



StreamLines

Quarterly Newsletter of the Office of the State Engineer

Fish Ladders on the Colorado River

A status report on infrastructure associated with the Upper Colorado River Basin Fish Recovery Program
Steve Pope, Water Commissioner, District 72

The Upper Colorado River Endangered Fish Recovery Program was implemented in 1988 for the purpose of recovering endangered fish in the Colorado River basin. Through coordinated efforts of federal, state, and private entities in the upper basin states, the goal of the program is to recover the endangered species while providing for future water development for human use. The program strategies include research on existing populations, improvement of habitat, providing adequate stream flows, management of non-native species, and the reintroduction of hatchery-raised endangered fish.

Several major improvements to river habitat have been made in recent years with the construction of fish passages and ladders on the mainstem of the Colorado River. These structures, constructed by the Bureau of Reclamation, acting as an agent

on behalf of the Recovery Program, enable endangered species to migrate upstream and down. A fish passage structure was constructed at the Grand Valley Irrigation Company (GVIC) Diversion Dam in 1998. The GVIC water right is the senior calling structure on the lower end of the Colorado River in the Grand Valley. In 2004, a fish ladder was completed at the Roller Dam which is the diversion structure for the Grand Valley Project. The Grand Valley Project is the largest diversion on the Colorado River, at times diverting over 2,000 cfs for irrigation purposes. With such large diversions taking place, the cooperators in the recovery program must work together to ensure that adequate flows are being allowed for fish passage and habitat protection while satisfying the demands for irrigation water. Under certain flow conditions, this task can be daunting. Other fish passages exist at the Redlands Diversion Dam on the

Other recent improvements include the construction of fish screens on both the GVIC and Grand Valley project canals. These screens, when operational, will return any fish diverted at the headgate back into the river. Historically, the Fish and Wildlife

(Continued on page 2)



Fish Screen at Grand Valley Irrigation Company (GVIC) Diversion

Gunnison River in Division 4.

The fish passages on the Colorado River are currently being operated on an intermittent basis to better determine target and attraction flows.

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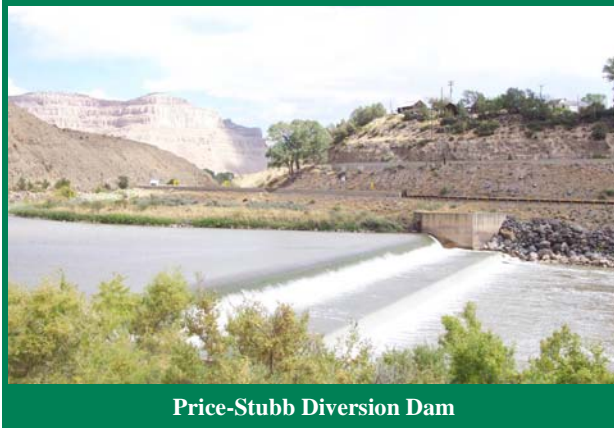


Fish Ladders on the Colorado River (cont.)

service has rescued these stranded fish and returned them to the river in the fall after the canals have been shut off for the season. The screen on the Grand Valley Project canal will be operated using SCADA technology while the GVIC screen will be manually operated.

The Price-Stubb Diversion Dam lies between the two existing fish passages and is the last hurdle for fish migration in the Upper Basin. The completion of a fish passage at the Price-Stubb will open up fish habitat extending from Lake Powell to Rifle, Colorado. Construction on the project is scheduled to begin in early 2007 with an anticipated completion date of April 2008. The target operational flow for this structure is in the range of 100 cfs.

This project may differ from the other fish passages in that there is a potential recreational component to the structure. When the passage was originally proposed, there was a great deal of interest from the local boating community to create a whitewater park in association with the fish passage. Although the Bureau is in favor of a multi-purpose structure, public law prohibits the use of funds allocated to the Recovery Program to be used for recreation facilities. In order for the project to proceed, an agreement was reached between the Bureau of Reclamation and the interested parties. This agreement required that the boating community pay for the cost of construction above that of a



Price-Stubb Diversion Dam

fish passage only. In addition, they had to get sponsorship from a governmental agency. The Town of Palisade agreed to sponsor the project and address issues of access and public safety.

