WARMWATER SPORTFISHERIES
STRATEGIC VISION DOCUMENT

Arizona Game and Fish Department

Statewide Fisheries Program

2019-2029

Arizona Game and Fish Department

2019

Approved [X] by Chris Cantrell _____ Date: 4/3/19

Aquatic Wildlife Branch Chief

Mission: To conserve Arizona's diverse wildlife resources and manage for safe, compatible outdoor recreation opportunities for current and future generations.

Agency Vision: To be the national conservation leader supporting the continuation of the North American Model of Wildlife Conservation and Arizona's most trusted, respected and credible source for wildlife conservation products, services and information.

AUTHORITY

The authority under which this Warmwater Sportfisheries Vision has been prepared and the responsibility for the maintenance and management of the state's wildlife resources are vested in the Arizona Game and Fish Commission and Department by Arizona Revised Statute Title 17 in **ARS-17-102, ARS-17-201 and ARS-17-231**.

Introduction

Arizona has an amazing diversity of aquatic habitats, a significant portion of which are managed for sportfishing opportunity. Many of the state's sportfish species are non-native and have been introduced to increase sportfishing opportunity. As a result the Arizona Game and Fish Department manages those resources in balance with native aquatic wildlife. The Arizona Game and Fish Department (Department) manages our sportfishing resources in two broad categories: coldwater fisheries and warmwater fisheries.

Table 1. Warmwater Sportfish found in Arizona.

Largemouth Bass *Micropterus salmoides*
Smallmouth Bass *Micropterus dolomieu*
Black Crappie *Pomoxis nigromaculatus*
White Crappie *Pomoxis annularis*
Bluegill Sunfish *Lepomis macrochirus*
Redear Sunfish *Lepomis microlophus*
Green Sunfish *Lepomis cyanellus*
Roundtail Chub *Gila robusta*
Tilapia *Tilapia sp.*
Northern Pike *Esox lucius*
Striped Bass *Morone saxatilis*
Yellow Bass *Morone mississippiensis*
White Bass *Morone chrysops*
Yellow Perch *Perca flavecens*
Walleye *Sander vitreus*
Yellow Bullhead *Ameiurus natalis*
Black Bullhead *Ameiurus melas*
Brown Bullhead *Ameiurus nebulosus*
Channel Catfish *Ictalurus punctatus*
Flathead Catfish *Pylodictis olivaris*
Carp *Cyprinus carpio*

Just slightly over 254,000 acres of impounded water (lakes, reservoirs, ponds, and tanks) and nearly 1,200 linear miles of rivers and streams are managed for warmwater species. These numbers include inland waters as well as the Colorado River. Management of these waters is based on biology, angler use, partnership commitments and needs, as well as social demands. Regulations on waters are established through management recommendations. These regulations are established to encourage angler use including harvest whenever appropriate.

The Department relies heavily on strong partnerships with water storage projects to manage warmwater fisheries in Arizona. Very few Department managed waters are owned or controlled by the State of Arizona. Water storage projects manage the majority of water in Arizona and therefore are very important partners in fisheries management. Even though the primary purposes for these projects are for irrigation, hydroelectric power, flood control, and municipal uses, they have been and remain engaged with the Department for fisheries management.

A list of 21 species of warmwater sportfish is provided in Table 1. While not an exhaustive list of warmwater species that could be considered a sportfish, these are the most commonly accepted ones. Some of these species are heavily used, but others are under-utilized or ignored. The latest license sales data from 2016 indicates the Department licensed more than 293,000 resident and 79,000 non-resident anglers. From a comprehensive angler survey the Department completed in 2013, anglers spent a total of just over 6 million days fishing in Arizona, a 17.6% increase from 2001. Of those user days, over 2.1 million were from trout fishing (36%) with the remaining 3.8 million for all other species (64%). Community Fishing Program waters had an estimated angler use of 676,286 angler use days (AUD) or 11 % of state's total AUD's. Approximately 75% of the state's AUD's were spent on just 32 waters around the state (Table 11). Four of the 5 top used

waters were all from Central Arizona impoundments. A peak in angling activity of 7.4 million AUD's occurred in 1992 (Fisheries Branch 2015). The 2013 estimate of 6 million AUD's shows a decline in activity; however this estimate is an increase of 900,000 from the low of 5.1 million AUD in 2001(Fisheries Branch 2015). Though fishing license sales have continued to trend up due to a license simplification strategy implemented in 2014, increased travel costs, competition with other recreational activities, drought conditions and economic recession are all possible influences in the overall decline of fishing recreation since 1992. According to the analysis in the 2013 Economic Impact of Fishing in Arizona (Fedler 2014), annual recreational sport fishing produces $1.47 billion in economic benefits for the state of Arizona. Among active anglers in 2013, the preference was: 69% fish for trout, 63% fish for bass and 30% fish for catfish. Current demand for sport fish in Arizona and the decreasing hatchery spring flows (water supply) have resulted in an annual shortfall of approximately 110,000 pounds of trout and 30,000 pounds of warmwater sportfish. The warmwater sportfish deficit totals 230,000 pounds when demand of the Community Fishing Program is included.

We expect angler use, in part can be increased through increased or improved access to waters currently unavailable or under-used by anglers. Through negotiation and partnership agreements, angler access may be secured to irrigation projects, municipal lakes, and reservoir and stream or river banks generally difficult for the shore angler to access. Municipal lakes are more intensively managed in cooperation with local governments to provide more fishing opportunity in proximity to urban population centers through our expanding Community Fishing Program. The Game and Fish Commission and the Department are emphasizing recruitment and retention of anglers and hunters through active marketing, improvement of angling quality, and increasing angling opportunity by identifying and overcoming barriers to angler participation.

