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Research Paper

How often are conservation developments managed for biodiversity protection? A case study in Colorado, USA

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ABSTRACT

Conservation Development (CD) is a strategy for conserving private lands with the potential to protect biodiversity while meeting growing demands for housing. Although CD is increasingly common, little is known about how CDs are implemented, and whether developers and homeowners follow best practices and achieve conservation objectives. We formally assessed the presence and content of management plans and conservation easements for CD subdivisions (n = 302) in six Colorado counties and documented the land uses and stewardship activities that are prohibited, permitted, encouraged, or required in the protected open space of each CD. We found that a majority (69%) of CDs had management documents on file, but their prevalence varied from 0 to 82% among the six counties. Fewer than one-third (29%) of the management documents stated a value or purpose for preserving the land, and objectives associated with human values (e.g., preservation of scenic or agricultural values), were far more prevalent (65–78% of documents with stated reasons for preservation) than objectives associated with conservation goals (e.g., preservation of wildlife, ecological/environmental values) (12–46%). Restrictions on land subdivision and regulation regarding the number and type of structures were most frequently included in management documents (84%), whereas guidelines for wildlife habitat improvement, species-specific monitoring and management, homeowner education, and access to the open space by domestic pets were rarely mentioned (all < 18%). By identifying common deficiencies in management documents, this study will help planners, developers, and homeowners more successfully implement CDs that effectively protect and maintain biodiversity on private lands over the long term.

1. Introduction

Effective preservation of private lands is a necessity for conservation; private and unprotected lands make up a majority of the world's land area and are disproportionately located in more ecologically diverse areas (Joppa & Pfaff, 2009; Knight, 1999). However, expanding housing needs and the desire to live, vacation, and retire near natural environments have resulted in the conversion of many private forests, grasslands, farms and ranchlands to residential development (Hansen et al., 2005). Effective tools for conservation on private lands are thus increasingly important for global biodiversity conservation (Norton, 2000).

Conservation development (CD) is a widely implemented private land conservation strategy that has potential to contribute substantially to the protection of private lands in countries around the world (Corcuera, Sepulveda, & Geisse, 2002; Langholz & Lassoie, 2001; Pejchar, Morgan, Caldwell, Palmer, & Daily, 2007). CD is an alternative to residential sprawl designed to decrease the negative environmental impacts of housing developments by clustering houses in a small portion of a property while preserving the remaining land as protected open space (Milder, 2007; Pejchar et al., 2007). CD has been in use for over four decades and occupies four million hectares of land in the United States, accounting for approximately one-fourth of private lands conservation (Milder & Clark, 2011). Although researchers are beginning to examine this strategy in more detail (e.g., Mockrin, Reed, Pejchar, & Salo, 2017), the overall contribution of CDs to private land conservation is poorly understood, and little research has assessed the degree to which CDs protect healthy and diverse ecosystems (Hostetler & Drake, 2009; Lenth, Knight, & Gilgert, 2006).

Long-term stewardship and effective management practices are critical for successful natural resource conservation in protected areas (Chape, Harrison, Spauling, & Lysenko, 2005; Hockings, 2003; Hockings, Stolton, & Dudley, 2004). Because CDs include both protected land and residential development, assessing and improving management practices in these subdivisions is especially important. Homeowner behaviors can negatively impact local plant and animal

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communities (Lerman, Turner, & Bang, 2012). For example, common practices in residential areas such as pruning shrubs and removing snags can decrease habitat for arthropods and cavity nesting birds (Faeth, Bang, & Saari, 2011; Mannan, Meslow, & Wight, 1980). Fertilizers and pesticides used on residential lawns can deposit excessive nutrients and toxins into local streams and water bodies (Hostetler & Drake, 2009), and plant communities altered by landscaping and gardening can also reduce the diversity and change the composition of species present in residential areas (Chamberlain, Cannon, & Toms, 2004; Lerman & Warren, 2011). Human behaviors in protected areas can cause significant disturbance to animals; recreation can increase wildlife flight and vigilance activities (George & Crooks, 2006; Mainini, Neuhaus, & Ingold, 1993; Ordeñana et al., 2010), and high levels of anthropogenic noise or light will decrease occurrence by certain species (Barber, Crooks, & Fristrup, 2010; Miller, 2006). Predation by domestic pets allowed to roam outdoors by homeowners (Clancy, Antony, Moore, & Bertone, 2003) can be extremely detrimental to local bird, reptile, and small mammal populations (Baker, Glynn, & Riegl, 2008).

