

CREEL SURVEY RESULTS FOR THE DUGGER UNIT  
OF GREENE-SULLIVAN STATE FOREST

Sullivan County

2008 Fish Management Report

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## EXECUTIVE SUMMARY

- An angler creel survey was conducted at the Dugger Unit of the Greene-Sullivan State Forest from March 3 through November 18, 2008. A total of 8,653 fish, consisting of 8 different species, was harvested that weighed an estimated 4,855 lb. Angler counts were conducted on all lakes in the Dugger Unit. An estimated 4,311 anglers fished 13,531 h (21.5 h/acre). Angler interviews were conducted on Bass, Black Cat, Duck, Goose, Long, and West Lakes. Anglers from 45 Indiana counties and the state of Illinois were interviewed during the survey.
- A muskie stocking program began at the Dugger Unit in 1997 with Bass Lake, the largest body of water at 222 acres. Bass Lake had the highest fishing pressure per acre and accounted for 50% of the total effort at the Dugger Unit lakes. Muskie were the third most sought after species at Bass Lake, after largemouth bass and “anything”. Anglers harvested an estimated 1,056 bluegill, 572 crappie, 549 redear sunfish, 447 largemouth bass, 71 warmouth, and 21 channel catfish. No muskie harvest was documented.
- Black Cat Lake is a 32-acre lake. An estimated 260 anglers fished 554 h (17.3 h/acre). Most anglers at Black Cat Lake indicated they were fishing for “anything”. Largemouth bass was the second most sought after species, followed by bluegill, then muskie. Anglers harvested an estimated 527 bluegill, 388 redear sunfish, 93 largemouth bass, 34 common carp, and 30 crappie. Black Cat’s muskie stockings began in 2003. No muskie harvest was documented.
- Duck Lake is a 59-acre lake. An estimated 250 anglers fished 1,060 h (18.0 h/acre). Most anglers at Duck Lake indicated they were fishing for “anything”. Largemouth bass was the second most sought after species, followed by bluegill, then crappie. An estimated 432 bluegill, 337 redear sunfish, 54 warmouth, 50 largemouth bass, 20 crappie, and 6 flathead catfish were harvested. Duck Lake’s muskie stockings began in 2008.
- Goose Lake is a 71-acre lake. An estimated 253 anglers fished 1,236 h (17.4 h/acre). Largemouth bass was the most sought after species, followed by “anything”, bluegill, then crappie. An estimated 1,208 bluegill, 524 redear sunfish, 488 crappie, 35 warmouth, 33 largemouth bass, and 12 channel catfish were harvested.
- Long Lake is a 46-acre lake. An estimated 242 anglers fished 1,117 h (22.0 h/acre). Bluegill was the most sought after species, followed by largemouth bass, then “anything”. Anglers harvested an estimated 411 bluegill, 262 redear sunfish, and 25 largemouth bass.
- West Lake is a 103-acre lake. An estimated 517 anglers fished 1,489 h (14.4 h/acre). Most anglers at West Lake indicated they were fishing for “anything”. Largemouth bass was the second most sought after species, followed by channel catfish, bluegill, then crappie. An estimated 599 bluegill, 166 redear, 108 channel catfish, 61 crappie and 31 largemouth bass were harvested. West Lake’s muskie stockings began in 2003. No muskie harvest was documented.

- The Division of Fish and Wildlife recommends the muskie program continue within the Dugger Unit.
- The Division of Fish and Wildlife should promote the muskie fishery statewide.
- The Division of Fish and Wildlife supports a state forest property rule change for the use of gas powered outboards with speed restrictions for Bass Lake only.

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## INTRODUCTION

The Dugger Unit is a 2,150-acre tract of reclaimed mine land in Sullivan County and is owned by the Indiana Department of Natural Resources, Division of Forestry. The 1,300-acre East Dugger Unit was acquired in 1995, while the 900-acre West Unit was acquired in 2001. These parcels were given to the Division of Forestry after the DNR allowed the re-mining of coal from 140 acres of land in Greene-Sullivan State Forest in 1985. Acquired from Peabody Coal Company, the Dugger Unit was specifically reclaimed for recreation and natural resource management.

Peabody Coal Company opened three Dugger Unit lakes to public fishing in 1987. The remaining lakes on the property were opened to fishing in 1995 (East Unit) and 2001 (West Unit) when the area was acquired by the Department of Natural Resources (Figure 1). There are 16 lakes on the property, ranging from 1 to 222 acres, and totaling approximately 629 acres of water. Ten of the lakes have boat ramps. Several smaller lakes are 'walk-in only' lakes. All lakes within the Dugger Unit are restricted to the use of electric motors. In addition, anglers may fish from shore at most of the lakes (Sapp 2004). The Division of Fish and Wildlife began a muskie stocking program at Bass Lake in 1997 (Table 1). West and Black Cat Lakes were stocked beginning in 2003 and Duck Lake in 2008. The creel survey was designed to assess angling pressure for the entire Dugger Unit, determine angling harvest and pressure at six designated lakes, and evaluate the muskie stocking program.

## METHODS

The angler creel survey was conducted March 3 to November 18, 2008 by a single clerk using a roving access design (Pollock 1994). The clerk worked 180 days. Ten days out of every 14-day period were sampled, including 3 out of 4 weekend days. The fishing day was divided into two 7.5 h periods; 7:30 am to 3:00 pm, and 3:00 pm to 10:30 pm. Angler counts were conducted on all lakes at two hour intervals during the shift to estimate the total fishing pressure at the Dugger Unit. Angler interviews were conducted on Bass, Black Cat, Duck, Goose, Long, and West Lakes. The lakes were divided into three groups so that the creel clerk conducted interviews at Bass Lake, Goose and Long Lakes, or West, Black Cat, and Duck Lakes on a given day. Time was allocated so that in any given month the clerk spent one half of his time at Bass Lake, one fourth at Goose and Long Lakes, and one fourth at West, Black Cat, and Duck Lakes

with the exception of March, October, and November. During March and October 1 through 18<sup>th</sup>, two thirds of the creel effort was on Bass Lake and one third on West and Black Cat Lakes. Additionally, from October 19 through November 8, effort was directed solely at Bass Lake.

The clerk attempted to interview all anglers at the conclusion of their fishing trip. Interview data included: length of trip, number in party, species sought, fish harvest, number of legal and sub-legal largemouth bass released, the number of legal and sub-legal muskie released, county of residence, angler's satisfaction rating with their fishing trip, opinion on future muskie stockings, angler's satisfaction rating with muskie fishing at the Dugger Unit, and angler's opinion on the use of gas powered outboards, with a 10 mph speed limit restriction, on Bass Lake. Fish weights were estimated using standard weight equations (Anderson and Neumann, 1996). Count and harvest data were expanded for the months creeled.

## RESULTS

An estimated 4,311 anglers fished 13,531 h (21.5 h/acre) at the Dugger Unit from March 1 to November 31, 2008 (Table 2, Table 3). In 1997, anglers fished an estimated 29,706 h on the five lakes creeled, more than twice the pressure documented during this creel (Schoenung 1998).