Warmwater species will generally continue to be self-sustaining, although multiple large central Arizona reservoirs have been significantly impacted by harmful invasive species such as golden alga and gizzard shad. Aquatic Invasive Species transported through live bait transfer and use, as well as by boat and other vectors are a huge threat to warmwater sportfishing.

Prolonged periods of drought are expected to continue, generally decreasing aquatic habitats for both warm and cold water species. Despite the fact that more anglers today practice catch-and-release, there remains a growing need to secure a stable source of warmwater fish to stock when a fishery is negatively impacted by aquatic invasive species or drought. The Department will continue to search for ways to expand and improve warmwater hatchery facilities and techniques to efficiently raise species such as Bluegill, Black Crappie and Channel Catfish as well as Largemouth Bass. In addition, enhanced abilities to provide smaller forage species will be critical. The Department will continue to explore the feasibility and economic viability of producing non-imperiled native fish species that can be used to augment native aquatic population assemblages as well as provide a live bait fish for anglers to utilize.

Ultimately, angler satisfaction with their fishing experiences will determine successful management. Seven themes have been identified that focus objectives to achieve angler satisfaction. Themes and objectives are developed herein. Under each objective, strategic approaches are provided to assess priorities and desired future conditions. The seven themes are:

1. Productivity/Forage/Prey
2. Habitat
3. Species
4. Access
5. Catch/Satisfaction
6. Planning
7. Outreach

As data and information become available, strategies for objectives will be updated.

Vision, Core Goals, Objectives, and Strategic Approaches for Warmwater Fisheries 2019-2029

Vision: To develop Arizona's warmwater fisheries into a nationally recognized leader in angler catch rates, satisfaction and trophy sized potential for warmwater sportfish.

Core goals:

1. ***Ensure 14 warmwater trophy management concept fisheries are created and maintained statewide. Each Region will strive to have at least one trophy concept fishery. A statewide minimum for each species or group of fishes will be:***
    - *AZ Hawg Bass-8*
    - *AZ Fat Cat-6*

2. ***Ensure 30 High Quality concept warmwater fishing opportunities are created and maintained statewide.***

3. ***Ensure at least 40 Featured Species concept warmwater fishing opportunities are created and maintained in the state. Species may include:***
    - ***Bluegill or Redear Sunfish***
    - ***Black Crappie***
    - ***Walleye***
    - ***Temperate Basses (Striped Bass, Yellow Bass, hybrids)***
    - ***Triploid Tiger Muskies***
    - ***Roundtail Chub***
    - ***Smallmouth Bass***

4. ***Ensure no less than 64 General Opportunity concept warmwater fishing opportunities are created and maintained statewide.***

5. ***Ensure no less than 46 Intensive Use concept warmwater fishing opportunities are created and maintained statewide.***

To achieve the vision, the Department must be able to manage for and reasonably predict productivity, forage, habitat, species composition, access and angling catch and satisfaction of those waters with warmwater angling opportunities. These seven themes are developed herein to provide specific standards and guidelines in which to aim for and prioritize work around.

Objective 1: Ensure primary productivity and food base production is measured, quantified and analyzed adequately in every fishery.

Primary productivity is the rate at which food energy is generated or fixed by photosynthesis. The flow and accumulation of this energy is the foundation of all biologic systems. Primary productivity will ultimately determine what a fishery is capable of producing. It is important to measure and understand the processes that drive primary productivity to improve and protect warmwater fisheries throughout Arizona.

Each warmwater fishery will be assessed for productivity and trophic structure. Understanding the rate at which energy accumulates and then is lost as organisms in one trophic level are consumed by organisms from the next trophic level is important in managing our fisheries. Food web dynamics can usually sustain no more than six energy transfers before the original primary production is depleted. Understanding the trophic structure in a fishery is extremely important and will determine the species and sizes of fish that will be available to anglers. Some organisms may be invasive, non-native or native to the state and could either short circuit or augment the transfer of energy to the desired species. We must understand primary production and food web dynamics, how they are utilized within a system, and how they can be manipulated to reach the vision and core goals for warmwater fisheries.

Strategic Approaches:

1) To ensure managers understand the historic baseline, gather and analyze historical data sets for productivity and food base on warmwater fisheries.
    a. Water Quality section data
    b. Datasets from ADEQ/EPA/USGS
    c. Make analysis available to all fish managers

2) Develop water quality ranges and standard methodologies for monitoring applicable chemical and physical parameters that will support primary productivity and sustain it through tertiary consumers.
    a. Through specific management plans, determine methods and frequency to measure established parameters for water quality, primary productivity and food

base.

3) Partner with other agencies, universities and organizations to gather and analyze data.
    a. Make analysis available to fish managers

4) Explore and implement strategies to increase primary productivity and food base production of a fishery, where appropriate.
    a. Explore opportunities to augment prey populations with native species of fish and aquatic animals.
    b. Ensure native species appropriate for forage are available from state hatcheries.
    c. Investigate the causes of chronic turbidity in Arizona waters and develop strategies to ameliorate its effects.

Objective 2: Assess and enhance fish habitat to support productive fisheries and healthy aquatic ecosystems.

Once productivity and food base parameters are established, warmwater fish require adequate habitat in which to thrive. The importance of the abundance, diversity and quality of habitats available to both prey and predator species cannot be overstated. So important is this aspect that a separate long term vison and action plan has been developed mainly to address reservoirs.

Strategic Approaches: (from Arizona Reservoir Fish Habitat Vision and Action Plan, 2015)

1) Protect, restore, and/or enhance physical habitat for warmwater fisheries.
    a. Increase complex littoral habitats as overall percentage of total reservoir area in accordance with reservoir type, location, and best management practices.
    b. Increase/restore spawning/juvenile habitat in reservoir systems and create habitats that would be available when reservoir water levels fall.
    c. Develop reservoir habitat projects and ensure up-to-date guidance documents and equipment is available for maintaining and/or restoring habitat diversity.
    d. Develop standardized methodologies to assess fish habitat in reservoir systems, including a system to organize assessment data in a format accessible to, useable by, and practical for fishery managers.
    e. Develop procedures and methodologies to prioritize and select fish habitat projects, and to monitor and evaluate the health of fish habitat in stream and reservoir systems.
    f. Develop and maintain an internal web-based, geo-referenced database for fish habitat data and reservoir assessments, project tracking, and research.

