

Maine Department of  
Inland Fisheries & Wildlife



Report Back to the 129<sup>th</sup>  
Joint Standing Committee on Inland Fisheries & Wildlife

**An Act to Require Biodegradable Hooks and Lures for Freshwater Fishing**

January 27, 2020

**Presented by Francis Brautigam, Director of Fisheries & Hatcheries**

## Executive Summary

This report was prepared by the Maine Department of Inland Fisheries & Wildlife, at the request of the 129<sup>th</sup> Joint Standing Committee on Inland Fisheries & Wildlife in support of LD 695, An Act to Require Biodegradable Hooks and Lures for Freshwater Fishing. LD 695 was carried over pending a stakeholder review of the proposed legislation.

In a May 28, 2019 Letter from the Joint Standing Committee the MDIFW received the following guidance in support of a public stakeholder process, with an expected report back by January 2020:

- *Focus discussions on soft plastic lures present in inland waters and known to be consumed by freshwater fish, as opposed to hard plastic lures, flies, and other non-plastic lures that may contain soft and hard plastic components;*
- *Identify existing and new nonregulatory strategies to reduce the presence of soft plastic lures and nonbiodegradable hooks in the environment;*
- *Review and discuss any strategies, both regulatory and nonregulatory, other states have implemented to address concerns with soft plastic lures and non-biodegradable hooks;*
- *Assess the potential impacts, both positive and negative, of legislation that would reduce or restrict the use of soft-plastic lures and nonbiodegradable hooks to address known health impacts; and*
- *In preparing for stakeholder discussions, the Committee recommends that the Department:*
  - *Conduct a literature review on soft plastic lures and non-biodegradable hooks in order to update available information on fish health effects and resource management implications; and*
  - *Summarize the Department's fish stomach data to assess the presence and distribution of soft plastic lures and non-biodegradable hooks in Maine.*

Participating stakeholders included representation from the following perspectives: Maine Professional Guides Association, MDIFW biological and enforcement staff, 7 Lakes Alliance, Maine Lakes Society, Maine Audubon, Maine BASS Nation, American Sportfishing Association, environmental lobbyist, and the Secretary of State.

Four stakeholder meetings were convened with consensus support for summary findings and recommendations, which favored a predominantly nonregulatory approach as the most appropriate and meaningful direction to reduce soft plastic lures in Maine waters at this time.

The discovery of soft plastic lures (herein SPLs) in the stomachs of fish by anglers cleaning their catch has prompted many inquiries to the Department over the years. Concerns regarding the presence of this unnatural product in Maine waters and potential fish health and other environmental concerns prompted LD 695.

A literature review was conducted to update information compiled in 2013, in response to similar legislation (**L.D. 42**), to better understand the effects of SPL and nonbiodegradable hook consumption by fish. As in 2013, no literature regarding hook metal type and health effects on freshwater fish was

located. Three additional relevant research investigations were identified regarding SPLs were identified and are collectively summarized as follows:

Sanft Study - bass either regurgitate or pass the SPLs within nine days and few SPLs occurred in bass stomachs sampled in reservoirs. Consumption of SPLs branded as biodegradable resulted in bass feeding on natural baits at a lower rate, suggesting biodegradable baits may have adversely impacted feeding behaviors of bass.

Raison Study – Documented SPL deposition rates of 128 SPLs per mile of shoreline in an Ontario Lake. Eight different SPLs were immersed in water for two years and found to swell, with little evidence of decomposition. Lake trout and smallmouth bass stomachs were sampled and few ingested SPLs (2.2 and 3.4 %, respectively) were found.

Skaggs essay – represented a call to action and relies on findings and perspectives offered by other authors to encourage better data on SPL ingestion rates and individual, as well as population, effects of SPL ingestion.

The 2009 Danner investigation (Appendix B) remains the most relevant published study examining the relationship between the consumption of SPLs and fish health. This short-term investigation suggests potential adverse fish health effects.

SPLs were first detected by Maine fisheries biologists in stomachs around the 1970's. SPLs and bass fishing are almost synonymous and the popularity of both has increased over the last 20 years. As of 2015, bass are rated by anglers as the second most preferred sportfish in Maine (next to brook trout).

The MDIFW has sampled more than 26,000 fish stomachs from a variety of sport fish collected from Maine's inland waters. A broad overview of the Department's fish stomach data indicates SPLs are generally consumed by sport fish at a very low rate (averaging <1% to 6% by management region) in Maine waters and are more prevalent in waters supporting bass fisheries. Limited available information from Raison<sup>1</sup> and the Department<sup>2</sup> suggests SPLs do not decompose for years and have the potential to accumulate over time.

Available information indicates SPLs also occur in stomachs of fish eating birds, although at an equally low rate. Necropsies performed on fish eating birds containing SPLs suggest that SPL ingestion does not result in gastric problems (including intestinal obstruction) and was not the cause of mortality in specimens examined.

The Department conducted a national review of state fishing regulations to determine if states have adopted special regulations to address concerns relating to non-biodegradable SPLs and hooks. Existing state fishing regulations restricted the number of hooks, use of barbs, and the gap width of hooks, but no restrictions appear to have been adopted to address concerns with the composition of the hook. There are no state bans on SPLs or nonbiodegradable soft plastic baits. Oregon includes SPLs under

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<sup>1</sup> Raison, T. **Exploring the Potential Effects of Lost or Discarded Soft Plastic Fishing Lures on Fish and the Environment.** Water Air Soil Pollut (2014) 225:1869

<sup>2</sup> Danner, Russell. **Voluntary Ingestion of Soft Plastic Fishing Lures Affects Brook Trout Growth in the Laboratory** North American Journal of Fisheries Management 29:352–360, 2009.

their definition of bait, New Hampshire similarly includes certain types of ingestible products (power baits) as bait, West Virginia precludes certain ingestible lures (power bait, gulp) in catch and release waters, Nevada excludes certain types of SPLs from their definition of artificial lures. These types of restrictions appear to be related to reducing potential hooking injury and mortality when fishing with passive methods that result in deep ingestion.

Available scientific information limits understanding regarding fish health and environmental effects of SPLs in Maine waters, but the science is emerging. Research on plastics in our oceans is receiving considerable attention at this time.

Industry marketing suggests biodegradable SPL alternatives exist; however, a lack of accountability and established industry standards for products marketed as “biodegradable” fail to inspire consumer confidence that these products offer benefits for the environment or the fish.

