



Off-Trail Permit Program Monitoring Summary

01 September 2010 Revisions

This final report presents results from monitoring of Open Space and Mountain Park's (OSMP) Off-Trail Permit Program (OTP) in active Habitat Conservation Areas (HCAs) from **March 1, 2007 to February 28, 2010**. At the beginning of this three year period, active HCAs included Southern Grasslands (SG), Lower Boulder Creek (BC) and Western Mountain Parks (MP). Starting on January 29, 2009, permits were also available for the new Eldorado Mountain (EM) HCA (Map 1). This report includes cumulative, annual, and monthly summaries addressing the key OTP monitoring objectives. For the purpose of this report, each monitoring year covers a 12-month period from March to the following February.

Off-Trail Permit Monitoring Objectives:

1. Document the number of visitor parties issued permits, the number of permitted person-visits, and the distribution of permitted off-trail travel by HCA, group size, activity, month and day of week¹.
2. Document the number of off-trail visitor parties and off-trail visitors complying with the OTP program, their awareness of the OTP program, the distribution of off-trail use by HCA, group size and activity, and the level of effort required to monitor off-trail permit compliance.

OTP monitoring objectives were achieved through:

1. An on-line OTP permit application program; and
2. Ranger monitoring of permit compliance

Part 1. Monitoring Off-Trail Permit Applications in HCAs Summary for March 1, 2007 to February 28, 2010

How many visitor parties were issued OTP permits from 3/1/2007 to 2/28/2010?

- Over the first three years of the OTP program, **793** OTP permits were issued.
- The number of annual permits issued increased in the 2009 monitoring year shortly after EM was added to the OTP program (Figure 1).
- In 2007 and 2008, the number of monthly permits issued for off-trail travel in the original HCAs appeared to have steadied at 3 to 16 permits per month after an initial peak in late spring 2007. In late spring 2009, following initiation of the OTP program in EM, rates of permit issuance again increased. Over the rest of 2009 and to February 2010, OTP permits were issued at a fairly steady rate of 40 to 57 permits per month.
- One individual issued multiple permits in EM since 2009 had a large effect on annual and monthly permit trends (Figures 1 and 2).

How many visits were permitted through the OTP from 3/1/2007 to 2/28/2010?

- Issued permits provided opportunities for **1,436** off-trail person-visits.

¹ The Off-Trail Permit Monitoring protocol initially included an objective aimed at identifying HCA locations of concentrated off-trail use. This objective was later determined to be unfeasible using the permit application program.

- The number of visits permitted through the OTP program in the 2009 monitoring year was nearly twice the number permitted in the first year of the OTP program (Figure 3).
- The numbers of permitted visits on a monthly basis showed similar trends to that for number of permits issued; off-trail visits increased in the spring following initiation of the program for one or more HCAs. However, the number of permitted visits per month showed more variability than the number of permits, reflecting differences in sizes of permitted groups.

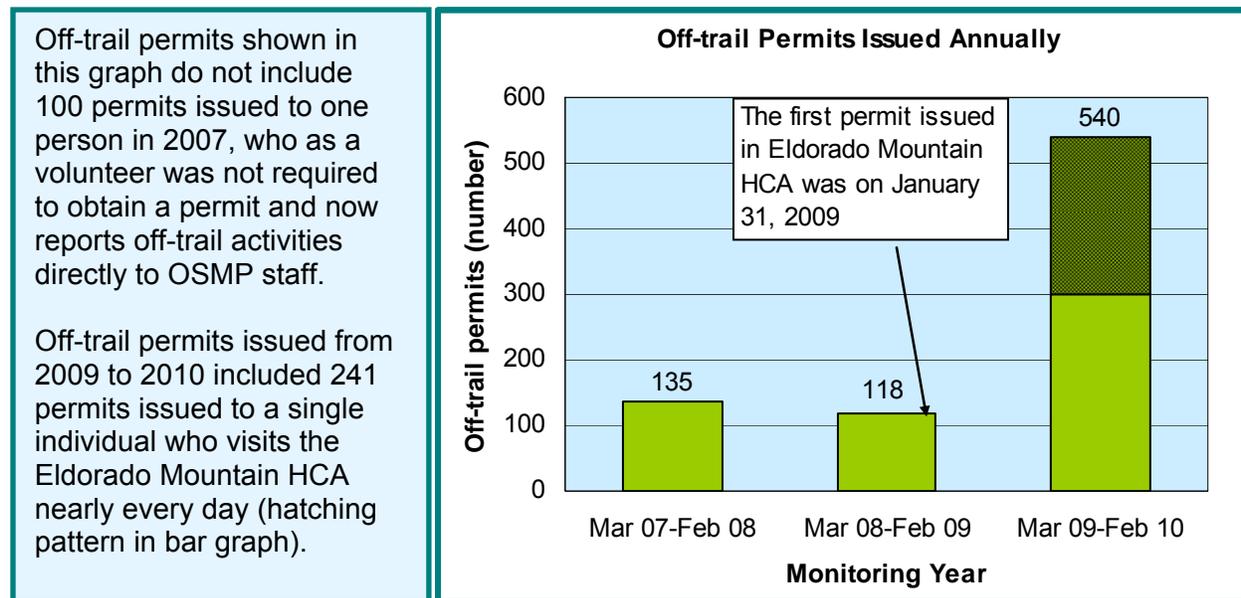


Figure 1. Number of off-trail permits issued in each monitoring year. Numbers above bars indicate the total number of permits issued.

