2023 Fishery Survey of Foxboro Ranch Estates

Report to the

Board of Foxboro Ranch Estates Community

322 E. Foxboro Road

Munds Park, AZ 86017

Prepared by:

Paul C. Reap, Wesley D. Franklin, Brian R. Kesner, and Paul C. Marsh

Marsh & Associates, LLC

5016 S. Ash Avenue, Suite 108

Tempe, AZ 85282

August 21-22, 2023

TABLE OF CONTENTS

SUMMARY

Two ponds at Foxboro Ranch Estates, Munds Park, Arizona were sampled overnight August 21-22, 2023 with entanglement nets, hoop nets, and minnow traps. A combined total of 272 individuals comprising three fish species was captured: bluegill, green sunfish, and largemouth bass. All individuals captured appeared in good health and condition. The target species was largemouth bass and most individuals (5 of 7) were considered "quality" length. The largest sportfish encountered was a 15.9-in (inch) largemouth bass that weighed 2.2 pounds (lbs). Bluegill was the predominant species captured overall with 262 individuals.

Catch per unit effort (CPUE) of largemouth bass was 1.73 across both ponds sampled. Five were captured in 4-acre pond and two in 6-acre pond. Average length of largemouth bass was 13.3 in. Relative weight (W_r) and proportional stock density (PSD) of largemouth bass were 91.6 and 71.4 respectively. Bluegill W_r and PSD were 90.3 and 56.0. Both species are measuring within the thresholds for a balanced management strategy. This management strategy is beneficial because it provides recreational opportunities for anglers of all ages.

A total of 113 young-of-year (small fish likely under one year of age) sunfish (bluegill and green sunfish) was captured in Gee minnow traps and hoop net sets (fish ranged from 1.8-2.7 in long). No other forage fish were captured despite known stockings of fathead minnow in at least one of the two ponds surveyed. Northern crayfish were observed in 6-acre pond, but not in 4-acre pond (water body closest to clubhouse). No white Amur, channel catfish, and rainbow trout were encountered during the survey despite angler observations of these species.

INTRODUCTION

The primary goals of fishery management at private ponds and lakes are to (1) provide a quality recreational experience for the kinds and sizes of fish desired by an active angling community, and (2) provide a biological mechanism to assist in the control of nuisance growths of aquatic plants, algae, and insect pests. Although several options are available, the most consistently implemented strategy to attain these goals is periodic stocking of hatchery-produced fish. At Foxboro Ranch Estates, for example, channel catfish, largemouth bass, and other species have been stocked to please anglers, grass carp (white Amur) are stocked to control aquatic plants,

and fathead minnows and sunfishes have been stocked to provide forage for target sport fish. A measure of overall program success comes with post stocking and longer-term reports of angler satisfaction and diminution or elimination of aesthetically displeasing conditions and nuisance biota. Periodic monitoring of the fish community provides program guidance and assessment.

This report presents results of a fishery survey conducted at Foxboro Ranch Estates on August 22-23, 2023. Objectives of this investigation were to (1) determine type and quantity of fish occupying the ponds, (2) evaluate general health, condition, and size of fish, and (3) make management recommendations as appropriate. Mike Merrimac, a landowner in Foxboro Ranch Estates and an active angler in the community, arranged this survey, acted as liaison with the community, and authorized access to the property.

