

WYOMING GAME AND FISH DEPARTMENT

FISH DIVISION

ADMINISTRATIVE REPORT

TITLE: Modification of The Wyoming Game and Fish Department's System For Classifying Stream Fisheries

AUTHORS: Tom Annear, Steve Wolff, Bob Wiley, Robb Keith, Kevin Johnson, Paul Mavrakis, and Curt Meyer

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INTRODUCTION

The Wyoming Game and Fish Department (WGFD) first developed a stream classification system in 1961. The inaugural system was intended to identify and rank the most important coldwater recreational fisheries. Over time, the system was also used to assess the relative potential impacts of proposed development projects to streams. The system also was adapted as one component in a land use management program to assess the relative value of properties being considered for acquisition by WGFD. The stream ranking protocol was periodically modified over the years. In its present form, streams are ranked using a combination of scores for productivity, accessibility and esthetics.

In recent years, fisheries managers have noted several limitations or problems with the present stream classification system. First, they observed some of the stream ranking attributes are highly subjective, such that classifications may not be easily defined or defended. Second, managers noted the present system addresses only trout and provides no information about the importance of cool/warm water sport fish or nongame fish. The present system also leads to considerable confusion with the stream classification system used by the Department of Environmental Quality. Lastly, managers felt the present stream classification may be used in ways that are not fully supported by the attributes used to rank streams, and other department policies and tools may be better suited to addressing these needs.

There were two primary purposes for conducting this assignment. The first was to assess the relative merits of the existing system and identify its usefulness as a management tool considering present day needs and conditions. A second purpose of this exercise was to identify ways to modify the present system to more precisely and defensibly identify the most important recreational fisheries.

APPROACH

The process of identifying problems and solutions for the existing stream classification system began by assembling the team of authors listed above. One of the first actions of the team was to survey regional fisheries management crews and fisheries administrators to assess their concerns with the present system and identify their information needs. Based on the input received from other Fish Division personnel, the team identified specific considerations and characteristics of the

existing classification system that provided a better understanding of the need for updating the system.

Ranking Strategy

One of the problems with the existing system is related to how stream classes were assigned or ranked. The present protocol is a relatively simple one that is based on the following formula:

$$\text{Class} = 4 * \text{Productivity Rating} + 2 * \text{Availability Rating} + 1 * \text{Esthetics Rating}$$

Of these three attributes, only the productivity rating is based on quantitative, defensible data. The availability rating is derived from an approximation of ownership patterns of lands along each particular stream segment. Availability assumes a meaningful and direct correlation between land ownership and accessibility. While there admittedly is a relation between these characteristics, it is at best imprecise and variable. For example, access may be good to some stream segments flowing through areas of private land where landowners provide ready access. Other landowners may totally restrict public access to other privately owned stream segments. Still other situations may exist where access to streams on public lands is prevented by the public's inability to cross private land.

The availability or access attribute was also considered one that could be used to discriminate against fisheries on private land in favor of those on public land. A system that ranks stream fisheries lower simply because of restricted access would portray the philosophy that potential impacts are less on lands held privately than on those in public ownership.

Aesthetics was found problematic because it was highly subjective. The system did provide guidelines for managers to follow in determining aesthetics but required them to discriminate between such things as whether stream channels were "extremely or very abused" and whether the landscape was "uninspiring", had "canyons" or "awesome canyons".

Another limitation of the existing system was it only addressed trout and provided no information on cool or warm water game fish species. This was problematic to fishery managers because it conveyed the message that the department had a greater responsibility to manage cold water game fish species than others. Though the majority of anglers prefer to catch trout and a majority of the department's budget is directed to trout, managers wanted a system which more accurately reflected their statutory obligation to manage all fish species.

Overall, the team felt inclusion of multiple factors in deriving a score tended to confuse the public's understanding of what different stream classes mean. Though the classification rank for each stream was weighted most heavily on trout density, many users of the system were either unaware of the other factors affecting rank or unable to discern the effect that each attribute had on the final determination of stream class. For example, a class 2 stream may have a relatively low productivity score but have high scores for scenic and access values. Other class 2 streams may have relatively high productivity scores but low scores for scenic and/or access attributes. Use of multiple factors to rank streams is an effective way to differentiate among streams; however, including many attributes in a ranking generally tends to dilute information - not add to it.