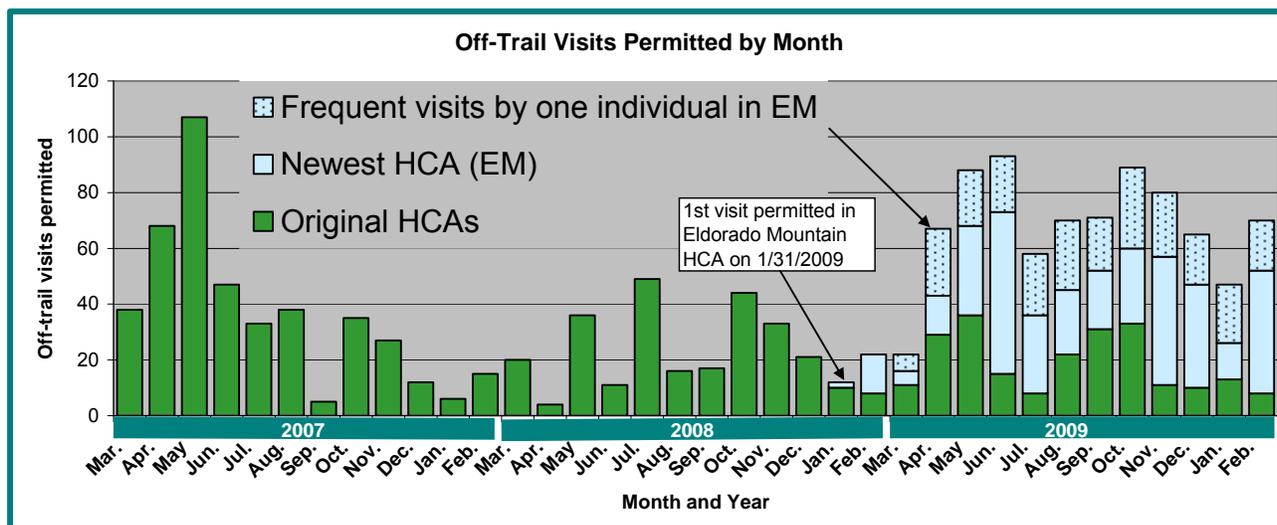


Figure 2. Number of off-trail permits issued each per month. Monthly permits do not include 100 permits issued to one person from March to July 2007, who as a volunteer was not required to obtain a permit.

Off-trail visits shown in this graph do not include 100 visits permitted for one person in 2007, who as a volunteer was not required to obtain a permit and now reports off-trail activities directly to OSMP staff.

Off-trail visits permitted from 2009 to 2010 included 245 visits permitted to a single individual who visits the Eldorado Mountain HCA nearly every day (hatching pattern).

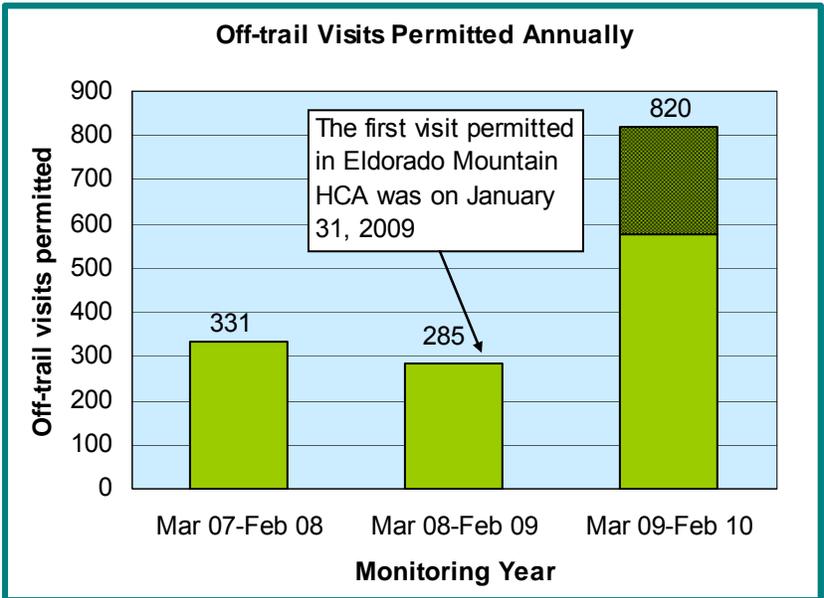


Figure 3. Number of off-trail visits permitted in each monitoring year. Numbers above bars indicate the total number of visits permitted.

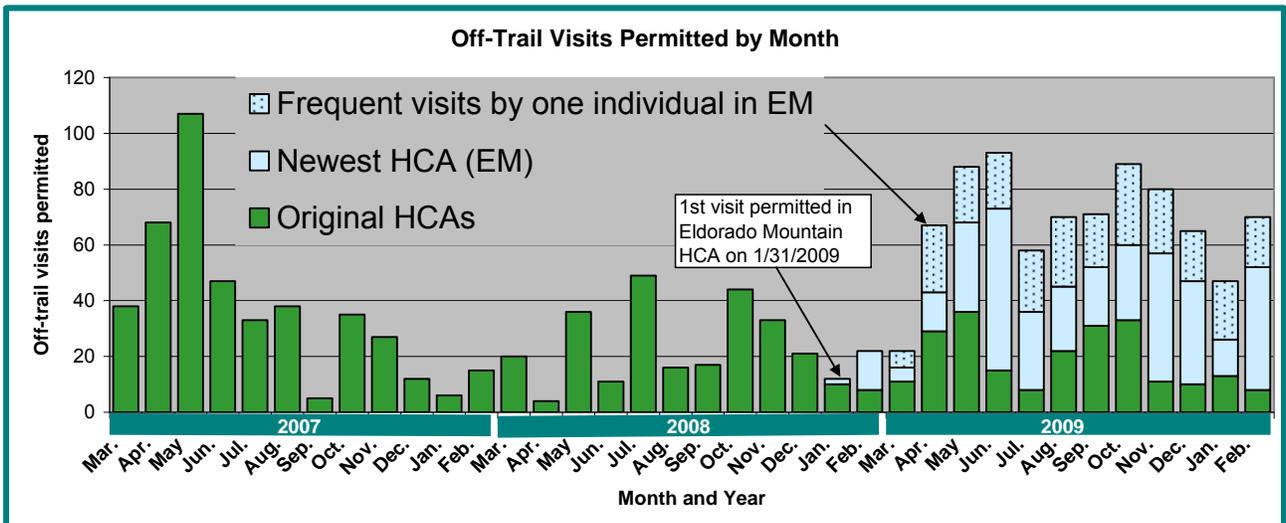


Figure 4. Off-trail visits permitted in each monitoring month. Monthly visits do not include 100 visits by one person from March to July 2007, who as a volunteer was not required to obtain a permit and now reports off-trail activities directly to OSMP staff.