Recent studies have pointed out the necessity of management plans and funding to support effective long-term open space stewardship in CDs (Hostetler, 2012; Hostetler & Drake, 2009; Hostetler, Allen, & Muerk, 2011; Pejchar et al., 2007; Reed, Hilty, & Theobald, 2014). Many CD residents are unaware of the many ways that human activities can diminish biodiversity, and they lack knowledge of effective strategies for open space management and environmentally sound land use (Youngentob & Hostetler, 2005). Without sufficient guidance for stewardship, residents could fail to act or engage in harmful practices in ways that undermine the CD's conservation objectives. Current guidelines for CD tend to focus on the design phase and neglect long-term stewardship of the protected land (Hostetler, 2012; Hostetler & Drake, 2009). For example, nearly three-quarters (72%) of CD ordinances in the western U.S. do not require a plan for protected land management (Reed et al., 2014). Several papers and books have used evidence from ecological research to provide suggestions to improve CD management for wildlife habitat conservation (Farr, Pejchar, & Reed, 2017; Hostetler, 2012; Hostetler & Drake, 2009; Milder, 2007; Pejchar et al., 2007). However, little is currently known about how often management plans and easements are implemented, and whether plans provide sufficient and ecologically sound guidance for residents.

In this study, we assessed the content of conservation easements and management plans for CD subdivisions in six Colorado counties. The content of these documents can provide valuable information about the land uses and human activities that could contribute to biodiversity conservation in CD open space. Our research questions were: 1) What proportion of CDs have management/stewardship documents?, 2) What are the stated reasons for preserving the open space?, and 3) Which stewardship activities and land use practices do these documents prohibit, permit, encourage, or require? By evaluating current guidelines for management, this research can help prioritize strategies to improve CD as an effective tool for conservation on private lands.

2. Methods

2.1. Data collection

We collected information from publicly available records for CDs in six Colorado counties in 2014: Boulder, Chaffee, Douglas, Larimer, Mesa, and Routt (Fig. 1). These counties contain 302 total CDs, which is the majority (86%) of the 352 CDs in the state (Hannum, Reed, Pejchar, Ex, & Laposa, 2012). For each CD, we recorded whether there was a document or plan on file that provided guidelines or regulations regarding stewardship of CD open space. We define stewardship as a holistic and directed approach to caring for a piece of land, which includes land uses and human activities, ecological restoration, revegetation, education initiatives, and management practices.

We used a set of detailed criteria to systematically review the content of each management document (Ordonez & Duinker, 2013; Reed et al., 2014) (Appendix A). We developed a list of stewardship activities and land uses that we expected to find in the management documents by referencing relevant literature that recommends guidelines for CD stewardship (Arendt, 1996; Hostetler, 2012; Hostetler & Drake, 2009; Lenth et al., 2006; Milder, 2007; Pejchar et al., 2007), and other literature regarding the content of land management plans (Ordonez & Duinker, 2013; Rissman et al., 2007; Wilhere, 2002). As we reviewed management documents, we added stewardship activities and land uses that appeared in the documents but were not included in our original list, and revisited previously reviewed documents to search for these items. For each stewardship activity and land use mentioned, we recorded whether the item was prohibited, permitted, encouraged, or required. We also noted whether the management documents included a stated value or purpose for preservation and/or stewardship of the open space.

The stewardship activities that we investigated were divided into three categories. The first, development and infrastructure, included the construction of new structures and buildings, fences, roads, and trails, and any rules regarding the maintenance or replacement of existing structures (Appendix A, 3a). The second, land use and activities, included human activities such as recreation, agriculture, grazing, mining, and other extractive land uses (Appendix A, 3b). When specified, we recorded whether land uses are restricted to take place during certain times of the year or to happen in certain areas. We also recorded any guidelines for how land uses are carried out in the protected space, including regulation for irrigation, pesticide, and herbicide use. The final category was habitat modification and management, which included access to the open space by people and domestic animals, and regulation for weed control, disturbance, monitoring, restoration activities, and mitigating human-wildlife conflict (Appendix A, 3c). In addition to recording specific stewardship activities and land uses that were permitted, required, encouraged, or prohibited, we also noted any additional recommendations regarding the implementation of those activities (e.g., reduce grazing during years of drought) (Appendix B).

2.2. Data analysis

We used a two sample *t*-test of proportions to determine whether the proportion of CDs with management documents differed between counties with CD ordinances that did or did not require a management document (Reed et al., 2014). We determined whether the document included a stated value or purpose for conserving the land, and we calculated the proportion of documents that included each stated value. We then analyzed the content of easements and management plans by calculating the proportion of documents that prohibited, permitted, encouraged, or required any items on the list of stewardship activities and land uses. We determined which activities were addressed most frequently to identify trends in the content of management documents and to identify stewardship activities that were lacking or rarely addressed.

3. Results

We obtained county record files for 296 CDs, or 98% of all of the CDs recorded in the six counties. Of the records that were unavailable, two files were withheld due to ongoing litigation and four were missing for unknown reasons.

