Vocational Heavy Construction Technology Program

A Comprehensive Plan including Program Needs and Future Directions

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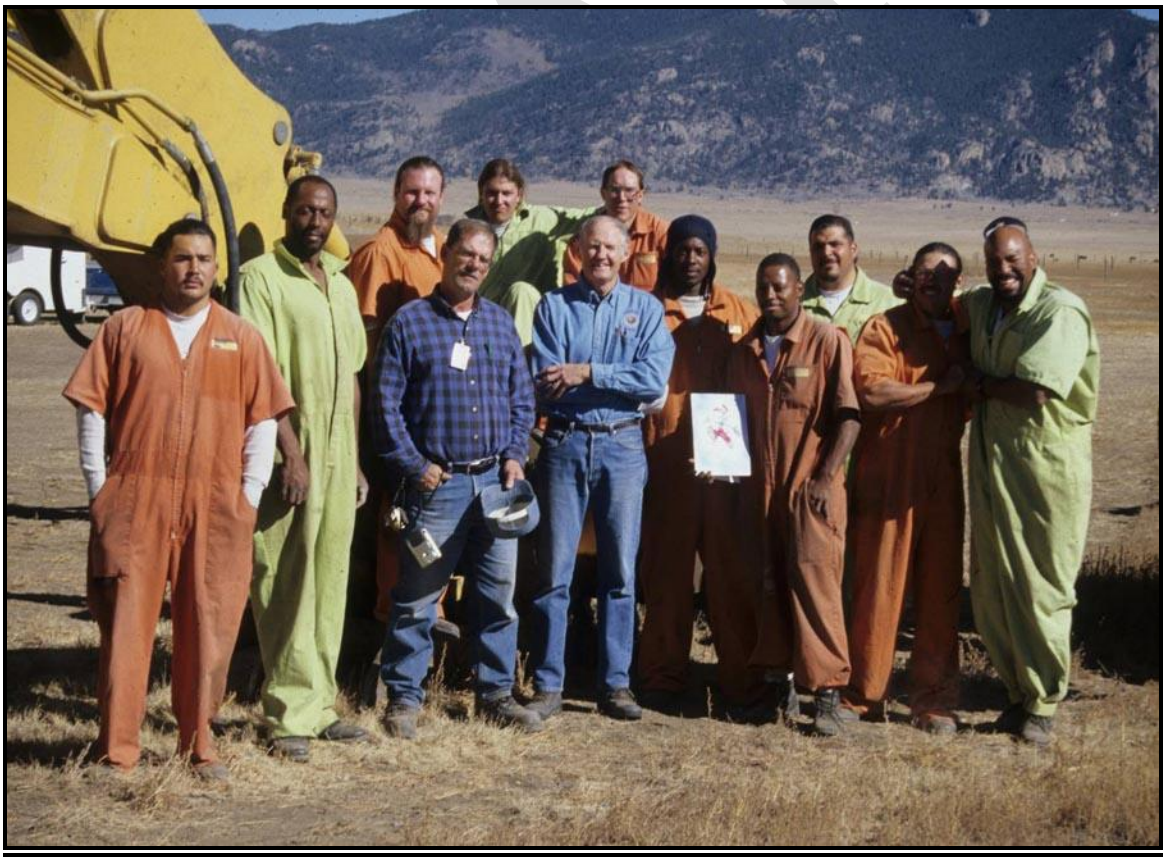
April 2007



EXECUTIVE SUMMARY

In 1997 Warren Diesslin, former Warden of the Buena Vista Correctional Facility, and Eddie Kochman, former Colorado Division of Wildlife (CDOW) Aquatic Section Manager, met and discussed a joint venture to rehabilitate degraded stream habitats while providing heavy construction training for inmates sincere about changing the direction of their lives. These men conceived and supported the vision of what is now known as the Vocational Heavy Construction Technology (VHCT) program. Tom Bowen, once a prison guard and later a Colorado Department of Corrections (CDOC) vocational educational instructor with years of practical heavy construction experience, developed and coordinated this program with the support and approval of Warden Diesslin. Tom contacted the Colorado Contractors Association (CCA) and they agreed to serve as a program sponsor. The CCA has since become an integral part of the program, serving as the advisory board and assisting student inmates with job placement once they have successfully completed the program. Through the VHCT program, two state agencies (CDOW and CDOC) and private industry have formed a rare partnership with different missions: to help redirect human lives while restoring river natural processes and aquatic habitats within driving distance of the Buena Vista Correctional Facility.

