Clark Ranch Report

Purpose Statement

The Clark Ranch conservation resources inventory is a preliminary analysis of the natural features, ecological condition, unique character and current conditions found on the property known as the Clark Ranch. The inventory includes consideration of and analysis provided to Utah Open Lands by the Park City Citizen's Open Space Advisory Committee. Recommendations found within the report are preliminary.

The analysis of future uses, goals and management of the property is limited and intended to be used as a tool to evaluate the impacts, significance and benefits of future uses. The resource inventory is not intended to make determinations for the eventual uses defined by the conservation easement nor does this inventory serve as a baseline documentation necessary to accompany an eventual conservation easement granted on this property. The resource inventory is a cursory guide to aid the Park City Council on the appropriate reserved rights and prohibited uses to be contemplated in any eventual conservation easement document.

CLARK RANCH
CONSERVATION RESOURCES INVENTORY

Compiled April through December 2015

Prepared by

Utah Open Lands Conservation Association

with

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Notes about this inventory:

- This document was created by the Utah Open Lands Team including Wendy Fisher - Executive Director, Russell Milholland - Stewardship Director, and Julia Pace - Conservation Program Associate in collaboration with Arthur Morris Ph.D., Marc Coles-Ritchie Ph.D., and Mindy Wheeler M.S.
- This inventory is intended to inform the baseline documentation, management plan and conservation easement for the Clark Ranch conservation project. It does not replace the baseline documentation but instead is a supplement provided to inform decision making and provide reference for both the baseline documentation and management plan
- All photos are from Clark Ranch, taken by the authors unless otherwise noted.
- "Photopoint" numbers refer to locations on the map in Fig. 23 in Appendix 1.
- Common names are used for plants and animals. Scientific names for plants can be seen in Appendix 2. For animal species, the scientific names are included in the text.

INTRODUCTION

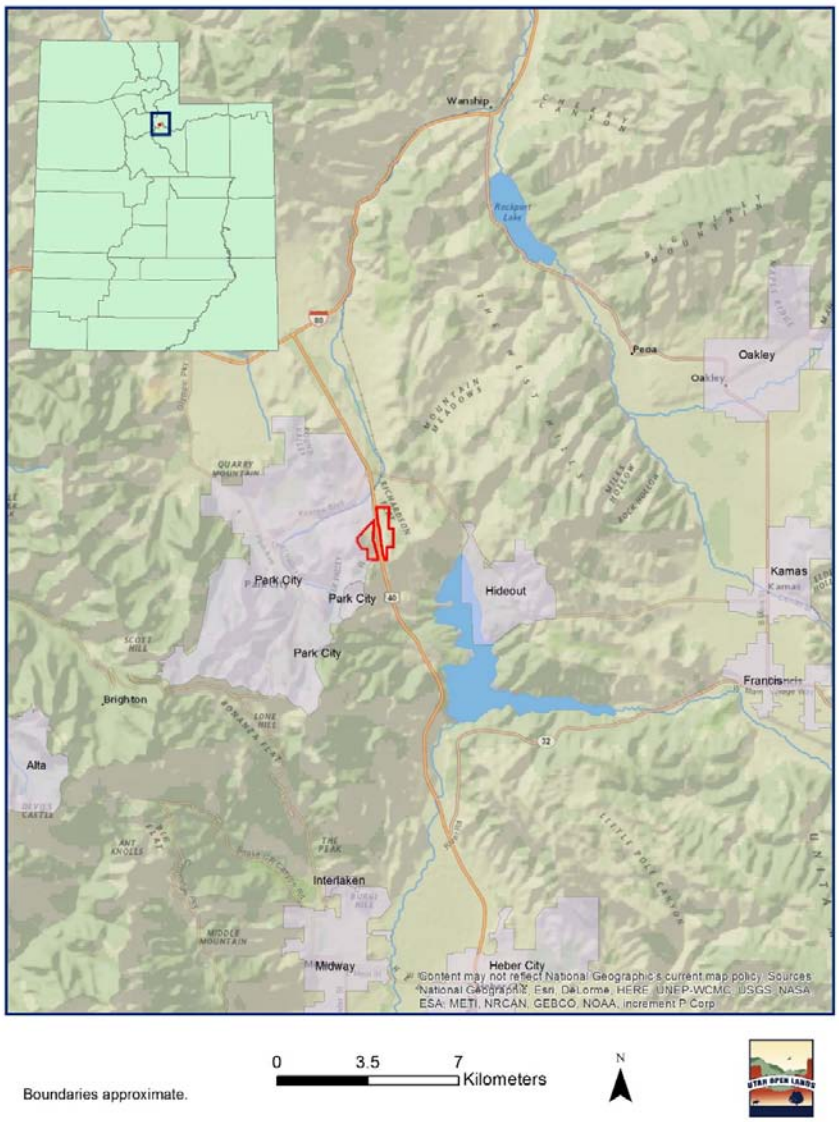


Figure 1. Locator map for the Clark Ranch Property, which is near Park City in Summit County, Utah.

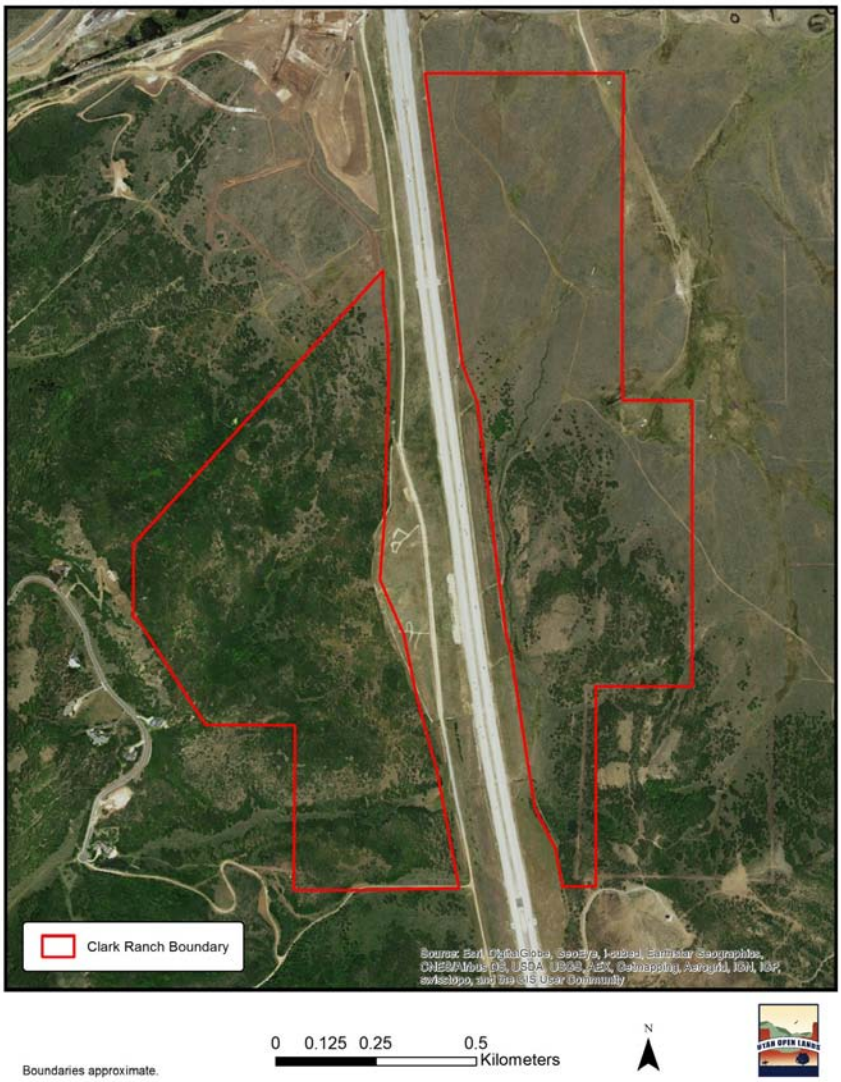


Figure 2: Orthophoto of Clark Ranch Property. Project boundaries in this and other maps are approximate and were copied from the Summit County Parcel GIS layer (SGID10_CADASTRE_Parcels_Summit).

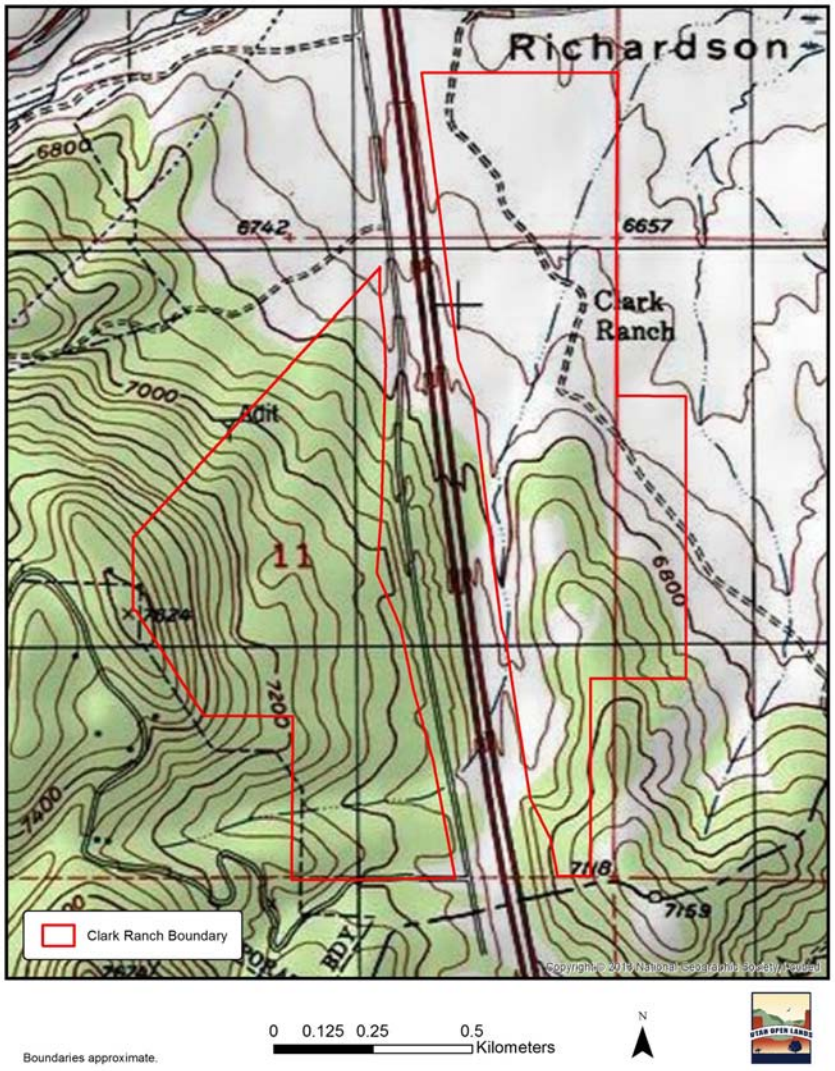


Figure 3: Topographic map of Clark Ranch Property.

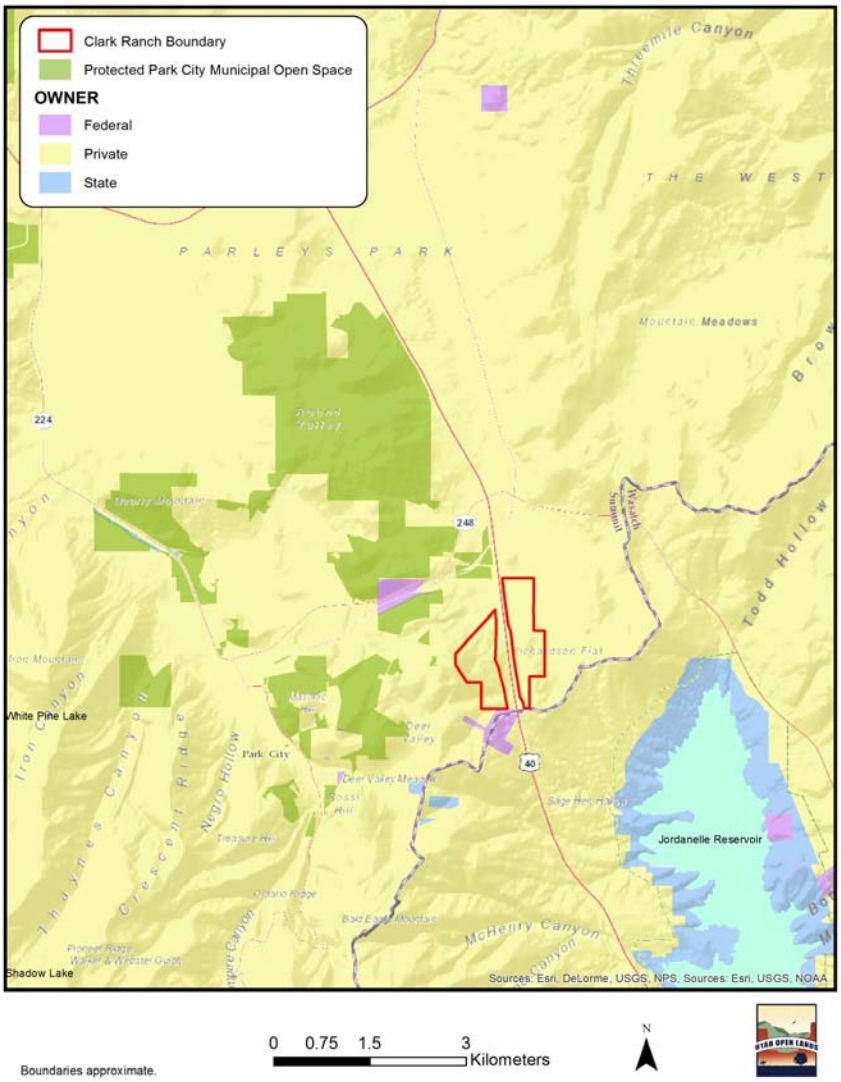


Figure 4: Map of public and private property ownership in the area of the Clark Ranch Property, as well as nearby dedicated open space and conservation easements. Federal land just to the south of the Property is owned by the Bureau of Land Management (LandOwnership GIS data from AGRC; accessed 6 Jul 2015).

PROPERTY DESCRIPTION

The open space described in this inventory commonly referred to as Clark Ranch (hereafter also referred to as "the Property") is approximately 350 acres of open land in the Upper Weber River drainage, Summit County, Utah. It is located in a portion of Sections 2, 11, 12 and 14 of Township 2S Range 4E, Salt Lake base and meridian. The exact parcel description will be recorded in the Deed of Conservation Easement and includes tax parcels SS-91-X, SS-121-X, PP-26-X and PP-26-A-1-AX. The Property covers both sides of U.S. Route 40 in the Quinn's Junction entry corridor approximately .75 miles south of Exit 4 for Park City/Kamas.

The Property is divided longitudinally by U.S. Route 40 and thus fundamentally split into two management units: East Parcel and West Parcel. Although some management objectives such as noxious weed control easily bridge both Parcels, others such as access, recreation, grazing and scenery management require examining each management unit in its own unique context.

Ownership

The Property is owned by Park City Municipal Corporation and managed by the PCMC Sustainability Department.

Access

Access to the Property is currently from a frontage road along Highway 40 on the West Parcel of the highway, or from Richardson Flat Road on the East Parcel of the Property. Several informal dirt roads exist on the eastern portion of the Property that appear to have been used for agricultural purposes. There is also a dirt road on the West Parcel that narrows to a trail. Several informal trails are found on the western portion of the Property and are currently used by the public to access the Property.