A total of 8,653 fish was harvested that weighed an estimated 4,855 lb (Table 4). Most anglers (42%) indicated they were fishing for largemouth bass (Table 5). Thirty two percent of the anglers were fishing for "anything". Bluegill were the third most sought after species (11%), followed by muskie (8%), crappie (5%), and channel catfish (1%). With the exception of muskie, the 1997 survey had a similar order of angler preference.

Anglers from 45 of Indiana's 92 counties and the State of Illinois fished at Dugger Unit during the creel period. Thirty percent of anglers resided in Sullivan County and 15% were from Greene County (Figure 2). Anglers specifically targeting muskie represented 14 of those counties and the State of Illinois (Figure 3). In 1997, anglers from 54 counties fished the Dugger Unit. The highest percentage of anglers was from Sullivan (24%), followed by Greene (19%), and Marion (14%) counties.

In addition, the clerk asked each party four questions. The responses to each question are as follows:

1. How would you rate your satisfaction with your fishing trip?

Seventy percent of anglers were satisfied, 15% were very satisfied, 6% were neutral/no opinion, 5% were dissatisfied, and 2% were very dissatisfied (Figure 4). There was a 2% non-response rate to this question.

2. Are you in favor of future muskie stockings?

Eighty-three percent of anglers responded that they were in favor, 11% said they were not in favor, and 3% were neutral/no opinion. There was a 3% non-response rate to this question.

3. How would you rate your satisfaction with muskie fishing at Dugger Unit?

Fifty-four percent of anglers were satisfied, 25% were very satisfied, 6% were dissatisfied, 4% were neutral/no opinion, and 3% were very dissatisfied (Figure 5).

There was a 7% non-response rate to this question.

4. Would you be in favor of the use of gas powered outboard with a 10 mph speed limit restriction on Bass Lake?

Eighty-three percent of anglers responded that they were in favor, 14% said they were not in favor, and 1% was neutral/no opinion. There was a 2% non-response rate to this question.

### Bass Lake

Bass Lake is a 222-acre lake, and the largest body of water at the Dugger Unit. The lake has deep holes (50 ft max depth), variable bottom landscape, several bays, an island, and scattered areas of flooded standing timber. There are four boat ramps around the lake and a handicap fishing pier near the southwestern most ramp. In 1997, Bass Lake was the first lake on the property to be stocked with muskie.

An estimated 1,860 anglers fished 6,732 h (30.3 h/acre) at Bass Lake (Table 2, Table 3). Fishing pressure was highest in August (5.6 h/acre), followed by May (5.3 h/acre), July (4.2 h/acre), April (3.8 h/acre), and June (3.0 h/acre). Overall, Bass Lake had the highest fishing pressure per acre and accounted for 50% of the effort at the Dugger Unit lakes.

The total harvest at Bass Lake from March through November was 2,719 fish, representing 6 species that weighed an estimated 2,107 lbs (Table 4). The overall harvest rate was 0.40 fish/h. The highest harvest rate was in June (1.57 fish/h), followed by March (1.35 fish/h), and then April (0.43 fish/h). Bluegill comprised 39% of the total harvest by number,

followed by crappie (21%), redear (20%), and largemouth bass (16%). Warmouth and channel catfish accounted for the remaining 4%. Bass accounted for 49% of the harvested weight, followed by crappie (25%), and then bluegill (17%).

A total of 1,056 bluegill was harvested that weighed an estimated 346 lbs. They ranged in length from 4.5 to 9.5 in and averaged 7.3 in. The highest harvest rate for bluegill was in June (0.82 fish/h). Five percent of anglers visiting Bass Lake were targeting bluegill (Table 5). Bluegill anglers harvested 31% of the total bluegill harvest. Fifty-eight percent of the bluegill were harvested by anglers fishing for “anything”. The remaining 11% were harvested by crappie, bass, and channel catfish anglers.

A total of 572 crappie was harvested that weighed an estimated 662 lbs. They ranged in length from 5.0 to 15.0 in and averaged 11.5 in. The highest harvest rate for crappie was during the month of March (1.32 fish/h). Five percent of anglers visiting Bass Lake were targeting crappie and they harvested 44% of the total crappie harvest. The remaining 56% were harvested by anglers targeting “anything”, bass, and bluegill.

A total of 549 redear was harvested that weighed an estimated 143 lbs. They ranged in length from 5.0 to 8.5 in and averaged 7.1 in. The highest harvest rate for redear was during June (0.47 fish/h). No anglers specified redear for a species preference. Fifty-five percent of the redear were harvested by anglers that specified “anything” for a preference. The remaining redear were harvested by bluegill, crappie, and bass anglers.

There were 447 bass harvested weighing an estimated 911 lbs. They ranged in length from 14.0 to 22.0 in and averaged 15.4 in. The catch rate for harvested bass was 0.07 fish/h. The highest catch rate was in June at 0.16 fish/h, followed by August (0.14 fish/h), and September (0.09 fish/h).

An additional 3,749 bass were reportedly caught and released at Bass Lake, bringing the total catch to 4,196 bass at a rate of 0.62 fish/h (Table 6). Anglers reported 3,119 of those bass were under 14 in, with the remaining 530 over 14 in. The estimated catch rate for legal bass (both harvested and released) was 0.15 fish/h.

Fifty percent of anglers visiting Bass Lake were bass anglers. An angler targeting bass had a catch rate of 0.77 bass/h and 0.05 legal bass/h. Bass anglers harvested 47% of the legal bass they caught, accounting for 86% percent of the total bass harvested. Bass were also caught by anglers targeting “anything”, crappie, bluegill, and muskie.

A total of 74 warmouth was harvested that weighed an estimated 10 lbs. They ranged in length from 5.0 to 6.0 in.

A total of 21 channel catfish was harvested that weighed an estimated 35 lbs. They ranged in length from 12.0 to 21.0 in and averaged 16.1 in. Less than one percent of anglers targeted channel catfish. Channel catfish were also harvested by anglers that specified “anything” for their fishing preference.

Bass Lake is the only Dugger Unit lake with documented muskie catch in this creel survey. An estimated 83 muskie were caught and released and 46% of the catch was of legal size (> 36.0 in) (Table 7). Muskie catches were documented in April (0.04 fish/h), September (0.03 fish/h), October (0.03 fish/h), and November (0.03 fish/h). No harvest was documented. Muskie was the third most sought after species at Bass Lake (12%) after largemouth bass and “anything”. Muskie anglers caught 30% of the reported catch. Forty-three percent of muskie were caught by bass anglers at a rate of one muskie in 100 h, and one legal muskie in 199 h. However, muskie anglers were much more efficient, catching a muskie in 35 h, and a legal fish in 83 h. Muskie were also caught by crappie anglers (22%) and anglers that specified “anything” (4%) in the survey.

Eighty-one percent of all Bass Lake anglers were satisfied or very satisfied with muskie fishing at the Dugger Unit. Muskie anglers were 85% satisfied or very satisfied. Bass anglers were 89% satisfied or very satisfied.