Whether or not SPLs are bad for fish or the environment is somewhat irrelevant because their occurrence in Maine waters is not natural and inconsistent with the intent of Maine’s Litter Control Act (Title 17, Section 2263) to keep Maine lands and waters clean.

There are two angler behaviors that contribute to SPL presence in Maine waters; deliberate disposal of used SPLs that no longer fish properly and the inadvertent loss while fishing when the lure is either pulled off the hook by a fish or the SPL is fished to a point where it is no longer retained by the hook. Each behavior was considered in reviewing potential strategies and effective solutions to reduce SPLs in Maine waters.

The Stakeholder Workgroup supported advancement of 6 recommendations to the joint standing committee for further consideration. Recommendations are summarized below:

- 1) Add language in Title 12 to emphasize and clarify that SPLs and other fishing tackle are litter under Maine’s Litter Control Act (Title 17), which is broadly written. Explore increases in penalties and agency license revocation for repeat offenders littering in waters of the State. Justification for these actions would be related to the inability to recover litter that sinks and accumulates over time.
- 2) Increased public awareness regarding proper disposal of used SPLs remains an important action to reduce SPLs in Maine waters. In addition to proposed new investments by “Keep America Fishing” (and its national partners in promoting the national “Pledge to Pitch It” campaign), the MDIFW will develop coordinated outreach in a number of platforms that may include Maine Open Water and Ice Fishing Law Book, the Maine Fishing Guide, and social media outlets to support “Pledge to Pitch it”. Maine B.A.S.S. Nation will work with local clubs and MDIFW to adopt SPL collection containers at several State boat launches.
- 3) Increased public awareness regarding proper use of SPL retention devices is necessary to influence angler behavior and associated SPL loss while fishing. The American Sportfishing Association (ASA) in partnership with manufacturers is willing to develop and manage an educational and awareness campaign program focused on the effective use of SPL retention devices and why these devices are important.

- 4) Industry should adopt standards for products that can be marketed as “environmentally friendly” that can be uniformly applied to manufacturers of SPLs to create accountability and encourage the development of more environmentally responsible products desired by some anglers and state agencies concerned about potential impacts to fish. Attainment of more rigorous “biodegradable” standards developed by EPA could be explored when future advances in technology support development.
- 5) The MDIFW will encourage opportunities for research partners (i.e., Maine’s universities) to investigate potential environmental impacts from SPLs, particularly if ongoing and planned outreach and educational efforts are not effective in reducing SPL presence in Maine lakes.
- 6) The MDIFW does not recommend any actions to further regulate materials used to manufacture fish hooks. There is no compelling evidence in Maine regarding the extent that more expensive hooks made using different coatings or materials are being used by anglers, but based on extensive sampling, monitoring, and management of fish populations by MDIFW fisheries biologists there is no field data to suggest their use is adversely affecting the health of fish populations.

## Introduction

At the request of the Maine Department of Inland Fisheries & Wildlife, the 129<sup>th</sup> Joint Standing Committee on Inland Fisheries & Wildlife (letter dated May 28, 2019), carried over LD 695, An Act to Require Biodegradable Hooks and Lures for Freshwater Fishing. This action provided the Department with time to convene stakeholder discussions to consider both regulatory and nonregulatory options that meet the intent of the bill, as well as alternatives to a ban on all nonbiodegradable lures and hooks. In the May 28<sup>th</sup> letter, the Joint Standing Committee also provided the following agency guidance in support of the stakeholder process and expected a report back by January 2020:

- *Focus discussions on soft plastic lures present in inland waters and known to be consumed by freshwater fish, as opposed to hard plastic lures, flies, and other non-plastic lures that may contain soft and hard plastic components;*
- *Identify existing and new nonregulatory strategies to reduce the presence of soft plastic lures and nonbiodegradable hooks in the environment;*
- *Review and discuss any strategies, both regulatory and nonregulatory, other states have implemented to address concerns with soft plastic lures and non-biodegradable hooks;*
- *Assess the potential impacts, both positive and negative, of legislation that would reduce or restrict the use of soft-plastic lures and nonbiodegradable hooks to address known health impacts; and*
- *In preparing for stakeholder discussions, the Committee recommends that the Department:*
  - o *Conduct a literature review on soft plastic lures and non-biodegradable hooks in order to update available information on fish health effects and resource management implications; and*
  - o *Summarize the Department's fish stomach data to assess the presence and distribution of soft plastic lures and non-biodegradable hooks in Maine.*

The Department formed a broad stakeholder committee comprised of the following members and affiliations:

Chad Tokowicz, American Sportfishing Association

John Peterson, Maine Professional Guides

Mark Desjardin, Maine BASS Nation

Eliza Donoghue, Maine Audubon

Peter Kallin, 7 Lakes Alliance / Maine Lakes Society

Ed Pineau, Lobbyist

Harry Wiegman, MDIFW District Game Warden

Matt Dunlap, Secretary of State

Jake Mitchell, American Sportfishing Association

Joe Overlock, MDIFW Fisheries Management Supervisor

Francis Brautigam, MDIFW Director of Fisheries & Hatcheries

Four stakeholder meetings were convened. Meeting agendas and summaries are included in **Appendix A** of this report.

### **Summary of Stakeholder Work Group Discussions**

***Focus discussions on soft plastic lures present in inland waters and known to be consumed by freshwater fish, as opposed to hard plastic lures, flies, and other non-plastic lures that may contain soft and hard plastic components.***

The discovery of soft plastic lures (herein SPLs) in the stomachs of fish by anglers cleaning their catch has prompted many inquiries to the Department over the years. Although LD 695 as written broadly captures all lures constructed of plastic, including hard plastics and plastic components, it is SPLs that are the subject of Department inquiries from the angling community and the focus of testimony and the work session discussions. Therefore, the stakeholder work group discussions focused on SPLs that are known to be present in inland waters and known to be ingested by freshwater fish in Maine.

