PERSPECTIVE

The U.S. Inland Creel and Angler Survey Catalog (CreelCat): Development, Applications, and Opportunities

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Inland recreational fishing, defined as primarily leisure-driven fishing in freshwaters, is a popular pastime in the USA. State natural resource agencies endeavor to provide high-quality and sustainable fishing opportunities for anglers. Managers often use creel and other angler survey data to inform state- and waterbody-level management efforts. Despite the broad implementation of angler surveys and their importance to fisheries management at state scales, regional and national coordination among these activities is minimal, limiting data applicability for larger-scale management practices and research. Here, we introduce the U.S. Inland Creel and Angler Survey Catalog (CreelCat), a first-of-its-kind, publicly available national database of angler survey data that establishes a baseline of national inland recreational fishing metrics. We highlight research and management applications to help support sustainable inland recreational fishing practices, consider cautions, and make recommendations for implementation.

IMPORTANCE OF INLAND RECREATIONAL FISHING

Recreational fisheries, where angler effort is primarily leisure-driven, are socially and economically important. In these complex social–ecological systems, management must balance the maintenance of ecological integrity with provision of high-quality fishing opportunities by understanding the interdependencies of the status of fish populations, their habitats, angler motivation and behaviors, and the economies dependent upon them (Ward et al. 2016; Arlinghaus et al. 2017; Camp et al. 2020; Nieman et al. 2021). Globally, more than 1 billion people participate in recreational fishing on an annual basis and the sector generates economic activity valued at US$190 billion and employs more than 60 million people (World Bank 2012). In countries where angling is a common

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activity, approximately 7% of the population (more than 174 million people globally) participate in inland recreational fishing (angling conducted in freshwaters and other landlocked aquatic systems—not to be confused with saltwater fishing conducted in enclosed bays and estuaries that are also sometimes referenced as "inland waters"; Funge-Smith 2018).

In the USA, 13% of the population (39 million people) identify as inland recreational anglers (hereafter, anglers; Figure 1), who each average over 16 individual outings for a total of 632 million outings annually (RBFF 2019, data from 2018). These anglers collectively spend approximately $30 billion on fishing equipment and trip expenditures with an associated multiplier effect of $83 billion in U.S. economic activity and support of over 500,000 U.S. jobs (ASA 2018; USFWS 2018, data from 2016). Inland recreational fisheries can attract visitors from outside communities, particularly to rural areas that may have limited economic activity, providing an influx of externally sourced revenue from travelling anglers that is transferred to local economies (Ditton et al. 2002; Gillespie et al. 2018). For example, inland recreational fishing across the southern USA contributes about 154,000 jobs and $18 billion through fishing expenditures, travel and service sector spending, and resulting economic activity (Poudel et al. 2018, data from 2006 and 2011).

CREEL AND OTHER ANGLER SURVEYS

Despite undeniable benefits provided by inland fisheries, effective fisheries management is frequently impeded by data limitations (Bartley et al. 2015; Midway et al. 2016). Angler surveys are conducted by managers and researchers to gather data about anglers' desires and behaviors for the purposes of refining fishing regulations and answering research questions. Creel surveys, namely in-person, on-site interviews focused on waterbody-specific effort, catch, and harvest, are generally considered to be the most reliably sourced angler survey methodology (Newman et al. 1997; Rasmussen et al. 1998; Chizinski et al. 2014). However, the extreme diversity of creel designs used in freshwater (reviewed in Pollock et al. 1994) creates a challenge for standardizing catch and effort estimates across a landscape. This incongruity makes broad-scale spatiotemporal and long-term trends in angler behavior, management action, and global environmental change difficult to examine. Unfortunately, these issues relate to many of the most pressing questions in fisheries science, particularly those related to data issues, regulatory actions, management interventions, and system impacts (Holder et al. 2020).

For example, efforts to maintain or enhance recreational fisheries often entail changing regulations or management strategies (e.g., stocking, habitat rehabilitation, community manipulation) over time (Arlinghaus et al. 2016). Having access to creel and angler surveys available across multiple states could aid managers in drawing comparisons, extrapolating trends, and identifying regional patterns and processes (e.g., effort, catch, harvest; Nieman et al. 2021). The ability to leverage data from nearby states may aid managers in assessing the potential efficacy of methods applied to their own waters. A standardized database among states could provide useful information on angler participation associated with other states, particularly in regions near state boundaries, because anglers may cross state boundaries to fish and because resident and non-resident anglers may have different catch and non-catch objectives (Tingley et al. 2019).