### Black Cat Lake

Black Cat Lake is a 32-acre lake located at the West Dugger Unit. The lake has a gravel boat ramp and ample shoreline fishing. The maximum depth is approximately 74 ft. Black Cat is west of County Road 275 East and connects to West Lake on the east side of the road via a culvert. This connection allows riverine species access from West Lake which is directly connected to Buttermilk Creek. Black Cat’s muskie stockings began in 2003.

An estimated 260 anglers fished 554 h (17.3 h/acre) at Black Cat (Table 2, Table 3). Fishing pressure was highest in July (3.3 h/acre), followed by May (3.1 h/acre), and August (2.4 h/acre).

The total harvest at Black Cat Lake from March through October was 1,072 fish, representing 5 species that weighed 675 lbs (Table 4). The overall harvest rate was 2.01 fish/h.

The highest harvest rate was in May (6.55 fish/h), followed by June (2.23 fish/h), and April (1.67 fish/h). Bluegill comprised 49% of the total harvest by number, followed by redear (36%), largemouth bass (9%), crappie (3%), and carp (3%). Bass accounted for 33% of the harvested weight, followed by bluegill (26%), warmouth (16%), and crappie (13%). No muskie catch was documented.

A total of 527 bluegill was harvested that weighed an estimated 151 lbs. They ranged in length from 5.5 to 8.5 in and averaged 7.0 in. The highest harvest rate for bluegill was in May (3.02 fish/h). Seventeen percent of anglers were targeting bluegill (Table 5). These anglers harvested 76% of the total bluegill harvest. The remaining bluegill were harvested by anglers that specified “anything” for fishing preference.

A total of 388 redear was harvested that weighed an estimated 125 lbs. They ranged in length from 6.5 to 8.5 in and averaged 7.7 in. The highest catch rate for redear was in May (2.85 fish/h). No preference for redear was reported by anglers. Ninety-one percent were harvested by anglers targeting bluegill. The remaining were harvested by anglers that specified “anything” for fishing preference.

A total of 93 bass was harvested that weighed an estimated 215 lbs. They ranged in length from 14.0 to 21.0 in and averaged 15.8 in. Catch rates for harvested bass were highest in September (0.54 fish/h) followed by May (0.34 fish/h), July (0.13 fish/h), and June (0.09 fish/h).

An additional 638 bass were reportedly caught and released during the creel at Black Cat Lake, for a total of 731 bass caught at a rate of 1.37 fish/h for all preference groups (Table 6). Anglers reported 584 of those bass under 14 in and the remaining 55 over 14 in. The estimated catch rate for all legal bass (both harvested and released) was 0.28 fish/h.

Thirty-three percent of anglers fishing at Black Cat were bass anglers. Bass were also caught by anglers whose preference was bluegill, muskie or “anything”.

A total of 30 crappie was harvested that weighed an estimated 57 lbs. They ranged in length from 14.0 to 14.5 in.

Thirty-four common carp were also harvested, accounting for approximately 127 lbs of the harvest.

## Duck Lake

The 59-acre Duck Lake borders County Road 350 East, west of Bass Lake. Duck Lake has steep rocky walls, deep holes, and shallow vegetated bays. The maximum depth of the lake is 38 ft. There is ample shoreline access. Duck Lake's muskie stockings began in 2008.

An estimated 250 anglers fished 1,060 h (18.0 h/acre) at Duck Lake (Table 2, Table 3). Fishing pressure was highest in July (4.1 h/acre), followed by May (3.1 h/acre), and August (2.2 h/acre).

The total harvest at Duck Lake from March through October was 899 fish, representing 6 species that weighed an estimated 358 lbs (Table 4). The overall harvest rate was 0.89 fish/h. The highest harvest rate was in May (2.62 fish/h), followed by June (1.20 fish/h), and April (0.90 fish/h). Bluegill comprised 48% of the total harvest by number, followed by redear (37%), and largemouth bass (6%). Crappie and flathead catfish accounted for the remaining 3%. Crappie accounted for 37% of the harvest weight, followed by bass (23%), and redear (22%).

A total of 432 bluegill was harvested that weighed an estimated 125 lbs. They ranged in length from 4.0 to 10.0 in and averaged 6.8 in. The highest catch rate for bluegill was in May (1.23 fish/h). Twenty-one percent of anglers visiting Duck Lake were targeting bluegill (Table 5). Bluegill anglers accounted for 53% of the total bluegill harvest. The remaining bluegill were harvested by fishing preferences "anything" (41%) and largemouth bass (6%).

A total of 337 redear was harvested that weighed an estimated 81 lbs. They ranged in length from 4.0 to 10.0 in and averaged 6.8 in. The highest catch rate for redear was in May (1.065 fish/h). Redear were harvested by bluegill (54%), "anything" (40%), and bass (6%) preference groups.

A total of 50 bass was harvested that weighed an estimated 91 lbs. Harvested bass ranged in length from 14.0 to 15.5 in. The highest catch rate for bass was in May (0.17 fish/h). Catch rates for harvested bass were highest in May (0.17 fish/h), followed by April (0.11 fish/h), and August (0.05 fish/h).

An additional 685 bass were reportedly caught and released during the creel at Duck Lake, for a total of 734 bass caught at a rate of 0.73 fish/h for all preference groups (Table 6). Anglers reported 633 of those bass under 14 in, with the remaining 22 over 14 in. The estimated catch rate for all legal bass caught (both harvested and released) was 0.07 fish/h.

Thirty-five percent of anglers fishing at Duck Lake were bass anglers. Bass were also caught by anglers whose preference was bluegill or “anything”.

A total of 20 crappie was harvested that weighed an estimated 22 lbs. They ranged in length from 11.5 to 12.5 in.

Fifty-four warmouth and six flathead catfish were harvested, accounting for approximately 39 lbs of the harvest by weight.

### Goose Lake

Goose Lake is a 71-acre lake located along the east side of County Road 450 East. There is a gravel boat ramp and walk-in shoreline access from the road. Goose Lake has flooded timber, deep holes, steep walls, and two islands. Goose Lake is approximately 53 ft deep. The high water clarity supports growth of deep beds of aquatic vegetation.

An estimated 253 anglers fished 1,236 h (17.4 h/acre) at Goose Lake (Table 2, Table 3). Fishing pressure was highest in May (4.2 h/acre), followed by June (2.7 h/acre), and July (2.3 h/acre).

The total harvest at Goose Lake from April through September was 2,300 fish, representing 6 species that weighed an estimated 939 lbs (Table 4). The harvest rate was 2.30 fish/h. The highest harvest rate was in June (6.09 fish/h), followed by April (3.14 fish/h), and May (1.74 fish/h). The lowest harvest rate was documented in September (0.47 fish/h). Bluegill comprised 53% of the total harvest by number, followed by redear (23%), crappie (21%), and warmouth (2%). Largemouth bass and channel catfish accounted for the remaining 2%. Crappie accounted for 49% of the harvested weight, followed by bluegill (23%), and redear (18%).

