	29	24.30	P.Ache, K.L.Weaver, P.K.Nelson		49	26.12	P.Ache, P.K.Nelson, P.D.Jorgensen	
E-26	Clark Valley SW	17	37.10	J.Fitch, D.C.Seals, M.B.Mulrooney, K.L.Weaver		29	30.27	E.Post	
E-27	Clark Valley SE	24	35.75	R.Thériault, P.D.Jorgensen, D.C.Seals, J.R.Barth		39	25.53	R.Thériault, A. & K. Mauro, J.R.Barth	
E-28	Palo Verde Canyon	22	29.00	P.D.Jorgensen		22	28.00	P.D.Jorgensen, H.E.Stone	
E-29	Big Wash	16	25.50	J.R.Barth, H.E.Stone, P.D.Jorgensen		17	31.05	J.R.Barth, H.E.Stone, P.D.Jorgensen	
F-4	Aliso Creek Mouth	78	54.25	B.C.Moore, K.Estey, B.Anderson, J.Roberts, D.Green, A.E.Klovstad, C.L.Mann		101	30.50	B.C.Moore, B.Anderson, K.Estey, D.Green, J.Roberts, A.E.Klovstad, C.L.Mann	
F-5	Ysidora Basin	89	123.00	R.Fischer, J.Morlan		98	29.50	P.A.Ginsburg, R.Fischer, E.Garnica, B.C.Moore	
F-6	Pilgrim Creek	77	23.75	B.E.Bell		88	35.25	B.E.Bell	
F-7	Morro Hill S	80	74.20	A.Peterson, P.A.Ginsburg		96	41.00	A.Peterson	
F-8	Bonsall	85	79.80	P.A.Ginsburg, L.Gammie		121	64.20	P.A.Ginsburg, L.Gammie	
F-9	Moosa Canyon	71	29.25	J.Evans, E.C.Hall		122	57.50	J.Evans, E.C.Hall	
F-10	Lilac	65	26.00	P.Unitt, M.McIntosh, L.J.Hargrove, J.K.Wilson		76	42.00	J.& B. Hargrove, P.K.Nelson, J.Ciarletta, B.O'Leary, S.Berg, P.Unitt	
F-11	Keys Creek	65	25.00	J.O.Zimmer, P.Unitt		70	34.00	J.O.Zimmer, P.K.Nelson, B. & M. McIntosh, P.Unitt	
F-12	Cool Valley	72	49.42	E.C.Hall, Jamie Simmons, J.R.Barth, O.Carter		83	25.00	E.C.Hall, A.Mauro, P.Unitt, S.M.Wolf, R.T.Patton, J.& B. Hargrove	
F-13	Rincon	74	58.50	S.Berg, M.Mosher, E.Wallace, B. & M. McIntosh, J.Determan, J.R.Barth		71	32.00	S.Berg, M.Mosher, J.R.Barth, G.L.Rogers	
F-14	Rancho Cuca	74	45.50	S.& J.Berg		67	29.00	S.& J.Berg	
F-15	La Jolla Amago	66	109.50	M.Dougan, S.Berg, D.C.Seals		71	31.91	S.Berg, J.S.Quon, W.E.Haas, J.R.Barth, D.C.Seals	
F-16	Dyche Valley	74	32.33	L.J.Hargrove		79	42.58	L.J.Hargrove	
F-17	West Fork San Luis Rey	68	25.75	S.E.Smith, K.J.Winter, G.A.Rebstock, J.R.Barth, L.J.Hargrove		76	38.25	P.Unitt, J.R.Barth, T.Myers, K.J.Winter, C.G.Edwards, G.L.Rogers, R.L.Barber	

F-18	Swan Lake	64	27.25	C. G. Edwards, G. A. Rebstock, M. G. Mathos, P. Unit, P.K. Nelson	82	47.50	G. L. Rogers, D. K. Adams, J. R. Barth, M. G. Mathos
F-19	Warner Springs Eagles' Nest	77	30.25	C. G. Edwards, P.R. Pryde, D. G. Seay, A. Mauro B. & M. McIntosh, K. Thomson, S. D. Cameron, D.C. Seals, P. Unit, K.J. Winter, P.R. Pryde	103	115.00	C. G. Edwards, M.W. Klein M. Bachar, J. & B. Hargrove, B. O'Leary, P. Unit, J. R. Barth,
F-20		80	52.20	B. & M. McIntosh, K. Thomson, S. D. Cameron, D.C. Seals, P. Unit, K.J. Winter, P.R. Pryde	66	42.21	M. Bachar, J. & B. Hargrove, B. O'Leary, P. Unit, J. R. Barth, K. Thomson, F. Sproul, K.L. Weaver
F-21	Los Coyotes	69	123.50	J. & B. Hargrove, M. & M. Smith	54	41.50	J. & B. Hargrove
F-22	San Ysidro Mt.	54	51.33	J.R. Barth, D.C. Seals, M.B. Mulrooney	49	52.25	J. R. Barth, D.C. Seals, M.B. Mulrooney, P.D. Jorgensen
F-23	Borrego Palm Canyon	52	127.50	L.J. Hargrove, A.G. Morley, P.D. Jorgensen, P. Famolare	60	75.16	H. L. Young, Alice DeBolt, P.D. Jorgensen
F-24	Borrego Springs N	42	27.25	M.L. Gabel	109	149.83	M.L. Gabel
F-25	Borrego Airport	40	89.00	P.Ache	61	59.50	P.Ache
F-26	Peg Leg E	18	39.65	B.Siegel,P.Ache, S.M. Wolf,D.C. Seals,M.B. Stowe	31	25.25	B.Siegel,R.Payne,P.D.Jorgensen,P.Unit
F-27	Font's Point	21	71.20	G.A. Rebstock,K.Forney	22	38.95	G.A. Rebstock,K.Forney
F-28	Ella Wash	19	25.00	D.C. Seals,L.J.Hargrove,K.L.Weaver	23	25.41	J.R. Barth,S.M.Wolf,P.Unit,P.D.Jorgensen
F-29	Microwave Relay Sta.	20	32.00	C.Hagen	25	34.75	C.Hagen,J.R. Barth,P.D.Jorgensen,G.A. Rebstock
G-4	Santa Margarita Estuary	76	56.50	P.A. Ginsburg,B.L.Peterson,B. Foster	143	46.25	P.A. Ginsburg,B.L.Peterson
G-5	Wire Mt.	82	51.50	R.Fischer,J.Moran	111	31.75	R.Fischer
G-6	San Luis Rey	86	84.00	M.R.Smith	137	80.75	M.R.Smith,D.Rorick
G-7	Guajome	86	131.40	D.Wyson,S.Grain	133	93.83	D.Wyson,S.Grain
G-8	Vista NE	71	69.00	M.Lesinsky,C.G.Edwards,E.C.Hall,J.O.Zimmer, L.J.Hargrove,O.Carter,J.Ciarletta	101	59.00	M.Lesinsky
G-9	Merriam Mts.	64	46.50	J.F.Clements,L.Holt,O.Carter,C.M.Manning, J.Ciarletta	71	36.50	M.Baumgartel,B.& M.McIntosh,C.M.Manning, L.Holt,J.F.Clements
G-10	Oat Hills	68	25.00	E.C.Hall,J.O.Zimmer	72	25.00	E.C.Hall,J.O.Zimmer,G.L.Rogers
G-11	Valley Center W	75	61.75	S.& S. Farrow,L.Seneca,V.Dineen	92	65.50	S.& S. Farrow
G-12	Valley Center E	64	26.67	J.R. Barth,P.Unit,A.& D.S Stanton	68	26.00	A.Mauro,T.Stands,S.Yamagata,P.K.Nelson,P.Unit
G-13	Lower Hellhole	67	46.75	G.Moreland,A.& T.Keenan,R.Breisch,L.J.Hargrove, P.Unit,E.C.Hall	71	33.73	G. Moreland,B.Orr
G-14	Rodriguez Mt.	44	10.50	P.Unit,P.K.Nelson	47	18.25	P.Unit,J.Ciarletta,J.K.Wilson,W.Pray
G-15	Pine Mt.	56	35.50	K.J.Winter,J.M.Wells	54	29.00	K.J.Winter,J.Ciarletta
G-16	San Luis Rey Picnic Area	75	65.75	W.E. Haas	93	27.50	W.E. Haas,J.Ciarletta,L.J.Hargrove,R.L.Barber,M.B.Stowe
G-17	Lake Henshaw	81	33.08	R.& S. Breisch,P.Unit,C.G. Edwards	124	70.23	C.G. Edwards
G-18	Matagual Creek	69	31.73	P.K.Nelson,M.U.Evans,T.Stands,S.Yamagata, G.L.Rogers,C.G. Edwards	68	34.25	C.G. Edwards,B.& M.McIntosh,P.Unit
G-19	Warner Ranch	65	26.60	J.D.Barr,J.R.Barth,E.C.Hall,A.Mauro, M.U.Evans,P.Unit	66	37.00	R.& S. Breisch,M.B.Stowe,P.Unit,I.S.Quon, R.T.Patton,J.K.Wilson
G-20	Upper Warner Valley	61	57.55	A.& T. Keenan,P.Unit,M.G.Mathos,L.J.Hargrove, J.R.Barth	62	75.00	A.& T. Keenan,T.W.Dorman,M.L.Gabel,J.K.Wilson, M.B.Stowe
G-21	Ranchita	68	36.46	J.R.Barth,D.C.Seals,L.J.Hargrove,E.C.Hall,B.E.Bell	74	26.50	R.Theriault,A.& T. Keenan,P.Unit,T.W.Dorman,M.L.Gabel, B.E.Bell
G-22	Chimney Rock	58	68.65	P.D.Jorgensen,J.R.Barth,G.L.Rogers	51	39.17	P.D.Jorgensen,M.L.Gabel,J.R.Barth,G.L.Rogers
G-23	Hellhole Canyon	48	43.50	M.L.Gabel	63	46.92	M.L.Gabel
G-24	Borrego Springs S	42	54.00	P.Ache	110	117.21	P.Ache
G-25	Borrego Sink	36	56.25	R.Theriault	63	81.00	R.Theriault
G-26	Borrego Sink Wash	28	26.50	J.Fitch,P.D.Jorgensen,M.B.Mulrooney,D.C.Seals	31	25.20	J.Fitch,J.K.Wilson,M.B.Mulrooney