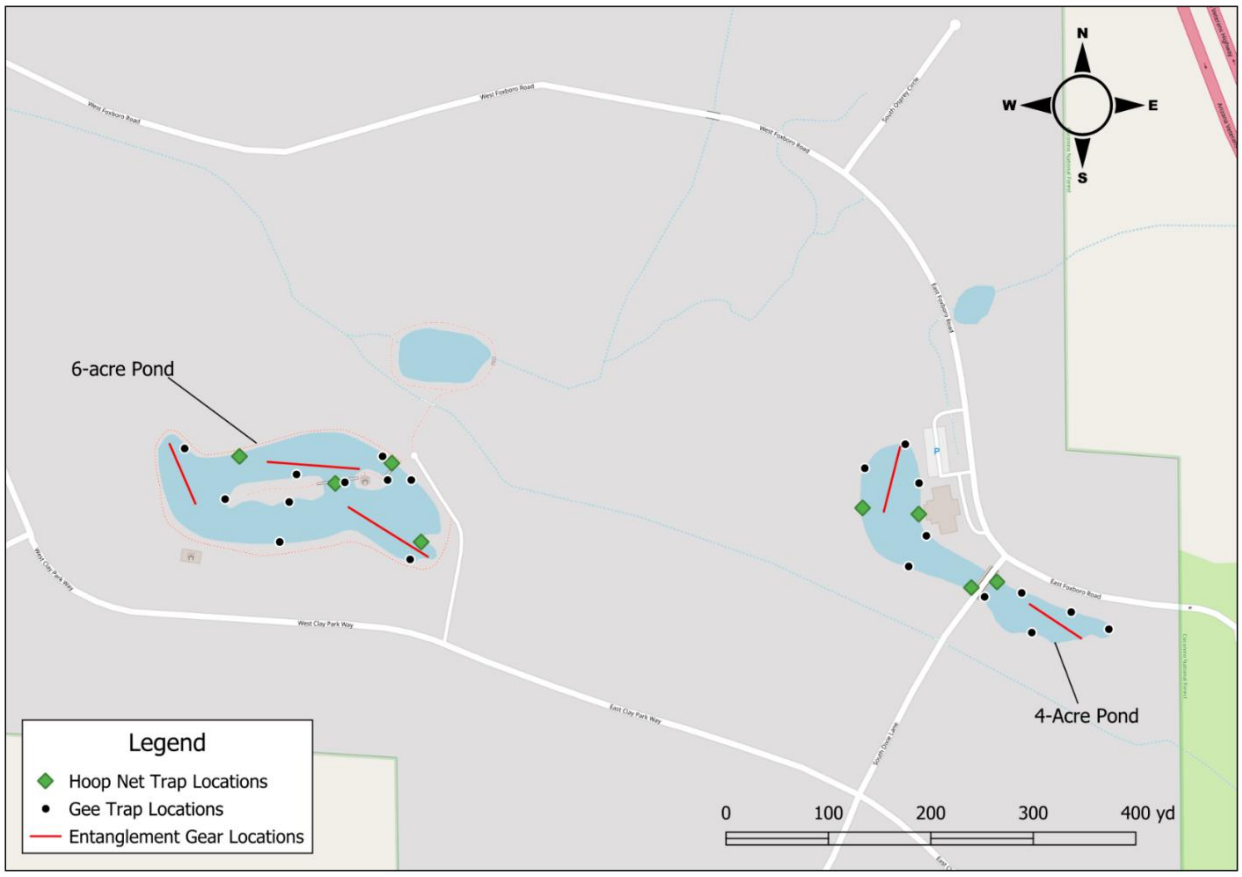
METHODS

The survey was conducted during one overnight sampling event from the evening of August 21 through the morning of August 22, 2023. Gear was deployed in two ponds approximately one hour before sunset (1800) and retrieved 1 hour after sunrise (0630; Figure 1). Four types of fishing gear were utilized during the survey: Gee® minnow traps, large hoop nets, experimental gill nets, and trammel nets. Gee® minnow traps are cylindrical galvanized steel, approximately 1 foot (ft) in diameter, and 2 ft long with ¼ inch (in) mesh and target small-bodied fish species and young-of-year fishes. Large hoop nets are cylindrical metal frame and nylon mesh traps approximately 2 ft in diameter and 4 to 5 ft in length with ½ in mesh and target small to medium sized fishes and juveniles of larger bodied species. Experimental gill nets are constructed of five, 25-ft panels with mesh sizes of ½ to 2 in. Trammel nets are 1½-in inner and 12-in outer mesh. Experimental gill nets typically capture a wide range of sizes and kinds and are highly size selective according to panel mesh size. Trammel nets target larger individuals and generally do not harm entangled fishes, although sensitive species (e.g., rainbow trout) can be damaged or killed in these nets. Total effective effort during this survey was 725 linear ft of netting. Locations were selected to be representative of available exposures and habitat.

Three ponds make up recreational fishing opportunities on the property and were distinguished by their size in surface acreage: 6-acre pond, 4-acre pond, and 1-acre pond. Two of the three

ponds were sampled. 6-acre pond was surveyed with two trammel nets and one experimental gill net along with four large hoop nets and 10 Gee traps. 4-acre pond was surveyed with two trammel nets along with 4 large hoop nets and 10 Gee traps. All traps were baited with dry dog food and deployed from, and tethered to, shore.