A total of 1,208 bluegill was harvested that weighed an estimated 253 lbs. They ranged in length from 4.0 to 9.0 in and averaged 7.8 in. The highest catch rate for bluegill was in June (4.08 fish/h). Twenty-five percent of anglers visiting Goose Lake were targeting bluegill (Table 5). Bluegill anglers harvested 80% of the total bluegill harvest. The remaining 20% was harvested by “anything”, crappie, and bass preference groups.

A total of 524 redear was harvested that weighed an estimated 194 lbs. They ranged in length from 6.0 to 10.0 in and averaged 8.0 in. The highest catch rate for redear was in June (1.85 fish/h). No anglers specified redear as their preference. Eighty percent of the redear were

harvested by the bluegill preference group. The remaining 20% was harvested by “anything”, bass, and crappie anglers.

A total of 488 crappie was harvested that weighed an estimated 387 lbs. They ranged in length from 8.0 to 14.5 in and averaged 10.7 in. The highest catch rate for crappie was in April (2.56 fish/h). Sixteen percent of anglers fishing Goose Lake were targeting crappie. Fifty-six percent of the crappie were harvested by crappie anglers. An additional 34% were harvested by anglers that specified “anything” as a preference group. The remaining crappie were harvested by bluegill anglers.

A total of 33 bass was harvested that weighed an estimated 83 lbs. They ranged in length from 14.0 to 22.0 in and averaged 15.9 in. Bass were harvested at Goose Lake in June (0.08 fish/h) and May (0.06 fish/h).

An additional 1,127 bass were reportedly caught and released during the creel at Goose Lake, for a total of 1,160 bass caught at a rate of 1.16 fish/h for all preference groups (Table 6). Anglers reported 1,093 of those bass under 14 in, and the remaining 34 over 14 in. The estimated catch rate for all legal bass caught (both harvested and released) was 0.07 fish/h.

Thirty percent of anglers fishing at Goose Lake were bass anglers. Bass were also caught by anglers whose preference was “anything”, bluegill, and crappie.

A total of 12 channel catfish was harvested that weighed an estimated 12 lbs. They ranged in length from 14.0 to 15.0 in. No anglers specified channel catfish for preference during the creel. Channel catfish were harvested by “anything” and bluegill preference groups.

Thirty five warmouth were also harvested that weighed approximately 10 lbs.

### Long Lake

Long Lake is a 46.2-acre lake and is located along the north side of County Road 100 South. The lake has two gravel boat ramps and ample shoreline access along the road. Long Lake has a maximum depth of 72 ft.

An estimated 242 anglers fished 1,117 h (22.0 h/acre) at Long Lake (Table 2, Table 3). Fishing pressure was highest in May (5.5 h/acre), followed by June (3.2 h/acre), and July (3.0 h/acre).

The total harvest at Long Lake from April to September was 698 fish, representing 3 species that weighed an estimated 290 lbs (Table 4). The harvest rate was 0.84 fish/h. The

highest harvest rate was in April (1.91 fish/h), followed by May (0.95 fish/h), and September (0.90 fish/h). The lowest harvest was documented in August (0.27 fish/h). Bluegill comprised 59% of the total harvest by number, followed by redear (38%), and largemouth bass (4%). Bluegill accounted for 47% of the harvested weight, followed by redear (29%), and bass (23%). Although no channel catfish harvest was documented, good size-structure was documented in the general survey (Kittaka, 2009).

A total of 411 bluegill was harvested that weighed an estimated 158 lbs. They ranged in length from 6.0 to 9.5 in and averaged 7.7 in. The highest harvest rate was in April (1.01 fish/h). Forty-three percent of anglers were targeting bluegill (Table 5). Bluegill anglers harvested 74% of the total bluegill harvest. Bluegill were also harvested by “anything” (20%) and bass (6%) preference groups.

A total of 262 redear was harvested that weighed an estimated 47 lbs. They ranged in length from 6.0 to 9.5 in and averaged 7.7 in. The highest harvest rate was in April (0.91 fish/h). Eighty-two percent of the redear were harvested by bluegill anglers. The remaining 17% were harvested by ‘anything’ and bass preference groups.

A total of 25 bass was harvested that weighed an estimated 85 lbs. They ranged in length from 15.0 to 17.0 in. Thirty-four percent of anglers were targeting bass.

An additional 827 bass were reportedly caught and released during the creel at Long Lake, for a total of 862 bass caught at a rate of 1.04 fish/h for all preference groups (Table 6). Anglers reported 782 of those bass under 14 in, and the remaining 55 over 14 in. The estimated catch rate for all legal bass caught (both harvested and released) was 0.10 fish/h.

Thirty-four percent of anglers fishing at Long Lake were bass anglers. Bass were also caught by anglers whose preference was bluegill or “anything”. Bass anglers were the only preference group to harvest bass at Long Lake.

### West Lake

West Lake is the largest lake on the West Unit at 103 acres. It is accessible from a gravel boat ramp off the west side of County Road 350 East. West Lake has ample shoreline access. The lake has a maximum depth of approximately 80 ft. Buttermilk Creek drains directly into West Lake at the north end. West Lake also collects overflow from the East Unit lakes via Bass, Duck, and Fox Lake. Muskie have been stocked at West Lake since 2003.

An estimated 517 anglers fished 1,489 h (14.4 h/acre) at West Lake (Table 2, Table 3). Fishing pressure was highest in August (3.3 h/acre), followed by July (3.1 h/acre), and September (2.7 h/acre).

The total harvest at West Lake from March to October was 965 fish, representing 5 species that weighed an estimated 486 lbs (Table 4). The overall harvest rate was 0.65 fish/h. The highest harvest rate was in May (1.49 fish/h), followed by August (1.02 fish/h), and July (0.77 fish/h). Bluegill comprised 62% of the total harvest by number, followed by redear (17%), channel catfish (11%), crappie (6%), and largemouth bass (3%). Channel catfish accounted for 29% of the harvest weight, followed by bluegill (28%), and bass (21%).

A total of 599 bluegill was harvested that weighed an estimated 198 lbs. They ranged in length from 5.0 to 8.5 in and averaged 7.3 in. The highest catch rate for bluegill was in May (1.01 fish/h). Only 7% of anglers were targeting bluegill (Table 5). Bluegill anglers harvested 21% of the total bluegill harvest. Sixty-seven percent were harvested by anglers who specified “anything” for their preference group. The remaining 17% were harvested by channel catfish and crappie anglers.

A total of 166 redear was harvested that weighed an estimated 40 lbs. They ranged in length from 5.5 to 8.0 in and averaged 7.0 in. The highest catch rate for redear was in May (0.37 fish/h). Redear were harvested by “anything” and bluegill preference groups.

A total of 108 channel catfish was harvested that weighed an estimated 97 lbs. They ranged in length from 6.5 to 20.0 in and averaged 13.3 in. The highest catch rate for channel catfish was in August (0.28 fish/h). Nine percent of anglers were targeting channel catfish. Channel catfish were also harvested by anglers who specified “anything” as their preference group.

