Highlighting UF/IFAS Programs in Fisheries and Aquatic Sciences, Aquaculture, and Pond Management

University of Florida Cooperative Extension Service / Institute of Food and Agricultural Sciences  Volume 5  Number 3  2001

Calendar of Events

August 24 – December 14
Fall 2001 Departmental Seminar Series
Fisheries and Aquatic Sciences/ Gainesville, FL
Fridays @ 3 PM    Schedule available on-line: http://fishweb.ifas.ufl.edu/seminars.htm

August 14-15
Fish Health Management Workshop
Ft. Lauderdale
Dr. Ruth Francis-Floyd           352/392-9617  ext 229

October & November
Recreational Pond Management Workshops
Call for more information or check web site: http://fishweb.ifas.ufl.edu
Chuck Cichra  352/392-9617 ext 249

November 26 - December 1
Marine Ornaments Conference 2001
Walt Disney Resort/Buena Vista, FL
Beth Miller Tipton  352/392-5930

May 19-24 2002
Aquatic Weed Control
Short Course 2002
Ft Lauderdale Marriott
North/ Ft Lauderdale, FL
Beth Miller-Tipton  352/392-5930
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Sturgeon Trackers

Graduate student Julianne Harris tracks Gulf of Mexico sturgeon moving up the Suwannee river.

Highlights

Continued on page 3.

rs. Daryl Parkyn and Debra Murie along with biologists Doug Colle and Jamie Holloway have just spent a busy season plying ancient waters for wild sturgeon research in the Suwannee River, with plenty of work still ahead. “There are three different sturgeon projects we’re concentrating on,” says Daryl. “One is development and implementation of non-lethal methods for examining stomach contents of these fish. It’s called a lavage method. Basically we pump the stomachs of live fish, and follow that up by making sure the fish aren’t dying. To do that, we’re holding the fish in tanks for up to 72 hours. This will give us a better idea of the food habits of the fish. We’re also putting telemeters in some of these fish, to track them in the river,” he said.

This is also part of a second collaborative study which examines the survival of sturgeon that were collected for the brood stock program. To examine these survival issues in the fish, they’ve been inserting ultra-sonic tags, pingers, which are used to determine the location of each fish. If the fish tag becomes stationary for a long period of time, Daryl sends a diver down to...
Aquatic Sciences
Gainesville

The following UF/IFAS faculty and staff are available to answer questions or provide technical support for aquaculture, fisheries and aquatic sciences, and pond management.

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**Student Involvement at UF**

Undergraduate and graduate students are an important part of the teaching, research, and extension programs at the University of Florida. Student involvement is highlighted in each issue of WaterWorks.

Beth Sargent, a native of New England, has spent the last seven years working on undergraduate and graduate degrees here at UF. She received a Bachelor of Science degree in Wildlife Ecology and Conservation in 1998, and will earn her MS degree later this year.

During her undergraduate career, Beth developed a keen interest in aquatic systems. In the fall of 1998, she started her master's degree under the direction of Dr. Ed Phlips and Dr. Anson Moye, dealing with the issue of mercury contamination and bioaccumulation in aquatic systems, including the Everglades. Mercury is a major health issue and concern because of its negative effects on humans and other organisms.

While studies in the past have focused on mercury in fish and wildlife and even zooplankton, few studies had focused on algae, specifically periphyton or algal mats that are characteristic of many aquatic systems.

The micro-ecosystem of periphyton is a major player in primary productivity of the complex Everglades system. However, little is known about how its structure and function affect mercury uptake. Understanding how and at what rate the cells take up mercury can help researchers and managers develop a better understanding of how mercury functions in an aquatic system and how it is transported through the food web to such high levels.

Data from Beth’s work and from other mercury projects across the country will be used to develop a model for predicting which areas are more prone to higher levels of mercury and how those areas can then be managed.

“My project provides the groundwork for understanding what happens to mercury at the bottom of the food web and how it gets there,” said Sargent. “Hopefully it can be applied to management in the Everglades and elsewhere.”

Beth is currently completing her thesis and seeking a job in the aquatic sciences field.
Continued from page 1.

determine if they have a dead fish or a shed tag. To date there have been no fatalities among the 18 pinger-tagged fish in the river.