Student inmates have rehabilitated 8.7 miles of degraded aquatic stream habitats on CDOW properties located along the South Platte River in South Park. South Park was identified as an ideal location to implement the program because CDOW owns or leases over 25 miles of public fishing waters in the Upper South Platte River drainage and its close proximity to the Buena Vista Correctional Facility. Much of the South Platte River in South Park is degraded due to excessive livestock grazing and mining. To date, 127 student inmates have graduated from the VHCT program. Program recidivism rate is 12% compared to a 60% overall recidivism rate in the Colorado penal system.

Through FY 2006-2007, CDOW/CDOC river restoration projects in South Park have cost a total of $21/linear foot. A survey of six recent river restoration projects in Colorado conducted by private companies range in cost from $61-$390/linear foot. The average cost for these private-industry projects was $218/linear foot. The VHCT program realizes on average a 90% cost savings, or up to 20 times less expensive than private industry. Private industry is also benefiting by being able to hire from a pool of well-trained, highly qualified heavy equipment operators. Cost of CDOW/CDOC projects in South Park range from $47,000-$148,000/year, with an average cost of $108,865/year. The total cost for eight years of construction is $979,785.

Over 20 different habitat treatments have been implemented in South Park that fall within three functional categories: restoring river natural processes, reducing bank erosion, and enhancing aquatic habitat for sport fish. Treatments include the use of rock, stumps, logs and riparian plants for bank re-vegetation.

CDOW personnel will work with the VHCT program again this year (FY 2007-2008), as well as in the future, continuing ongoing efforts aimed at restoring degraded stream habitats in South Park. However, a new research phase will begin that includes evaluation and monitoring of restored aquatic habitats, quantifying how various stream habitat improvements translate into positive changes in sport fish biomass, carrying capacity, improved angler opportunities, as well as addressing other complex research questions.

I. INTRODUCTION

A. Purpose of the Vocational Heavy Construction Technology Program

The Vocational Heavy Construction Technology (VHCT) program exists to provide student inmates with education and training that will equip them with the basic life and work skills necessary to obtain employment with a construction company once they have completed their sentences. This program is a cooperative program between the Colorado Department of Corrections (CDOC) and the Colorado Contractors Association (CCA). The Colorado Division of Wildlife (CDOW) has been the major customer of the program, particularly in South Park where natural river processes and aquatic habitats have been restored nearly nine miles of the South Platte River.

B. Why Restore Rivers?

Overall health of river aquatic habitats generally deteriorate because of poor land use in the watershed and riparian areas, accelerated stream bank erosion, poor water quality and stream flow regimes altered by water use such as irrigation diversions or transport of water via the stream for domestic purposes. When this occurs fish and aquatic habitats are degraded.

Past land practices have caused many portions of the South Platte River to become degraded in South Park. Some of the major factors leading to the South Platte River's current degraded state include historic mining operations, channelization for irrigation and to accommodate railroads, extermination of beaver, changes in the natural stream flow regime due to water impoundments and long-term affects due to overgrazing.

River restoration projects can improve river bank stability, natural river processes and in-channel aquatic and fish habitats. Our river restoration experience and studies indicate the most severe cause of aquatic and trout habitat degradation can be traced to eroding stream banks and over width river channels. Our river restoration projects concentrated in these two areas, encouraging natural river processes.

Completed channel improvements in South Park have nearly doubled adult and juvenile brown trout WUA (weighted useable area, Milhous et al. 1984). Trout biomass also increased almost 2.5 times with channel improvements. The increase in biomass was from new trout production and migration of fish into newly created habitat.

In addition to these direct measures of success, the Statewide Fish Management Policy states several principles related to river restoration.

1. **The long-term health of aquatic systems, including both habitat and fisheries, is paramount.**

2. **Providing recreational fishing opportunity will be an important objective of the Colorado Division of Wildlife.**

3. The protection of native species and their habitats is a priority.

Thus, it follows that both the protection of existing healthy fisheries habitat as well as restoring degraded habitats back to a healthy state should be a high priority in regards to fisheries management. River restoration activities not only rehabilitate existing degraded aquatic habitats for fish, but also can potentially create new fish habitat where formerly no fish were present. The goal of river restoration work is to repair degraded aquatic habitats and thus influence the long-term health of aquatic systems. New recreational fishing opportunities are created either through rehabilitation of degraded fish habitat (marginal habitats), enhancement of aquatic habitat to address factors that limit fish populations, and/or creation of new aquatic fish habitat where there once was no habitat at all. Therefore, the Statewide Fish Management Policy provides a clear mandate for restoring streams and rivers in Colorado.

In addition to the Statewide Fish Management Policy, the Colorado Division of Wildlife 2002-2007 Strategic Plan states the following under F-1, Fishery Habitat Quantity and Quality:

"Healthy aquatic environments are essential to maintain healthy and viable fisheries, and critical for self-sustaining populations. The Division desires to protect and enhance the quality and quantity of aquatic habitats."