How many unique visitors were issued OTP permits from 3/1/2007 to 2/28/2010?

- 173 different applicants were issued permits over the 1st three years of the OTP program
- Just over half (91) were issued a permit only once (Figure 5).
- One individual was issued 241 permits (240 of these in EM).

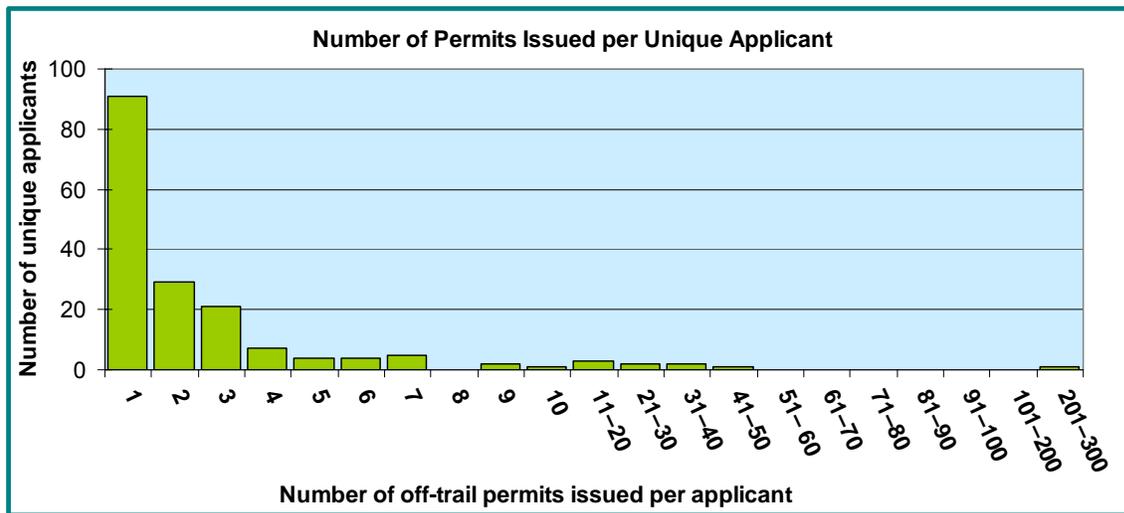


Figure 5. Frequency distribution showing the number of unique applicants issued different numbers of off-trail permits over three years of monitoring.

- Over the three years, a small pool of new individuals were issued OTP permits each month (Figure 6, diamond symbols)
- Although the number of new individuals issued OTP permits each month is small (Figure 6, diamond symbols), there was no indication of a plateau in cumulative unique permits. (Figure 6). The number of unique individuals issued permits continued to grow over the 36 months

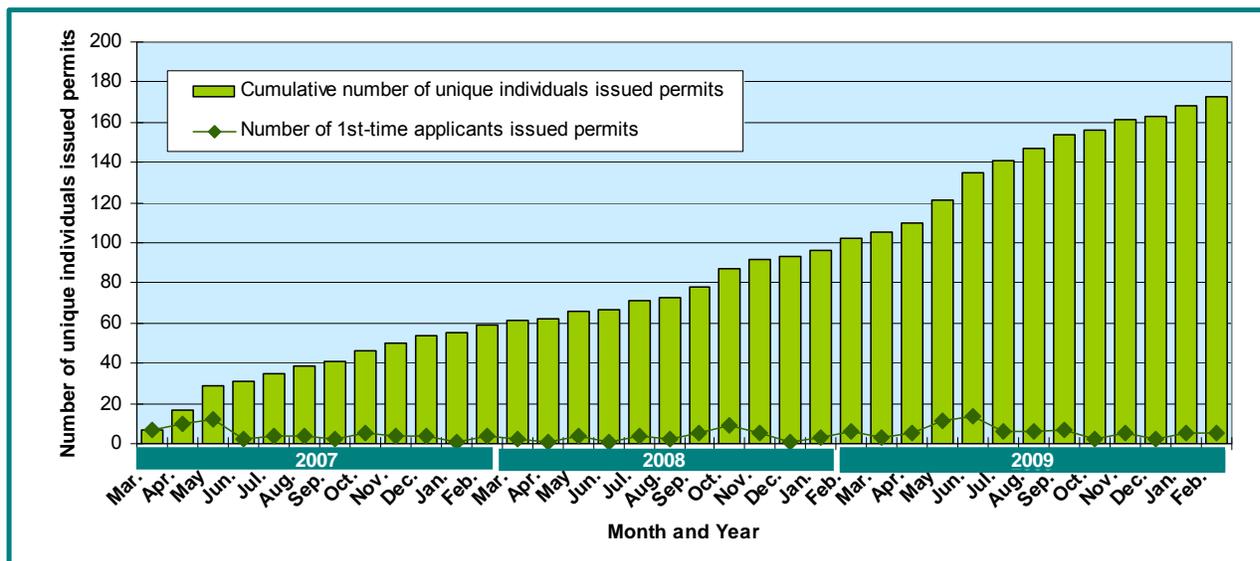


Figure 6. Cumulative number of unique individuals issued permits each month (bars) and the number of permits issued monthly to 1st-time applicants (diamonds) over the three years of the OTP program.

How were OTP permits distributed among the four active HCAs?

- Permits issued for EM, the newest HCA, accounted for the largest number of OTP permits (Table 1; Figure 7).
- Although permits were issued in EM for only the last third of the period from 2007 to 2010, the number of permits issued and visits permitted were greater than those in MP (Table 1)
- Approximately half (240 of 453) of the permits issued in Eldorado Mountain HCA were issued to one individual. The 178 permits issued in MP (Table 1) did not include 100 permits issued to a single individual who as a volunteer was not required to obtain a permit.

Table 1. Number of permits and visits to each HCA (3/2007-2/2010).

03/01/2007 to 2/28/2010	Off-trail Permits	Off-trail Visits
HCA	No.	No.
Lower Boulder Creek.	18	38
Southern Grasslands	144	279
Western Mountain Parks	178	510
Eldorado Mountain	453	609
Total	793	1436

- Among HCAs, permits issued annually for BC were consistently lowest at ≤ 11 permits per year (Figure 7). The number of permits issued for MP and SG were comparable in all three years (Figure 7).

