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DRAFT CONSERVATION AGREEMENT  
Lepidomeda mollispinis / Virgin spinedace

The Virgin spinedace (Lepidomeda mollispinis) is proposed for listing as a threatened species pursuant to the Endangered Species Act of 1973, as amended. The Virgin spinedace is a small cyprinid minnow endemic to the Virgin River drainage in southwestern Utah, northwestern Arizona, and southeastern Nevada. Virgin spinedace were once common throughout clearwater tributaries of the Virgin River, and in mainstem north of Pah Tempe Springs, Hurricane, Utah. Current spinedace populations are highly fragmented, and occur almost exclusively within Utah. There has been a 40% reduction in the historic distribution of the Virgin spinedace due to stream dewatering for agricultural purposes, mining, and urban growth, and the introduction of non-native fishes. These factors continue to threaten the Virgin spinedace.

This Conservation Agreement has been initiated to restore historical habitat of the Virgin spinedace and to reduce threats to the species by ensuring adequate stream flows. This document's primary purpose is to conserve the Virgin spinedace through interim conservation measures under the Endangered Species Act of 1973, as amended.

I. SPECIES INVOLVED

Virgin Spinedace (Lepidomeda mollispinis)

The implementation of this Conservation Agreement will benefit five additional native fish species in the Virgin River and associated tributaries, including two endangered species (woundfin, plagopterus argentissimus; Virgin River chub, Gila robusta seminuda) and a category 2 candidate species (flannelmouth sucker, Catostomus latipinnis).

II. INVOLVED PARTIES

- A. United States Fish and Wildlife Service  
Suite 404, Lincoln Plaza  
Salt Lake City, UT 84115  
(801) 524-5001
- B. Utah Department of Natural Resources  
1636 West North Temple  
Salt Lake City, UT 84116  
(801) 538-7227
- C. Washington County Water Conservancy District  
148 East Tabernacle  
St. George, UT 84770  
(801) 673-3617

D. USDI Bureau of Land Management  
Utah State Office  
324 South State Street  
Salt Lake City, UT 84111  
(801)

E. USDI National Park Service  
Zion National Park  
Springdale, UT 84767  
(801) 772-3256

Separate Memorandum(s) of Understanding will be developed with additional parties as necessary to ensure implementation of management objectives.

### III. AUTHORITY

The authority for the Fish and Wildlife Service to enter into this voluntary Conservation Agreement derives from the Endangered Species Act of 1973, as amended; the Fish and Wildlife Act of 1956, as amended; and the Fish and Wildlife Coordination Act, as amended.

### IV. STATUS AND DISTRIBUTION OF THE VIRGIN SPINEDACE

Addley and Hardy (1993) and Valdez et al (1991) will be used to summarize the current status and distribution of the Virgin spinedace.

### V. PROBLEMS FACING THE SPECIES

1. Present or threatened destruction, modification, or curtailment of its habitat or range.

Historical habitat of the Virgin spinedace is not well documented. The earliest records (Tanner 1932, 1936) indicated the species was common in the Santa Clara River and North Fork of the Virgin River. However, collection records at the University of Nevada Las Vegas, Brigham Young University, University of Michigan Museum of Zoology, and the United States National Museum indicated a general decline in Virgin spinedace range and population (Cross 1975). As an example, Hubbs collected Virgin spinedace near Bunkerville, Nevada, in 1938, but surveys in 1942 in the same area failed to produce any Virgin spinedace, and the species has been absent from subsequent surveys below Littlefield, Arizona (Cross 1975). Cross (1975) further reported the absence of Virgin spinedace from surveys of upper Beaver Dam Wash and the lower Santa Clara River, where it once was common. Cross (1975) attributed this decline to physical and chemical deterioration of habitat and the introduction of non-native species. The most recent surveys indicate a continued decline in viable habitat (Addley and Hardy 1993). Dewatering, agriculture and livestock impacts, impoundment of reservoirs, and competition and predation from non-native species have contributed to this

decline (Cross 1975; Valdez et al. 1991; Addley and Hardy 1993).