***Conduct a literature review on soft plastic lures and non-biodegradable hooks in order to update available information on fish health effects and resource management implications.***

General sentiment expressed by the angling public is rooted in concern that consumption of SPLs plastics may adversely impact fish health and the viability of Maine sport fisheries. A literature review was conducted to update information compiled in 2013, in response to similar legislation (**L.D. 42 - An Act To Prohibit the Use of Rubber Lures for Fishing / LD 43 – An Act to ban the Use of Nonbiodegradable Hooks**), and a resolve directing the Department, in part, to conduct a literature review to better understand the effects of SPL consumption on fish. In a 2014 department report<sup>3</sup> to the 126 Joint Standing Committee on Inland Fisheries & Wildlife, the 2009 Danner investigation (Appendix B) was identified as the only relevant published study examining the relationship between the consumption of soft plastic lures and fish health. Findings included observed weight loss and anorexic behaviors for fish feeding on soft plastic lures. In 2013 the department was unable to locate any relevant literature on the effects of nonbiodegradable hooks on freshwater fish. Steel hooks typically oxidize and degrade in freshwater, where pH and the oxygen concentration of water being key factors influencing oxidization and degradation of steel hooks.

An updated literature review conducted in 2019 revealed three additional relevant papers relating SPLs to fish health. Furthermore, there is a growing body of literature on various plastics in the marine environment, which is not discussed in this report. As in 2013, no literature regarding hook metal type and health effects on freshwater fish was located. One paper is referenced in this report, but because the work was done with marine fish it may have limited application in freshwater environments. Identified new research since 2013 is briefly discussed below.

Sanft in 2018 (Appendix B) studied the effect of ingested SPLs in Largemouth bass and documented that largemouth bass that consumed SPLs would either regurgitate or pass the lures within nine days. In

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<sup>3</sup> Degraff, Dana. **MDIFW Report back to Legislature on Chapter 18 Resolve, To Require the Department of Inland Fisheries and Wildlife To Conduct a Study on the Use of Rubber lures and Nondegradable Fishing hooks and Lures.** January 28, 2014. 126th Legislature – Second Session.

addition, less than 1% of bass sampled in reservoirs were found with SPLs in their stomachs. Interestingly, the bass that initially fed on SPLs marketed as biodegradable actually fed on natural baits at a lower rate than those who ingested SPLs not branded as biodegradable, suggesting biodegradable baits may have adversely impacted feeding behavior of bass.

Raison (Appendix B) in 2014 investigated the potential effects of lost or discarded SPLs on fish and the environment, acknowledging that as the popularity of soft plastic baits has increased, so has their presence in fish and the environment. Snorkel surveys in a lake in Ontario, Canada documented SPL deposition as high as 80 per km (Approximately 128/mile) of shoreline per year. Eight different SPLs were immersed in water for 2 years and found to swell, with little evidence of decomposition. Lake trout and smallmouth bass stomachs were sampled, and few ingested SPL were found (2.2 and 3.4 %, respectively). However, interestingly anglers reported higher rates of SPLs in their harvested catch (17.9% in lake trout). This author recommended outreach to educate anglers on how to rig their soft plastic lures to reduce inadvertent losses, promote responsible disposal of used lures, and encourage industry to manufacture lures less likely to be lost.

A third paper by Skaggs (Appendix B) is not a research study, but rather a call to action and relies on findings and perspectives offered by other authors, including those cited in this report (i.e., Danner and Raison) to encourage better data on SPL ingestion rates and individual, as well as population, effects of SPL ingestion.

Similar to 2013, no relevant research was uncovered regarding hook metal type and health effects on freshwater fish. Most studies focused on hook type (circle, J style, treble, etc.) rather than the composition of the hook. One marine study (McGrath, 2014 / Appendix B) did indicate that nickel plated steel hooks in a saltwater fish (mullaway) increased nickel levels in the blood and liver of fish.

***Summarize the Department's fish stomach data to assess the presence and distribution of soft plastic lures and non-biodegradable hooks in Maine.***

SPLs were first detected by Maine fisheries biologists in stomachs around the 1970's. SPLs and bass fishing are almost synonymous and the popularity of both has increased over the last 20 years. As of 2015 bass are rated by anglers as the second most preferred sportfish in Maine (next to brook trout).

The Department routinely samples inland fish populations throughout the state. When lethal fish samples are available, fish stomachs are removed to assess diet and prey availability. Over the last 20 years more than 26,000 fish stomachs have been examined from a variety of fish collected from Maine's inland waters. Course level information regarding the occurrence and distribution of SPLs in Maine fish by region of the state is summarized in Tables 1, 2, 3.

Table 1 provides a summary across all waters sampled statewide, where the highest percentage of SPLs in fish stomachs occur in southern and central Maine; in approximately 5% of the fish sampled. SPLs were found in less than 1% of the fish examined in the rest of the state (4 other regions with stomach data), for a statewide average of 2% occurrence.

**Table 1. Percentage of fish containing SPLs in waters with and without bass combined.**

| <b>All Waters</b> |                       |                      |           |
|-------------------|-----------------------|----------------------|-----------|
| Region            | # of Stomachs Sampled | # of Stomachs w/SPLs | % w/SPLs  |
| A                 | 4925                  | 245                  | 5%        |
| B                 | 2416                  | 124                  | 5%        |
| C                 | 853                   | 3                    | <1%       |
| D                 | 5676                  | 11                   | <1%       |
| E                 | 11486                 | 15                   | <1%       |
| F                 | 1451                  | 12                   | <1%       |
| <b>TOTAL</b>      | <b>26807</b>          | <b>410</b>           | <b>2%</b> |

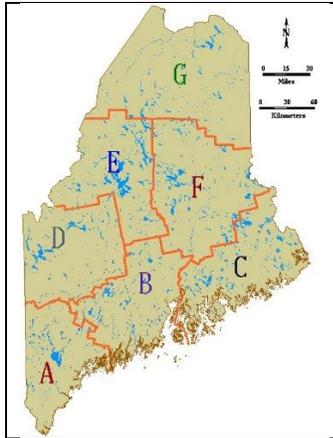


Table 2 provides a summary of waters sampled that do not support populations of bass. Few soft plastic lures (less than 1%) were detected in fish from waters that do not support bass, evidence that SPLs are fished less commonly in waters managed exclusively for trout and salmon.