A total of 61 crappie was harvested that weighed an estimated 48 lbs. They ranged in length from 9.0 to 14.0 in and averaged 10.6 in. The only documented crappie harvest was in August (0.18 fish/h). Crappie were harvested by anglers whose preference group was “anything”.

A total of 31 bass was harvested that weighed an estimated 103 lbs. They ranged in length from 15.0 to 21.0 in and averaged 17.8 in. Bass were harvested in June (0.07 fish/h) and August (0.05 fish/h). Twenty-three percent of anglers visiting West Lake were targeting bass.

An additional 686 bass were reportedly caught and released during the creel at West Lake, for a total of 717 bass caught at a rate of 0.48 fish/h for all preference groups (Table 6). Anglers reported 676 of those bass under 14 in, with the remaining 10 over 14 in. The estimated catch rate for all legal bass caught (both harvested and released) was 0.03 fish/h.

Twenty-three percent of anglers fishing at West Lake were bass anglers. Bass were also caught by anglers whose preference was “anything”, bluegill, or crappie.

## DISCUSSION

The Dugger Unit provides a wide range of fishing opportunities with the added bonus of a maturing muskie fishery. The ‘fish of ten thousand casts’ is thriving at Bass Lake after 10 years of stocking (Kittaka, 2009). The West and Black Cat muskie fisheries should reach comparable quality by 2013, and Duck Lake by 2019. Anglers came from a 100-mile radius to the Dugger Unit to fish for muskie. Muskie ranked fourth in angler preference for the Dugger Unit. That number will likely rise as Black Cat, West, and Duck Lake muskie fisheries mature. The overall approval for stocking muskie at the Dugger Unit was 85%. Based on the lack of muskie fishing opportunities in southern Indiana, the overall approval for stocking muskie at the Dugger Unit, and the success of Bass Lake, the Division of Fish and Wildlife recommends that the muskie program at the Dugger Unit continue. The Division of Fish and Wildlife should promote the muskie fishery statewide.

With 42% of anglers targeting largemouth bass, they continue to be the most popular species. Overall effort at the Dugger Unit in 2008 was down from the 1997 creel, however, bass harvest and catch and release rates were similar. The highest catch rate for bass greater than 14 in was at Black Cat Lake, followed by Bass, and Long Lakes.

Bluegill and redear harvest was documented at all lakes in the Dugger Unit. Black Cat and Goose Lakes were noted for the number and quality of bluegill and redear harvested.

Channel catfish were targeted by only 1% of the anglers fishing the Dugger Unit. Harvest was documented at Bass, Goose, and West Lakes, however, good channel catfish size structure was documented in all six lakes during the general survey in 2008. Anglers targeting catfish before 7:30 am and after 10:30 pm may have been under-represented.

Pressure was down at the Dugger Unit since the previous survey in 1997 (Schoenung, 1998). The 2006 National Survey of Fishing, Hunting, Wildlife-Associated Recreation for

Indiana documented a 23% reduction in number of anglers in Indiana from the 1996 to 2006 (U.S. Department of the Interior, et al., 2007). Record high crude oil prices likely had an impact on fishing related activities in 2008, peaking at \$137 per barrel in July (Figure 6) (Energy Information Administration, 2009). Also impacting the Greene-Sullivan County area were record rainfall totals in early June 2008 in south central Indiana.

According to the 2006 National Survey of Fishing, Hunting, and Wildlife-Associated Recreation, the average cost for a fishing trip in Indiana was \$62.60/angler day in 2006. This value is based on fishing related expenditures such as bait, tackle, food, license fees, lodging, and transportation. The \$62.60/angler was used to calculate a monetary value for the Dugger Unit fishery. During the 2008 Dugger Unit creel survey, there were 4,311 angler days, representing an economic value of \$269,887.

The survey question concerning the use of gas powered outboards with a 10 mph speed limit was based on the size of Bass Lake (222 acres) and angler comments received in the past. Due to the favorable response to this question, Division of Fish and Wildlife supports a State Forest rule change to allow gas powered boats with a speed restriction for Bass Lake only.

## RECOMMENDATIONS

- The Division of Fish and Wildlife recommends the muskie program continue within the Dugger Unit.
- The Division of Fish and Wildlife should promote the muskie fishery statewide.
- The Division of Fish and Wildlife supports a State Forest property rule change for the use of gas powered outboards with a speed restriction for Bass Lake only.

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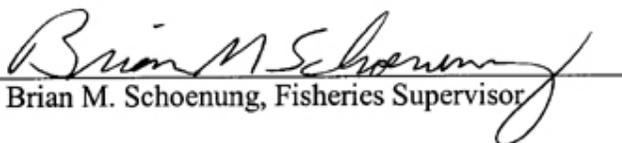
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Table 1. Annual muskie stockings for Bass, West, Black Cat, and Duck Lakes at Dugger Unit, Greene-Sullivan State Forest.

<u>Lake</u>	<u>Date</u>	<u>No. stocked</u>	<u>Avg. Size(in)</u>	<u>Size Range (in)</u>
Bass Lake	1997	2200	9.0	-
	1998	1760	10.3	8.6 - 11.3
	1999	1760	10.2	-
	2000	1760	11.0	-
	2001	3520	11.4	9.3 - 13.7
	2002	1760	9.3	8.0 - 11.0
	2003	1759	9.5	8.5 - 11.2
	2004	1100	9.1	7.9 - 10.9
	2005	1100	9.4	8.9 - 11.2
	2006	1100	8.7	-
	2007	446	8.8	7.8 - 9.9
	2008	1100	8.4	7.3 - 10.0
West Lake	2003	522	9.5	8.5 - 11.2
	2004	485	9.1	7.9 - 10.9
	2005	485	9.4	8.9 - 11.2
	2006	485	8.7	-
	2007	99	8.8	7.8 - 9.9
	2008	486	8.4	7.3 - 10.0
Black Cat Lake	2003	502	9.5	8.5 - 11.2
	2004	155	9.1	7.9 - 10.9
	2005	155	9.4	8.9 - 11.2
	2006	155	8.7	-
	2007	31	8.8	7.8 - 9.9
	2008	154	8.4	7.3 - 10.0
Duck Lake	2008	295	8.4	7.3 - 10.0

Table 2. Estimated total fishing pressure in hours by lake by month at Dugger Unit, March to November, 2008.

<u>Month</u>	<u>Bass Lake</u>	<u>Black Cat</u>	<u>Duck Lake</u>	<u>Goose Lake</u>	<u>Long Lake</u>	<u>West Lake</u>	<u>Other DU Lakes</u>	<u>TOTALS</u>
March	179	58	57	33	5	0	30	362
April	840	40	111	133	77	116	186	1,503
May	1,171	101	185	301	256	202	209	2,425
June	677	58	123	195	146	198	217	1,614
July	930	105	242	164	140	320	220	2,120
August	1,244	76	132	78	91	345	224	2,190
September	626	75	113	129	117	283	232	1,574
October	461	21	46	152	122	26	73	900
November	604	21	52	51	64	0	52	844
Totals	6,732	554	1,060	1,236	1,017	1,489	1,444	13,531

Table 3. Estimated total fishing pressure in hours per acre by lake by month at Dugger Unit, March to November, 2008.