In this article, we seek to address the clear need for a single, standardized repository for inland creel and other angler survey data from across the nation. We (1) introduce the U.S. Inland Creel and Angler Survey Catalog (CreelCat) as a new, publicly available national database of angler survey data that establishes a repository and baseline for national inland recreational fishing data; (2) highlight applications of this national database; and (3) consider cautions and make recommendations for implementation. This is a synthesis of discussions first started at a national creel and angler survey database virtual workshop of technical experts with the intent to create a database developed (in part) by and for users. The workshop participants included state, federal, and academic experts who provided lessons learned from their own experiences, translated recommendations into infrastructure and processes in CreelCat, and identified strategies for implementation and longevity of the database. We believe what we have learned from CreelCat can be useful to those stewarding other databases as well.

THE U.S. INLAND CREEL AND ANGLER SURVEY CATALOG (CREELCAT)

Managers and researchers can use CreelCat to help identify knowledge gaps, pinpoint pitfalls, and promote opportunities for U.S. inland recreational fish harvest and angling activity (see Box 1). CreelCat (Figure 2) is a first-of-its-kind, publicly accessible, national repository of spatially explicit inland creel and other angler surveys that include, at minimum, catch and harvest data. CreelCat comprises survey data from individual waterbodies that can then be analyzed, compared, or summarized across state, regional, and national levels, allowing multistate and regional comparisons. This database aims to support fisheries research and management by highlighting fisheries trends at multiple spatial and temporal scales, addressing critical gaps in our understanding of inland recreational fisheries as complex social–ecological systems (Arlinghaus et al. 2017; Nieman et al. 2021) to help prepare stakeholders for the future impacts of climate change (Pinsky and Fogarty 2012). More broadly, CreelCat can serve as a model to encourage other countries to develop comprehensive tracking of recreational fishing to bolster international reporting to the Food and Agriculture Organization of the United Nations and other relevant entities.

CreelCat can assist with addressing some key social and economic aspects of inland recreational fisheries by integrating them with human dimensions data (following Heck et al. 2016; Ward et al. 2016; Camp et al. 2020). The social side of inland recreational fisheries management is often the most poorly understood (Arlinghaus et al. 2002; Villamagna et al. 2014) and represents a source of considerable uncertainty for management outcomes (Fulton et al. 2010). CreelCat can facilitate improved valuation of economic and cultural benefits of inland recreational fisheries through analysis of broad-scale spatiotemporal trends in key metrics such as catch composition, harvest, angler demographics, and angler motivations, as well as identification of critical data gaps (Nieman et al. 2021). Such large-scale, cross-jurisdictional efforts have been vital in crafting strategic fisheries management plans for fish populations in dynamic systems such as the Laurentian Great Lakes (e.g., Guthrie et al. 2019).

Likewise, the broad spatiotemporal scale of CreelCat encourages pairing with environmental datasets to assess landscape-scale drivers (e.g., climate change, urbanization) of inland recreational metrics (e.g., harvest, catch; McCluskey