A total of 214 CDs (69%) collectively had 256 documents on file that provided guidelines or regulations for stewardship of the protected open space: 158 conservation easements (52% of CDs), 75 habitat/land/outlot management/stewardship/use plans (25%), nine weed management/control plans (3%), six wildlife conservation/mitigation plans (2%), five forest management/stewardship plan (2%), two

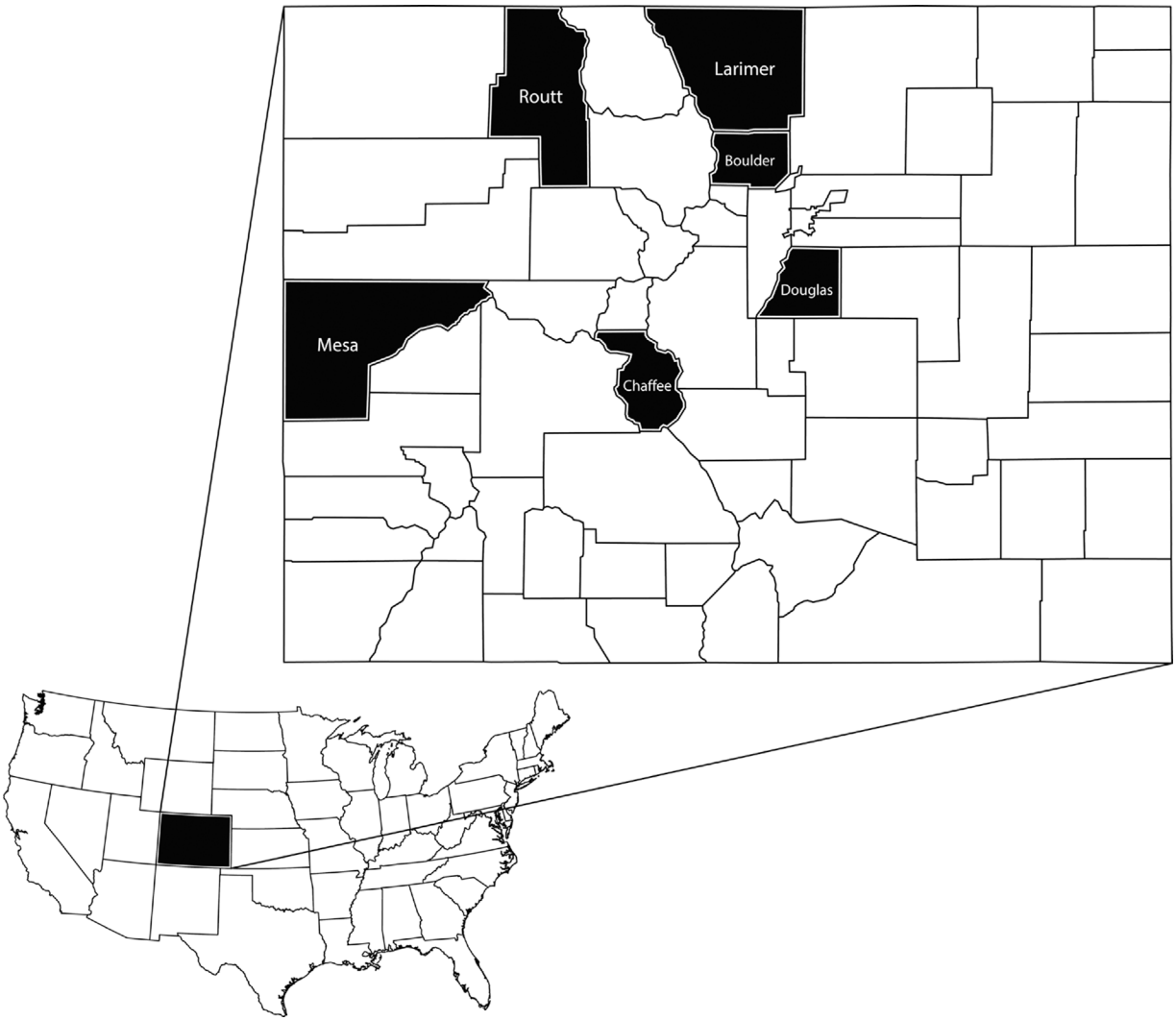

Fig. 1. Location of six counties within Colorado, USA, that were included in the analysis of CD management documents.

agricultural management plans (1%), two pasture management plans (1%), two homeowners association regulation/restrictions documents (1%), one archaeological easement (0.3%), one deed of development rights (0.3%), and one trail easement (0.3%).

Three of the six counties had ordinances that required a management plan or conservation easement (Boulder, Larimer, and Routt counties). The proportion of CDs with management documents differed widely among counties (range: 0–82%, mean = 45%), and counties with an ordinance that required a management plan or conservation easement had significantly higher proportions of CDs with management documents on file than those without requirements for management documents ($\chi^2 = 75.3$, $p < 0.001$).

3.1. Stated reason for preserving the open space

Fewer than one-third (29%) of the management documents included a stated reason for preservation or stewardship of the open space. Among documents that stated a conservation purpose, the majority of documents listed scenic/aesthetic values (78%), open space values (76%), and/or agricultural values (65%). Natural values (55%), ecological/environmental values (46%), and wildlife/wildlife habitat values (28%), and water resources (9%) were listed less frequently. Recreation, rural character, geological features, and flood control were all mentioned in fewer than 6% of these documents.