The desired achievement, F-1.1, is to "protect and enhance existing quantity and quality of habitats available to support fish populations." One of the performance measures listed under this desired achievement is to "Quantify performance targets for in-stream flows, conservation pools, purchase or lease of water for aquatic habitat and habitat improvements." Included under Recommended Means are two statements:

1. **Protect the quality of habitat through** working partnerships to achieve pollution abatement, environmental protection, and **physical habitat improvements**.

2. **Take actions to minimize the negative impacts upon aquatic habitats resulting from human activity.**

The most recent statewide resident Angler Survey conducted in 2004 helps to direct priorities of aquatic habitat restoration. The following information is from the 2004 Colorado Angler Survey Summary Report (March 2006).

The 2004 Angler Survey reaffirms the importance of trout fishing in Colorado since seventy-six percent of resident anglers list "trout" as their preferred fish. All of Colorado's coldwater habitats, including seasonally cold waters, are important in meeting the statewide demand for trout fishing. Most of the restoration efforts conducted in Colorado have focused on coldwater habitats containing trout, including all work conducted in South Park by through the VHCT program.

When queried about where anglers prefer to fish, the majority of anglers of all license types say they most often fish in mountain lakes, followed by coldwater streams and lakes in lower

elevations. Almost all restoration work conducted through the VHCT program has involved restoration of coldwater streams.

When licensed anglers were presented with a list of potential steps the CDOW could take to encourage them and other anglers to fish more, the top most frequently mentioned steps (in order of preference) by anglers were:

1. Improve the quality and size of fish.
2. Increase access to fishing locations on private land.
3. **Improve fish habitat.**
4. Stock more catchable trout.
5. Provide better information on where to fish.

Thus, the angling public recognizes the importance of fish habitat improvement as a way to encourage themselves (and other anglers) to fish more. They even ranked fish habitat improvement as more important than increasing the numbers of stocked catchable trout.

II. VHCT PROGRAM BACKGROUND

A. History

The VHCT program began during the mid 1990's after Warren Diesslin, former Warden of the Buena Vista Correctional Facility, and Eddie Kochman, former CDOW Aquatic Section Manager met several times, starting in 1997, and discussed a joint venture to rehabilitate degraded stream habitats in South Park, CO while simultaneously providing heavy construction training for inmates sincere about changing the direction of their lives.

Tom Bowen coordinated and developed the new VHCT program with the support and approval of Warden Diesslin. While creating the program, Tom benefited from his past work experience, including working as a prison guard and later as a DOC vocational educational instructor with years of practical heavy construction experience. Tom had a vision for the program that would enable inmates to more effectively transition from prison back to society with the hope of a secure, well-paying job once they had completed the program. Tom's belief was that out of such a program, lives would ultimately be changed and recidivism reduced. Tom located a willing program sponsor in the Colorado Contractors Association (CCA). Among other important functions, the CCA serves as an advisory board to assist students with job placement once they have completed the program. The VHCT program brought together two state agencies (CDOW and CDOC) with different missions and a major trade association, the CCA, in a rare partnership: to help redirect human lives while restoring river natural processes and aquatic habitats within driving distance of Buena Vista (see VHCT program brochure, Appendix A).

The first CDOW/CDOC river restoration project was completed in 1998 (Figure 1). The CDOW paid for restoration materials including boulders, trees, and cobble; heavy equipment rentals; inmate salaries (at $.60 per hour) and provided on-the-job technical assistance. This first river restoration project using student inmates was highly successful in terms of enhancing aquatic habitat for sport fish and restoring natural river processes. More importantly when these inmates (about 20 students) were released from prison, they all found jobs in the construction industry and were successful in turning their lives around.

Figure 1. Photo of VHCT inmates involved in the first restoration project in South Park, 1998.

Based on the early success of river restoration projects through the VHCT program, former CDOW Director, John Mumma, earmarked $1,000,000 of capital construction monies for river restoration projects in South Park over a five-year period. CDOW has continued funding river restoration work in South Park through 2007. CDOW invested monies for restoration projects because of the significant cost savings resulting from this program (up to 90% cost savings) and because it allowed CDOW aquatic researchers (technical managers) opportunities to implement on-the-ground creative ideas without expensive change-order charges during construction. This project cost savings plus the valuable vocational training during river restoration projects made this a win-win situation for inmates, the CDOW, CDOC and subsequently the private sector contractors who hire heavy equipment operators.