The Bureau plans to solicit bids for

the project starting in late November 2006. Because of specific timelines, bids will consist of the construction of one of two alternatives, either a fish passage only or a fish passage with whitewater park. This depends on the ability of the stakeholders to acquire sufficient funds for the construction of the park and their ability to address all of the public safety issues associated with its operation.

Thus far, the Bureau of Reclamation has spent approximately \$7 million on fish passage structures above and below the Price-Stubb Diversion Dam. The total cost of the Price-Stubb structure has yet to be determined.



Government Highline Fish Screen



The completion of the Price-Stubb fish passage will increase the importance of water administration in the Grand Valley. Since 1998, a multi-party agreement has been in place between the Bureau of Reclamation and the water users in the Grand Valley that allows for 30,000 acre-feet per year of surplus water from Green Mountain Reservoir and coordinated releases from Reudi and Wolford Mountain Reservoirs to be made available for fish flows. This water is used to boost flows in the Colorado River between the GVIC Diversion Dam and the confluence of the Gunnison River. In addition, the Bureau has made an additional 31,650 acre-feet available for release from Reudi Reservoir to increase flows in the same reach. The continued cooperation of governmental entities and private and public organizations is key for the success of the program and future water development within the basin. ♦

Division 3 Well Measurement Rules

Michael Sullivan, Division Engineer, Water Division 3

The State Engineer promulgated Rules and Regulations regarding measurement of ground water diversions in the Rio Grande basin in late 2005. During the protest period, the Rio Grande Water Users Association (RGWUA) filed a statement of opposition. That opposition was not with the concept of measuring ground water withdrawals, but more over the implementation of the rules and the ability to install and certify the large number of meters in the basin in a short time. The rules require that measuring devices be installed by licensed pump installers, authorized manufacturers representatives, or certified by approved well testers. In

response, well measurement personnel from Water Divisions 2 and 3 put on a training course for well testers. At the end of the course, those who passed the test were listed as certified well testers. Over 60 folks participated in the May 2006 course.

The objectors also asked that the rules fairly consider individual variances to the rules that would minimize the expense of complying with the rules. Over the past year, DWR has worked with the objectors to clarify the variance process and set up a guideline for evaluation of variances. In August, DWR and the RGWUA reached a stipulated settlement that allowed

the Judge to decide favorably on the Rules for Ground Water Measurement. As approved, the rules require that all ground water diversions have an approved measuring device installed by March 1, 2007.

Meanwhile, during late 2005 and early 2006, DWR requested additional personnel to implement the measurement rules. The Legislature approved the request for additional personnel (7.0 FTE) effective July 2006. Division 3 is currently in the process of hiring the newly authorized staff and hopes to have staffing complete by November. ♦

Tacoma Hydroelectric Project

Jeff Titus, Water Commissioner, Division 7, District 30

Located about 20 miles north of Durango, the Tacoma Hydroelectric project is situated on a high intermountain plateau west of Animas River in La Plata and San Juan Counties. The project was originally constructed in 1905 and 1906. The majority of the water for operation of the facilities originates from Cascade Creek as well as from Little Cascade Creek and Elbert Creek. The main storage facility is Electra Lake (aka Cascade Reservoir) which impounds about 22,000 acre-feet and approximately 800 acres sur-

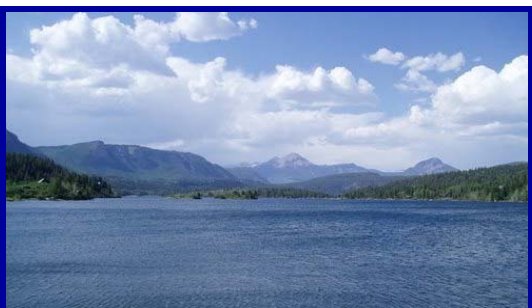
face area. Surrounding Electra Lake are 101 cabins, most of which are part-time residences. As well as being the main storage facility for the Tacoma Hydroelectric Project, Electra Lake provides augmentation for the over-appropriated Elbert Creek drainage. Water from Cascade Creek is diverted by way of a 10-foot high structure constructed in 1923 into a 10-foot diameter, semi-circular, elevated wooden flume that is 4,400 feet in length with a capacity of approximately 350 cfs. Water is then carried by a 1,400-foot long, 60-inch steel inverted siphon that crosses Cascade Creek and enters a underground 14,500-foot long, 64-inch steel pipe before it is released into the open channel of Little Cascade Creek. A satellite monitoring station keeps records of flows from the pipeline to Little Cascade Creek. Water is carried down Little Cascade Creek to Aspaas Lake and diverted by Aspaas Dam into Electra



