



A publication of
Bonefish &
Tarpon Trust

BONEFISH & TARPON JOURNAL

STEWARDSHIP THROUGH SCIENCE

2013 EDITION

**BTT's Series
Buccaneers
& Bones**
pg 20

**Habitat
Evaluation**
pg 45



WHAT'S INSIDE:
BTT HEROES pg 12
ANDY MILL pg 25
**BACK TO THE
FUTURE** pg 56

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BTT is proud to feature
the 2013 Artist of the Year:
Brett James Smith
Read more on page 67



BONEFISH & TARPON JOURNAL

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www.bonefishtarpontrust.org

FEATURES

page8



Honing-in On Habitats

page12



BTT Heroes

page17



Florida Keys Initiative

page25



The Two-Handed Strip

page51



Project Permit

page56



Back to the Future

ARTICLES

Buccaneers & Bones	20	Conservation News & Initiatives	53
The Bahamas Initiative	30	A Tarpon Social	59
A Tagging Tale	35	A Tournament Partnership	60
Dietary Clues	39	Abducted by Aliens	63
Big Apple Backing	43	DNA Points the Way	67
Habitat Evaluation: Mangrove Flats	45	Making Progress	69

BTT'S MISSION

To conserve and enhance global bonefish, tarpon and permit fisheries and their environments through stewardship, research, education and advocacy.

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Setting the Hook

MAINTAINING THE MOMENTUM

A Note from the Chairman and President

Bonefish & Tarpon Trust is blessed with a small but very hardworking and effective staff headed by Dr. Aaron Adams. However, like many conservation organizations our lifeblood is the thousands of hours donated by our many volunteers, directors, officers, and fundraising event hosts.

The efforts of each of these 100-plus individuals include our 45 directors, 26 honorary directors, 10 event hosts and helpers, all of whom provide assistance that's very consequential and important to the cause.

We'd also like to give special recognition through our new BTT Hero category, which will be awarded annually. For 2011, the BTT Heroes are Jeff Storm Harkavy, who provided the vision and leadership to make the 2011 BTT Symposium such a success, and Rick Hirsch, who organized the very successful Boca Grande fundraiser and tarpon tagging program. For 2012, the BTT Heroes are Paul Dixon, Rick Bannerot and Jon Fisher, who created, organized and executed BTT's first fundraiser in New York City.

Clearly committed members, like our generous partners and engaged volunteers, provide BTT with the vision, expertise, energy and resources to carry out its cutting-edge research, education, advocacy and habitat restoration programs.

Tackling the needs of tarpon, bonefish and permit holistically is what distinguishes BTT. Rather than looking at just one issue or niche, entire ecosystems are being assessed as all the strands of this web are connected. Combined with the collection of scientific data via the BTT Keys Initiative, the Bahamas Initiative and work in Mexico and Belize, BTT utilizes the invaluable insights of guides and anglers who have long been students of the ebb and flow of the flats and its creatures. In addition to acquiring relevant knowledge through its sharply focused research, BTT utilizes this body of knowledge by working closely with resource agencies as well as the angling public to craft new management regimes and to develop and teach more fish-friendly angling practices.

Knowledge acquired through BTT research becomes the foundation for BTT education and advocacy programs. We've recently embarked on an exciting new endeavor that uses knowledge acquired through our research while continuing to scientifically monitor and measure results. In addition to several other such projects, BTT is restoring juvenile tarpon habitat in the crucial Charlotte Harbor ecosystem, which serves not only as home to the world-famous Boca Grande Pass, but also as important juvenile habitat.

BTT is blessed to have legends and truly Homeric heroes to lead, guide and inspire us, but we're ever mindful that you — our most valued stakeholders — make the actionable results happen. Behind every project, program or initiative there is an enabler, someone whose generosity and support comes in the form of an angler, citizen-conservationist, guide, outfitter, club owner, corporate partner, academician/researcher, volunteer and agency biologist. We thank each of you for joining us in making a difference to the resource, to the imperiled flats environments, and to anglers today and tomorrow.

Tom Davidson is a Founding Member and Chairman, and Matt Connolly is President of Bonefish & Tarpon Trust



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What we do:

- Science for Conservation
- Habitat Conservation and Restoration
- Spawning Location Protections
- Angler Education

Florida Keys — working with guides/anglers to protect and improve fisheries for the future

Bahamas — flats and mangrove conservation

Project Permit — population study, what, when, and how they tick

Boca Grande, Florida — juvenile tarpon habitat restoration

Nurture Belize — protecting fishing areas from development and destruction



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Honing-in On *Habitats*

DR. AARON J. ADAMS
is Director of Operations for Bonefish & Tarpon Trust

Photo by Ian Davis

After chasing the bonefish for what seemed an eternity through sargassum seaweed dotting the flat, we finally maneuvered the fish boatside. Ish jumped from the platform, took the leader in his right hand while his left slid under the fish's belly. I could see that the fish was long, and as Ish turned it toward me its hefty width became obvious too — a nice fish that topped the scales at over 10 pounds.

Tailing along a muddy shoreline with three or four other bonefish, it had eaten the fly eagerly. Ish let me know that this was the smallest fish in the group, a friendly jab that incited my colorful reply.

After tagging the fish and taking a few photos, Ish let the revived gray ghost slide out of his hands and swim slowly across the flat out of sight. As we watched it swim away, Ish asked how old the fish might be.

"I'm not really sure," I said, "but based on some of the work that's been done on bonefish age and growth, I'd say it's pushing 20 years."

As I got back on the bow and stripped line off the reel for another shot, I couldn't help but think about all that went into getting the bonefish to that age. It took a lot of skill to escape being eaten, and probably some luck too. But it also took a host of healthy habitats to support that bonefish for all those years.

Healthy habitats = healthy fisheries.

That statement seems self-evident, but habitat conservation and restoration of habitats continues to be a major focus of fisheries conservation. This is true for Bonefish & Tarpon Trust as well as other groups working in the fish world. In fact, worldwide, habitat issues (loss and degradation) rank second only to overfishing as causes of fish population declines. This is why you will see habitat as a core factor in much of the work that BTT supports.

It's nice to see that anglers get it, too: According to a recent BTT membership survey, the top priority for bonefish, tarpon and permit conservation is habitat conservation and protection. A recent national poll of anglers and hunters ranked habitat conservation at the top of their list of priorities.

Let's get back to that bonefish for a moment. In order to make it to the ripe old age of 20, it required access to a suite of healthy habitats. First, its parents needed an area to gather for their pre-spawning aggregation as well as clean offshore ocean water for spawning and for larva hatched from the fertilized egg. Once that larva found its way back inshore and became a juvenile, it needed a protected, sandy embayment with plenty of small worms and crustaceans for food. And as the bonefish grew older

and larger, it necessitated a variety of healthy habitats — from mangroves to deeper channels — where it could find a rich and diverse diet.

Those few moments of being connected to that fish with thin monofilament occurred because the fish was supported by a lifetime of healthy habitats. The same holds true for tarpon and permit. It's these stories that BTT is working to understand and to tell, and to ensure that they continue to be told in the future. Keep these stories in mind the next time you connect with a bonefish, tarpon or permit and recognize all that went into making that moment possible.

It's All About the Habitat

You will note in the articles of this year's Journal and in Journals past, that habitat is a common theme. Tagging bonefish, for example, is not just about tracking the distance of their travels, but also about discerning which habitats, and what combination of habitat and location, are most important. Similarly, tagging and tracking permit and tarpon tell us not only about their travels, but their habitat needs.



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 Aaron Adams, from Bonefish & Tarpon Trust, prepares for the hunt. VAL ATKINSON



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You might think of this like a connect-the-dots puzzle. The first step is to draw the dots so we know what the puzzle should look like. Each study that BTT supports adds a dot to the puzzle. Once we know the shape of the puzzle, we can work to connect the dots. For example, dots would be identifying where bonefish spawn and what habitats and locations appear necessary to support bonefish throughout the year. The ongoing work to track bonefish moving from feeding to spawning locations is the line connecting the dots. Once dots connect we can work on strategies to keep the puzzle intact.

We're making great headway. BTT helped to support research that identified when and in what types of places bonefish spawn. Ongoing work is using the findings of that previous research to identify spawning locations in other areas. And ongoing work highlighted in this issue is getting a better handle on bonefish movements and habitat use not related to spawning.

Another example at making connections takes place on Eleuthera, Bahamas, by BTT collaborators. Their work helps identify habitat use by bonefish and to connect this to bonefish diet. This information will be essential to identifying key areas for fisheries conservation and habitat protection.

In the tarpon world, the satellite tagging of adults continues to answer questions about tarpon migrations and habitat use daily. Still elusive are possible spawning locations, but that should soon be determined.

Earlier work on juvenile tarpon habitat identification served as a foundation to begin targeting juvenile tarpon habitat conservation and restoration. Tagging of juvenile tarpon to monitor their movements in association with the first tarpon habitat restoration project is under way near Boca Grande, Florida, with similar work planned for Florida's Indian River Lagoon in 2013.

Our knowledge of permit movements continues to grow due to ongoing tagging efforts in Florida, Mexico and Belize. Recaptures are starting to come in and they show some interesting movement patterns. Planning is already ongoing to build on the tagging effort, which I expect you will read about during 2013.


Even if we can never fully tell the story for bonefish, tarpon and permit, our goal centers on learning enough that we can work with anglers, guides, lodges, other conservation groups and resource managers to conserve enough critical habitats to keep the fisheries healthy. In fact, it's probably best that we don't learn the whole story, because doing so would take some of the mystery out of fishing. After all, that big bonefish deserves to keep some of its secrets too. 



Photo by Rick Ruoff

KEEPING OUR HANDS DIRTY
AND OUR ENVIRONMENT CLEAN.



At Hell's Bay, "conservation" isn't just a sticker on the back of our truck. To us, conservation means getting wet and dirty, tagging fish, and carrying researchers to places only our skiffs can take them. These are just some of the ways we proudly support the Bonefish and Tarpon Trust. Together, we strive to preserve the natural resources that enrich our experiences, for generations to come.



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BTT Heroes

Bonefish & Tarpon Trust owes much of its success to the passionate support of members, guides, anglers and sponsors. As mentioned in the beginning of the Journal by BTT Chair Davidson and President Connolly, in this Journal we present our inaugural BTT Heroes for 2011 — Jeff Harkavy and Rick Hirsch. Their level of involvement warrants special mention and we plan on recognizing such Heroes each year.



Jeff Storm Harkavy and BTT Chair Tom Davidson.

Photo by Pat Ford

Jeff Storm Harkavy

Jeff's passion for fishing, concern for the future of recreational fisheries and understanding of the need for conservation has created an unstoppable advocate for our fisheries. In addition to Jeff's tireless efforts on behalf of BTT he's also a champion for the International Game Fish Association and the Guy Harvey Foundation.

In addition to being a Founding Member of BTT, Jeff helped bring together two fledgling organizations in 1998: Tarpon Unlimited led by Bill Curtis and the Bonefish Research Project (a collaboration between a group of sponsors led by BTT Chair Tom Davidson and the University of Miami). Jeff served as the first Vice Chair of BTT (then Bonefish & Tarpon Unlimited) and remains a member of the Executive Committee.

What sets Jeff apart is his ability and willingness to use his connections and influence within the fishing community to create the Bonefish and Tarpon Symposium — BTT's anchor event. Working in collaboration with Dr. Jerry Ault, also a Founding Member and Board Member, Jeff organized, planned and executed the first symposium in 2003.

Jeff's goal for the first symposium was twofold: First, he wanted to bring together scientists to share information and formulate new research to help fulfill BTT's mission of gaining



Photo by Pat Ford

scientific knowledge of bonefish and tarpon to restore and protect the fisheries; second, to bring together anglers, scientists, guides, the media, marine and fishing industry, and government leaders. The keynote event of an "Evening With the Legends Banquet" turned out to be hugely successful. Emceed by Curt Gowdy, the banquet honored Joan Wulff, Stu Apte, Billy Pate, Bill Curtis, Chico Fernandez and Mark Sosin. This initial BTT symposium also started the process of bringing together those committed to conserving the fishery for the future as well as recognizing those who helped develop the flats fishery we enjoy today.

Fast forward eight years, and Jeff volunteered to take on the challenge of making the third symposium better than the first. Aided by a symposium steering committee, Jeff brought a fresh vision to the symposium with five main goals: raising awareness for BTT's research efforts to date as well as future projects; gathering the world's leading scientists working on bonefish, tarpon and permit; enhancing membership outreach; raising funds for BTT's efforts; and creating a venue for interaction of generations of guides and anglers, legends and new faces.

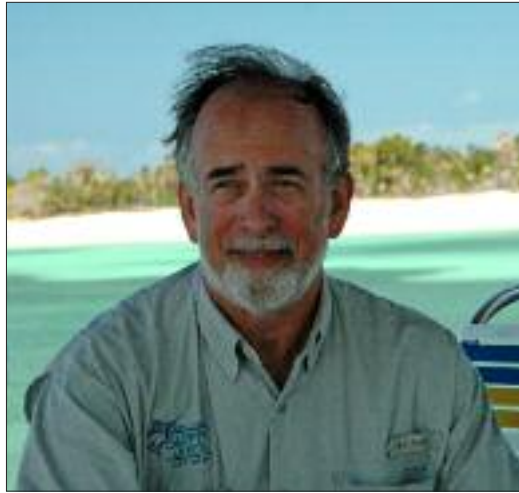
True to form, Jeff's leadership brought us the best symposium yet, bringing in more than \$120,000 in new funds and creating the biggest buzz in the fishing world that BTT has ever experienced. The challenge now is to match the success with the next symposium in November 2014. Jeff, are you up for a three-peat?

Rick Hirsch

Admittedly a late starter in the world of fly fishing, Rick's first exposure to the flats came about from fishing for bonefish. But he fell off the proverbial cliff once he hooked his first tarpon. For many, the rest of the story would be tales of the trials and tribulations of a tarponaholic. But what makes

Rick special is that upon retirement from a career on the commodities market, he's taken on a second career — marine conservation. Bonefish & Tarpon Trust is fortunate to be the recipient of Rick's tireless efforts toward tarpon conservation.