3.2. Development and infrastructure

The documents addressed a wide variety of stewardship activities and land uses, and wording that permitted or prohibited development or infrastructure in the open space was included most often (84% of documents) (Fig. 2). Development activities that were most often prohibited included subdivision (53%), residential structures in the preserved area (48%), and expansion of structures and pavement that exceeds 10 acres or 10% of the total area of the parcel (40%) (Fig. 2). Development activities that were most often permitted included building agricultural structures (51%) and building or repairing fences in the open space (26%) (Fig. 2). Several of the documents that permitted fences in the open space restricted the type of fencing allowed; one-quarter (25%) permitted fencing only when it was “wildlife-friendly” or did not inhibit the movement of wildlife through the property, and 18% only permitted fencing in certain areas, including the interior or exterior of the open space, or as protection around a wetland.

3.3. Land use and activities

A majority (61%) of the documents included regulations on 75 types of land uses and human activities in the open space (Fig. 3). Land use and activities that were most often prohibited include the storage or dumping of trash (21% of documents), livestock grazing/ranching

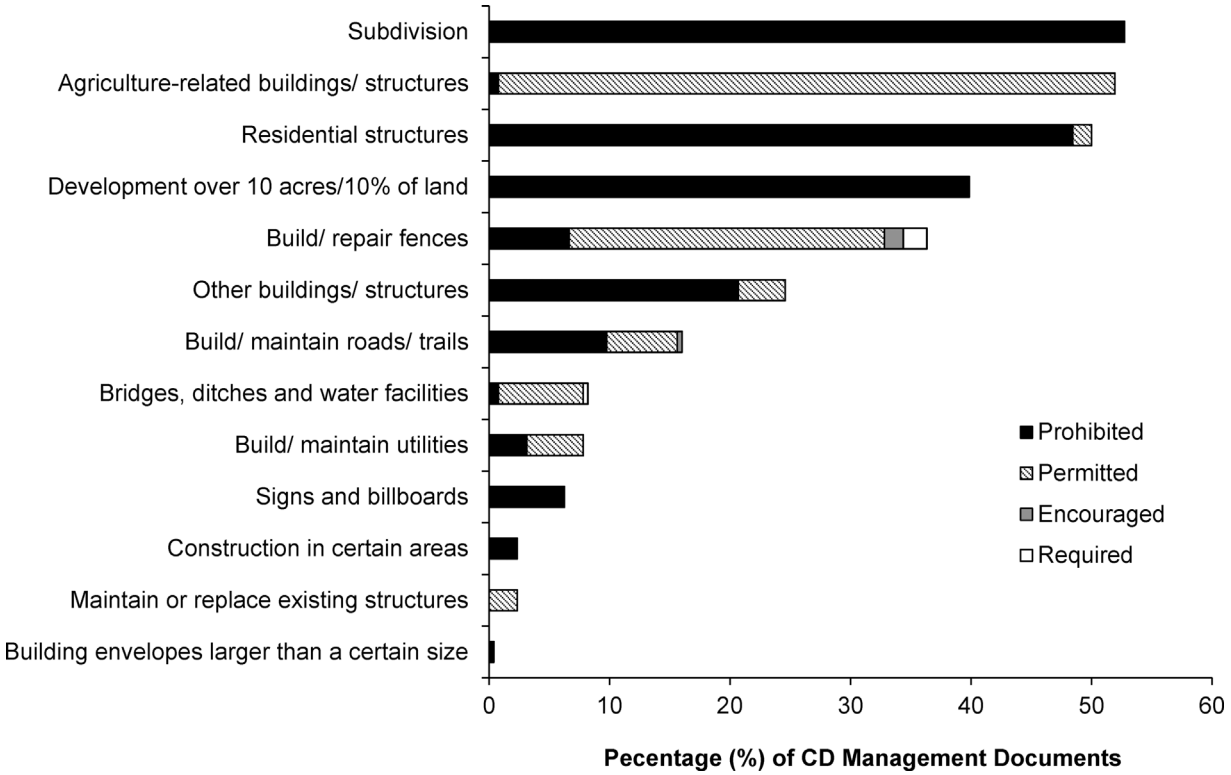

Fig. 2. CD management documents that prohibited, permitted, encouraged, or required actions associated with development and infrastructure.

(14%), public access (13%), and motorized/active recreation (12%) (Fig. 3). Land use and activities that were most often permitted include agricultural production (43%), livestock grazing/ranching (37%), and passive/low-impact recreation (20%) (Fig. 3). Of the documents that permitted livestock grazing, 30% limited the areas within the open space where grazing was permitted, 26% limited the number or type of species permitted in the open space, 23% required that grazing occur only when the open space vegetation was in a good condition, and 21%