Cascade Flume

Lake through a cut channel into the Elbert Creek drainage. Electra Lake is formed by Terminal Dam and Stagecoach Dam. Terminal Dam was originally constructed between 1903 and 1906. Due to seepage and deterioration, the dam was reconstructed in 1980 and 1981. Terminal dam is a zoned, rock-filled embankment dam with an impermeable asphalt membrane on the upstream face and an asphalt-paved crest. The dam crest length is 1,270 feet, with a crest width of 22 feet, and maximum

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Electra Lake (Cascade Reservoir)

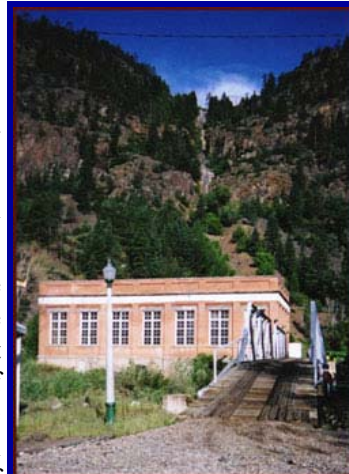
Tacoma Hydroelectric Project *(cont.)*



Cascade Flume

height of 62 feet. The spillway for Electra Lake is at Stagecoach Dam. Stagecoach Dam is 140 feet long and armored with treated tongue-and-groove timber planking. With the ability to control inflow and outflow, no significant spills over Stagecoach Dam have occurred since its modification in 1980. The outlet structure from Electra Lake consists of a 54-inch steel pipe that exits the reservoir through a 9-foot tunnel excavated through bedrock. Reservoir releases are controlled by a 48-inch butterfly valve that can be remotely operated from the powerhouse via a telemetry system. An 8-inch manually operated electric valve can be

adjusted to make releases directly into Elbert Creek for irrigation, augmentation and commercial uses. A 66-inch steel pipe then carries water approximately two and one-half miles to the lip of a precipice 1,000 feet above the Tacoma generating plant which sits on the bank of the Animas River. The hydraulic pressure can produce a maximum of eight megawatts of electricity, which is enough power for about 8,000 residential customers. Above the powerhouse, the penstock bifurcates into two high-pressure, 54- and 30-inch diameter welded steel penstocks. Prior to entering the powerhouse, the 54-inch penstock bifurcates into 48-inch and 36-inch branches. The 48-inch branch was intended for a future generating unit. The 36-inch diameter branch bifurcates to supply two 4,000 horsepower Pelton turbines which drive gen-



Tacoma Powerhouse

erators for Units No. 1 and No. 2 each rated at 2,250 kW. The older 30-inch diameter penstock supplies flow to a 5,000 horsepower Pelton turbine, which drives generator Unit No. 3, rated at 3,500 kW. Two of the three existing generators are more than 100 years old. Over the course of the year, the Tacoma Station which is operated by Xcel Energy, produces an average of 28,000 megawatt hours. ♦



Tacoma Generators

Removing Tamarisk at Tabeguache Preserve

Alison Needham, Litigation Coordinator

One of the greatest threats to rivers and riparian habitats in western Colorado is the invasion of the tamarisk, also known as Salt Cedar. Settlers in the 1800s brought tamarisk to the American southwest from the Mediterranean areas of North Africa and Eurasia. They planted it for erosion control, as windbreaks, and in ornamental gardens.

Tamarisk disrupts the structure and stability of native plant communities and degrades native wildlife habitat by out-competing and replacing native plant species, monopolizing lim-

ited sources of moisture, and increasing the frequency, intensity and effect of fires and floods. Although it provides some shelter, the foliage and flowers provide little food value for native wildlife species that depend on nutrient-rich native plant resources.