“One interesting thing about these tags is we have coated them with a substance they use on heart pacemakers, and it keeps the tags from being rejected by the fish,” says Daryl. “Normally a fish would encase a foreign body and expel it through the body wall or the gut cavity. So far this technique has been working well.

“Our third project on sturgeon examines their environmental tolerances. We’re looking at the interplay between temperature tolerance, oxygen consumption and current velocity. So we’re trying to figure out if the fish are getting exposed to conditions that might put them at risk,” he said.

To do that involves experiments in the lab with young fish borrowed from the brood stock program. They measure oxygen consumption of these fish at different water temperatures and water velocities. They also monitor the oxygen and temperature in the Suwannee River as the year goes by, so they have a good idea of what’s going on in the river on an annual basis.

“In addition, we’ve released 30 large fish that have a different kind of tag on them. The tags will log temperatures they’re exposed to for the next five years. This will allow us to estimate the fish’s metabolic oxygen demands and their metabolic rates. We also hope to better understand what the temperature preferences are for these fish at different times of the year.

“So if we recover these fish at any time, we can download the data off the tag and let the fish go. And even then that tag will continue recording data. With a bit of luck we’ll get some of those fish back,” he said.

These three projects have been funded by the Sturgeon Production Working Group for the past two years. The Group is comprised of people from the Florida Fish and Wildlife Conservation Commission (also known as the FWC), Department of Environmental Protection (DEP), the University of Florida, and a sturgeon aquaculture industry representative — a wide range of people.

“Hopefully funding will continue for one more year, but at the present time it’s still up in the air,” Daryl said. “River conditions for sturgeon were good last spring,” he said. “From February through April the river was in good shape, with a record number of fish in reproductive condition. At least, it was more than we’ve ever seen in the years we’ve been studying them. That was really encouraging. Unfortunately, in May, we had a decrease in river flow. So we’re not sure how that affected the survival of a subsequent spawn that occurred.”

In June, as the river dropped, almost all of the sturgeon being studied were concentrated in an area between Fanning Springs and Manatee Springs. “Fourteen of the 18 tagged fish concentrated in this area, which was interesting,” he said. “Our hunch is that they’ll remain near the springs even as the river rises in July from summer rainstorms. Several studies have suggested that in summer these fish stay near the springs because of temperature advantages. It’s thought that the adult fish don’t feed during summer, and they hang out near the springs. The lower water temperature reduces their metabolic needs. That helps them make it through the summer.”

In the fall, they start moving out initially, at least, into the estuary region near the mouth of the river. It is presumed they feed there on the sand and mud flats. This fall Daryl, Debra, Doug and a new graduate student, Julianne Harris, will be tracking these fish as they move out of the river and into the estuaries.

They will attempt to identify areas of critical use for these fish. As Daryl explains, “This may be important because they’re talking about dredging the Suwannee River. Now, after the net ban, it’s not as important for boat traffic. However, this has been an important portion of the river for sturgeon migrating upstream.

“Next spring, the pinger tags will still be working and with some luck, we’ll be able to track these fish to their spawning grounds. That should help us get a better handle on where these fish are reproducing,” he said.
UF/IFAS Aquaculture and Pond Management Update

Department of Food and Resource Economics

Florida Sea Grant continues its work on several projects that are related to fisheries and aquaculture:

- The multi-species project is still in progress. We’ve drafted a paper that profiles businesses targeting reef fish, lobster, stone crab, and/or coastal pelagics in south Florida.

- Dr. Larkin is doing a survey of wholesale and retail sectors of the marine ornamental industry via a web site, which should be quite interesting.

- She is soliciting information about the most demanded attributes of a few selected marine ornamental species. This would be helpful for individuals trying to culture these species.

- The red tide project is nearly completed. The project had two components: the economic impact of the 1999 red tide event in Okaloosa County, and a survey of awareness of Sarasota/Manatee County residents regarding red tide issues.

The red tide project is still in progress. Dr. Larkin is doing a survey of wholesale and retail sectors of the marine ornamental industry via a web site, which should be quite interesting.

School children are introduced to Florida’s ever popular spiny lobster at an annual UF/IFAS “Something Fishy” event held at the Florida Museum of Natural History.