Figure 1. Locations of entanglement net, Gee trap, and hoop net deployments during survey of Foxboro Ranch Estates on August 22-23, 2023.



Fish were removed from a trap or net and placed in a holding container (bucket or net tub) filled with fresh lake water. All fishes were identified to species, counted, and examined to determine general health and condition. Individuals captured in gill, trammel, and hoop nets were measured (total length [TL] in millimeters [mm], measured from the tip of the snout to the tip of the compressed caudal [tail] fin); (25.4 mm equals 1 in) and weighed (grams; 454 grams [gm] equals 1 pound [lb]) for comparison with data for future surveys. Fish captured in Gee minnow traps were measured for TL but generally not weighed. Original field data were in SI units (mm

and gm), while measurements given in this report have been converted to English units (in and lbs). Catch Per Unit Effort (CPUE) was calculated for trammel and gill nets by converting the total surface area of deployed netting to standardized units of 100 square meters (m^2); (4.04 m^2 of netting were deployed). Dividing the total catch of each species by this value standardizes the catch to allow for direct comparisons to other surveys regardless of differences in total effort. Bluegill, green sunfish, and largemouth bass captured in traps that were small (less than 3 in) were likely less than one year old and labelled as "young-of-year." Most fish were released unharmed near their points of capture; incidental mortalities were removed.

Bluegill and largemouth bass were evaluated by relative weight (W_r) to assess condition and proportional size distribution (PSD) as a recreational metric of the fishery. W_r is a measure of health or condition, comparing measured weight of a fish to its length-specific standard weight predicted by weight-length regression constructed to represent the species. The standard metric being a value of 100, significant values above or below this standard may indicate the population in question is underutilizing surplus of prey (above 100) or experiencing limiting feeding conditions (below 100). PSD is a five-cell length categorization system that defines lengths for "stock," "quality," "preferred," "memorable," and "trophy" sized fish based on percentages of world record length for a given species. Target PSD for this fishery based on objectives of the community is 20-60 for the bluegill population and 40-70 for the largemouth bass population. Hitting these targets would indicate the fishery meeting objectives of being considered a balanced fishery.

RESULTS AND DISCUSSION

A total of 39 individuals representing two species was captured by gill and trammel nets across both ponds (Table 1). Bluegill was the most abundant species captured in entanglement nets, accounting for 82% (32 fish) of the total catch. Largemouth bass made up 18% of catch by entanglement nets and were captured only by this gear type. Large hoop nets were set for a total of 121.3 hours across both ponds. Hoop nets were the most successful gear deployed, capturing a total of 160 fish, all of which were bluegill. Gee traps were set for a total of 315.9

hours, resulting in capture of 73 young of year bluegill and green sunfish. The experimental gill net set in 6-acre pond did not produce any fish.

Table 1. Catch summary table of fish species caught and catch per unit effort (Hoop net and Gee trap, number of fish per set hours; Trammel net, number of fish per net-unit of 100 m^2) by gear type across two ponds during survey at Foxboro ranch Estates, Munds Park, Arizona August 22-23, 2023.

Species	Hoop Net	Gee Trap	Trammel Net	Gill Net	Total
Bluegill	160	70	32	-	262
Green sunfish	-	3	-	-	3
Largemouth bass	-	-	7	-	7
Catch	**160**	**73**	**39**	**0**	**272**
CPUE	**1.32**	**0.23**	**9.65**	**0.00**	**-**

Comparing the two ponds, the largemouth bass catch in 6-acre pond (two fish) was lower than catch in 4-acre pond (five fish; Table 2). However, the largest bass caught during the survey (15.9 in) was from a trammel net set in 6-acre pond. Excluding young-of-year fish, 4-acre pond had a higher total catch (57 fish) than 6-acre pond (24 fish). Northern crayfish were captured in trammel nets, Gee minnow traps, and hoop nets set in 6-acre pond but were not observed in 4-acre pond, which is 500 yards to the east. The level of impact crayfish are having on the fishery at 6-acre pond is unknown, but it should be mentioned that there were a considerable amount caught (>200). Largemouth bass are known to utilize crayfish as forage, although not exclusively. In addition, crayfish could pose a threat to bluegill abundance by disrupting recruitment early in their life cycle by feeding on eggs and young fish.