Other Management Tools and Classification Systems

When the classification system was developed in 1961 the department had few tools to convey the differences among streams to developers whose projects might impact stream fisheries. Consequently, the stream classification system was relied upon to provide direction. Though the system did a reasonable job of identifying the relative importance of streams to anglers, it generally

failed to provide more useful specific information about fishery elements like habitat integrity or condition, the species of fish present and fishery management concept. In 1994 the Game and Fish Commission adopted a mitigation policy that included those features, thus minimizing the need for a stream classification system to provide information about habitat, species present and management concept.

The original classification system was likewise heavily relied upon to help compare the fishery value of streams on properties being considered for acquisition by the department. However, inclusion of accessibility in the stream classification system provided misleading information in some instances. In many cases, increased access was one of the reasons for considering some parcels; but, if the stream was ranked low already because of limited access, the properties value would be lowered compared to its value if access to affected streams was good. In 1997 the department developed a new habitat and access evaluation process (HAEP) that included specific fishery attributes but not stream class. Development of this tool reduced the need to use stream rank as a means of providing specific fishery habitat or access information.

A recurring problem with the original classification system was that it was commonly confused with the water quality classification system used by the Wyoming Department of Environmental Quality (DEQ). Both systems were numeric (e.g. class 1, 2, 3 etc.) but the two classification systems were not directly comparable. This led developers and others to frequently make incorrect assessments about potentially affected streams.

Based on recognition of the above issues and input from fishery managers, the team identified the following objectives for the modified stream classification system.

1. The system should acknowledge the sport fishery values of all streams.
2. The system should be based on quantified or otherwise defensible information.
3. The new system should be based on existing data or manipulation of existing databases. It should not require collection of additional field data.
4. The system should be relatively simple so users can clearly understand it.
5. Stream ratings should be based on existing conditions - not potential or anticipated future conditions.
6. The system should be designed and presented in a format that ends or minimizes confusion with the Department of Environmental Quality's classification system.

ACTIONS AND CONCLUSIONS

Upon consideration of the above factors, the team concluded the present system needed to be modified to reflect present day needs and circumstances. While identification of the limitations of the present system was relatively easy, determination of the nature of changes and format of the new system was less clear. To help determine the specific changes to make and characteristics to include in the new system, several questions were posed. The answers to those questions were used to provide the necessary guidance. The questions and answers are presented below.

Who Will Be The Primary Users?

The primary users of the existing classification system have been the WGFD, other state and federal agencies, sponsors of private development projects, anglers and the general public. Most of those groups have used the system to provide information about potential fishery impacts and mitigation needs of various activities done in association with flowing streams. As described above, many of those information needs are now more appropriately met by the department's mitigation policy and habitat and access evaluation program. Anglers and the general public have

used the existing classification system to assess the relative value of angling opportunities. Relatively precise information about fish population densities is not directly included in the mitigation policy or (HAEP) and does not exist in any other readily available medium other than department databases.

In conclusion, because mechanisms exist to deal specifically with issues like land acquisition and potential impact assessment, the classification system should be designed primarily for anglers and the general public who simply want to know which streams support trout, which streams support cool/warm water fisheries and where the most productive streams in the state are found.

Should standing waters be included and use the same format as running waters?

A distinct need exists to classify or categorize standing water fisheries managed by the department based on input of both fishery managers and team members. Such a ranking could be used to help anglers and the general public identify more productive standing waters. The system could also be used to help the Habitat Protection Program identify relative impacts of proposed development projects on public fisheries. However, development of a single system to rank the relative importance of standing and flowing waters poses several challenges.

Foremost among those is that most standing water fisheries in the state are dependent upon stocking to maintain fishable populations of sport fish. Thus, the number and size of fish is at least partially dependent upon the number and species of fish stocked. Further, technical difficulties exist in accurately determining the density of fish in reservoirs. Use of productivity indices like the morpho-edaphic index (MEI) is one way to determine the relative productivity of standing waters. However, this method often shows small waters are relatively more productive than large ones. Further limiting the application of this method is that it provides information only on the relative productivity of waters as opposed to an estimate of total production (number or pounds of fish). In addition, lake productivity indices are not directly comparable to stream productivity indices.

Use of ratios that reflect the proportion of large fish in the population (like PSD) is problematic because of its variability over time and the influence of stocking. Though this approach could be used on streams and standing waters, comparability of ratios would be limited because fish often grow larger in lakes than in streams. The ability of this method to reliably discriminate among waters is also limited by the fact that the ratio shows only the population structure and provides little information about the number of fish in individual waters. In addition, PSD can change rapidly with angling pressure and removal of a relatively few large fish.

In light of the inherent differences between stream and standing water fisheries, the team was unable to identify a single ranking system that could be used with acceptable discriminatory ability and comparable utility on each water type. Because our assignment was to work on the stream classification system, we deferred the issue of a standing water classification system to a future exercise.