2) Work to maintain or restore appropriate hydrologic conditions in reservoir systems to support healthy aquatic ecosystems.

a. Coordinate and cooperate with reservoir controlling authorities to ensure consideration of the needs of fish and aquatic resources within reservoir operations plans.
b. Coordinate and cooperate with reservoir controlling authorities to adapt reservoir operations plans to address the projected effects of climate change.

3) Integrate the Department's water quality program into reservoir and stream management planning and implementation with regard to water quality and limnological issues.

a. Work with state partners to participate in water quality standards development and review to provide consideration for the habitat needs of fish and aquatic organisms.
b. Coordinate with partners to maintain or restore the function of riparian and upland habitats to maintain water quality reaching reservoirs.

Objective 3: Actively manage through appropriate means to ensure the desired sizes and species of warmwater fish are present in each fishery.

The individual characteristics of a particular fishery along with active management such as stocking, species removals, and use of regulations help determine community composition and available management actions to sustain, suppress, or expand that fishery. Below are strategic approaches that provide targets for individual abundance or density indices, growth rates, angler catch rates, and other metrics. Specific parameters are identified for Largemouth Bass, Flathead Catfish and Channel Catfish and general parameters for other species to provide objective criteria for determining and prioritizing work activities, measuring management success and possible indicators of challenges within a fishery. Parameters listed for species size structures use length frequency indices established in Anderson and Neumann (1996), and Guy et al. 2007.

Many of Arizona's fisheries have populations of fish species that were not introduced by the state or by permit of the state. These species include Green Sunfish, Black Bullhead, Brown Bullhead, Yellow Bullhead, Gizzard Shad and various Tilapia species just to name a few. In addition, the Department and the U. S. Fish and Wildlife Service have stocked various species historically that do not have the same value or desirability as they once did. Two of these species are Common Carp and Northern Pike. All these species have limited value as sportfish or forage. However, they are all known to hinder if not prevent conservation or recovery of some aquatic threatened and endangered species as well as compete for limited food and space with more desirable sportfish species. Therefore, active management using appropriate methods including but not limited to physical and chemical removal and aggressive implementation and enforcement of regulations will be necessary.

Strategic Approaches:

1) Make decisions through public, watershed scale, planning efforts about species composition of all fisheries.
    a. Determine the use on or demand for a fishery.
    b. Determine if productivity, forage and water stability is appropriate for species goals (can it be what we want it to be).
    c. Ensure impacts to threatened and endangered species are defined and acceptable.

2) Define management concepts using national standards for size class, catch rates and other appropriate measures to meet core goals.

Trophy Concept

The trophy water concept will concentrate on Largemouth Bass and both Flathead Catfish and Channel Catfish. Populations will be managed for more fish in the Preferred, Memorable and Trophy length classes as discussed in Anderson and Neumann (1996). These length classes are nationally recognized, based on world record data and help to facilitate communication and comparison between states. Lower angler catch rates and a larger average size caught will be expected. Other species of warmwater fish may be managed for large fish potential; however parameters will be set within individual lake or stream management plans.

AZ Hawg Waters: AZ Hawg waters provide ideal conditions for producing fish larger than 10 pounds and provide opportunities to catch a bass exceeding 15 pounds. These waters are highly productive, have high growth rates, and excellent habitat for all life stages of bass. These waters often produce fish at or near state records. Management strategies will focus on promoting and protecting large fish. Target include:

1. Genetic influence over 80% from Florida Bass where conditions are appropriate
2. Total Spring Electrofishing Catch Per Unit Effort: $\geq$ 50 bass/hour of electrofishing
3. Fall Recruitment: 20 – 50 % sampled by electrofishing are Age-1
4. Size Structure: Proportional Size Distribution (PSD) between 50-80, a Proportional Size Distribution of Preferred (PSD-P)(15 to 20 inch) sized fish between 30-60, and a Proportional Size Distribution of Memorable (PSD-M)(20-25 inch) sized fish between 10-25
5. Angler Catch Rates of no less than .25 fish per hour
6. Fall Relative Weight: between 95-105.

AZ Fat Cat Waters: Fat Cat waters provide ideal conditions for producing fish larger than 40 pounds for Flathead Catfish and 15 pounds for Channel Catfish. These waters are highly productive, have high growth rates, and excellent habitat for all life stages of catfish. These waters often produce fish at or near state records. Management strategies will focus on promoting the fishery and protecting large fish. Targets include:

1. Total Fall Electrofishing Catch per Unit Effort: ≥ 10 fish/hour of electrofishing, or > 5 fish/hour of baited hoop nets
2. Size Structure: ≥ 15% of the total catch ≥ 34 inches for Flathead Catfish, 28 inches for Channel Catfish.

High Quality Concept

The High Quality concept will concentrate on Largemouth Bass, however other species of warmwater fish may be managed for quality potential; parameters for other species will be set within individual lake management plans.

High Quality waters exhibit conditions for producing bass and other warmwater sportfish that reach lengths generally considered a quality size by anglers. In most instances these waters maintain self-sustaining populations but may be stocked on occasion. Management strategies will focus on maintaining suitable populations that provide satisfactory catch rates and sizes for anglers. Targets for Largemouth Bass include:

1. Total Spring Electrofishing Catch Per Unit Effort: ≥ 100 fish/hour of electrofishing
2. Fall Recruitment: 20 – 50 % sampled by electrofishing are Age-1
3. Stock Density: PSD between 40-70, PSD-P (15 to 20 inch) between 10-40
4. Relative Weight Factor: between 90-105
5. Angler Catch Rates of no less than 0.5 fish per hour.