Adjacent Land

Most surrounding land is privately owned. Sixty-eight acres of Federal Land managed by the Bureau of Land Management abuts the West Parcelto the south (Fig 3). West and north of the West Unit are the Morning Star Estates and Park City Heights (currently under construction) housing developments. North and east of the East Unit is approximately 550 acres United Park City Mining Property which holds development restrictions. A portion of this property is known as the Richardson Flat Tailing site, is a contaminated superfund site. The remaining property east and south of the East Unit is privately owned and is leased together with Clark Ranch as part of the Mayflower grazing area.

Existing Encumbrances

Both the East and West Unitsof Clark Ranch have been leased for many years by Gillmor Livestockfor grazing. It is intended for the lease on the East Unit to be continued while the West Unit will most likely be discontinued due in part to proximity to development.

There are additional right-of-way agreements through the Property on old roads. At this point, the extent of these encumbrances is unknown, most of which are used primarily by the grazing operators.

There are no other known encumbrances on the Property.

Existing Structures

The remnants of the Clark family dairy operation occur on the Property, although the structures have been removed. What remains are several concrete pads, and occasional debris. Livestock fencing occurs on the East Parcel Property, which closes off an approximately 60 acre pasture from the Mayflower grazing area. Wildlife fencing follows the Highway 40 corridor for the length of the Property on both sides, although the fence on the West Parcel is located between the Highway and frontage road on UDOT property.

HISTORICAL CONTEXT

Use of the area by Native Americans occurred, but no documentation has been found specifically for the Property. Nearby areas were settled by early pioneers in the late 1800's. Grazing of livestock such as cattle, sheep, and horses began around that time, and is thought to have occurred on the Property more or less continuously since then.

The Property used to be operated as a dairy farm by the Clark Family during mining boom in Park City, although it is generally assumed that no part of the Property has been irrigated for agricultural production. Clark Ranch was purchased by the Gillmor family in the 1940's and has been used since primarily as open range for the grazing of sheep and cattle. In response to recent human and livestock use, plant and wildlife communities have been altered somewhat from their native state. Non-native grasses are found in many areas on the Property, either due to purposeful planting across the Property sometime in the past, or as a result of dispersal from other areas.

Mining was very common in Greater Park City from the middle of the 19th to the middle of the 20th century. It is likely that prospecting occurred on the hillsides although there is no record of any mines located on the Property. Heavy metals associated with this mining history have been found on the Property. It is theorized that the traces of lead found on the Property are the result of livestock watering in Silver creek and carrying deposited mine tailings in their hoofs as they traveled back to graze the property. Concentrations under this theory would be more concentrated in the vicinity of the original location of the dairy barn.

HAZARDOUS AND TOXIC MATERIALS

A Phase 1 Environmental Site Assessment (ESA) was conducted for the Property by Kleinfelder during the spring of 2015. The full report is on file at both Park City Municipal and Utah Open

Lands, and the following is a direct quote of the Recognized Environmental Conditions (REC's) identified in the Executive Summary of the ESA:

- *The Site is located directly south of the Richardson Flats Tailings facility; therefore, soils on the Site may have become impacted by air-transported concentrations of heavy metals.*
- *The Site contained two concrete pads that are reportedly associated with a former dairy farm operation. Concentrated debris including glass and steel drums were observed in a garbage pit and within the drainage leading to the northeast. Additionally, a groundwater well was observed near the concrete pads. This area is considered an REC due to potential impacts from burned and buried debris in the garbage pit and potential impacts to groundwater through the groundwater well.*
- *Lead impacted soils were identified at concentrations above EPA established clean-up levels in soil at the Site. The identified soil impacts may be associated with impacted water diverted from the irrigation canal identified within the Park City Heights VCP or from air-transmitted deposits from the Richardson Flat tailings or activities related to the concrete pads located on the Site.*

The ESA recommends proper investigation and classification of soils suspected to be impacted by heavy metals before any disturbance or development occurs on the Property. Additionally, education of the public about the environmental conditions of the Property may be necessary. For additional information regarding the identified REC's and recommendations therein, the full ESA should be consulted.

CONSERVATION VALUES

The Property providesopen space worthy of conservation for a variety of reasons.Utah Open Landsrecognizes theconservation valueof a projectas informed by the Conservation Purposes listed in U.S. Internal Revenue Code § 170(h)(4)(a). The code states: "for purposes of this subsection, the term **'conservation purposes'** means – **(i)** the preservation of land areas for outdoor recreation by, or the education of, the general public, **(ii)** the protection of a relatively natural habitat of fish, wildlife, or plants, or similar ecosystem, **(iii)** the preservation of open space (including farmland and forest land) where such preservation is – **(I)** for the scenic enjoyment of the general public, or **(II)** pursuant to a clearly delineated Federal, State, or local governmental conservation policy, and will yield a significant public benefit, or **(iv)** the preservation of a historically important land area or a certified historic structure."

The Clark Ranch Property provides the following Conservation Values:

OPEN SPACE - SCENIC

The expansive and unbroken views of the Property from Highway 40 are of high value, and increasingly so because of the current development pressures along the route. The property has a high degree of visual vulnerability due to the vegetative structure which is mainly a sage-brush steppe environment with low-lying vegetation and topography which has little variation making alterations to the land and specifically structures highly visible. The Park City planning goals have long included the preservation of the City's entry corridors. These corridors serve to provide a sense of place and provide distinction for the mountain resort character. Clark Ranch sits on a prominent entry corridor into the community thus increasing the scenic value of the property within the stated goals of the community. Highway 40 is travelled by thousands of individuals on a daily basis and Clark Ranch is easily viewed by those traveling both North and South on the highway. For a more in-depth analysis of the Scenic value refer to the Scenic Inventory section.

NATURAL HABITAT OF WILDLIFE AND PLANTS

The Property contains relatively natural and highly functioning ecosystem including components of several biotic communities native to the area, including Northern Oak, Shrubsteppe (sagebrush/grassland), Aspen Forest, Mountain Shrub, Wetland and Wet Meadow. Wetlands are listed by the Utah Division of Wildlife Resources, Comprehensive Wildlife Conservation Strategy (CWCS) and Utah Partners in Flight Avian Conservation Strategy as highest priority habitats for wildlife and birds in Utah.Shrubsteppe, mountain shrub, and wet meadow habitats are also listed as priorities for conservation in Utah.

The Property is crucial value habitat for mule deer. Mule deer are currently a priority species for conservation in Utah (CWCS) in part because of habitat loss and degradation. Conservation of high-value habitat is important for the species. The Property is also part of the seasonal migratory pathway for mule deer as deer need to move to higher and lower elevations depending upon the

season as well as to find water (see Fig. 19). The Property is also crucial value habitat for elk and moose and is included in the range known to be occupied by greater sage grouse in recent years (see Figs. 20, 21 and 22).

The following additional wildlife species of particular interest for conservation have been documented in the general area of the Property: ferruginous hawk, smooth greensnake, western toad, Lewis' woodpecker, bobolink, and Columbia spotted frog (UDWR data are mapped by topographic quad). Incidental use of the Property by these species is possible, however no known threatened, endangered, or sensitive species of plants or animals were noted on the Property during this survey.

OUTDOOR RECREATION AND EDUCATION

Currently, the Property does not include any formal recreation or education opportunities, however its proximity to the Park City Municipal multi-use trail system and existing neighborhoods and developments provides significant potential for outdoor recreation. An old informal multi-use trail crosses the hillside on the West Parcel of the Property, which is maintained by community members and used occasionally for mountain biking, hiking and trail running. Additionally, old road beds and game trails are occasionally used for hiking, wildlife viewing and dog walking by local residents. The relatively intact ecosystem and proximity of the property to the Park City schoolsand community provides for casual or formal education opportunities on the Property.

OPEN SPACE - AGRICULTURAL

Agricultural production has been an important component of Clark Ranch for multiple generations. The protection of rangeland for agriculture is recognized by the State of Utah as a conservation value through the Utah Farmland Assessment Act. The grazing of sheep and cattle has occurred on the Property in recent years, and it is understood that the Property will continue grazing activities into the future. Forage on the Property includes a variety of native shrubs, grasses, and forbs. Permanent surface water source (spring) exist on the East Parcel of the Property (Figs. 11 and 12).

OPEN SPACE - COMMUNITY VALUE

The Park City Community has placed a significant value on the preservation of open space as part of the quality of life residents enjoy. Open Space bonds have been passed numerous times with a majority of support from residents and provided the primary source of funding for the Clark Ranch project. Open space is valued for multiple reasons including the ability to control and limit growth and development. Protecting open entry space corridors, limiting unfettered growth and ensuring the integrity its natural setting are all designated community value in existing City masterplans.

THREATS TO CONSERVATION VALUES

Damage to the conservation values may result from the threats described below. Details about how to manage the Property to prevent damage from these threats are provided in the Management Plan.

Improper Maintenance: While maintenance of the Property is necessary to keep it clean, attractive and safe, some maintenance decisions could also degrade Conservation Values of the Property.For example, improperor no control of noxious weeds could change plant communities in an undesirable mannerand/or harm wildlife.Additionally, inappropriately relaxed monitoring and enforcement of necessary restrictions may result in unsafe and unsightly conditions.

Invasive Species: Invasive plants and animals pose threats to the ecological integrity of the natural area.Effective management should encourage a diversity of healthy native plant and animal species.Consistent control of scattered populations of invasive plants will be necessary to prevent further establishment and extent of invasive plant populations on the Property.Control of invasive species on the Property should be a priority.

Habitat Loss, Fragmentation or Degradation:Habitat loss, fragmentation or degradation is likely the highest threat to all species on the Property. Plants and animals maintain ecological function and structure through their interactions.Considerations for potential habitat alterations (including ecological restoration) should include habitat requirements for listed priority species, as well as other vulnerable species, such as nesting raptors and neotropical migrant birds. Further, emphasis should be placed on conservingkey habitats for wildlife in the area, including wetlands, wet meadows, mountain shrub, shrubsteppe and aspen forest.Healthy ecosystems typically contain a shifting mosaic of habitat patches through natural disturbances such as fire, disease outbreaks, and animal population ebbs and flows among other natural cycles.However, habitat fragmentation (i.e., breaking of habitat patches into smaller parts) artificially by roads, trails, usage patterns, or structures that present unnatural obstacles to wildlife movement is a form of habitat degradation.Additional protection of adjacent open space is highly recommended to ensure a healthy and connected ecosystem on the property.

Improper pest control: Some plants and animals on the Property may be undesirable; however, attempts to control these undesirable species introduce the potential for harm to the Conservation Values of the Property.Some organisms may simply be perceived as pests, while actually presenting little or no threat and great benefits (bats for example).Many wild animals have the potential to present problems for humans (for example, coyotes, deer, mountain lions, wasps, mosquitoes), but solving these issuesshould nottarget complete local eradication of the wild animals.Outreach may be important to create a cultural climate that accepts or appropriately manages interactions with wild animals.

Feral and loose domestic cats and dogs: Feral and loose domestic cats present predation threats to wild animals including small mammals and birds. A recent study suggested that free-ranging

cats are responsible for the deaths of high numbers of birds and small mammals in the United States (Loss et al. 2013); however, these threats are probably restricted when larger predators such as coyotes are present (Kays et al. 2015).Domestic dogs may pose threats to the Conservation Values of the Property, particularly if dogs are allowed to roam freely and/or are aggressive toward wild animals. Unless provided for in the Conservation Easement through an off-leash dog area, pet owners should comply with City and County laws. In addition to threats from the domestic animals to the ecosystem, loose cats and dogs in the natural area face threats themselves such as exposure to wild animals, disease, parasites, and possibly the ingestion of poisonous or harmful plants or animals.

Inappropriate Trails: Trails serve valuable purposes socially and can be ecologically beneficial by focusing use and helping to ensure appropriate movement of people through landscapes.Trails can also be indirectly beneficial to wildlife and plants by helping people to experience and learn about and feel affection for nature and special places.However, some kinds of trails or trail uses have potential to degrade wildlife habitat, introduce invasive species ordisturb scenic integrity.Trails should be well-designed and maintained to prevent damage to the natural areas, especially the wet areas, the bench on the western hillside, and aspen forests.

Improper Grazing Practices: It is possible that some grazing practices could harm the stated Conservation Values.Improper grazing practices are listed by the UDWR as primary threats to mountain shrub, wet meadow, shrubsteppe, and other habitats like those found on the Property (Sutter et al. 2005).Grazing in many areas has been associated with habitat and natural-systems degradation (Fleischner 1994).Excessive clearing and trampling of riparian areas is a potential threat to wildlife values on the Property, even if it only occurs in some places.Harm to the Conservation Values would likely result from traditionally managed livestock grazing in which livestock is allowed to graze at will within the boundaries of a property for long periods of time.A goal of a grazing management plan should be to seek maintain abundant, diverse vegetation and wildlife and other Conservation Values.

Improper Fire and Fire Suppression: Although fire is a natural occurrence in the ecosystem of the Property, uncontrolled fire on the Property can now threaten the safety of people and nearby structures.Removal of wood from the Property can degrade ecological processes, particularly if the removal is widespread and or involves removal of valuable large wood habitat.

Predator Eradication:Predators are valuable to ecosystems historically and currently. For example, predators help to keep populations of herbivores in check, which can benefit native plant communities. In addition, the presence of relatively large predators, such as coyotes, has been found to limit the detrimental effects of smaller, non-native predators such as feral cats (Kays et al. 2015). A general predator eradication program for the Property is not recommended. If individual predators become problems, appropriate removal or deterrence strategies will need to be considered.

Dumping/Storage: Dumping, storing, or disposing of materials on the Property has the potential to introduce harmful or toxic materials onto the Property.Dumping of any materials can set a

precedent of using the Property for disposal purposes.Therefore, no materials should be dumped, stored, or disposed of on the Property.

Climate Change: Large-scale climate change may affect the environment local to the Property.If predicted temperature increases of a few degrees occur, native organisms on the Property will respond both to higher temperatures and side effects such as increased drought or invasion by other plants and animals.Therefore, stewardship of the Property would do well to emphasize conservation of water resources including wetlands and wet meadows, and encourage a variety of native species to help bolster ecosystem resilience and adaptability (see climate data in "Climate" section).

SCENIC INVENTORY

Due to Clark Ranch's unique location along a main entry corridor to Greater Park City, the Scenic quality of the Property is identified as a key conservation value. As elaborated in the Open Space inventory, recommendations from the Park City Citizens Open Space Advisory Committee identified this entry corridor value as a key value for conservation under the *Aesthetics*portion of matrix. Additional conservation values under the matrix include: *Recreation*, *Critical Conservation* and *Community Character*. Priorities associated with the *Aesthetics* value include: protect resort and open view sheds, Greater Park City entry corridor, preserves open space buffers against new development encroachment, prevention of new residential or commercial construction.