Table 2. Catch summary table of fish species caught across two ponds and separated by gear type during survey at Foxboro Ranch Estates, Munds Park, Arizona August 22-23, 2023.

Pond	Species Gear	Bluegill	Green sunfish	Largemouth bass	Catch
4-Acre Pond	Hoop Net	43	-	-	43
4-Acre Pond	Gee Trap	57	3	-	60
4-Acre Pond	Trammel Net	24	-	5	29
6-Acre Pond	Hoop Net	117	-	-	117
6-Acre Pond	Gee Trap	13	-	-	13
6-Acre Pond	Trammel Net	8	-	2	10
Total		**262**	**3**	**7**	**272**

Table 3. Average length and range (inches) of bluegill and largemouth bass. Relative weight (W_r; expected) encountered on survey at Foxboro Ranch Estates, Munds Park, Arizona August 22-23, 2023.

Species	Average	Range	W_r	PSD-Q
Bluegill	5.9	3.1-8.5	90.3	56.0
Largemouth Bass	13.3	11.4-15.9	91.6	71.4

Largemouth bass was the second most abundant species with seven individuals captured ranging from 11.4-15.9 in. Average TL of largemouth bass was 13.3 in (Table 3). Of the seven individuals captured, all were considered of at least stock length (8 in). Three individuals were quality (12 in) and two preferred (15 in) length (Figure 2). No largemouth bass were considered of memorable or trophy length during this survey. Of the 262 bluegill captured, 84 were considered stock length (3 in), 56 quality length (6 in), and four preferred (8 in; Figure 3). No bluegill encountered in this survey were memorable or trophy length.

Figure 2. Length frequency histogram of Largemouth Bass (SD lengths indicated by dashed vertical lines; S – "Stock", Q – "Quality", P – "Preferred") caught during survey conducted at Foxboro Ranch Estates, Munds Park, Arizona August 22-23, 2023.