The Virgin River Basin is significantly altered by dams and diversions built for agricultural and municipal purposes. These structures, and associated dewatering, resulted in the degradation or elimination of Virgin spinedace habitat. Many river reaches historically contained Virgin spinedace habitat, but are now dewatered due to impoundments or diversions. These include: the DI ranch (East Fork of Beaver Dam Wash), the Santa Clara River below Gunlock Reservoir, Magotsu Creek, Ash Creek near Toquerville, Leeds Creek, and the mainstem Virgin River between Quail Creek Diversion and Pah Tempe Springs (Addley and Hardy 1993).

Even without complete dewatering, dams and diversions can significantly alter Virgin spinedace habitat. Lack of stable instream flows affect aquatic vegetation, dissolved oxygen levels, temperature, pH levels, and turbidity. Low water levels and resulting elevated water temperatures, altered water chemistry, and low dissolved oxygen levels are detrimental to Virgin spinedace. In addition, dams and diversions are barriers to fish movement within the Virgin River system and have resulted in fragmentation of Virgin spinedace populations. Low flows resulting from the diversion of river water also can cause habitat fragmentation. In North Creek, for example, the Virgin Canal Diversion extracts much of the stream's flow. Virgin spinedace are present below the diversion, but are essentially isolated in pools connected by small trickles of water (Addley and Hardy 1993). Habitat fragmentation has isolated populations of Virgin spinedace, limited the exchange of genetic material, and thus reduced the effective gene pool of the species.

Livestock grazing is another cause of Virgin spinedace - habitat degradation and population declines. Cattle and sheep utilize riparian areas and cause devegetation, stream bank erosion, siltation, and degraded water quality. Valdez et al. (1991) indicated 10 of 13 populations of Virgin spinedace were threatened by grazing in riparian areas and by runoff from nearby cattle feed lots. No exclosures presently exist to prevent livestock damage within riparian zones in Virgin spinedace habitat.

The construction of water storage facilities since the early 1900's has caused the direct destruction of historical Virgin spinedace habitat. Virgin spinedace prefer clear, cool flowing streams comprised of pools, runs, and riffles (Rinne 1971; Deacon and Rebane 1990; Addley and Hardy 1993). They are not adapted to lacustrine environments created by the four reservoirs that have inundated historical Virgin spinedace habitat: Schroeder Reservoir on Beaver Dam Wash, Baker Dam and Gunlock Reservoirs on the Santa Clara River, and Quail Creek Reservoir on Quail Creek. The most recent of these, Quail Creek Reservoir, inundated approximately 3.4 km (2.1 mi) of high quality Virgin spinedace habitat when it was filled in 1985. Subsequently, Virgin spinedace have disappeared from Quail Creek where they were formerly common to abundant (Addley and Hardy 1993). The other three reservoirs are also thought to have flooded Virgin spinedace habitat (Schroeder Reservoir - 0.5 km (0.3 mi); Baker

Dam Reservoir - 1.0 km (0.6 mi); Gunlock Reservoir - 2.9 km (1.8 mi)). Prior to construction of Schroeder Reservoir, Miller and Hubbs (1960) indicated Virgin spinedace were found in upper Beaver Dam Wash. Subsequent surveys failed to record Virgin spinedace (Cross 1975; Addley and Hardy 1993) in this area. The amount of stream habitat negatively impacted by reservoir construction and operation is greater than the actual amount inundated. However, in the absence of pre- and post-impoundment studies, habitat alteration above and below these four reservoirs (i.e., introduction of non-native fishes, quality and quantity of water, siltation, changes in velocity, vegetation, dissolved oxygen, etc.) cannot be effectively measured. The stocking of these four reservoirs with predaceous, non-native game fish may have contributed to the Virgin spinedace's decline through predation and competition.