<u>Month</u>	<u>Bass Lake</u>	<u>Black Cat</u>	<u>Duck Lake</u>	<u>Goose Lake</u>	<u>Long Lake</u>	<u>West Lake</u>	<u>Other DU Lakes</u>	<u>Total</u>
March	0.8	1.8	1.0	0.5	0.1	0.0	0.3	0.6
April	3.8	1.3	1.9	1.9	1.7	1.1	2.0	2.4
May	5.3	3.1	3.1	4.2	5.5	2.0	2.2	3.9
June	3.0	1.8	2.1	2.7	3.2	1.9	2.3	2.6
July	4.2	3.3	4.1	2.3	3.0	3.1	2.3	3.4
August	5.6	2.4	2.2	1.1	2.0	3.3	2.4	3.5
September	2.8	2.3	1.9	1.8	2.5	2.7	2.4	2.5
October	2.1	0.6	0.8	2.1	2.6	0.2	0.8	1.4
November	2.7	0.7	0.9	0.7	1.4	0.0	0.5	1.3
Totals	30.3	17.3	18.0	17.4	22.0	14.4	15.2	21.5

Table 4. Estimated fish harvest, harvest rates, average length, estimated weights, and length range of fish harvested at Dugger Unit, March to November, 2008.

<u>Lake</u>	<u>Species</u>	<u>Number</u>	<u>Percent</u>	<u>Weight (lb)</u>	<u>Harvest Rate fish/h</u>	<u>Average Length (in)</u>	<u>Length Range (in)</u>
Bass Lake							
	Bluegill	1,056	39	346	0.16	7.3	4.5 - 9.5
	Crappie	572	21	662	0.08	11.5	5.0 - 15.0
	Redear	549	20	143	0.08	7.1	5.0 - 8.5
	Largemouth bass	447	16	911	0.07	15.4	14.0 - 22.0
	Warmouth	74	3	10	0.01	5.6	5.0 - 6.0
	Channel catfish	21	1	35	*	16.1	12.0 - 21.0
	<b>Total</b>	<b>2,719</b>		<b>2,107</b>	<b>0.40</b>		
Black Cat Lake							
	Bluegill	527	49	151	0.99	7.0	5.5 - 8.5
	Redear	388	36	125	0.73	7.7	6.5 - 8.5
	Largemouth bass	93	9	215	0.17	15.8	14.0 - 21.0
	Carp	34	3	127	0.06	19.6	19.0 - 20.2
	Crappie	30	3	57	0.06	14.2	14.0 - 14.5
	<b>Total</b>	<b>1,072</b>		<b>675</b>	<b>2.01</b>		
Duck Lake							
	Bluegill	432	48	125	0.43	6.8	4.0 - 10.0
	Redear	337	37	81	0.33	6.8	4.0 - 10.0
	Warmouth	54	6	13	0.05	6.6	6.0 - 7.0
	Largemouth bass	50	6	91	0.05	14.9	14.0 - 15.5
	Crappie	20	2	22	0.02	12.0	11.5 - 12.5
	Flathead catfish	6	1	26	0.01	21.5	21.5
	<b>Total</b>	<b>899</b>		<b>358</b>	<b>0.89</b>		
Goose Lake							
	Bluegill	1,208	53	253	1.21	7.8	4.0 - 9.0
	Redear	524	23	194	0.52	8.0	6.0 - 10.0
	Crappie	488	21	387	0.49	10.7	8.0 - 14.5
	Warmouth	35	2	10	0.04	7.0	6.0 - 8.0
	Largemouth bass	33	1	83	0.03	15.9	14.0 - 22.0
	Channel catfish	12	1	12	0.01	14.5	14.0 - 15.0
	<b>Total</b>	<b>2,300</b>		<b>939</b>	<b>2.30</b>		
Long Lake							
	Bluegill	411	59	158	0.50	7.7	6.0 - 9.5
	Redear	262	38	47	0.32	7.7	6.0 - 9.5
	Largemouth bass	25	4	85	0.03	15.9	15.0 - 17.0
	<b>Total</b>	<b>698</b>		<b>290</b>	<b>0.85</b>		
West Lake							
	Bluegill	599	62	198	0.40	7.3	5.0 - 8.5
	Redear	166	17	40	0.11	7.0	5.5 - 8.0
	Channel catfish	108	11	97	0.07	13.3	6.5 - 20.0
	Crappie	61	6	48	0.04	10.6	9.0 - 14.0
	Largemouth bass	31	3	103	0.02	17.8	15.0 - 21.0
	<b>Total</b>	<b>965</b>		<b>486</b>	<b>0.64</b>		
<b>TOTAL</b>		<b>8,653</b>		<b>4,855</b>			

\* Less than 0.01.

Table 5. Percent of angler preference by lake at Dugger Unit, March to November, 2008.

<u>Species preferred</u>	Bass	Black Cat	Duck	Goose	Long	West	Other DU	Overall DU
	<u>Lake</u>	<u>Lake</u>	<u>Lake</u>	<u>Lake</u>	<u>Lake</u>	<u>Lake</u>	<u>Lakes</u>	<u>Preference</u>
Largemouth bass	49.5	33.3	34.6	30.4	34.3	22.8	18.8	42.4
Bluegill	5.4	16.7	21.2	25.0	42.9	7.0	6.3	11.0
Crappie	4.5		1.9	16.1		5.3		4.8
Channel catfish	0.9					8.8		1.3
Muskie	11.8	6.7						7.9
Other	<0.1					3.5		0.4
Anything	27.6	43.3	42.3	28.6	22.9	52.6	75.0	32.4

Table 6. Catch rates of released and harvested bass at Dugger Unit, March to November, 2008.

<u>Lake</u>	Released				Harvested		Released and Harvested	
	Length < 14 in		Length > 14 in				Length >14 in	
	<u>No.</u>	<u>fish/h</u>	<u>No.</u>	<u>fish/h</u>	<u>No.</u>	<u>fish/h</u>	<u>No.</u>	<u>fish/h</u>
Bass Lake	3,219	0.48	530	0.08	447	0.07	978	0.15
Black Cat	584	1.10	55	0.10	93	0.17	148	0.28
Duck Lake	663	0.66	22	0.02	50	0.05	72	0.07
Goose Lake	1,093	1.09	34	0.03	33	0.03	67	0.07
Long Lake	782	0.95	55	0.07	25	0.03	80	0.10
West Lake	676	0.45	10	0.01	31	0.02	41	0.03
<b>Totals:</b>	7,017		706		679		1,386	

Table 7. Catch rates of released and harvested muskie at Dugger Unit, March to November, 2008.