Rick brings equal passion to his fishing and conservation efforts. Ever vigilant about becoming a better tarpon angler, Rick immerses himself in all things tarpon. However, unlike most other anglers whose pursuits seldom go beyond the



concerns of fly patterns and tarpon presentation strategies, Rick's fishing experiences, conversations with tarpon experts and enormous passion for conservation have produced a committed activist on behalf of furthering the tarpon fishery.

Never one to be satisfied with incomplete knowledge, Rick spent years of study at Columbia University's CERC program and obtained a Certificate in Conservation Biology in marine studies. He has applied this expertise to tarpon conservation, focusing efforts on raising funds in his favorite tarpon grounds — the waters near Boca Grande, Florida. Through his efforts,

Rick raised more than \$150,000 to support satellite tagging of tarpon to identify spawning grounds and winter migrations. But just as importantly, he's also engaged and educated guides and anglers about tarpon conservation, which brings more advocates to the cause. Always moving forward, Rick is now focusing his efforts on fundraising and education for juvenile tarpon habitat conservation and restoration. Future tarpon anglers will owe much to Rick. 🐟

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Florida Keys Initiative

DR. AARON J. ADAMS
is Director of Operations for Bonefish & Tarpon Trust

You most certainly know about the flats fishery of the Florida Keys. You've also undoubtedly viewed photos of big bonefish, record-breaking tarpon and huge permit caught in the Keys. You likely realize flats fishing got its start there and that many legends of the angling world emerged from here.

For most of the fishery's history this fame and acclaim kept the fishery going. But the pressures of the modern world are catching up with the Florida Keys and so many other places in the form of water quality, coastal development and habitat loss. Action is needed to make sure this iconic fishery will be healthy for future generations of anglers. The conservation and (when needed) restoration of the Keys flats fishery represents the overarching goal of BTT's Florida Keys Initiative.

Bonefish & Tarpon Trust began the Initiative in 2012 with these overall objectives:

- 1) Determine potential causes for declines in bonefish population size and enact measures to correct the problems and restore the population.
- 2) Work with guides and anglers to identify important fishing areas and habitats for bonefish, tarpon and permit.
- 3) Identify and address the top threats to Florida Keys flats habitats and bonefish, tarpon and permit fisheries.
- 4) Identify and protect key bonefish, tarpon and permit spawning locations.
- 5) Assist in the formulation and application of a fishery conservation plan for Florida Keys bonefish, tarpon and permit fisheries as well as their habitats.

Like other ongoing work by BTT and our collaborators, the Florida Keys Initiative will rely on a combination of science, advocacy and education to achieve success. For example, we need science to help determine the most important and healthy habitats, and which need to be restored. Education becomes critical because advocacy is only as strong as the voices that support it. And advocacy produces the action required to restore the system to health.

Economics = Action

Through years of work we've learned that science, education and advocacy sometimes aren't enough. In some cases, it's economics that becomes the final piece to the puzzle. This is why the study on the economic value of the Keys flats fishery was funded. A similar study in Belize provided the final push needed for flats champions in that country to finally convince the legis-

lature to make bonefish, tarpon and permit catch and release only. In addition, a report on the economic value of bonefish in The Bahamas elevated conservation of the fishery to a high level of government attention.

It's pretty amazing that there's never been an assessment of the economic impact of the flats fishery in the Florida Keys. We know that the fishery is valuable — after all, people travel from around the world to chase bonefish, tarpon and permit on the flats of the Keys. But until now, we've never been able to put a number to that value. As of this writing, the first-ever study on the economic impact of the Keys flats fishery is nearing completion and will be released in April 2013. We're confident that the results of this study will help to leverage the action needed to protect and restore the Florida Keys flats fishery. The full report will be available online, so please keep an eye on the BTT blog (blog.tarbone.org) and our web site (www.bonefishtarpontrust.org) for the report's release.

Bonefish Food

At about the same time that this 2013 edition of the BTT Journal is printed, the results of the Flats Assessment Study will be released. This study determines whether changes in bonefish prey contribute to apparent declines in bonefish abundance in parts of the Florida Keys. This study examined bonefish prey on flats with bonefish as well as flats no longer occupied by bonefish and compared these findings to similar collections performed 10 or more years ago. If the findings reveal fewer or different bonefish prey than decades ago, future research will examine causes. If prey types and abundance remain unchanged, then future research will examine other factors that might negatively influence bonefish. In either case, this study lays the foundation for the next steps in protecting and restoring the Florida Key's flats fishery and habitats.

Being Active in the Process

More and more, resource managers are incorporating spatial approaches into their overall resource management strategies.



Photo by Glenn Pittard

For example, managers have historically relied on strategies like harvest seasons, size limits or gear restrictions to manage fisheries. But as the importance of habitat to fisheries health became more evident and the frequency of user conflicts increased, management plans are employing strategies that include habitat management.

The Florida Keys National Marine Sanctuary incorporates spatial management into its broader management strategy. To some extent, the FKNMS uses a zone system to manage natural resources in the sanctuary. This is also a strategy that is increasing in use by national and state parks, wildlife management area, and by national and state resource management agencies.

The FKNMS is undergoing a periodic review and revision of their management plan, which will include revisions to their zone designations. Realizing that the inclusion of spatial habitat management is here to stay, Bonefish & Tarpon Trust is engaged in the process. Following a protocol developed with anglers and hunters in Montana, BTT is working with guides and anglers in the Keys to map important fishing areas and habitats. These data will then be used to prioritize areas that should remain accessible for flats fishing, whether as catch-and-release only, pole-and-troll or open zones.

During the process, we are working one-on-one with guides to ensure their information remains confidential. We then combine fishing information with habitat maps to identify areas critical to the flats fishery. We share these maps with the participating guides and a consensus reached on proposals to present to the FKNMS Advisory Committee that will be determining the new management strategy. The goal is to ensure that flats fisheries remain accessible and healthy, that habitats remain protected, and that user conflicts are kept to a minimum.

The Florida Keys flats fishery remains the epicenter of the world of flats fishing. The goal of the Florida Keys Initiative is to make certain that the story continues for ongoing generations.

Habitat Identification and Restoration

Ongoing research in the Bahamas shows that juvenile bonefish require open sandy or silty bottoms in protected embayments not too distant from open water. (Previously BTT-funded research revealed that the juvenile bonefish found along sandy beaches are the species *Albula garcia*, which entails <3% of the recreational fishery. *Albula vulpes* is the species that makes up >97% of the fishery and thus the focus of this new juvenile research.) With this information in hand, efforts at identifying juvenile bonefish locations in the Florida Keys will be renewed. Once identified, these juvenile locations will be incorporated into habitat conservation plans for the flats fishery.

As habitats critical to the flats fishery are identified, BTT will work with local, state and national agencies to prioritize locations for habitat restoration.

Education

One of the top concerns among guides and anglers in the Florida Keys is the need for education about best practices for catch-and-release fishing. This includes gear selection, fight time and fish handling. Since catch-and-release fishing is only an effective conservation tool if practiced correctly (so that most fish survive), catch-and-release education becomes essential to the long-term health of bonefish, tarpon and permit fisheries in the Florida Keys. Guide and angler education will be a core component of the Florida Keys Initiative.

Much work is needed to educate Florida Keys residents and visitors about the importance of healthy habitats to healthy fisheries. Habitat-associated threats to fisheries include boating (propeller scars, grounding, running over fishing areas), pollution and poor water quality. More details will also be forthcoming about additional projects now in the early planning stages.

B e P r o a c t i v e

Our biggest challenge is obtaining funding for these much-needed projects. Although many independent groups and government agencies address environmental issues in the Florida Keys, none focus on the habitats and gamefish of the flats. We need your help. Donations can be made by clicking the Donate Now tab on our web site or by mailing a contribution to our home office.

You can also assist by taking part in studies. This may be as simple as answering questions in a survey or getting a bit wet and dirty pulling nets for sampling.

You can also be an advocate for BTT and for bonefish, tarpon and permit. When more voices join the call for healthy fisheries, the decision-makers are more likely to listen. 🐟



Photo by Ian Davis

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Sunset at Deep Water Cay.



Michael Keaton after a prolific day on the water.



The 'Skipper' and 'Gilligan' get ready to wade for bonefish.



Sunrise casting a golden glow.



The fight is on.

BTT is proud that we spend no funds on the production of this series, and is grateful to Orion Multimedia and Outdoor Channel for financing this work.



Yvon Chouinard stalking his prey.



Tom Brokaw hooks a bonefish.



Feasting under the stars.



Meet the real star of the series.

April Vokey teaches William Pinder how to cast a spey rod.



Bill Klyn and Lefty Kreh are all smiles.



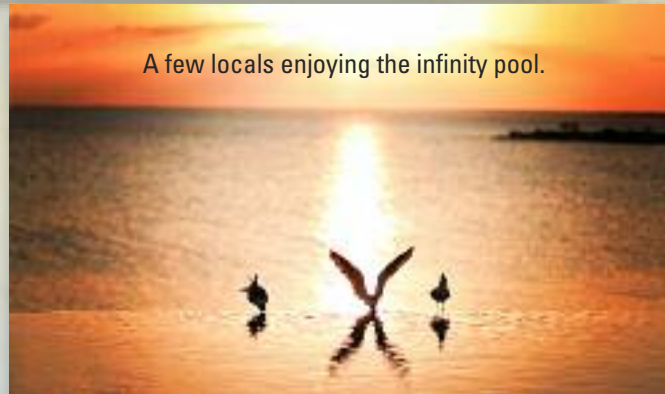
Feeding time in The Bahamas.



Living to fight another day.

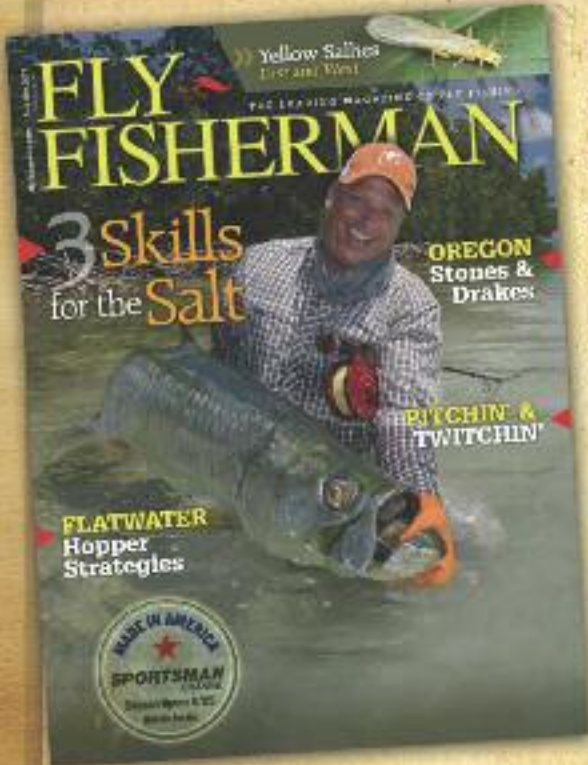


Videographer Larry Sletten gets hooked during filming. He was fine.



A few locals enjoying the infinity pool.

Photos by Orion Multimedia



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The Two-Handed Strip

ANDY MILL

A new tarpon season is here. Yet the fishing isn't what it once was — how can that be? With diminishing numbers of tarpon, increasing boat and angler traffic, and warier and spookier fish, is it possible that someday we'll look back on 2013 as our own good old days?



Photo by Pat Ford

You bet!

If you fished tarpon during the 1960s or even the '80s, you would be hard-pressed to believe that catch numbers can still be what anglers experienced back then. Believe it. No, I'm not talking about the big Homosassa fish — they're all but gone — but in many, many areas 15 bites and catching eight to 12 fish a day are very real prospects. And I'm not talking about baby tarpon. I'm talking nice big, fat, adult fish. No, you won't see huge numbers of fish as Miami's Bill Curtis did back then on any given day in May.

Even so, with cooperative water and weather, today's sophisticated angler can still eagerly and realistically hope to smoke the poon. Trouble is, the number of fish to throw at is another story. I've heard estimates that in our lifetime we've lost as many as 90 percent of our adult tarpon. Some speculate that most of the surviving fish swim in deeper water to avoid the traffic jam on the shallower edges. With fewer fish and more pressure than ever, we anglers need to be smarter and better than ever — *much* better.

Our equipment is vastly superior with improved hooks, rods and reels. Today, if you get tight to a fish you've got an excellent chance of catching it. Just look at the fly tournament numbers during the last 40 years. During a week of great weather in the Hawley tournament, you need to catch 20 fish in those five days just to have a chance — and 25 fish or more may win it. Those are caught fish, so how many bites will you be getting? That's damn good fishing, my friend.

The evolution in techniques, tactics and equipment for tarpon speaks volumes in fish caught, that is, if you can change with the times.

The unprepared angler who doesn't practice his or her casting, won't upgrade gear or relies on the same old strip-the-fly tempo year after year with the same old flies tied on big hooks can expect to experience less and less success. The calculus is simple: Fish are smarter than ever and pressured more than ever and this trend will continue.

The best anglers today fish 16- to 20-foot leaders, turning them over with one to three false casts, delivering the bug from 20 to 80 feet if needed, using 40- to 60-pound shock tippets with the smallest of flies tied on No. 2 hooks.

They're watching and reading their fish, assessing where to put the fly and how to feed that animal prior to letting go of the fly to make the cast. Are you doing all this?

With fewer fish and more pressure than ever, we anglers need to be smarter and better than ever — much better.

During recent years a new evolution of tarpon fishing methodology has attracted new disciples. I'm talking about fishing in clear water on the east side of the Florida Keys. If you can catch these sliding, sensitive fish you can catch most tarpon anywhere. Remember the fact that tarpon in general want to play the game; they are willing to be caught. But these clear-water swimmers represent some of the most demanding fish on the planet. If you can catch these tarpon you're at the top of the angling food chain.

The top Keys guides and anglers now focus on the extraordinary magnetism of the palolo worm on *Megalops atlanticus*. The influence of this skinny, rust-colored sea worm on our favorite fish is substantial. During the late big moon of May and the full and new moons of June, a biological phenomenon takes place on the ocean side of the Florida Keys from Miami to Key West. During these moons, on the later part of the falling tide just prior sundown, the palolo worm hatches out of the coral rocky bottom, swims to the surface and triggers an avalanche of feeding tarpon.