## 2. Overutilization for commercial, recreational, scientific, or educational purposes.

Overutilization is not recorded as a factor in the decline of Virgin spinedace populations. Although Virgin spinedace were once used as a bait fish in the lower Colorado River (Miller 1952), they are no longer threatened by commercial or recreational collection. There is no indication that recent research studies (Valdez et al 1991; Addley and Hardy 1993) have negatively impacted Virgin spinedace populations.

## 3. Disease or predation.

The introduction of non-native species into the Virgin River system has been identified as contributing to the decline of native fish populations (Hardy 1991; USFWS 1993). Espinosa and Deacon (1973) documented largemouth bass (Micropterus salmoides) selectively preying on Virgin spinedace. Largemouth bass, brown trout (Salmo trutta), and rainbow trout (Onchorhynchus mykiss) are stocked into reservoirs and ponds within the Virgin River drainage (Valdez et al. 1991). These predatory fish can move out of reservoirs into Virgin spinedace habitat, effectively eliminating Virgin spinedace. Addley and Hardy (1993) stated that rainbow trout immediately below Schroeder Reservoir (Beaver Dam Wash) probably prevent upstream migration and recolonization by Virgin spinedace. Addley and Hardy (1993) also suggest crayfish (Astacidae) and red shiner (Notropis lutrensis) prey on larval and young-of-year life stages in the lower reaches of several tributaries, thereby reducing survival and recruitment of the Virgin spinedace and other native fishes.

The red shiner, a non-native species in the Virgin River system, is considered a primary cause of the decline in endangered woundfin populations due to increased competition and possibly, predation (USFWS 1993). Red shiners probably have had a similar negative impact on the Virgin spinedace. Another introduced species, the redbside shiner (Richardsonius balteatus),

was considered a threat to Virgin spinedace by Rinne (1971) and Cross (1975), however redbreasted shiners have significantly declined (Valdez et al. 1991). There is no indication of competition between Virgin spinedace and other native species in the Virgin River basin.

Asian tape worm (Bothriocephalus acheilognathi) arrived in the Virgin River system with the red shiner in 1986. It is known to weaken infested fish. Although this parasite alone does not appear to cause significant reductions of Virgin spinedace, it probably has a significant adverse effect when coupled with other environmental stress, (e.g. low water levels). Additionally, Addley and Hardy (1993) reported finding Virgin spinedace infested with an unknown parasite in the Ash Creek drainage. They were unable to determine the effect of this parasite on the Virgin spinedace.

#### 4. Other natural or manmade factors affecting the species' continued existence.

Drought can directly impact Virgin spinedace habitat by dewatering of stream reaches, limiting usable habitat, and isolating individual populations. Many of the tributaries in the Virgin River drainage have intermittent flows, disappearing completely during drought years. Although drought is a naturally occurring phenomenon, historically, fish could follow receding water conditions. However, fish in some areas can no longer retreat to areas with sufficient water because of artificial barriers. Virgin spinedace populations in these areas could be extirpated due to stranding during drought periods. Natural recolonization of these lost populations is unlikely because fish are unable to access areas lost to drought. In areas of reduced flows, Virgin spinedace could be limited to suboptimal habitat, and increased exposure to other mortality factors, such as predators and competition with other fish species.

Drought can also indirectly affect the continued existence of the Virgin spinedace. Stream reaches containing minimum flows for Virgin spinedace under natural conditions can become dewatered during drought by diversion for agricultural or municipal uses. When these factors exist in combination, greater habitat loss occurs on a more frequent basis than would occur under drought conditions alone.

Pollution is a potential problem for all native species within the Virgin River basin. Return flows from municipal drains and agriculture often make up a significant portion of a stream's total flow. Water from agriculture is often contaminated with pesticides or herbicides. Cattle also pollute streams with their waste and through erosion and increased siltation. Low flows, caused naturally or by diversions, increase the impact mineral springs have on the chemical composition of the water.