Council Goals

1. World Class Multi-Seasonal Resort Destination
2. Preserving &Enhancing Natural Environment
3. An Inclusive Community of Economic & Cultural Opportunities, Responsive
4. Cutting Edge and Effective Government

	Categories (Purpose)	*Recreational*	*Aesthetics*	*Critical Conservation*	*Community Character*
Tier I	***Will the open space purchase advance and/or protect stated goals in the Park City General Plan and specifically add/or enhance one or more of the following four primary purposes?***				
Tier II	**Values and Priorities (Intent/Unweighted)** ***The following sections are intended to narrow the prioritization of allowed uses and preserved values which may further enable COSAC to identify funding sources and the appropriate protection tool.***	• Improves trail connectivity and new trail development. • Acquisition needed for public access; • Passive recreation higher priority (Passive/Non-motorized activities on established trails; related trail infrastructure, parking); • Active recreation (includes improved fields, parks, facilities, group camping, restrooms); • multiple public uses permitted	• Protect resort and open view sheds; • Greater Park City Area entry corridor; • preserves open space buffers against new development encroachment • Prevention of new residential or commercial construction- land may or may not have specific additional conservation values	• Protection of the natural habitat of fish, wildlife or plants; • Enhances stream corridor or watershed; • Protects wetlands; • Existing natural characteristics and conservation values essentially preserved as is and primary over other uses	• The preservation of open space in conjunction with agriculture, farmland and forestland, or the preservation of historically important land or a historic structure. Appropriate support related infrastructure. • Preservation is for the scenic enjoyment of the general public, which will yield a significant public benefit; may include mines, mine structures or repositories provided open character of land is maintained and environmental issues mitigated; secondary uses partitioned

Figure 5. COSAC Matrix for the Clark Ranch Project.

Key Observation Points

The primary public observation area for Clark Ranch is U.S. Route 40, which bisects the Property longitudinally from north to south. U.S. Route 40 (also referred to in this document as Highway 40 or the Highway) is a federal highway which travels from Silver Summit Junction to Heber City,

and onward to Denver, CO and the eastern United States. Highway 40 is a four-lane divided freeway as it crosses through the property and it is traveled by many tourists and commuters on their way into and out of Greater Park City.

In addition to traveling through the property on Highway 40, Quinn's Junction (the intersection between Highway 40 and State Route 248) is a key observation point as it is a primary entry point for much of the workforce of Park City traveling from Heber City or Snyderville Basin on Highway 40 or from the Kamas/Oakley area on 248. Quinn's Junction is undergoing development including a new movie studio, the Park City Heights housing development an addition to Park City Medical Center. Currently, the junction houses a sports facility, hospital, industrial park, office park and the Richardson's Flat tailings area. Quinn's junction is backdropped by primarily open land including the protected Round Valley open space, the 2700 acre restricted Greater Park City Mining property, and the Clark Ranch property.Finally, the Property is also visible from the lightly used West Parcel frontage road and Richardson Flats roads.

Figure 6. View of the Property from the eastbound lane (towards Heber City) of Highway 40 near the Quinn's Junction exit. Much of the natural landscape visible in this photo is included in the Clark Ranch Property.

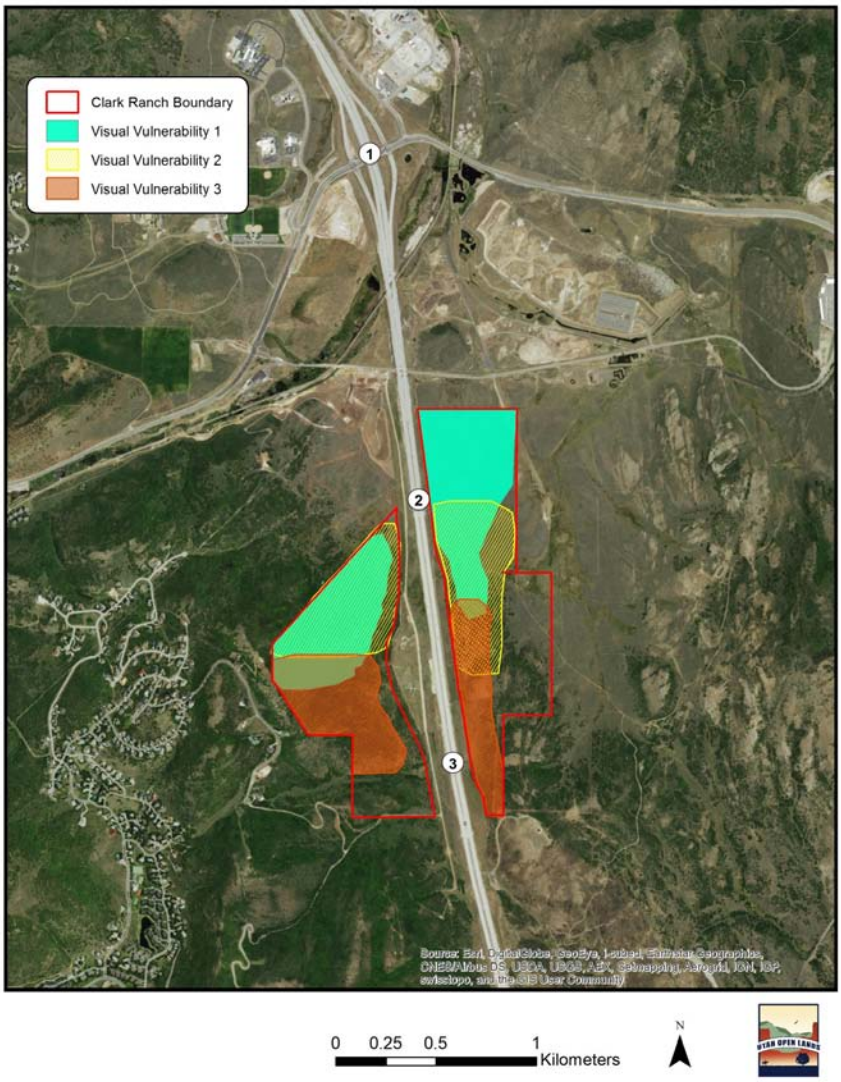


Figure 7: Map of visual vulnerability for Clark Ranch Property. Visual vulnerability is defined as the degree to which alterations of the landscape (i.e. road cuts or structures) can be seen.

EAST PARCEL

Visibility

Much of the East Parcel of Clark Ranch is visible from Highway 40, especially the northbound lane, due to its lowered position in the landscape. Portions of the East Parcel is also visible from parts of State Road 248 and Quinn's Junction.

Figure 8. View of the Property heading north towards Park City on Highway 40.

Scenic Quality

The East Parcel exhibits unobstructed views of shrubsteppe and wet meadow flats, as well as a small oak covered hillside. The variety in textures and colors is not highly pronounced, regardless, the East Parcel provides high scenic value for its undeveloped natural condition and its prominence in the landscape. The current condition of the greater Richardson Flat, Clark Ranch viewscape is mostly unbroken with occasional visible road, boundary or fenceline cuts. The scenery is impacted somewhat by the presence of the tailing facility and a park and ride lot, both of which are located north of the Richardson Flat road and off the property. South of the road, the Property blends seamlessly with the adjacent Property in an entirely open condition.

Sensitivity and Vulnerability

The scenic quality of the East Parcel is sensitive and vulnerable due in part to its prominence and location within the open landscape. Structures or active recreation facilities (manicured parks or ball fields) would alter the natural textures and tones and have the potential to stand out and not blend well with the surrounding landscape, looking out of place, depending on the alteration to the topography and turf or vegetative cover decisions. An important part of the scenic quality of the Property is its relationship to the surrounding undeveloped private lands. Development or visual disturbance on adjacent private land has the potential to affect the scenic vista of the region, though significant development of the area would raise the scenic value of the Property for its role as an open space buffer and protected entry corridor.

WEST PARCEL

Visibility

Due to its steep slopes the West Parcel is more visible from a distancethan the East Parcel. Views of the West Parcel are prominent from Highway 40 near Quinn's Junction and SR 248, while a cut-bank on adjacent UDOT owned property obstructs visibility from the Highway as it transects the Property. The hillside on the West Parcel is visible from the westbound (heading north) lane of the Highway as it is further away from the cutbank and raised frontage road. (see Fig. 9)

Figure 9. View of the hillside on the West Parcel from the westbound lane of Highway 40.

Scenic Quality

The views of the West Parcel consist of undisturbed natural hillside covered primarily in oak, maple and mahogany with small pockets of aspen stands.The West Parcel displays more variety in texture, color and shape due to the multiple vegetation types and the topography. Currently, there are no visual obstructions or development features and existing roads and trails are not visible from key observation points. The Property blends nicely with adjacent property behind the current phase of the Park City Heights development and the BLM managed parcel.

Sensitivity and Vulnerability

Since the West Parcel covers much of a distinct hillside, it is less reliant on the surrounding landscape for its scenic quality and is thus less at risk to be diminished by development of adjacent lands. Additionally, the views of the West Parcel from the highway are blocked in many places by the cut bank, limiting its vulnerability. Development of the adjacent Park City Heights may introduce structures and landscaping in close proximity to the northern corner of the West Parcel, which would limit the vulnerability of introducing structures or other manmade features to this area. Additionally, limited trailhead parking could be developed on the property with minimal impact to the scenic quality if located adjacent to the development, or adjacent to the frontage road which is raised above the Highway. The introduction of singletrack trails is not likely to create significant impact to the viewscape if they are created thoughtfully, however large

machine built cuts could affect visual characteristics due to the slope vulnerability aspects as it is highly visible from Quinn's Junction.

RECREATION INVENTORY

Park City Municipal and the Greater Park City community consider outdoor recreation to be an important part of its character. The region prides itself on its designation as a year round destination in part because of its extensive open space and non-motorized multi-use trail network. The Clark Ranch property is the newest addition to this network and has high potential for

EXISTING RECREATIONAL RESOURCES

Although the Property does not currently have any developed recreational resources, it does currently serve several recreational uses. An illegally built multi-use singletrack known as the "Two Fingers" trail, crosses the West Parcel on the upper slopes of the hillside. This narrow trail is used for mountain biking, hiking, and trail running, but extends on to private property on both sides of the Property boundary. The trail is narrow and not heavily used but is apparently maintained as we noticed recent vegetation trimming along the trail in the summer of 2015. In addition to the two fingers trail, an old road on the West Parcel which leads out from the Park City Heights development currently serves as an informal hiking route. A use trail continues past the end of the road up into the aspen stand before it becomes impassable. It is likely that this trail is used rarely for hiking, wildlife viewing or dog walking. The development of Park City Heights has cut off the entrance to this road, however it will likely be used by residents of the new development if an alternative is not presented.

A common current use of the Property is for dog walking, either by individuals or by professional dog walking services. Several routes have been noticed to be used by dog walkers, though they have not worn in footpaths or created trails. Other times, dog walkers will just walk along the frontage road of the West Parcel or the fenceline on the East Parcel and let the dogs roam throughout the sage or oak landscape. This current use may be hard to curb, but has the potential to significantly impact the natural value of the Property as dogs have a tendency to chase wildlife, damage vegetation, and introduce excess nitrogen into the ecosystem.

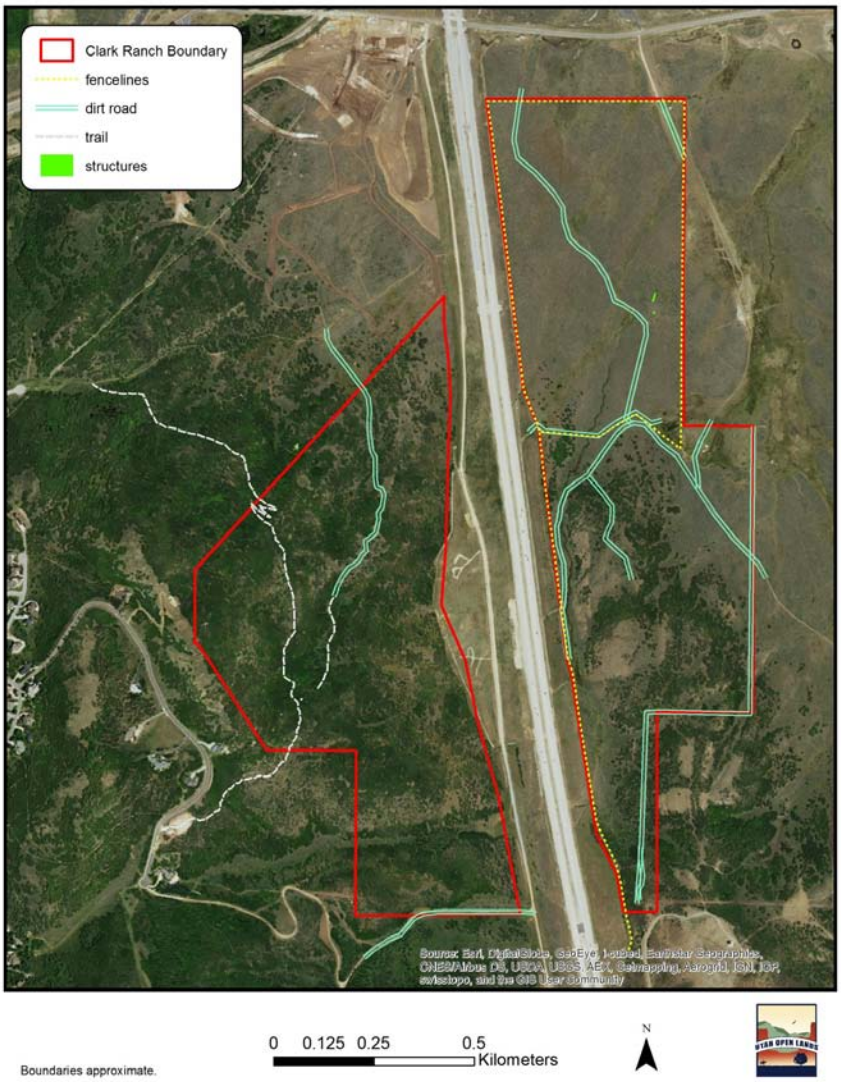


Figure 10: Map of infrastructure on the Clark Ranch Property.

FUTURE POTENTIAL

Access Points

Currently, recreational access to the Property is limited and undefined. Official access should be determined, many options are available. One option is to block the West Parcel frontage road with a locked gate. The feasibility of this has not been determined, though the primary reason for the construction of the frontage road was for the potential development of Clark Ranch. The main access point on the East Parcel is through the Greater Park City Mines property and it is unknown whether public access through those properties would be allowed.

The most obvious access point would be an access point or trailhead developed in conjunction with the Park City Heights development. This could allow recreational use to be concentrated onto approved trails and limit widespread dispersed use. Due its small size, lack of connection to protected open space or existing trails and agricultural use, extensive summer trail development on the East Parcel is not recommended. If additional open space is protected in the Mayflower area, further access and trail development could be warranted.

A common access point is near the south end of the West Parcel where there is a flat grassy area at the bottom of a small draw. If a trailhead is desired on the Property and the utilization of Park City Heights is not available, this is the most appropriate alternative location. This area would be limited to a few cars (1-5) and would require leaving the access road ungated and open to the public.

Finally, the proximity of the Property to the Richardson's Flat Park-and-Ride suggests that using the existing lot as a hub for recreation in the area could provide significant parking capacity while limiting the visual impact of additional parking facilities. Unfortunately, the Park-and-Ride lot is approximately 1/3rd of a mile away from the East Unit and would require additional trail agreements through the United Park City Mining property.

Singletrack Trails

Due to its proximity an extensive multi-use singletrack trail network, multi-use trail development has high potential for the Clark Ranch property. The small size of the Property does not warrant an exclusive trail network, but new trails could be connected into the existing networks. The exception would be the creation of a hiking only trail which could be appropriate leading up to an overlook near the top of the hill on the West Parcel.