B. Student Inmate Rehabilitation Program

Only student inmates sincere about changing their lives and lacking heavy equipment experience are admitted as candidates for the VHCT program. Student applicants must have a high school education or equivalent and be approved through an interview process with the Program Advisory Board (CCA). The program provides hands-on training related to operating heavy equipment and obtaining necessary experience to gain employment within the construction industry at a salary considerably higher than employment available to them prior to incarceration. On-the-job training includes heavy equipment operation, heavy equipment maintenance, surveying skills, blueprint reading, development of various additional construction job skills, teamwork development, inmate behavioral changes and leadership training. The VHCT program aids inmates in redirecting their lives once they are released from prison, as evidenced by the reduced recidivism rates of inmates successfully graduating from the program. The VHCT program is self supporting using the monies generated from contracts with customers, primarily public entities.

The VHCT program works because it instills a work ethic which enables inmates to develop self confidence on the job and in their lives, and it helps students develop individual job skills. Alumni provide an important safety net to recent graduates during the first critical months after leaving prison. The program has also served to build interpersonal relationships as alumni assist recently released graduates by loaning them money to buy work clothing and safety equipment for their jobs. They also assist newly released students to find jobs. Once inmates graduate from the program and are released from prison, they live in a halfway house. CDOC program staff, VHCT program alumni, and CCA members work together to assist inmates with securing a job in the construction industry.

Besides the CDOW, the VHCT program also contracts for natural resource construction projects with Federal agencies, the U.S. Fish and Wildlife Service, and U.S. Forest Service and public entities including the Denver Water Department, Trout Unlimited and Park County-Upper South Platte Coalition.

III. VHCT PROGRAM RESULTS

A. River Restoration

A major component of the VHCT program has been to restore natural river processes and in-stream aquatic habitats. To date, student inmates have rehabilitated 8.7 miles of degraded aquatic stream habitats on CDOW properties located along the South Platte River in South Park (Table 1). Stream habitat rehabilitation utilized 22 different habitat treatments that fall within three functional categories: restoring river natural processes, reducing bank erosion, and enhancing aquatic habitat for sport fish (Table 2). Treatments include the use of rock, stumps, logs and riparian plants for bank revegetation. South Park was identified as an ideal location to implement the program because CDOW owns or leases over 25 miles of public fishing waters in

the Upper South Platte River drainage and because of its close proximity to the Buena Vista Correctional Facility. Much of the South Platte River in South Park is degraded due to excessive livestock grazing and mining. Through FY 2006-2007, CDOW/CDOC river restoration projects in South Park have cost an average of $21/linear foot. A survey of six recent river restoration projects conducted in Colorado by private companies range in cost from $61-$390/linear foot (Table 3). The average cost for these private industry projects was $218/linear foot. Stream restoration cost savings utilizing the VHCT program result in an average cost savings of 90%, or up to 20 times less expensive than private industry.

Table 1. CDOW stream restoration projects completed using the VHCT program including year of project completion, restoration location, county, length of stream restored, costs, major treatments implemented, land ownership, and primary funding sources.

Year	Stream	County	Project			Ownership	Funding
			Length (miles)	Cost (total/per linear ft)	Major Treatments		
1998	South Platte River	Park	.2	$97,850 / $92.66	Reduce channel width, excavate pools, boulder & log placement	Colo. State Parks	CDOW/Cap. Const.
1999	South Fork of South Platte River	Park	.7	$139,610 / $37.77	Excavate new channel, Boulder and log placement	Denver Water Dept.	DWD/CDOW Cap. Const.
2000	Threemile Creek	Park	.5	$138,000 / $52.27	Constructed new flood channel for Threemile Creek, dam and retention lake.	CDOW/Lower Spinney SWA	CDOW/Cap Const.
200l	South Platte River	Park	.9	$148,000 / $31.14	Reduce channel width, excavate pools, boulder & log placement	CDOW/Lower Spinney SWA	CDOW/Cap Const.
2002	South Fork of South Platte River	Park	1.2	$146,000 / $12.57	reduced channel width, excavate pools	CDOW/ Knight/Imler SWA	CDOW/Cap. Const.
2002	South Fork of South Platte River	Park	1.0		reduced channel width, excavate pools , boulder & log placement	CDOW/ Badger Basin SWA	CDOW/Cap. Const.
2003	South Platte River	Park	1.0	$128,725 / $24.38	reduce channel width, excavate pools, boulder & log placement	Aurora/Colo. State Park	CDOW/Cap. Const.
2004	South Platte River	Park	.3	$47,000 / $29.67	reduce channel width, excavate pools, boulder placement	CDOW/Lower Spinney SWA	CDOW/Cap. Const.
2005	South Fork of South Platte River	Park	1.7	$84,000 / $6.92	Installed streamflow structures and developed existing channels, excavate pools	CDOW/Upper Spinney SWA	CDOW/Cap Const.
2005	Tarryall Creek	Park	.6		Reduce channel width, excavate pools, willow & log placement	CDOW/ Tarryall SWA	CDOW/Cap Const.
2006	South Fork of Middle South Platte River	Park	.6	$50,600 / $15.97	Reduce channel width, excavate pools, boulder & log placement	CDOW/ Badger Basin SWA	CDOW/Cap Const.
Total	**All Streams**	**Park**	**8.7**	**$979,785 / $21.33**	**> 20 total treatments applied**	-	-