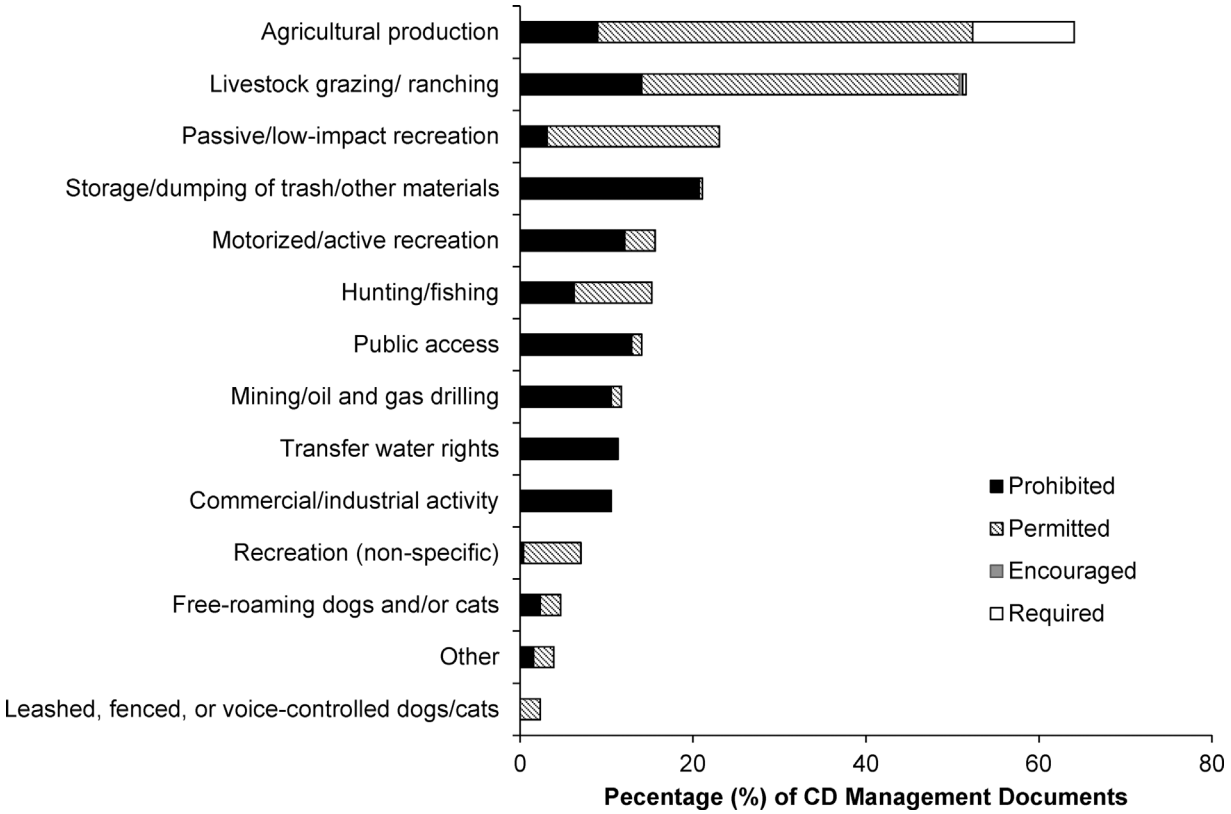

Fig. 3. CD management documents that prohibited, permitted, encouraged, or required actions associated with land use and activities.