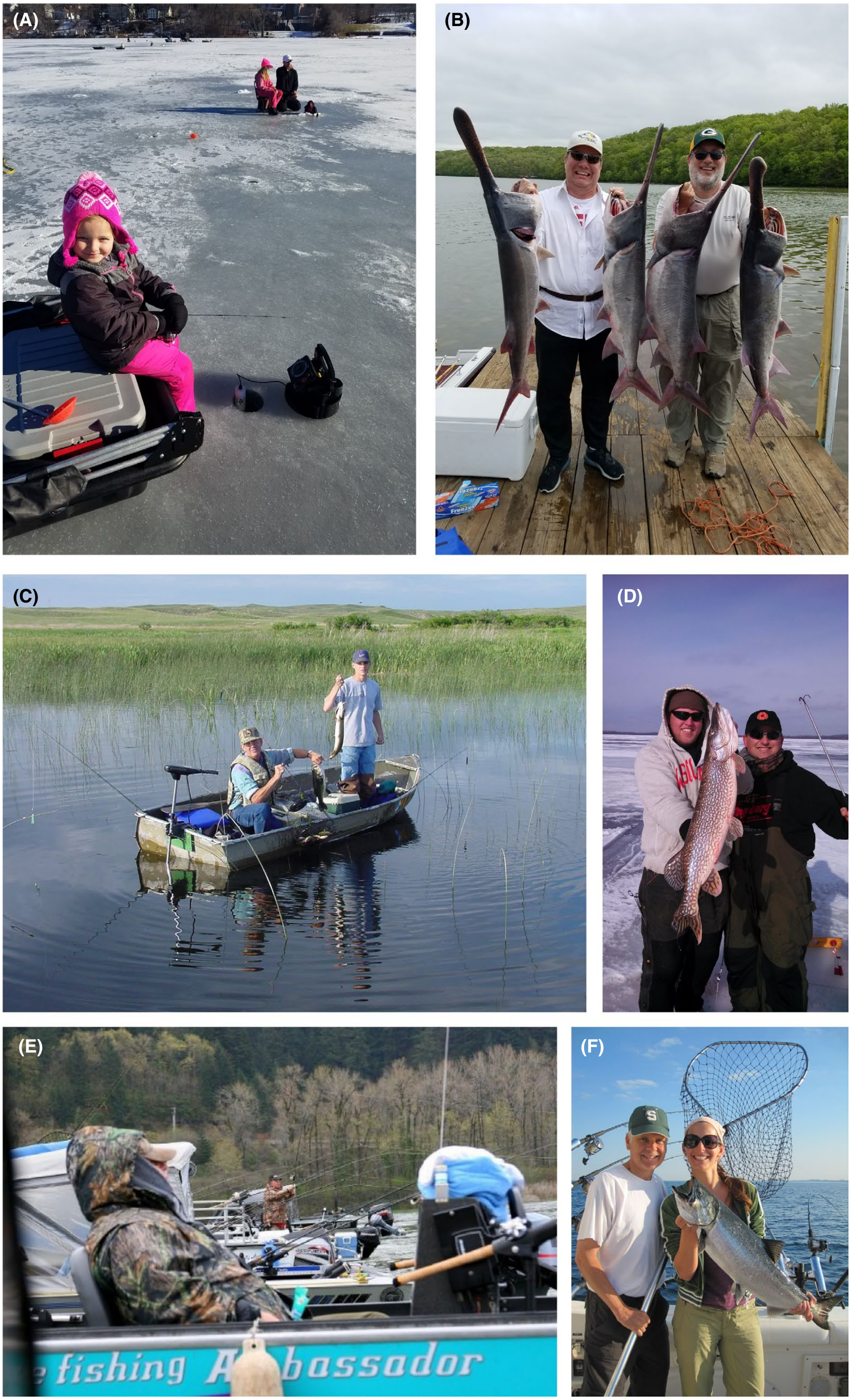


Figure 1. Inland recreational fishing is a leisure activity for 13% of the American population. Diverse examples of inland recreational fishing across the country: (A) Ice fishing in Wisconsin (photo credit: Mark Baldock); (B) Paddlefish snagging in Missouri (photo credit: Ryan Lueckenhoff); (C) Fishing in Nebraska (photo credit: Craig Paukert); (D) Another take on ice fishing in Wisconsin (photo credit: Steve Gospodarek); (E) "Hogline" salmon fishing in Oregon (photo credit: Abigail Lynch); (F) Charter fishing on Lake Michigan (photo credit: Abigail Lynch).

Box 1. Description of potential research questions that can be answered through a national creel database

Spatial and temporal variability in angler use (i.e., catch, harvest, effort)

- How does angling trend across space and time?
- How much food do inland recreational fisheries provide on a national scale? Can this information be used to inform global estimates of recreational fisheries harvest?
- What is the economic value of inland recreational fisheries harvest? What is the economic value of catch-and-release fishing?
- Why do some waterbodies not conform to large-scale patterns?

Projecting angler use with landscape-level drivers

- Are there environmental characteristics that can drive ecological change and how does this affect angling?
- Is variability in catch, harvest, effort a function of landscapes, states' political or funding support (e.g., harvest-oriented vs. catch-and-release; non-resident vs. resident anglers)?
- How does climate change or other stressors impact angler satisfaction over time? Where are the changes the most felt or impacting satisfaction the most?
- Where are potential new areas of increased harvest under different climate conditions?
- Do temporal trends in harvest vary across landscapes?
- Which aspects of a fishery attract anglers to travel long distances?

Angler demographics

- Which anglers compose a given species-specific fishery?
- How do angler preferences vary across states? Fisheries? Landscapes?
- How do other forms of recreation impact fishing activities (e.g., displacement of anglers by recreational floaters, boaters, displacement of anglers; resident vs. non-resident)?
- How do urban and rural fisheries compare on different metrics of value (e.g., money vs. participation vs. angler recruitment)?
- Who accounts for the most effort, catch, harvest? Are there areas with more or less subsistence vs. sport fishing?
- Catch data are often really skewed—who are the "super users"? How do they differ in motivation from more casual anglers? What is the variance in catch and harvest opportunities among anglers?
- What type of fishery is most attractive to new or young anglers?
- How does the cultural value of recreational fishing vary across user groups?

Species composition

- Which species are targeted where and by whom?
- Track invasives spread and emergence.
- Do consumptive anglers shift harvest to compensate for species abundance changes?
- Will anglers respond adaptively to shifting species assemblages as waters warm?
- Which species are more likely to be harvested vs. released? Is there spatial or temporal variation in these trends?