This inch-and-a-half-long worm is a member of the Eunicidae family of invertebrates. The worm breaks off its back end or epitoke, which swims to the surface, darts about with consistent speed and gets swept out to sea, releasing sperm and eggs.

I've seen the bay side of the Keys void of fish during these moons. The ocean-side flats, too. Overnight, emptied. Where did they go? Well, as we found out from our

Bonefish & Tarpon Trust satellite tags, they're either offshore spawning in 400 feet of water or staging up at bridges waiting for the evening worm hatch. I've been in the middle of these hatches surrounded by thousands of fish exploding on these worms as they scurry about. Bombs! Massive detonations abound as these dinosaurs clobber worms as if life and death was the difference.

Question: Does this small meal have anything to do with the reproductive cycle of these fish, which is occurring this time of year? Moons, worms and sex — can this be a coincidence? Is this relationship based on fertility, an aphrodisiac? I can't imagine the frenzy being simply over a slight meal of protein for the kind of effort these beasts put in chasing a worm.

As anglers, we must look at this insatiable drive and use it to refine our arsenal of fish-catching skills. Given the tarpon's desire for this micro-meal, I now use the worm 90 percent of the time I'm fishing the ocean side from April through June, regardless of moon phase, and especially near the sandbars where worms occur and on the moons around the hatch.

Fishing the worm is not the game changer, but how you fish it is. In general, when trying to match the hatch you must not only replicate the imitation but the natural movement as well. When fishing the

worm I've noticed a monster difference in how to retrieve it most successfully. You can catch fish with a one-handed strip, but upon closer examination of these swimming worms you'll see continuous movement. I've discovered that a two-handed strip is imperative. You can get continuous movement with a one-handed strip, but to do so you need to extend and retrieve your rod hand with perfect timing of your stripping hand, which for me is more difficult than a simple two-handed retrieve.

Once the cast is made, simply put the rod in your armpit of your casting arm or between your knees. I do the latter. Then start to retrieve the fly with a hand over hand motion, resulting in a continuous movement of your fly with no pausing or stopping it. You can fluctuate the speed, but the fly must stay in motion.

I've learned that the most important aspect of fishing the worm fly is that it must be in motion when the fish first sees it. Remember, the worm is never still in the water.

If you're casting to a fish coming toward you and slightly off line of the 12 o'clock position of the boat, you need to not only lead the fish well ahead of it, but also cast past the track the fish is on. This way you can time it so that, as you're sliding the fly onto the tarpon's

path, the fly is in motion when he sees it. If slightly late getting the fly onto the fish's path you'll pinch the fly, meaning the fly will be closing in on its outside eye. Tarpon hate this.

If your cast is short of the fish's path and you put the fly in motion, the fish will never see it. If the fly is on the track and you have to wait for the fish to see your fly, he'll duck below it when he sees it sitting

motionless. On occasion, you can make these mistakes and get away with it, but it's game on if you do it correctly.

Once the fly is on the tarpon's path and moving when he sees it, he'll target it and start closing the gap to your worm. Allow him to close in on your fly without stopping the fly's motion. When he eats the fly, remember you're now essentially hand-lining the fish. When you get tight to the fish, set the hook with your hands because the rod should be either under your arm or between your knees. This is a fragile time because without the rod in your hands there's nothing to absorb the shock that comes when the fish feels you set the hook. Expect to break a few fish off while getting a feel for how long you can hang on before you allow the fish to have fly line as you grab your rod and get the fish on the reel. Once on, feed the fly line out as you normally do while reaching for the rod.



Above photos by Pat Ford



Photo by Carl Ball

The other great asset of double-hand stripping is you won't be able to rod-set the strike too early, yanking the fly out of the fish's mouth. If the fly slides out of the tarpon's mouth when stripping, the fly will still be in the water in front of the fish. Most likely he'll eat it again. In contrast, if you rod-strike too early, the fly is out of the fish's mouth and out of the water. It's game over.

A tarpon usually takes the worm fly with a simple sip. Sometimes, though, they'll stick their head two feet out of the water to grab it. In either case, just keep stripping until you feel the weight of the fish on the line in your hands. Don't forget: long 16-foot leaders, a clear tip or full clear fly line, small hooks and light bite tippets.

You're probably wondering what's the best worm pattern? I can't give you all my secrets; look what happened with the Toad. But how you fish the fly will be at least as important as the pattern, so choose a couple of worm flies and go at it.

P.S. How many fish do we need to catch, hook or jump to make a great day on the water? Hell, if I'm in fish, I love every second of the day without even being attached. We don't need to abuse these fish

to feed our egos any more than we already do. Paraphrasing Steve Huff at the Bonefish & Tarpon Trust Symposium in November of 2011: "My God, you've got an incredible animal on the end of your string putting monster holes in the water. How many times do you need to see that in a day to make it a good day — one?"

Take care of *Megalops*.



Photo by Rick Ruoff

ANDY MILL is the author of the award-winning book *A Passion for Tarpon*, an accomplished tarpon angler, and winner of many tarpon tournaments.

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The Bahamas Initiative

DR. AARON J. ADAMS
is Director of Operations for Bonefish & Tarpon Trust

DR. DAVID P. PHILIPP
is Chairman of the Fisheries Conservation Foundation

DR. AARON D. SHULTZ
is Director of the Cape Eleuthera Institute

The Bahamas Initiative is a collaborative research and conservation program between Bonefish & Tarpon Trust, Fisheries Conservation Foundation and Cape Eleuthera Institute designed to contribute to successful management of the bonefish fishery in The Bahamas. The goal involves providing information to guides, lodge owners and The Bahamas government so they can create effective fish and habitat management plans.

The economic study conducted in 2009 as part of this initiative documented the annual economic impact of the recreational bonefish fishery at \$141 million, which underscored the importance of this fishery to the Bahamas. This rings especially true for the Out Islands where the recreational fishery can be responsible for a significant portion of an island's economy.

The overall objectives of the initiative:

- 1) Determine the population health, economic and biological value of the Bahamas fishery to contribute to conservation of the fishery and habitats.
- 2) Engage fishing guides and lodge owners in conservation education using research as an education tool.
- 3) Assist fishing guides and lodge owners in the formulation of a fishery conservation plan for bonefish and bonefish habitats.

Bonefish Tagging

Tagging and recapture of bonefish provides information on bonefish movements, size structure of bonefish in the fishery and habitat use. This information allows the determination of the geographical areas that should be used for management, and to what extent bonefish in different areas mix. The research will identify which

habitats and areas are essential for bonefish, and help determine locations and sizes of conservation zones.

Bonefish Spawning

Recent research on Eleuthera identified the general characteristics of bonefish spawning. Research on Eleuthera, Andros and Abaco has revealed long-distance migrations from feeding grounds to probable spawning locations, suggesting that they may serve a large geographical area. In conjunction with fishing guides on each island, the use of tag-recapture, sonic tagging and observation aims to identify bonefish spawning locations in conjunction to working with guides.

Growth Study

In 1995, research to determine growth rate concentrated on Florida Keys bonefish. Until recently, it was assumed that all bonefish

grew at the same rate. Recent research, however, indicates that bonefish in the Bahamas and Caribbean reveal a slower growth rate than in the Florida Keys. For example, a 23-inch (fork length) Caribbean bonefish equals 16 years of age, but a 23-inch Florida Keys bonefish equals six years.

Information on the age structure of bonefish populations is important for management because fish of all ages must be present to sufficiently support a healthy fishery. For example, a population dominated by old fish



Photo by Alan Kuhre

Photo by Dr. Aaron Adams

may indicate low survival of juveniles, which would require management action. Bonefish age is estimated from counting the rings in their otoliths (ear bones). Measurement of the fork length of collected fish can be combined with age estimates from the otoliths to define a length-age relationship. After this relationship is determined, the age structure of the population can be monitored by measuring lengths (collection of bonefish is no longer needed). The growth study will be conducted throughout the Bahamas to provide a geographically based length-age relationship that will be directly applicable to management.

Juvenile Bonefish

While it may seem self-evident that healthy habitats are essential for healthy fisheries, in many cases habitat isn't part of fisheries management plans. One of the challenges to including habitat in fisheries management plans is that habitat use by many species is not known. This is the case for bonefish, *Albula vulpes*, whose habitat use patterns are relatively unknown throughout its range. Identifying juvenile habitats becomes of particular concern.



Photo by Chris Haak

Although overfishing is most often listed as causing declines of fish populations, loss and degradation of habitats ranks at least as important. This is especially true for primarily catch-and-release fisheries such as bonefish, which have experienced population declines. Nurseries represent habitats essential to supporting juvenile fishes — if juveniles can't locate habitats where they can grow and be protected from predators, not enough will survive to adulthood and the fishery will decline. Nurseries become especially susceptible to habitat degradation because they tend to occur in shallow, coastal areas impacted by human activities.

Potential loss of nursery habitats is troubling because the impacts of this habitat loss may not be felt for many years. This is especially true for long-lived species like bonefish, which can live 20 years or more. As long-lived species age, their growth rate slows and fish of a wide age range may be of similar size. Thus, it is difficult to determine the age structure of the population. Will there be enough young fish to replace the aging fish each year? In a worst-case scenario, if very few juveniles survive each year, the population decline won't be seen until the older fish begin to die off without being replaced by enough juveniles. This means that by the

time the problem is realized, it may be years too late. Since juvenile bonefish habitats remain unknown and potential negative impacts to the bonefish population are large, it's important to determine what type of habitats juvenile bonefish require. Once these habitat types can be identified, future research can address how widespread they are and the extent to which juveniles survive to adulthood.

Fisheries Capacity

Far too often, fishing effort and harvest exceed the capacity of fish populations and fish habitats, leading to declines in the fishery. Although the assumption is that catch-and-release fisheries are safe from overcapacity because of no (or little) harvest, this is not the case. Catch-and-release fisheries that suffer from overcapacity experience declines in catch per unit effort, reduced fish size, fewer fish encountered and an overall decline in the quality of the fishing experience.

Decline might result from a variety of causes: lower-than-expected post-release survival resulting in a smaller population size and possibly a reduction in fish size (larger fish are most targeted, and their mortalities will be reflected in reduced fish size); fish becoming habituated to fishing pressure and adjusting their behavior (e.g., becoming more selective in response to bait, lures or flies and therefore less catchable with avoidance of areas that experience fishing pressure); habitat degradation (e.g., propeller scarring of seagrass beds, decrease in water quality resulting from coastal development to satisfy peripheral needs to an expanded fishery). There have been numerous discussions in The Bahamas about determining the capacity of bonefish fisheries, so research to examine this issue is warranted and needed.



Above photo by Harold Brewer

Right photo by Dr. Aaron Schultz



Fisheries and Habitat Mapping

One of the challenges to developing long-term conservation plans for flats fisheries involves no spatial data on the fisheries or habitats critical to the fisheries. Because of this lack of information, it is not possible to create a proactive conservation plan, to address threats to the fisheries and the critical habitats or to address user conflicts (e.g., jet skis on the flats). In conjunction with guides, lodges and anglers, BTT will lead a Mapping Project to identify fishing areas and essential habitats

so that a comprehensive conservation plan can be developed.


The Teddy Roosevelt Conservation Partnership used a mapping strategy to protect important fishing and hunting areas in the American West, an approach that may be applicable to The Bahamas. In this approach, TRCP worked with hunters and anglers to identify the areas where they hunted and fished, and also mapped important fish and game habitats. This information



Photo by Harold Brewer

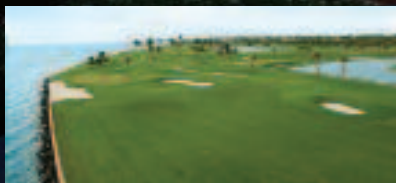
was then used to prioritize areas for conservation to ensure that other activities did not infringe upon hunting or fishing or cause damage to habitats. The same can be accomplished in The Bahamas to create a flats fishing habitat conservation map. The map can help to better inform natural resource managers as they design and implement conservation strategies, whether area closures or user-group limitations. Flats fishing areas would be prioritized for conservation, reducing user-group conflicts and lessening the chance that managers will close flats fishing areas.

Lend A Hand

Our biggest challenge is funding this important work, so donations are always welcome. As the 2009 economic study revealed, the overwhelming majority of anglers who travel to the Bahamas to fish for bonefish are from the United States. A smaller, but growing, percentage of anglers travel to the Bahamas from Europe. Unlike an amusement park, where we can pay our entrance fee, enjoy the rides, and go home knowing that someone is keeping the rides maintained and safe, the bonefish fishery of the Bahamas will remain healthy only if we invest the money and time to help keep it that way. Please consider a donation to this Initiative an investment in the fishery and in the economic well-being the fishery can help bring to the Bahamas. You can donate by clicking on the Donate Now tab on our web site (write "Bahamas Initiative" in the Referral box), or sending a donation by mail to our home office. 

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 YAMAHA

A Tagging Tale

DR. AARON J. ADAMS
is Director of Operations for Bonefish & Tarpon Trust



Photo by Dr. Aaron Adams

It's pretty rare when the same sentence includes the words "tropics" and "hypothermia," but that's exactly what I blurted through chattering teeth on a November day while on the flats at the eastern end of Grand Bahama Island. We were on the second day of tagging bonefish out of Deep Water Cay Club, on the backside of a strong cold front.

Working in waist deep water and buffeted by 25-knot northeast winds proved to be a brutal combination. More than once I heard someone question the whereabouts of any thermoses of coffee or hot chocolate. That the bonefish hunkered down in deeper water off the flats forced us to work in chest-deep water, adding salt in our wounds. But on the previous day we tagged a couple hundred bonefish, and in the days to come the crew would up the total to more than 500, so the chills were worth it.

Anyone watching from afar would have likened the scene to the famed wild horse roundups of the desert southwest, but instead of horses, trucks and helicopters, a group of scientists and guides corralled bonefish using 300 feet of seine nets, four flats boats and people power. Not glamorous, to be sure, but with a goal of tagging more than 1,000 bonefish at this location in 2012, these tactics gave us the best chance to get the job done. If instead we tried to catch each bonefish individually and tag it, it would be tough to tag even 500 fish in less than a week. In fact, to eliminate temptation we leave rods off the boats on these bonefish rodeo days. How's that for dedication from a group of hardcore anglers!