Featured Species Concept

Featured or unique species waters provide anglers the opportunities to catch species considered to be highly desirable, but are not found all over the state. Waters managed under this concept may feature Bluegill or Redear Sunfish, Black Crappie, Walleye, Striped Bass, Yellow Bass, Tiger Muskellunge, Roundtail Chub or Smallmouth Bass. These fisheries are supported by either natural reproduction or stocking. This concept may be integrated with any other concept. Targets include:

1. Size Structure: multiple age classes
2. Relative Density: based on specific water management plan
3. When available, PSD values will be identified in specific water management plans per species featured.

General Opportunity Concept

General opportunity waters will have an emphasis on maintaining high angler catch rates either through intensive stocking of various size classes or maintenance of robust fish populations though various means. Targets include:

1. Size Structure: multiple age classes
2. Relative Density: ≥ 50 fish/hour of electrofishing

3. Angler Catch Rates of no less than 1.0 fish per hour.

Intensive Use Concept

Intensive Use waters provide for harvest by stocking catchable fish where the demand for harvest cannot be supported by other management techniques. Angler demand is met by regular stockings of catchable and incentive fish that exhibit minimal growth and are harvested at about the same size as they were when stocked. Management strategies for warmwater Intensive Use waters are focused on maximizing stocked fish return to the angler and spreading angling opportunity throughout an entire season and among anglers. Objective parameters for warmwater Intensive Use waters are focused on angler catch rates and stocking rates. Targets include:

1. Angler Catch Rates of no less than 0.5 fish per hour.
2. Stocking Rates will be adjusted and evaluated on a per acre basis, and seek to maintain target catch and satisfaction rates.

Objective 4: Work with land managers, partners and stakeholders to ensure fishing access is safe, usable and appropriate.

With the ever increasing demand for water and the complexity of Arizona water law, new recreational fishing lakes may never be built in Arizona. Although the addition of new public waters outside of municipalities seems unlikely, sources of stable funding for improving angler and boating access to existing waters is projected to remain consistent. Just as important as providing quality warmwater fishing opportunities is providing safe, consistent and reliable access to those opportunities.

Strategic Approaches:

1) Ensure each warmwater fishery has adequate facilities to accommodate angler use.

    a. Work with land management agencies to ensure adequate parking, shoreline access, boat launching and mooring facilities are available to accommodate current and projected use for each warmwater fishery.
    b. Work with the Department's Development Branch to ensure fishing access facilities are planned for, constructed and maintained adequately to accommodate current and projected use for each warmwater fishery.

2) Protect Access for warmwater fisheries.

    a. Work with land management agencies to ensure angler access is protected leading to no significant loss to stream or lake angling access for the period of this vision.

b. Work with partner groups, angling groups and private landowners to ensure no significant loss to stream or lake angling access for the period of this vision.

Objective 5: Strive to ensure a satisfaction rate of 80% on all waters.

Fishing participation in Arizona has been static or declining since the early 1990's. Recent research suggests people have been and are continuing to change the way they look and interact with wildlife. Modernization and urbanization seem to be driving a generational based change in how people view and participate in fishing and hunting. The desire to eat fish has changed to a more mutualistic view involving more catch and release. As societal values move away from a perceived need to hunt and fish, the Department must continue to deploy strategic approaches that embrace changing values but also ensures sound science in managing warmwater fish populations.

Angler satisfaction will be central to these strategic approaches and will be crucial in maintaining the strong fishing heritage in Arizona. Satisfaction may come in many forms, as some anglers will demand high catch rates or trophy opportunities to be satisfied. Others may be satisfied with just a day fishing in the outdoors with family or friends. It will be critical that the Department frequently asks what all types of anglers want from their fisheries as well as asks if they are satisfied or not. If anglers are not satisfied with their fishing experience or opportunity, they may stop fishing. Satisfaction will be the standard that determines success in keeping fishing participation in Arizona as high as it can be. An 80% satisfaction rate will be the target for all warmwater fisheries.

Strategic Approaches:

1) Conduct creel surveys at least every 5 years at waters identified through the Departments implementation planning process.

2) Standardize a satisfaction question and ensure it is asked each time an angler survey is conducted at all warmwater fisheries.

3) Conduct a statewide angler survey every 5 years to better understand angler use.

4) Evaluate water specific creel and statewide angler survey findings to initiate management approaches in management plans and this vision.

Objective 6: Make decisions through public, watershed scale, planning efforts about warmwater species composition of all warmwater fisheries.

The Department currently follows a watershed-based fisheries management process. This defined process provides a systematic, data driven way to accommodate socio-political concerns, include public involvement, and facilitate the development of fisheries management plans at various scales. The process includes mechanisms to identify critical linkages (e.g., management plans, policies, regulations, databases) that influence criteria for deciding management emphasis for a delineated management unit. It also serves to assist with evaluations in changes of status for imperiled species under the Endangered Species Act.

The watershed-based fisheries management process defines existing and desired management emphasis categories and allows for more specific prescriptions under those categories as appropriate. Emphasis designations are derived from analysis and comparison of current and potential angling opportunities as well as native fish conservation opportunities. Recommendations of management emphasis designations are only derived after an analysis of the Department's goal to manage for no net loss to angler opportunity. When management decisions result in reductions to angling opportunities in one management unit, the watershed-based fisheries management process requires compensation of lost angler use days (AUDs) in another management unit. Final decision-making authority rests at the Director's level or Commission when deemed appropriate. As with any process, adaptive modifications are periodically implemented to ensure major objectives are being met efficiently and effectively.