Evaluation of effects of regulations and management actions

- What are impacts of changing angler trends to fish management (e.g., not enough fish are harvested to impact fish populations)?
- Is the relationship between money spent on a creel program and data quality linear? If not, what elements make a "good" creel program (i.e., what information do managers need most)?
- Examine strengths and weaknesses of creel designs (e.g., what can be used to improve creel programs)?
- When and where does a regulation work (e.g., what do they have to look like to be effective)? How do they affect effort, harvest, or catch? How do they affect angler behavior? How do they affect size selectivity?
- Do fisheries regulated more by angler satisfaction have different (i.e., better or worse) outcomes than fisheries regulated on biological data?
- How effective are different stocking strategies at driving angler use and satisfaction?

and Lewison 2008). Pronounced shifts in social (e.g., urbanization or changing demographics) or environmental (e.g., climate change) conditions are occurring across much of the USA (Murdock et al. 2008; O'Driscoll et al. 2010; Lynch et al. 2016). Data available from areas that are predictive of future conditions in other locations may be useful in determining how to manage for these changes. Pooling data from multiple states in CreelCat may also aid in providing guidance in areas where information is limited and help identify regional patterns or trends.

Inland fisheries productivity is tightly linked to ecological processes, including land and water use (Paukert et al. 2016; Giacomazzo et al. 2020), primary production (Downing et al. 1990), and climate (Mogensen et al. 2014), meaning fisheries trends can serve as ecological and social indicators (Villamagna et al. 2014; Jackson et al. 2016). However, the dynamism of inland fisheries is critically underestimated – changes in human populations (Post et al. 2008), technology (Feiner et al. 2020), and behavior (Sass and Shaw 2020) all influence fish harvest. Though CreelCat cannot be used as a benchmark of a particular status (e.g., healthy population, underexploited fishery), it can provide a baseline for comparison of inland fisheries to track relative indicators of change. Thus, it may enhance our understanding and appreciation of the magnitude of inland fishing activity and changes in inland fisheries, informing management and conservation for these complex social–ecological systems.

Lastly, CreelCat will be useful in drawing comparisons of catch, harvest, or other metrics between states or similar waterbodies for more powerful predictions of, for example, fishery production and assessments of management interventions. Standard metrics for fishery data (e.g., age and growth, catch per effort, size structure) have been developed for popular sport fish by region and waterbody type (Brouder et al. 2009), and CreelCat may be able to provide a similar function for creel survey data. Additionally, increased data accessibility through CreelCat facilitates engagement in cross-boundary and cross-disciplinary discussions, thereby connecting inland fisheries with broader social–ecological systems research communities.

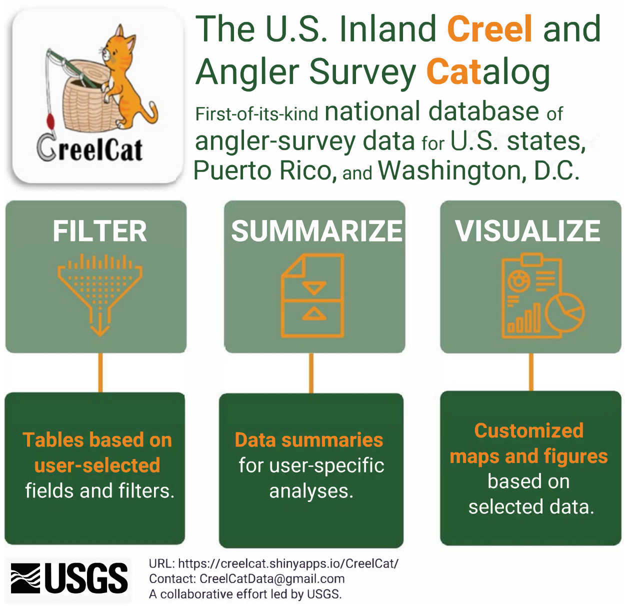


Figure 2. Conceptual schematic of the U.S. Inland Creel and Angler Survey Catalog (CreelCat).

ASSEMBLING CREEL AND ANGLER SURVEY INFORMATION NATIONALLY

We contacted agencies in all 50 U.S. states, Puerto Rico, and Washington, D.C. with requests for recent (collected since 2010) inland creel and other angler survey data. We maintained a correspondence record to ensure appropriate documentation, acknowledgment, and contact for future requests as the database was assembled. In our national creel and angler survey database virtual workshop, stakeholders from state and federal agencies and academia identified several database features important to users including: a web interface, downloadable query results and datasets, ease of access to metadata, and accessible analytical and summarization tools.

Initial records from agencies have been compiled from 43 states, as well as Washington, D.C. and Puerto Rico—two states do not have any inland creel or angler survey data available and attempts to gather data from the remaining states are currently in-progress (Figure 3). The number and scale of creel surveys conducted varies greatly by state. Available data range from comprehensive (annual or long-term, ≥5 months, surveys representing a suite of species) to targeted (short term, <5 months, or limited species representation) surveys. Some states do not have recent (since 2010) creel data, but do systematically collect angler survey information that can be used to estimate catch and harvest for specific waterbodies, whereas other states do not have datasets available for estimating catch or harvest in their waterbodies.