The data are currently being analyzed. One interesting finding is that restaurants and lodging facilities located in the coastal zip codes of Okaloosa County were found to be significantly impacted by the red tide event.

This was in contrast to a similar study in Sarasota and Manatee Counties. The analysis, which used Florida Dept. of Revenue data, found those industry sectors lost about $0.5 million in sales.

- With respect to hard clam culture, a project nearing completion addresses the economic impact of the hard clam culture industry on the Florida economy. This project solicited market information from 49 shellfish wholesale dealers that handle cultured hard clams. Information about sources and destination of product, sales volumes, market prices, and out-of-Florida sales was gathered.

- Three distinct regions were chosen to see how the markets for each area differed (East Coast, Panhandle to Tampa Bay, and Southwest Coast). Of the firms interviewed by telephone, approximately 90 percent responded fully to the questions posed. Firms that handled less than one million clams annually made up about ten percent of the market, with 70 percent of the sales volumes attributed to firms handling more than one million clams.

Clam wholesale firms obtained the majority of their cultured clams from other growers (73 percent), with the remainder coming from their own personal leases and other wholesaler firms.

Of the total number of cultured clams sold, about half went to out-of-state buyers, while 25 percent went to buyers within the same region. Twenty-five percent went to buyers outside of the sellers region but still in Florida. Other wholesale distributors represented the most important type of buyer.

Restaurants and retail buyers were of almost equal importance, with sales directly to consumers representing a very small share. The total economic impact of cultured clam sales was estimated to be $34 million. Thus, the added economic activity associated with culture clam sales is significant, particularly when compared to initial grower ($16 million) and wholesale ($22 million) sales.

This added economic impact is generated by value-added activities, out-of-state sales and the economic activity created as in-state sales are re-spent with local and regional economies.

Chuck Adams
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Tropical Aquaculture Laboratory
Ruskin

Tropical Fish Farmers Recovering from Last Winter

The winter of 2000-2001 was a killer for tropical fish farmers in Florida, but the industry is bouncing back. A series of cold fronts that swept through the state in late December and early January were devastating to tropical fish in ponds, even those under protective greenhouse structures.

Estimates of how many fish were lost were as high as 80 percent throughout the state.

Tropical fish are the state’s largest segment of aquaculture, accounting for almost 50 percent of the total farm-gate value.

Florida is subtropical, not tropical, and periodically the industry is damaged by severe winter weather. In response to this threat, many farmers cover their smaller earthen ponds with greenhouse plastic from October through late March.

During normal, severe winter weather events, these covers provide adequate protection for the crop. While temperatures at night may drop well below freezing, they usually will recover quickly within the next few days, and the pond temperatures rebound accordingly.

Water temperatures
beneath covered pools rarely drop below 70° F. This past December, a series of cold fronts brought temperatures down, but not to a point where the fish were in trouble.

However, for ten consecutive days in late December through early January, a continuous series of fronts swept through the state, all the way to the Florida Keys.

In Hillsborough and Polk Counties high temperatures did not exceed 60° F during this time; lows at night were in the 20’s and 30’s. Here at the Lab, pond temperatures of 45° F were measured in open ponds and 58° F in covered ponds.

Farmers who raise fish that are sensitive to cold water (e.g., many of the Cichlids, tetras, livebearers, etc.) experienced massive losses, with some individuals losing 100 percent of their crop. Even normally “hardy” species (e.g., some of the barbs and danios) perished this year.

Aquaculture farmers should know that if they experienced significant losses, they are eligible for assistance through the USDA Farm Service Agency (FSA). Grants and loan programs available for qualifying producers. For more information, contact your local FSA office.

The good news is that because tropical fish have relatively short generation times when compared to many other crops, most of the industry has recovered enough to resume sales.

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Sam Mitchell
Aquaculture Farm
Blountstown

New Raceway
Construction of a raceway system is nearing completion. The raceway will be stocked with the Asian clam Corbicula to evaluate its potential as a filter organism for dairy effluent.

Fisheries and Aquatic Sciences Ph.D. student Lance Riley, under the advisement of departmental faculty members Drs. Ed Philips, Patrick Baker and Shirley Baker will analyze how and at what rate the clams sequester phosphorus and utilize it for growth.