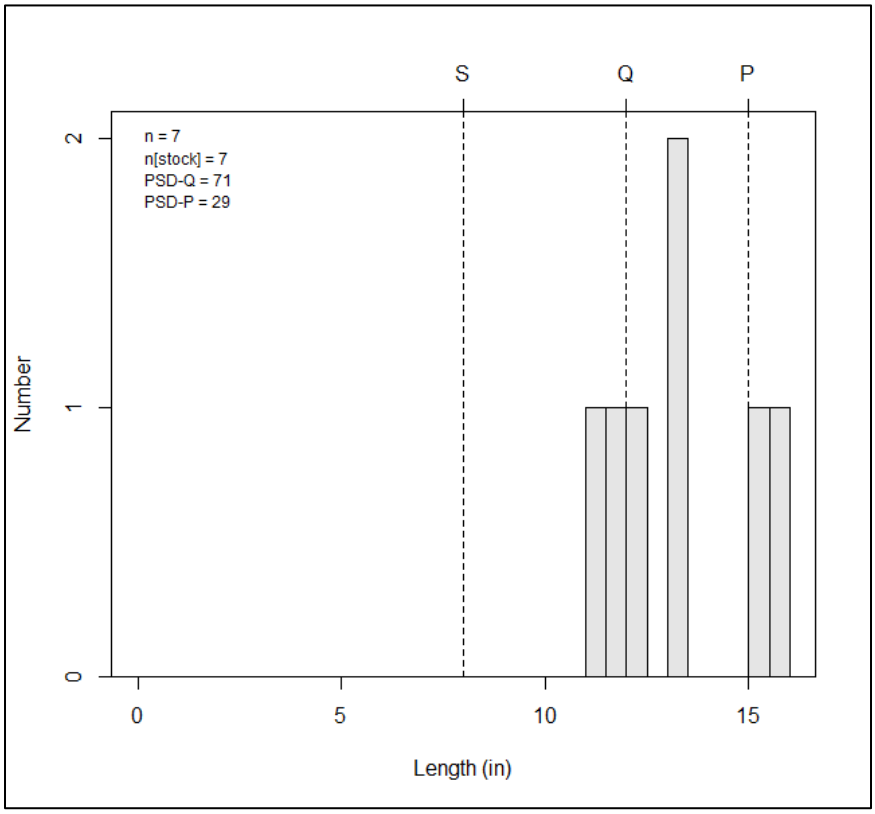
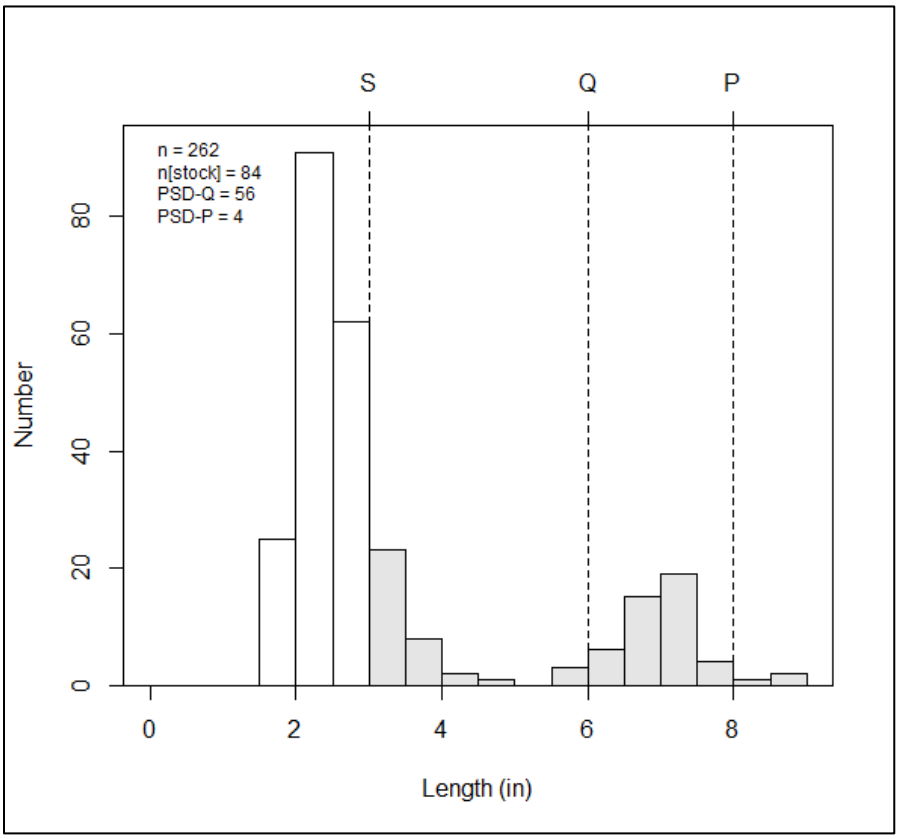
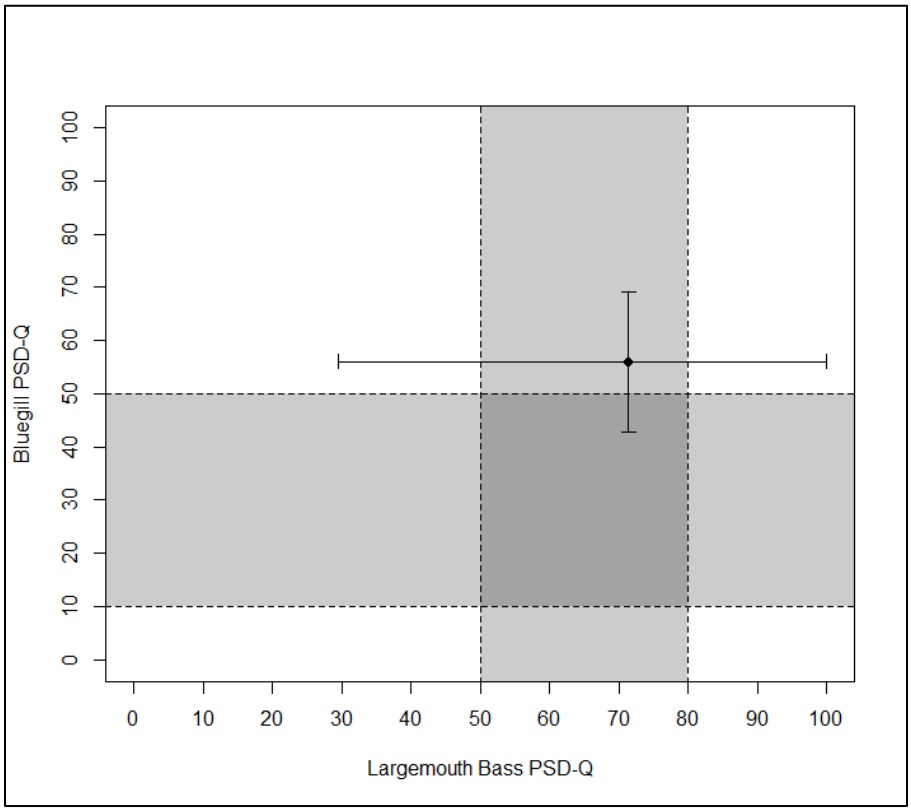