DATABASE ACCESSIBILITY AND APPLICATIONS

Data are stored in tabular form in Google Sheets and can be downloaded directly into a *.CSV file or copied to a user's personal account. Data are compiled for individual georeferenced surveys, which are typically summarized at the level of individual waterbodies (i.e., no raw interview data). The database includes tables containing information related to survey details, waterbody information, angling effort, fish

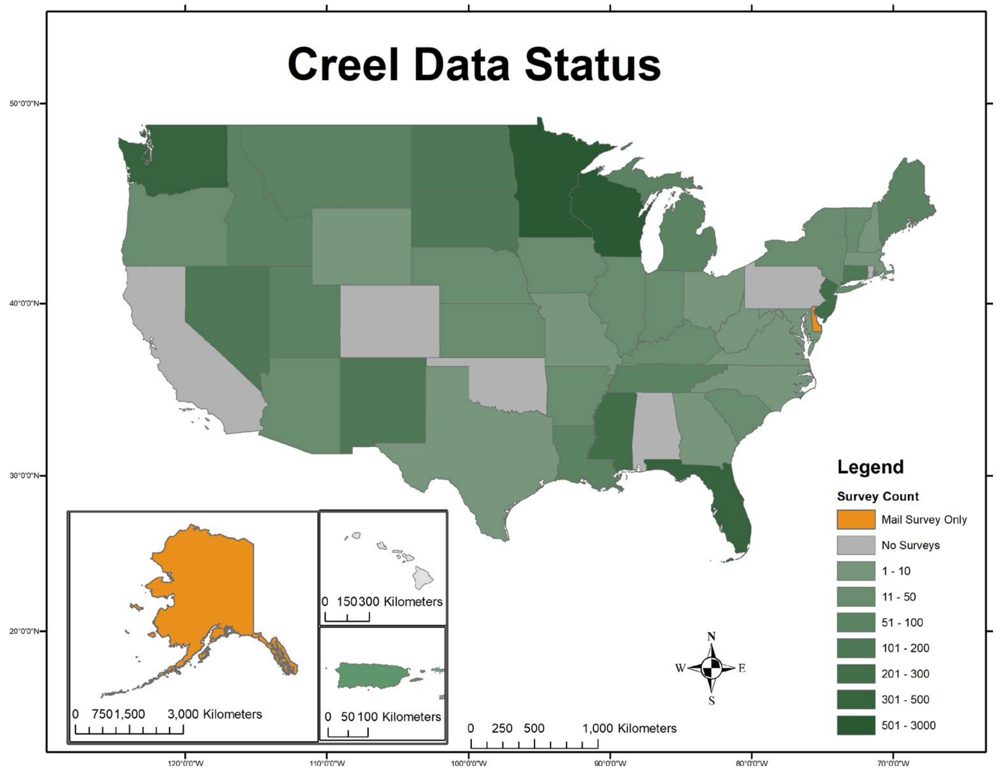


Figure 3. Classification of recent (2010–present) creel and angler survey status in each state as well as Washington, D.C. and Puerto Rico. States classified as "Mail Survey Only" do not have creel survey data available but were able to provide angling and harvest information from mail surveys. Unavailable states are those which collect creel survey data but declined to provide it to the database. The remainder of classifications represent a gradient of the number of creel surveys in the database from each state.

Table 1. Fields within the U.S. Inland Creel and Angler Survey Catalog (CreelCat)

Field Names	Units	Description
Survey Info Table		
SurveyID		Unique ID for each survey
State		State name
WaterbodyName		Waterbody name
WaterbodyID		Unique waterbody identifer
PermID		National Hydrography Dataset (NHD) identifer
WaterbodyType		NHD classification
WaterbodyArea	km^2	Surface area of waterbody making up the survey
StreamLength	km	Length of stream surveyed
Upstream_Pos	lat/long	Upstream position of surveyed stream reach
Downstream_Pos	lat/long	Downstream position of surveyed stream reach
Year		Year the survey began
StartDate		Year/month/day
EndDate		Year/month/day
Duration	days	Duration of the survey
Focal_Species		All or name of targeted taxa group
SurveyType		Creel or mail/online angler survey
SurveyProtocol		Roving, access, etc.
SurveyCitation		Survey methodology citation
ReportCitation		Report citation
Agency		Agency name
DataSourceUnit		Agency unit that provided the data
Comments		Comments on survey
Demographic Information		
SurveyID		Unique ID
Per_Resident	%	Percent resident anglers
Per_NonResident	%	Percent non-resident anglers
Fish Information		
SurveyID		Unique ID
SciName		Scientific name of species or taxonomic group
CommonName		Common name of species or taxonomic group
HarvestRaw	# fish	Raw count of # fish harvested
HarvestEstimate	# fish	Estimate of # fish harvested
HarvestEstSE		Standard error of harvest estimate
ReleaseRaw	# fish	Raw count of # fish released
ReleaseEstimate	# fish	Estimate of # fish released
ReleaseEstSE		Standard error of release estimate
CatchRaw	# fish	Raw count of # fish caught