The Florida Department of Environmental Protection has mandated reduction of phosphorus in dairy effluent. Negative economic impact to dairy farmers may be offset by using the clams as secondary crop (feed ingredient, etc.).

The project will be underway in Blountstown later this summer and will run through at least next year.

Bass research
Ph.D. graduate student Jeff Hill, under advisement of Dr. Chuck Cichra, is conducting research at SMADF to determine prey use patterns of largemouth bass and peacock cichlids, in regard to predator efficiency and potential interspecific interactions.

Peacock cichlids were introduced into southeast Florida canals, even where largemouth bass were already present, to consume over-abundant forage fish.

Channel Blue Cats
A regional project began in May to demonstrate channel x blue hybrid catfish production, spawning technology, and economics.

The project, funded by the USDA Initiative for Future Agriculture and Food Systems, is a cooperative effort of the University of Florida, Auburn University, and the University of Georgia and is being conducted at facilities of all three universities.

Though the animal is a forced hybrid, requiring a higher level of technical spawning knowledge, the channel x blue hybrid has demonstrated faster growth rates, better feed conversion ratios, higher marketability, higher dress-out percentages, and greater disease resistance than its parent species.

Stocking Hybrid Striped Bass
Beginning this past spring, SMADF began raising hybrid striped bass in conjunction with the Blackwater Fisheries Center of the Florida Fish and Wildlife Conservation Commission for the express purpose of stocking fishing ponds for youth fishing events around the state.

After grow-out is complete this first year, it is anticipated that 20,000 hybrid striped bass will be available for stocking for Fishing for Success and FWC events.

Andy Lazur
Moves to Maryland

After more than a decade of service at the UF/IFAS Sam Mitchell Aquaculture Demonstration Farm (SMADF) in Blountstown, aquaculture specialist Dr. Andy Lazur has taken a new position with Sea Grant at the University of Maryland’s Horn Point Laboratory in Cambridge, Maryland.

During his tenure at UF, Andy directed operations at SMADF and worked on a statewide and regional basis to provide critical information to current and potential foodfish and baitfish farmers.

In April Andy was presented an award of appreciation his hard work and dedication to the aquaculture industry in Florida. The award was presented by the Florida Aquaculture Association at the Taste of Florida Aquaculture legislative reception in Tallahassee.

We will miss Andy and wish him the best of luck!

Debbie Britt Pouder
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Pentastomes are parasites that have been seen over the past few years on several ornamental tropical fish farms around Tampa. They are a group of worm-like parasites that infect many different species of fish. Infections have been found in several families of fish including Cichlidae (tilapia), Cyprinidae (dans), Cyprinodontidae (flagfish), and Poeciliidae (mosquitofish, swordtails, mollies and platies).

How to Identify

Members of the pentastome family have been in Florida for a long time. Not as common as some of the other parasites, they can easily be confused with them. If you raise fish outdoors and are visited by alligators, water snakes, or aquatic turtles, you may want to learn more about this fish parasite.

Typical pentastomid lesions seen on fish closely resemble infections by digenean trematodes or flukes, such as trematodes. However, Digenean trematodes and pentastomids have different life cycles and different control methods. That’s why proper identification is so important.

Although pentastomes are small, they can be seen without the use of a microscope. However, a microscope can help differentiate them from other similar parasites. Pentastomes in fish resemble very small white, segmented grubs or worms. However, they are more closely related to fish lice such as Argulus than to true worms. They are believed to be closely related to members of the group of organisms known as Crustacea, which include crabs, lobsters and shrimp, as well as the parasitic fish louse. Adult pentastomes, which are found in reptiles, look different from the larval or nymph stage, found in fish. They have been described as resembling prehistoric caterpillars.

Life Cycle

Pentastomes have a complex, indirect life cycle. Infections cannot be transmitted directly from fish to fish. Adults of the pentastome species that infect fish are found in reptiles, which are considered to be their final host. Typically, adult stages of the parasite are found in the respiratory system of reptiles, usually within the lungs and/or trachea (i.e., windpipe).