(Continued)

TABLE 4 (Continued)

Square	Species ^a	Breeding Season			Species ^b	Hours	Primary observer(s)	Winter
		Hours	Primary observer(s)					
G-27	Hills of the Moon Wash	20	36.80	J.R. Barth, G.L. Rogers, G.A. Rebstock, D.C. Seals	23	27.00	D.C. Seals, J.R. Barth, P.K. Nelson, J.K. Wilson, P.D. Jorgensen, P. Unitt	
G-28	Fault Wash	17	30.00	D.C. Seals, M.B. Mulrooney, P. Unitt	18	26.25	J.R. Barth, M.B. Mulrooney, P. Unitt, P.D. Jorgensen, G.A. Rebstock	
G-29	Five Palms Spring	20	46.75	G.A. Rebstock, K. Forney	23	31.50	G.A. Rebstock, K. Forney	
H-5	Oceanside	78	108.00	J. Determan	136	80.13	J. Determan, J. Ginger	
H-6	Buena Vista Lagoon E	83	68.50	L.E. Taylor, J. Ginger	122	98.00	L.E. Taylor	
H-7	Vista SW	67	32.50	L.Holt, E.C. Hall, J.O. Zimmer, P. Unitt, D. Huckabay, J. Ciarletta	85	37.50	D. Huckabay, M. Fugagli	
H-8	Vista SE	58	32.35	J.O. Zimmer	82	32.25	J.O. Zimmer	
H-9	Twin Oaks	72	30.30	J.O. Zimmer, L.J. Hargrove	78	32.25	A. Craft	
H-10	Jesmond Dene	60	28.75	D.&D. Bylin	73	26.00	D.&D. Bylin	
H-11	Burnt Mt.	69	39.75	D.&D. Bylin	79	28.00	A. Mauro, M.B. Stowe, B.E. Bell, L. Hunter, B.C. Moore	
H-12	Lake Wohlford	74	29.25	P. Hernandez, S. Christiansen, E.C. Hall, D.C. Seals, W.E. Haas	105	52.10	P. Hernandez, S. Christiansen	
H-13	Bear Valley	68	35.25	O. Carter, P. Unitt, E.C. Hall, J.B. & M. McIntosh	82	41.83	W. Pray, C. Rideout, L. & R. Johnson, N. Osborn, L. Hunter, R. Forster, W. Hunter	
H-14	Rancho Guajito	52	9.00	K.L. Weaver, P. Unitt	51	14.33	A. Mauro, P. Unitt, J.R. Barth, W. Pray	
H-15	Pamo Valley N	58	28.00	O. Carter, W. Pray	61	33.42	O. Carter	
H-16	Gem Hill	79	25.65	E.C. Hall, J.O. Zimmer	78	28.33	E.C. Hall, J.O. Zimmer, J.J. McColm	
H-17	Mesa Grande	75	25.37	M. McIntosh, P. Unitt, C.M. & J. Manning	85	36.94	K.L. Weaver, B. & M. McIntosh, L.J. Hargrove, E.C. Hall	
H-18	Moretti's Junction	68	27.90	C.G. Edwards, J.R. Barth, P. Unitt	62	42.00	P. Unitt, B. & M. McIntosh, J.K. Wilson, W.E. Haas	
H-19	Matagual Valley	64	32.50	D.C. Seals, B.E. Bell, M. Baumgartel, A. Mauro, P. Unitt, S.E. Smith	65	41.67	R.B. Riggan, R.T. Patton	
H-20	San Felipe	81	56.00	A. & T. Keenan	79	61.50	A. & T. Keenan	
H-21	Lithia Springs	52	39.16	B.E. Bell, P. Unitt, J.O. Zimmer, E.C. Hall,	61	27.75	B.E. Bell, P. Unitt, R. Thériault, W.E. Haas	
H-22	Camel Rock	50	57.75	G.A. Rebstock, M. McIntosh	46	25.00	P.D. Jorgensen, J.R. Barth, P. Unitt	
H-23	Pinyon Ridge	42	29.00	P.D. Jorgensen, J.R. Barth, P. Unitt	51	34.92	M.L. Gabel	
H-24	Yaqui Meadows	24	25.00	M.L. Gabel	32	25.75	P.K. Nelson	
H-25	Casa del Zorro	39	43.00	H.L. Young, M. Mosher	91	64.75	H.L. Young, M. Mosher	
H-26	Sleepy Hollow	30	27.00	M.L. Gabel	41	26.50	M.L. Gabel, H.E. Stone	
H-27	Borrego Mt. West Butte	24	27.00	M.L. Gabel	27	29.25	M.L. Gabel, H.E. Stone	
H-28	Borrego Mt. East Butte	19	25.55	J.R. Barth, P.D. Jorgensen, G.A. Rebstock	19	27.25	J.R. Barth, P.D. Jorgensen	
H-29	Squaw Peak	15	29.24	J.R. Barth, P. Unitt	18	26.48	J.R. Barth, J. Determan, P. Unitt	
I-6	Agua Hedionda	76	50.10	W.E. Haas, P.A. Ginsburg, J. Ciarletta	142	53.76	P.A. Ginsburg, J. Ciarletta	
I-7	Palomar Airport	70	73.00	E. Garnica, D. Geiger, C.G. Edwards, M. Baumgartel	91	71.00	E. Garnica, D. Geiger	
I-8	Green Oak Ranch	70	114.75	C.H. Schork, I. Graham, S. Grain, N. Taylor, B. & M. McIntosh	96	30.25	C.H. Schork, I. Graham, S. Grain	
I-9	San Marcos	64	80.25	P.Zucker, G.L. Rogers, J. Ciarletta, K.L. Weaver	95	44.50	P.Zucker	
I-10	Escondido NW	69	25.00	E.C. Hall	69	25.00	E.C. Hall	
I-11	Escondido NE	65	31.50	O. Carter, R. Hummel, D.C. Seals, P. Unitt	90	48.75	L. Hunter, C. Rideout, M. Baumgartel, O. Carter, B.C. Moore, J. Russell, E.C. Hall	