In any given year, tamarisk consumes over 500 million acre-feet of water from the Colorado River Basin, nearly twice the Colorado River water allotted to Nevada. Tamarisk pulls salt from ground water and deep soils, concentrating it in its small leaves. When the leaves drop, they poison the sur-

rounding soil with such high levels of salt that native cottonwoods and willows have no chance of germinating. Tamarisk increases the

(Continued on page 5)



Removing Tamarisk at Tabeguache Preserve *(cont.)*

potential for fire as large quantities of dead leaves accumulate in tamarisk stands. They become so dense that it can be difficult to camp and recreate on many southwestern rivers. Tamarisk transforms our vital, diverse, dynamic, and complex riparian areas into monocultures of low wildlife value.

Tamarisk is controlled by five principal methods: applying herbicide to foliage of intact plants; removing above-ground stems by burning or mechanical means followed by herbicide; spraying basal bark with herbicide; digging or pulling plants; and cutting stems close to the ground followed by application of herbicide to the cut stems (the "cut-stump method"). The USDA has also tested releasing two species of insects for tamarisk biocontrol but the releases are not yet permitted.

In 2003, The Nature Conservancy ("TNC") teamed with Volunteers for Outdoor Colorado ("VOC") to clear part of TNC's Tabeguache Preserve, 610 acres along seven miles of the San Miguel River between Naturita and Uravan in Montrose County. In light of the success of the 2003 project, VOC tackled an adjoining area on September 16 and 17, 2006.

Twenty-five volunteers with ten crew leaders waded across the two-foot-



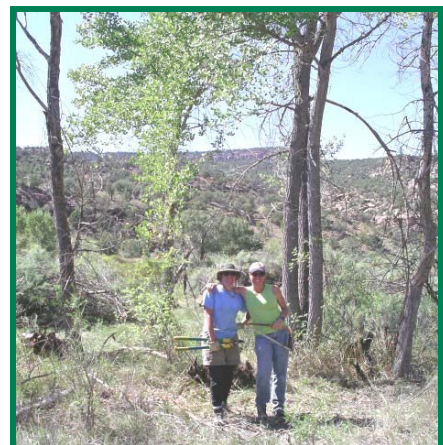
Before: Julie, Alison, the evil tamarisks and a nice three-trunk cottonwood on the right. You can almost see another cottonwood on the left, behind the thicket of tamarisks.

deep San Miguel River armed with handsaws, bow saws, garden loppers, a chainsaw and gallons of herbicide to "cut-stump" as many tamarisks as they could find.

TNC's property was divided into parcels 100 feet wide by 300 feet deep. Four teams cut down bushes and trees up to thirty feet tall. Moments after a cut, an herbicide was applied to the stump. If not applied within two minutes, the stump would heal and more tamarisks would grow from it. The cut trees were stacked in brush piles away from the river, to limit the possibility of seeds germinating in bare, wet soil. TNC will monitor the

brush piles and any new plants that do sprout around the piles will be removed before they have a chance to become established.

The San Miguel River is one of the last free-flowing rivers in the Colorado River watershed. The river supports a nearly continuous belt of riparian forest dominated by native cottonwoods and willows. This striking area contains some of the



Twenty minutes later: A pile of dead tamarisks and a nice three-trunk cottonwood on the right and a tall cottonwood with room to breathe.

best examples and rarest associations of riparian vegetation in the West. By focusing on this area, the TNC hopes to keep the San Miguel as beautiful and diverse as it was meant to be. ♦

Two Sets of Revised Rules Adopted

Joseph Grantham, Hearing Officer

The Colorado Ground Water Commission and the State Engineer's Office have each recently adopted revised rules and regulations. In August, the Commission adopted revised adjudicatory rules, and in September, the State Engineer adopted amended rules for water banking in the Arkansas River. The revised adjudicatory rules govern the way the Commission deals with adjudication proceedings under its jurisdiction. This includes rulemaking and hearings before the Commission and its hearing officer. These rules had not been revised since the early 1980s and the changes adopted provide clearer guidelines for everyone to use in the Commission's hearing processes. The revised water bank rules change the administrator of the water bank to the Upper Arkansas Water Conservancy District. Under the previous rules, Southeastern Water Conservancy District was the bank administrator. Further, changes to the rules allow for an expedited process when using the bank if the participant has court decreed fully consumable storage rights. Both sets of rules were promulgated with no opposition from any parties.