The process has four major objectives: 1) to reduce current and future conflicts between angling opportunity and native fish conservation; 2) to provide an integrated management strategy whereby all fish management activities within the watershed work toward meeting long-term aquatic wildlife and other Department goals for the watershed/project area; 3) to proactively manage toward and improve the status of native fish within the watershed/ project area, promoting delisting of current listed species under the Endangered Species Act, and preventing the need for future federal listings; and 4) To proactively manage toward warmwater angling within a watershed consistent with the Department's goal of no net loss of angling opportunity and to provide the ability to enhance angler recruitment.

Strategic Approaches:

1) Use Public Processes to determine the use on or demand for a warmwater fishery

    a. Commission Policies and Input

    b. Environmental Checklist Process

    c. Watershed based Fisheries Management Process

    d. Angler group communication and presentations

    e. Individual Lake and Stream Plans

i. Determine if productivity, forage and water stability is appropriate for warmwater sportfish species goals (can it be what we want it to be).

2) Ensure impacts to native threatened and endangered species are addressed.

   a. Clearly define impacts to all native species

   b. If impacts to threatened and endangered species are not acceptable, ensure mitigation and or conservation measures are defined and meaningful.

Objective 7: Provide the public with outreach and education materials showcasing the warmwater fishing opportunities of Arizona.

There are an estimated 400,000 anglers in Arizona. Their participation helps fund fisheries management activities (including conservation of all wildlife and habitats) and outdoor recreation opportunities, and provides economic benefits of approximately 1 billion dollars to state and to local communities (Fedler 2014). Data from a statewide angler survey conducted in 2013 suggested over 73% of anglers in Arizona prefer to fish for warmwater species of fish (Fisheries Branch 2015). The effective distribution of outreach and education materials is imperative to not only showcase the warmwater opportunities in Arizona but to inform anglers about the activities that they support and to educate people about the benefits of the programs in order to build public backing and ensure continued participation.

The use of two new challenge programs, the AZ Hawg Bass and Fat Cat challenges will inspire increased participation in warmwater angling. The development of the fishaz.azgfd.com web-site has been very successful in informing, educating and encouraging anglers to learn more about fishing opportunities in the state. As distribution of outreach and education materials goes more and more to a digital format, the Department will continue to develop new and innovative ways to interact with anglers and expand on how they can find up to date fishing information. It will also be important to maintain personal contacts with local anglers as well as national fishing organizations and neighboring state programs to maintain relationships and address local and regional issues with a unified message.

Strategic Approaches:

1) Create and expand the Arizona Hawg Bass and Fat Cat Challenge Programs (www.azgfd.gov/fishing/challenges) where appropriate to attract attention and create excitement about Arizona's warmwater opportunities.

2) Expand the new Fish and Boat Arizona webpage (https://fishandboataz.azgfd.com) to provide timely, accurate information on where and how to fish and what facilities are available.

3) Inform anglers of the most productive angling techniques and methods to increase angler success.
    a. Develop and maintain varied and diverse "how to" videos.
    b. Conduct fishing clinics around the state.

4) Develop innovative ways to provide information on warmwater fisheries through web-based interactive tools that allow anglers to find the latest fishing reports, surveys and management planning.

    a. Post timely information on how fishing license dollars go toward improving warmwater fishing opportunities.

    b. Maintain active social media efforts to ensure anglers can access the latest information.

5) Continue to work with local roundtable groups, local and national fishing organizations and regional stakeholders to provide consistent and unified messages for warmwater species conservation in Arizona and throughout the Southwest.

    a. Support local and national fishing organization events.

    b. Support angling groups with specific fishing clinics.

Sources Cited

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Tables.

Table 2. Proposed Hawg Water designated fisheries.

Stream/Lake	Reach	Size	Species
Arivaca Lake	Entire lake	80 acres	Largemouth Bass
Canyon Lake	Entire Lake	926 acres	Largemouth Bass
Dead Horse SP Middle Lagoon	Middle Lagoon	5.32 acres	Largemouth Bass
Mittry Lake	Entire Lake	440 acres	Largemouth Bass
Pena Blanca Lake	Entire Lake	45 acres	Largemouth Bass
Roosevelt Lake	Entire Lake	13,058 acres	Largemouth Bass
Saguaro Lake	Entire Lake	1,195 acres	Largemouth Bass

Table 3. Proposed Fat Cat designated fisheries.

Stream/Lake	Reach	Size	Species
Bartlett Lake (including Verde River below Horseshoe Lake)	Entire lake	2,015 acres +3 miles	Flathead, Channel Catfish
Colorado River-Imperial Division	Walters Camp to Imperial Dam	1,325 acres + 38 miles	Flathead Catfish
Lake Pleasant	Entire Lake	8,000 acres	Flathead Catfish
Lake Mary (upper)	Entire Lake	500 acres	Channel Catfish
Roosevelt Lake	Entire Lake	13,580 acres	Flathead Catfish
Topock Marsh	Entire Marsh (Excluding Beal Lake)	175 acres	Channel Catfish
Salt River (above Roosevelt Diversion)	Roosevelt Diversion to Forest Boundary	53.7 miles	Flathead Catfish
Verde River (below Bartlett Lake)	Bartlett Dam to reservation boundary	11.6 miles	Flathead Catfish

Table 4. Proposed High Quality Largemouth Bass designated fisheries.

Stream/Lake	Reach	Size
Alamo Lake	Entire lake	3,500 acres
Apache Lake	Entire lake	2,500 acres
Bartlett Lake	Entire lake	2,015 acres
Cataract Lake	Entire lake	35 acres
Colorado River-Imperial Division	Walters Camp to Imperial Dam	1,325 acres +38 miles
Dead Horse Lagoons	upper and lower lagoons	11.28 acres

Dogtown Reservoir	Entire lake	50 acres
Fool Hollow Lake	Entire lake	150 acres
Lake Havasu	Entire lake	19,300 acres
Kaibab Lake	Entire lake	45 acres
Lake Mohave	Entire lake	26,500 acres
Parker Canyon Lake	Entire lake	125 acres
Patagonia Lake	Entire lake	260 acres
Rainbow Lake	Entire lake	80 acres
Salt River (lower)	Stewart Mountain Dam to Granite Reef Dam	14.4 miles
Water Ranch Lake	Entire lake	5 acres
Whitehorse Lake	Entire lake	30 acres

Table 5. Proposed High Quality Smallmouth Bass designated fisheries.