Mining activities near streams may be contaminating water in the Virgin River system. Valdez et al. (1991) identified two reaches of Virgin spinedace habitat threatened by contamination

from mining activities: Beaver Dam Wash and Moody Wash. Cyanide contamination in Beaver Dam Wash from a gold mine on the East Fork is being studied to determine its effects. Changes in water quality from contamination sources, such as agriculture and mining, could negatively impact Virgin spinedace habitat, rendering entire reaches uninhabitable.

Habitat fragmentation, degradation, and loss have severely impacted the Virgin spinedace. Recent studies indicate a 40 percent reduction in Virgin spinedace habitat from its historic range (Valdez et al. 1991). The degree of current and future threats to Virgin spinedace habitat (mining, non-native fishes, dewatering, livestock impacts, and proposed water development projects) remains high. Continued fragmentation of the remaining habitat could lead to loss of genetic and population viability. The Virgin spinedace is highly susceptible to future habitat loss and population declines.

## VI. CONSERVATION ACTIONS TO BE IMPLEMENTED

The goal of this Conservation Agreement is to remove the threats warranting listing of the Virgin spinedace and to restore historical spinedace habitat.

### A. Management Actions

#### 1. Habitat Maintenance and Enhancement

##### a. Determine Flow Requirements

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Channel forming flows - The frequency and magnitude of channel forming flows will be determined. An analysis to determine differences between historic and current channel characteristics will be completed. Flood frequency analysis will also be performed.

Minimum flows - Minimum flow recommendations will be determined by comparing spinedace population numbers, stream flows and habitat characteristics throughout the Virgin River basin for empirical relationships. Minimum flow guidelines will be refined, if necessary, based on monitoring of population response.

##### b. Reestablish and Maintain Required Flows

Once minimum and channel forming flows have been established, they will be monitored and maintained in areas currently occupied by Virgin spinedace.

Minimum and channel forming flows will be re-established in approximately 24 miles of Virgin spinedace habitat. Priority areas for restoring flows are on the Santa Clara River between Gunlock Reservoir and the confluence with the Virgin River (16.7 miles) and on the Virgin River between Quail Creek Diversion and Pah Tempe Springs (2.8 miles).

An additional five miles of habitat will be restored within one of the following areas.

- Virgin River
  - Below Washington Fields Diversion
- Beaver Dam Wash
  - East Fork
    - Upper reach (Schroeder to Motoqua)
    - Middle reach (Motoqua to Lytle Ranch)
    - Lower reach
- Santa Clara River
  - Magotsu Creek
  - Moody Wash to Baker Dam Reservoir
  - Baker Dam Reservoir to Gunlock Reservoir
- North Creek
  - Below Virgin Diversion





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The Nevada Department of Wildlife will evaluate options for managing rainbow trout in Schroeder Reservoir on the Beaver Dam Wash.

UDWR will determine the feasibility of eradicating green sunfish within the Santa Clara River and will also review options for managing brown trout in the area above Baker Dam to Moody Wash.

Red shiners will be eradicated in the Virgin River from Johnson diversion to the Utah-Arizona border. Studies to determine the distribution of red shiners have been completed and treatment procedures are being developed. Engineering feasibility for implementing fish barrier structures associated with the proposed shiner treatment are currently being studied.

Status unknown

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shiner abv. Johnson

### 5. Spinedace Population Monitoring

A monitoring plan will be developed to assess spinedace and habitat response to specific management actions and to determine population trends.

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responsibilities; periodically

### B. Administration of Conservation Agreement

Progress of the conservation agreement will be monitored, evaluated, and presented in an annual report. All parties to the conservation agreement will be required to report progress on their specific responsibilities on a quarterly basis.

Timeline for implementation of specific management actions.

Funding mechanisms

interval:  
10 min.

### VII. DURATION OF AGREEMENT 3 & m

The duration of this Conservation Agreement is for 3 years following the date of the last signature. During the 12th and 24th months of this Conservation Agreement, the parties involved will review the Conservation Agreement and its effectiveness to determine whether revisions are warranted. By the 36th month, the Conservation Agreement must be reviewed and either modified, renewed, or terminated. If some portion of this agreement cannot be carried out or if cancellation is desired, the party requesting such action will notify the other parties within 1 month of the changed circumstances. When and if it becomes known that there are threats to the survival of the subject species that are not or cannot be resolved through this or any Conservation Agreement, action will be initiated to list this species under Section 4 of the Endangered Species Act through either a proposed rule or an emergency rule.