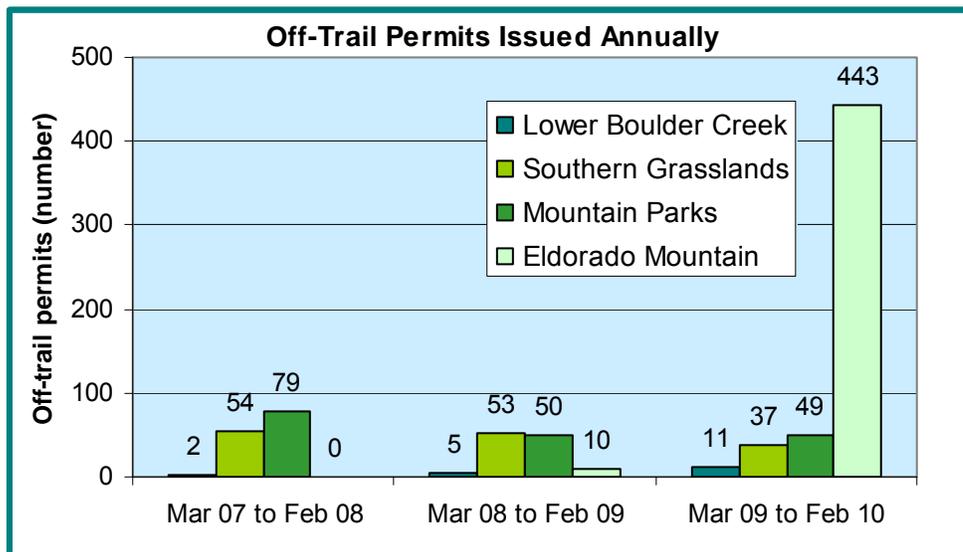


Figure 7. Number of off-trail permits issued by year and by HCA over three monitoring years. Numbers above bars indicate the number of permits in each HCA.

How large were permitted off-trail parties?

- On average over the three years, permitted parties consisted of 1.81 off-trail visitors. Median party size was one visitor per party.
- Permits were predominantly issued for small groups of visitors; about two thirds (67%) of all permits issued were for single visitors and 21% were issued for parties of two visitors. Only 12% of permits were issued for parties of three or more visitors.

What off-trail activities did permitted parties engage in over the last three years?

- Although 77% of all off-trail permits were issued for hiking, activity distributions differed among HCAs (Figure 8). Nature observation, photography, and other activities accounted for a larger proportion of permits in BC and SG than in MP and EM.
- The Other activity category included various volunteer resource monitoring projects (Christmas bird counts, BCNA Stewardship monitoring, knapweed checks), fishing, lunch breaks, “hanging out”, painting, search and rescue dog training, and sail plane activities.

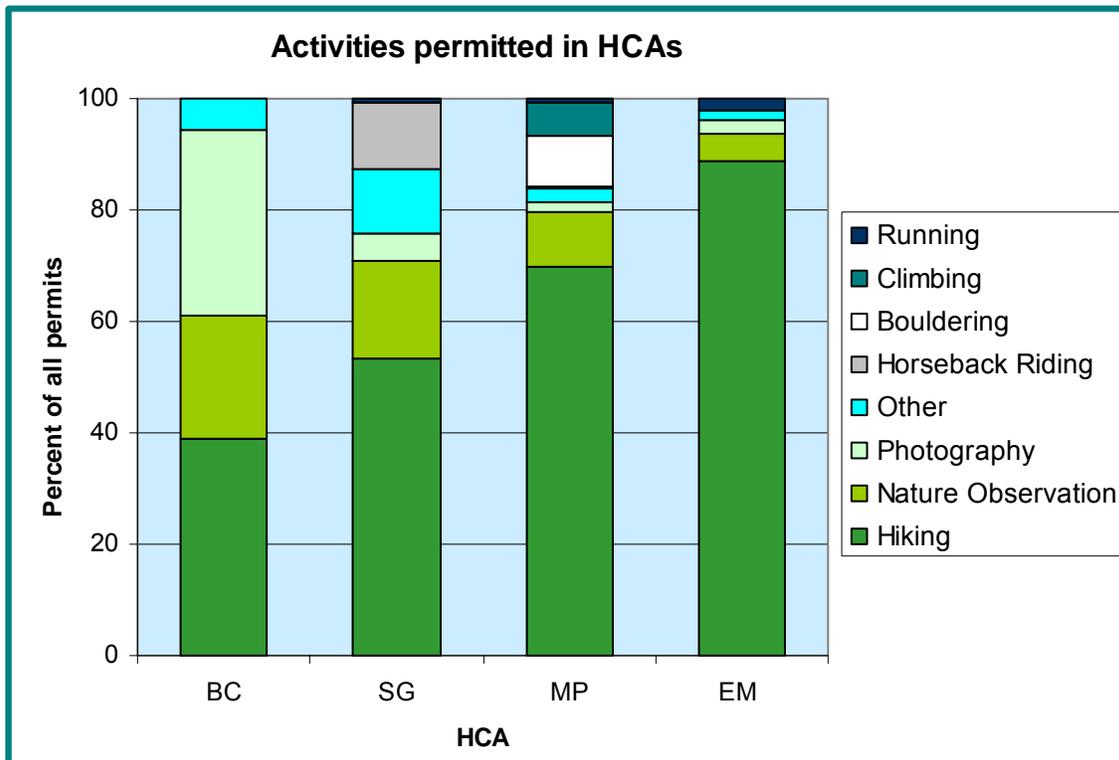


Figure 8. Distribution of off-trail permits by activity type and HCA over three years of monitoring.

How did permit issuance and number of visitors vary by day of week?

- During the three-year period, more off-trail permits were issued for Sunday than for other days of the week (Figure 9, 1st bar series). This trend is consistent in each of the monitoring years.
- The number of off-trail visits permitted over the three years was greater on weekend days than on week days (Figure 9, 2nd bar series). Approximately 3 times more visits were permitted on Sundays than on weekdays.