Can cold and cool/warm water stream fisheries be included in a single system?

The team's instructions were to develop a system that provided information about cold and cool/warm fish species. Consequently, discussion focused on not whether to include both fish groups (including nongame fishes); but, how to accomplish this task.

This aspect of the assignment posed several challenges. Primary among these was that little quantitative data exists for many streams harboring only cool/warm water fish species. Another challenge was how to deal with stream segments where cold and cool/warm water species co-exist

(like the Bighorn River below Boysen Reservoir). Another lesser challenge associated with this question was how to deal with situations where only nongame fish species occurred when those species could be found in both cold and cool/warm water habitats (speckled dace, mottled sculpins, redbreast shiners).

Though the number of cool/warm water stream fisheries in the state is relatively few, the near total absence of recent quantitative data for any of them posed a nearly insurmountable task for ranking them at the present time. After considering schemes that would simply reduce the number of ranks for these waters to subjectively determined limits like “abundant” and “few”, the team chose to simply acknowledge streams with “fishable” or “unfishable” populations. Warm water stream fisheries do merit classification when quantitative data are available. This situation should be remedied before the next update to the stream classification system or within five years, whichever comes first.

The issue of stream segments harboring both cold and cool/warm water populations was somewhat less problematic; but, certainly also was limited by the lack of quantitative data for cool/warm water fish populations. The lack of quantitative data for cool/warm water streams and decision to use a present/absent format for them made resolution of this question somewhat easier. The team concluded these situations can be best handled by displaying the presence of fishable cool/warm water fish populations with a distinctive color or overlay pattern along target streams.

This aspect of the project led to uncertainties of whether the stream classification system should be based on game fish (as legally defined) or sport fish (commonly sought by anglers). If the system is based on game fish, stream ranking would necessarily include species like mountain whitefish and stonecats. This is problematic because a) quantitative data are lacking for these species on many streams, b) some species (like mountain whitefish) reach relatively higher densities than are attainable by trout in many larger streams and c) though popular with some anglers, some game fish species (like mountain whitefish) are not commonly sought by most stream anglers. Thus, if game fish are the basis for stream ranking, some streams with low densities of trout but very high densities of mountain whitefish could be ascribed higher rankings than other streams with high densities of trout. This consequence could misrepresent the angling or recreational importance of some streams to the state. Fishery managers could include mountain whitefish in classifications in situations where they feel anglers actively seek that species and where they have quantitative population estimates.

Fishery managers had expressed an interest in development of a ranking system that provided information about streams containing only nongame fish species to reflect the department’s commitment to these species. The team initially considered assigning streams with unfishable populations of game fish and/or only nongame fish a separate category and displaying them on the summary map. Doing so created two significant problems. The first was the relatively high number of streams in this category could cause excessive clutter on the summary map and result in some user confusion. The second problem is the general lack of department fishery data on this group of streams. These potential limitations were addressed by the decision to not rank streams that contain only nongame fish species. This should not be construed as a lack of the department’s recognition of the importance of these waters. Rather, it was felt that the goal of the stream category system was to rank sport fisheries and not nongame fish populations. Information on presence and relative abundance of nongame fish populations is more appropriately found in basin management plans available at the central office or regional offices, or the department’s stream-lake inventory database.

The team concluded the following:

- Streams would be ranked on the basis of “commonly sought after sport fish” until quantitative data and angler preferences allow consideration of all game fish species in the ranking system.
- The system will show a single map with 4 categories of cold water sport fish.
- Cool/warm water streams will not be categorized because there are relatively few of them and there is little quantitative data documenting the density of warm water species.
- Streams with fishable populations of cool/warm water sport fish will be displayed in a simple “present/absent” type format. These stream segments will be displayed by a light color shading or pattern over the stream segment or adjacent to the cold water rank designation.
- Categories for cool/warm water species should be developed within the next five years as managers gather more quantitative data for those streams.
- Streams with no sport fish should not be displayed (colored) on the summary map.
- The back side of the map will provide information about the system including an explanation that all unmarked streams may or may not support fisheries; but if fish are present, they are either non-sport or unfishable populations of sport fish based on the opinions of supervisors.

What attributes should the classification system be based on?