Why, you might ask, are we so intent on tagging bonefish that we put down the rods and opt for a bonefish rodeo? Quite simply, it's because that's the most efficient way to get more answers to questions such as:

- As you watch a released bonefish slowly swim away, do you ever wonder where it goes, if it stays in nearby waters or heads for another flat?
- Do bonefish have home ranges or do they wander?
- As any experienced angler can tell you, bonefish will use a variety of habitats from mangroves to reef flats, but which habitats seem to be the most important?

- If challenged to identify the habitats and locations most essential to keeping a bonefish fishery healthy, could we do it?

Tagging, Part 2

As if the cold front that hit Deep Water Cay wasn't enough, a few weeks prior some of the sampling crew was on Abaco working with guides to catch bonefish schools during what is thought to be a spawning migration. In two days of nasty weather they were able to tag over 600 bonefish before being forced to hunker down by Hurricane Sandy. Some of the crew returned to Abaco for a few days in late November, and tagged another 100 bonefish. During this effort, three tagged bonefish were recaptured — all had been tagged in the Marls in 2010, indicating that bonefish from throughout the Marls had joined the spawning migration.

Teamwork

The Bahamas bonefish tagging program began in 2009 as part of the Caribbean Bonefish Tagging Program (you can see the most recent results of that program in the story on page 63). The Bahamas program is part of the Bahamas Initiative, which is a collaboration between Bonefish & Tarpon Trust, Fisheries Conservation Foundation, and Cape Eleuthera Institute. We also work closely with lodges, guides, and Bahamas National Trust.

Tagging would not be possible without the commitment of volunteer guides and hosting by lodges. Lodging, food, guides and boats were provided by Deep Water Cay Club on the east end of Grand Bahama Island, and by H2O Bonefishing on the north side of GBI. Tagging on Abaco would not have been possible without the help of Buddy and Cindy Pinder, who took care of logistics, rounded up volunteers, and have maintained the tagging program with guides for three years. Those who helped with the recent net-based tagging included Buddy and Cindy Pinder, Dee Albury, Tom Daly, Paul Pinder, Justin Sands, Tom Albury, Richard Albury and Jody Albury. And thanks to the many collaborating scientists as well.

Next Steps

Based on the preliminary results from the ongoing bonefish tagging program, it appears that bonefish remain in a relatively small home range for much of the year (see the story on page 63 for a summary of recapture information). Additional tagging will lead to more recaptures, which will allow us to better describe bonefish movements. We will also be able to better identify essential locations for habitat protection.


Previous work on Eleuthera and Andros, and ongoing work on Abaco, suggests that bonefish leave their home ranges for spawning migrations that might be as much as 60 miles one way. We are currently in the process of identifying spawning locations and determining how far bonefish travel to reach them — in other words, how much of an island's bonefish population travel to a single spawning location?

As we learn more about the spawning requirements for bonefish, we will be able to identify spawning locations throughout the region. For example, with knowledge of the lunar phase, time of year, and depth requirements, we will be able to narrow the search to a few select locations and survey those locations at peak spawning times. As spawning locations are identified, work will begin to have these locations protected.

In today's world of increasing pressures on natural resources,



Photo by Jason Franklin

we can't realistically expect that every inch of possible bonefish habitat can be protected, but the more we know, the better we can be in keeping the fishery in top shape or improving declining fisheries. Without tag-recapture studies, it would be difficult to work with guides, anglers, lodges and resource management agencies to formulate conservation strategies that will ensure the long-term health of the fishery and the jobs and economic value it supports. 

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Using Science to Inform Conservation

MOTE SCIENTISTS HAVE BEEN STUDYING Southwest Florida's fish species since the Lab opened its doors in 1955. Many stocks of our most popular species have declined over recent decades because of habitat loss, increased fishing pressure and the occasional Florida freeze.

Mote has been working to understand critical habitat needs and develop restoration methods for some of the state's most important species. In 2013, Mote is launching a reinvigorated effort especially focused in Charlotte Harbor, one of Florida's — and even the nation's — few remaining healthy estuaries.

Mote believes that strong science-based conservation programs coordinated with stakeholders like anglers and fishing guides will play a critical role in preventing further environmental degradation and in keeping local fisheries healthy.

Charlotte Harbor is Mote Marine Laboratory's historical home, where it first began operating under the direction of the famed "Shark Lady," Dr. Eugenie Clark. Throughout Mote's history as an independent nonprofit marine research organization, Charlotte Harbor has always been an important focus. Most recently:

- In 1995, Mote played a key role in establishing the Charlotte Harbor National Estuary Program.
- A few years later, Mote began the Charlotte Harbor Initiative, which brought together marine researchers of all types to focus on the ecology and health of the Harbor.
- In 2001, Mote established its Charlotte Harbor Field Station on Pine Island, which continues to have robust research programs related to the tarpon and snook fisheries.
- Studies of red tide and sharks are also focused on Charlotte Harbor and adjacent Gulf waters.

WITH GRASSROOTS COMMUNITY SUPPORT, the Mote-Boca Grande Partnership will launch in January with a satellite Mote office in Boca Grande — a focal point and resource where residents and visitors can learn more about — and participate in — local tarpon, snook, shark and red tide research programs under way now as well as those research programs that Mote would like to implement. In short, it will be a place that will foster ocean literacy.

As Boca Grande resident and former U.S. Representative Andy Ireland says:

"The privilege of living in the Tarpon Capital of the World also comes with a responsibility. We need to be good stewards of our marine environment. To have good stewardship of a resource, you need to have the participation of knowledgeable residents."

Learn more about the Mote-Boca Grande Partnership online at www.mote.org/partnership.



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Dietary Clues

DR. KAREN J. MURCHIE

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DR. MICHAEL POWER

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DR. STEVEN J. COOKE

Environmental Science and Biology at Carleton University

Photo by Dr. Aaron Adams



Photo by Dr. Karen Murchie

Scientists possess an arsenal of techniques at their disposal when it comes to understanding the biology of fishes. Each method offers its own inherent advantages and disadvantages and often only one part of a question that you may be trying to answer can be examined by each method. For example, putting acoustic tags in bonefish can answer where the fish spend their time, but only when fish stay within the array of hydrophone receivers. As soon as fish swim out of detection range, we can no longer track their movements.

Another way of looking at where bonefish spend time is through an investigation of their diet. Certain habitats serve as home to specific prey items and this can give us clues on a bonefish's movements. Analyzing a fish's diet can be done a number of ways. One method involves regurgitating a fish and seeing what's in the stomach. Done properly, this can be accomplished with minimal harm to the fish. The technique is fast and easy, but it only gives you a snapshot of what the fish has been eating. Different prey digest at different rates, and for species such as bonefish with a pretty high metabolic rate, empty stomachs can be common; no gut contents equals no clues.

In contrast, a method called stable isotope analysis works based on the principle that "you are what you eat." All living

things contain a "signature" in terms of carbon and nitrogen content relative to their diet. It works like this: Imagine you only ate hamburgers, and hamburgers have a carbon signature of 6‰ (per mil) and a nitrogen signature of 10‰. Since physiological processes cause your tissue (like blood and muscle) to register a 0-1‰ higher value in carbon and 3-4‰ higher value in nitrogen, your carbon and nitrogen signatures would reflect your diet by showing values of 6-7‰ for carbon and 13-14‰ for nitrogen.


Nitrogen ratios provide clues on what level of the food chain a fish is feeding, and in particular what prey items they're consuming. Carbon ratios tell us about the source of the food chain such as seagrass beds vs. open ocean. This is because carbon isotope ratios vary drastically between the types of primary producers (i.e., the plants near the base of the food chain, like seagrass, algae or plankton). For example, food chains based on plants growing in shallow coastal areas (like seagrass) will differ markedly from food chains based on primary production occurring in the offshore surface water (pelagic) areas where microscopic phytoplankton are the key primary producers. Combined, the nitrogen and carbon isotope values give a picture of not only what the fish eats, but also where they eat. The bonus is that by taking a sample of



muscle tissue from a bonefish, we can get an idea of their diet over a time-scale of a couple months.

Over the past six years we've collected muscle tissue samples from bonefish at various life stages (from free-floating larvae to adult) from around Eleuthera, The Bahamas, and also collected muscle tissue samples from known bonefish prey items (from mantis shrimp to gobies), as well as algae from the various habitats. Stable isotope analyses for these samples took place August 2012 at the University of Waterloo, Canada. While the data analysis is preliminary at this point, we can see a distinct difference in the carbon signatures of juvenile

bonefish collected from the Bahamas Bank Caribbean side vs. the Atlantic side of Eleuthera. In addition, nitrogen data indicates that juvenile bonefish reveal a much narrower range of diet than adults. While there's much more exploring of the data to be done, these results suggest very specific habitat needs for juvenile bonefish, whereas adult fish appear to be much more cosmopolitan in their movements and feeding habits.

The knowledge obtained from this study will not only provide the angler with a better sense of which fly patterns to pack for a trip, it will also mean that we gain a better understanding of bonefish habitats over their life for more effective conservation measures. 



Photos by
Dr. Aaron Adams

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Big Apple Backing

It should come as no surprise that an April 2012 fundraiser in New York City brought in more than \$120,000 for Bonefish & Tarpon Trust. After all, a 2009 study of the economic value of the Bahamas bonefish fishery found that many of the anglers who travel to the Bahamas to fish for bonefish hail from the Northeast.

The evening at the New York Anglers Club came about from the good timing and hard work of Paul Dixon, Rick Bannerot, Jon Fisher and C.D. Clarke. The added presence of Tom Brokaw, Lefty Kreh and Andy Mill sharing fish stories certainly helped draw a packed house.

So how did this event become a reality? While Paul Dixon enjoyed the goings on at the BTT Symposium in November 2011, BTT Chair Tom Davidson and Vice Chair Russ Fisher approached Paul and asked if he'd put together a fundraising dinner in New York. With a long-standing relationship with BTT (he helped put the first satellite tag in a tarpon), Paul knew the importance of the mission. He readily agreed to take on the task and obtained the support of Brokaw, Kreh and Mill by arranging an open date in their calendars — no small feat in itself.

With the guests of honor lined up, Paul obtained the help of Rick Bannerot as the uber organizer. Jon Fisher, owner of the finest fly shop in New York City and a champion of conservation causes, also came aboard as well as C.D. Clarke, a sporting artist of much acclaim. The evening netted significant funds for BTT as well as many new members and the next NYC fundraiser for BTT in 2013 is being planned.



Photos by Rick Bannerot



About the Organizers

PAUL DIXON grew up in Newport Beach, California, where he began fishing at age three. He became a fly angler during a summer in Idaho and never looked back. He sold his real estate company and moved to the East Coast to pursue his passion. He's been a guide for striped bass in the Northeast and for tarpon in the Keys for decades, and brings as much passion to conservation as he does to fishing.

RICK BANNEROT grew up in West Virginia and began fishing the offshore waters of Florida when he was six years old. He stoked his passion for fishing by reading stories by Joe Brooks and Charlie Waterman and accounts of the exploits of Stu Apte, Lefty Kreh and Billy Pate. At 12, thanks to his dad and uncle, he was introduced to the backcountry of Islamorada and the rest is history. He has since introduced his own children to the flats.

C.D. CLARKE travels the world hunting, fishing and painting. He carries his art supplies on his back so he can paint on location. Boats, leaky waders, fishing rods, wet wool, bird dogs, decoys and shotguns are integral parts of C.D.'s life. He paints them with a sportsman's understanding, making his work essential to the true sportsman's art collection.

JON FISHER has posted a "Gone Fishin'" sign, and continues to pursue the gamefish of the flats and support their conservation the best way he knows — on the water.

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- /// Venue for the BTT tagging trip with Dr. Aaron Adams, May 24-31, 2013.

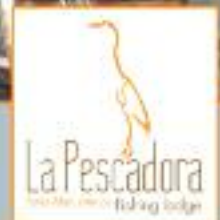


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Habitat Evaluation: Mangrove Flats

Learning to see the flats from the bonefish's perspective will help you find more fish.

DR. AARON J. ADAMS

is Director of Operations for Bonefish & Tarpon Trust

Let's say you and a fishing buddy finally take the step of planning your first do-it-yourself bonefish trip. You do your research, select a destination and make travel plans. The dates are blocked on your calendar, and as the departure date approaches you start to examine the abundance of aerial photos and satellite images available on the Internet. With a bit of effort you identify some likely looking flats accessible from shore and quickly assemble a list of spots to fish during your excursion.

As you fish each of these spots during your trip, you find that some hold bonefish and others do not. And try as you might, you can't figure out an explanation — stable weather, wind direction didn't change, good sunlight every day, and you fished similar times of the tidal cycle on each flat. To make it more confusing, some flats fished well throughout the tide while others seemed to be barren at all stages of the tide. Although anglers excel at exaggerating their catches, they're even better coming up with excuses for not catching and yet neither of you could figure out a good excuse for the Zero Flats.

Next time, try looking at the flats from the bonefish's perspective. Even the perspective of an angler standing on the flat might not be sufficient if you don't know what to look for. With that in mind, the following tactics and tips will up your gamesmanship.

All flats differ in some ways. At first glance many flats look the same, especially to an angler with limited experience chasing bonefish. Mangroves fringe the shoreline, the shallow flat slopes gently into open water. The thigh-high mangroves might even be standing in water for much of the tidal cycle. But look a little closer and you'll start to see subtle differences that can make one flat teem with hungry bonefish and another completely devoid of bonefish.

Tide, weather, wind and temperature all play a role in whether you will find bonefish on a flat, but all things being equal, the physical characteristics of the flat will determine whether you find bonefish. The key is to find flats with some complexity to them because it's the complexity that houses bonefish prey. But beware, the complexity isn't always obvious.