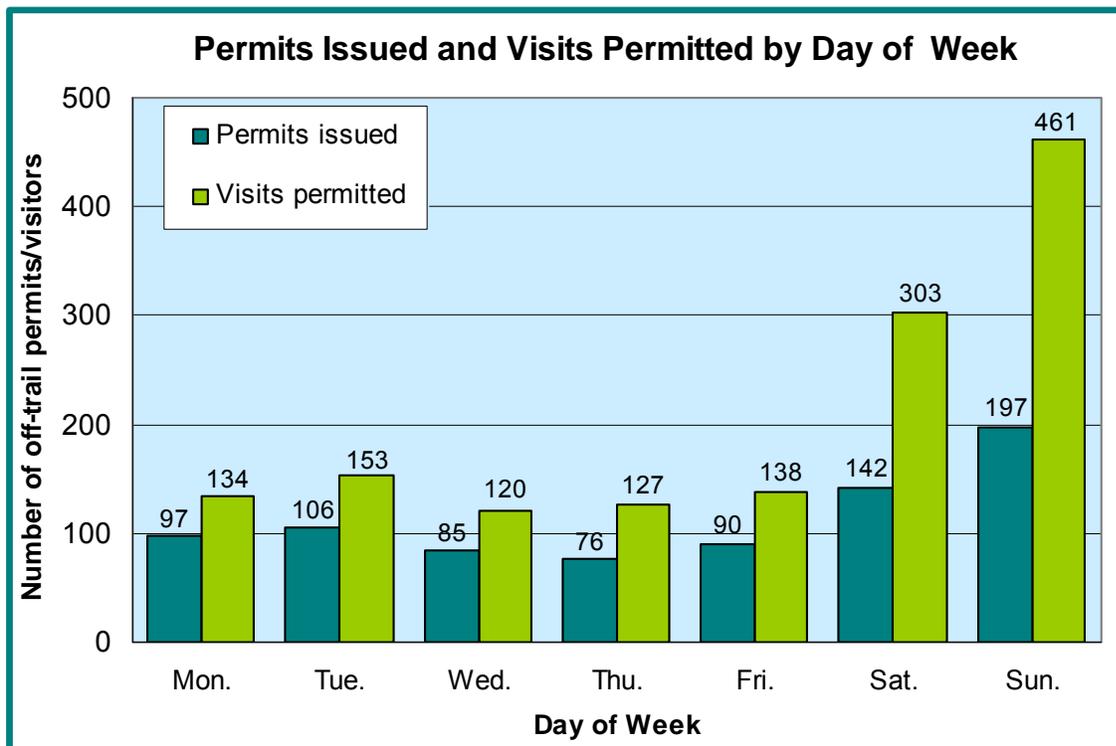


Figure 9. Number of permits issued and visits permitted for each week day summed over the three-year monitoring period.

Part 2. Monitoring Off-trail Permit Compliance in HCAs Summary for March 01, 2007 to February 28, 2010

What proportion of off-trail HCA parties contacted between 03/01/2007 and 02/28/2010 had obtained an off-trail permit?²

- Over all three years, 10.6% of the 47 parties encountered off-trail were in compliance with the requirement to obtain an off-trail permit.
- When parties camping in HCAs (mostly thought to be homeless) were excluded from the analysis, 14.3% of off-trail parties (5 of 35 parties) were in compliance with the requirement to obtain an off-trail permit.
- Compliance with off-trail permit requirements was consistently low. In 2007, 1 of 13 off-trail parties encountered had valid permits; 1 of 19 had permits in 2008 and in 2009, 3 of 15 had permits (Figure 10). In each monitoring year, $\leq 20\%$ of parties contacted had complied with off-trail permit regulations.
- Rangers issued 13 verbal warnings and 13 summonses (including 8 for camping) for HCA off-trail violations.
- Many off-trail parties encountered without permits were within 50 ft of the trail. See Appendix 1 for specific information (activity, location, party size, and notes) about each off-trail party.

² Non-compliance records from ranger patrols for the Cottonwood Grove, Jewel Mountain, Sombrero Marsh, and Tall Grass East HCAs were not included in the analyses because these areas were not part of the OTP program.

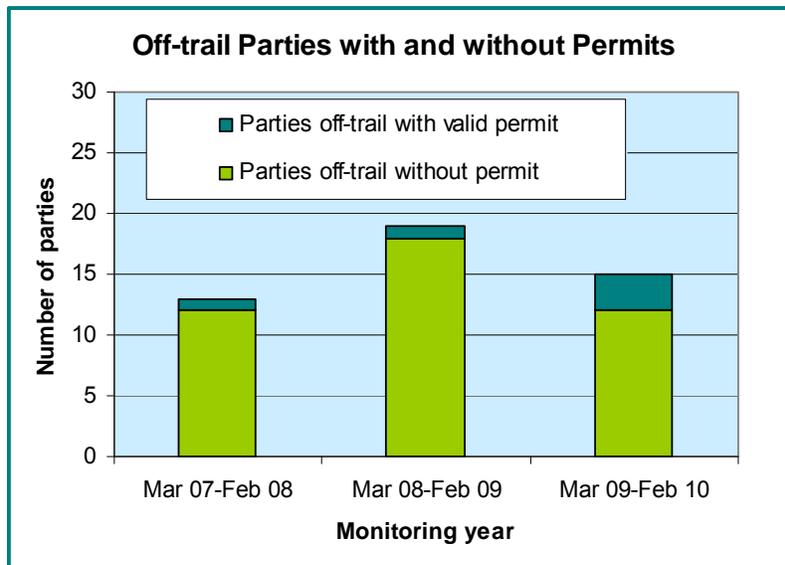


Figure 10. Number of off-trail parties encountered with and without a valid permit for campers and non-camping parties.

What resources were committed for these patrols between 03/01/2007 and 02/28/2010?