Figure 3. Length frequency histogram of Bluegill (PSD lengths indicated by dashed vertical lines; S – "Stock", Q – "Quality", P – "Preferred") caught during survey conducted at Foxboro Ranch Estates, Munds Park, Arizona August 22-23, 2023.



PSD relationship of largemouth bass (71.4) and bluegill (56.0) indicates that of a balanced fishery (Figure 4). W_r was 91.6 for largemouth bass and 90.3 for bluegill. Indicating that both species are in relatively good condition and the largemouth bass are making use of the forage species available to them. This community is intermediate between extremes of a large number of small fish and a small number of large fish and therefore may have satisfactory rates of recruitment and growth of target species in the future.

Figure 4. Predator prey PSD relationship of Largemouth Bass and Bluegill sampled at Foxboro Ranch Estates, Munds Park, Arizona August 22-23, 2023.



A total of 68 young-of-year sunfish (bluegill and green sunfish) was captured in 20 overnight Gee minnow trap sets. In eight overnight hoop net sets, 111 bluegill considered young-of-year were captured. The 6-acre pond had the most young-of-year captures with 113 sunfish captured in Gee traps and hoop nets. Green sunfish were caught in low densities (three fish) and only captured in 4-acre pond. Catch of young-of-year in this survey confirms natural recruitment of forage species in Foxboro Ranch at both ponds.

Foxboro Ranch Estates supports a balanced and healthy sport fish population. Largemouth bass abundance appears adequate to support a modest fishery and their average size is typical when compared to larger samples. Bluegill also are abundant and recruiting naturally to provide forage for largemouth bass. Many bluegill are catchable size and can be utilized as a great recreational resource for young anglers. Channel catfish, rainbow trout, and white Amur were

not encountered during this survey despite known stockings and reported observations by anglers.

RECOMMENDATIONS AND RATIONALE

This is the first fish survey at Foxboro Ranch Estates by Marsh & Associates. Given the lack of largemouth bass catch during this survey and observations by anglers in the community, a stocking of largemouth bass in both ponds would be recommended with an emphasis on 6-acre pond. Continued annual or biennial stocking of fathead minnow at 10 lb/surface acre in both ponds should be considered to provide additional forage for sport fish and help ensure a healthy largemouth bass population. Bluegill and other sunfish appear to be recruiting successfully, but this alone will not support the fishery to meet management objectives. An already enforced catch and release policy is supported to ensure the largemouth bass population is given an opportunity to sustain or improve its current population. The difference in catch of largemouth bass between the two ponds may be attributed to differences of abundance.

Northern crayfish abundance in 6-acre pond is a concern to the fishery. Crayfish were caught and observed in all gear types. It is uncertain how crayfish were introduced to the system. This population should be suppressed by mechanical means and then have the population reassessed in a future survey. Mechanical suppression would include trapping with Gee minnow traps baited with dry dog food or other bait to lure crayfish to the traps. Northern crayfish are invasive to the state of Arizona and considered a nuisance biota. They are known to feed on eggs and young fish, as well as degrade spawning conditions for largemouth bass by destroying beds.

Due to lack of knowledge of habitat within the ponds, a concerted effort to establish artificial habitat structures may be necessary. Gathering Christmas trees at the end of every holiday season, tying them to cinder blocks, and placing them in the ponds at various places would provide an affordable solution. Recording where the structures are placed would be beneficial to anglers as well as future stocking and survey efforts.

Observations and discussions with residents of future angling success in the two ponds would provide supplemental information in addition to biennial surveys. Consider a survey of the fish population in one to two years at pre-spawn (late February-mid March) to assess stocking success and status of the community structure. Surveys with similar sampling efforts across time will provide more information to aid management recommendations in the future.