**Table 2. Percentage of fish containing SPLs in waters without bass**

| <b>All Waters</b> |                       |                      |               |
|-------------------|-----------------------|----------------------|---------------|
| Region            | # of Stomachs Sampled | # of Stomachs w/SPLs | % w/SPLs      |
| A                 | 1115                  | 1                    | <1%           |
| B                 | 0                     | 0                    | 0%            |
| C                 | 372                   | 1                    | <1%           |
| D                 | 5033                  | 7                    | <1%           |
| E                 | 1236                  | 1                    | <1%           |
| F                 | 1078                  | 0                    | 0%            |
| <b>TOTAL</b>      | <b>8834</b>           | <b>10</b>            | <b>&lt;1%</b> |

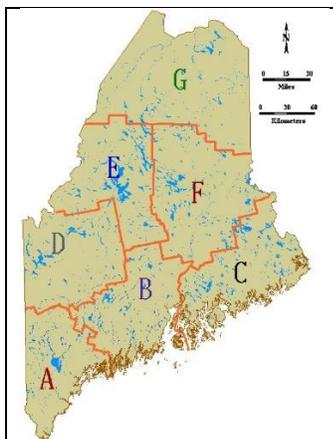
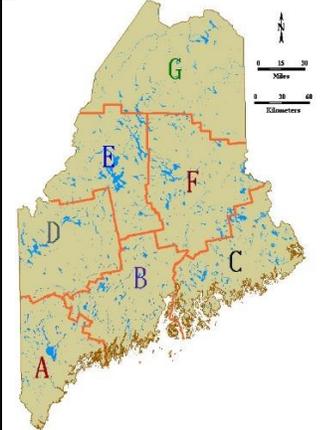


Table 3 summarizes fish stomach data from waters that also support bass fisheries. Unlike other regions of the state, most waters in southern and central Maine support populations of bass, and not surprisingly represent the highest occurrence of soft plastic lures found in sampled fish, at 6% and 5%, respectively.

**Table 3. Percentage of fish containing SPLs in waters with bass**

| Region       | Waters with Bass      |                      |           |
|--------------|-----------------------|----------------------|-----------|
|              | # of Stomachs Sampled | # of Stomachs w/SPLs | % w/SPLs  |
| A            | 3810                  | 244                  | 6%        |
| B            | 2416                  | 124                  | 5%        |
| C            | 481                   | 2                    | <1%       |
| D            | 643                   | 4                    | <1%       |
| E            | 10250                 | 14                   | <1%       |
| F            | 373                   | 12                   | 3%        |
| <b>TOTAL</b> | <b>17973</b>          | <b>400</b>           | <b>2%</b> |



A broad overview of the Department’s fish stomach data indicates SPLs are generally consumed by sport fish at a very low rate in Maine waters. Limited available information from Raison<sup>4</sup> and the Department<sup>5</sup> suggests SPLs do not decompose for years and have the potential to accumulate over time if not consumed. Although SPLs are known to be consumed by fish, questions regarding their occurrence in wildlife was also raised during stakeholder work group deliberations. According to Avian Haven (a local wildlife rehabilitator) they rarely see SPLs in stomachs of birds associated with water. Mark Pokras at Tufts University performs necropsies on fish eating birds from area states and he estimates SPLs occur in about 5% of the birds examined. Interestingly, this rate of ingestion appears to be consistent with the rate of SPLs found in fish that reside in southern and central Maine. Mr. Pokras also indicated that he has not seen any gastric problems from SPL ingestion in birds, including gastro-intestinal obstruction.

***Review and discuss any strategies, both regulatory and nonregulatory, other states have implemented to address concerns with soft plastic lures and non-biodegradable hooks***

The Department conducted a national review of state fishing regulations to determine if states have adopted special regulations to address any concerns relating to SPLs and hooks. A summary of this review is provided in Appendix D. In regard to hooks, existing state fishing regulations restricted the number of hooks, use of barbs, and the gap width of hooks, but no restrictions appear to have been adopted based on the composition of the hook. Although there are no state bans on SPLs or nonbiodegradable soft plastic baits, there were a few special regulations adopted pertaining to use of SPLs. For example, Oregon designates soft plastic lures as a “bait”, not a lure, in the same terminal tackle category that would also include baitfish and earth worms. New Hampshire also includes certain types of ingestible lures (power baits) in their definition of “bait”. West Virginia precludes use of ingestible lures like gulp and power bait in catch and release waters. Nevada has excluded “power baits and similar” (scented/flavored brand of soft plastic lures) in their definition of “artificial lures”. These

<sup>4</sup> Raison, T. **Exploring the Potential Effects of Lost or Discarded Soft Plastic Fishing Lures on Fish and the Environment.** *Water Air Soil Pollut* (2014) 225:1869

<sup>5</sup> Danner, Russell. **Voluntary Ingestion of Soft Plastic Fishing Lures Affects Brook Trout Growth in the Laboratory** *North American Journal of Fisheries Management* 29:352–360, 2009.

types of state restrictions appear to be related to reducing potential hooking injury and mortality when fishing with passive methods that result in deep ingestion.

***Identify existing and new nonregulatory strategies to reduce the presence of soft plastic lures and nonbiodegradable hooks in the environment***

Stakeholder work group discussions considered the following regulatory and nonregulatory strategies in the development of recommendations to the Joint Standing Committee.

Nonregulatory

- Advancement of SPL product development (stronger, biodegradable, etc.) & SPL retention technology (hooks, retainers, the lure) to reduce loss while fishing
- Adopt industry standards for “biodegradable” SPLs
- Detail existing/new “rebauling” programs and outreach
- Encourage additional research to assess potential fish health & environmental impacts

Regulatory

- Require industry to list ingredients for “biodegradable” SPLs
- Restrict use of SPLs in most vulnerable populations
- Statewide ban on all SPLs
- Require use of SPL retention devices
- Define SPLs as “bait”; no use of SPLs where ALO in effect
- Require bass tournament reporting of SPL losses to monitor loss rates over time
- Review Maine’s Litter Control Act in Title 17 to explore statutory revisions, including clarifications and penalties for deliberate littering; name SPLs within existing definition of “litter”