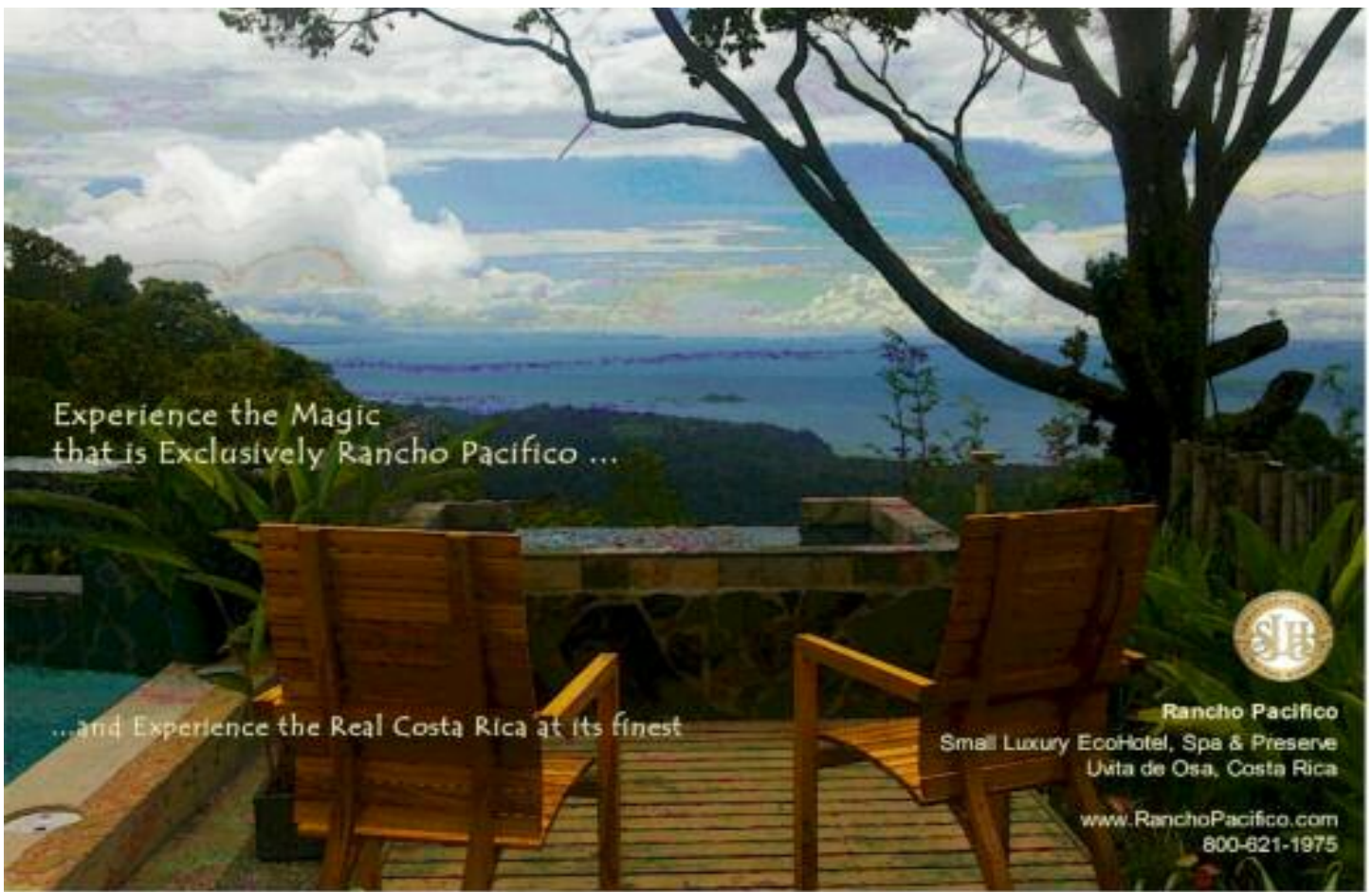
Watch Your Bottom

The bottom types of mangrove flats consist of limestone, sand or mud. If fishing from a boat, all of these bottom types are accessible. But if you're wading, you might not be able to fish muddy-bottom flats. Even if you only sink up to your ankles with each step on a muddy flat, it makes for exhausting fishing at best and impossible to stalk bonefish with stealth.

Mud bottom mangrove flats tend to provide good fishing. The soft bottom is perfect to burrow for organisms like worms, clams and some species of shrimp and crabs. Clams and many worm species will remain underground and filter food from water they suck in through a small hole at the surface. Crabs and shrimp generally use their burrows as shelter during the day and venture out at night to feed. It is these buried prey that bonefish pursue when they jet water out of their mouths to excavate a burrow. So even on a mud flat that at first glance seems barren, the soft sediment allows for complexity beneath its surface — an unseen world of tubes and burrows. You'll want to look for small holes in the mud surface that indicate clams or worms lie underneath, small mounds usually made by worms or shrimp and small excavations dug by crabs. If you see these signs of bonefish prey, you should also find bonefish.



Photo by Glenn Pittard



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Photo by Dr. Aaron Adams

If the mud bottom also has algae or seagrass, all the better. This adds habitat complexity on top of the mud bottom that hosts even more prey. More species of shrimp and crabs will seek shelter and feed among this vegetation, providing more food for bonefish.

In general, the mud bottom also indicates an area protected from strong currents and waves, which would scour the mud bottom down to the limestone base. These areas also tend to be good places to fish on windy days, and the layout of the flat should stay consistent over time.

A much better situation for wading is a sand flat. The sand creates a harder bottom, which makes wading practical. The clues that reveal the presence of bonefish prey are the same as those on the mud flat. Small holes and mounds reveal the presence of clams and worms, and the digging of crabs, though less evident because the sand particles quickly fall into the holes, will also be evident.

In general, sand flats will have three general forms. Flats with completely smooth surfaces will generally attract feeding bonefish only if pockmarked by holes from clams and worms. Flats with wave-forms made by current and wave action tend to be a bit too dynamic to allow clams and worms to remain

Photo by Dr. Aaron Adams



established because they must spend too much energy clearing their holes of constantly moving sand. Flats with hills and holes created by the burrowing and digging of clams, worms, crabs and other bonefish prey tend to be the most productive.

As on mud flats, sand flats with seagrass and algae also provide habitat for prey on the sand flat surface, which makes for good bonefish feeding opportunities. In general, I've found that mangrove sand flats with scattered seagrass or algae offer the best fishing and tend to hold the largest bonefish. These flats also can be great places to find tailing bonefish on rising tides when they search for small swimming crabs feeding in the skinniest of water as they inch into the mangroves.

Flats of limestone bottom can offer the best and worst of conditions for bonefish prey. Some flats are flat limestone with no cracks and crevices to harbor crabs and shrimp, and no sand-filled depressions with the odd worm or clam. At first blush, these flats can be deceiving – they often have a covering of algae that suggests good habitat. But a closer look reveals that this is just a thin coating of algae that provides little shelter for bonefish prey. On these flats you might see the occasional bonefish in transit, but only rarely will they stop and feed.

At the other end of the spectrum is the limestone bottom with cracks, crevices and sand-filled holes, typically covered by a healthy layer of fleshy brown algae and patches of seagrass. The algae attaches to exposed limestone while the seagrass patches grow in the sand that fills the scattered depressions. In my experience, these flats offer the best of all worlds — hard bottom for wading or easy poling, an abundance of complex habitats to support a diversity of bonefish prey and plenty of bonefish of all sizes.

Water Level

It goes without saying that tide and water level strongly influence movement patterns of bonefish on the flats. But how do you know what range of water levels are experienced by a mangrove flat? As you step onto a flat, how do you know if the water level is suitable for bonefish?

Reading the tide tables serves as a first step to figuring out the best times to be on a flat. But wind and weather can greatly influence water level and greatly modify typical tidal flows. Keep in mind that tide tables are only predictions and can differ from what actually occurs. The flats habitat provides clues that you can use to adjust your fishing strategy to maximize your chance of finding bonefish.

The water levels usually found on a flat are revealed by the plants and organisms growing on it. For example, flats typically with water on them for much of the tidal cycle will have algae or seagrass growing well onto the flat. The algae and seagrass can tolerate exposure to air during low tide on occasion (such as at spring low tides), but not on a daily basis. It is these areas where you will first find bonefish pushing onto the flat during a rising tide and where you might find them even on a low tide. If algae and seagrass are high and dry as you step onto a flat, it may be quite some time before the area is fishable, so you may want to head to a different area or wade into deeper water and look for bonefish along edges of flats.


the flats under water all or most of the time will host more prey. Flats covered by water will support organisms that can't move to escape dry conditions, such as clams and worms. Many clams and worms can close off their holes and wait out a few hours until the tide rises once again, but not for too long or too frequently. Therefore, flats dry at low tide on a regular basis will usually lack these types of prey.

In contrast, more mobile prey such as swimming crabs and to a lesser extent walking crabs and shrimp, can move on and off the flat as the tide floods and ebbs. They might be present on flats submerged during most tides as well as flats alternately covered and exposed. However, for this group of prey, flats that remain covered during neaps tides and exposed briefly during spring tides seem to be best. Bonefish know this and tend to be very aggressive and eager to get onto the flats to feast on these small crabs, sometimes even pushing into such shallow water that their backs become completely exposed. This is especially true on flats with small depressions that hold pools of water during low tide and act as low tide refuges for these crabs.

Right Place, Right Time

As the tide rises into the mangroves, many bonefish follow. Some bonefish remain along the outer edge of the flooded mangroves and can be targeted here. But many of the larger fish will push farther into the mangroves. Wading among the thigh-high mangroves in search of bonefish can be a lot of fun, with bonefish appearing briefly in openings between mangroves before disappearing again behind a mangrove branch. However, landing these fish can be difficult at best because mangrove proproots are hell on leaders and tippets. For this reason, I'll often reel in my line and stalk bonefish with a camera in mangrove-stunted areas. The mangroves provide great cover, making it possible to get very close for photographs.

Contrary to what many think, the largest bonefish first push onto these mangrove flats with the rising tide and they're the last to exit the flats on the ebb. Maybe it's due to a lifetime of experience or being too large to fear predation by ospreys. Whatever the reason, the skinniest water often produces the largest fish. This makes it especially important to be able to interpret the flats habitat to put you in the right place during these small windows of opportunity.

With many mangrove flats looking the same from afar or even at first glance while wading, taking a harder look next time just might make your day. 



Above photo by Glenn Pittard

Red mangrove proproots will have algae growing on them as



Photo by Dr. Aaron Adams

well, and sometimes even barnacles and sponges. Once again, the top of the algae growth indicates the typical high tide line, the portion of the proproot that is covered by water regularly. Barnacles will indicate the portion of the proproot between high and low tide lines. Sponges will also reveal the portion of the proproot exposed at only the most extreme low water events (such as a low spring tide plus strong off-shore winds).

It's always risky to generalize when it comes to ecology, but in this case I think to do so is informative if only to guide evaluation of these important bonefish habitats. In general,

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DR. AARON J. ADAMS
is Director of Operations for Bonefish & Tarpon Trust

“You need to be comfortable when alone with your thoughts for long periods of time if you’re going to be a permit angler.”

Although I could not see Al’s face as he muttered those words from his perch on the bow, I could feel that dogged determination gripping him as the day slipped away. In Mexico to highlight Project Permit, we’d yet to find a permit not on a strict diet that forbade everything in our fly boxes. The guide didn’t seem fazed either — he’d seen it all before. In fact, it pleased him that Al’s Zen-like approach repressed the meltdown so common to anglers fly fishing for permit.

Al Perkinson serves as Vice President for Marketing at Costa and he’s the force behind Project Permit, which is now active in Florida, Mexico and Belize. With almost nothing known about permit biology, Costa stepped up to the plate four years ago to fund Project Permit — the first program to tag permit.

The overall goal of this program involves using tag-recapture methods to estimate movements, migrations, size, and catch rates of permit. It sounds pretty basic, but this is information we need to know in order to keep an eye on the health of permit fisheries. Although permit support an important recreational fishery throughout the region, we do not know whether the permit captured in one area are from the same population as those caught in another area. Are permit in the Florida Keys the same permit captured in northern Florida in summer? Do permit travel between Florida and the Caribbean? If the number of permit declines in one area, is that bad news for the whole region or a reflection of a local problem?

Research on many other fish species reveals that a portion of a population tends to stick to a home region, and a portion tends to move longer distances (sometimes returning to a home site, other times inhabiting different areas). Some species undergo long distance migrations on a regular basis (such as amberjack), whereas others tend to stick close to home and undertake migrations only for spawning (as appears to be the case for bonefish). Since knowing movement patterns of a fish species becomes essential information for designing conservation strategies (how large of an area must be considered for a management plan), this tagging study is essential for permit conservation.

Al didn’t connect with a permit on that day, though he enjoyed plenty of good shots and some close follows. The permit that day

turned out to be large (which made it doubly frustrating) and in a finicky mood. But we did catch two during the week, which gave the project coverage in fishing magazines in the United States and Mexico.

Tail of the Tape

Slow and steady is the motto for fish-tagging programs, especially when talking about permit. It’s a special fish for which mere “shots” serve as fodder for day-end discussions and actual catches merit a round of cold beers.

Going into its third year, over 800 permit have been tagged as part of Project Permit. Five recaptures occurred in Florida, with three of those recaptures in the third year of tagging. Results are mixed so far: Three tagged permit recaptures occurred within the same general area where tagged, but others moved a considerable distance — one fish ran 10 miles along the Florida Keys and another moved 40 miles parallel to Florida’s east coast.

Recaptures in Belize haven’t as yet taken place while in Mexico all three of the recaptures there occurred in Ascension Bay within a mile of the tagging location.

We clearly need more permit to be tagged and recaptured before reaching any conclusions, but thanks to the continuing efforts by guides and anglers we will get there.



Photo by Capt. Joe Gonzalez



Photo by Collin Ross

The Team's the Ticket

As with all of BTT's projects, we can only realize success with teamwork. The number of anglers and guides participating in Florida is too great to list them all here, but we'll mention the top four permit taggers in Florida (all guides): Joe Gonzalez, Carl Ball, Mike Holliday, Will Benson. Thanks to these captains and all permit taggers out there.

In Mexico, Nassim Joaquin and Rafael Chacon represent our chief collaborators. They oversee the project, train guides in tagging techniques, distribute tagging kits and retrieve and record data. Participating lodges in Mexico are: Boca Paila, Pesca Maya, Palometa Club, Ascencion Bay Bonefish Club, Grand Slam Lodge, Casa Viejo Chac Lodge, Casa Blanca, Playa


Blanca, Paradise Lodge, Costa de Cocos, Club Grand Slam, freelance guides from Cozumel Island and local fishing clubs.