Stream/Lake	Reach	Size
Fool Hollow Lake	Entire lake	3,500 acres
Lake Havasu	Entire lake	2,500 acres
Lake Mohave	Entire lake	26,500 acres

Table 6. Proposed High Quality Catfish designated fisheries.

Stream/Lake	Reach	Size	Species
Deadhorse Lagoons	All three lagoons	16.6 acres	Channel Catfish
Fool Hollow Lake	Entire lake	150 acres	Channel Catfish
Lyman Lake	Entire lake	1,500 acres	Channel Catfish
Patagonia Lake	Entire lake	260 acres	Flathead, Channel Catfish
Saguaro Lake	Entire lake	1,195 acres	Channel Catfish
Scotts Reservoir	Entire lake	80 acres	Channel Catfish
Show Low Lake	Entire lake	100 acres	Channel Catfish
Verde River	Below Bartlett Lake to Fort McDowell Reservation	11.6 miles	Flathead Catfish

Table 7. Proposed Featured Species designated fisheries.

Stream/Lake	Reach	Size	Species
Apache Lake	Entire lake	2,500 acres	Walleye, Smallmouth Bass
Alamo	Entire lake	3,500 acres	Black Crappie
Alvord Park Lake	Entire lake	25 acres	Black Crappie
Black River	upper	18.5 miles	Roundtail Chub

Blue River	upper	50.8 miles	Roundtail Chub
Canyon Lake	Entire lake	926 acres	Yellow Bass
C.C. Cragin (Blue Ridge)	Entire lake		Wiper (White Bass+Striped Bass)
Chevelon Creek	upper	12.8 miles	Roundtail Chub
Colorado River – Davis Dam to I-40	Entire reach	34.2 miles	Striped Bass
Eagle Creek	Entire creek	58.5 miles	Roundtail Chub
East Verde River	Entire river	18.5 miles	Roundtail Chub
Fool Hollow Lake	Entire lake	150 acres	Walleye
Fossil Creek	Entire creek	14.9 miles	Roundtail Chub
Greenfield Park	Entire lake	1 acre	Largemouth Bass
Green Valley Lakes	Entire lake	13 acres	Largemouth Bass
Lake Havasu	Entire lake	19,300 acres	Redear
Lake Mary (Upper)	Entire lake	500 acres	Tiger Muskie, Walleye
Lake Mead	Entire lake	150,000 acres	Striped Bass
Lake Mohave	Entire lake	26,500 acres	Striped Bass
Lake Pleasant	Entire lake	8,000 acres	Striped Bass
Lake Powell	Entire lake	16,000 acres	Striped Bass, Smallmouth Bass
Little Colorado River	Lower River	143 miles	Roundtail Chub
Long Lake	Entire lake	268 acres	Tiger Muskie
Lyman Lake	Entire lake	1,500 acres	Walleye
Mingus Lake	Entire lake	3 acres	Bluegill
Oak Creek	below Sedona	40.2 miles	Roundtail Chub
River Reservoir	Entire lake	50 acres	Tiger Muskie
Saguaro Lake	Entire lake	1,195 acres	Yellow Bass
Show Low Lake	Entire lake	100 acres	Walleye
Silver Creek	GF property	2.5 miles	Roundtail Chub
Soldier Annex Lake	Entire lake	90 acres	Tiger Muskie
Soldier Lake	Entire lake	30 acres	Tiger Muskie
Shucking Tank	Entire tank	2 acres	Largemouth Bass
Tempe Town Lake	Entire lake	220 acres	Black Crappie
Tonto Creek	Middle reach	21.4 miles	Roundtail Chub
Upper Limestone Tank	Entire tank	0.5 acres	Bluegill
Verde River	Sullivan Lake to Sycamore Creek	40 miles	Roundtail Chub
Verde River	Sycamore Creek to Childs	53.4 miles	Flathead Catfish
Verde River	Childs to Horseshoe lake	39.8 miles	Largemouth Bass and Smallmouth Bass

Verde River	Below Bartlett Lake to Fort McDowell Reservation	11.6 miles	Largemouth Bass
Wet Beaver Creek	upper and middle reaches	12.4 miles	Roundtail Chub

Table 8. List of General Opportunity Fisheries

Stream/Lake	Size	Species
Alamo Lake	3,500 acres	Channel Catfish
Arivaca Lake	80 acres	Redear, Bluegill
Antelope Tank	3.7 acres	Bluegill, Redear
ASU Research Park	18 acres	Largemouth Bass
Bartlett Lake	2,015 acres	Black Crappie
Bass Tank	1.3 acres	Largemouth Bass, Bluegill
Blue Tank	3.5 acres	Largemouth Bass, Bluegill
Cibola Lake	15 acres	Largemouth Bass, Flathead Catfish, Black Crappie
City Reservoir	8 acres	Channel Catfish
Cluff Ranch Ponds	10 acres	Largemouth Bass, Redear, Bluegill, Black Crappie
Clear Creek Reservoir	45 acres	Largemouth Bass, Channel Catfish, Bluegill
Concho Lake	60 acres	Largemouth Bass, Channel Catfish, Bluegill
Crystal Gardens (Avondale)	72 acres	Largemouth Bass
Colorado River – Davis Dam to I-40	34.2 miles	Smallmouth Bass
Colorado River-Palo Verde-Cibola Division	47.3 miles	Largemouth, Flathead Catfish
Colorado River-Parker Strip	14.5 miles	Largemouth Bass, Smallmouth Bass
Colorado River-Yuma	27.1 miles	Largemouth Bass, Flathead Catfish Channel Catfish
Dankworth Ponds	7 acres	Largemouth Bass, Bluegill, Redear, Black Crappie
Deadhorse State Park Lagoons	16.6 acres	Bluegill
Fool Hollow Lake	150 acres	Bluegill
Garret Tank	1.5 acres	Channel Catfish, Bluegill
Gila - Phoenix Area	130.9 miles	Largemouth Bass, Tilapia
Gila - Safford Area	42.5 miles	Channel Catfish, Flathead Catfish
Goldwater Lake	22 acres	Channel Catfish, Largemouth Bass