Several considerations influenced the direction of the stakeholder work group. For example, work group perspectives regarding the aforementioned strategies generally reflect an appreciation that available scientific information limits understanding regarding fish health and environmental effects of SPLs in Maine waters. Even though some additional research has been undertaken in the scientific community since (and likely because of) Maine’s 2013 legislation exploring a ban on nonbiodegradable fishing lures, there remains a significant data gap in understanding potential environmental impacts. Furthermore, while SPLs are certainly present in some Maine waters, their occurrence in freshwater fish appears to be relatively low (< 6% in fish sample by MDIFW). Furthermore, distribution and particularly

abundance of SPLs in Maine waters appears to be influenced by region of the state and the occurrence of black bass. Reflecting on the somewhat recent ban on lead jigs and sinkers (Title 12, Section 12663), this legislation was supported by a compelling body of scientifically peer reviewed studies regarding the environmental effects of lead on wildlife and people, consumption of lead and mortality of wildlife, widespread use of lead sinkers by anglers, and the existing availability of nonlead alternatives to support an ambitious legislative ban. The same compelling body of information does not exist for SPLs; the science is still emerging. Furthermore, industry has not provided broadly accepted biodegradable alternatives to replace conventional SPLs. Industry marketing suggests alternatives do exist; however, a lack of accountability and established industry standards for products marketed as “biodegradable” fail to inspire consumer confidence that these products offer benefits for the environment or the fish. Furthermore, whether or not SPLs are bad for fish or the environment is somewhat irrelevant because their occurrence in Maine waters is not natural and inconsistent with the intent of Maine’s Litter Control Act (Title 17, Section 2263) to keep Maine lands and waters clean.

The stakeholder work group recognized there are two angler behaviors that contribute to SPL presence in Maine waters; deliberate disposal of used SPLs that no longer fish properly and the inadvertent loss while fishing when the lure is either pulled off the hook by a fish or the SPL is fished to a point where it is no longer retained by the hook (and should have been replaced and properly disposed of). Each behavior was considered in reviewing potential strategies and effective solutions to reduce SPLs in Maine waters. A brief discussion of both regulatory and nonregulatory strategies discussed is offered below; however, in recognition of all the aforementioned considerations the stakeholder workgroup favored a nonregulatory approach as the most appropriate and meaningful direction to reduce SPLs in Maine waters at this time.

Advancement of SPL product development (stronger, biodegradable, etc.) & SPL retention technology (hooks, retainers, the lure) to reduce loss while fishing. The American Sportfishing Association (ASA) reached out to some SPL industry representatives to explore areas of ongoing research and development. At least one manufacturer (Zman) is producing a much tougher and more elastic lure that is advertised as more durable, naturally buoyant, and is reported to be nontoxic and does not contain Polyvinyl chloride (PVC), Plastisol, or Phthalates. Increased durability may offer improved retention on the hook and fewer lost lures. There remains some industry driven interest in developing biodegradable lures. For example, Pradco brand has been working on a research project with Arizona State University to explore the viability of SPLs that biodegrade. Biodegradable technologies are reportedly gaining momentum due to the rising angler desire and environmental awareness. MHG claims to have produced a “hard-plastic lure” that is “100% certified biodegradable” by Biodegradable Products Institute, which apparently indicates the lure will be decompose to its elemental state, releasing carbon, hydrogen and oxygen) in 8 to 12 weeks.

There is a great variety of different sizes and types of SPLs on the market along with an equal diversity of retention devices and methods that are sold to retain SPLs on the hook to reduce inadvertent losses while fishing. Because of the great variety of SPLs that are available, it is likely that the angling public is confused by the options and when to use them. The popularity of bass fishing is growing in Maine, and so is the likelihood for increases in future use of soft plastic lures. While there is some existing consumer information on the proper use of SPL retention devices, this information may benefit from an improved, coordinated delivery system. Possible outreach partnerships and initiatives were explored.

Adopt industry standards for “biodegradable” SPLs. Currently, there does not appear to be any accepted SPL industry standards for products marketed as “biodegradable”. Industry typically markets to consumers interested in environmentally friendly products by portraying products as “biodegradable”, but there appears to be limited accountability regarding decomposition in natural waters and the toxicity of any decomposition byproducts. The American Society for Testing and Materials publishes industry standards for a number of parameters, including a standard test method for determining aerobic biodegradation of plastic materials in the marine environment. EPA defines a biodegradable product as “the ability of a substance to be broken down physically and/or chemically by microorganisms”. Biodegradable Products Institute also offers certification and standards for performance. One manufacturer (Bio Baits) produces a water-soluble SPL; and while it is reported to degrade, the product contains a small amount of PVC (>10%), and apparently under EPA’s definition this product is disqualified as being considered as biodegradable. Even so, standardization and establishment of a benchmark within industry in the use of the term “biodegradable” or “environmentally friendly”, or some other reference term would enable manufacturers to meet an attainable standard either set by industry or other organizations with established performance criteria. This would offer other manufacturers the ability to meet and exceed those standards to better meet consumer expectations and better address environmental concerns.

Detail existing/new “rebaiting” programs and outreach. The national “Pledge to Pitch-It” campaign program (which was developed in response to Maine’s 2013 proposed legislation to ban nonbiodegradable lures) is alive and well and is being updated to include additional corporate sponsors, will include three major national tournament bass fishing organizations, and the use of well-known spokespeople to promote the program. This national campaign is supported by several national and international fishing organizations that partner with Keep America Fishing (a national advocacy group for anglers). The campaign boasts the clever tagline “*Release fish not lures*”. The campaign is outlined on the following link, <https://www.pledgetopitchit.org/sign-the-pledge-to-pitch-it/>, and focuses on promoting recycling and proper disposal of SPLs, including signing a pledge of commitment in recognition that clean waters free of litter provide a healthier environment for our fish.

While no other states appear to have directed the same level of attention to SPLs in the environment as Maine, many others now have SPL recycling programs. Maine has led the way in this regard and many states (including Maine) have created a competition between clubs with prizes awarded for the most weight of SPLs turned in at the end of a season. In addition, SPL recycle containers are maintained on many southern Maine waters by local bass clubs to increase awareness and to offer environmentally friendly disposal options.

Overall, there has been a considerable positive response from manufacturers, fishing advocacy groups, and the organized bass fishing community to increase awareness and reduce the presence of SPLs in waters throughout the country, including Maine, since the proposed ban on nonbiodegradable lures in 2013. Operating under the premise that clean waters provide good habitat for our fishery resources is a program stance we can all get behind.

Encourage additional research to assess potential fish health & environmental impacts. The stakeholder work group certainly recognized the need for additional research on the environmental effects of SPLs to better understand any environmental consequences from SPLs in Maine waters. For example; the compounds used in manufacturing SPLs, the health effects of SPL ingestion by fish, and the compounds

liberated during SPL decomposition and associated environmental effects were identified. Additional research will be particularly meaningful for future advocacy of regulatory strategies in the event SPL losses and intentional littering remains a future concern.