Resolution of this issue was dictated by the objective that attributes should be defensible and/or quantitative as well as that they should not require collection of additional field data on any stream segments. These criteria dictated that esthetic characteristics could not be used because they are not quantitative or defensible. Specific indices of habitat characteristics (like sinuosity, eroding banks or width/depth) could not be used because those data are not readily available for all stream segments and would require field work for many streams (especially cool/warm water streams in eastern Wyoming). Stream management concept categories (trophy, wild, basic yield) were considered as ranking attributes but their utility raised as many questions as they seemed to provide benefit. Because one of the purposes of this project was to identify important waters in the state, it was necessary to consider whether the primary users of the system (anglers and the general public) place a higher value on “wild” stream fisheries (like the upper Green River) than they do on popular stream segments of basic yield (stocked) fisheries (like the lower Green River). Though “wild” fisheries are a benefit to the department and desirable from an ecological perspective, most potential users of the system likely place a greater value on fishing opportunity in general. The team further felt it was unnecessary to develop a system based on ecological attributes (stocking policies) in part because doing so would duplicate one aspect of the mitigation policy.

The team noted there was no need to base the system on species present or sensitive habitats because those concerns are addressed by other department mechanisms (mitigation policy and HAEP). Further, though the public is more concerned with stream habitat conditions now than they were years ago, many anglers care less about what habitat looks like than they do about catching fish. From a professional perspective, fishery managers do not need a stream classification system to tell them where to do habitat improvement work.

Inclusion of an attribute related to accessibility was considered because that attribute had a quantitative characteristic and provided information about the relative value of stream segments to the public. However, this attribute bore limitations that may not be readily discernable to users. One is that a high ranking for a stream may not necessarily mean that segment is accessible to the general public. Even if poor accessibility is used to reduce stream rank by one level, the general public would not necessarily know why two adjoining stream segments were different ranks - and

managers would often still need to access the database to know the reason for rank changes. If accessibility were used to direct anglers to accessible waters (which is perhaps the main reason for including the attribute), fishery managers would need to create more stream segments than are presently used and update stream rank more often to reflect changing land ownership and accessibility conditions. Relying on land ownership patterns to identify accessibility was considered somewhat subjective because some streams with a high proportion of publicly owned land can have limited access if a private landowner restricts access through his property to those segments. Likewise, some landowners may allow considerable public access to streams on their private property.

Sport fish production (pounds per mile) was regarded a good attribute because it is quantitative, defensible, easily understood by the general public and available for nearly every stream in the state. Further, pounds per mile is the primary attribute driving the present ranking system. Pounds per mile data are collected in a standardized manner by all fishery managers and provide an objective comparison of stream segments throughout the state. These facts make this attribute different from the many commercially available fishing guide publications that indicate the best streams for fishing (on a relatively subjective basis). Production is also an attribute that can be used with equal utility on cool/warm water streams in the future when fishery managers add precision to that ranking system.

A ranking system based on sport fish production would also have particular utility in the department's mitigation policy. That policy still includes "stream class" as one index of resource value and having a system based solely on production would be an appropriate complement to the other components of the mitigation policy that assign resource values based separately on habitat, species status and management concept.

The team was unable to identify any other attributes that met the criteria established at the start of the project. Consequently, we decided to base the new stream ranking system solely on pounds per mile of sport fish.

Because stream fisheries exhibit natural population variation in response to environmental factors, the productivity index should be an average of all population estimates within each stream segment within the most recent five year period preceeding updates to the ranking system. If no or inadequate population data are available in the most recent five year period, managers should use the most recent population estimate. Likewise, managers should ensure that the estimate should be of resident fish and not reflect a population that is biased by seasonal behavior of fishes (immigration or emmigration).

What Terms And Concepts Should Be Used To Present The New System?

Because of the present confusion between the WGFD's classification system and the stream classification system used by the Department of Environmental Quality, the most important terms to avoid were references to a stream classification system and stream classes. The team concluded stream "categories" and a "stream ranking system" were more appropriate. The map, when produced, would be titled the "*Wyoming Stream Categories Map*".

Because the DEQ system is based on a numeric ranking, it was equally important the modified WGFD system not be numeric. After consideration of several conventions, the team expressed support for ranking streams on a ribbon system. Such a convention is one our public is already familiar with because it is a part of the existing system. As such, a ribbon system would be easily understood and would not require a significant re-education effort. The team proposed using blue,

red, yellow and green ribbons for the top four stream rankings. Streams containing populations of cool/warm sport fish species would be indicated as orange ribbon.