Subdistrict Formation

Michael Sullivan, Division Engineer, Water Division 3

Under Senate Bill 04-222, the formation of ground water management subdistricts in the Rio Grande basin was authorized to try and address the problems of over-pumping in the basin and related impacts. Since the legislation became law, residents in the Rio Grande basin have been working to form several subdistricts. At the end of 2005, a group representing a proposed subdistrict encompassing a large area in the unconfined closed basin area (north of the Rio Grande) presented petitions to the Rio Grande Water Conservation District (RGWCD) for formation of Subdistrict #1. The RGWCD reviewed the petitions and submitted them to the court in 2006. The court held a hearing on the formation of the subdistrict on July 18 and authorized formation of Ground Water Management Subdistrict #1 of the RGWCD. The District is presently selecting the Subdistrict #1 Board of Managers. Once seated, the subdistrict board will begin working on the water management plan. The plan must be submitted to the State Engineer and the Water Court for approval. Other proposed subdistricts are still in the formation/petition stage.

Human Resources

New Division Engineers

State Engineer Hal Simpson is pleased to announce that he has appointed **Ms. Erin Light** as the new Division Engineer for Division 6 in Steamboat Springs. Erin started with the Division of Water Resources in May of 2001 as the Assistant Division Engineer and Hydrographer for the Division 6 Office. Prior to that time, she was with the Bureau of Reclamation for two and one-half years, and with Muller Engineering for four and one-half years. Ms. Light has B.S. and M.S. in Civil Engineering from Colorado State University.

In addition, **Wayne Schieldt** was appointed as Division Engineer for Water Division 4 in Montrose and assumed that role on September 15, 2006. Wayne has many years of experience in Division 4 and will provide continuity to water administration in the Gunnison River basin.

New Employees

David Berry was hired April 5, 2006 as a temp and on July 26 began his permanent duties as District 70 Water Commissioner in Division 5. He graduated from CU at Boulder and CSU in Ft. Collins. His prior experience with people and the land will be most helpful in this new endeavor.

Jacob Duvall started with the Denver office on July 24 as a Records Technician. He comes to us from a position in the radiology department of Swedish Medical Center. He is a Master of Science Candidate in Environmental Science, and has a BA in both History and Music from CU Boulder. His hobbies include bicycling, hiking, and brewing beer.

Jean Ray started working for Division 6 on August 14. Ms. Ray will be performing all hydrographic duties as well as other water resource engineering related activities in the office including, but not limited to, water rights tabulation and diversion record review. For the last two years, Jean has worked as an independent consultant through her company, Environmental Engineering and Evaluation, LLC. During these two years, she also worked part-time for the Routt County Conservation District. Prior to starting her own consulting firm, Jean worked for 13 years as an engineering consultant with MWH in Steamboat Springs. Her positions with MWH included Senior Engineer, Project Engineer, Environmental/Water Group Manager, and Principal Engineer. Prior to her employment with MWH, Jean worked for Civil Design Consultants in Denver and for the Denver Water Department.

Cliff McQuigg started on the Denver IT Infrastructure team on August 23 as an IT Professional 1. Cliff has a Bachelor of Science Degree in Computer Information Systems from Metropolitan State College. Prior to this, he was employed for five years as an Administrative Assistant at Metropolitan State College. Some of his duties will include hardware and network support.

William Elvis Cunningham was hired as a full-time Well Enforcement Deputy Commissioner based in Greeley in late August. Elvis grew up on a farm in the Las Animas area. He received his BS in Geography/GIS from UNC in May 2006. Elvis began working on high capacity well enforcement as a temporary employee in July. His excellent work habits and calm demeanor have already proven to be of great asset in the less than pleasant task of well enforcement.

Bruce Phillips was hired by Division 1 on September 1 and will be based in Sterling. Bruce will split his time between high capacity well enforcement and water administration duties as a Deputy Water Commissioner. Bruce comes to us

Human Resources (cont.)

with a wide variety of work experience including spending the last six years working for the City of Sterling on their water system. Bruce's varied talents and work experience should provide a strong base for working on both well enforcement and general water administration.

Corey DeAngelis joined Division 3 as the chief of its newly created water measurement branch on September 1. Corey's main duty will be to manage the new well metering program in the Rio Grande Basin. A graduate of Colorado State University, Corey comes to us from Davis Engineering Services, Inc., where he was a project engineer.