Require industry to list ingredients for “biodegradable” SPLs. The development of an industry standard would likely be more meaningful than listing ingredients, which could not only be proprietary, but may offer limited value to all but the most knowledgeable consumers.

Restrict use of SPLs in most vulnerable populations and/or define SPL as “bait”, which would preclude their use where angler may only fish with artificial lures. State Heritage Fish Waters are lakes and ponds that support wild populations of native brook trout and Arctic charr that have no history or no recent history (within 25 years) of stocking. Most would agree that these waters represent some of Maine’s most important, and perhaps most vulnerable fishery resources. At the time of this report there are 582 State Heritage Fish Waters, most of which are restricted to fishing with artificial lures or flies, and none may be fished with live fish as bait. To prohibit the use of SPLs in 582 State Heritage Fish waters would result in the unwelcome addition of 582 new special regulations to the lawbook, which is inconsistent with ongoing lawbook simplification efforts undertaken by MDIFW. Additionally, SPLs appear to be rarely used in these waters (due to general lack of black bass). This strategy might be viewed differently if the use of SPLs in these waters were to increase and/or environmental threats were better understood.

With advances in fishing technology MDIFW must also reevaluate existing terminal tackle definitions to ensure they reflect new products and any associated management concerns. In more recent years there has been a growing concern from MDIFW staff related to deep hooking injury and mortality using newer lifelike and chemically scented SPLs and putties in waters restricted to artificial lures only. Unlike traditional artificial lures made from metal, hard plastic, and wood, newer SPLs look, feel, smell, and “taste” like natural prey. Unlike traditional lures, these products are often fished passively and are therefore ingested by fish, causing deep hooking injuries which are more likely to be lethal. Artificial lure restrictions are applied to some waters to reduce hooking injury and mortality where wild populations are less robust. However, artificial lure restrictions are also applied to reduce hooking mortality of stocked fish when seasonal harvest restrictions are in place. As an example, this provision limits fish mortalities during the fall following stocking to maintain acceptable winter angler catch rates. To further illustrate this example, if SPLs were defined as “bait”, anglers would no longer be able to fish with SPLs from October through December in the southern region of Maine. This includes approximately 482 waters that are primarily managed for coldwater sportfish, but (many support bass as well). This strategy was considered in the context of exploring opportunities to impose limited restrictions on the use of SPLs to facilitate increased public awareness regarding SPL concerns that prompted LD 695. Using regulatory restrictions to create public awareness, considering the unintended effects on MDIFW efforts to simplify Maine’s fishing law book and angler use opportunities do not appear to offer the most meaningful solution at this time.

Statewide ban on all SPLs. Without standards or compelling research to confirm or deny product claims of biodegradability, the availability of SPLs that meet agency and legislative expectations under LD 695 do not appear to exist. Therefore, the work group considered the alternative of banning use of all SPLs, regardless of their composition or claims of environmental compatibility. This regulatory action was viewed as overly restrictive and not well justified at this time.

Require use of SPL retention devices. The use of SPL retention devices and their value in reducing unintentional losses of SPLs while fishing received considerable discussion from work group stakeholders. However, instead of focusing on regulatory merit, the discussion favored an increase in outreach and education to encourage and promote the use of SPL retention devices as a meaningful next step to reduce SPL litter in Maine's waterways. A lack of awareness regarding the use of retention devices and concerns related to the loss of soft plastics in Maine waters is perhaps the most important need to address moving forward. Requiring use of SPL retention devices (which are readily available on the market) remains a viable future option in the event SPLs remain a future concern.

Require bass tournament reporting of SPL losses to monitor loss rates over time. This strategy was explored as a means to more easily assess change in SPL loss rate over time, but it was recognized that the inherent challenges to accurately capture desired information was limiting. Instead of this direct measure, anglers could also be surveyed to gauge awareness and effectiveness of strategies implemented to reduce the occurrence of SPLs in Maine waters.

Increase penalties for deliberate littering; name SPLs within existing definition of "litter". Beyond any potential fish health implications, the presence of SPLs, as well as other fishing gear (i.e., fishing line, worm containers, etc.) in Maine waters constitutes litter under Title 17, Section 2263 (Appendix C), and represents litter that is not easily recoverable, unlike littering on land. Intentional violators are subject to fines of no less than \$100 and no more than \$500 for first time offenders (Appendix C). The Maine Litter Control Act is broadly written and while not specific to fishing tackle, the Maine Warden Service has issued violations for deliberate disposal of SPLs. However, effective enforcement can be challenging because litter thrown overboard that sinks is not readily recoverable as evidence.

The Litter Control Act was adopted to reduce littering on land and in waters of the state. This statute was examined to determine if it could be emphasized and clarified in Title 12 to improve compliance for deliberate littering of SPLs. Increasing fines, including license revocation may be options but could be challenging given the limited science regarding environmental impacts from SPLs in Maine's waters. In considering the value of increased penalties and license revocation, the threat from SPLs would need to represent a greater concern than other forms of litter. Perhaps one justification that could be considered is that any litter deposited in waters of the state is not easily recoverable, unlike litter on land. Alternatively, perhaps the language in the Litter Control Act could be revised to create a stronger connection to Title 12, (MDIFW's statute of jurisdiction) and/or offer more clarification to increase awareness of SPL concerns in the litter law.

***Assess the potential impacts, both positive and negative, of legislation that would reduce or restrict the use of soft-plastic lures and nonbiodegradable hooks to address known health impacts***

In 2013, LD 42 was proposed to ban nonbiodegradable soft plastic lures and hooks. The bill prompted a resolve directing MDIFW to study issues associated with the proposed legislation and report back to the Joint Standing Committee on Inland Fisheries and Wildlife. MDIFW reported that the sale and use of only biodegradable SPLs and hooks was not a viable option, considering there was no industry or other known standards for biodegradable products, even those marketed as biodegradable that would support effective agency implementation. In the absence of an established standard, anglers would not know what products were legal for use and compliance/enforcement would be unreasonably challenging. At that time MDIFW did not recommend any legislation solutions to address SPLs in Maine waters. The aforementioned challenges remain a concern with LD 695, which would be unreasonably

challenging to implement and achieve compliance. If concerns regarding the use of existing SPLs are sufficiently great, a ban on all SPLs, while unpopular would offer improved compliance and enforcement and eliminate vagaries regarding what is or is not biodegradable. Even a complete ban on all SPLs would require some language development to capture the broad spectrum of products that may be considered SPLs. In lieu of a complete ban, MDIFW and the stakeholder Work Group offer recommendations that include legislative and nonregulatory strategies for consideration in meeting the intent of LD 695. The following recommendations are consistent with limited available information regarding potential environmental impacts and their limited occurrence in Maine waters.