I-12	Bottle Peak	75	38.95	C. Rideout, J.O. Zimmer	97	46.82
I-13	Rockwood Canyon	66	25.58	O. Carter, C.R. Mahrdt, E.C. Hall	65	27.00
I-14	Boden Canyon	59	54.25	R.L. Barber, C.R. Mahrdt	59	55.70
I-15	Pomo Valley S	70	38.25	O. Carter	102	77.41
I-16	Black Canyon	60	38.50	K.J. Winter, S. McKelvey	53	53.80
I-17	Bloomdale Creek	70	31.15	D.C. Seals	64	25.83
I-18	Santa Ysabel Mission	76	32.10	S.E. Smith, D.W. Au	74	31.25
I-19	Upper Santa Ysabel Creek	65	62.95	S.E. Smith, D.W. Au	48	28.50
I-20	Volcan Mt.	76	56.75	A.& T. Keenan	81	82.00
I-21	San Felipe Valley N	72	42.30	J.O. Zimmer, W.E. Haas	88	50.00
I-22	Grapevine Canyon	38	36.50	P.K. Nelson	40	26.25
I-23	Yaqui Flat	45	47.00	P.K. Nelson	39	25.50
I-24	Tamarisk Grove	40	124.75	P.K. Nelson	59	45.50
I-25	San Felipe Narrows	23	26.50	P.K. Nelson	30	33.50
I-26	Sunset Wash	24	31.50	L.J. Hargrove	29	30.25
I-27	Cactus Garden	16	25.00	P.K. Nelson, D.C. Seals	27	25.58
I-28	Ocotillo Wells	26	26.16	J.R. Barth, L.J. Hargrove, B. Miller, P. Unitt	37	25.09
I-29	Ocotillo Badlands	27	26.24	P. Unitt, J.R. Barth, B. Miller	32	25.09
J-6	Batiquitos Lagoon	65	109.00	M. Baumgartel	118	90.00
J-7	La Costa	85	351.50	M. Baumgartel, C.C. Gorman	145	133.00
J-8	Questhaven	82	53.50	J.O. Zimmer	134	78.95
J-9	Harmony Grove	85	56.40	J.O. Zimmer	97	46.20
J-10	Escondido SW	67	61.75	O. Carter	104	50.25
J-11	Escondido SE	68	52.00	W. Pray	108	66.83
J-12	Wild Animal Park	91	48.45	D. & D. Bylin	154	134.75
J-13	San Pasqual	71	38.75	D. & D. Bylin, B. & M. Mcintosh	89	43.18
J-14	Tim's Canyon	72	50.25	C.R. Mahrdt, R.L. Barber	82	45.85
J-15	Valle de los Amigos	71	62.58	L.E. Taylor	99	76.00
J-16	Sutherland Lake W	78	46.87	B. Travis, G. Warneke, J.R. Barth	87	28.00
J-17	Sutherland Lake E	70	26.50	J.O. Zimmer, E.C. Hall, B. Travis, G. Warneke	77	29.00
J-18	Santa Ysabel	73	32.90	S.E. Smith	82	40.25
J-19	Wynola	95	76.10	S.E. Smith, D.W. Au	84	60.05
J-20	Julian N	84	67.30	M.B. Stowe, E.C. Hall, J.O. Zimmer, A. & T. Keenan, J.R. Barth, O. Carter	92	55.10
J-21	San Felipe Valley S	48	29.75	P.K. Nelson	63	28.25
J-22	Scissors Crossing	85	73.83	E.C. Hall	65	28.00
J-23	Sentenac Canyon	67	67.00	R. Thériault	61	25.50
J-24	Chuckwalla Wash	32	35.20	L. & M. Polinsky, S.D. Cameron, J.R. Barth, G.L. Rogers	30	44.99
J-25	Mescal Bajada	26	41.00	B. & M. Mcintosh	27	40.20
J-26	Sunset Mt.	27	33.75	A.G. Morley, M.B. Mulrooney	27	32.17
J-27	Vallecito Mts. NE	21	27.50	A.G. Morley, J.R. Barth, D.C. Seals, P. Unitt	22	25.74
J-28	Bendire's Thrasher	26	27.75	J.R. Barth, G.L. Rogers	30	25.67
J-29	Halfhill Dry Lake	30	29.50	L.J. Hargrove	36	27.17

(Continued)

TABLE 4 (Continued)

Square	Species ^a	Hours	Breeding Season		Species ^b	Hours	Primary observer(s)	Winter
			Primary observer(s)					
K-6	Moonlight Beach	40	30.75	J. Ciarletta, C.C. Gorman, P. Unitt	77	39.50	J. Ciarletta, E. Garnica	
K-7	Encinitas	64	65.75	C.C. Gorman, R. & A. Campbell	70	51.75	C.C. Gorman, R. & A. Campbell	
K-8	Olivenhain	64	60.25	J. Determan	100	49.57	J. Determan	
K-9	Elfin Forest	68	75.75	L. E. Taylor	79	45.75	L. E. Taylor	
K-10	Lake Hodges	84	194.91	R. L. Barber	145	154.00	R. L. Barber	
K-11	Kit Carson Park	104	100.75	E. C. Hall	164	135.32	E. C. Hall, R. L. Barber	
K-12	Highland Valley	80	44.75	E. C. Hall	100	57.50	E. C. Hall	
K-13	Bandy Canyon	91	32.50	P. M. von Hendy, M. McIntosh	98	34.50	P. M. von Hendy	
K-14	Ramona NW	65	46.75	G. & A. Kroon, G. L. Rogers, B. & M. McIntosh	79	30.99	K. Smeltzer, G. & A. Kroon, J. L. Lincer	
K-15	Ramona NE	77	29.50	B. & M. McIntosh	109	51.78	B. & M. McIntosh	
K-16	Hatfield Creek	70	32.75	G. & A. Kroon	76	34.45	G. & A. Kroon, G. L. Rogers, R. & S. Breisch, J. Ciarletta	
K-17	Ballena Valley	70	50.25	O. Carter, J. DeCanio, D. C. Seals	81	28.00	O. Carter, J. DeCanio, D. C. Seals	
K-18	Dye Mt.	57	41.33	R. C. Sanger, L. J. Hargrove, J. R. Barth, K. J. Winter	54	25.50	R. C. Sanger, K. S. Williams, J. M. Wells, K. J. Winter	
K-19	Pine Hills	74	35.95	S. E. Smith, J. R. Barth, L. J. Hargrove, R. Breisch, M. B. Stowe	71	31.00	M. B. Stowe, S. E. Smith, A. & T. Keenan, R. Warren, J. Ciarletta, V. Moran	
K-20	Julian S	73	40.95	E. C. Hall	81	26.50	E. C. Hall	
K-21	Banner	72	35.25	P. K. Nelson	77	22.25	P. K. Nelson, J. K. Wilson, P. D. Jorgensen	
K-22	Granite Mt.	47	45.00	A. & T. Keenan, L. J. Hargrove, J. R. Barth, D. C. Seals	49	26.00	A. & T. Keenan, M. B. Mulrooney	
K-23	Earthquake Valley W	43	105.75	G. Sanders, P. K. Nelson, L. & M. Polinsky	53	30.00	G. Sanders, A. & T. Keenan, J. R. Barth	
K-24	Earthquake Valley E	34	40.00	B. Graffius, D. C. Seals, M. B. Mulrooney, L. J. Hargrove	28	40.25	B. Graffius, S. M. Wolf, N. Fraser, M. B. Mulrooney, P. Unitt	
K-25	Pinyon Mts.	34	38.00	R. Thériault, D. C. Seals, J. R. Barth, M. B. Mulrooney	31	25.50	R. Thériault, M. B. Mulrooney, J. R. Barth	
K-26	Pinyon Canyon	32	44.00	M. D. Hoefer, E. Jorgensen, M. B. Mulrooney, D. C. Seals	28	25.67	M. D. Hoefer, M. B. Mulrooney, P. Unitt, J. R. Barth	
K-27	Harper Flat	27	24.88	J. R. Barth, P. D. Jorgensen, D. C. Seals	20	26.58	J. R. Barth, D. C. Seals, M. D. Hoefer	
K-28	Starfish Cove	23	38.00	L. J. Hargrove, A. & T. Keenan	27	35.00	L. J. Hargrove, M. Bache, G. A. Rebstock, R. C. Sanger, J. O. Zimmer, M. D. Hoefer, D. C. Seals, K. S. Williams, J. Determan, P. Unitt	
K-29	Elephant Tree	24	41.00	M. D. Hoefer, L. J. Hargrove, A. & T. Keenan	31	61.50	M. D. Hoefer, L. J. Hargrove	
L-7	San Elijo Lagoon	80	127.33	A. Mauro	151	123.50	A. Mauro	
L-8	Rancho Santa Fe	68	37.00	A. Mauro	101	48.75	A. Mauro	
L-9	Lusardi Creek	71	37.00	A. Mauro	108	50.00	R. T. Patton, A. Mauro	
L-10	La Jolla Valley	72	28.00	K. J. Winter, C. Van Tassel	71	36.00	K. J. Winter, R. Warren	
L-11	Rancho Bernardo	55	59.00	E. J. McNeil	79	41.25	E. J. McNeil	
L-12	Blue Sky Ranch	73	48.00	B. & M. McIntosh	101	38.80	B. & M. McIntosh	
L-13	Mt. Woodson	68	55.25	P. M. von Hendy, C. G. Edwards, K. J. Winter	96	65.00	P. M. von Hendy	
L-14	Ramona SW	67	64.25	G. Moreland, F. Sproul, G. L. Rogers, E. C. Hall	88	58.63	F. Sproul, B. Orr, G. Moreland	
L-15	Ramona SE	70	46.50	A. Mauro	86	27.00	A. Mauro, P. Unitt	
L-16	San Vicente Valley	74	54.40	J. D. Barr, M. & S. Cassidy	79	25.75	J. D. Barr, M. & S. Cassidy, B. & M. McIntosh, R. & S. Breisch	
L-17	Mt. Gower	82	99.33	R. C. Sanger, K. S. Williams	83	35.25	R. C. Sanger, K. S. Williams	
L-18	Mildred Falls	65	27.75	W. Pray, O. Carter, K. J. Winter, L. J. Hargrove, R. C. Sanger	59	33.50	W. Pray, O. Carter, J. K. Wilson	
L-19	Inaja/Cosmit	75	36.50	O. Carter, W. Pray	62	28.50	O. Carter, W. Pray	
L-20	North Peak	72	70.75	A. Young, A. Mauro, R. Breisch, K. Satterfield, D. C. Seals, J. R. Barth, V. Moran	72	56.50	A. Young, R. Breisch, V. Moran	
L-21	Chariot Canyon	74	88.85	J. K. Wilson	76	47.50	J. K. Wilson	