- Rangers conducted 392 patrols in active HCAs for a total of 632 hours. During these patrols, rangers concurrently engaged in other ranger responsibilities.
- 97 patrols (24.7% of all patrols and 14.5% of total patrol hours) focused on finding and clearing camps on OSMP lands in HCAs.
- Patrols ranged in length from 10 minutes to 6 hours.
- Approximately 11% of the 392 patrol events involved contact with off-trail parties.
- Across all 3 years, “encounter effort” was calculated as 13.5 patrol hours/party encountered off-trail. There was no evidence that yearly increases in HCA patrol hours were associated with higher numbers of encounters with off-trail parties or lower hours of patrol per off-trail party encountered (Figure 11).

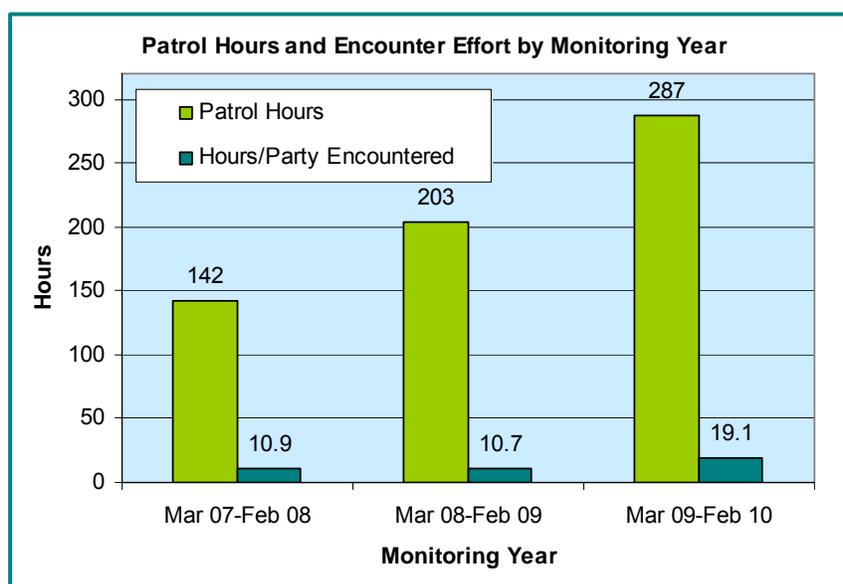


Figure 11. Hours of ranger patrol (green bars) and patrol hours per off-trail party encountered (blue bars) in each monitoring year.

How were ranger patrols distributed among HCAs?

- Rangers patrolled the largest HCA (MP) most frequently in all years (Figure 12). Camping patrols occurred frequently in MP. By the 3rd year of monitoring, non-camping patrols in MP and the newest HCA (EM) were conducted at similar frequencies
- Time spent patrolling MP far exceeded time in other HCAs (Figure 13). Rangers spent more time patrolling MP because this is the HCA with greatest visitation. These patrols were often of longer duration, involved travel across a larger and more remote area, included frequent camping checks, and occurred in all three years.

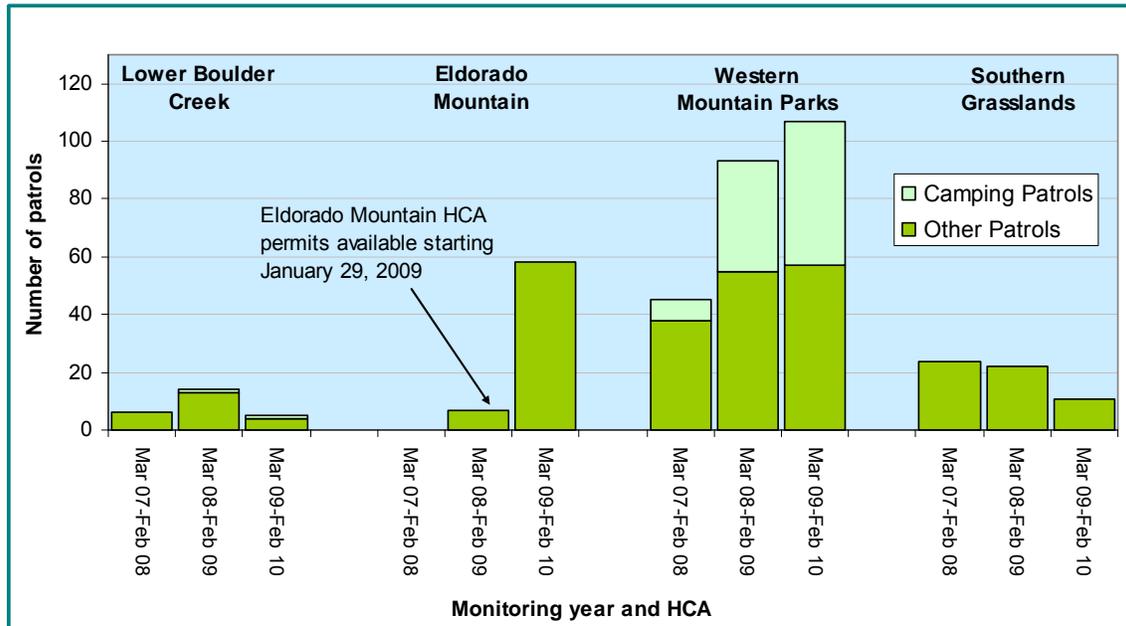


Figure 12. Number of ranger patrols in the four HCAs for each of the three monitoring years.