Table 2. Benefits assigned to river channel and aquatic/trout habitat treatments used in restoration projects.

Treatments to Improve Natural River Processes			
River Channel Treatment	Benefits		
	Natural processes	Reduces bank erosion	Aquatic habitats
Reduce river channel width	Primary	Secondary	Primary
Pool excavation	Primary	Secondary	Primary
Elevate riffle substrate	Primary	Limited	Primary
Woody overhead trout cover	Primary	Secondary	Primary
Riparian vegetation	Primary	Primary	Secondary
Riparian bench	Primary	Primary	Secondary
Woody Material Treatments Used to Reduce River Bank Erosion			
River Bank Treatments	Benefits		
	Natural processes	Reduces bank erosion	Aquatic habitats
Log spur	Secondary	Primary	Secondary
Log vane	Secondary	Primary	Secondary
Horizontal log	Secondary	Primary	Primary
River bank root wad	Secondary	Primary	Primary
Channel-edge log/root wad	Secondary	Primary	Primary
Boulder Treatments Used to Reduce River Bank Erosion			
River Channel Treatments	Benefits		
	Natural processes	Reduces bank erosion	Aquatic habitats
Cross vane	Secondary	Primary	Primary
Single boulder deflector	Secondary	Primary	Secondary
Hard point	Secondary	Primary	Limited
Boulder J hook	Secondary	Primary	Primary
Boulder vane	Secondary	Primary	Secondary
Treatments to Enhance Mid-Channel Aquatic and Trout Habitats			
Aquatic Habitat Treatments	Benefits		
	Natural processes	Reduces bank erosion	Aquatic habitats
Random boulders	Limited	Limited	Primary
Boulder clusters	Limited	Limited	Primary
Rock garden	Limited	Limited	Primary
Stumps	Limited	Limited	Primary
Mid-channel root wads	Limited	Limited	Primary
Off bank root wads	Limited	Secondary	Primary

Table 3. Cost comparison of six major river restoration projects from Colorado with river restoration costs using the VHCT program including stream name, river restoration collaborators, miles of river restored, restoration cost, and reasons for restoration.

Stream name	River restoration company/ organization	Miles restored	Cost per linear foot	Reason for restoration
Blue River	Northwest Colorado Council of Governments (NWCCOG), Town of Silverthorne, T.U., National Forest Foundation, CDOW, and Denver Water	0.6	$61	Enhance aquatic habitats and channel reconstruction
Little Snake River	Dave Rosgen, Wildland Hydrology	10.5	$90	Enhance aquatic habitats, channel reconstruction, and riparian revegetation
San Miguel River (Phase I)	Town of Telluride (Public Works)	0.7	$200	Restoration included: creation of an instream sedimentation basin, implementing bank stabilization treatments, creating and improving wetlands, developing riparian habitats, enhancing aquatic habitat, and placing instream hydraulic structures.
Eagle River (Edwards Eagle River restoration)	Eagle River Watershed Council	1.6	$236	Enhance aquatic habitats, channel reconstruction, and riparian revegetation
Lefthand Creek	CDOW, City of Longmont (Public Works), Parks and Open Space, CDOT, Longmont Power and Communications, Carter & Burgess, Duran Excavating, Aquatic and Wetlands Company, and Property Owners	0.9	$333	Channel reconstruction, floodplain reconnection, and riparian revegetation
West Ten-mile Creek		0.4	$390	Channel reconstruction and riparian revegetation
South Platte River	**CDOW/CDOC (VHCT program)**	**8.7**	**$21**	**Restore natural river processes, reduce bank erosion, enhance aquatic habitats**

B. Restoration of Inmate Lives

Another part of the program's mission is to develop student inmate work ethics necessary to succeed in the industry as well as society. The VHCT program fosters an environment that promotes integrity, trust, responsibility and confidence. The program encourages changes in behavior, changes in the way students think and helps them to establish priorities and goals necessary to get a "fresh start" in life. Inmates receive a minimum of 18 months of on-the-job training in heavy equipment and maintenance. To date, 127 student inmates have graduated from the VHCT program. Only 15 students have returned to prison because they violated program rules. The program recidivism rate is 12% compared to a 60% overall recidivism rate in the Colorado penal system. A major accomplishment that has taken place with this program is the mentoring of recent VHCT program graduates from VHCT alumni. This is particularly true for those students when they reach the halfway house.