L-22	Oriflamme Canyon	50	R. Thériault, J.R. Barth, M.B. Mulrooney, P. Unitt	51	R. Thériault, P.D. Jorgensen, J.R. Barth
L-23	Box Canyon (Hwy. S2)	35	D. Lantz, B. Siegel, P.K. Nelson	35	D. Lantz, S.D. Cameron, B. Siegel, J.R. Barth
L-24	Blair Valley	30	R. Thériault	46	R. Thériault
L-25	Whale Peak	32	R. Thériault	33	R. Thériault
L-26	Hapaha Flat	28	J.R. Barth, D.C. Seals	30	J.R. Barth, W.T. Everett
L-27	Mud Palisades	21	D.C. Seals, M.B. Mulrooney	26	J.R. Barth, D.C. Seals, M.B. Mulrooney
L-28	Mollusk Wash	20	D.C. Seals, L.J. Hargrove, M.B. Mulrooney	17	D.C. Seals, J.R. Barth, B. Bothner, M.B. Mulrooney
L-29	Split Mt.	20	M.D. Hoefer, G.A. Rebstock, K. Forney, J.R. Barth	19	D.C. Seals, J.R. Barth, P.D. Jorgensen
M-7	Del Mar	71	D.R. Grine	138	D.R. Grine
M-8	San Dieguito Valley	64	P. Unitt, L. & R. Johnson, B. & M. McIntosh	122	R.T. Patton
M-9	McGonigle Canyon	56	K.J. Winter, C. Van Tassel, F. Hall	67	K.J. Winter
M-10	Rancho Peñasquitos	68	K.J. Winter, C. Van Tassel	76	K.J. Winter
M-11	Poway W	77	40.00	K.J. Winter	K.J. Winter
M-12	Poway E	64	48.25	P.M. von Hendy, B. & M. McIntosh	P.M. von Hendy, B. & M. McIntosh
M-13	Iron Mt.	68	2.00	R. Payne, K.J. Winter, C. Van Tassel	K.J. Winter, B. & M. McIntosh
M-14	Fernbrook	62	69.00	B. Hendricks, D.C. Seals, J. Savary	W.E. Haas, B. Hendricks, D.C. Seals, M. McIntosh, P. Unitt
M-15	Cañada de San Vicente	83	93.82	J.R. Barth, J. Smith, J.K. Wilson, P.K. Nelson, C.H. Reiser	P. Lambert, J. Smith, W.E. Haas
M-16	San Vicente Mt.	68	82.92	J.D. Barr, R.C. Sanger, J.R. Barth, E.C. Hall, M. Farley	J.D. Barr, M.B. Mulrooney, G.L. Rogers, J.M. Wells
M-17	Isham Creek	78	91.58	R.C. Sanger, K.S. Williams	R.C. Sanger, K.S. Williams, D.C. Seals
M-18	Devil's Punchbowl	62	107.75	R.C. Sanger, Kathy Williams	R.C. Sanger, K.J. Winter, L.J. Hargrove, P. Unitt
M-19	Sill Hill	64	30.00	K.J. Winter, S. McElvey, C. Jones	K.J. Winter, J.R. Barth
M-20	Cuyamaca Peak	97	195.85	A. & T. Keenan, R.E. Webster, G.L. Rogers	A. & T. Keenan
M-21	Upper Green Valley	69	72.50	P.D. Jorgensen	P.D. Jorgensen
M-22	Oriflamme Mt.	49	48.90	P.D. Jorgensen, J.R. Barth, D.C. Seals, D. & C. Batzler	P.D. Jorgensen, J.R. Barth, G.L. Rogers
M-23	Butterfield Ranch	53	59.03	H. Williams, R. Thériault, P.K. Nelson, R. Orr, B. O'Leary	H. Williams, P.K. Nelson
M-24	Vallecito Valley	50	48.60	P.K. Nelson, B. Siegel, J. Aguirre, J.R. Barth, R. Thériault	P.K. Nelson, B. Siegel, J. Aguirre, P. Unitt
M-25	Vallecito Stage Station	50	36.30	M.C. Jorgensen, P.D. Jorgensen, R. Thériault	M.C. Jorgensen, P.D. Jorgensen, A.E. Klovstad, C.L. Mann, R. Thériault
M-26	Agua Caliente	39	43.95	E.C. Hall	E.C. Hall
M-27	June Wash	20	26.25	R. Thériault	R. Thériault
M-28	Fish Creek Wash W	17	33.08	D.C. Seals, J.R. Barth, M.B. Mulrooney, P. Unitt	J.R. Barth, M.B. Mulrooney
M-29	Fish Creek Wash E	18	28.50	J.R. Barth, D.C. Seals	J.R. Barth, P. Unitt, P.D. Jorgensen
N-7	Los Peñasquitos Lagoon	86	160.75	D.K. Adams	D.K. Adams, K. Estey, B.C. Moore
N-8	Carmel Mt.	77	158.00	A. & D. Stanton	A. & D. Stanton
N-9	Los Peñasquitos Canyon	65	45.00	D.K. Adams	D.K. Adams, L. & R. Johnson
N-10	Miramar Reservoir	79	79.50	K.J. Winter, C. Van Tassel, G. & A. Kroon	K.J. Winter, G. & A. Kroon
N-11	Beeler Canyon	69	35.01	K.J. Winter, C. Van Tassel	K.J. Winter, Brock Ortega
N-12	Goodan Ranch	72	29.26	W.E. Haas, B. & M. McIntosh	B. & M. McIntosh, W.E. Haas
N-13	Slaughterhouse Canyon	69	107.00	R. & S. Breisch, C.G. Edwards, K.J. Winter	R. & S. Breisch, N. Osborn
N-14	San Vicente Reservoir	75	26.25	N. Lamken, P.R. Pryde	N. Osborn, R. & S. Breisch, P.L. Lambert
N-15	Barona	76	63.50	R.C. Sanger, P. Unitt, D.C. Seals	N. Lamken, R.C. Sanger, J. Smith
N-16	El Cajon Mt.	64	41.58	J.R. Barth, D.C. Seals	J.R. Barth, D.C. Seals, J.M. Wells, K.J. Winter
N-17	Sand Creek	65	33.83	D.C. Seals, J.R. Barth	J.R. Barth, D.C. Seals, P. Unitt
N-18	Tule Springs	54	36.33	J.R. Barth, E.C. Hall, A. & T. Keenan, P. Unitt, J.O. Zimmer	J.R. Barth
N-19	Sherilton Valley	68	40.17	G. & R. Wynn	G. & R. Wynn