<u>Lake</u>	Released				Harvested		Released and Harvested	
	Length <36 in		Length > 36 in				Total	
	<u>No.</u>	<u>fish/h</u>	<u>No.</u>	<u>fish/h</u>	<u>No.</u>	<u>fish/h</u>	<u>No.</u>	<u>fish/h</u>
Bass Lake	45	0.01	38	0.01	0	-	83	0.01
Black Cat	0	-	0	-	0	-	0	-
Duck Lake	0	-	0	-	0	-	0	-
West Lake	0	-	0	-	0	-	0	-
<b>Totals:</b>	45		38		0		83	

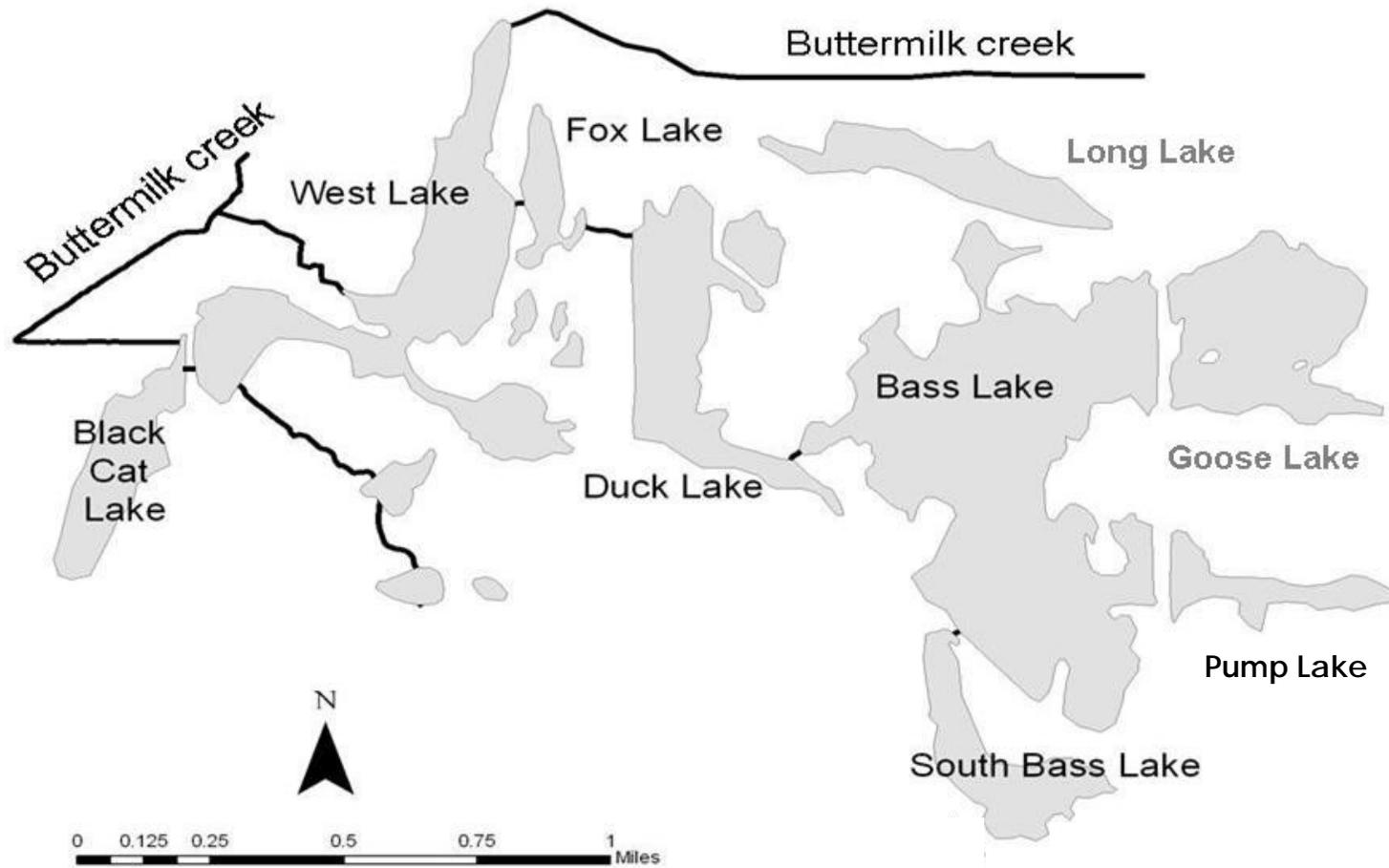


Figure 1. Map: Dugger Unit, Greene-Sullivan State Forest.