In Belize we team with Belize River Lodge and El Pescador. Many thanks for everyone's continuing efforts in Belize as they will assuredly pay off with a healthy permit future.

Pitch In

As often occurs with tagging programs, enthusiasm can wane over time. We need anglers and guides to dust off their tagging kits and get back to it. You only have to see the fruits of labor with the bonefish program to see the value in tagging. If you haven't yet tagged and want to, please let us know. Individual anglers do the permit tagging in Florida — just request a tagging kit directly from us.

Tagging in Mexico and Belize takes place at the above lodges partnering with BTT, so if you travel to Mexico or Belize to fish for permit, ask your guide if he has a tagging kit. In all cases, if you catch a tagged permit either record the necessary information (fork length, date, catch location) before letting the fish go or clip off the tag and mail it to us with the information.

If you catch a tagged permit, look at the tag carefully and see if it says "\$100 Reward." We've placed tags in permit with that message and if turned in with the appropriate recapture information you've just earned an easy C-note. 



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Conservation News

& Initiatives

Nurture Belize

Like so many coastlines throughout the world, the flats of Belize aren't immune from the dual threats of habitat loss and degradation. But rather than accept an uncertain future, anglers and guides of Belize aim to protect the flats so the fishery remains healthy. BTT member Adam Marton spearheads the fundraising effort and he posed a question to himself: Whose responsibility is it to ensure the Belize fishery enjoys the understanding and protection it deserves? He immediately recognized the answer: It's up to all of us.

The first step in this effort is to work countrywide with guides, anglers, lodges and other sources to identify critical habitats and fishing areas for bonefish, tarpon and permit. This information will be used to support proactive efforts aimed at protecting these areas from dredging, development, pollution and user conflicts.

To donate to this project, please click on the Donate Now tab on the BTT web site and write "Nurture Belize" in the referral box when you make your donation. You can also mail a check to our home office in Key Largo.



Photo by Dr. Aaron Adams

How important is this area to the fishery for adults in the Gulf of Mexico and Caribbean?

Despite protections of the uplands bordering the coast, those protections do not extend to the ocean. Threats from the sea therefore become of concern to guides and anglers calling this area home.

In order to answer these important questions and to gather information addressing threats to the fishery, the first step involves BTT collaborating with guides, outfitters and anglers of Campeche to tag juvenile tarpon in Mexico. This project kicked off in November 2012 with guides and anglers receiving instruction on how to measure and tag juvenile tarpon. The first 25 tarpon were thus tagged. Tarpon Town Anglers, Ocean View Hotel and local anglers graciously hosted the event. During the kickoff for it, additional projects became the subject of discussion and planning. This provided a very positive outlook for this important region of the tarpon fishery.

Sub-Adults in Indian River Lagoon

Even as we learn more about adult tarpon migrations and build on our knowledge of

Mexican Juvies

The waters along the west coast of the Yucatan Peninsula have long been recognized as a hotspot for juvenile tarpon. It's common to jump 20 fish a day and a boatful of anglers will usually enjoy little competition from others. These tarpon generally run 16 to 40 inches in size, meaning they're one- to three-year-old fish and quick to eat a fly.

The creeks that drain the uplands and feed freshwater to the vast seagrass beds along the coast are pristine and tunnel through vast canopies of ancient mangroves. Much of the uplands lie in protected areas and remain undeveloped, keeping mangrove creek habitats in perfect working order for juvenile tarpon.

But little is known about these fish that represent the future of the fishery. Do individual tarpon stay in a single home creek or do they move among creeks? How far offshore do they venture? Are juvenile tarpon caught and released more than once and, if so, how many times? Since the fishery is comprised almost entirely of one- to three-year-old fish, where do they go once reaching age four?



Photo by Orion Multimedia

Fortunately there's much good news about the flats fishery of Belize — it's thriving. Bonefish, tarpon and permit enjoy the luxury of federal protection that makes these species catch and release only. But like so many other places in the world, the dual threats of habitat loss and degradation creep closer every day. Because of the inevitability of those threats coupled with the positive flats status in Belize, this represents an opportune time to gather the information needed to craft conservation and management strategies to keep the Belize fisheries healthy.



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small juvenile tarpon to initiate habitat restoration projects, we still know very little about sub-adult tarpon. These tarpon between 10 and 40 pounds magically appear in a lagoon or creek one day and they're gone the next. Where do they come from and where do they go? How extensive are their movements, what habitats seem most important? How much does coastal habitat loss or declines in water quality affect them?

We don't know the answer to any of these questions, which is why BTT is funding a new study in Indian River Lagoon. Dr. Jon Shenker of Florida Institute of Technology uses acoustic (sonic) tags and underwater acoustic receivers to monitor sub-adult tarpon movements in Indian River Lagoon on Florida's east coast. Dr. Shenker catches sub-adult tarpon with hook and line, and surgically implants acoustic tags in the fish. These tags send out pings, similar to what you might hear from a submarine, with each tag possessing a unique series of pings. Underwater receivers detect the pings as tagged tarpon swim by. This allows Dr. Shenker to use a network of receivers to plot the movements of these tarpon in response to factors like water temperature, river flow and habitat changes. Given that these young tarpon represent the future of the fishery, the more Dr. Shenker learns during this study the better.



Photo by Eric Perez

Catch 'Em for the Cause

Get in touch regarding the following Traveling Angler Trips:

- El Pescador, Belize, January 23 – 27, 2013
- Belize River Lodge, Belize, May 18 – 25, 2013
- Palometa Club, Mexico – May 24 – 31, 2013

A number of tournaments donate proceeds to benefit BTT. The anglers in the events become familiar with BTT and many sign up as new members plus BTT receives funds for research, conservation and education. The following 2013 tournaments donate their proceeds to BTT:

- March Merkin Permit Tournament, Key West, Florida, March 11–14
- Palometa Club Permit Tournament, Punta Allen, Mexico, May 17-24
- Del Brown Permit Tournament, Key West, Florida, July 14–17
- Lowcountry Tarpon Tournament, Georgetown, South Carolina, September (date to be determined)
- Cheeca Lodge Backcountry Tournament, Islamorada, Florida, November 8-10, 2013

Florida Regulations

The Florida Fish and Wildlife Conservation Commission (FWC) is considering new regulations to manage recreational fisheries. At present, Florida's fisheries are considered either available for commercial sale or commercial sale prohibited without any official recreational definition. These proposed changes would affect tarpon, bonefish and permit.

The draft rule being considered would create the two following designations for recreational fisheries:

Gamefish — Species for which there would be no commercial harvest, possession or sale; fishing by hook and line only; recreational harvest only (within

season, size and bag limits); zero bag limit for captain and crew of for-hire vessels (only paying anglers could harvest fish).

Sportfish — No commercial sale, possession or harvest; no recreational harvest or possession (i.e., catch and release only); fishing by hook and line only.

The FWC is approaching this as a two-step process. Step 1 is to pass a Draft Rule so that it becomes an enforceable regulation.



Photo by Pat Ford

Step 2 will be to select species for each category. Likely species for Gamefish designation include snook and redfish while Sportfish would include bonefish, tarpon and sailfish. Following recent changes to regulations for bonefish as catch and release only, they would automatically be designated a Sportfish.

Discussion is ongoing on whether to continue the harvest tag system now in place for tarpon and thus allow harvest for world records or to eliminate the tag system and make all Sportfish catch and release only. Also on the table is the possible designation of permit as a Sportfish in the Special Permit Zone (Florida Keys) where there's already no commercial harvest or sale.


Stay tuned to the BTT blog (blog.tarbone.org) for updates on these important considerations and projects in Belize, Mexico and Florida. 



Photo by Eva Furner

Back to the Future

DR. AARON J. ADAMS
is Director of Operations for Bonefish & Tarpon Trust

The tarpon with the oldest confirmed age reached at least 63 years after residing in the Shedd Aquarium in Chicago for that long. And research on tarpon age using their otoliths (earbones) indicates that tarpon might live to 80 years of age. It's not clear how many survive to that ripe old age given the constant threat of shark attack and other challenges of the wild oceans, but some of those huge fish that make an angler's jaw drop surely lurked the waters for decades.

As I watched a monster tarpon swim by the boat this past summer, cruising by without a worry after refusing the most perfect fly presentation *ever*, I couldn't help but stop to think about how many changes that old-timer must have seen. Staked out on the beach near Boca Grande Pass, the water shown clear, light winds blew offshore and inexplicably few boats anywhere nearby. It probably looked a lot like it did 40 years ago when that fish possibly swam that same course, not an angler in sight. On this day that fish had no reason to be wary, but perhaps a lifetime of experience caused the refusal.

As I watched the fish swim slowly away along the sandbar, I imagined what it must have been like when, as a new larva, the tarpon entered a mangrove creek and transformed into a juvenile possibly 60 years ago or more. It could choose from endless choices to reside among the wetlands and creeks covering the coastline. It's quite a different story today – much coastal habitat has been lost, and the offspring of this big fish enjoys fewer choices of nursery habitat. The thought made me worried about the future of the fishery.

Lemon Bay Leads the Way

Lemon Creek once connected Lemon Bay to a network of shallow, backcountry creeks, ponds and seasonal wetlands. This represented perfect habitat for juvenile tarpon and snook. Like much of the coastline, bit-by-bit the area experienced development and the habitat was lost. But remnants of the



Photo by Cole Fairbanks

creek remained and larval tarpon kept arriving. Even now, juvenile tarpon can be seen rolling most mornings in what remains of the creek.

We'll never be able to restore the entire lost habitat, but habitat restoration can be effective. Lemon Creek is a great place to start because juvenile tarpon still try to use it. That's why Bonefish & Tarpon Trust is working with the Lemon Bay

Conservancy to restore 80 acres of a defunct golf course now called Wildflower Preserve, located just a few miles north of Florida's world-famous Boca Grande Pass. The goal involves monitoring the juvenile tarpon population before the restoration begins in 2013 in order to determine how many juvenile tarpon live there and how many survive long enough to leave the creek and enter the estuary. We'll then continue to monitor the juvenile tarpon after the restoration to determine the true benefits of the restoration.

As JoEllen King, a University of Florida graduate student conducting the study, and her crew of volunteers pulled the seine net down the long, narrow pond. They strained to gain a foothold in the soft, mucky bottom that reached thigh depth. The weighted bottom line of the net dug into the muck, making progress painfully slow. Swirls at the surface of the murky water turned into jumping juvenile tarpon, many jumping over the top of the net to freedom. After five minutes of slow progress, the crew finally got to solid ground at the end of the pond and pulled-in the net hand over hand. Juvenile tarpon continued to swirl and jump, but many became caught in the billowing end of the net. Quickly transferred into a cooler full of clean water, the crew counted 30 juvenile tarpon for this haul.

Working quickly, they measured each juvenile tarpon and took small clips of fin tissue from tarpon smaller than eight inches long. The DNA will be extracted from the tissue and saved in a database. If that tarpon is caught again and a tissue sample taken, it can be identified and thereby provide information on movement, growth and survival. Tarpon longer than eight inches were implanted with a computer chip, similar to that implanted into pets for identification. Each chip has a 10-digit identification number that can be read by handheld detectors that look like metal detection wands you see at airports, or by an

underwater antenna that detects the chip if a tarpon swims past.

The data from the monthly sampling will allow us to estimate survival based on whether tarpon are recaptured as well as growth rates for tarpon recaptured and measured each month. If tarpon can survive and grow large enough to leave the Preserve by swimming into Lemon Creek, the underwater antenna will detect them. Combined, this information will tell us how suitable this habitat really is.

Sampling at Wildflower Preserve started in September 2012 and will continue monthly for a year before the restoration occurs. After the bulldozers re-create the contours for wetland and volunteers replant mangroves and other wetland plants, the sampling will resume and continue monthly for two years. With the year's worth of pre-restoration data as a baseline, the post-restoration sampling will tell us how successful the

restoration turned out to be (more tarpon that grow faster and survive = success) as well as help us design and conduct more restoration projects in the future.

Big Bucks Needed

Habitat restoration is a costly venture. For Wildflower Preserve, costs include: the price of land purchased by Lemon Bay Conservancy; funds for planning the restoration, bulldozer work, restoration project (approximately \$450,000); and the sampling to evaluate the success of the restoration for juvenile tarpon (about \$110,000). We are extremely appreciative of the generous donations from the following project sponsors: True Flies, Robertson Foundation, Mick and Kathy Aslin, Vanderbilt Family Foundation, The Orvis Company, Sanibel Fly Fishers, and numerous individuals donating to the project. The project would also not be possible without the help of volunteers willing to get dirty to help the future of tarpon.

Above photo by Cole Fairbanks



Photo by Mike Lintz

If you can help by making a donation or assisting with sampling, please contact us at info@bonefishtarpontrust.org.



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A Tarpon Social

DR. KATHY GUINDON

is an assistant research scientist with the Florida Fish and Wildlife Conservation Commission's Fish and Wildlife Research Institute

I fondly refer to certain groups of rolling tarpon as "tail-slapping happy fish." I love seeing hundreds of tarpon boiling at the surface or simply a few rolling in synchronicity. Anglers frequently ask why tarpon roll, and when I first began studying the species I wondered the same. Now I can share some of the reasons.

One reason for rolling involves breathing atmospheric air and filling their swim bladders, thus obtaining more oxygen to supplement gill-breathing capabilities. A tarpon's swim bladder has a direct opening to its esophagus, or throat, so it fills quickly and efficiently. Inside the swim bladder are four longitudinal rows of spongy tissue very similar to a human lung. This tissue accesses the oxygen that fuels the tarpon's muscles, which is needed for endurance during bouts of exercise such as battling an angler on hook and line, performing long-distance swimming migrations or out-swimming a shark.

Australian research showed that the Pacific ox-eye tarpon (*Megalops cyprinoides*) permitted to breathe air at the surface after angling recovered back to normal in one hour. That's relative to tarpon that took several hours to recover if prevented from gulping air at the surface. Tarpon will also roll more frequently for breathing when inhabiting water with low dissolved oxygen concentrations.