Definition Of Breaks Between Categories

The team concluded because cool/warm water stream sport fisheries would be reflected on the map, there only needed to be four categories for cold water sport fish (with all unmarked stream segments reflecting the potential for harboring nongame fish or unfishable populations of any sport fish). The ranking system was developed using the department’s RIVERSTN database. The estimate for all species of trout in each estimate was combined to provide an estimate of total pounds of trout per mile. Then, all population estimates for each stream segment (water number) were averaged to provide a single estimate for each water number. Breaks between stream categories were determined by identifying the points on this scale that included approximately the same number of stream miles in each category as exist under the present classification system (about 2%, 5%, 43% and 50% of stream miles should be in each category in descending order from blue to green). This approach was used only to establish the break points between categories - not to limit the number of stream miles that may occur in any one category. For example, any stream segment with a documented fish density of 600 pounds per mile or more may be considered Blue Ribbon. After some modifications and fine-tuning, the following table was developed:

CATEGORY	Percent of Stream Miles	POUNDS OF SPORT FISH PER MILE
Blue Ribbon	3	≥600
Red Ribbon	6	≥300 and <600
Yellow Ribbon	28	≥50 and <300
Green Ribbon	63	≥1 and <50
Orange Ribbon	Unknown	Any cool/warm water game fish present

When adequate data become available for cool/warm water sport fisheries, the team suggests considering a three level scheme for those streams that generally reflects “high”, “medium” and “low” population densities.

Summary

The design and characteristics of the product of this effort met all of the objectives identified by fishery managers and the study team. The new system is more objective and defensible, can be generated using existing information, is simple and easily understood by most potential users, provides needed information to supplement the department’s mitigation policy and habitat and access evaluation program and is more distinguishable from the classification system used by the Department of Environmental Quality. Though the system is based only on the single attribute of cold water sport fish production, this attribute does provide a meaningful and objective way to rank streams in all parts of the state. In addition, this stream characteristic is not addressed in other components of the mitigation policy that focuses on habitat, species presence and management concept and is an appropriate complement to that policy. The attribute provides meaningful information to anglers and the general public by helping them identify streams with more fish, and is valuable to the State because it identifies those streams that can withstand more angling pressure than others. The system will also provide some, albeit limited, information on cool/warm water sport fishes and nongame fish populations.

The proposed system does not include an adjustment factor for access. We doubt any system could reasonably reflect this information in a format that is useable by anglers. Further, downgrading a stream because of poor access (or upgrading one with good access) unfairly reduces the value of the stream fishery solely on its own merits and may potentially deny a private landowner from owning a blue ribbon stream. Likewise, downgrading a stream simply because of access may cause environmental regulators to recommend development activities on privately owned land instead of on an adjoining segment that is publicly held, thus discriminating against waters on private property.

In consideration of these factors, the proposed system will have the following characteristics:

1. The system will be designed for anglers and the general public with an underlying purpose of showing where the most productive streams are located in the state.
2. The ranking will be based solely on sport fish (trout) density (pounds per mile). Mountain whitefish may be included if managers determine this species is actively sought in that segment by anglers and they have quantitative estimates of mountain whitefish abundance.
3. The ranking will consist of a single display (map) that shows the ranking of cold water sport fish streams. Stream segments that support fishable populations of cool/warm water fisheries will be indicated on the same map.
4. There will be 4 categories for cold water streams and one category for cool/warm water streams.
5. Stream rankings will be described by a ribbon system. Stream segments with cold water sport fish present will be categorized as blue, red, yellow or green). Stream segments with cool/warm water sport fish will be indicated by an orange strip next to the segment.
6. Reference to “stream class” will be eliminated to avoid confusion with the DEQ classification system and be replaced by calling the new system a stream ranking system.
7. Each ribbon grouping will be a stream category, not class.
8. The map will be titled the “*Wyoming Stream Categories Map*”.
9. To ensure long-term effectiveness of the stream ranking system it should be updated every five years following implementation of the new system.

Future Needs

Though the team did not support including more attributes within the proposed format, it did acknowledge the potential need for continued evolution of the system. Foremost among these is the need to increase the quantity and quality of information on populations of cool/warm water stream fisheries. This information is essential to develop a comparable ranking system within the next five years.

In response to input from regional managers, the team also supported development of a comparable but separate classification system for ranking the value of standing waters to anglers and the general public. Such a system is needed to identify those waters that are of greatest value to the State as well as to identify the numerous opportunities for angling in standing waters.

Providing information about the accessibility of streams to the general public was an issue the team dealt with extensively without a great deal of concurrence. Though this issue is important, it is also very complicated and dynamic, depending on the level of precision that is desired. To be most useful, the team considered that development of a separate stream access guide may be the most reasonable way to address the information need. If this were developed it would require a significant investment of resources and a commitment to updating the information on a reasonable frequency.