Within the lungs of their reptile hosts, the adult pentastomes deposit eggs containing larvae with four leg-like appendages. After deposition, these eggs are coughed up, swallowed, and then passed through the reptile’s gastrointestinal tract where they are deposited into the water through the feces. The eggs develop into the infective stage and, after being eaten by the appropriate fish host, the larvae hatch out, develop, and undergo several molts.

The juvenile life stage located in the fish more closely resembles a worm and is known as a nymph. After infected fish are eaten by the proper final reptile host, the parasite perforates the intestinal wall, migrating through the body to the lungs. When the pentastome matures, the life cycle is completed.

A number of common reptiles are known reservoirs of pentastomes. Florida soft-shell turtles have been found harboring adult stages of one group of pentastomes in the genus Alofia. Alligators harbor adult pentastomes of the species Sebekia mississippiensis. Other species of pentastomes have been found in snapping turtles and aquatic snakes including the cottonmouth, red-bellied water snake, diamondback water snake, and the common water snake.

Disease in Fish Caused by Pentastomes

The appearance of the fish as well as the amount of tissue damage done by the parasite will depend on the fish species infected, whether or not the fish has been infected before, and the species and number of pentastomes present. In one published report, little damage was seen in infected mosquitofish, whereas the same species of parasite caused significant damage and inflammation in infected swordtails. Necropsy of the swordtails revealed several clinical findings: prominent swellings of the skin, tracks where the parasites had migrated through the muscle, and encapsulated juvenile (nymph) stages present in the body cavity as well as under the connective tissue of many organs.

In some of the infected fish examined at the University of Florida’s Tropical Aquaculture Laboratory, there have been obvious swellings in the skin and muscle from which nymph stages have been extracted. Conversely, other fish have had relatively few external signs of the parasite. However, in some of these fish, significant numbers of parasites have been seen internally during necropsy. One swordtail had over 200 pentastomes of various sizes located throughout its body.

Diagnosis and Treatment

Affected fish may have grub-like lesions within the skin and muscle. However, these external signs are not always present, and infections will occur within the fish’s internal organs.

Common characteristics of pentastomes include a relatively short body length relative to body diameter (compared to nematodes); obvious segmentation (annuli) of the body (nematodes are not segmented); small hooks on the anterior (head) end; and a coiled nymph stage. In contrast,
digenean trematodes in fish are usually found as immature metacercariae (a larval stage in an oval, encysted form). If these cysts are broken, the digenean trematodes that emerge appear flatter and have circular oral and ventral suckers.

Because pentastomes can be found encapsulated in many different locations within fish, there are no treatments other than prevention. Chemical treatments to kill stages in the water have not been evaluated. Affected fish typically must be culled. Depending upon the severity of infection within a population, anywhere from a few percent to as high as 30 percent of the fish in a pond may be affected. Consequently, it is important that infections are recognized early so that preventative measures can be instituted as soon as possible.

Prevention

Primary prevention of pentastomid infections in fish requires control of the final hosts: aquatic turtles, water snakes, and alligators. Predator control should be a standard practice in an aquaculture facility. Fish sharing ponds with any of these hosts may be susceptible to pentastomid infections. Prolonged exposure to infected reptiles will increase nymph loads in susceptible fish by increasing the number of infective larvae in the ponds. This number will increase with time. Farms that have aquatic reptiles and do not regularly clean (muck/pump down, rinse, and lime) and restock their ponds will be at greater risk of infection.

Conclusion

Fish with whitish bumps, or raised areas that contain parasites that resemble grubs should be examined by a fish health specialist for proper identification of the parasite. Some species of fish have significant disease caused by pentastomid infections that can contribute to morbidity or mortality.

On the other hand, infected species of fish may suffer no ill effects, and may show no grossly visible signs of disease at all. Several different parasites or other diseases may cause a similar appearance on the fish, so positive identification of the problem is an important first step.

If pentastomes are determined to be the cause of fish disease, then turtle, alligator, and water snake populations within the affected ponds or farm should be controlled and ponds should be cleaned and restocked. Production ponds should be cleaned at least once or twice a year. There are no known methods for chemical removal of parasites from infected fish, which consequently must be culled.

So What Is “Extension” Anyway?