Granite Basin Lake	5 acres	Largemouth Bass, Channel Catfish
Granite Mtn. Tank #2	3.7 acres	Bluegill, Redear
Harman Tank	1 acres	Channel Catfish, Bluegill, Largemouth Bass
Harmon Tank	.5 acres	Channel Catfish, Bluegill
Lake Havasu	19,300 acres	Striped Bass
Lyman Lake	1,500 acres	Largemouth Bass
Horseshoe Reservoir	365 acres	Largemouth Bass
Horsethief Basin Lake	2 acres	Largemouth Bass, Redear
Kinnikinick Lake	126 acres	Channel Catfish
Lake Pleasant	8,000 acres	Largemouth Bass
Lake Mead	150,000 acres	Largemouth Bass, Channel Catfish
Lake Mohave	26,500 acres	Channel Catfish
Little Mormon Lake	70 acres	Channel Catfish
Little Ortega Lake	225 acres	Channel Catfish
Long Lake (Soldiers Complex)	268 acres	Channel Catfish
Lynx Lake	55 acres	Largemouth Bass
McElhaney Tank	1.5 acres	Channel Catfish, Bluegill
Mittry Lake	440 acres	Channel Catfish
Morton Lake	10 acres	Channel Catfish
Parker Canyon Lake	125 acres	Channel Catfish, Bluegill, Redear
Patagonia Lake	260 acres	Bluegill Redear
Pena Blanca Lake	45 acres	Bluegill, Redear
Phoenix Area Canals	140 miles	Channel Catfish, Largemouth Bass
Presley Tank	4 acres	Largemouth Bass, Bluegill
Rainbow Lake	80 acres	Bluegill, Channel Catfish
Roosevelt Lake	13,058 acres	Black Crappie
Roper Lake	32 acres	Largemouth Bass, Bluegill, Redear Black Crappie
Santa Fe Lake	3 acres	Channel Catfish
Scotts Reservoir	80 acres	Largemouth Bass, Bluegill
Show Low Lake	100 acres	Largemouth, Smallmouth Bass, Bluegill
Soldier Annex Lake	90 acres	Channel Catfish
Soldier Lake	30 acres	Channel Catfish
Steel Dam Lake	5 acres	Channel Catfish, Bluegill
Swale Tank	2 acres	Channel Catfish, Bluegill
Topock Marsh	4,000 acres	Largemouth Bass, Black Crappie

Verde River-Sycamore Creek to Childs	53.4 miles	Largemouth Bass, Smallmouth Bass
Verde River-Childs to Sheep Bridge (Horseshoe)	39.8 miles	Channel Catfish
Whipple Lake	30 acres	Channel Catfish
Whitehorse Lake	30 acres	Black Crappie
Woodland Reservoir	10 acres	Channel Catfish, Largemouth Bass, Bluegill
Watson Lake	70 acres	Largemouth Bass, Channel Catfish
Willow Creek Reservoir	20 acres	Largemouth Bass, Bluegill
Yuma Area Canals	213.9 miles	Largemouth Bass, Flathead Catfish, Channel Catfish

Table 9. List of Intensive Use Fisheries

Stream/Lake	Size	Species
Alvord Lake	25 acres	Channel Catfish, Bluegill Largemouth Bass
Bonsall Pond	2 acres	Channel Catfish, Bluegill, Largemouth Bass
Chaparral Lake	10 acres	Channel Catfish, Bluegill, Largemouth Bass
Copper Sky Lake	5 acres	Channel Catfish, Bluegill, Largemouth Bass
Cortez Park Lake	3 acres	Channel Catfish, Bluegill, Largemouth Bass
Council Avenue Pond (Somerton)	1 acre	Channel Catfish, Bluegill
Dave White Pond	1 acre	Channel Catfish, Bluegill, Largemouth Bass
Desert Breeze Lake	4 acres	Channel Catfish, Bluegill, Largemouth Bass
Desert West Lake	5 acres	Channel Catfish, Bluegill, Largemouth Bass
Discovery Ponds	3 acres	Channel Catfish, Bluegill, Largemouth Bass
Eldorado Pond	3.5 acres	Channel Catfish, Bluegill, Largemouth Bass
Encanto Lake	7.5 acres	Channel Catfish, Bluegill, Largemouth Bass
Evelyn Hallman Pond	3 acres	Channel Catfish, Bluegill, Largemouth Bass
Fain Lake	2 acres	Channel Catfish, Bluegill
Fortuna Pond	9 acres	Channel Catfish, Bluegill