Jason Smith was hired as a full-time Deputy Water Commissioner for Districts 1 and 64 in mid-September. We were fortunate enough to hire Jason as a temporary employee in June, so he got to spend about a month "learning the ropes" from John Anderson, who retired the end of June as a District 1 Deputy Water Commissioner. Jason grew up on a farm near Troy, Idaho, and received his BS in Geography/GIS from UNC in August. Jason is a real "go-getter" and we look forward to his continued development/understanding in water administration matters.

Matt Hardesty began work for Division 3 on September 18 as a hydrographic engineer. Matt is a graduate of the Colorado School of Mines, and was a project engineer with Davis Engineering Services, Inc., prior to beginning work with DWR.

Mark Vanarelli was hired on September 18 to fill the Professional Engineer vacancy on Team 456 in the Denver office. Mark has a B.S. in Geological Sciences from Rutgers University in New Jersey, a Professional degree in Geological Engineering, a Masters of Engineering degree in Earth Systems Engineering, both from the Colorado School of Mines, and is also currently completing a PhD in the same field at CSM. Mark brings fifteen years of experience in environmental engineering to the position, and will be responsible for reviewing water court applications, substitute water supply plans, subdivision water supply plans, hard rock mining, gravel pit and 404 referrals, as well as non-exempt well permits.

Paul Perri started with the Dam Safety Branch in the Denver office on October 2 as a Design Review and Construction Inspection Engineer. He brings to DWR extensive experience in both the design and construction of dams after nearly 10 years of work as a design consultant with GEI Consultants and most recently with W. W. Wheeler and Associates in Denver. Paul has a BS degree in Agricultural Engineer from Colorado State University. His primary duties will include the review of the design and construction documents for the construction of new dams and major modifications to existing dams and the construction inspection of the approved projects to assure that the project construction is in conformance with the approved plans and specifications. Other duties will include providing assistance to the dam safety engineers in the Division offices on technical dam safety issues, performance of safety inspection of existing dams, and responding to emergencies.

Retired Employees

Frank Kugel retired in mid-September after 22 years of service with the Division of Water Resources and assumed the position of Manager of the Upper Gunnison Water Conservancy District. While at DWR, Frank was a dam safety engineer, the assistant Division Engineer and the Division Engineer for Water Division 4, the Gunnison River Basin.

Robert "Bob" Daniels retired from the Division of Water Resources at the end of August 2006. Bob started as the Water Commissioner for the Siembritas Arroya (District 46) in May of 1988. In March of 2002, he transferred over to be the lead Water Commissioner for the Pine River (District 31) until his retirement. Bob received the Water Commissioner of the Year award in Division 7 in 1992, 1999 and 2004 as well as the Division of Water Resources Technical Support Person of the Year in 2003. Bob worked several winters on the QA/QC project for CDSS. In this capacity, he became an expert in Dbase3+. He took this newfound knowledge and applied it to almost all aspects of his job. When Dbase could not be made to do what Bob wanted it to do, he taught himself Excel to fill in the holes. Bob took a spreadsheet developed by the Division Engineer and lead Water Commissioner to account for the releases from Vallecito Reservoir into the Pine River and refined it to be a management tool used to maximize water use and efficiency on the Pine River, and also used this spreadsheet design in four other Districts in Division 7.

Walt Bohrer began working for the Division of Water Resources in Division 6 in 1982 as a well inspector. After the well inspection program was discontinued, Walt became the water commissioner for Water District 44 in 1991. Mr. Bohrer remained in this position until he retired on August 31, 2006. Prior to joining the Division, Walt was an independent well driller. It goes without saying that the Division 6 office relied on his expertise in ground water wells throughout his employment. Mr. Bohrer was a superb water commissioner.



CALENDAR OF EVENTS

- November 14-15** Colorado Water Conservation Board Meeting, Denver, Colorado; for more information, contact Dena Crist at 303-866-3441
- November 17** Colorado Ground Water Commission Meeting, Denver, Colorado; for more information, contact Marta Ahrens at 303-866-3581
- December 5** Colorado Board of Examiners of Water Well Construction and Pump Installation Contractors Meeting, Denver, Colorado; for more information, contact Gina DeArcos at 303-866-3581

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