#### **Recommendations for Consideration by the Joint Standing Committee on Inland Fisheries & Wildlife**

- 1) Add language in Title 12 to emphasize and clarify that SPLs and other fishing tackle (e.g., fishing line) are litter under Maine's Litter Control Act (Title 17), which is broadly written. While Warden Service is currently able to cite intentional violators who dispose of soft plastics in Maine waters, additional revisions would create increased emphasis and awareness of SPLs as litter when discarded in Maine waters. Another avenue for legislative action could include increasing penalties and considering agency license revocation for repeat offenders littering in waters of the State. Justification for this action would be related to the inability to recover litter that sinks and accumulates. MDIFW is not aware of hooks being deliberately tossed in Maine waters or being deserving of similar consideration regarding Maine's Litter Control Act (although hooks could be listed as another example of litter under Title 12).
- 2) The 2013 legislation to ban nonbiodegradable SPLs and hooks did create a wakeup call to the lure manufacturing industry and the angling public. That awareness prompted a national campaign and outreach initiatives directed at discouraging past practices of disposal overboard. Increased public awareness regarding proper disposal of used SPLs remains an important action to reduce their occurrence in Maine waters. In addition to proposed new investments by "Keep America Fishing" (and its national partners in promoting the national "Pledge to Pitch It" campaign), MDIFW will develop coordinated outreach in a number of platforms that may include Maine Open Water and Ice Fishing Law book, the Maine Fishing Guide, and social media outlets to support "Pledge to Pitch it". Maine B.A.S.S. Nation will work with local clubs and MDIFW to adopt SPL collection containers at several State boat launches.
- 3) Increased public awareness regarding proper use of SPL retention devices is necessary to influence angler behavior and associated SPL loss while fishing. The American Sportfishing Association (ASA) in partnership with manufacturers is willing to develop and manage an educational and awareness campaign program focused on the effective use of SPL retention devices and why these devices are important. MDIFW would promote this campaign and associated messaging regarding proper use and disposal of SPLs. There may be additional outlets, including hosting of educational information on the [Secretary of State Kids' Page](#), and other websites managed by sporting clubs. This outreach campaign would include the development of materials for display at cooperating retail outlets, as well as providing information in digital form. Specific expectations for campaign development and marketing could be outlined in an MOU with ASA and should include:
  - a) "Fact sheet"(s) and videos on SPL retention methods (i.e., O-rings, bait keepers, adhesives, etc.), as well as selection and "how to" information, increased awareness why anglers should use retention devices and reduce SPL loss in Maine Waters;

- b) Distribution of sample SPL retention devices to retailers to encourage instruction of their use to customers;
  - c) Development of displays, signage, and pamphlets for distribution and use by retailers;
  - d) Commitments from industry Pro-staff to engage with the outreach campaign on social media and special events.
  - a) Existing discussed plans to update the “Pledge to Pitch It” campaign (managed by Keep America Fishing) to create awareness regarding disposal of SPLs could be used as a platform to promote use of SPL retention devices and include the following: Retention Device Materials Tool Kit – a collection of promotional materials that can be accessed by the public for easy download and shareability like, one-sheets, buck slips, social media posts, articles, etc.
  - b) Utilize high-profile anglers to help promote messaging using various outlets including PSAs, videos, social media, special events, etc.
- 4) Industry should adopt standards for products that can be marketed as more “environmentally friendly” that can be uniformly applied to manufacturers of SPLs to create accountability and encourage the development of more environmentally responsible products desired by some anglers and state agencies concerned about potential impacts to fish. Attainment of more rigorous “biodegradable” standards developed by EPA could be explored when future advances in technology support development.
- 5) MDIFW will encourage opportunities for research partners (i.e., Maine’s universities) to investigate potential environmental impacts from SPLs, particularly if ongoing and planned outreach and educational efforts are not effective in reducing SPL presence in Maine lakes.
- 6) MDIFW does not recommend any actions to further regulate materials used to manufacture fish hooks. Potential impacts from the use of SPLs are viewed as a higher public concern than the use of fish hooks made from a variety of metals and coatings that affect the rate a hook “rusts” or oxidizes. There is no evidence in Maine regarding the extent that more expensive hooks made using with different coatings or materials are being used by anglers, but based on extensive sampling, monitoring, and management of fish populations by MDIFW fisheries biologists there is no field data to suggest their use is having any effect on the MDIFW to manage healthy populations of fish. Perceived public concerns regarding the material used to manufacture hooks is not a commonly expressed public concern; unlike SPLs.

## **Appendix A: Work Group Meetings**

**Biodegradable Lures and Hook Work Group**

**Meeting Agenda & Summary**

**July 17, 2019**

Agenda

- I. Introduction/Background
  - i. Work group participants
  - ii. LD 695
  - iii. IFW testimony
  - iv. Public inquires
  - v. Address by Senator Davis (sponsor of LD 695)
  - vi. Prior legislation – January 2014 legislative report (scuba study, literature review, IFW stomach data review, test of “biodegradable”)
  
- II. Expectations from the Joint Standing Committee on Inland Fisheries & Wildlife (LD 695)
  - i. Focus on soft plastic lures consumed by fish
  - ii. Existing/new nonregulatory strategies to reduce SPL and nonbiodegradable hooks in the environment (manufacturers, conservation/angling groups, etc.)
  - iii. Regulatory/nonregulatory strategies used by other states to address SPL & nonbiodegradable hooks
    1. Review of Regulations in other states (pending)
  - iv. Potential impacts (positive/negative) of Maine legislation to reduce/restrict SPL & nonbiodegradable hooks to address fish health issues
    1. Fish health impacts
      - a. Fish stomach dataset...angler reports
      - b. Research – updated (since 2014) literature review
  
- III. Potential approaches to reduce SPL in Maine waters?