A social aspect explains why tarpon rise to the surface together. A study conducted in 1940 placed small tarpon (about 10cm long) in tanks for observation. One fish rising to the surface induced others to do the same. The rolling in this study represented a social and respiratory movement triggered by the visual cue.


Further experiments in 1941 used artificial objects to test if biologists could induce tarpon to rise together in a



Photos by Dr. Aaron Adams

more social nature. A wooden model of a tarpon, painted silver, yielded the best results. Statistics showed significant induced movement and it was not by chance that the fish rose up together. A small school of tarpon in one aquarium even induced the movement of another group of tarpon held in an adjacent aquarium. When researchers blinded some tarpon and placed them in an aquarium with sighted tarpon, no imitative rises occurred by the blind fish when other tarpon rose to the surface. Blind fish still rose to the surface at the same rate as other tarpon, but for breathing purposes.

In 1942 these same experiments took place in an outside canal with five tarpon four to five feet in length. Scientists found comparable results to that of the small tarpon with one note: The large fish did not rise as frequently as the small tarpon, but when they did the movements may have been a social response. In larger bodies of water, the authors reported less mimicking of behavior because such fish can be separated more easily than fish in a river or canal.

It appears that tarpon do have a social nature to rise together, so those "tail-slapping happy fish" may be just that! 

A Tournament PARTNERSHIP



DR. JERALD S. AULT

is a Professor of Fisheries and Director of the Tarpon Bonefish Research Center at University of Miami's Rosenstiel School of Marine and Atmospheric Science

The motto of the inaugural Forgotten Coast Invitational (FCI) tarpon satellite-tagging tournament summed it up precisely: camaraderie and conservation. Tom Morgan of Apalach Outfitters and captains David Mangum and Chris Robinson organized the two-day event held June 14-15, 2012, near Apalachicola, Florida. This tournament represents the first-of-its-kind, fly-only tarpon competition aimed directly at science and conservation. It all came about through a unique partnership with Bonefish & Tarpon Trust (BTT) and the Tarpon and Bonefish Research Center (TBRC) at the University of Miami.

Targeting Tarpon Conservation

The biggest challenge in tarpon conservation is the lack of knowledge about tarpon migration patterns. We've suspected for years that "their tarpon are our tarpon," but researchers still possess very little hard data to help guide management decisions in regards to regional fishery impacts and stock status for this highly sought-after and long-lived sport fish.

The contest also served as a chance for the area's passionate tarpon anglers and guides to converge and celebrate the sport. Unlike standard format tarpon tournaments, the FCI's foremost objective involved tagging tarpon. The tags provide the information we need to ensure a healthy and protected tarpon population in the Gulf and worldwide.

Through the vehicle of the tournament, placement of state-of-the-art SPOT and PAT satellite tags was the contest's main objective. The BTT and TBRC provided 16 satellite tags for the tournament. At \$6000 per tag, this contribution amounted to nearly \$100,000. With this solid foundation of funding for tags, a number of our friends in the fly-fishing industry stepped up as gold sponsors — Patagonia, Simms, Costa del Mar and Orvis.

"This scientific event could not have happened without the support of these, and other, dedicated companies," said Tom

Morgan. "It was really gratifying to see how enthusiastic they all were with contributing to the furtherance of tarpon science."

Using the latest space-age tagging technologies, the SPOT tag allows for real time tracking of a tagged tarpon. Anytime a fish rolls, free jumps or spends time at the surface, the ARGOS satellite network can detect the tag and fairly accurately determine the tarpon's position. As the ARGOS satellite tracks the paths of tagged tarpon across the Gulf and Caribbean, TBRC researchers collect indisputable data that the tarpon in our backyard today may be thousands of miles away in a month's time, reinforcing the idea that "our tarpon are their tarpon" and vice versa.

With this groundbreaking technology, BTT scientists have the facts they need to lobby for effective conservation and sustainability of the resource. The long-term goal is to provide hard data to researchers to effect state-to-state and even country-to-country legislation and laws aimed at limiting tarpon harvests and providing enhanced protections of seasonal feeding, spawning and juvenile nursery habitats. The FCI event served as a big step in this direction because the fish tagged during the tournament will provide information to bolster efforts at protecting tarpon and their habitats.

Tournament Format

The FCI event consisted of an invitational field of 17 top fly-fishing tarpon guides and charter-angler teams in the region. With an entry fee of \$500 per team, each guide selected up to two charter anglers to fish out of his skiff and only anglers (not guides) were allowed to fish. If an angler received a fee for saltwater guiding in the past five years, he or she could not participate as a chartered angler. The tournament permitted only fly-fishing with no leader or tippet line-class restrictions. As a result, tarpon were caught, tagged, revived and released in short fight times.



Guides, anglers and scientists gathered for the Forgotten Coast Invitational pre-tournament kick-off meeting at Apalach Outfitters.

Above photo by Dr. Jiangang Luo




Movement tracks in the Gulf of Mexico from the inaugural FCI tarpon satellite-tagging tournament. Data show summer-fall convergence at the Mississippi River, with inset showing movements around the Mississippi Delta. Fall-winter movements reveal southward migrations to at least the Florida Keys (east) and Mexico (west). Tarpon215's last location on October 20, 2012, was at the mouth of the Mississippi River (marked with the star). Will it go east or west?

Boats launched at 6:30 a.m. with lines out at 4 p.m., with one exception: If a boat was hooked-up with a tarpon at quitting time, that boat could fight that fish to conclusion. Three volunteer tag boats composed of TBRC team members Dr. Jiangang Luo, David Bryan and I — with the assistance of BTT Board member Chris Petersen of Hell's Bay Boatworks — covered about 30 miles of coastline in a concerted effort to safely attach tags to mature migratory tarpon. Once a tarpon hookup occurred, each fishing team/skiff called a designated phone number and the closest tag boat ran to that guide's boat. The landed tarpon was handed off to the tag boat so it could be measured (fork length and girth), tagged and released.

A captured tarpon needed to weigh at least 80 pounds to be eligible for scoring. Catch and tagging data were logged on a scorecard and the winning team registered the most tarpon tagged over the two-day tournament. In the event of a tie, the team with the heaviest tarpon prevailed.

Big Fish, Big Benefits

Nine tarpon, ranging from 93.5 to 137.8 pounds, received satellite tags during the tournament. The data from these tags indicated a strong seasonal convergence of tarpon from Apalachicola to the biological riches at the mouth of the Mississippi River. Seasonal migrations from this area have been southward to both the east (Florida) and west (Mexico). One of these tarpon is still at the Mississippi River. It will be of great interest to see which way and how far it travels south this winter.

A spectacular video by Grahame Morton of Waterline Media about the tournament and tagging program can be viewed at <http://vimeo.com/47187988>. The success of the FCI now serves as a model for cooperation and collaboration between the angling and scientific communities in tarpon conservation efforts. It is a grand complement to the tarpon satellite tagging program that is just beginning to show its true potential for preservation and sustainability of tarpon migration and spawning habitats, not only in our local waters, but worldwide. 

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Abducted By Aliens

DR. AARON J. ADAMS
is Director of Operations for Bonefish & Tarpon Trust

This is the type of thing you read about in supermarket tabloids. The story is usually based on a first-hand account of someone mysteriously abducted from their car, examined on some kind of operating table, injected with a tracking device and then returned to their car as if nothing happened. Of course, nobody believes them except others who have been abducted.

In recent years, this same scenario has played out many times for bonefish — they're magically removed from the water, measured, outfitted with a tag and released. Sometimes they experience this abduction alone, other times the abduction occurs with many other bonefish. And just like the tabloid stories, some of them are abducted more than once. Abductions have been reported in the Bahamas, Belize, Mexico, Cuba and previously from the Florida Keys. If only they could talk to share their experience.

Bonefish & Tarpon Trust has been working with guides, lodges, anglers and scientific collaborators to tag bonefish in numerous locations in the Caribbean since 2009. From the bonefish's perspective, we're the invading aliens. But we are benevolent aliens with a purpose: To figure out their movement patterns and habitat use so we can focus on the most appropriate strategies for habitat conservation. In other words, the abductions are all about making sure bonefish and their habitats stay healthy into the future — we're doing it for their (and our) own good.

The goals involve identifying key habitats and locations for bonefish and connecting the different habitats they use during their lives as juveniles, adults, for spawning and migrations. By knowing such we can make conservation of these habitats and locations a priority. The philosophy is that if we can ensure healthy habitats for bonefish, the fishery should be healthy as well.

It's never too soon to gather this information, and waiting can be risky. If we know which habitats are most important, BTT can work with our members

and collaborators to get the most important areas protected before problems arise so that, for example, a ship channel isn't dredged through an important spawning location. In areas where bonefish populations have already declined, knowledge of how bonefish use habitats can help guide restoration. But if we don't start this work until the habitats disappear, we'll be too late.

Most of the tagging has been through the tireless efforts of guides and anglers — all very essential to this program. Although the program is ongoing, it's worth sharing some preliminary result, as of the fall of 2012.

The vast majority of bonefish recaptures occur within a mile or two of where they were tagged, whether the time between tag and recapture was a few days or more than a year. Of course exactly what the fish do between the tag and recapture dates is unknown, but the commonality of results suggests that bonefish stick close to home for much of the time.

Some bonefish recaptures occur at much greater distances from



Photo by Orion Multimedia

Table 1. Number of bonefish, *Albula vulpes*, tagged and recaptured by anglers using external dart tags, by location.

Location	Number Tagged	Number Recaptured	Percent Recapture
Abaco, Bahamas	1403	20	1.43
Deep Water Cay, Bahamas	165	2	1.21
Eleuthera, Bahamas	1094	84	7.68
Exuma, Bahamas	177	0	0
Grand Bahama Island, Bahamas	52	0	0
South Andros, Bahamas	122	3	2.46
Ambergris Cay, Belize	448	0	0
Belize City, Belize	400	3	0.75
Yucatan Peninsula, Mexico (Cozumel, Ascension Bay, Espiritu Santo Bay, Chetumal Bay)	712	0	0
Las Salinas, Cuba	682	22	3.23
TOTAL	4543	134	2.95

Table 2. Summary of the number of days between tagging and recapture dates for tagged bonefish tagged by anglers. On Eleuthera (where seine nets were also used), 16 fish were recaptured twice and two fish were recaptured three times.

Location	Minimum	Maximum	Average
Abaco, Bahamas	12	766	322
Deep Water Cay, Bahamas	2	46	
Eleuthera, Bahamas	2	713	258.02
South Andros, Bahamas	351	351	
Belize City, Belize	72	385	196.33
MEAN	87.8	452.2	258.7844

Table 3. Summary of distance (in miles) between tag and recapture locations for bonefish tagged by anglers (seine nets were also used on Eleuthera).

Location	Minimum	Maximum	Average
Abaco, Bahamas	0	5	1.01
Deep Water Cay, Bahamas	0	2	
Eleuthera, Bahamas	0	12.39	1.3
Belize City, Belize	0	2.5	0.83
MEAN	0	5.47	1.16

Table 4. Summary of the number of days between tagging and recapture dates for tagged bonefish, *Albula vulpes*, that were recaptured, and distance (in miles) between tag and recapture locations for Las Salinas, Cuba. Data are summarized by time and distance categories.

Days Between Tag and Recapture	Number of Bonefish	Distance Between Tag and Recapture	Number of Bonefish
0 – 30	2	0 – 0.25	17
31 – 90	7	0.26 – 0.6	4
91 – 365	5	0.61 – 1.25	0
1 to 2 years	5	1.26 – 2.5	1
2 to 3 years	3	>2.5	0

the tagging location. When combined with data from acoustic tagging studies, it appears that many of these longer distance movements may be associated with spawning migrations. More work is ongoing to test this assumption.

On a smaller scale, data are starting to show some of the hot-spot habitats heavily used by bonefish, which helps guide upcoming habitat conservation efforts. More details on this aspect of the project will be forthcoming.


In the end, this program will provide the information needed to enact conservation measures to protect bonefish fisheries, whether that protection is needed now or in the future.

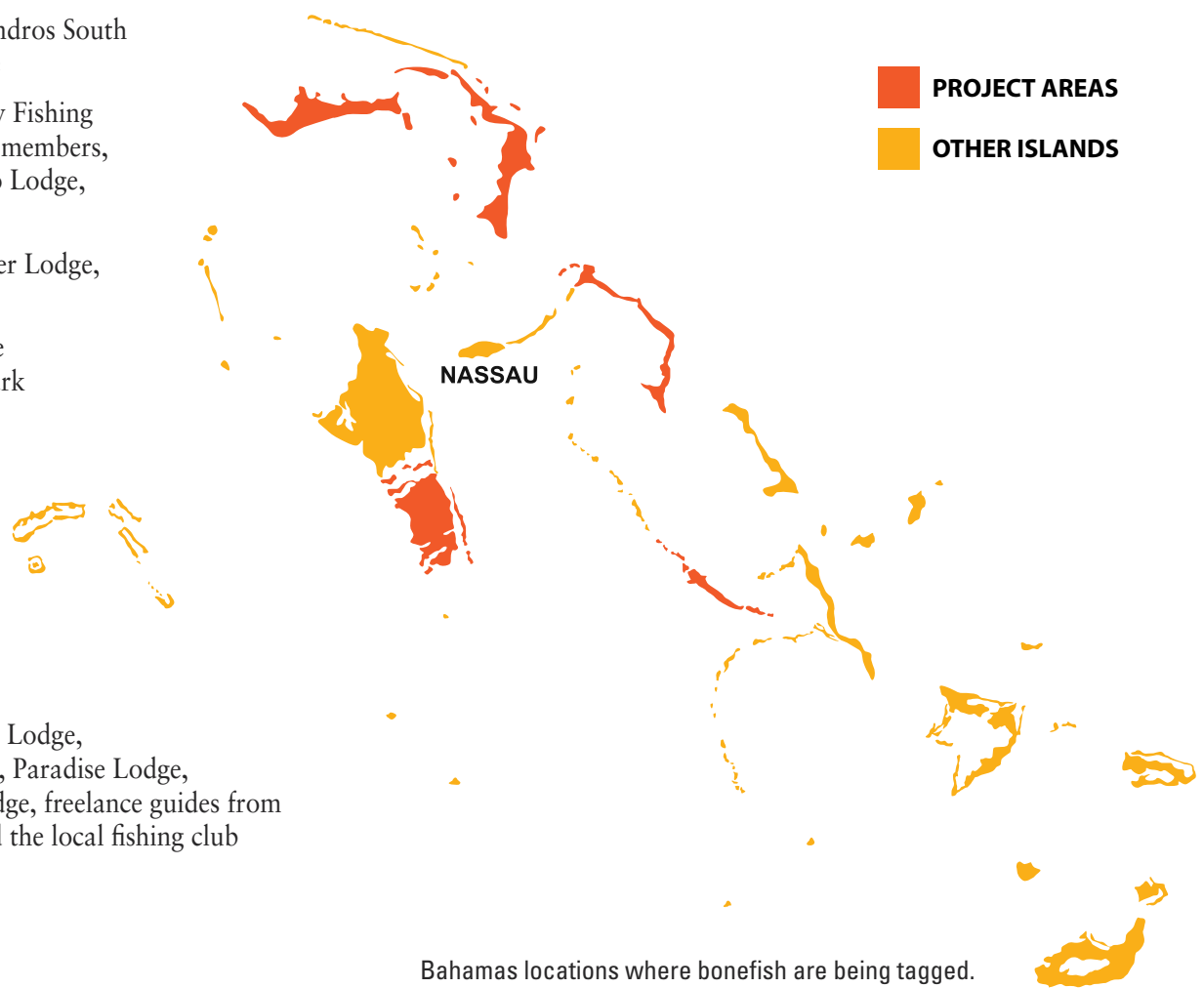
Participants include the following as well as the many anglers who fished with guides participating in the program.