The Cooperative Extension Service is a partnership of county, state, and federal government which serves the citizens of Florida by providing information and training on a wide variety of topics. In Florida, the Extension Service is a part of the University of Florida’s Institute of Food and Agricultural Sciences with selected programs at Florida Agricultural and Mechanical University (FAMU). Extension touches almost everyone in the state from the homeowner to huge agribusiness operations in such areas as food safety, gardening, child and family development, consumer credit counseling, youth development, energy consumption, sustainable agriculture, competitiveness in world markets, and natural resource conservation.

Congratulations to Joe Nadolny, HCC’s Aquaculture student of the year for 2001. Joe is now manager of Fish World in Tampa. He came from Southern Tropical Fish Hatchery in Lakeland, graduated from the University of Tampa, and was one of the first volunteers at The Florida Aquarium. Joe was one of the first students in the HCC Aquaculture program when it began four years ago.

Congratulations to Tim Thomas III, who graduated with an AS degree in Aquaculture. Tim is a third generation commercial fisherman from Lakeland where his family owns Thomas Seafood. He’s been working since last summer for Donald Drawdy at Imperial Tropical Fish Farm, Lakeland. Tim did internships at Richloam State Fish Hatchery and Imperial Tropical Fish Farm.

Joe Nadolny, Manager of Fish World in Tampa, Jerry Kust, formerly with the US Air Force and Segrest Farms, Chris Kranntner, and Krista Reep of Spring Hills, also graduated with HCC’s first College Credit Certificate (CCC) in Aquaculture Technology.

This summer brought several new events and programs to HCC. For the first time, we will host a record number of nine interns in the Aquaculture Program. They will be assigned to VW Tropical Fish in Lakeland, Niemow’s Tropicals, Incin Gibson-ton, Sea Critters in Dover, Lowery Park Zoo in Tampa and the Port Manatee State Fish Hatchery.

HCC’s Aquaculture Program recently became partners with the National Science Foundation’s Marine Advanced Technology Education (MATE) Center at Monterey Peninsula College in Monterey, California.

As a result of this partnership Dr. Bill Falls has been selected to attend a two-week seminar at MATE in July entitled Introduction to Marine Submersibles. Also, HCC now has an independent contract from MATE to survey zoos and aquariums in the American Zoo and Aquarium Association (AZA) to define job skills required for a Public Aquarist.

Seven students are working on this project which will be completed in August.

It’s anticipated that both HCC and MATE will continue to benefit from their collaborative relationship and linked websites.

Dr. Bill Falls
813/253-7881

* * *

The Florida Aquarist
Common duckweed is a small, floating plant that can totally obscure sunlight. It most often occurs in small lakes and ponds where the water is alkaline, hardwater, or eutrophic.

If you see a pond covered with this stuff it often means the water is getting too much phosphorous, magnesium, nitrogen, sodium, or potassium. These conditions are often the result of human influences.

Duckweed however is no invader to Florida, but a widespread aquatic plant found almost world-wide. It likely earned its name because of the fact that visiting migratory ducks are fond of eating it. Though native to Florida, duckweed becomes a problem when it colonizes an entire pond surface and hinders light from reaching any other aquatic growth below it. A population of duckweed can double every few weeks, so controlling it can be a real problem.

Goldfish and grass carp love to feed on duckweed, but they can only eat so much—very often they can’t catch up with a fast-growing population of this floating weed. It takes a lot of goldfish to control vegetation like this, and predators constantly feed on the goldfish. Throwing grass carp into a pond means they will eat anything green, not just the duckweed.

Grass carp are practically insatiable, but a thick mat of duckweed requires at least 50 grass carp per acre of water to control it. Even though carp can eat their body weight daily in vegetation, they still can’t keep ahead of the weed’s growth curve—that is how fast duckweed can grow! Another problem with heavy duckweed is that little oxygen exists in the water column below, making it difficult to support all but the hardiest forms of fish life.

Two recommended herbicides that can bring duckweed under control is Sonar and Reward. Neither are restricted and do not require an applicator’s license. They’re sold by agriculture supply stores. The pond owner can spread an application, and then later after the recommended safe period, add some goldfish or grass carp when the duckweed count is still fairly low—then the fish can jump ahead of the weed’s daily growth rate.

So, if your pond is coated with countless, tiny leaves of duckweed, treating it in a timely and reasonable fashion will restore it to a more normal appearance.

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