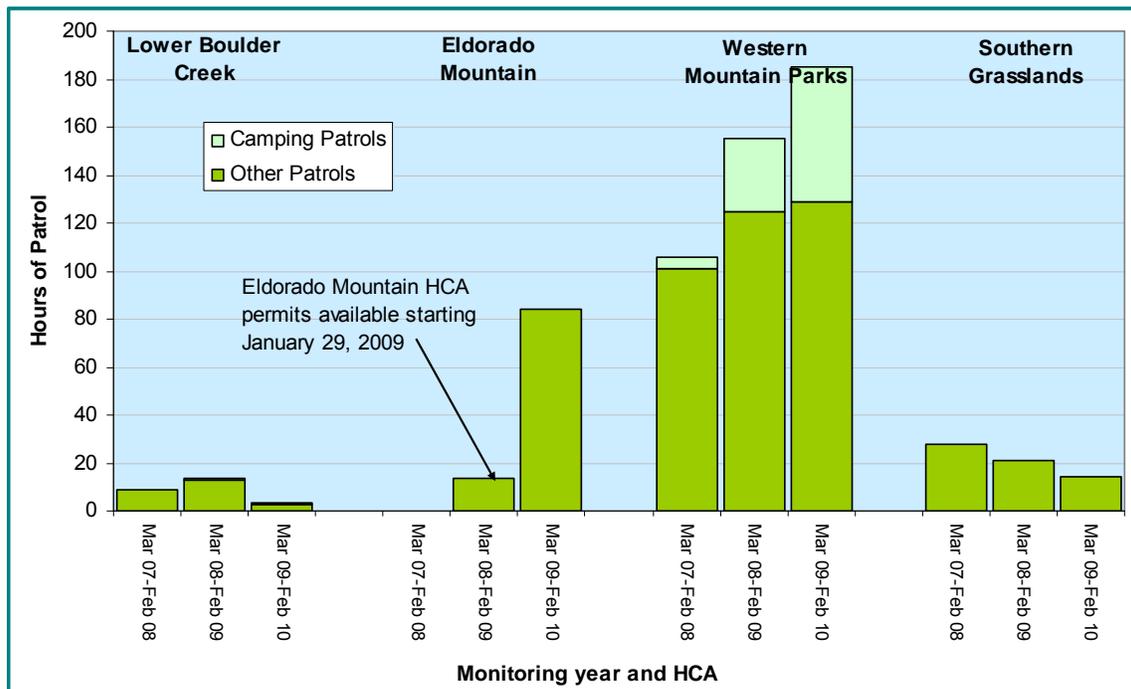


Figure 13. Number of hours patrolled in the four HCAs for the three monitoring years. In Lower Boulder Creek, camping patrol hours (0.3 hours in 2009 and 2010) are indiscernible.

What proportion of off-trail parties without permits knew about the OTP program?

- In mid November of the 2008-2009 monitoring year, monitoring methods were revised to include a question posed to off-trail parties without permits on their awareness of the OTP permit requirement.
- Of the 14 off-trail parties without a permit that were asked and responded to this question, 12 stated they were not aware of the OTP program and two parties stated they were aware of the program but did not obtain a permit.

Conclusions and Monitoring Recommendations

What can we conclude after three years of monitoring?

OSMP's off-trail permit program has provided many opportunities for visitors to legally travel off-trail in HCAs. Over the first three years of program implementation, OSMP issued 793 permits to 173 unique applicants for a possible 1436 off-trail person-visits. The annual number of off-trail permits increased more than four fold after initiation of the permit program in Eldorado Mountain HCA. Nearly half of those permits were issued to a single individual.

Compliance with the HCA off-trail permit requirement has been consistently low among the small number of off-trail parties contacted by rangers. Over the three years, 10.6% of the 47 off-trail parties contacted had permits (12 of the 47 parties were illegal campers). In each of the three monitoring years, 80% or more of off-trail parties had not obtained a permit.

How well did we do meeting monitoring objectives?

The OTP permit application monitoring program provides an effective means to track and compare the number of permit applications and requested person-visits by HCA, group size, off-trail activity, and time of visit. The program cannot, however, be used to pinpoint HCA subareas or specific locations that potentially receive trampling or wildlife impacts due to heavy off-trail visitation. Inconsistencies in how applicants record destinations and subareas for their off-trail visits and uncertainties about whether all destinations listed are actually visited preclude use of the database for this purpose.

Measuring visitor compliance with off-trail permit requirements proved difficult and inefficient due to the low detectability of off-trail visitors over the extensive HCA land areas. During the 3-year monitoring period and over 632 patrol hours, OSMP rangers encountered only 47 off-trail parties (including 13 parties in areas frequently patrolled for campers). In an effort to improve encounter rates, OSMP employed a roving technician to monitor off-trail HCA compliance in summer 2008. The results were comparably low encounter rates. These efforts tell us little about the extent of off-trail travel in HCAs because we are unable to estimate the proportion of off-trail visitors who go unobserved.

Decisions and recommendations

OSMP developed two sequential decision memos³ explaining and outlining recommendations for future OTP monitoring based on monitoring results summarized here and staff's assessments of implementation success and costs. Key decisions included:

- Continuing the off-trail permit application program to track permit application trends, to highlight the ecological significance of HCAs, and to teach about and encourage low impact travel in HCAs
- Ending off-trail compliance monitoring by the roving technician in summer 2008

³http://intraweb.ci.boulder.co.us/files/departments/osmp/decisionmemos/Off_trail_permit_monitoring_decision_memo_February_3_2010.pdf; February 3, 2010
http://intraweb.ci.boulder.co.us/files/departments/osmp/pdf/otp_decision_memo.pdf; October 15, 2008

- Ending off-trail compliance monitoring by rangers in February 2010 but continuing to track off-trail compliance in HCAs using the summons and warnings database
- Using undesignated trail monitoring to identify high use areas within HCAs
- Continuing advertising and outreach efforts as possible to: 1) inform visitors about the need for a permit to access HCA's; 2) encourage and improve low-impact visitor behavior when off-trail; and 3) improve the understanding of the ecological importance of HCA's.

Appendix A. Additional information on the 47 off-trail parties, included their location, off-trail activities, and group size.