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State fund'g = Heritage Grants

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## IX. ATTACHMENTS

1. Literature Cited
2. Stocking Procedures

### LITERATURE CITED

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- Hardy, T.B. 1991.
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- Tanner, V.M. 1932. A description of Notolepidomyzon utahensis, a new catostomid from Utah. Copeia 3:135-136.
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- Valdez, R.A., W.J. Masslich, R. Radant, and D. Knight. 1991. Status of the Virgin spinedace (Lepidomeda mollispinis mollispinis) in the Virgin River drainage, Utah. Report to Utah Div. Wildl. Res. Salt Lake City, Ut. BIO/WEST Report No. PR-197-1. 43 pages.

Review by

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UTAH DEPARTMENT OF NATURAL RESOURCES

DIVISION OF WILDLIFE RESOURCES

STATE OF UTAH PROCEDURES FOR FISH STOCKING AND INTRODUCTIONS INTO  
THE VIRGIN RIVER BASIN

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APPLICABLE DOCUMENTS:

1. Resolution of the Colorado River Fish and Wildlife Council Pertaining to Sport Fish and Their Value to the Colorado River States, May, 1994.

[The Colorado River Wildlife Council is composed of the Directors of State Wildlife Agencies from the Colorado River Basin states. This resolution prepared by the Council endorses sound management of both native and **nonnative** fishes in the Colorado River Basin and recognizes the importance of nonnative fishes to the angling public and to the **economy.**]

2. Interim Procedures for Stocking Nonnative Fish Species in the Upper Colorado River Basin, March 10, 1994.

[It is hoped that a finalized procedure can be adopted by 1995. This was developed as a cooperative effort between the U.S. Fish and Wildlife Service and the states of Colorado, Utah, and Wyoming. The purpose is to ensure that stocking practices will be consistent with the recovery of endangered fishes in the Upper Basin. It recognizes the importance of **nonnative** species. It provides guidelines and limitations for **stocking.**]

3. Introduction of Aquatic Species, Environmental Policy Statement of the American Fisheries Society, **date ?**

[This document presents actions proposed by the American Fisheries Society to evaluate potential, new introductions of aquatic wildlife before proceeding with actual transplants or **stockings.**]

STATE OF UTAH PROCEDURES FOR AGENCY FISH STOCKINGS:

1. Before a new species can be stocked in any state water, it must go through a proposal process. The proposal must receive approval from the Aquatic Section and the Division.
2. Following Division of Wildlife Resources approval, any new introduction into a given body of water must be approved through the state-wide clearinghouse, Resource Development Coordinating Committee (RDCC). This includes a review by local county organizations of government.

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3. A new introduction into any given body of water is subject to agreements with other agencies (such as the M.O.U. with the U.S. Fish and Wildlife Service on stocking nonnative fishes in the Upper Colorado River Basin).
4. State of Utah management plans (such as the Draft Strategic Plan, the Cutthroat Trout Management Plan, and individual water management plans) give guidelines for stocking by areas and species.
5. All fish stockings, including routine stocking of salmonids, follow strict procedures:
  - Annual requests for fish stocking are submitted from field personnel.
  - Requests are reviewed by (1) Regions and (2) the Salt Lake City Office Aquatic Section.
  - An official Stocking Catalog is printed annually.
  - Any exceptions to the Stocking Catalog during the year must be approved in writing from the Salt Lake City Office Aquatic Section.
  - Only Wildlife Resources employees are authorized to stock fish and stockings must correspond with the Stocking Catalog or exceptions approved in writing as noted above.
  - Each and every stocking must be recorded on an official Wildlife Resources report called a Stocking Slip.