(Continues)

Table 1. (Continued)

Field Names	Units	Description
CatchEstimate	# fish	Estimate of # fish caught
CatchEstSE		Standard error of catch estimate
HarvestPercent	%	Harvest as a percent of total catch
CatchEstPerEffort	# fish / hour	Estimate of # fish caught per estimated hours of effort
HarvestEstPerEffort	# fish / hour	Estimate of # fish harvested per estimated hours of effort
CatchEstPerAcre	# fish / acre	Estimate of # fish caught per waterbody acreage
HarvestEstPerAcre	# fish / acre	Estimate of # fish harvested per waterbody acreage
CatchEstPercent	%	Percentage of total catch attributable to a species
HarvestEstPercent	%	Percentage of total harvest attributable to a species
MeanLength	cm	Average length
MeanWeight	g	Mean length
Angler Preference		
SurveyID		Unique ID
TargetSpecies		Scientific name of target species
TargetName		Common name of target species
TargetEffortHoursRaw	hours	Raw count of angler hours
TargetEffortHoursEst	hours	Estimate of total angler hours
TargetEffortHoursSE		Standard error of angler hours estimate
TargetEffortPercent	%	Percent of total hours targeting a species
Percent_Anglers	%	Percent of anglers targeting this species
Angler Effort		
SurveyID		Unique ID
CumulativeEffortHoursRaw	hours	Raw cumulative effort in hours
CumulativeEffortHoursEst	hours	Estimate of cumulative effort in hours
CumulativeEffortHoursSE		Standard error of estimate of cumulative effort in hours

catch and harvest, angler preferences, and angler demographics (Table 1). We created a web interface with an R Shiny application (Chang et al. 2020) called CreelCat that allows users to view, filter, query, summarize, map, plot, download, and submit creel and angler survey data (available: https://creelcat.shinyapps.io/CreelCat). The R Shiny application allows users to create custom tables that include any elements of interest filtered to the scope of their project. It also allows users to calculate basic summary metrics (e.g., sum, average, minimum, maximum) across multiple surveys by grouping on features of interest. CreelCat has a variety of visualization tools that allow users to develop custom plots (e.g., scatter, histogram, pie) as well as maps based on the information stored in the database (see Box 2). Additionally, users are able to upload or enter new data for immediate personal use and, if they wish, include in the publicly available dataset pending data review and approval.

CreelCat users (e.g., state agencies, researchers, stakeholders) have interests that vary across different scales (e.g., landscape-level harvest and participation vs. local fishing pressure); therefore, spatial queries for descriptive statistics are a key database output to provide context and value for CreelCat content. For example, state agencies may use CreelCat to review angler distribution and harvest at a local or regional level, whereas researchers studying drivers of participation may seek to use regional or national-scale data to examine landscape-level processes. Key statistics include catch, harvest, and fishing effort values by waterbody. These metrics can then be compared across surveys spanning a range of years or among waterbodies, which were surveyed using similar methods. This can provide agency staff with a repository that could amass results for stakeholders to easily view and compare with available angler survey information for their state or region.

CAUTIONS FOR DATABASE INTERPRETATION

Uncertainty in understanding recreational fisheries exists due to complexities in accurately measuring fish populations (Zale et al. 2013) and anglers' harvest behavior (Hunt et al. 2011), as well as the patchy (Carpenter and Brock 2004) and dynamic (Ludwig and Leitch 1996) dispersion of people and fish across the landscape. Quantifying harvest for inland recreational fisheries is especially difficult (Guthrie et al. 1991; Pollock et al. 1994). Further, creel surveys are often spatiotemporally unique and not necessarily related to fishing pressure or fish abundance. Small lakes comprising lake-rich landscapes make the number of discrete systems too vast to sample efficiently, whereas large lakes and other inland systems (i.e., rivers, wetlands) pose sampling difficulties as discrete boundaries are unclear. Anglers are a highly diverse user group (Holland and Ditton 1992; Connelly et al. 2001) who move across landscapes (Wilson et al. 2020), including between surveyed and unsurveyed waterbodies. Angler decision making regarding when and where to fish (Fenichel et al. 2013), and why, when, and where to release or keep fishes is complex (e.g., harvest decisions; Hunt et al. 2002; resident and non-resident preferences; Tingley et al. 2019; release decisions; Kaemingk et al. 2020).