Typical salary range for program graduates is $15.00-$18.00/hour with an annual salary of $40,000-$50,000 (including overtime wages). For example, one program graduate is now a project superintendent in Denver for a large construction company and has an annual salary of $72,000/year. Another graduate started his own roofing company in Montrose and hires inmates on release from local jails.

IV. PROGRAM COSTS AND BENEFITS

A. Inmate Incarceration

On average, each inmate returning to prison costs taxpayers about $35,000 per year. The break-even point of a $600,000 expenditure (cost for four pieces of heavy equipment) would be reached when 17 former inmates were returned to prison for one year. The VHCT program has a 12% recidivism rate compared to 60% for the statewide penal system. A one-time cost of $600,000 over a 10-year period appears to be a sound investment for this program because it has reduced recidivism by 48%. The program has graduated 112 inmates that are now tax-paying citizens living crime-free lives.

B. River Restoration Costs

River restoration projects completed by this CDOW/CDOC program have provided savings ranging from 31-90% over private industry costs. The actual improvement to the fishery, in terms of increased biomass per mile or increase in the proportion of quality-sized fish has not been well-estimated or studied. However, the number of angler hours that restored river segments provide over un-restored segments is greatly increased (personal communication, Jeff Spohn CDOW fisheries biologist). This change in the total number of angler hours (recreation opportunity) from before and after river restoration projects has also not been well-studied and only weak data exist to document changes in angler use in these areas. However, anglers have expressed high satisfaction with their experience in fishing restored segments of the South Platte River.

IV. COMMITTEE RECOMMENDATIONS

A. Background

During the winter and spring of 2007, committee members met on several occasions to discuss VHCT program needs and recommendations for the future. The committee identified the following conditions as necessary to ensure the VHCT program's continued ongoing success. In addition to the VHCT program's contributions to restoring portions of the South Platte River, CDOW research will focus on quantifying how habitat improvement work has increased angling opportunities, increased the level of angler use and satisfaction, and how specific habitat improvement treatments perform over time.

B. VHCT Program Expansion

If the program owns its own heavy equipment, the cost savings could be passed on to other state agencies like Colorado State Parks and Colorado Bureau of Mines and Reclamation. The Aurora Water Department and Superfund sites in the Leadville area may also have an interest in the services provided by this program. The program could also potentially be expanded to other locations in Colorado that have candidate river restoration sites nearby a state correctional facility (Rifle or Delta). While this paper focuses on aquatic program benefits, there are similar opportunities for terrestrial programs to benefit from the VHCT program. The CDOC facility at Sterling could be a prime example where medium security inmates can receive similar training. A small program currently exists at Sterling, but CDOW has not yet contracted for services.

Future projects in South Park will continue to focus on the most degraded sections of the South Platte River. A total of 7.2 miles of degraded river segments have been identified as candidate sites that would benefit from CDOW/CDOC river restoration projects (Table 5).

Table 5. Prioritized South Park stream channels segments and projects that would benefit from CDOW/DOC restoration projects.

Stream	Length (mile)	Primary Treatment	Project Description
Middle Fork/ South Platte River	2.5	Reduce channel width, Excavate pools	Upper Spinney SWA/Lower end of Badger Basin perpetual easement
South Fork of South Platte River	1.0	Reduce channel width, Excavate pools	River reach upstream of Badger Basin HQ - Lower end of Badger Basin perpetual easement
South Fork of South Platte River	1.0	Reduce channel width, Excavate pools	Badger Basin perpetual easement adjacent to Hartsel town site
South Platte River	1.0	Reduce channel width, Excavate pools	Lower Spinney SWA (Dream Stream)
South Platte River	1.0	Reduce channel width, Excavate pools	River segment downstream of Park Co. Rd 59.
Tarryall Creek (upstream from Tarryall Res.)	.5	Design new stream channel & irrigation diversion	Construct new stream channel and irrigation diversion.
Tarryall Creek (Upper SWA segment)	.2	Design trout passage around an irrigation diversion structure	Construct trout passage structure over irrigation diversion
Total	**7.2**	**-**	**-**

C. Research Opportunites

Sport Fish Enhancement

Future research opportunities associated with river restoration work in the South Platte include the following: a comprehensive study that would seek to quantify how habitat improvements have increased carrying capacity in streams, increased sport fish biomass, changed the number of quality-sized sport fish and assisted in addressing limiting factors/conditions that might otherwise preclude sport fish enhancement (in terms of total biomass). Determining whether particular habitat treatments are more appropriate than others to maximize the benefits to sport fish, whether particular habitat treatments would favor rainbow trout over brown trout (or favor one particular fish species over another, including non-desirable species). Developing a comprehensive plan for monitoring stream habitat improvements over time and developing modeling techniques that would assist in addressing these questions (simulating various habitat treatment scenarios under varying flow conditions, etc.).