(Continued)

TABLE 4 (Continued)

Square	Species ^a	Breeding Season			Species ^b	Hours	Primary observer(s)	Winter
		Hours	Primary observer(s)					
N-20	Cuyamaca West Mesa	75	139.75	B.Siegel,D.Jadlowski	57	80.25	B.Siegel,D.Jadlowski	
N-21	Cuyamaca East Mesa	65	36.50	J.Fitch,P.D.Jorgensen	65	27.00	J.Fitch,P.D.Jorgensen	
N-22	Filaree Flat	70	118.50	G.L.Rogers,D.C.Seals	56	66.67	G.L.Rogers	
N-23	Garnet Peak	57	34.00	B.Graffius,K.J.Winter,D.C.Seals	43	36.50	K.J.Winter,B.Graffius,J.M.Wells	
N-24	The Potrero	25	24.75	J.R.Barth,P.Unitt,N.Nicolai	32	39.25	N.Nicolai,E.C.Hall,J.O.Zimmer,G.L.Rogers,R.T.Patton,V.Moran,R.Breisch,P.Unitt,J.R.Barth	
N-25	Inner Pasture	26	46.25	A.&T.Keenan,D.C.Seals,J.R.Barth,M.B.Mulrooney	30	27.33	A.&T.Keenan,J.R.Barth,M.B.Mulrooney,G.A.Rebstock,S.M.Wolf,R.T.Patton	
N-26	Tierra Blanca	28	39.32	J.R.Barth,L.J.Hargrove,D.C.Seals	28	38.25	J.R.Barth,M.G.Mathos,P.Unitt,R.T.Patton,P.D.Jorgensen,M.B.Mulrooney	
N-27	Palm Spring	41	25.60	R.&S.Breisch,D.C.Seals	37	26.15	R.&S.Breisch	
N-28	Arroyo Seco del Diablo	21	77.00	R.&S.Breisch	24	26.37	R.&S.Breisch	
N-29	Deguynos Canyon	21	30.17	J.R.Barth,P.Unitt	20	25.25	J.R.Barth	
O-7	Torrey Pines	50	47.75	D.G.Seay	102	44.65	D.G.Seay	
O-8	Golden Triangle	60	55.50	D.K.Adams	90	57.75	D.K.Adams	
O-9	Miramar W	64	33.92	N.Osborn,T.Conkle,G.L.Rogers,P.Unitt	68	56.75	D.K.Adams,T.Conkle	
O-10	Miramar Central	69	40.50	G.Grantham,T.Conkle,G.L.Rogers	102	46.50	G.Grantham,W.E.Haas,J.R.Barth	
O-11	Miramar E	73	112.33	G.L.Rogers	74	43.25	G.Grantham,G.L.Rogers	
O-12	Sycamore Canyon	86	55.92	W.E.Haas,I.S.Quon,T.Conkle,G.L.Rogers,P.Unitt	117	29.25	I.S.Quon,W.E.Haas,R.&S.Breisch,M.B.Stowe	
O-13	Eucalyptus Hills	60	41.50	N.Osborn,D.C.Seals	79	25.25	D.C.Seals	
O-14	Wildcat Canyon	73	26.50	M.B.Stowe	105	28.50	M.B.Stowe	
O-15	El Monte Park	75	77.75	D.C.Seals,S.Peters	77	38.25	D.C.Seals,S.Peters	
O-16	El Capitan Reservoir	86	85.00	S.Kingswood	94	46.66	S.Kingswood,J.K.Wilson	
O-17	Viejas Mt.	55	36.50	J.R.Barth,D.C.Seals,L.J.Hargrove,P.Unitt,C.G.Edwards	60	25.09	P.Unitt,J.R.Barth,C.G.Edwards,J.M.Wells	
O-18	Poser Mt.	55	27.00	K.J.Winter,L.J.Hargrove	54	28.00	K.J.Winter,L.J.Hargrove	
O-19	Hulbird Grove	79	52.67	J.R.Barth	67	29.75	C.Anderson,K.J.Winter,L.J.Hargrove,P.Unitt	
O-20	Oakzanita	70	44.25	D.W.Povey,A.&T.Keenan,L.Polinsky,P.D.Jorgensen	83	47.00	D.W.Povey	
O-21	Upper Pine Valley Creek	62	49.00	P.Unitt	55	30.50	P.Unitt	
O-22	Noble Canyon	71	73.50	P.Unitt	63	25.00	P.Unitt	
O-23	Mt.Laguna	77	134.25	A.E.Klovstad,C.L.Mann,C.G.Edwards	58	18.25	A.E.Klovstad,C.L.Mann,E.C.Hall,J.O.Zimmer,P.Unitt	
O-24	Stephenson Peak	48	25.00	P.Unitt,L.J.Hargrove,N.Nicolai	47	25.33	N.Nicolai,J.R.Barth	
O-25	Red Top	28	15.50	J.R.Barth	31	27.58	J.R.Barth,J.Determan	
O-26	Canebrake Canyon	31	43.08	J.R.Barth,P.Unitt	33	43.92	J.R.Barth,L.J.Hargrove,J.Determan	
O-27	Well of Eight Echoes	35	43.58	P.R.Pryde	43	36.17	P.R.Pryde,G.L.Rogers,P.K.Nelson,L.J.Hargrove	
O-28	Bow Willow	30	87.08	P.Famolario,P.D.Jorgensen,R.&S.Breisch,D.C.Seals,J.R.Barth,L.J.Hargrove	40	33.25	P.D.Jorgensen,E.C.Hall,P.K.Nelson,P.Famolario,A.&T.Keenan	
O-29	Carizzo Marsh	37	36.67	M.C.Jorgensen,P.D.Jorgensen,P.Unitt,M.G.Mathos,F.Belinsky	42	25.25	M.C.Jorgensen,P.D.Jorgensen	
P-7	La Jolla	54	58.05	L.&M.Polinsky	123	62.08	L.&M.Polinsky,M.G.Mathos,F.Belinsky	
P-8	San Clemente Canyon	57	49.00	A.Compton,B.Marino,K.Muienberg,K.Neal,M.Mosher,Joanne Moore,C.G.Edwards	65	26.25	A.Compton,B.Marino,K.Muienberg,P.Unitt,L.&M.Polinsky,M.Mosher	
P-9	Kearny Mesa	62	25.93	K.Kenwood,G.L.Rogers,L.&R.Johnson,R.Breisch	77	25.25	T.Myers,T.Conkle,K.Kenwood	