Despite the immense value in creel survey metrics, we include a cautionary note on analyzing or comparing the data stored in CreelCat due to differences in methodology among surveys. Surveys contained in CreelCat differ in sampling (and estimate) duration and timing, taxa inclusion (e.g., targeting Largemouth Bass *Micropterus salmoides* vs. community data collection), taxa naming (e.g., species specific "White Crappie" *Pomoxis annularis* vs. pooled "Crappie"), other aspects of survey protocol (e.g., roving vs. access), survey location selection (e.g., targeted vs. random), and expansion/estimate generating procedures; all of which means that care and caution is required when determining whether surveys can be compared and how to go about doing so. Combining datasets from multiple sources based on non-random sampling events (e.g., creel surveys are often probabilistic in design; Malvestuto et al. 1978) with varying sample periods (i.e., long-term vs. short-term creel surveys) and specific management aims has great potential for creating a variety of issues that may cause results to be misleading and invalid.

A careful evaluation of survey characteristics based on the provided metadata should be performed before making any comparisons or conducting any analyses using the data from the CreelCat database. This also applies when pairing creel data with other local, regional, or national data (Leonelli and Ankeny 2012), identifying and summarizing data to useful and appropriate spatiotemporal scales (Rao et al. 2012), and linking available environmental data (e.g., land cover, temperature) with catch, harvest, and effort information (Mukuria et al. 2019). To make these limitations and considerations clear, any CreelCat user must acknowledge the following statement on data limitations anytime the database is opened:

> Data contained in the CreelCat database were collected using a variety of sampling protocols. Thus, comparison, summarization, or analysis using any of the creel data contained within CreelCat may be misleading or inaccurate. Users should verify that potential differences in survey characteristics such as survey timing (e.g., open-water vs. ice) or duration (e.g., 30 days vs. 300 days), taxa inclusion (e.g., Largemouth Bass only vs. all species), taxa naming (e.g., species specific "White Crappie" vs. pooled groups "Panfish"), other aspects of survey protocols (e.g., roving vs. access), waterbody selection (e.g., random vs. targeted), and expansion/estimate calculation methodology are either consistent among included surveys or the user must take steps to standardize or account for potential differences where they exist. CreelCat users are responsible for evaluating whether selected surveys are valid for comparison, summarization, visualization, etc. based on the information contained directly in the data-table or through review of the provided metadata.

PRELIMINARY RECOMMENDATIONS FOR DATABASE CONTINUITY

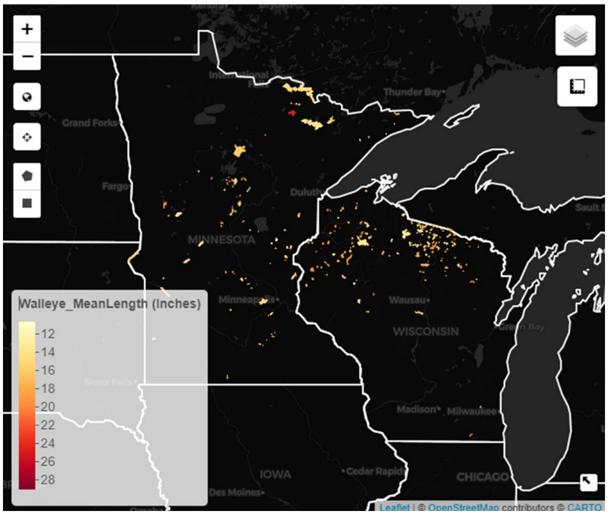
CreelCat is now accessible with a public-facing interface and common built-in queries to make it easier for managers and other users to view and extract particular information of relevance for their specific needs (Figure 2; Box 2). Though this is a novel database for inland systems, we can learn from similar programs; for example, a large-scale creel program has been in place for marine systems since 1979 (beginning with the Marine Recreational Fisheries Statistics Survey, which has been revised, redesigned, and updated over the decades to the current Marine Recreational Information Program; NAS 2017). Specifically, we suggest that regional coordination committees composed of state agency personnel who synthesize catch and effort for their state be formed to strategize best options for standard comparison. Additionally, there will likely be a need to identify survey methods that are comparable for different fishery types (e.g., stream, pond, large and small lakes) and, in some cases, jurisdictions (e.g., states). Combining estimates may not always be feasible, yet some methods may allow consolidation across broad scales and fishery types. If estimation methods cannot be combined for meaningful summaries of catch and effort, users could consider sentinel sites—places where long time series of catch and effort data may exist and could be used as representative samples of fishing trends through time (e.g., Wisconsin Department of Natural Resources Northern Highland Fisheries Research Area; Shaw et al. 2019). Finally, we suggest that angler representatives be part of this process, such that CreelCat can be understood

Box 2. Examining multi-state Walleye *Sander vitreus* angling characteristics to highlight potential applications of the CreelCat data and interface.