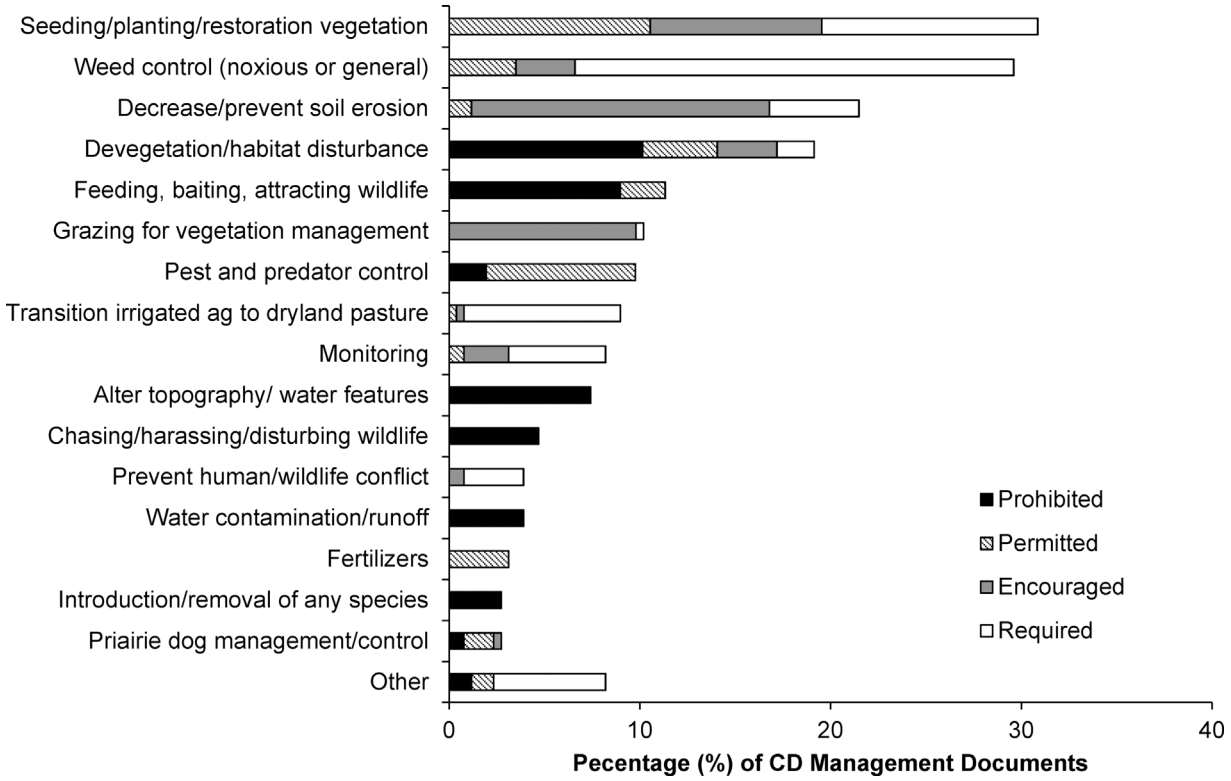

Fig. 4. CD management documents that prohibited, permitted, encouraged, or required actions associated with habitat modification and management.

required or encouraged rotational grazing or other sustainable grazing management. Most commonly, the documents that permitted passive, or non-motorized, recreation allowed activities such as hiking, horse riding, bicycling, and snowshoeing, and 30% of the documents restricted these activities to trails or certain areas of the open space.

3.4. Habitat modification and management

One-third (33%) of the management documents included regulations on habitat modification or management of open space, including provisions regarding vegetation management, monitoring and education, and wildlife habitat, disturbance, and human-wildlife conflict (Fig. 4). Habitat modification or management activities that were most often prohibited include devegetation or habitat disturbance (10% of documents), feeding, baiting, or attracting wildlife (9%), and altering the open space topography or water features (7%). Activities that were most often permitted, encouraged, or required include seeding, planting, or restoring vegetation (31%), weed control (30%), and decreasing or preventing soil erosion (21%) (Fig. 4).

4. Discussion

For CD to achieve its potential as an effective private land conservation strategy, developers and homeowners need to implement best practices during the CD subdivision's design, construction and stewardship phases (Hostetler & Drake, 2009). However, current recommendations to improve CD practice tend to focus on design, while long-term stewardship is neglected (Feinberg, Hostetler, Reed, Pienaar, & Pejchar, 2015; Hostetler, 2012; Hostetler & Drake, 2009). We found that nearly 70% of CDs in our study region had documents on file to guide stewardship, most frequently in counties with ordinances requiring such documents. Yet, more than two-thirds of these documents did not include a purpose for preserving, stewarding, or restoring the land. Documents that did cite a purpose most often listed scenic/aesthetic, open space, and agricultural values, rather than conservation of wildlife, ecosystems, or other natural resources. Comparing the content of management plans to published guidelines for effective biodiversity conservation in these types of developments can help illuminate major gaps between science and practice, and help guide effective land stewardship after CD open space is set aside to be preserved (Table 1).

Biodiversity and natural resource conservation is only one of many goals that motivate the implementation of CD subdivisions. In many cases, CDs are used to preserve agricultural production, cultural and archaeological resources, recreation, and aesthetic values for homeowners (McMahon & Pawlukiewicz, 2002). While it is often assumed that CD will benefit wildlife because housing is clustered and undeveloped land is preserved (Arendt, 1996; Theobald, Miller, & Hobbs, 1997), the other management goals and land-use practices of developers and landowners may result in CDs that contribute limited value to regional conservation (Austin & Kaplan, 2003; Lenth et al., 2006; Milder, 2007). The stated reasons for preserving the open space that were included in the management documents demonstrate that human uses and enjoyment are often prioritized over biodiversity conservation. Objectives associated with human uses, such as scenic and agricultural values, were far more prevalent than goals more closely linked to nature conservation, such as wildlife values or ecological/environmental values. Future research should focus on whether the stated reason for preserving the open space influences whether the open space is effectively managed to support conservation objectives.

Building and infrastructure development and land uses such as agriculture and grazing were included in a majority of the management documents, while few documents provided guidance on habitat management. The high frequency of regulations on development and land use is not surprising given that protecting land from intensive development is a basic goal of CD and a common requirement of CD ordinances (Pejchar et al., 2007; Reed et al., 2014; Rissman et al., 2007). In fact, the majority of management documents on file were conservation easements, which are specifically designed to limit development and/or restrict certain uses on a property (Boulder County Parks & Open Space, 2016). The content of these regulations has important implications for

Table 1
Current limitations of CD management plans and conservation easements (n = 256) and recommendations for adding or altering content to increase CD's potential to achieve wildlife conservation objectives.