The most obvious and easiest trail connection would be a connection on the West Unit from the Fox Tail trail to the Snowtop trail. This connection is called for in the Park City Trails Master Plan, but would require working with the adjacent Park City Heights and Morning Star neighborhoods. The unauthorized "Two Fingers" trail currently creates this connection, and sections or the entirety of this alignment could be formalized for this purpose if the access issues are formalized.

Another option would be to create a trail (either hiking only or multi-use) that climbs out of the Park City Heights development into the Property. The old road bed and existing footpath could be used for part or all of this alignment, or a small loop could be constructed.

Finally, if a trailhead is constructed adjacent to the frontage road, a trail leading up to the Solamere/Snowtop trails ora hiking trail leading up to the top of the hill on the West Parcel could be appropriate.

Paved Pathways

Due to its location in the entry corridor, it is possible that the Property may be appropriate for a paved pathway connecting into Wasatch County. Highway 40 is the only public route from residents of Wasatch County into Greater Park City, and because it is a divided highway serves as a poor option for cycling or human powered commuting. A paved path through Clark Ranch connecting Quinn's Junction with Wasatch County would be a benefit to the community, though the design of this project would be outside the scope of this inventory.

Winter Trails

If any singletrack trails are constructed or adopted on the Property it is likely that they would act as winter trails for snowshoeing and fat-bikes. A paved pathway, if constructed, could be groomed as a cross-country ski trail. Due to the size and topography of the Property, a cross-country ski trail network may be less feasible, however the East Parcel is already dotted with old roads which could serve as a base for additional groomed cross-country ski trail network. Due to its importance as wintering habitat for mule deer and elk, winter recreation should include consideration for minimizing impacts to the wildlife. Signage, limitations on how recreation is conducted could be prudent.

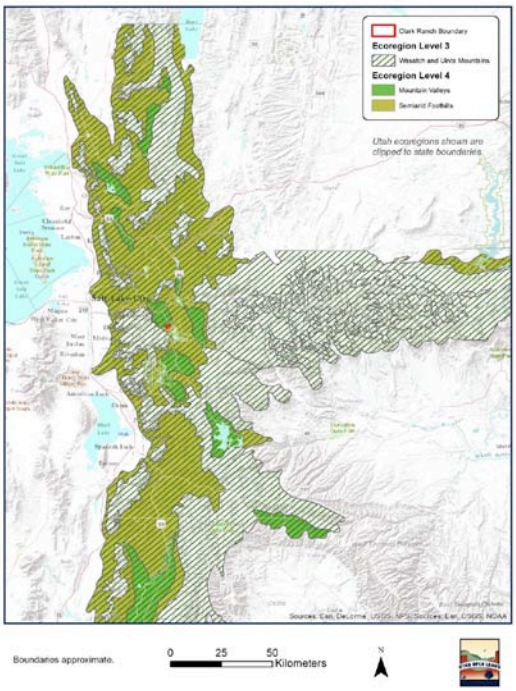
Active Recreation (parks and fields)

The potential for active recreation through the creation of parks or fields is limited on Clark Ranch. Because of the topography of the West Parcel, developed fields or recreational amenities are not very feasible. On the East Parcel, the topography is appropriate but access could present a challenge. The development of recreation amenities on the East Parcel have the potential to impact the scenic quality of the Property based on height, alterations to natural topography and vegetation and breadth of alternation needed for the anticipated amenity.

ECOLOGICAL INVENTORY

CLIMATE

The climate in the Eastern Summit County of the Property consists of generally cool summers and cold winters. Snowfall can begin in September, with snow cover generally from November through April. Snow may get several feet deep on the Property, especially on the east facing aspects of the West Parcel. At the nearby Snyderville Basin weather station: mean annual precipitation is about 20 inches, mean annual temperature is about 39 F, with maximum daily temperatures near 90 F and minimum temperatures below 0 F[1].



The Clark Ranch Property falls on the interface between the mountain valleys (19g; to the north) and the semiarid foothills (19f; to the south) of the Wasatch and Uinta Mountain Ecoregion (19; Woods et al. 2001) (see Fig. 14). The region is marked by fewer than 40 to 80 frost-free days, and long, cold winters (Woods et al. 2001).

Global climate change has the potential to significantly change climate and weather patterns and thus effect local-scale ecosystems. Scientific analyses of temperature changes are available for the nearby Park City[2] and Snyderville Basin[3]weather stations which do not suggest significant local temperature changes. Utah in general appears to be showing a warming trend, based on data from several thousand weather stations across the state[4].

Figure 11: Map of ecoregions in Utah, showing the location of the Property in the Wasatch andUinta Mountains.

[1]Utah State University climate data center http://www.wrcc.dri.edu/cgi-bin/cliMAIN.pl?utkama
[2] http://berkeleyearth.lbl.gov/stations/35929
[3] http://berkeleyearth.lbl.gov/stations/35989
[4] http://berkeleyearth.lbl.gov/regions/utah

GEOLOGY AND SOILS

Significant Features

→Interesting Geology - The intersection of the Wasatch Mountains and the Uinta Mountains in this vicinity created a complex and interesting geological history of the area.

→Soils that support native biotic communities – Soils on the property are the basis for habitat for plants and animals.

Significant Threats

→Erosive Soils- Soils with a high vulnerability of eroding are a natural feature of the Property, which can provide challenges for vegetation management.

→Newly Cut Roads on the Property- Recently, a new road was cut near boundary of the property on the East Parcel. This clearing has introduced numerous noxious weeds and could cause excessive erosion that should be addressed immediately.

→Old Roads and Trails - Parts of an old road on the West Parcel of the property has some deep ruts in it that serves to cause further excessive erosion.

The underlying physical properties of the geology and soils of the Property is the foundation upon which the ecosystem has developed. The understanding of this foundation can result in better informed decisions regarding how management actions may be the impetus for changes in land health and ecosystem stability.

The geology exhibited at Clark Ranch is of interest as the property is near the intersection of the Wasatch and Uinta Mountains, two dominant topographic features on the Utah landscape. The geologic history of this area extends back at least 300 million years, while rocks of much older age are located at depth and not exposed at the surface.

Rock formations in the Clark Ranch area include a mixture of sedimentary materials such as mudstone, limestone and sandstone ranging in age from Pennsylvanian to Triassic (approximately 200 to 300 million years old). In addition, Tertiary volcaniclastic rocks, composed of volcanic debris and ash deposited from centers of distant volcanic activity approximately 30-40 million years old, are present. Exposures and outcroppings revealing underlying structural geology occur in limited locations on the Property and are assumed to be associated with the Frog Valley Fault and members of the Park City Formation (Bromfield and Crittenden 1971).

Mining potential at the Property was not fully determined as part of this inventory. Historically, small and medium sized mines were prevalent on adjacent properties and produced quantities of gold, silver, lead, copper and zinc (SGID_U250_MineralDeposits1988).Although the area is in a historical mining area for precious metals (Doelling and Toeker 1983), no current mines are

known near the Property (Bon and Heuscher 2008), suggesting that the economically viable mineral potential of the area is low[5].

Soils on much of the Property are considered alluvium or colluvium originating from conglomerate, andesite, sandstone, quartzite, or shale. Mountain soils such as those on the Property are relatively fragile because of the steep slopes and fairly thin layers of organic soil. The soils associated with the springs and wetlands in the northeastern portion of the Property are listed as both hydric (wetland soils) and farmland of statewide importance; no other soils on the Property are rated hydric or of high significance for farming (NRCS 2015). The characteristics and distribution of soil types on the Property are summarized below in Table 1 and in the Soils Map(Fig 12).

[5] Also referenced were know deposits of phosphate (SGID_U250_PhosphateDeposits1988), coal(SGID_U250_CoalDepositAreas1988) and potash(SGID_U250_PotashDeposits1988) which do not appear to occur on the Property.

Table 1: Dominant soils found on the Property and adjacent areas and associated potential management issues[6]

Name	Erosion Potential	Location on Property	Ponding Hazard	Soil origination	Ecological Site Description	Potential Management Issues
106— Ayoub Cobbly loam 2-15% slopes	Slight to moderate	Under slopes on East Parcel just west of open meadows	None	From slope alluvium derived from andesite over residuum weathered from andesite	Mountain gravelly loam (Mtn big sagebrush)	Has susceptibility to moderate erosion on natural surface roads
125- Dunford- Ayoub-Melling complex 30-60 percent slopes	Severe	On East Parcel slopes in southern region	None	Derived from andesite	(Dunford)- Mountain Gravelly Loam (Oak) (Ayoub) Mountain Gravelly loam (Mtn big sagebrush) (Melling) Mountain shallow loam (Mtn big sagebrush)	Low soil strength; natural surface roads tend to erode
127 – Echocreek – Kovich loams – 0-10 percent slopes	Slight to moderate	Lies under spring on East Parcel and under wet meadows outside property	None	Alluvium from sandstone, quartzite, and shale	Upland Loam (Basin wildrye)	Farmland of statewide importance, moderately susceptible to frost action
181- Yeates Hollow-Henefer Complex 15-30 percent slopes	Moderate to severe	Mid-slope on West Parcel of property	None	derived from colluvium derived from conglomerate, sandstone and quartzite	(Yeates) Mountain Stony Loam (Mtn Big sagebrush) (Henefer) mountain loam (oak)	Moderate to severe erosion potential, moderate susceptibility to frost action, low soil strength
182- Yeates Hollow-Henefer Complex 30-60 percent slopes	Severe	Upper slopes on West Parcel as well as under sagebrush dominated areas on East Parcel in the northern region	None	derived from colluvium derived from conglomerate, sandstone and quartzite	(Yeates) Mountain Stony Loam (Mtn Big sagebrush) (Henefer) mountain loam (oak)	Severe erosion potential, moderate susceptibility to frost action

[6] Source: NRCS Soil Survey of Summit County Area, Utah, Parts of Summit, Salt Lake and Wasatch Counties (NRCS 2004)

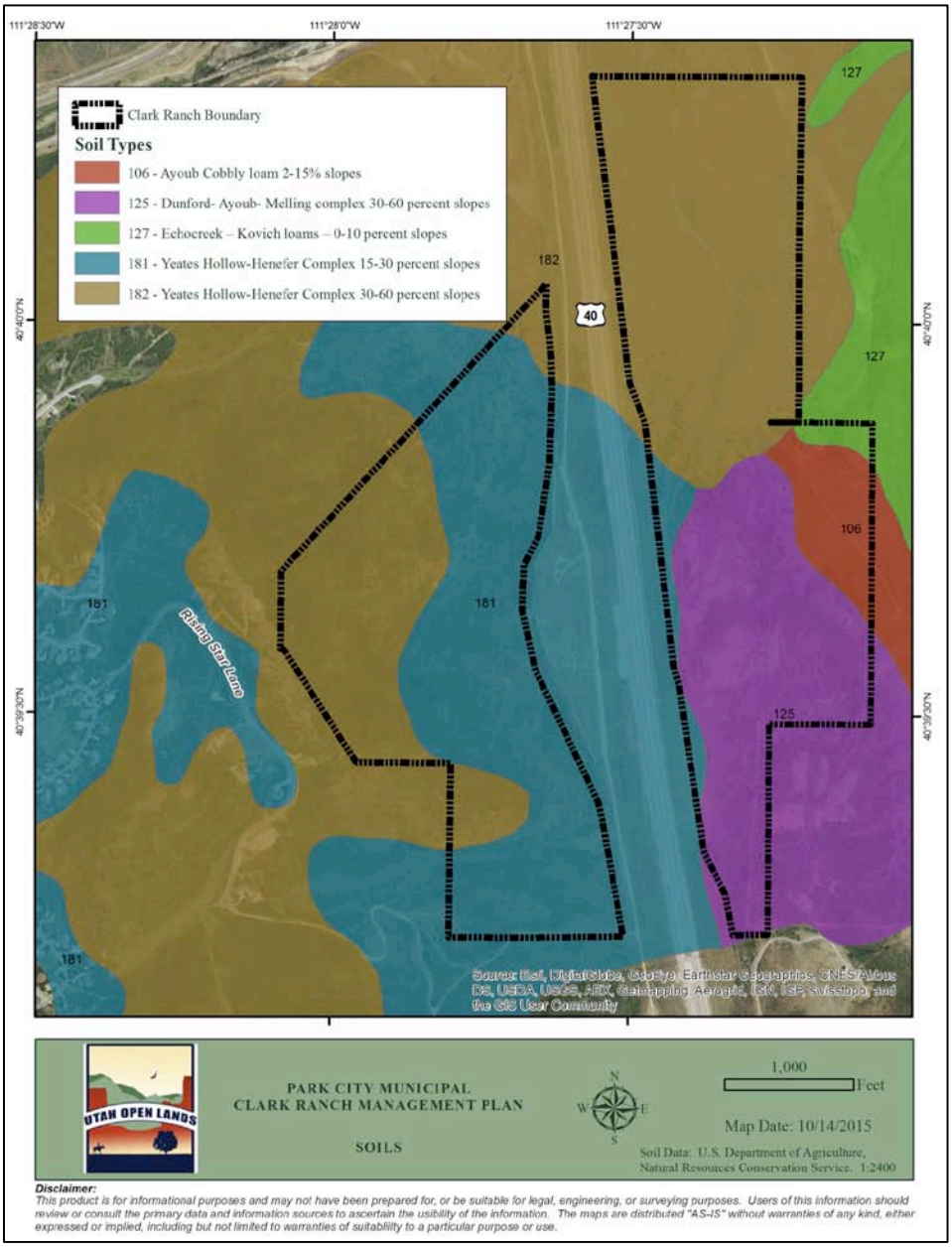


Figure 12. Soil Types at Clark Ranch

WATER

Significant Features

→ Wetland Habitat –The Property provides open water and wet meadows. Each of these wetland habitats satisfies different needs of wildlife as well as function to maintain or improve water quality.

Significant Threats

→ Water Quality A large storm water culvert discharges directly into the main intermittent drainage on the East Parcel of the Ranch. Pollutants and debris from roads will end up on the property and could decrease water quality.

→ Potential Decline in Groundwater – It is possible that increased groundwater extraction by humans and the possibility of more frequent and severe droughts may reduce the amount of water that discharges at the wetlands of the Property and thus reduce the ecological values and functions of these wetlands.

→ Inappropriate Herbicide Application – Noxious weeds are scattered throughout the Property, and will be a constant management task to maintain suitable wildlife habitat. Particular care should be taken around the spring and intermittent drainages when using herbicides.

Surface Water

The Property is located in the Silver Creek subwatershed of the Upper Weber River watershed. An intermittent stream flows across the Property. Prior to the construction of Highway 40, the stream appears to have flowed out of the drainages on the West Parcel toward the flats on the East Parcel of the Property. Today, this channel occasionally still carries surface water, but it appears to be largely runoff from heavy storms or from snowmelt. The dense vegetation in the channel helps to filter sediment, debris and nutrients, and the channel contains significant debris as a result. The culvert that brings both intermittent flow from the West Parcel of the Property as well as stormwater from Highway 40 is becoming s undercut likely from large amounts of water emanating from the highway during storms.

Permanent surface water on the Property consists of two springs on the eastern portion of the Property (seen map in Fig. 13). These springs have been excavated probably to improve access for watering livestock, and support small ponds of a few meters extent, as well as larger wetland areas sustained by the groundwater discharge. Both springs usually have standing water in them, but in 2015 the spring to the east dried up completely by late summer. According to the livestock lessee, this spring has not dried up since it was excavated 5 to 10 years ago.