P-10	Murphy Canyon	57	25.77	D.K. Adams	72	43.75	D.K. Adams
P-11	Mission Gorge	79	52.80	E.Post	90	28.00	E.Post, G.Grantham,J.Harrell
P-12	Santee	83	35.75	E.Post,N.Osborn,C.G.Edwards,B.C.Moore, M.B.Mulrooney,F.Shaw	139	37.00	E.Post
P-13	Winter Gardens	78	151.00	D.C.Seals	86	29.00	D.C.Seals
P-14	Lakeside	81	65.00	M.B.Stowe	109	41.50	M.B.Stowe, C. G. Edwards
P-15	Harbison Canyon	75	113.50	R.Roedell,N.Osborn,E.Wallace, C. G. Edwards	71	41.50	N.Osborn,R.Roedell,C. G. Edwards,P.Unitt
P-16	Galloway Valley	73	60.00	G.&S.Sabbadini,P.Unitt,M.McIntosh,M.B.Stowe,	64	25.00	G.Sabbadini,P.Unitt,K.J.Winter
P-17	Alpine	70	54.50	D.C.Seals,C.G.Edwards,J.K.Wilson,R.Breisch	90	25.75	C.G.Edwards,K.J.Winter,M.B.Stowe,P.Unitt
P-18	Viejas Valley	73	32.50	C.G.Edwards,K.J.Winter,M.McIntosh,P.Unitt	60	25.00	K.J.Winter
P-19	Descanso	69	35.50	B.&M.McIntosh,R.Schiller,D.C.Seals,P.Unitt	66	25.25	P.Unitt,J.M.Wells,K.J.Winter,M.B.Stowe
P-20	Guatay Mt.	66	25.42	P.Unitt,J.K.Wilson,J.R.Barth,L.J.Hargrove	81	32.75	P.Unitt,J.K.Wilson,P.K.Nelson,L.J.Hargrove,N.Osborn, B.Siegel,M.Sadowski,L.Polinsky
P-21	Pine Valley/Guatay	77	95.00	J.K.Wilson	66	57.50	J.K.Wilson
P-22	Scove Canyon	72	44.75	P.Unitt	61	25.00	P.Unitt
P-23	Wooded Hill	69	48.50	E.C.Hall,J.O.Zimmer	58	27.12	E.C.Hall,J.O.Zimmer
P-24	Cuyapaipe	57	38.25	D.C.Seals,P.Unitt	45	27.00	D.C.Seals,E.C.Hall,J.O.Zimmer
P-25	Pepperwood Trail	38	34.66	J.R.Barth,L.J.Hargrove,G.L.Rogers,M.B.Mulrooney	41	34.16	L.J.Hargrove,M.B.Mulrooney,J.R.Barth
P-26	Sombrero Peak	40	72.75	P.R.Pryde,M.B.Mulrooney,L.J.Hargrove	38	30.25	P.R.Pryde,A.&T.Keenan,M.B.Mulrooney,P.K.Nelson
P-27	Egg Mt.	33	80.00	D.G.Seay	32	46.00	D.G.Seay,P.K.Nelson,J.K.Wilson,F.L.Unmack,M.B.Mulrooney
P-28	Sweeney Pass	24	37.75	P.K.Nelson,J.K.Wilson,D.C.Seals,J.R.Barth	25	26.00	B.&M.McIntosh,A.Mauro,F.L.Unmack,M.B.Mulrooney
P-29	Canyon sin Nombre	21	38.66	D.C.Seals,J.R.Barth,M.B.Mulrooney,P.D.Jorgensen, M.G.Mathos,F.Bellinsky,P.Unitt	27	25.17	G.&A.Kroon,J.R.Barth,R.Breisch
Q-7	Pacific Beach	46	58.00	J.C.Worley	120	25.00	L.&M.Polinsky,E.Wallace
Q-8	Bay Park	71	66.75	E.Wallace,J.C.Worley	145	74.25	E.Wallace,J.C.Worley
Q-9	Linda Vista	58	99.50	T.Plunkett,D.&A.Hester	62	96.75	T.Plunkett,D.&A.Hester
Q-10	Grantville	63	29.25	N.Osborn,P.Unitt	90	25.75	P.Unitt,N.Osborn
Q-11	Lake Murray	86	165.50	N.Osborn	117	114.00	N.Osborn
Q-12	Grossmont	55	87.25	J.Bennett	64	62.50	J.Bennett
Q-13	El Cajon	37	26.75	K.Neal	64	26.75	K.Neal
Q-14	Singing Hills	69	58.75	J.E.,&K.Berndes,T.A.Oberbauer	81	69.00	J.E.,& K Berndes,T.A.Oberbauer
Q-15	Dehesa	84	49.07	H.L.Young,A.Young,P.Unitt,G.A.Rebstock,J.R.Barth, W.E.Haas,N.Osborn	96	27.25	P.Unitt,A.Young
Q-16	Loveland Reservoir	76	64.75	J.K.Wilson,L.J.Hargrove,R.&S.Breisch,P.Famolaro	90	84.80	J.K.Wilson,L.J.Hargrove,R.& S. Breisch
Q-17	Hidden Glen	81	89.25	P.Famolaro	86	32.00	P.Famolaro,R.& S. Breisch,M.B.Stowe
Q-18	Japatul Valley	68	28.00	K.J.Winter,L.J.Hargrove,D.C.Seals,P.Unitt	92	36.75	K.J.Winter,J.K.Wilson,M.Sadowski,P.K.Nelson,N.Osborn, P.Unitt,R.& S. Breisch
Q-19	Horsethief Canyon	62	37.74	D.C.Seals,P.Unitt,M.G.Mathos,P.K.Nelson,J.K.Wilson, J.R.Barth	60	25.00	P.Unitt,M.McIntosh,D.C.Seals,N.Osborn
Q-20	Pine Creek Wilderness	59	29.00	K.J.Winter,G.A.Rebstock,G.L.Rogers	87	30.33	G.L.Rogers,W.E.Haas,R.& S.Breisch,R.T.Patton,J.R.Barth
Q-21	Long Valley Creek	69	51.25	L.J.Hargrove,E.C.Hall,J.Determan,J.K.Wilson, M.U.Evans,P.Unitt,P.D.Jorgensen	78	33.75	A.&T.Keenan,B.C.Moore,P.Unitt,G.L.Rogers,F.L.Unmack
Q-22	Glen Cliff	69	158.50	J.K.Wilson	53	73.00	J.K.Wilson
Q-23	Gibbets Flat	63	51.00	C.G.Edwards,E.C.Hall,J.O.Zimmer,J.R.Barth	51	87.50	C.G.Edwards,J.R.Barth,L.J.Hargrove,J.M.Wells

(Continued)

TABLE 4 (Continued)