Current limitations	Recommended improvements
●Agricultural production was permitted or required by more than half (55%) of management documents, but fewer than 25% limited its extent, regulated herbicide/pesticide use, or encouraged prevention of soil erosion	● Include specific regulations for agricultural activities that could impact water quality and soil erosion
●Fewer than one-third (< 30%) of the documents that permitted livestock grazing limited the number of animals or required sustainable grazing practices	● Provide best management practices for sustainable agriculture ● Specify the species and maximum number of animals that are permitted to graze the open space ● Encourage or require rotational grazing and other sustainable grazing practices ● Limit livestock access to ecologically sensitive areas in the open space
●Very few (11%) documents encouraged or required seeding, planting, or managing vegetation in the open space and only 5% encouraged the use of native plants when revegetating	● Require that the CD maintain native plant cover in the open space and restore or replant areas that have been disturbed ● Discourage landscaping or planting invasive exotic plants
●Very few (7%) documents mentioned habitat features that are important to wildlife, and some documents required removal of important features such as snags ●Very few (< 10%) documents mentioned domestic pets ●Education initiatives and consultation with experts were mentioned in only 2% of management documents	● List important habitat features that can benefit targeted wildlife, and include recommendations for preserving these features on the landscape ● Prohibit access to open space by free-roaming domestic pets ● Establish active education and outreach programs for residents ● Encourage or require consultation with local agencies and experts to provide advice regarding best practices for management
●Fewer than 10% of documents required long-term monitoring	● Require long-term monitoring of the open space and adaptive management to adjust to changing conditions
●Very few (2%) management plans included a description of how stewardship would be funded	● Clearly identify funding sources to ensure long-term support for stewardship activities

wildlife conservation; preserving a large proportion and contiguous area of CD from development increases habitat use by human-sensitive species (Farr et al., 2017; Lenth et al., 2006; Milder, 2007).

Although management documents often included information on permitted open space land uses, few provided regulations or guidelines to ensure that these uses are implemented in a way that avoids habitat degradation and achieves conservation goals. For example, of the management documents that permitted or required cultivated agriculture, only a few made recommendations that residents lessen the impacts of agriculture or use sustainable agricultural practices. Similarly, of the CDs permitting grazing, a small minority limited the areas where grazing was allowed, or encouraged sustainable grazing management. Agricultural land uses can provide habitat for many types of species (Pywell et al., 2012), and if managed correctly, livestock grazing can have a positive effect on plant and animal communities by acting as a form of disturbance that mimics the historic disturbance regimes of ecological systems originally reliant on bison grazing (Jones & Bock, 2002). However, soil erosion, water pollution, and habitat destruction associated with certain types of agricultural and grazing practice can seriously impact local plant and animal communities (Crosson & Ostrov, 1990; Foley et al., 2005; Freemark, 1995), and unregulated agriculture and grazing may limit the conservation effectiveness of CD.

Very few documents provided detailed information about vegetation management, monitoring and education, promoting wildlife habitat, decreasing disturbance to wildlife, and limiting human-wildlife conflict. However, these are common issues raised by researchers regarding how to improve CD management for wildlife habitat conservation (Farr et al., 2017; Hostetler, 2012; Hostetler & Drake, 2009; Milder, 2007; Pejchar et al., 2007). For example, the composition and structure of open space plant communities are among the most important factors that influence the conservation value of CDs (Farr et al., 2017; Hostetler & Drake, 2009; Lenth et al., 2006), but the management plans we examined rarely mentioned open space vegetation, and the prescriptions were often limited in scope. The preservation of certain habitat features, such as snags, shrubs, and wetland marshes, can also provide important roosting and nesting structures for many birds and mammals (Ehrlich, Dobkin, & Wheye, 1988). However, these features were rarely mentioned in management plans, and recommendations were disparate when they were included. For example, equal numbers of plans required that snags be removed and recommended that snags be maintained. CD management documents also rarely restricted resident and pet access to the open space, despite evidence that disturbance by humans and their pets can negatively impact wildlife communities (Baker, Bentley, Ansell, & Harris, 2005; Beckerman, Boots, & Gaston, 2007; Crooks & Soule, 1999; Odell & Knight, 2001).

5. Conclusions

Our study identifies the current strengths and weaknesses in the documents that guide stewardship of CD subdivisions in Colorado, USA. Including requirements for a long-term management plan in CD ordinances is an important first step to encourage long-term stewardship. However, even where they are required, management plans will fall short of achieving biodiversity conservation objectives unless they include critical guidelines and regulations that address important conservation issues, enforcement of plan implementation, and resources to support stewardship activities (Table 1). An important next step is to determine whether CDs are more effective at achieving conservation objectives if management documents are present, and if conservation outcomes are improved when management documents reflect best practices. Although management documents provide insight into possible land uses and stewardship activities that may take place in a CD, they may not fully reflect actual stewardship activities or land conditions on the ground. In addition, management plans may fall short of achieving biodiversity conservation objectives if they lack enforcement of plan implementation and resources to support stewardship activities (Table 1). Land-use goals will vary depending on social, economic, and biophysical factors, thus management plans must be context-dependent to provide quality habitat for wildlife communities. If the values, goals, and management of CDs currently neglect or impede conservation objectives, adding this content to management plans may help CD achieve its potential as an effective tool for private lands conservation.

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Douglass County, and Chaffee County for help obtaining county records. Funding for this project was provided by the School of Global Environmental Sustainability, the Warner College of Natural Resources, and the United States Forest Service.

Appendix A

The systematic content analysis used to determine the presence or absence of a list of land uses and stewardship activities in management plans or easement documents for CDs in six Colorado counties.