Ground water

No observations of groundwater depths or conditions were done during baseline documentation. Vegetation communities, identified wetlands (NWI) and soil reports for nearby soils (NRCS 2015) indicate that water is near the surface regularly, for some length of time near the springs (eastern portion of the Property) and in the low-lying areas and stream channel to the east of Highway 40. It appeared from the presence of wetland-associated plants and wet soils that more areas are functional wetlands than were delineated as wetlands by the National Wetland Inventory (Fig. 13).

Water Rights

There are two registered water rights on the Property – the point of diversion for water right 35-5580 is on the West Parcel of Highway 40 and is owned by Nadine Gillmor. This water right is for 9.45 acre-feet with a priority year of 1862. The other water right is on theEast Parcel of the Property and belongs to John Clark for 0.022 cubic feet per second (CFS) (Water right # 35-8832).

Comment [RM1]: Is this all accurate?

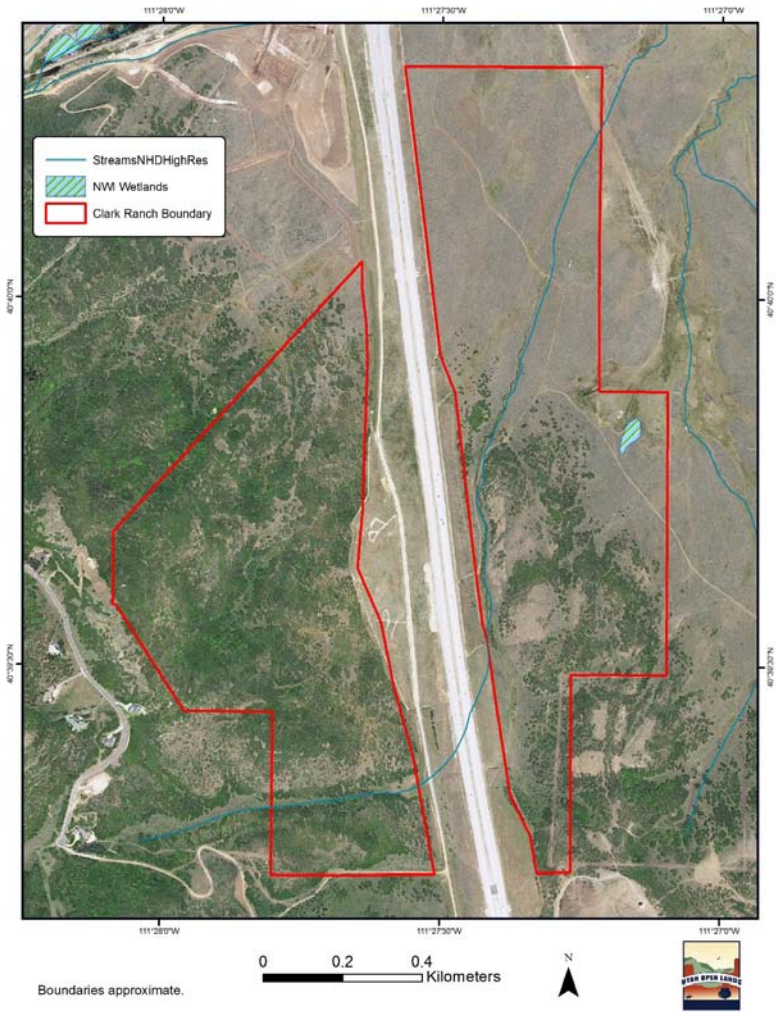


Figure 13: Map of surface water and wetlands on the Property. The stream shown crossing the Property is an intermittent stream. Wetlands were estimated by the National Wetland Inventory, but do not indicate the full extent of wetland areas on the Property (see Fig. 14 Vegetation Communities).

VEGETATION

Significant Features

- → Aspen stands – Although the extent of aspen on the property is relatively small aspen is uncommon for this region. This species is an extremely important browse species for large ungulates in the area (mule deer and moose).
- → Mosaic of vegetation communities – The mosaic of different vegetation communities provides a high level of landscape diversity. The relatively good health of the vegetation communities and their respective positions on the landscape provides for effective wildlife habitat.
- → Wetland – Open water is an extremely rare feature in the arid west landscape and it is highly important for both wildlife and livestock.
- → Alderleaf mountain mahogany (*Cercocarpus montanus*) patches – This particular species of mountain mahogany is uncommon in this region. This species is an extremely important browse species for large ungulates in the area (mule deer and moose).

Potential Threats

- → Noxious weeds are in many areas of the Property, which is of concern because they can displace the native vegetation, reduce biodiversity and degrade wildlife habitat.
- → Potential improper grazing practices could include not enough rest between grazing rotations and too many animals, which could compromise the Conservation Values of the Property. However, with proper management, livestock grazing can be compatible and even complementary to land stewardship.

The natural vegetation of Clark Ranch provides the underlying basis for many of the properties Conservation Values. Habitat and food provided by the individual plants and vegetation communities are the foundation for nearly all of the wildlife use of the Property. Additionally, the vegetation provides the agricultural utility of the property and the colors, textures and shapesare the basis of the scenic quality.

Seven vegetation community types were mapped (see Fig. 14 on next page) on the Property. The vegetation community types were delineated in accordance with habitat classifications of the Utah Comprehensive Wildlife Conservation Strategy (Sutter et al 2005) and Utah Partners in Flight (Parrish et al 2002). Two additional landcover delineations were mapped which do not match with the classification standards, disturbed grassland and roads. As with most vegetation maps, the delineations of communities are not an exact boundary because the vegetation communities intergrade. The acreage of each mapped vegetation type is presented in Table 2.

Specific data about each community collected during the course of this inventory can be found in Appendix 2.

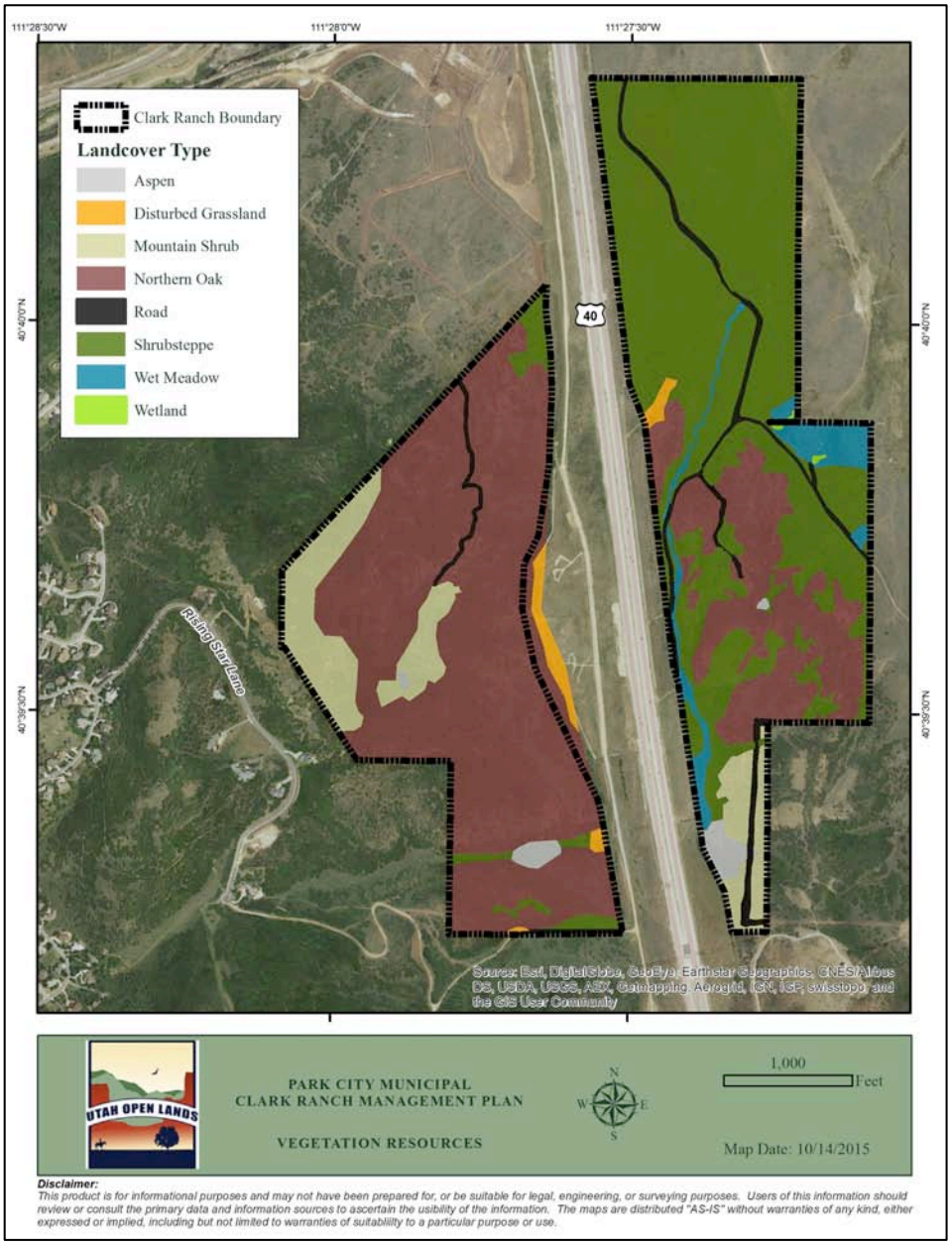


Figure 11. Vegetation Communities of Clark Ranch.

Notes on Figure 14:

1. Vegetation communities were delineated based on extensive field surveys of the property during the spring and summer of 2015 by three professional ecologists.
2. The name of this file is ClarkRanchVegetation2015.shp and is on file with both Utah Open Lands and the Park City Municipal Sustainability Department.
3. In order to be able to cross walk vegetation communities to a national level, additional classifications were used including:
    - National Vegetation Classification Standard (NVSC) (http://usnvc.org/),
    - Ecological Site Descriptions (ESD's) (https://esis.sc.egov.usda.gov/Welcome/pgReportLocation.aspx?type=ESD)
    - Accepted common names for the most dominant species.
4. Additionally, a professional opinion is included in the data with regards to the condition of the diversity, structure, presence of non-native species, and plant health.

Table 2. Vegetation Communities at Clark Ranch.

Type	Acres	Percent
Northern Oak	167.8	47.5
Shrubsteppe	132.2	37.4
Mountain Shrub	28.7	8.1
Wet Meadow	10.2	2.9
Dirt Road	5.3	1.5
Aspen	4.5	1.3
Disturbed Grassland	4.4	1.2
Wetland	0.3	<1
Total	353.3	

Notes on Table 2:

1. Northern oak and mountain shrub intergrade and are not always distinct. At Clark Ranch Northern oak has more Gambel oak whereas mountain shrub has more bigtooth maple, but both species occur in both communities.
2. Wetland and wet meadow landcover was determined from site visits and aerial photographs; it has not been formally delineated for jurisdictional purposes.
3. Landcover was delineated manually as polygons in ArcMap (v. 10.3), based on field observations. Map projection: UTM NAD83 Zone12N. Features were traced from high-resolution 2011 aerial imagery (ESRI Basemap) and compared with features in 2014 aerial imagery (NAIP, UTM NAD83 Zone12N). All boundaries are approximate.

Oak

The Northern Oak woodlands cover the greatest area of any vegetation type at Clark Ranch (167.8 acres or 47.5%). These woodlands are dominated by Gambel oak which grows as a shrub or small tree and naturally varies in density and height depending upon climate, soil depth, slope aspect, land use history and other variables. In northern and central Utah, Gambel oak often shares dominance with bigtooth mapleon more northern facing slopes and in drainages. Over decades, oak stands will often give way to bigtooth maple stands since maple is more shade tolerant and can have higher reproductive success. The oak density varies widely, from

continuous cover (difficult to impossible to walk through) to widely spaced clumps (a nice stroll through the woods). The differences in density can result from a combination of soil depth, topography, aspect, fire history and past land uses. For example, south facing slopes with shallow soils will hold less moisture and thus will tend to harbor oak stands that are shorter and have reduced stem diameters (Clary et al 1986).

In addition to the differences in density and stem size, the oak stands also have differences in understory plant composition. On the Property, snowberry was common in the understory of some stands, but in others, elk sedge and grasses were more common. Other common species in this vegetation type include Utah serviceberry, sagebrush, and Oregon grape. Common herbaceous species include slender wheatgrass, mountain brome, and Mule's ears. Mule's ears is also an indicator of relatively intense past grazing practices, as livestock generally avoid this species (Mueggler 1988). There are isolated patches of Dalmatian toadflax and cheatgrass throughout the oak stands.

Figure 15. Different growth habits of Gambel oak - a dense stand on the left vs relatively open clumps on the right.

Much of the oak on the Property appears to be healthy and persisting well. Oak is an important forage species for deer and elk. However, it is possible for oak to become overly dense such that it hinders wildlife movement. Natural disturbances such as wildfire, disease, competition and herbivore interactions are important to the ecology of oak stands in order to maintain a mosaic of oakbrush and other vegetation types on the landscape. The construction of roads on the Property has created openings as well as structural diversity in some of the oak stands. Oak is a vigorous re-sprouter and these openings will likely fill in with oak in a few decades, but the openings can create habitat for a different suite of plants to increase diversity, but can also create openings for noxious and/or undesirable weed species. Research has shown that fires in natural oak systems generally occurred between every 35 and 100 years (Brown et al 2000). Should disturbances such as fire not be allowed to occur naturally, these areas will likely trend toward more conifer trees or big tooth maple stands over hundreds of years.

Aspen Forests

The Aspen vegetation type is a small portion of Clark Ranch (1.3%) but its ecological importance far outweighs its extent. Aspen forests are known to be among the most diverse and productive in western landscapes (Chong et al 2000).A healthy aspen stand generally has several different age and size classes, which assures good regeneration (reproduction) and recruitment (growth above browse height). Greater precipitation in the drainages and some north facing slopes on the Property allow aspen stands to persist due to the localized increase in moisture content and availability compared to the drier surrounding areas. In recent years, there has been a decline in the health and extent of aspen stands in the West. Although each aspen stem's life span averages only between 80 to 120 years, consistent replacement should be occurring through the aspen's underground network of roots and shoots to become new trees. The Aspen stands on the Property are relatively small and isolated and are not exhibiting high levels of recruitment or regeneration.

The most abundant plants of the Aspen forests are quaking aspen in the overstory and mountain snowberry and bigtooth maple in the understory. Other shrubs present at low cover are: Saskatoon serviceberry, Woods' rose and Scouler's willow. There are numerous forbs in the understory including: western valerian, starry false lily of the valley, Fendler's meadow-rue, elkweed, sticky purple geranium and sweetcicely. Graminoids in the Aspen forest understory include: Kentucky bluegrass, Geyer's sedge, brome. Complete data on the aspen forest plots at Clark Ranch are found in Appendix 2.

Figure 12. Left image: aspen stand in the southern region of the western side of the Property; note lack of regeneration of young aspen in the stand (Photopoint 12). Right image: aspen stand with higher density of understory shrubs and tall forbs (near Photopoint 10).