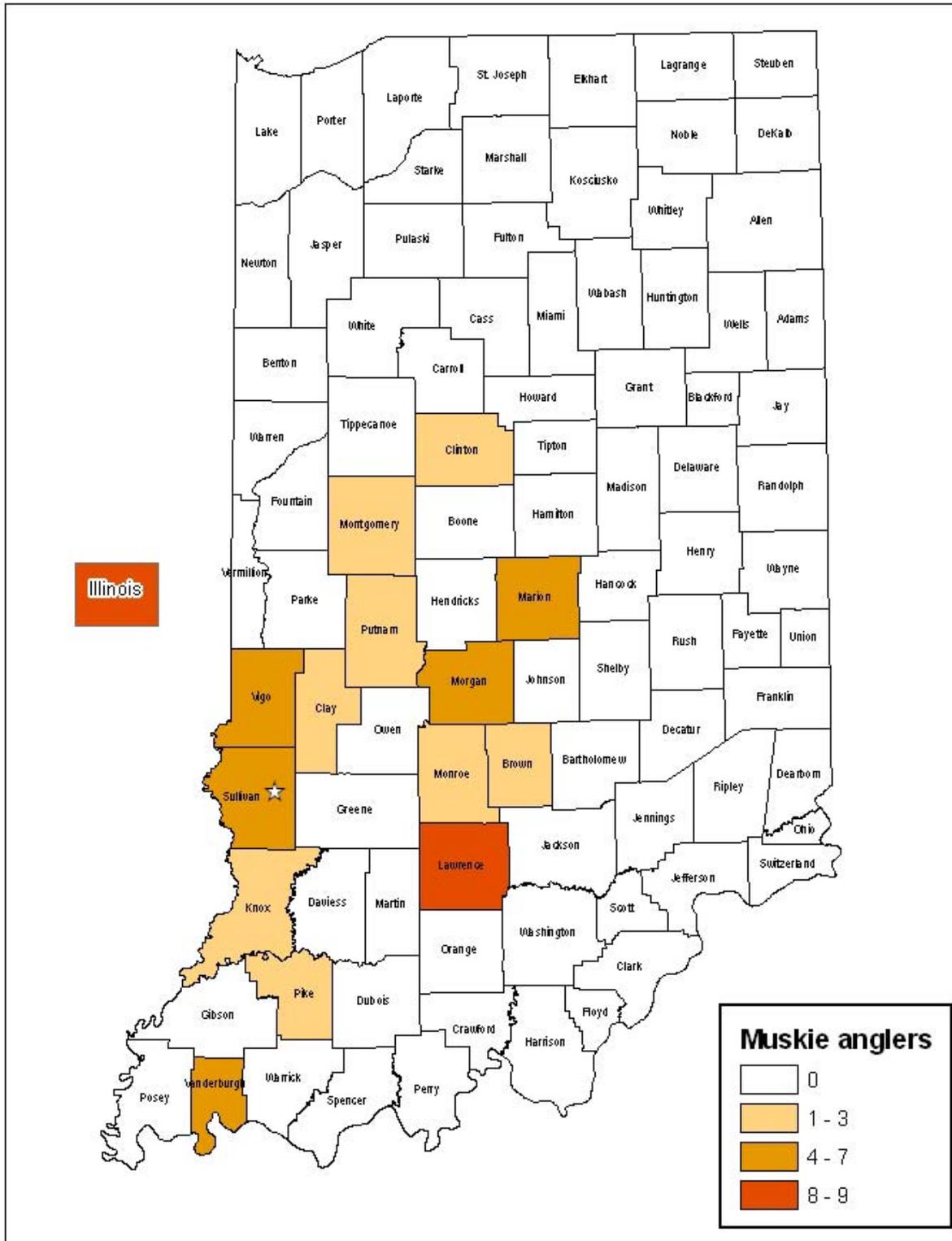


Figure 3. County of origin, sum, and distribution of muskie anglers visiting Dugger Unit, 2008.

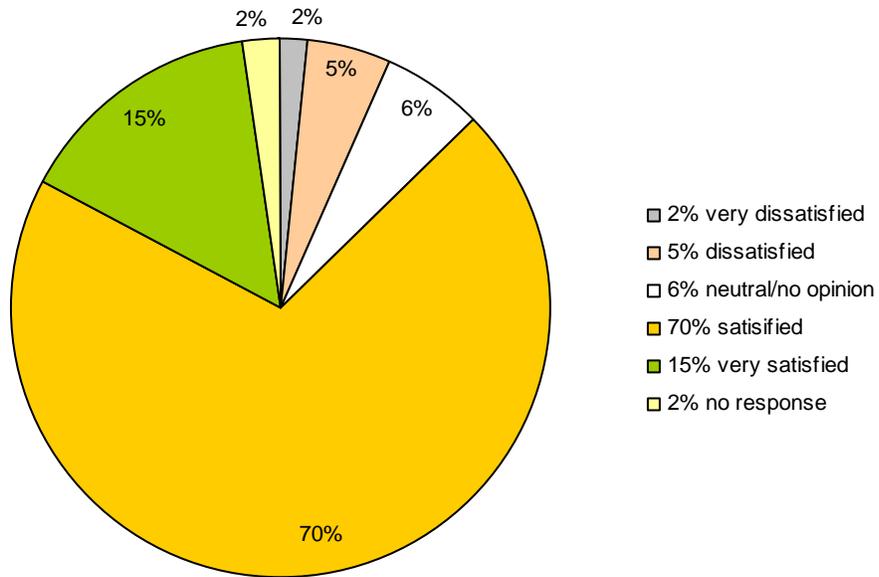


Figure 4. Response to survey question #1, “How would you rate your satisfaction with your fishing trip?”

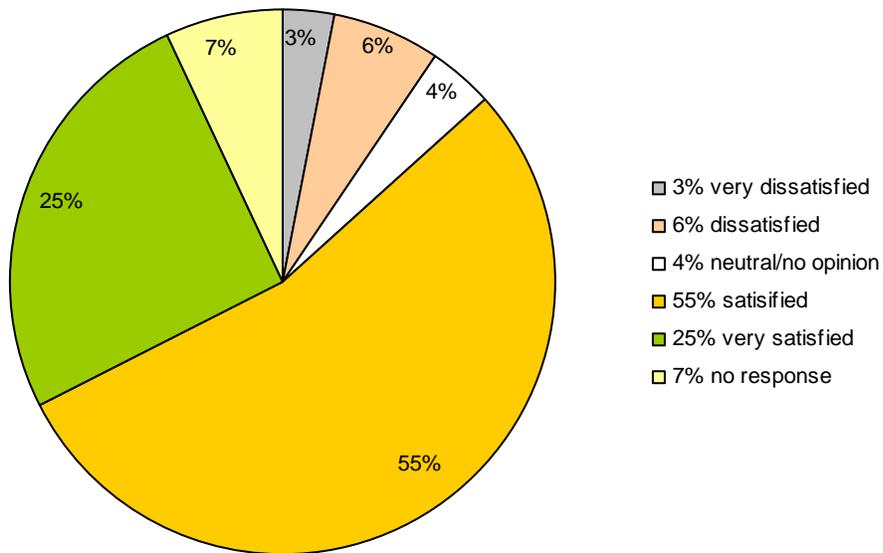


Figure 5. Response to survey question #3, “How would you rate your satisfaction with muskie fishing at Dugger Unit?”

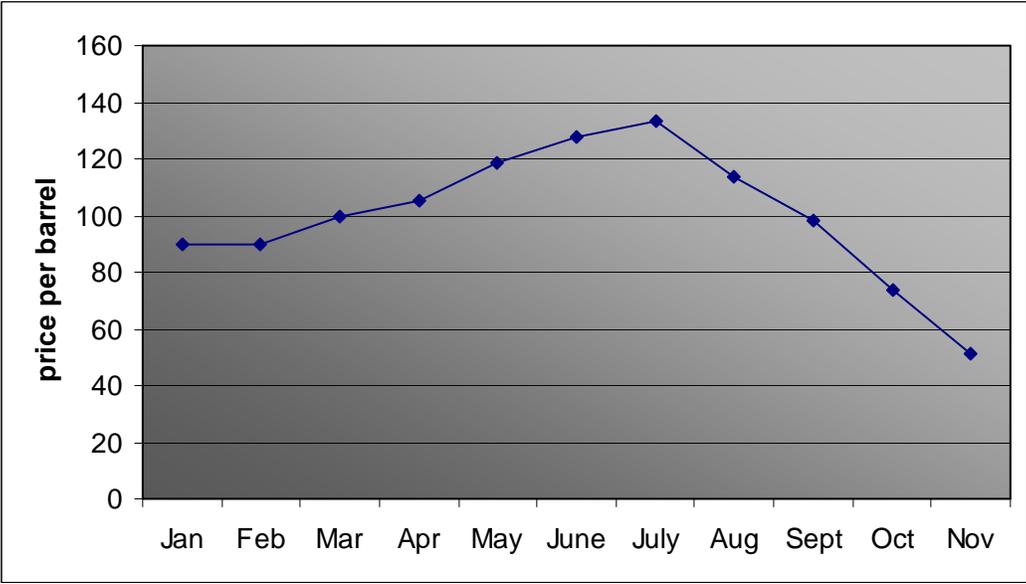


Figure 6. The 2008 average monthly price of crude oil, Energy Information Administration, United States Department of Energy, 2009.