I. Document Overview:

1. Name:
2. Type:

- Easement
- Management plan
- Other [specify]

3. Date CD established:

II. Document Content:

1. Stated Reason for Preserving the Open Space: Is there a stated reason for preserving the land, or value of the land for conservation? [Yes/No]

a. If yes, what is the stated value?

- Scenic
- Wildlife habitat
- Open Space
- Other [specify]

2. Which of the following elements are required to be included in the document? (Select all that apply.)

- Establishment of funding source
- Staffing needs
- Monitoring of conservation targets
- Management of conservation targets
- External approval or review of management plan
- External enforcement of management plan
- Other [specify]

3. Which of the following land uses or activities are mentioned in the document? If mentioned, indicated whether they are prohibited, permitted, encouraged, or required in the CD. Note any specific requirements, seasonal restrictions, or other details about the activity or land use. (i.e. For each item, indicate: [Mentioned/Not mentioned] and [Prohibited/Permitted/Encouraged/Required/] [seasonal restrictions/additional details/requirements]) (see Appendix B).

A. Development and Infrastructure

- Additional buildings and structures
- Roads
- Parking lots
- Golf courses
- Subdivision
- New utilities
- Fences
- Leases or other agreements
- Feedlots
- Tennis courts
- Swimming facilities
- Athletic fields
- Helicopter pads
- Airstrips
- Trenches
- Storm Drainage Improvements

B. Land Use and Activities

- Agriculture
- Grazing
- Timber harvest
- Non-commercial use
- Commercial recreational uses
- Haying

- Commercial or Industrial activity
- Mining
- Dumping of trash
- Storage of vehicles and equipment
- Storage of agricultural products
- Sod farming
- Non-motorized recreation
- Motorized recreation
- Non-consumptive recreation
- Hunting
- Training hunting dogs
- Activities that negatively impact threatened or endangered species
- Off-road Travel
- Discharge of Firearms
- Paintball

C. Habitat Modification and Management

- Access by residents
- Access by public
- Pets
- Range Management
- Soil Conservation
- Weed control
- Pest species control
- Control of exotic species
- Control of invasive
- Prevention of overgrazing
- Alteration of water features
- Use of fertilizers
- Use of pesticides
- Use of herbicides
- Fire protection
- Prescribed fire
- Habitat restoration
- Native species vegetation
- Supplemental feeding
- Stream bank stabilization
- Erosion control
- Snag removal
- Stream restoration
- Noise restrictions
- Homeowner education

D. Other [Specify]

Appendix B

See Table B1.

Table B1
Specific recommendations included in management documents regarding land use, preservation of resources, and other stewardship activities in 214 conservation development (CD) subdivisions in Colorado, USA.

Activity/Resource	Recommendation	# of CDs
Grazing	Prevent/avoid overgrazing	6
	Monitor vegetation and adjust stocking rates	2
	Reduced stocking/grazing during years of drought	2
	Livestock kept out of water bodies	1
	Avoid devegetation/disturbance	1
	Graze or mow grass in lots to keep height below 7 inches	1
	Minimum rest period 45-days April 15-June 15, 90 days June 15-October 15	1

(continued on next page)

Table B1 *(continued)*

Activity/Resource	Recommendation	# of CDs
	Exclosures for grazing	1
	Supplemental winter feeding for livestock	1
	Wetlands can be grazed, but should remain undisturbed	1
Non-native Species	Avoid introducing non-native species	6
	Remove dwarf mistletoe, prune slightly infected trees	3
	Decrease population of Knapweed	2
	Use combination of methods to combat weeds	2
	Control cattails	1
	Mow, maintain grass to lessen dependence on chemicals for weed control	1
	Eradicate Canadian thistle	1
	Remove Russian Olive trees around wetland area	1
	Avoid introduction/removal of any new species	1
Agriculture	Minimize disturbance	2
	Maintain soil fertility	1
	Minimize impacts of agriculture on residents	1
	Rotate crops and pasture grasses	1
	Don't cut plants at immature stage	1
	Reduce use of commercial fertilizers, pesticides, and herbicides	1
	Vegetative assessment before irrigation water permanently removed	1
Water Resources	Avoid degradation/development of riparian area	8
	Keep foreign debris from collecting in riparian areas	3
	Change drainage to have small shallow pools and wetlands	1
	Construct and maintain drainage in receptor ditch	1
	Reduce water loss	1
	Increase wildlife around ponds/wetlands	1
	Set aside areas for wildlife/wetland	1
Forests	Protect young aspen with fencing	1
	Land management consistent with the historic recreational and forestry uses	1
	Burn slash piles	1
	Maintain snags	1
Disturbances	No alteration of structures with historical significance	3
	Remove excess earth/rocks, tailings from construction, maintenance, repair	2
	Prevent changes to ridgelines	1
	Reasonable steps to prevent third parties from disturbing area	1
Wildlife conflict	Traffic regulations to limit potential collisions with wildlife	3
	Outdoor storage of garbage in bear-proof containers	2
	Minimize potential for elk-human conflict	1
Wildfire	Natural landscaping to reduce wildfire threat	1
	Put in a fuel break	1
Homeowner Education	Educate homeowners to appreciate and maintain existing vegetation	1

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