There are two distinct types of aspen forest at Clark Ranch (see images in Fig. 16). One type of aspen forest is drier and seems to be more impacted by ungulate grazing, creating a relatively open understory (lower density of trees and shrubs), a limited amount of forbs and an abundance of grasses (Fig. 16 left image). The other type of aspen forest seems to have more soil moisture and a higher density of trees and shrubs, abundant tall forbs and a lower

abundance of grasses (Fig. 16 right image). Some species that were much more abundant in the moist aspen forest were the wildflowers: roughfruit fairybells, elkweed,sweetcicely and starry false lily of the valley; and the shrubs Scouler's willow and Saskatoon serviceberry.

Aspen forests are valuable for wildlife for many reasons. Aspen forests naturally include standing dead trees that are valuable for nesting, roosting, and feeding. Fallen trees (called down wood) are useful for shelter, nesting, feeding, and in soil formation. The structure of the trees and branches create vertical layers many feet above the ground that are useful for nesting, roosting, shelter, and feeding. The naturally lush and diverse understory provides abundant opportunities for feeding, breeding, and sheltering. The rapid turnover (growth and death) of aspen trees creates a diversity of habitat components that are valuable for colonization, resilience to disturbance, and as refugia.

Shrubsteppe

The Shrubsteppe communities (sometimes called sagebrush/grasslands) are a large part of the Property (37.4% or 132.2 acres). The shrubsteppe is dominated by mountain big sagebrush and in some areas is co-dominated by snowberry. Although the ecological importance of sagebrush is sometimes overlooked, it provides important habitat to many sagebrush obligate species and is considered a particularly imperiled vegetation types around the west (Knick and Connelly, 2011; Miller et al., 2011).Due in part to past land use patterns, the shrubsteppe communities of Clark Ranch vary widely in their ecological condition.

The north and eastern regions generally have very low diversity with chiefly sagebrush and an understory of one of two introduced grasses – crested wheatgrass or Kentucky bluegrass. These areas are also interspersed with weeds such as cheatgrass, musk thistle and Dalmatian toadflax.

Shrubsteppe areas in the southeastern portion of the Property have much higher diversity and resemble high quality native areas. In these areas, the shrubsteppe is interspersed with other shrubs such as bitterbrush, snowberry, Gambel oak and Douglas rabbitbrush. The area also has a plethora of native grasses such as Letterman's needlegrass, thickspike wheatgrass, bluebunch wheatgrass and slender wheatgrass. Common native forbs include hoary tansyaster, Munro's globemallow, showy goldeneye, sulphur-flower buckwheat, wavyleaf thistle, and Wyoming Indian paintbrush.

Figure 17. Shrubsteppe with an understory of a single species (crested wheatgrass) vs shrubsteppe community with a diversity of other shrubs and forbs and grasses

The differences in condition are likely due to a combination of past land use patterns and the construction of the highway. Crested wheatgrass and Kentucky bluegrass were seeded to provide forage for livestock around 1987[7]. Crested wheatgrass has been shown to outcompete native grasses and forbs over time (Newman and Redente 2001). Kentucky bluegrass was also likely seeded, however, Kentucky bluegrass is a shallow-rooted species and thus does not prevent erosion as well as native grasses (Weaver and Darland 1949). Erosion in the midst of the East Parcel is likely evidence of these conditions (Fig.18).

Figure 18. Erosion under area dominated by Kentucky bluegrass – a non-native, shallow rooted species

Shrubsteppe areas should ideally consist of a mosaic of different size classes of sagebrush with an abundant and diverse understory of grasses and forbs in order to support the numerous obligate sagebrush wildlife species. Higher forb (wildflower) diversity is important for insect populations, which in turn is extremely important for many birds and other wildlife species. A

[7] Luke Gillmor, personal communication, Oct 2015

high quality sagebrush steppe can support livestock grazing if managed and monitored carefully.

Wetland

Wetlands constitute less than 1% of the land cover (0.3 acre) at the Clark Ranch, the small extent of this area is also disproportionate to the important ecological functions it serves. The southeast part of the Property has some springs that create ponds that feed into wet meadows downslope. This wetland area is fed by a spring and was excavated between 5 and 10 years ago to provide more accessible water for livestock[8]. The repeated use of these springs by livestock can decrease the health of the open water areas by shearing the banks or edges of the wet areas as well as potential animal waste in the open water

The largest and most natural-looking spring-fed pond has a diameter of about 45 ft (Fig. 19 left). There is open water with a significant amount of algae and duckweed on the surface. Around the margin of the standing water the vegetation is dominated by wetland graminoids including: common spikerush, longstyle rush, Northwest Territory sedge and arctic rush. Forbs in this wetland include: water speedwell, Canada thistle, alkali buttercup, willowherb and seep monkeyflower. Complete data on Wetland is found in Appendix 2.

There is another spring-fed wetland to the south although it has much less wetland vegetation. This spring had water in March but it had no water in August of 2015. It had significant bare ground and weeds. It should be noted that according to Luke Gillmor, the open water area to the East is usually the larger open water area on the property of the two[9]. 2015 was a particularly dry year but the livestock lessee has never lost water completely as has happened this year.

Figure 19.The image on the left shows the western spring-fed wetland. The image on the right shows the eastern spring that dried up completely in 2015, and has significant bare ground and weeds.

[8] Luke Gillmor, personal communication, Oct 2015
[9] Ibid.

A better understanding of how the hydrology of the spring may be affected by drought and wet years is desirable to realize the potential for improvement toward a fully functional wetland. It may be warranted to find alternatives to water livestock so as to minimize the trampling, heavy grazing and soil shearing of the edges of the pond.

Wet Meadow

Downslope of the springs and in the drainage from Highway 40 are Wet Meadows which are characterized by a seasonally high water table. The Wet Meadow community is dominated by Arctic rush (also known as Baltic rush or wiregrass) which, in some cases, expresses over 90% cover within the community. Other graminoids (with low cover) were: Nebraska sedge, broadleaf cattail and Kentucky bluegrass. Forbs in the wet meadow (with very low cover) were: bull thistle, Canada thistle, meadow thistle and willowherb. The drainagenear Highway 40 also has some patches of narrowleaf willow. Complete data on Wet Meadow plot is found in Appendix 2.

Figure 20. The image on the right shows a mosaic of wet meadows downslope from a spring. The image on the leftshows a wet meadow in an ephemeral channel just east of Highway 40, dominated by wiregrass.

The Wet Meadow communities are generally in fair condition as noxious weeds such as musk and Canada thistle are relatively dense in the ephemeral drainage, and the diversity of plant species found in these areas is relatively low when compared to intermittent drainages in better condition. In better condition areas, there is a diverse suite of plants that are adapted to a predictable hydrological regime. Since the hydrology on the Property has been somewhat modified by the Highway, excavation of the springs and external water management, fewer species are able to adapt. Although the ephemeral draw has a few willows, most of the Wet Meadow areas are heavily dominated by Arctic rush. Although Arctic Rush is a native plant and binds soil well, it is often associated with areas with historically modified, intense land uses, such as modified hydrology or high intensity livestock grazing (Hurd et al 1996). Wiregrass is better able to adapt to a lowered water table than other common wetland plants (Dwire et al 2006, Manning et al 1989).

Mountain Shrub

The Mountain Shrub communities consist of 14.3% of the area of Clark Ranch. The Mountain Shrub vegetation type on the Property has a higher diversity of shrub species than the Northern Oak communities. In western landscapes, both Northern Oak and Mountain Shrub occupy the elevation between the Shrubsteppe at the lower elevations and the conifer forestsin the upper elevations. The Property does not support conifer forests due to conditions associated with the moderate elevation, although there are a few small white fir and Douglas-fir trees on the Property.

The most abundant plants of the Mountain Shrub communities are bigtooth maple (typicallywell over 50% cover) and Gambel oak (sometimes 25% cover). Other shrubs present at very low coverare: Mountain snowberry, Scouler's willow and Saskatoon serviceberry. There aresome forbs at low cover including: Engelmann's aster, Nevada pea, houndstongue, narrowleaf goosefoot and sweetcicely. There are a few grasses present at low cover including: blue wildrye and Kentucky bluegrass. Complete data on Mountain Shrub plot is found in Appendix 2.

The mountain shrub communities are generally in good to excellent condition due to their high bio-diversity, relatively low cover from noxious weeds, good stand structure (age and size class variation) and good health. There is, however, some small patches of the noxious weed houndstongue within the mountain shrub communities. Houndstongue disperses and establishes easily as its seed attaches readily to animal fur and this area is favorable habitat for this noxious weed.

Figure 21. Dense big tooth maple stand and open birch leaf mountain mahogany – both mountain shrub communities.

These communities are highly valuable as wildlife habitat for large ungulates as evidenced by the heavy browsing of the alder leaf mountain mahogany and high density of ungulate scat in these areas. Further, the big tooth maple areas provide cover and multiple spots for animals to bed down. It will be important to carefully monitor the condition of the mountain shrub areas

as all alderleaf mountain mahogany were heavily browsed on the Property and thus may be challenged to produce seed to reproduce.

Disturbed Grassland

The disturbed grasslands on the Property are areas that have been significantly modified by humans, either by clearing and revegetating for roads, or in one case, by excessive runoff from the highway that has high concentrations of road salts in it. The grasses in these areas are common species used in revegetation that are primarily non-native. Grass species in revegetated areas include smooth brome and crested wheatgrass. The dominant grass species where the excess salt-contaminated water enters the Property are foxtail barley and Canada bluegrass.

Invasive species

Invasive species on the Property include musk thistle, Canada thistle, garlic mustard, Dalmatian toadflax, yellow toadflax,houndstongue, Russian knapweed, dyer's woad and Scotch thistle. Invasive weeds have the potential to decrease the Conservation Values if left unchecked.Active control of particularly dense orproblematic weeds is recommended.An infestation of note is apatch of garlic mustard on the West Parcel close to the lower road/ trail.Dalmatian toadflax, musk thistle and Canada thistle are common, particularly on the East Parcel of the Property. Most of the Dalmatian toadflax infestations are somewhat diffuse, making them even more difficult to control.

Plant species listed as special concern for conservation

No known threatened, endangered, or sensitive plant species were observed or reported on the Property.

Species of Special Concern for Conservation
Attempts were made during field data collection to find plant or animal species on the Property that warrant special concern for conservation.Observations during these visits were not definitive.More thorough surveys would be needed to determine their existence or to fully describe the occurrence of many species of special concern on the Property.

WILDLIFE

The large extent of the open land contiguous with the Property helps to ensure the presence of many species of wildlife, including those that require relatively extensive landscapes, such as mountain lions, elk, mule deer, and raptors.Wildlife species of special conservation need that have been documented on or near the site are listed in the tables below.

Table 3. Wildlife species of concern that have been found in the general area of Clark Ranchand for which habitat may still be viable (others species may also be possible).

Common Name	Scientific Name	Last Documented	CWCS Status	State Status	UPIF Score	Primary Habitat	Secondary Habitat	Notes
Bald Eagle	*Haliaeetus leucocephalus*	2003	Tier I	SPC	27	Lowland Riparian	Agriculture	1
Bobolink	*Dolichonyx oryzivorus*	2005	Tier II	SPC	36	Wet Meadow	Agriculture	1
Columbia Spotted Frog	*Rana luteiventris*	pre-1931	Tier I	CS	NA	Wetland	Wet Meadow	1
Ferruginous Hawk	*Buteo regalis*	1988	Tier II	SPC	33	Pinyon-Juniper	Shrubsteppe	1
Greater Sage-grouse	*Centrocercus urophasianus*	2008	Tier II	S-ESA	36	Shrubsteppe	NA	1
Lewis's Woodpecker	*Melanerpes lewis*	1913	Tier II	SPC	40	Ponderosa Pine	Lowland Riparian	1
Short-eared Owl	*Asio flammeus*	2003	Tier II	SPC	29	Wetland	Grassland	1
Western Toad	*Bufo boreas*	1976	Tier II	SPC	NA	Wetland	Mountain Riparian	1
Broad-tailed Hummingbird	*Selasphorus platycercus*	2015	Tier III	-	33	Lowland Riparian	Mountain Riparian	2
Mule Deer	*Odocoileus hemionus*	2015	Tier III	-	NA	Shrubsteppe	Mountain Shrub	2
Brewer's Sparrow	*Spizella breweri*	2015	Tier III	-	34	Shrubsteppe	High Desert Scrub	3
Smooth Greensnake	*Opheodrys vernalis*	2011	Tier II	SPC	NA	Mountain Riparian	Wet Meadow	3
Long-billed Curlew	*Numenius americanus*	NA	Tier II	-	34	Grassland	Agriculture	4
Sage Sparrow	*Amphispiza belli*	NA	Tier III	-	32	Shrubsteppe	High Desert Scrub	4
Sage Thrasher	*Oreoscoptes montanus*	NA	Tier III	-	29	Shrubsteppe	High Desert Scrub	4
Virginia's Warbler	*Vermivora virginiae*	NA	Tier III	-	36	Northern Oak	Pinyon Juniper	4

CWCS: Utah's Comprehensive Wildlife Conservation Strategy 2005-2015. Sutter et al. 2005; Tier I is highest priority for conservation.
UPIF: Utah Partners in Flight Conservation Strategy v.2.0. Parrish et al. 2002; higher score indicates higher priority for conservation; 40 is highest.
State Status Codesfrom Utah's State Listed Species by County (http://dwrcdc.nr.utah.gov/ucdc/viewreports/sscounty.pdf): **S-ESA** Federally-listed or candidate species under the Endangered Species Act; **SPC** Wildlife species of concern; **CS** Species receiving special management under a Conservation Agreement in order to preclude the need for Federal listing.
Primary and secondary habitat from CWCS.
Summit County bird observations from the county checklist (http://www.utahbirds.org/counties/xChecklists/SummitChecklist.pdf)
Notes:

1 Documented in this quad; habitat may exist on Property (UDWR, TES_20140808).
3 Observed nearby; habitat appears appropriate on Property.
2 Observed on Property.
4 Observed in Summit County; habitat may be appropriate on the Property.

Mammals

The Property provides food, water, and shelter resources for mammals. The activities of these mammals have a strong influence on all trophic levels and are integral to the ecosystem.Examples include:

- Small mammal herbivores feed on seeds and fruits which influences vegetation and disperses seeds to allow the spread and persistence of plant species.
- Other small mammals, such as bats, feed on invertebrates such as crickets and grasshoppers.
- Burrows of small mammals can provide shelter for other animals and likely aid in soil aeration and water infiltration.
- Small mammals form a base of prey species for predatory birds, reptiles, and mammals.

The following small and mid-sized mammals were observed on or very near the Property

- American badger (*Taxidea taxus*)
- Chipmunk (*Neotamius* spp.)
- Coyote (*Canis latrans*)
- Pocket gopher (probably *Thomomys talpoides*)
- Uinta ground squirrel (*Urocitellus armatus*)
- Vole (*Microtus* spp.)
- White-tailed jackrabbit (*Lepus townsendii*)
- Yellow-bellied marmot (*Marmota flaviventris*)

Larger mammals on the Property can influence soil structure, and their herbivory may influence vegetation abundance and species.Large herbivores provide prey for large predators, and are commonly culturally desirable as game animals and for aesthetic reasons.Mule deer are present on the Property.Evidence of elk, moose, and mountain lion was found on or near the Property, andblack bears are known to occur in the vicinity.The following large mammals were detected in the area of the Property:

- Elk (*Cervus canadensis*)
- Moose (*Alces alces*)
- Mountain lion (*Puma concolor*)
- Mule deer (*Odocoileus hemionus*)

Black bears (*Ursus americanus*) are known to occur in the vicinity.