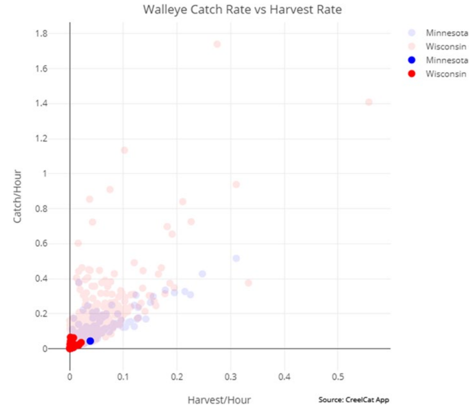
Exploring relationships among metrics related to the characteristics of recreational catch and harvest, angler effort, waterbody characteristics, and angler preferences can lend insight into the management of these complex systems. In addition to functioning as a publicly accessible database, CreelCat also contains a number of tools that have been designed to support a variety of management-oriented tasks. These tools link the creel and angler survey data contained in the CreelCat database to visualizations such as maps, scatterplots, line plots, bar charts, and pie charts.

The tools available within the CreelCat interface provide managers with a variety of ways to interact with and explore the data contained in CreelCat and assist with management, planning, and decision-making. To highlight the potential utility of these figures, we have developed the following example which explores Walleye angling data in portions of Minnesota and Wisconsin based on a subset of the creel and angler survey data.

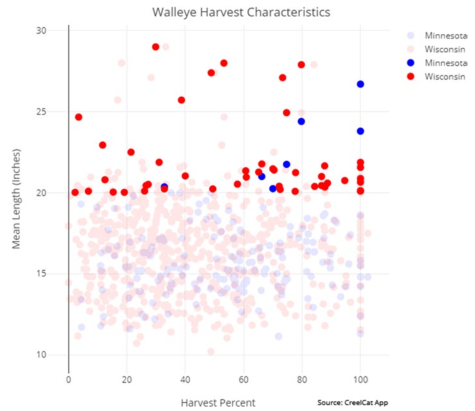
Spatial Patterns in Walleye Harvest
The mapping functionality provided within CreelCat gives users the ability to quickly and easily give spatial context to creel data from across the country. The map below was created in CreelCat to show the mean length of harvested Walleye in a subset of lakes in Wisconsin and Minnesota from the CreelCat database.



Relationships between Catch, Harvest and Mean Length
In an exploratory comparison of the mean length (inches) of harvested Walleye vs. the percentage of Walleye being harvested (pounds harvested/ pounds caught*100; Figure below), we expected the size structure of the underlying population to drive the percentage of Walleye being harvested. However, our comparison did not show any clear relationship. We then selected those surveys that had lengths



greater than 20 inches and highlighted them on a plot of harvest vs. catch per hour of angling effort (Figure below). Interestingly, we found that those surveys which had relatively large average size for harvested fish had relatively low catch and harvest per hour of angling effort. Evaluating the potential linkages between a variety of different metrics related to Walleye angling may provide additional insight for management.



and communicated broadly to angler groups (e.g., American Sportfishing Association, Bass Anglers Sportsman Society, Trout Unlimited, lake associations).

We propose a perpetuity protocol for CreelCat consisting of four key components. First, we will maintain public accessibility to a portion of CreelCat to maximize transparency, along with archiving complete provided datasets within CreelCat for traceability of all data. Second, we will identify a practicable schedule to ensure consistent and streamlined database updates. The database's relevance and utility for data providers can enhance its own longevity by encouraging updates. Third, we plan to integrate CreelCat with the American Fisheries Society's Gray Literature Database (available: https://graylitreports.fisheries.org) by cross-linking to full reports to identify synergies among creel data-reporting avenues. Fourth, we will ingrain adaptability in the CreelCat database structure to ensure flexibility as future needs change. Ultimately, we will design an exit strategy to archive CreelCat for future use when we no longer have the capacity to update and maintain it, similar to other efforts that have reached their life span (e.g., MARIS; Beard et al. 1998).

We acknowledge that collecting, synthesizing, and stewarding creel data from myriad sources and programs is a difficult undertaking. Even so, CreelCat enables managers and stakeholders to quantify fisheries baselines, identify spatiotemporal patterns in angler behavior, and learn from one another's experiences (e.g., Box 2). A robust, durable, and public database for recreational fisheries information has the potential to transform inland recreational fisheries management and research in the USA. We invite any agencies, researchers, and other users to apply CreelCat for their own particular needs. CreelCat will only live on through its users and use. We encourage you to visit https://creelcat.shinyapps.io/CreelCat to explore the tool yourself.

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