Square	Species ^a	Breeding Season			Species ^b	Hours	Primary observer(s)	Winter	
		Hours	Primary observer(s)						
Q-24	Thing Valley	57	39.49	J.R. Barth, P.Unitt, R.C.Sanger, D.C.Seals	63	27.50	J.R. Barth, J.M.Wells, P.Unitt		
Q-25	Cottonwood Campground	47	42.00	N.Nicolai, E.C.Hall, J.O.Zimmer, A.&T.Keenan, J.R.Barth	43	39.08	N.Nicolai, B. & M.McIntosh, G.L.Rogers		
Q-26	Rockhouse Canyon	44	40.66	R.C.Sanger, J.R.Barth, D.C.Seals, P.Unitt, L.J.Hargrove, B.O'Leary	47	25.41	P.Unitt, M.G.Mathos, A.& T.Keenan, J.R.Barth		
Q-27	Carrizo Canyon	35	39.00	L.J.Hargrove, F.L.Umnack, D.Julian	29	42.30	D.Julian, R.Breisch, A.Mauro		
Q-28	Jojoba Wash	23	35.00	G.&A.Kroon	26	40.00	G. & A.Kroon, P.D.Jorgensen, H.E.Stone		
Q-29	Volcanic Hills	22	56.00	G.&A.Kroon, D.C.Seals, P.Unitt, J.K.Wilson, J.R.Barth	24	28.00	G. & A.Kroon		
R-7	Ocean Beach	33	162.80	V.P.Johnson	109	41.00	V.P.Johnson		
R-8	Old Town	63	36.85	A.E.Klovstad, C.L.Mann, C.Hewitt, J. & B.Peugh	147	28.33	A.E.Klovstad, C.L.Mann, B.C.Moore		
R-9	Mission Valley	64	99.50	J.K.Wilson, H.L.Young	107	151.75	J.K.Wilson		
R-10	East San Diego	48	112.33	J.Dietrick	51	81.25	J.Dietrick		
R-11	Lemon Grove	46	29.75	P.Unitt, F.Shaw	82	30.00	D.&A.Hester, M.B.Stowe, E.Wallace		
R-12	La Mesa	49	32.10	N.Inman, M. & D.Hastings	75	41.75	N.Inman, M. & D.Hastings		
R-13	Casa de Oro	82	88.05	M. & D.Hastings, J.R.Barth, A.Mercieca	89	32.00	M. & D.Hastings, J.R.Barth		
R-14	Jamacha	79	26.50	N.Perretta, P.Nance	80	27.25	N.Perretta, S.D.Cameron, R. & S.Breisch		
R-15	McGinty Mt.	65	40.25	P.Unitt, G.A.Rebstock, J.R.Barth, N.Osborn,	60	26.27	P.Unitt, W.E.Haas		
R-16	Sycuan Peak	67	37.04	T.A.Oberbauer, W.E.Haas	57	27.41	P.Unitt, J.R.Barth, M.B.Mulrooney		
R-17	Lawson Valley	64	48.03	P.Unitt, J.R.Barth	65	26.18	J.R.Barth, M.B.Stowe, K.Thomson, P.Unitt		
R-18	Japatul Fire Station	62	36.75	J.R.Barth, P.Unitt, A.Mauro, G.A.Rebstock	60	25.99	D.W.Povey, R. & S.Breisch, J.R.Barth		
R-19	Espinosa Creek	55	42.50	M.Sadowski, J.I.K.Wilson, J.R.Barth, D.C.Seals	47	35.13	J.R.Barth, G.L.Rogers, L.J.Hargrove, R. & S.Breisch, A. & T.Keenan		
R-20	Corte Madera	67	51.66	L.J.Hargrove, J.R.Barth, G.L.Rogers	88	28.00	L. & M.Polinsky, P.Unitt, R. & S.Breisch, A.E.Klovstad, C.L.Mann, D.Herron, D.Clark		
R-21	Long Valley	54	33.25	J.R.Barth, D.Herron, A.E.Klovstad, C.L.Mann, G.L.Rogers, J.E. & K.Berndes, D.Clark	67	26.00	P.Unitt, B.McIntosh, G.Bustillo, E.C.Hall, W.E.Haas, B.C.Moore, F.L.Unmack		
R-22	Cottonwood Valley	66	25.50	L.J.Hargrove, A. & T.Keenan	63	26.00	P.Unitt, J.M.Wells, R. & S.Breisch, M.U.Evans		
R-23	Kitchen Creek	60	66.60	L.J.Hargrove	62	27.99	L.J.Hargrove		
R-24	Simmons Canyon	71	34.25	J.Larson, A. & T.Keenan, P.K.Nelson, D.C.Seals, J.R.Barth	74	29.42	J.Larson, A. & T.Keenan, B. & M.McIntosh, J.R.Barth, J.M.Wells		
R-25	Manzanita Reservation	56	27.17	J.R.Barth, G.A.Rebstock, J.Determan	75	25.25	A.Mauro, K.J.Winter, J.R.Barth, J.K.Wilson, L.J.Hargrove, G.L.Rogers, T.Cass		
R-26	Lost Valley	69	42.08	P.Unitt, A.Mauro, J.R.Barth, G.A.Rebstock, L.J.Hargrove, R.Or	55	25.00	J. & B.Hargrove, L.J.Hargrove, J.K.Wilson, F.L.Unmack, S.M.Wolf, R.Breisch, A.Mauro, J.R.Barth		
R-27	Redondo Flat	45	30.75	L.J.Hargrove, P.D.Jorgensen, G.A.Rebstock, R.C.Sanger, B.O'Leary	38	32.00	L.J.Hargrove, J.R.Barth, G.A.Rebstock, P.Unitt, M.B.Mulrooney, E.C.Hall, J.O.Zimmer, S.M.Wolf		
R-28	Indian Hill	32	33.65	J.O.Zimmer	39	30.75	J.O.Zimmer		
R-29	Dos Cabezas Mine	31	42.00	G.A.Rebstock, P.K.Nelson, M.B.Mulrooney, D.C.Seals, J.R.Barth, L.J.Hargrove	22	51.83	J.R.Barth, P.Unitt, L.J.Hargrove, R.C.Sanger, E.C.Hall, J.O.Zimmer		
S-7	Point Loma	52	134.25	V.P.Johnson	124	77.00	V.P.Johnson, J.C.Worley		
S-8	North Island	31	40.49	R.T.Patton	128	93.00	R.T.Patton		
S-9	Downtown San Diego	41	42.50	Y.Ikegaya	114	119.25	Y.Ikegaya		
S-10	Greenwood/Mt. Hope	44	30.75	P.Unitt	90	37.00	P.Unitt		
S-11	Encanto	43	25.08	P.Unitt	58	25.25	P.Unitt		

S-12	Sweetwater Reservoir	77	21.75	P.Famolaro	127	30.07	P.Famolaro, T.W.Dorman
S-13	San Miguel Mt.	98	2.75	P.Famolaro	112	56.12	P.Famolaro, T.W.Dorman, P.Unitt
S-14	Steele Canyon	69	53.75	S.D.Cameron, N.Osborn, P.Unitt	62	25.50	S.D.Cameron, P.Unitt
S-15	Jamul	73	63.25	C.Woodruff, A.& T.Keenan, B.& M.McIntosh, P.Unitt	70	31.50	C.Woodruff, P.R.Pryde, J.& B.Hargrove, M.G.Mathos, P.Unitt
S-16	Lee Valley	62	27.75	J.R.Barth	65	25.07	E.Post, D.Hastings, A.Mercieca
S-17	Lyons Valley	62	60.85	J.R.Barth, P.K.Nelson, D.C.Seals	59	31.25	J.R.Barth, P.Unitt, C.Rideout
S-18	Wilson Creek	76	64.50	R.& S.Breisch, J.Hannan	83	25.30	J.R.Barth, D.W.Povey
S-19	Barrett Lake	74	70.42	R.& S.Breisch, J.Hannan	92	25.30	R.& S.Breisch, J.Hannan
S-20	Hauser Wilderness	55	53.83	E.C.Hall, J.O.Zimmer, R.C.Sanger, D.C.Seals, J.R.Barth, L.J.Hargrove, R.& S.Breisch	51	36.00	R.J.Barth, D.C.Seals, J.M.Wells, R.& S.Breisch
S-21	Morena Creek	80	56.58	S.E.Smith	103	38.00	S.E.Smith
S-22	Boulder Oaks	90	155.75	R.& S.Breisch	103	47.90	R.& S.Breisch
S-23	La Posta	71	33.25	L.J.Hargrove, B.& M.McIntosh	80	25.00	L.J.Hargrove, E.C.Hall, C.R.Mahrdt, O.Carter
S-24	Miller Valley	72	28.25	L.J.Hargrove, B.& M.McIntosh	75	25.00	L.J.Hargrove, B.& M.McIntosh
S-25	Live Oak Springs	58	43.00	D.C.Seals, B.Siegel, B.& M.McIntosh, R.& S.Breisch, J.K.Wilson, J.R.Barth	56	26.25	W.Dallas, R.Vinton, R.& S.Breisch, B.O'Leary, P.Unitt, D.C.Seals
S-26	McCain Valley	59	34.83	F.L.Umnack, J.K.Wilson, G.L.Rogers, P.Unitt, M.U.Evans	55	26.50	F.L.Umnack, J.K.Wilson, P.K.Nelson, D.C.Seals
S-27	Sacotone Spring	45	50.25	E.C.Hall, J.O.Zimmer, M.Sadowski, J.K.Wilson, B.& M.McIntosh, P.Unitt, R.Ort	40	25.16	J.K.Wilson, F.L.Umnack, D.C.Seals, A.Mauro, G.L.Rogers, J.R.Barth
S-28	Carizzo Gorge	30	13.75	R.Breisch, A.Keenan, J.R.Barth	38	39.90	R.Breisch, F.L.Umnack, P.K.Nelson, J.K.Wilson
S-29	Dos Cabezas Spring	34	40.99	A.Young, A.& T.Keenan, J.R.Barth, A.Mauro, P.Unitt	37	28.50	A.Young, A.& T.Keenan, P.Unitt
T-9	Silver Strand	20	29.75	Y.Ikegaya, J.Coatsworth	102	83.75	J.Coatsworth
T-10	National City	45	31.50	P.Unitt, R.T.Patton, T.Godshalk, W.E.Haas	118	44.00	T.Godshalk, P.Unitt
T-11	Bonita	69	52.74	P.Unitt	121	97.56	P.Famolaro
T-12	Sunnyside	67	124.50	T.W.Dorman	114	102.14	T.W.Dorman
T-13	Upper Otay Lake	76	100.83	T.W.Dorman, J.F.Walters	119	85.99	T.W.Dorman, J.F.Walters
T-14	Proctor Valley	59	27.50	P.Unitt	67	25.58	P.Unitt
T-15	Rancho Jamul	70	36.00	J.K.Wilson, F.L.Umnack, V.Marquez, P.Unitt	81	37.50	P.K.Nelson, B.& M.McIntosh, J.K.Wilson, J.Determan, P.Unitt
T-16	Dulzura	65	49.41	D.C.Seals, T.Stands, S.Yamagata, P.Unitt, A.& D.Stanton, D.& A.Hester, A.& T.Keenan	78	50.71	R.& S.Breisch, D.W.Povey, A.Mauro, M.B.Stowe
T-17	Mother Grundy Peak	69	26.75	P.K.Nelson, D.C.Seals, L.J.Hargrove, S.M.Wolf, P.Unitt	60	33.72	S.M.Wolf, A.& T.Keenan, J.K.Wilson, H.Ingersoll, J.R.Barth, L.J.Hargrove
T-18	Rattlesnake Canyon	61	25.25	P.Unitt, L.J.Hargrove	53	27.50	P.Unitt, J.R.Barth, L.J.Hargrove, J.M.Wells
T-19	McAlmond Canyon	73	28.91	J.R.Barth, P.Unitt, J.K.Wilson, E.C.Hall	72	26.50	J.R.Barth, J.B.Hargrove, E.C.Hall, R.& S.Breisch
T-20	Round Potrero	77	30.75	J.M.Wells, J.R.Barth	75	27.00	J.Larson, G.A.Rebstock, M.B.Stowe, A.Mauro, J.R.Barth, P.Unitt
T-21	Lake Morena	82	145.20	R.& S.Breisch	91	46.70	E.C.Hall, J.Q.Zimmer, C.R.Mahrdt, P.Unitt, R.B.Riggan
T-22	Morena Village	67	43.25	R.& S.Breisch	86	29.13	F.L.Umnack, D.C.Seals, P.Unitt
T-23	La Posta Microwave	64	25.25	L.J.Hargrove, J.Larson, P.Unitt	72	33.00	L.J.Hargrove, B.Siegel, E.C.Hall, C.R.Mahrdt, O.Carter, R.& S.Breisch
T-24	Clover Flat	65	40.83	P.Unitt, J.R.Barth, D.C.Seals, B.Siegel	66	25.92	J.Larson, G.A.Rebstock, M.B.Stowe, A.Mauro, J.R.Barth, P.Unitt
T-25	Hill Valley	64	30.83	P.Unitt, E.C.Hall, J.Determan	75	25.41	E.C.Hall, J.Q.Zimmer, C.R.Mahrdt, P.Unitt, R.B.Riggan
T-26	Boulevard	61	55.38	J.K.Wilson, F.L.Umnack	64	27.50	F.L.Umnack, D.C.Seals, P.Unitt
T-27	Bankhead Springs	69	41.88	J.K.Wilson, F.L.Umnack	82	35.00	F.L.Umnack, J.K.Wilson
T-28	Arsenic Spring	55	45.50	F.L.Umnack, J.K.Wilson	49	36.80	F.L.Umnack
T-29	In-Ko-Pah	30	32.25	B.Siegel, D.C.Seals, P.Unitt	32	36.00	B.Siegel, F.L.Umnack, L.J.Hargrove
U-10	South Bay	55	20.75	B.C.Moore, M.R.Smith, R.T.Patton	139	73.00	B.C.Moore