*Mammals listed as special concern for conservation:*The Property provides critical habitat for mule deer. Abundant evidence of mule deer bedding and feeding was seen on the Property on both the East and West parcels. Mule deer are considered a priority for conservation in Utah (Sutter et al. 2005).

Birds

The Property provides resources for many species of birds, some that visit incidentally and others that are specialized for particular habitats on the Property or nearby. Birds createvertical linkages in ecosystems, feeding on and providing prey for organisms at ground level and higher.Birds are mobile vectors for nutrients and seeds.

Birds observed on the Property included:

- American goldfinch (*Spinus tristus*)
- American robin (*Turdus migratorius*)
- Blue-gray gnatcatcher (*Polioptila caerula*)
- Broad-tailed hummingbird (*Selasphorus platycercus*)
- Brown-headed cowbird (*Molothrus ater*)
- Chipping sparrow (*Spizella passerina*)
- Great-horned owl (*Bubo virginianus*)
- House wren (*Troglodytes aedon*)
- Long-eared owl (*Asio otus*)
- MacGillivray's warbler (*Geothlypis tolmei*)
- Mallard (*Anas platyrhynchos*)
- Mourning dove (*Zenaida macroura*)
- Northern harrier (*Circus cyaneus*) (Appeared to have a nest on the Property in the low shrubs at the northern end of the ridge on the East parcel.)
- Red-tailed hawk (*Buteo jamaicensis*)
- Spotted towhee (*Pipilo maculatus*)
- Violet-green swallow (*Tachycineta thalassina*)

*Birdslisted as special concern for conservation:*Broad-tailed hummingbirds, which have been observed on the Property, are a priority species for conservation in Utah. Habitat on the Property also may be appropriate for several other priority species for conservation, such as short-eared owl (*Asio flammeus*), Brewer's sparrow, sage sparrow (*Amphispiza belli*) and Virginia's warbler (*Vermivora virginiae*).Bobolinks (*Dolichonyx oryzivorus*) have been documented in the general area, but are not likely to use habitat on the Property. Greater sage grouse are still known to occupy some sagebrush areas in the vicinity, but roads and development have increasingly fragmented the shrubsteppe habitat on which they depend, which has caused changes in their distribution and use patterns. The level of use by sage grouse on the Property is currently unknown. No evidence of sage grouse was detected during baseline observations.

Reptiles and Amphibians

Reptiles and amphibians prey on invertebrates and small vertebrates and form part of the prey base for other predators.Frogs may help keep insect populations in check.Frogs can be

considered biological indicators they are so sensitive to water quality.Conservation of frogs has gained international attention due to widespread declines in frog populations.[10]

Western terrestrial garter snakes (*Thamnophis elegans*) were observed on the Property. Habitat appears good for sagebrush lizards (*Sceloperusgraciosus*) and other reptiles adapted to the area.

*Reptiles and amphibians listed as special concern for conservation:*Columbia spotted frogs are known to breed in Summit and Wasatch Counties, and habitat on the Property may be able to support small populations, given wetlands and adjacent wet meadows and wetlands. Habitat on the Property appears appropriate for western toads (*Bufo boreas*), northern leopard frogs (*Rana pipiens*), common garter snakes (*Thamnophis sirtalis*) and smooth greensnakes (*Opheodrys vernalis*), all of which are priority conservation species with ranges that include the area of the Property.

Fish

No fish were observed on the Property. Habitat on the Property does not appear appropriate for any species of fish native to the area.

Invertebrates

Invertebrates are important ecological elements on the Property as they support other wildlife species, interact with vegetation, link vegetation and wildlife, function in decomposition, and connect other ecological elements in nutrient cycles and energy transfers. The naturalist E. O. Wilson (1987) wrote: "*It needs to be repeatedly stressed that invertebrates as a whole are even more important in the maintenance of ecosystems than are vertebrates."*

Terrestrial riparian invertebrates and aquatic larvae of terrestrial invertebrates are important in the diets of fish in systems like the Provo River and tributaries. Aquatic insects and mollusks such as fly larvae and freshwater mussels filter water, contributing to clean, high-quality water conditions.

*Invertebrates listed as special concern for conservation:*Western pearlshell (*Margaritifera falcata*) is a freshwater mussel that has been documented in the area of the Property (see Table 2); however, habitat on the Property does not currently appear appropriate for western pearlshells (they are typically found in clear, fast streams).

[10]http://www.amphibianark.org/, http://www.savethefrogs.com/why-frogs/index.html, April 28, 2011 was worldwide Save the Frog Day as reported by CNN http://news.blogs.cnn.com/2011/04/30/frog-lovers-worldwide-unite-for-save-the-frogs-day/

REFERENCES

Angermeier, P.L., A.P. Wheeler, A.E. Rosenberger. 2004. A conceptual framework for assessing impacts of roads on aquatic biota. Fisheries 29:19-29.

Bon, R.L. and S. Heuscher. 2008. Small mines in Utah. Utah Geological Survey. Circular 108 ISBN 978-1-55791-805-8

Bowns, J.E., C.F. Bagley. 1986. Vegetation responses to long-term sheep grazing on mountain ranges. Journal of Range Management 39:431-434.

Chong GW, Simonson SE, Stohlgren TJ, Kalkhan MA 2000.Biodiversity: aspen stands have the lead, but will nonnative species take over? In: Shepperd WD, BinkleyD, Bartos DL, Stohlgren TJ, Eskew LG (eds) Sustainingaspen in western landscapes. RMRS-P-18. USDA ForestService, Rocky Mountain Research Station, Fort Collins, pp 261–271

Doelling, H.H. 1983. Non-metallic mineral resources of Utah. Utah Geological and Mineral Survey. Map 71

Doelling, H.H., and E.W. Tooker. 1983. Mining district areas and principal metal occurrences. Utah Geological and Mineral Survey. Map 70

Fleischner, T.L. 1994. Ecological costs of livestock grazing in western North America. Conservation Biology 8:629-644. http://courses.washington.edu/esrm479/grazing2.pdf

Forman, R.T.T., and L.E. Alexander. 1998. Roads and their major ecological effects. Annual Review of Ecology, Evolution, and Systematics. 29:207-231.

Kays R., R. Costello, T. Forrester, M.C. Baker, A.W. Parsons, E.L. Kalies, G. Hess, J.J. Millspaugh, and W. McShea. 2015. Cats are rare where coyotes roam. *Journal of Mammalogy* DOI:10.1093/jmammal/gyv100

Knick, S.T. and J.W. Connelly. 2011. Greater sage-grouse and sagebrush: an introduction to thelandscape. Pp. 1-9 *in* S.T. Knick and J.W. Connelly (eds). Greater Sage-Grouse: ecologyand conservation of a landscape species and its habitats. Studies in Avian Biology (vol.38). University of California Press, Berkeley, CA.

Loss, S.R., T. Will, and P.P. Marra. 2013. The impact of free-ranging domestic cats on wildlife of the United States. Nature Communications. Doi:10.1038/ncomms2380

Miller, R.F., S.T. Knick, D.A. Pyke, C.W. Meinke, S.E. Hanser, M.J. Wisdom, and A.L. Hild. 2011. Characteristics of sagebrush habitats and limitations to long-term conservation. Pp.145-184 *in* S. T. Knick and J. W. Connelly (eds). Greater Sage-Grouse: ecology andconservation of a landscape species and its habitat. Studies in Avian Biology (vol. 38).University of California Press, Berkeley, CA.

Natural Resources Conservation Service (NRCS). 2015. Custom soil resource report. Report generated by the National Cooperative Soil Survey, Web Soil Survey. http://websoilsurvey.nrcs.usda.gov/appAOI: ClarkRanchBounds_1.Accessed July 10, 2015.

Parrish, J.R., F.P. Howe, R.E. Norvell. 2002. Utah Partners in Flight avian conservation strategy, version 2.0. Utah Division of Wildlife Resources http://utah.ptfs.com/awweb/awarchive?item=12156

Sutter, J.V. M.E. Andersen, K.D. Bunnell, M.F. Canning, A.G. Clark, D.E. Dolsen, F.P. Howe. 2005. Utah Comprehensive Wildlife Conservation Strategy (CWCS) 2005-2015. Utah Division of Wildlife Resources. http://wildlife.utah.gov/cwcs/

U.S. Internal Revenue Code (IRS) § 170 (Conservation Values are listed in section h.4.a) https://www.law.cornell.edu/uscode/text/26/170

Wilson, E.O. The little things that run the world (the importance and conservation of invertebrates). 1987. Conservation Biology 1:344-346

Woods, A.J., Lammers, D.A., Bryce, S.A., Omernik, J.M., Denton, R.L., Domeier, M., and Comstock, J.A., 2001, Ecoregions of Utah (color poster with map, descriptive text, summary tables, and photographs): Reston, Virginia, U.S. Geological Survey (map scale 1:1,175,000). ftp://ftp.epa.gov/wed/ecoregions/ut/ut_front.pdf

Links

Summaries of top priority habitats for conservation in the CWCS that are found on the Clark Ranch:

- Wetland http://wildlife.utah.gov/cwcs/02.pdf
- Shrubsteppe http://wildlife.utah.gov/cwcs/04.pdf
- Mountain shrub http://wildlife.utah.gov/cwcs/05.pdf
- Wet meadows http://wildlife.utah.gov/cwcs/07.pdf
- Aspen forest http://wildlife.utah.gov/cwcs/10.pdf

APPENDIX 1. PHOTOS

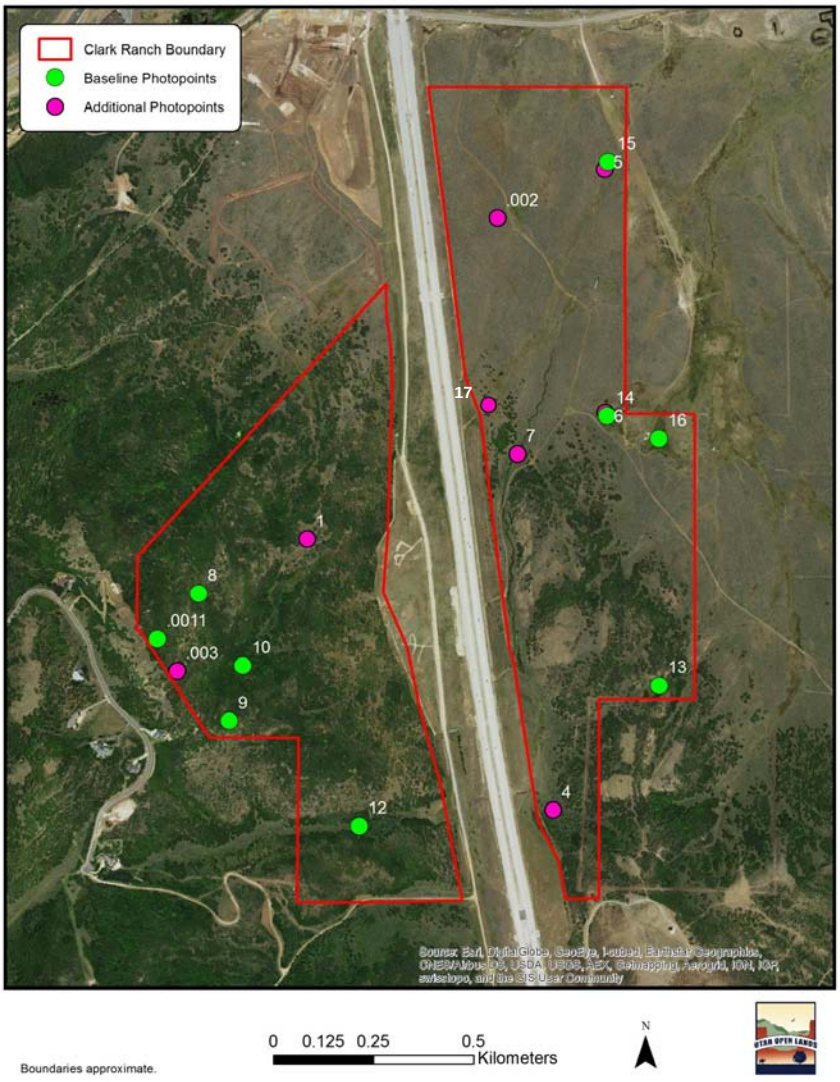


Figure 22: Map of photopoints for photos included in this baseline (including this appendix). All points are approximate.

Figure 23: Two-track road on West Parcel of the Property. Photopoint 1.

Figure 24: Shrubsteppe of northeastern potion of the Property. Photopoint 5.

Figure 25: Culvert that carries water from the Highway to the drainage on the East Parcel of the Property.Photopoint 17.

Figure 26: Outflow from spring flowing north and east toward wet meadows important for sage grouse habitat. Photopoint 14 (Photo date 07/14/2015).

Figure 27: Aspen stand on the East Parcel of the Property.Photopoint 4.

Figure 28: Abundant debris in the old intermittent stream bed on the East Parcel of the Property. Photopoint 002(Photo date 03/23/2015).

Figure 29: Trampling and erosion atspring on the southeast part of Property. Photopoint 14(Photo date 03/07/2015).

Figure 30: Nebraska sedge (foreground) and Arctic rush or wiregrass (background) in drainage on the East Parcel. Photopoint 7 (Photo date 07/14/2015).

Figure 31: A highly browsed mountain mahogany shrub.Photopoint 003.

Figure 32: A closely cropped antelope bitterbrush shrub.Photopoint 003.

APPENDIX 2. PLANTS OF CLARK RANCH

The table below lists all of the plants observed at Clark Ranch as well as summarized plot data, with average cover values for vegetation types (if multiple plots were sampled). Common name, scientific name and native status are from the USDA PLANTS database (http://plants.usda.gov/) except for a few common names that were updated to locally familiar names. Weed status is from the Utah Noxious Weed List (http://ag.utah.gov/plants-pests/noxious-weeds.html). Vegetation Types are from the Utah Division of Wildlife Resources Comprehensive Wildlife Conservation Strategy. There are 175 species in this list, which represent all of the species we observed at Clark Ranch during the 2015 field season. There are certainly a few other species present that we did not observe.

The cover values below are based on data collected in each of the vegetation types at multiple places at Clark Ranch during the 2015 field season by Mindy Wheeler, Arthur Morris and Marc Coles-Ritchie for Utah Open Lands. The Ocular-Macroplot method of the Forest Service (USDA 2008) was used. Those methods use circular plots with a diameter of 74.4 ft, which produces a 1/10th acre plot. In each plot the percent of the ground covered by each plant species was recorded. The plot locations were selected to represent the variability in these vegetation types that were observed at Clark Ranch, but these data only represent a few places on Clark Ranch, and do not necessarily represent the entire ranch. Similarly, these data cannot be used to monitor changes at the ranch.