Improvements in Angler Use

Another research objective would be to quantify how habitat improvements increase recreational angling use and increase the total number of angler hours per stream mile. A program creel

study may be appropriate to document angler use of restored versus un-restored stream segments. This is important in determining how habitat improvement projects might increase angler use annually, an important economic incentive to consider when planning future restoration projects.

D. Heavy Construction Equipment Needs

Field CDOC staff and CDOW biologists have identified four pieces of heavy construction equipment that are needed to insure the program's continued success. Currently, the most expensive part of the river restoration projects (annually) is heavy construction equipment rentals (Figure 3). Specific equipment needs include an excavator with an attached hydraulic thumb, a front end loader, a backhoe with attached hydraulic thumb and a road grader. The estimated life of this equipment could be as high as 10 years. The total cost for these four pieces of heavy equipment would be approximately $600,000, depending upon price quotes and contributions by the construction industry (Table 4).

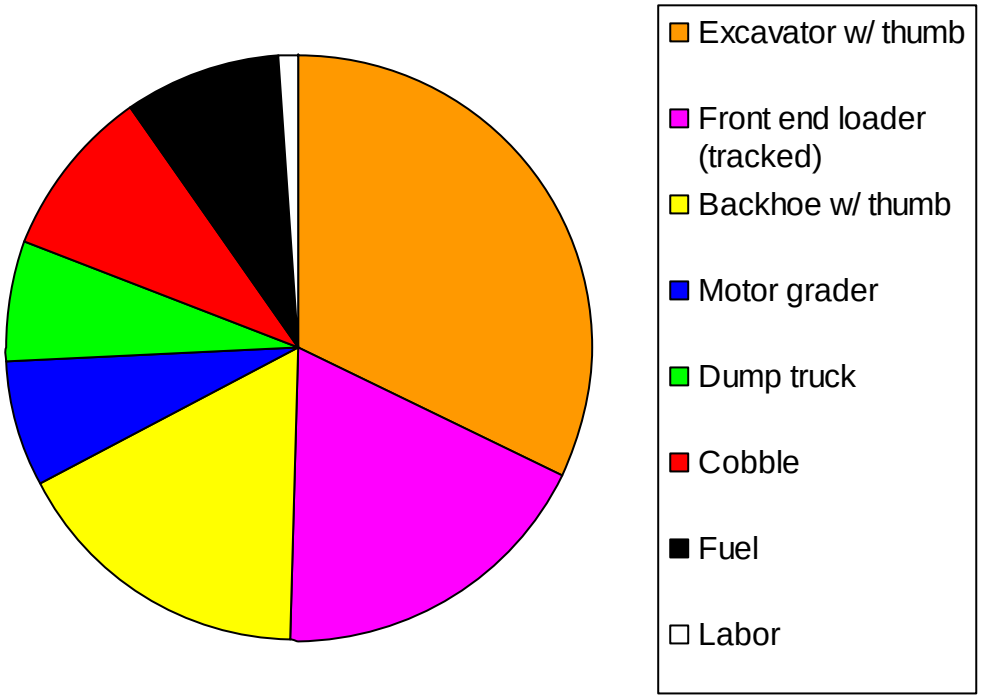


Figure 3. Typical costs associated with 3 month restoration project (based on FY 05-06 values). Cost percentages include the following: heavy equipment rental = 81%, treatment materials = 9.5%, fuel = 8.5% and labor = 1%.

Table 4. Equipment costs (purchase and lease) for 4 pieces of heavy construction equipment necessary to perform stream restoration projects.

Heavy equipment	Annual lease	Purchase
Excavator w/ attached hydraulic thumb	$68,100	$189,750
Front-end loader	$58,000	$125,400
Road grader	$58,000	$200,000
Backhoe w/ attached hydraulic thumb	$36,000	$89,825
Total	$220,100	$604,925

If the VHCT program had its own heavy equipment, seat time for inmates would not be limited by the short-time period that heavy equipment is leased. Inmates could spend more time learning operational and maintenance skills as well as developing additional skills if the equipment was available on-site and on a year-round basis.