## **STATE OF UTAH RULES FOR PRIVATE PONDS AND AQUACULTURE (PROCLAMATION FOR AQUACULTURE AND FISH STOCKING), GENERAL SUMMARY:**

1. **A** Certificate of Registration (a permit called a **COR**) is required before engaging in any attempt to buy, sell, rear, transport or stock live aquatic wildlife.
2. **A** separate **COR** is required to import live fish into Utah from any source outside the state.
3. No private fish installation shall be developed on natural lakes or natural flowing streams, or reservoirs constructed on natural stream channels (Utah Code 23-15-10). Installations must be properly screened. Records of purchases and sales must be kept and made available to the Division of Wildlife Resources upon request.
4. Applications for **COR**'s are made through the Division of Wildlife Resources office in Salt Lake City. Applications are reviewed by the Regions, including field inspections of facilities to insure compliance with rules.

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5. Only approved fish species determined by the Division of Wildlife Resources are allowed to be stocked under a COR.
6. State of Utah rules governing introduction of grass carp, stipulating that fish be certified as sterile triploids, apply to approval of fish allowed for introduction and stocking by COR.

## **PROPOSED GUIDELINES FOR STATE OF UTAH STOCKING AND FISH INTRODUCTIONS INTO THE VIRGIN RIVER BASIN:**

1. Bonneville cutthroat trout should be considered a native species (or at least a historic species) within the Virgin River basin. Any future introductions should be limited to areas above 5,000 feet elevation and to locations where interactions with other native fishes would not occur or at least be very limited.
2. Stocking of native species should be accomplished as identified in Conservation Agreements or in concert with the U.S. Fish and Wildlife Service as part of conservation or recovery efforts for native fish species. Such stockings will be consistent with standard state protocol for stocking and RDCC requirements.
3. Stocking of nonnative aquatic species ALREADY OCCURRING in the Virgin River Basin:

### Rainbow Trout:

Stocking to be allowed in all areas where they do not directly conflict with native fish species or where they will not establish self-sustaining populations in association with native species of special concern.

### Brown Trout:

In general, not to be stocked. However, consideration should be given to replacing existing populations in the event they are lost. This should be restricted to areas above 5,000 feet elevation where there would not be conflicts with native species of special concern.

### Other Salmonids:

Stocking to be restricted to areas in association with existing populations and where they will not conflict with native species of special concern.

### Nonnative Minnows:

Not to be stocked.

### **Smallmouth Bass:**

Not to be stocked.

### Green Sunfish:

Not to be stocked.

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reproduce and establish wild populations in adjacent areas containing native fishes of special concern. (3) Application approved for rainbow trout if reproduction and establishment of a self-sustaining population is not likely in adjacent areas containing native fishes of special concern. (4) Applications considered on a case-by-case basis for other **salmonids**, with approval/denial depending upon the likelihood of natural reproduction should fish escape, upon the presence or absence of native species in adjacent areas, and upon the likelihood of contact with native species of special concern.

**4. Condition:** Application for facility satisfies state law and rules. Facility is located outside of the flood plain and has no return flows to a natural channel.

**Action:** (1) Application approved for rainbow trout, largemouth bass, and bluegill sunfish. (2) Application denied for any fish species that are not currently established or stocked in the Virgin River Basin. (3) Application for other species considered on a case-by-case basis, approval/denial depending upon the presence or absence of native fish species in adjacent areas, the likelihood of natural reproduction, and the likelihood of contact with native species of special concern.

**5. Condition:** Application for facility satisfies state law and rules. Facility is not located outside of the flood plain and/or has return flows to a natural stream channel. However, the natural channel drains into impoundments containing rainbow trout, largemouth bass, and/or bluegill sunfish, and species of special concern are not found in the interconnecting waterways.

**Action:** (1) Application approved for rainbow trout, largemouth bass, and/or bluegill sunfish. (2) Application denied for any fish species that are not currently established or stocked in the Virgin River Basin. (3) Application for other species considered on a case-by-case basis as outlined above under number 4.

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