Common Name (Scientific name)	Native Status	Weed Status	Vegetation Types and Cover Values						
			Aspen	Mountain Shrub	Northern Oak	Shrubsteppe	Wetland	Wet Meadow	Observed but not in plots
Number of Plots			3	1	2	3	1	1	
Trees									
Douglas-fir (*Pseudotsuga menziesii*)	Native		<1						
quaking aspen (*Populus tremuloides*)	Native		30						
Rocky Mountain juniper (*Juniperus scopulorum*)	Native								x
white fir (*Abies concolor*)	Native								x

Common Name (Scientific name)	Native Status	Weed Status	Vegetation Types and Cover Values						
			Aspen	Mountain Shrub	Northern Oak	Shrubsteppe	Wetland	Wet Meadow	Observed but not in plots
Shrubs									
alderleaf mountain mahogany (*Cercocarpus montanus*)	Native								x
antelope bitterbrush (*Purshia tridentata*)	Native								x
big sagebrush (*Artemisia tridentata*)	Native				8	19			
bigtooth maple (*Acer grandidentatum*)	Native		27	70					
chokecherry (*Prunus virginiana*)	Native			<1	4				
creeping barberry (*Mahonia repens*)	Native		1	1	2				
curl-leaf mountain mahogany (*Cercocarpus ledifolius*)	Native								x
elderberry (*Sambucus*)	Native								x
Gambel oak (*Quercus gambelii*)	Native		<1	25	60				
mountain snowberry (*Symphoricarpos oreophilus*)	Native		39	5	16				
narrowleaf willow (*Salix exigua*)	Native								x
Oregon boxleaf (*Paxistima myrsinites*)	Native		1	1	1				
rubber rabbitbrush (*Ericameria nauseosa*)	Native					<1			
Saskatoon serviceberry (*Amelanchier alnifolia*)	Native		3	3					
Scouler's willow (*Salix scouleriana*)	Native		2	3					
snowbrush ceanothus (*Ceanothus velutinus*)	Native								x
Utah serviceberry (*Amelanchier utahensis*)	Native				2				
Woods' rose (*Rosa woodsii*)	Native		3	<1	1				
yellow rabbitbrush (*Chrysothamnus viscidiflorus*)	Native								x
Graminoids									
arctic rush (*Juncus arcticus*)	Native						3	98	
basin wildrye (*Leymus cinereus*)	Native								x
blue wildrye (*Elymus glaucus*)	Native			3					
bluebunch wheatgrass (*Pseudoroegneria spicata*)	Native					<1			

Common Name (Scientific name)	Native Status	Weed Status	Vegetation Types and Cover Values						
			Aspen	Mountain Shrub	Northern Oak	Shrubsteppe	Wetland	Wet Meadow	Observed but not in plots
bulbous bluegrass (*Poa bulbosa*)	Introduced								x
Canada bluegrass (*Poa compressa*)	Introduced					<1			
cheatgrass (*Bromus tectorum*)	Introduced								x
clustered field sedge (*Carex praegracilis*)	Native								x
common spikerush (*Eleocharis palustris*)	Native						14		
common wheat (*Triticum aestivum*)	Introduced								x
creeping bentgrass (*Agrostis stolonifera*)	Introduced						1		
crested wheatgrass (*Agropyron cristatum*)	Introduced					23			
Douglas' sedge (*Carex douglasii*)	Native								x
field brome (*Bromus arvensis*)	Introduced				<1	<1			
foxtail barley (*Hordeum jubatum*)	Native						<1		
Geyer's sedge (*Carex geyeri*)	Native		2		11				
Hood's sedge (*Carex hoodii*)	Native		1						
Kentucky bluegrass (*Poa pratensis*)	Introduced		11	2	10	2		1	
Letterman's needlegrass (*Achnatherum lettermanii*)	Native					<1			
Liddon sedge (*Carex petasata*)	Native								x
longstyle rush (*Juncus longistylis*)	Native						10		
mountain brome (*Bromus marginatus*)	Native				1				
muttongrass (*Poa fendleriana*)	Native								x
Nebraska sedge (*Carex nebrascensis*)	Native							3	
needle and thread (*Hesperostipa comata*)	Native								x
needleleaf sedge (*Carex duriuscula*)	Native								x
nodding brome (*Bromus anomalus*)	Native		1	<1					
Northwest Territory sedge (*Carex utriculata*)	Native						4		
prairie Junegrass (*Koeleria macrantha*)	Native								x

Common Name (Scientific name)	Native Status	Weed Status	Vegetation Types and Cover Values						
			Aspen	Mountain Shrub	Northern Oak	Shrubsteppe	Wetland	Wet Meadow	Observed but not in plots
purple oniongrass (*Melica spectabilis*)	Native								x
reedgrass (*Calamagrostis*)	Native						<1		
Sandberg bluegrass (*Poa secunda*)	Native								x
slender wheatgrass (*Elymus trachycaulus*)	Native			<1	4	<1			
smooth brome (*Bromus inermis*)	Native				<1	<1			
squirreltail (*Elymus elymoides*)	Native					<1			
thickspike wheatgrass (*Elymus lanceolatus*)	Native					<1			
Wasatch bluegrass (*Poa arnowiae*)	Native								x
water whorlgrass (*Catabrosa aquatica*)	Native						<1		
western wheatgrass (*Pascopyrum smithii*)	Native					<1			
woolly sedge (*Carex pellita*)	Native								x
Forbs/herbaceous									
Algae (on surface of pond)							50		
alkali buttercup (*Ranunculus cymbalaria*)	Native						1		
American vetch (*Vicia americana*)	Native		1		2				
arnica (*Arnica*)	Native								x
arrowleaf balsamroot (*Balsamorhiza sagittata*)	Native				2				
Aster					1				
ballhead waterleaf (*Hydrophyllum capitatum*)	Native				1				
bastard toadflax (*Comandra umbellata*)	Native								x
bird's-beak (*Cordylanthus*)						<1			
broadleaf cattail (*Typha latifolia*)	Native						<1	1	
bull thistle (*Cirsium vulgare*)	Introduced							<1	
buttercup (*Ranunculus*)							<1		
Canada thistle (*Cirsium arvense*)	Introduced	C	<1				2	<1	

Common Name (Scientific name)	Native Status	Weed Status	Vegetation Types and Cover Values						
			Aspen	Mountain Shrub	Northern Oak	Shrubsteppe	Wetland	Wet Meadow	Observed but not in plots
common dandelion (*Taraxacum officinale*)	Introduced		1						
common bugloss (*Anchusa officinalis*)	Introduced								x
common mullein (*Verbascum thapsus*)	Introduced				<1	<1			
common plantain (*Plantago major*)	Introduced						<1		
common yarrow (*Achillea millefolium*)	Native		1		2	1			
curlycup gumweed (*Grindelia squarrosa*)	Native					<1			
cutleaf balsamroot (*Balsamorhiza macrophylla*)	Native								x
cutleaf nightshade (*Solanum triflorum*)	Native								x
Dalmatian toadflax (*Linaria dalmatica*)	Introduced	B				<1			
Douglas' knotweed (*Polygonum douglasii*)	Native				<1	<1			
duckweed (*Lemna*)	Native						2		
Dyer's woad (*Isatis tinctoria*)	Introduced	B							x
elkweed (*Frasera speciosa*)	Native		2	<1					
Engelmann's aster (*Eucephalus engelmannii*)	Native		4	3					
Fendler's meadow-rue (*Thalictrum fendleri*)	Native		2						
foothill deathcamas (*Zigadenus paniculatus*)	Native				<1				
Garlic mustard (*Alliaria petiolata*)	Introduced	A							x
Gardner's yampah (*Perideridia gairdneri*)	Native				<1				
goldenrod (*Solidago*)	Native				1	<1			
Great Basin Indian potato (*Orogenia linearifolia*)	Native								x
gypsyflower (*Cynoglossum officinale*)	Introduced	C		1					
hoary tansyaster (*Machaeranthera canescens*)	Native					<1			
hollyleaf clover (*Trifolium gymnocarpon*)	Native								x
horned spurge (*Euphorbia brachycera*)	Native								x
houndstongue (*Cynoglossum officinale*)	Introduced	C							x

Common Name (Scientific name)	Native Status	Weed Status	Vegetation Types and Cover Values						
			Aspen	Mountain Shrub	Northern Oak	Shrubsteppe	Wetland	Wet Meadow	Observed but not in plots
Jessica sticktight (*Hackelia micrantha*)	Native		<1						
lambstongue ragwort (*Senecio integerrimus*)	Native		<1						
lanceleaf figwort (*Scrophularia lanceolata*)	Native								x
largeflower triteleia (*Triteleia grandiflora*)	Native								x
largeleaf avens (*Geum macrophyllum*)	Native		1						
lesser rushy milkvetch (*Astragalus convallarius*)	Native								x
Lewis flax (*Linum lewisii*)	Native								x
littleflower penstemon (*Penstemon procerus*)	Native								x
longleaf phlox (*Phlox longifolia*)	Native								x
maiden blue eyed Mary (*Collinsia parviflora*)	Native								x
meadow thistle (*Cirsium scariosum*)	Native							<1	
mouse-ear chickweed (*Cerastium*)					<1				
mule-ears (*Wyethia amplexicaulis*)	Native				2				
Munro's globemallow (*Sphaeralcea munroana*)	Native					<1			
musk thistle (*Carduus nutans*)	Introduced	B	<1			<1			
narrowleaf goosefoot (*Chenopodium leptophyllum*)	Native			1	<1				
nettleleaf giant hyssop (*Agastache urticifolia*)	Native		1						
Nevada pea (*Lathyrus lanszwertii*)	Native		1	2	2				
nodding microseris (*Microseris nutans*)	Native								x
northern bedstraw (*Galium boreale*)	Native								x
Nuttall's violet (*Viola nuttallii*)	Native								x
pale agoseris (*Agoseris glauca*)	Native								x
parsnipflower buckwheat (*Eriogonum heracleoides*)	Native								x
pepperweed (*Lepidium*)									x
pinyon groundsmoke (*Gayophytum ramosissimum*)	Native				1				

Common Name (Scientific name)	Native Status	Weed Status	Vegetation Types and Cover Values						
			Aspen	Mountain Shrub	Northern Oak	Shrubsteppe	Wetland	Wet Meadow	Observed but not in plots
povertyweed (*Iva axillaris*)	Native					1			
pricklypear (*Opuntia*)	Native								x
pussytoes (*Antennaria*)	Native								x
redroot buckwheat (*Eriogonum racemosum*)	Native								x
roughfruit fairybells (*Prosartes trachycarpa*)	Native		1						
Russian knapweed (*Acroptilon repens*)	Introduced	B							x
Scotch cottonthistle (*Onopordum acanthium*)	Introduced	B							x
scrambled eggs (*Corydalis aurea*)	Native				1				
seep monkeyflower (*Mimulus guttatus*)	Native						<1		
sego lily (*Calochortus nuttallii*)	Native								x
shortstyle bluebells (*Mertensia brevistyla*)	Native								x
showy goldeneye (*Heliomeris multiflora*)	Native				1	<1			
silky lupine (*Lupinus sericeus*)	Native		<1			<1			
slender cinquefoil (*Potentilla gracilis*)	Native		1		<1				
snakeweed (*Gutierrezia*)									x
spotted stickseed (*Hackelia patens*)	Native								x
spreading fleabane (*Erigeron divergens*)	Native								x
starry false lily of the valley (*Maianthemum stellatum*)	Native		3						
sticky cinquefoil (*Potentilla glandulosa*)	Native				<1				
sticky purple geranium (*Geranium viscosissimum*)	Native		2						
stinging nettle (*Urtica dioica*)	Native								x
sulphur-flower buckwheat (*Eriogonum umbellatum*)	Native					<1			
sweetcicely (*Osmorhiza berteroi*)	Native		2	1					
sweetclover (*Melilotus*)									x
tiny trumpet (*Collomia linearis*)	Native				<1				

Common Name (Scientific name)	Native Status	Weed Status	Vegetation Types and Cover Values						
			Aspen	Mountain Shrub	Northern Oak	Shrubsteppe	Wetland	Wet Meadow	Observed but not in plots
tuber starwort (*Pseudostellaria jamesiana*)	Native		<1		1				
twolobe larkspur (*Delphinium nuttallianum*)	Native								x
unknown forb w long leaves						<1			
unknown forb w ovate, toothed leaf					<1				
unknown forb, very thin						<1			
Wasatch beardtongue (*Penstemon cyananthus*)	Native								x
water speedwell (*Veronica anagallis-aquatica*)	Native						3		
wavyleaf thistle (*Cirsium undulatum*)	Native					<1			
western aster (*Symphyotrichum ascendens*)	Native				1	1			
western coneflower (*Rudbeckia occidentalis*)	Native		<1						
western tansymustard (*Descurainia pinnata*)	Native				<1				
western valerian (*Valeriana occidentalis*)	Native		5						
western wallflower (*Erysimum asperum*)	Native								x
white sagebrush (*Artemisia ludoviciana*)	Native		1			<1			
whitetop (*Cardaria draba*)	Introduced								x
willowherb (*Epilobium*)	Native						1	<1	
Wyoming Indian paintbrush (*Castilleja linariifolia*)	Native					<1			
yellow salsify (*Tragopogon dubius*)	Introduced				<1	<1			
yellow toadflax (*Linaria vulgaris*)	Introduced	A							x

More data from the vegetation plots are presented below.

Northern Oak woodlandsat Clark Ranch

Attribute	Data (from 2 plots)
Native species count	86-100% of the species at a plot
Native species cover	99% cover
Invasive species	none (undesirable species: common mullein and yellow salsify with cover of 1% each)
Tree density	approximately 900 Gambel oak stems/acre (about 3 inch diameter stems)
Ground cover	about 90% plant litter and 2% bare ground
Browsing	low to moderate browsing on shrubs (Gambel oak, mountain snowberry and chokecherry)

Aspen Forest at Clark Ranch

Attribute	Data (from 3 plots)
Native species count	86-100% of the species at a plot
Native species cover	99% cover
Invasive species	Canada thistle and musk thistle (cover <1% each). Other plants indicative of disturbance: common dandelion, Kentucky bluegrass
Tree density	not recorded
Ground cover	not recorded
Browsing	not recorded

Shrubsteppe at Clark Ranch

Attribute	Data (from 3 plots)
Native species count	65-85% of the species at a plot
Native species cover	70% cover
Invasive species	Dalmatian toadflax, musk thistle (undesirable species: common mullein and yellow salsify with cover of 1% each)
Tree density	none

Ground cover	about 85% plant litter, 5% bare ground, 4% ungulate droppings and 1% moss (remainder is basal cover of plants)
Browsing	high level of browsing of the rabbitbrush and Indian paintbrush

Wetland areas at Clark Ranch

Attribute	Data (from 1 plot)
Native species count	77% of the species at a plot
Native species cover	92% cover
Invasive species	Canada thistle, musk thistle
Tree density	none
Ground cover	Plant litter is abundant; bare ground was only about 4%
Browsing	graminoids and forbs were browsed

Wetland measurements: open water about 31 x 13 ft and a total wetland area of 59 x 31 ft.

Wet Meadows at Clark Ranch

Attribute	Data (from 1 plot)
Native species count	71% of the species at a plot
Native species cover	highly variable (50-90% cover)
Invasive species	musk thistle, Canada thistle,
Tree density	none
Ground cover	Plant litter is abundant; bare ground was only about 4%
Browsing	grazing and trampling was evident

Mountain Shrub communities at Clark Ranch

Attribute	Data (from 1 plot)
Native species count	95% of the species at a plot
Native species cover	99% cover
Invasive species	houndstongue (cover 1%)
Tree density	approximately 2,000 maple trees/acre (about 2 inch diameter stems) and 400 Gambel oak stems/acre
Ground cover	plant litter was very abundant and thick (mostly maple leaves); no bare ground visible.
Browsing	high level of browsing on the Scouler's willow