Date	Activity	No/party	Permit?	Location	Notes
3/18/2007	Hiker/Pedestrian	2	No	Just east of Greenbelt Plateau Trail	Party had two dogs off-leash
4/22/2007	Equestrian/Horse	1	No	Hartnagle	
5/18/2007	Hiker/Pedestrian	4	No	Greenbelt Plateau	Family of four looking for shade on a warm day (shade break)
6/2/2007	Hiker/Pedestrian	1	Yes	Green Mtn. West Ridge area.	He told me that he sees off trail hikers often without permits.
6/16/2007	Hiker/Pedestrian	1	No	Greenbear area.	Barely off trail, didn't know about permit program.
6/18/2007	Camping	1	No	Ridge behind Silver Saddle Motel	
7/19/2007	Hiker/Pedestrian	3	No	Bear Canyon (reroute) near a creek area	Three people and two dogs (off leash) in a creek area. They said they were watering their dogs. I issued two summons for dogs being off leash.
8/12/2007	Equestrian/Horse	2	No	Hartnagle	Gave warning
8/28/2007	Hiker/Pedestrian	1	No	50 yards east of Green Mtn West Ridge Trail.	Observed 1 male w/dog off-leash. Issued summons for 6-1-16. 10 min later saw same person ~ 50 yds off-trail sitting on a rock. Re-contacted and explained HCA permit requirements & gave him warning
10/11/2007	Hiker/Pedestrian	1	No	About 20 ft off Greenman Trail	I contacted a man hiking off Greenman Trail. He was only about 20 ft off and he was just looking at a view. I contacted him and gave him information about off-trail permits
10/20/2007	Hiker/Pedestrian	2	No	East Varra	
11/11/2007	Kite-flying	2	No	north of High Plains east of Greenbelt trail.	Individuals were kite flying. Wrote summons for dog off leash/High Plains trail.
12/15/2007	Hiker/Pedestrian	2	No	40.5 mile marker of Boulder Canyon	Cameron H Cadwell and Lee E Gillian (warned) (in Database)
5/5/2008	Hiker/Pedestrian	2	No	White Rocks; upper road	shortcut due to rain
5/10/2008	Camping	2	No	Ridge west of Silver Saddle	
5/10/2008	Camping	2	No	Ridge behind Silver Saddle	
6/9/2008	Camping	1	No	Ridge south of Silver Saddle	ticket issued
6/9/2008	Camping	1	No	Ridge West of Silver Saddle	Ticket issued; 1 person camping
6/18/2008	Running	1	No	Matterhorn/W. Varra	Runner trying to get back to Flatiron Vista
7/3/2008	Camping	1	No	South side of Boulder Canyon at 40 mile mark	Issued a camping ticket, warned for HCA violation, number in party not recorded
9/4/2008	Hiker/Pedestrian	4	No	Bear Peak West Ridge	Not far off trail (30-50 ft) enjoying a view and taking pictures. Gave them HCA information; very cooperative
9/10/2008	Hiker/Pedestrian	6	No	Green Mountain, West Ridge	
9/14/2008	Equestrian/Horse	2	No	30-40 yards off High Plains Trail; NE of Greenbelt Plateau trailhead	2 horseback riders looking for High Plains Trail. Cut through HCA from Greenbelt Plateau trail to High Plain's trail. Only approximately 30-40 yards off-trail.
10/1/2008	Hiker/Pedestrian	2	No	Green Mtn West Ridge	
10/2/2008	Yoga	1	No	Cathedral Rock	Advised Regulations - Attempting to work out an administrative shortcut for this party. He is a regular. Contact is recorded in database. Now has open permit to be there if reported.
10/26/2008	Hiker/Pedestrian	2	No	Cathedral Rock	Verbal warning
10/26/2008	Hiker/Pedestrian	1	No	Cathedral Rock	Verbal warnings
11/2/2008	Hiker/Pedestrian	1	No	Kolb Eagle Closure	Contacted one for entering Kolb Eagle Closure/HCA. Warning in database

Date	Activity	No/party	Permit?	Location	Notes
1/31/2009	Hiker/Pedestrian	2	No	North of High Plains trail 1/4 east of Greenbelt Plateau	2 people walking 2 dogs off-leash, started on High Plains and headed North along fence line west of Hayes driveway. Not aware of program, issued a ticket for dog off-leash, warned for HCA violation
2/4/2009	Hiker/Pedestrian	1	No	Culver Ponds	1 person from Oil Company walking about 200 yards from truck and oil pump on Culver Ponds (on lunch break, hanging out in trees) - not asked re awareness/not contacted
2/14/2009	Photography	2	Yes	East of White Rocks trail	Photographer got permit for off-trail - I saw him just before large uphill that leads towards Gunbarrel. Knew about permit by reading the signs.
2/24/2009	Hiker/Pedestrian	2	No	West of Goshawk trail	Issued summonses
3/14/2009	Hiker/Pedestrian	7	No	Bear Canyon trail	Family of 7 observing a rock ~ 20 ft off-trail
3/24/2009	Kite-flying	2	No	East of Greenbelt Plateau trail, North of Parking Lot	
3/25/2009	Camping	1	No	1/4 mile up Silver Saddle Ridge	Ticketed for camping, warned for HCA permit, Transient, did not know about OTP program
5/31/2009	Hiker/Pedestrian	13	Yes	100 yards off Goshawk Trail	
6/8/2009	Photography	1	No	Only a few feet off Goshawk Trail	Only few feet off trail taking pictures on Goshawk Trail
6/8/2009	Hiker/Pedestrian	1	Yes	15 yards off Goshawk by Spring Brook	BCNA volunteer checking for birds and nest, Party 1 mentioned seeing fresh horse tracks on social trail by Spring Brook
6/8/2009	Hiker/Pedestrian	2	Yes	Burn area by bridge	Audubon volunteer checking bluebird boxes
6/24/2009	Hiker/Pedestrian	2	No	Approx. 1/2 way along the trail	Eating lunch ~ 20 ft off trail, Uncertain why didn't obtain permit;
6/24/2009	Photography	2	No	Approx. near Mickey Mouse trail	Taking photographs ~ 30 ft off trail, reason for not obtaining permit unknown
7/4/2009	Running	1	No	Goshawk	I met a man running on Goshawk; he admitted to running on 2-track - he thought sign on tree would be helpful
8/2/2009	Camping	2	No	South of 40 mile marker of Boulder Canyon	Issued summons for camping, warned about HCA
8/26/2009	Camping	1	No	100 Arapahoe	
8/28/2009	Camping	1	No	North side of Flagstaff	Summons issued for HCA and camping
9/3/2009	Camping	1	No	south of 40 mile mark	Summons issued for camping/HCA violation; Reasons for not obtaining permit unknown
9/19/2009	Camping	1	No	South of 40 mile mark of Boulder Canyon	Issued summons for 5-6--10 and 8-8-3 (Camping and HCA?). Reasons no permit not determined.

Map 1. Active HCAs, delineated in dark green with a red boundary.