(Continued)

TABLE 4 (Continued)

Square	Species ^a	Breeding Season			Species ^b	Hours	Primary observer(s)	Winter	
		Hours	Primary observer(s)						
U-11 Chula Vista	51	72.57	T.W. Dorman, P. Unitt			78		88.98	T.W. Dorman
U-12 Telegraph Canyon	59	136.83	T.W. Dorman			82		207.00	T.W. Dorman
U-13 Lower Otay Lake W	68	34.74	V. Marquez, P. Walsh, T. Stands, S. Yamagata, P. Unitt			103		62.75	V. Marquez, P. Unitt, B. & M. McIntosh, T. Stands, J. R. Barth, S. Buchanan, N. Osborn, P. Unitt
U-14 Lower Otay Lake E	82	61.53	S. Buchanan, N. Osborn, P. Unitt			108		43.63	J.R. Barth, J. Hammond, K.J. Winter, A. & T. Keenan
U-15 Otay Mt. N	54	40.50	A. & T. Keenan, P. Unitt, G. L. Rogers, L. J. Hargrove, J. Hammond			44		26.09	
U-16 Donohoe Mt.	61	66.58	J. R. Barth, R. Breisch, J. Hammond, P. Unitt, D. C. Seals, L. J. Hargrove, A. & T. Keenan, E. C. Hall, K. J. Winter			53		35.25	A. Mauro, S. D. Cameron, J. & B. Hargrove, L. J. Hargrove, J. R. Barth, J. Hammond
U-17 Engineer Springs	71	42.75	D. W. Povey			79		55.95	D. W. Povey, S. M. Wolf, R. T. Patton
U-18 Barrett Junction	70	28.00	P. Unitt, L. J. Hargrove, N. Fraser, D. C. Seals			66		25.25	P. Unitt, J. & B. Hargrove, G. L. Rogers, V. Marquez
U-19 Potrero Peak	59	25.50	B. & M. McIntosh			63		25.65	B. & M. McIntosh
U-20 Potrero	71	55.75	R. & S. Breisch, P. Unitt			86		30.15	R. & S. Breisch
U-21 Hauser Mt.	60	34.00	D. C. Seals, J. R. Barth, K. J. Winter, R. C. Sanger, P. Unitt			55		25.25	P. Unitt, J. Determan, R. Breisch, L. J. Hargrove, A. Mauro, S. M. Wolf
U-22 Campo W	69	25.00	E. C. Hall, C. R. Mahrt			66		26.00	E. C. Hall, C. R. Mahrt
U-23 Campo E	70	53.42	D. & A. Hester, B. & M. McIntosh, P. Unitt			83		30.33	D. & A. Hester, B. & M. McIntosh, D. C. Seals
U-24 Shockey Truck Trail	58	26.16	J. R. Barth, P. K. Nelson, L. J. Hargrove, F. L. Unmack			49		28.50	P. K. Nelson, F. L. Unmack, J. R. Barth, L. J. Hargrove, G. L. Rogers
U-25 Tierra del Sol	62	36.16	J. R. Barth, G. L. Rogers, E. & L. Wallace, D. Gould, S. Jorgensen			56		25.58	E. Wallace, J. R. Barth, R. Breisch, J. & B. Hargrove, G. L. Rogers, T. Cass
U-26 Lake Domingo	59	54.66	J. K. Wilson, F. L. Unmack			67		36.70	F. L. Unmack
U-27 Boundary Creek	64	104.75	F. L. Unmack, J. K. Wilson			72		66.25	F. L. Unmack
U-28 Jacumba	69	58.11	F. L. Unmack, J. K. Wilson, P. K. Nelson, C. G. Edwards, P. Unitt			71		27.00	F. L. Unmack
U-29 Jacumba Airstrip	38	51.75	F. L. Unmack, J. K. Wilson, P. Unitt			40		41.45	F. L. Unmack
V-10 Imperial Beach	70	32.50	C. G. Edwards, B. C. Moore, R. T. Patton, M. R. Smith			183		157.00	C. G. Edwards
V-11 Otay Valley	76	25.25	P. Unitt, G. McCaskie			143		50.00	G. McCaskie, P. Unitt
V-12 Otay Mesa W	68	94.25	P. Walsh, P. Unitt, G. L. Rogers			68		32.75	P. Walsh, W. E. Haas, P. Unitt
V-13 Otay Mesa E	62	25.75	P. Unitt, G. L. Rogers			97		25.00	P. Unitt, W. E. Haas
V-14 O'Neal Canyon	61	49.00	S. D. Cameron			63		34.75	S. D. Cameron
V-15 Otay Mt. S	45	47.00	P. Unitt, D. C. Seals, G. A. Rebstock			41		25.25	J. R. Barth, L. J. Hargrove, P. Unitt
V-16 Mine Canyon	64	39.00	D. C. Seals, A. & T. Keenan, B. E. Kus, P. P. Beck			66		32.50	D. C. Seals, J. K. Wilson, M. G. Mathos, P. Unitt
V-17 Little Tecate Peak	70	48.50	D. C. Seals, P. P. Beck, A. & T. Keenan			66		29.00	E. C. Hall, J. O. Zimmer, C. R. Mahrt, G. L. Rogers, A. & T. Keenan
V-18 Tecate Peak	45	46.00	D. C. Seals, A. & T. Keenan, P. Unitt			34		42.00	D. C. Seals, A. & T. Keenan, P. Unitt
V-19 Tecate	55	24.25	B. & M. McIntosh			51		25.05	B. & M. McIntosh, D. C. Seals, A. & T. Keenan
W-10 Border Field	80	40.33	W. E. Haas, P. Unitt			142		45.75	S. Walens, G. L. Rogers, K. Aldern
W-11 San Ysidro	61	25.00	P. Unitt			95		25.50	P. Unitt

^aSpecies possibly, probably, or confirmed nesting within the square; migrants and nonbreeding visitors excluded.^bAll species recorded December–February, early or late migrants included.