Francis Short Pond	1 acre	Channel Catfish
Freestone Pond	4 acres	Channel Catfish, Bluegill, Largemouth Bass
Friendship Pond	1 acre	Channel Catfish, Bluegill, Largemouth Bass
Greenfield Pond	1 acres	Bluegill, Channel Catfish
Green Valley Lakes	13 acres	Black Crappie
Kennedy Lake	10 acres	Channel Catfish, Bluegill
Kiwanis Park Lake	13 acres	Channel Catfish, Bluegill, Largemouth Bass
Lakeside Park Lake	14 acres	Channel Catfish, Bluegill
Lynx Lake	55 acres	Channel Catfish
Mansel Carter Oasis Park Lake	5 acres	Channel Catfish, Bluegill, Largemouth Bass
McQueen Pond	2 acres	Channel Catfish, Bluegill, Largemouth Bass
Pacana Pond	2 acres	Channel Catfish, Bluegill, Largemouth Bass
Papago Ponds	6 acres	Channel Catfish, Bluegill, Largemouth Bass
Patterson Ponds	8 acres	Channel Catfish, Black Crappie, Largemouth Bass, Bluegill
Pioneer Lake	4 acres	Channel Catfish, Bluegill, Largemouth Bass
Redondo Lake	13 acres	Channel Catfish, Bluegill
Red Mountain Lake	8 acres	Channel Catfish, Bluegill, Largemouth Bass
Rio Vista Lake	2.7 acres	Channel Catfish, Bluegill, Largemouth Bass
Riverview Park Lake	5.8 acres	Channel Catfish, Bluegill, Largemouth Bass
Roadrunner Pond	2 acres	Channel Catfish, Bluegill, Largemouth Bass
Sahuarita Lake	10 acres	Channel Catfish, Bluegill
Show Low Creek Meadows	1.7 miles	Channel Catfish, Bluegill, Largemouth Bass
Silverbell Lake	13 acres	Channel Catfish, Bluegill
Steele Indian School	2.5 acres	Channel Catfish, Bluegill, Largemouth Bass
Stone Dam	15 acres	Channel Catfish, Bluegill, Black Crappie
Surprise Lake	5 acres	Channel Catfish, Bluegill, Largemouth Bass

Tempe Town Lake	220 acres	Channel Catfish, Bluegill, Largemouth Bass
Veterans Oasis Lake	5 acres	Channel Catfish, Bluegill, Largemouth Bass
Water Ranch Lake	5 acres	Channel Catfish, Bluegill
West Wetlands Pond	1.3 acres	Channel Catfish, Bluegill

Table 10. Number of locations with Warmwater Management Concept opportunities including total acres and miles for lakes and streams.

Management Concept	Locations		Lakes (acres)	Streams (miles)
AZ Hawg Bass	7	3.5%	15,749.3	0
Fat Cat AZ	8	4.1%	25,595	106.3
High Quality	28	14.3%	91,732.9	64
Featured Species	41	20.9%	230,873.5	572.5
General Opportunity	67	34.2%	230,975.3	743.6
Intensive Use	45	23.0%	531.3	1.7
Total:	196			

Table 11. 2013 Estimated State Water Angler User Days (AUD) extrapolated from license sales.

Water	‡ Trout		Non-Trout		Total		Cumulative
	AUD	Row %	AUD	Row %	AUD	%	%
Master List Total:	***2,127,112***	***35.58%***	***3,851,467***	***64.42%***	***5,978,578***	***99.98%***	
Roosevelt Lake			451,242	100.00%	451,242	7.55%	7.55%
Lake Pleasant			347,462	100.00%	347,462	5.81%	13.36%
Saguaro Lake	59,168	20.63%	227,637	79.37%	286,805	4.80%	18.15%
Lake Havasu			276,471	100.00%	276,471	4.62%	22.78%
Bartlett Lake			276,009	100.00%	276,009	4.62%	27.39%
Big Lake	162,859	100.00%			162,859	2.72%	30.12%
Colorado River - Topock Area	37,608	23.61%	121,681	76.39%	159,289	2.66%	32.78%
Woods Canyon Lake	154,297	100.00%			154,297	2.58%	35.36%
Veterans Oasis Lake	63,743	42.00%	88,026	58.00%	151,769	2.54%	37.90%
Canyon Lake	44,229	29.41%	106,159	70.59%	150,389	2.52%	40.41%
Patagonia Lake	38,984	26.23%	109,640	73.77%	148,623	2.49%	42.90%
Red Mountain Lake	53,043	36.00%	94,298	64.00%	147,341	2.46%	45.36%
Lake Powell			129,731	100.00%	129,731	2.17%	47.53%
Silverbell Lake	54,254	42.00%	74,922	58.00%	129,176	2.16%	49.69%
Apache Lake	24,799	19.33%	103,496	80.67%	128,295	2.15%	51.84%
Lake Mohave	18,966	15.23%	105,566	84.77%	124,532	2.08%	53.92%
Willow Springs Lake	84,357	69.91%	36,308	30.09%	120,666	2.02%	55.94%

Colorado River - Ehrenberg/Blythe to Yuma			114,523	100.00%	114,523	1.92%	57.85%
Colorado River - Lees Ferry	105,168	100.00%			105,168	1.76%	59.61%
Salt River (Below Saguaro)	45,025	43.42%	58,672	56.58%	103,697	1.73%	61.35%
Alamo Lake			88,281	100.00%	88,281	1.48%	62.82%
Fool Hollow Lake	51,898	60.59%	33,757	39.41%	85,655	1.43%	64.26%
Mittry Lake			75,549	100.00%	75,549	1.26%	65.52%
Show Low Lake	43,427	60.87%	27,917	39.13%	71,345	1.19%	66.71%
Lynx Lake	49,625	73.37%	18,012	26.63%	67,637	1.13%	67.84%
Dead Horse Lake	48,898	73.31%	17,802	26.69%	66,700	1.12%	68.96%
Parker Canyon Lake	34,644	52.01%	31,966	47.99%	66,609	1.11%	70.07%
Lake Mary (Upper)			64,996	100.00%	64,996	1.09%	71.16%
Colorado River - Parker Strip Area			60,692	100.00%	60,692	1.01%	72.18%
Water Ranch Lake	23,279	41.00%	33,499	59.00%	56,779	0.95%	73.12%
Tonto Creek (Salt River Drainage)	56,152	100.00%			56,152	0.94%	74.06%
Ashurst Lake	41,551	74.13%	14,501	25.87%	56,052	0.94%	75.00%