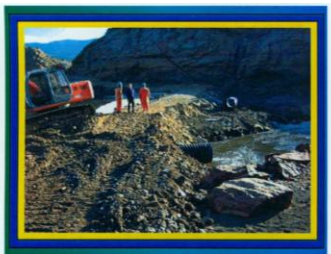
E. Conclusions

The VHCT program consists of a rare partnership between the CDOC, CDOW, and private industry. The program has endured for nearly 10 years in spite of numerous obstacles and challenges. Each party involved realizes a tremendous benefit from this relationship, as well as society as a whole. The CDOC ultimately benefits by successfully rehabilitating inmates and lowering the overall recidivism rate for prisoners in the Colorado penal system, the CDOW benefits by improving degraded stream habitat and increasing angling opportunity and satisfaction completed at a fraction of the expense required if using private contractors, the private industry benefits from a pool of well-trained individuals from which to hire from, and society as a whole benefits from the program when inmates are successfully rehabilitated and reintegrated into society as law-abiding, tax-paying citizens holding down a steady job. A unique program such as this deserves the attention and financial support necessary to ensure its continued success.

VI. CITATIONS

Milhous, R. T., D. L. Wegner, and T. Waddle. 1984. User's Guide to the Physical Habitat Simulation System. Instream Flow Information Paper 11. U.S. Fish Wildl. Serv. FWS/OBS-81/43 Revised. [475 pp.]

Appendix A.



Companies Who Have Hired Our Graduates

- *American Civil-Constructors*
- *Hamon*
- *Power Motive*
- *Swerdfeger*
- *Tarco*
- *Tierdale*

PROGRAM BENEFITS TO THE EMPLOYER

1) EMPLOYEE TRAINING
   a) Computer Literate
   b) Construction Experience
   c) Trained Operator
   d) Safety Trained
   e) Supervisory Experience
   f) Surveying Skills

2) EMPLOYEE OFFERS
   a) Employer Tax Credit of $2,400
   b) Self Motivated
   c) Positive Work Ethics

COMMUNITY BENEFITS

1. Monitored Reintegration
2. Immediate Job Placement
3. Mandatory Deductions for Child Support and Restitution.

PROGRAM SPONSORS AND STAKE HOLDERS

Colorado Contractors Association
Operating Engineers Union Local #9
Heavy Equipment Training Institute
Colorado Department of Corrections
Community Corrections
Independence House
Parole / I.S.P.

designed by WM. BLOWE 2002 vocational heavy equipment

VOCATIONAL HEAVY CONSTRUCTION TECHNOLOGY PROGRAM

Program Administrator:
Thomas G. Bowen
(719) 221-2234

Program Locations:
Buena Vista Minimum Center
Rifle Correctional Center
Sterling Correctional Center

PROGRAM PURPOSE

The Colorado Contractors Association and the Colorado Department of Corrections are pleased to present a program to prepare inmates for a successful introduction to the heavy equipment construction trade.

The mission of the Heavy Equipment Program is to provide the students with basic work skills to obtain employment in todays construction industry. It is the programs mission to enhance and develop the proper work ethics vital in making it in the industry, as well as society. The Heavy Equipment Program will foster an environment that promotes Integrity, Trust, Responsibility, and Confidence. Graduates will use these characteristics to cope on a professional level, as well as dealing with everyday issues and situations they will encounter in society. The program encourages change in behavior, change in the way students think, and helps to establish priorities and goals, in so doing helping to create a "FRESH START" in life. The program tries to emulate a real working site, to include emphasis on our safety record, management of equipment and tools, time limitations and deadlines, receiving as well as delegating orders, and of course the satisfaction and encouragement of a job well done.

Currently upon completion of the program, and meeting, community requirements, graduates are eligible for heavy construction positions which are available throughout the state by contractors who sponsor the program.

CRITERIA

Students must have no CODE of PENAL DISCIPLINE CONVICTIONS within 90 days prior to applying.

Students must not have tested positive for any illegal controlled substances within the previous 12 months.

Students must have a high school diploma or G.E.D.

Students must be able to obtain a "gate clearance" from the D.O.C. security staff.

Students must not be active gang members.

Students are required to pass the oral job interview as a part of being considered for the program.

Students must sign a contract committing to 18 months with the program in D.O.C., and an additional 18 months with a contractor while in community corrections, and/or parole.

It is preferred that students be able to obtain their drivers license.

On The Job Training Projects:

1) *Antero*
2) *Spinney*
3) *Reinicker*
4) *Division of Wildlife*
   a) Constructing River Structures
   b) Constructing River Rehabilitation
   c) Surveying / River Transects
5) *U.S. Forest Service*
   a) Road Service
   b) Road Reconstruction
   c) Landscaping