- Grand Bahama Island — Deep Water Cay Club, H₂O Bonefishing, Grand Bahama Bonefishing
- Exuma — Norman Wells, Judd Rocciola, Barry Lightboun, Dr. Aaron Shultz, Paul Leferve, Reno Rolle
- Eleuthera — Cape Eleuthera Institute, The Island School, Danny Rankine
- South Andros — Andros South Lodge, Bair's Lodge
- Abaco — Abaco Fly Fishing Guides Association members, Delphi Club, Abaco Lodge, Black Fly Lodge
- Belize — Belize River Lodge, El Pescador Lodge
- Cuba — Cienaga de Zapata National Park
- Mexico — Boca Paila Lodge, Pesca Maya Lodge, Palometa Club Lodge, Ascencion Bay Bonefish Club, Casa Viejo Chac Lodge, Casa Blanca Lodge, Playa Blanca Lodge, Paradise Lodge, Costa de Cocos Lodge, freelance guides from Cozumel Island and the local fishing club

Next Steps

As part of the Bahamas Initiative (a collaborative effort between BTT, Fisheries Conservation Foundation, and Cape Eleuthera Institute), we are starting a new phase of the tagging program in the Bahamas — we are using large seine nets to capture and tag many bonefish at a time. Since the amount of data depends on the number of fish recaptured and the number of recaptures depends on the number of fish caught, this new strategy will help gain this much-needed information faster.

You can participate by fishing in the areas where tagging is occurring. Request a tagging kit for your boat and tag bonefish you catch. If you catch a tagged bonefish, we need to know when, where, the tag number and the fish's length (tip of the nose to fork in the tail). Write all this down while on the water and leave the tag in the fish. You can also call the phone number on the tag and report this information. Otherwise clip the tag from the fish and contact us so we can give you instructions for mailing the tag to us. Now that's a perfect excuse to go fishing for bonefish! 





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Photo by Dr. Aaron Adams

DNA Points the Way

DR. KATHY GUINDON

serves as Assistant Research Scientist for the Florida Fish and Wildlife Conservation Commission, Fish and Wildlife Research Institute

DNA fingerprinting represents a forensics technique commonly used to determine if two or more genetic samples (such as from hair or a scale) belong to the same individual. Each individual animal possesses a unique DNA sequence, so when two genetic samples share a DNA profile it's highly probable they came from the same individual. Since an individual's DNA profile remains the same for life, DNA fingerprinting proves to be a good way to track an individual tarpon in the fishery throughout its lifetime.

Since 2005, volunteer anglers have been collecting tarpon DNA samples from which scientists can learn more about Atlantic tarpon using DNA fingerprinting techniques. As of Oct. 1, 2012, geneticists from the Florida Fish and Wildlife Conservation Commission (FWC) have extracted and catalogued DNA from 15,357 angler-returned samples. Of those, 14,402 samples came from anglers fishing in Florida, 431 from other states and 524 from

anglers in countries outside of the US. Evaluations of the DNA profiles through June 27, 2012, revealed genetic sampling occurred more than once with 143 of those tarpon, which means they are recaptures. Further investigation of recaptures by biologists may reveal more details about seasonal movement patterns and population structure. In addition, genetic tracking will be used to estimate the number of tarpon in a given area.

The Tarpon Genetic Recapture Study is an ongoing, collaborative project between the FWC, Mote Marine Laboratory and Louisiana Wildlife and Fisheries. To volunteer, call 1-800-367-4461 or email TarponGenetics@MyFWC.com and request a special kit available for the collection and room-temperature storage of DNA samples from individual tarpon (instructions included for using the kit).

For more information about the project, visit

<http://myfwc.com/research/saltwater/tarpon/genetics/>. 

ARTIST OF THE YEAR

Brett James Smith

Born in 1958, Brett began his career in art as an illustrator working with his New York agents on assignments for books, magazines and advertising art. Twenty years ago he turned to easel painting, chronicling his outdoor experiences in sporting art. His work is now widely sought by sportsmen and western art collectors.

Working in oils, transparent watercolors and etching, Brett's art has a nostalgic, timeless appeal that's become his trademark. Eight years ago he moved to a summer studio in northwest Montana where he immersed himself in the history and culture of the Rocky Mountain West. His subject matter expanded to include Native Americans and the adventurous characters who populated the West.

"Ideas are what make interesting, unique paintings," says Brett. "Only so many ideas exist within the confines of contemporary activities such as sporting subjects, wildlife and landscape painting. But when you mix the historical culture of outdoorsmen and the magnificent landscapes of the places where they recreate, ideas become limitless."





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Back in 1998, when a group of us first joined to create Bonefish & Tarpon Unlimited, I didn't make any predictions about the future. But I can assure you that I wouldn't have predicted that we would make as much progress as we have in the past 14 years. We have been able to support research that has opened the eyes of many to the worlds of bonefish, tarpon, and permit. The hard work of our staff, board, volunteers, and collaborators, along with the generosity of our members, donors, and sponsors is really paying off. Where we once held up our hands and said "we don't know" in response to questions about things as basic as habitat use, we now have some answers and we're learning more each day. Most important, those answers are leading to better conservation and stewardship, which will make for better fisheries in the long run. And with this new information we are better able to tackle challenges like the Florida Keys Initiative. I don't have enough space here to list everything that BTT has accomplished and continues to work on, but here are some highlights.

Making Progress



Russ Fisher,
Vice-Chairman of the Board

Bonefish

What we've done:

- BTT funded research that determined bonefish spawning habitats and seasons.
- BTT worked with scientific colleagues to determine that there are three species of bonefish that occur on the flats of the Caribbean, and the extent that each is in the fishery. With *Albula vulpes* (Common bonefish) comprising 96% of the fishery, we can now focus our conservation efforts on this species.
- Bonefish in the Florida Keys grow two to three times faster than in the Caribbean. Knowing growth rates and ages of fish is essential for assessing fisheries health.
- Tag-recapture projects have revealed that although most bonefish remain in relatively small areas, bonefish appear to migrate long distances to spawn.
- Our support of research on catch and release, and our resulting education campaign, has refined angler behavior, and undoubtedly increased the survival of released fish.



Photo by Dr. Aaron Adams



David Denies
PERDIZHUNTING



David Denies
DOVESHOOTING



David Denies
DUCKHUNTING



David Denies
PIGEONSHOOTING

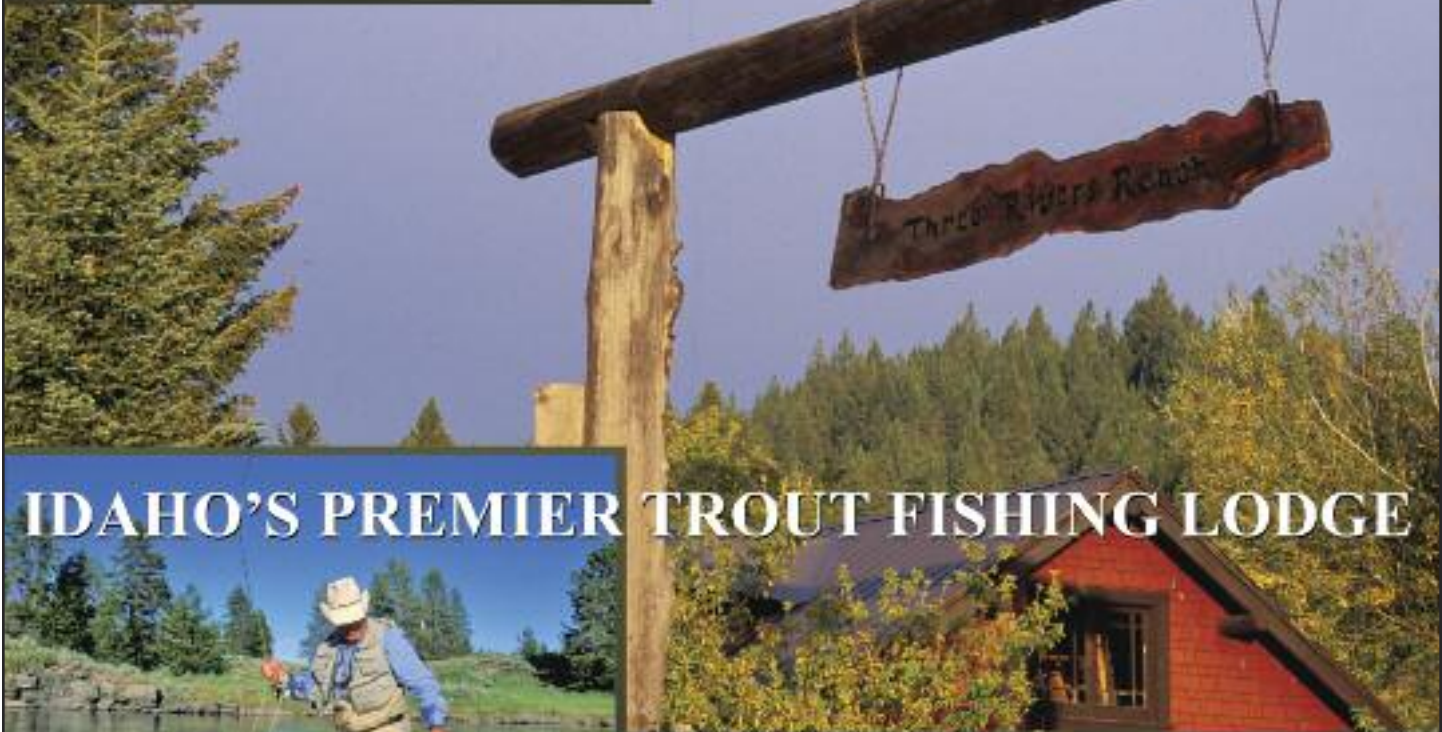


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- BTT has funded research to identify juvenile bonefish habitat characteristics.
- Initiated a multi-year, collaborative Bahamas Initiative to promote conservation of the bonefish fishery and habitats.
- Improved regulations for bonefish in Florida.
- BTT funded research that revealed that the recreational bonefish fishery in The Bahamas is worth >\$141 million per year.

What we're doing:

- Using our new knowledge of bonefish spawning requirements to identify and protect spawning locations (several have already been located), and document how far bonefish migrate to spawn.
- The hard work of guides, anglers, and scientific collaborators to tag bonefish is allowing us to focus on hotspots for conservation.
- Using new knowledge of juvenile bonefish habitats, we are getting ready to search for and identify juvenile habitats throughout Florida, the Bahamas, and Caribbean so these important areas can be protected.

Below photo by Ian Davis

Tarpon

What we've done:

- Funded satellite tagging research that documented long-distance (inter-state and international) migrations by adult tarpon, that some adults appear to remain in smaller home ranges, and extensive use of coastal river habitats.
- Funded research to identify spawning locations
- Funded research on the effects of catch and release on tarpon.
- Funded research to identify habitat requirements for juvenile tarpon.



Photo by Dr. Aaron Adams



What we're doing:

- Using information from satellite tagging to bolster local and regional conservation efforts
- Conducting the first juvenile tarpon habitat restoration project, with more restoration and protection to come, as part of the juvenile tarpon habitat initiative.
- Working to improve tarpon regulations, using a science-based approach.

Permit

What we've done:

- Determined that sandy, windward beaches are the only nursery habitat for juvenile permit.
- Began the first ever tagging program for permit. Initiated in Florida in 2010, it expanded to Belize and Mexico in 2011.
- Worked with Florida Fish and Wildlife Conservation Commission on new regulations for permit, which took effect in 2011.

What we're doing:

- Continuing the international tagging program to learn about movements and habitat use by permit
- Initiating a new permit tracking program
- Working with collaborators throughout the Caribbean on improved regulations for permit

Ecosystems Initiatives

Florida Keys Initiative:

- Assessing the health of the flats ecosystem
- Identifying important fishing areas so access can be preserved and user conflicts reduced
- Determining the economic value of the flats fishery
- Investigating causes for fisheries declines

Bahamas Initiatives:

- Identifying keys habitats to protect the bonefish fishery
- Working with guides, collaborators, and the government on zones to protect the fishery, habitats, and spawning locations
- Assessing the health of the fishery and habitats throughout the Bahamas

Our efforts are now gaining even more momentum due to the new collaboration between Bonefish & Tarpon Trust and the Tarpon and Bonefish Research Center at University of Miami. This will help us raise significantly more funds, and enhance our ability to tackle some of the bigger challenges we face in protecting and restoring flats fisheries.

Education


We have sponsored four international science symposia on bonefish, tarpon, and permit research, conservation, and fishing, with the next symposium scheduled for November 2014. This is a venue to bring scientists, anglers, guides, managers, and industry together. 



Photo by Pat Ford

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