- i. Nonregulatory:
  - 1. Advancement of SPL product development (stronger, biodegradable, etc.) & SPL retention technology (hooks, retainers, the lure) to reduce loss while fishing
  - 2. Adopt industry standards for “biodegradable” SPL
  - 3. Detail existing/new “rebauling” programs and outreach
  - 4. Encourage additional research to assess potential fish health & environmental impacts
  - 5. Other?
- ii. Regulatory:
  - 1. Require industry to list ingredients for “biodegradable” SPL
  - 2. Restrict use of SPL in most vulnerable populations
  - 3. Statewide ban on all SPL
  - 4. Require use of SPL retention devices
  - 5. Define SPL as “bait”; no use of SPL where ALO in effect
  - 6. Require bass tournament reporting of SPL losses to monitor loss rates over time
  - 7. Increase penalties for deliberate littering
  - 8. Other?

IV. Future meetings...AM/PM

- i. August 20
- ii. September 17
- iii. October 15
- iv. November 12
- v. December 12

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Meeting Summary

Members in Attendance: Francis Brautigam, Mark Desjardin, Jake Mitchell, Ed Pineau, John Peterson, Eliza Donaghue, Pete Kallin, Chad Tokowicz, Matt Dunlap, Joe Overlock

Absent: Harry Wiegman

(The final agenda presented at the start of the meeting was followed in order and all items were addressed by the conclusion of the meeting.)

This meeting summary is intended to provide an outline of key issues and concerns discussed and is not a detailed account of every comment conveyed. The summary is intended to assist IFW with planning and facilitation and to capture the general scope of the discussions.

The purpose of the initial meeting of Biodegradable Lures and Hooks Work Group was to get oriented to the members and the issues before the work group.

Following introductions by members, Francis Brautigam discussed LD 695, sponsored by Senator Paul Davis of Senate District 4, and provided background on MDIFW testimony and public inquiries related to this topic.

Senator Davis then addressed the group to provide additional background and to share his motivations for proposing LD 695. Senator Davis expressed his appreciation to the group for their interest/participation on this subject and then excused himself.

Francis then discussed the January 2014 MDIFW Report to the Maine Legislature on a similar bill (LD 42, also sponsored by Sen. Davis). This report included a literature review, a partial summary of MDIFW fish stomach data related to Soft Plastic Lures (SPLs), a summary of a 2013 MDIFW SCUBA survey, information obtained from the fishing tackle industry, and discussed recommendations.

Next, Francis shared the letter provided by the 129<sup>th</sup> Legislature Committee on Inland Fisheries and Wildlife, which outlined guidance to the Department and this work group.

Secretary Dunlap then discussed the lead sinker law and the strategy that was employed to initially ban the sale of certain lead sinkers, prior to banning use. The group also noted that the lead sinker bill was successful because the negative impacts associated with use of lead tackle were well documented and there were available alternatives on the market.

Eliza Donaghue then discussed that Maine Audubon's primary concerns relate to impacts to fish that ingest SPLs and the organisms that then consume those fish?

Francis identified the need for additional research to tease out actual concerns vs. perceived concerns. This is a growing issue due to the recent popularity and availability of SPLs and it appears that efforts to address concerns are ahead of the available research at this time.

Francis then presented recent data (last 20 years) from MDIFW's stomach database, highlighting a greater occurrence in fish stomachs in southern and central Maine where bass fishing and use of SPL has a longer history:

Waters without bass = <1% w/SPLs

Waters with bass = 2% w/SPLs

All waters = 2% w/SPLs

The group discussed the use of SPL retention devices (O-rings, zip ties, etc.) and the importance of education in creating public awareness. It was acknowledged that awareness about the issue has greatly increased in response to the 2013 bill and that many organized bass clubs actively collect and dispose of SPLs at the conclusion of tournaments.

Francis identified that there likely will not be a single “silver bullet” fix to address the concern of SPL in the environment.

Chad Tokowicz asked if MDIFW stomach data could identify if fish that were found with stomachs containing SPLs were in compromised health. Francis shared that the data was collected for purposes other than identifying SPL occurrence and that there are multiple variable affecting fish health (i.e. condition factor), and it would therefore be very difficult to draw any conclusions related to compromised health. It was also noted that MDIFW does not have data that conclusively proves mortality of fish due to ingestion of SPLs. Fish found to contain SPLs were either lethally sampled or harvested by anglers.

Francis then discussed research conducted by MDIFW and two additional papers that resulted from a recently completed updated literature (since 2013) review.

A 2009 MDIFW study by Danner, et al, suggested that ingestion of SPLs by brook trout in a hatchery setting, resulted in impacts to fish health.

A 2018 study by Sanft, et al, showed that largemouth bass typically expelled SPLs within nine days.

A 2014 study by Raison, et al, showed SPLs increased in weight by 61% and in length by 19% in cold water; and increased in weight by 205% and in length by 39% in warm water. Also, sampling at Charleston Lake revealed that 2.2% of lake trout and 3.4% of smallmouth bass contained SPLs.

Eliza mentioned that although not related specifically to SPLs, there is growing research related to phthalates in the environment. She suggested that she could share that research with the work group.

Ed Pineau asked if there was an industry standard for the term “biodegradable”. Pete Kallin mentioned that he had found a group that “certifies” other products as “biodegradable”. Mark Desjardin suggested that “biodegradable” was likely more of a marketing strategy.

Next, Mark asked about the portion of the bill related to hooks. Francis shared that this will be a challenging issue and that MDIFW was unable to find any literature related to biodegradable hooks. Furthermore, the Department staff are not finding hooks in fish that would create population management concerns. Chad asked for clarification regarding whether this particular issue would be a priority for this group. Francis said that we are expected to explore all components of the bill, but there appears to be even less available information on biodegradable hooks than SPLs. Therefore, we should consider staff field observations. Ed mentioned that personal communication with Sen. Davis suggested a greater concern with SPLs. Chad said that he could reach out to industry to get more information on this issue.

Francis then identified some potential non-regulatory approaches for the group to consider and discuss at future meetings:

Industry/product development – are there incentives for industry to create products that reduce the likelihood for loss of SPLs off the hook? What are the areas of SPL product development focused.... i.e., longer lasting, stronger, more realistic?

Is there industry interest in creating an industry standard for “biodegradable” or its it little more than a marketing gimmick? Chad mentioned that he will bring this up with industry.

Discussed the potential to differentiate between certain waters with differing levels of vulnerability.

Chad asked if MDIFW could increase studies to get a better handle on fish health impacts in Maine. This led to a brief discussion about the research limitations of MDIFW and that peer reviewed research projects would carry more weight than gray literature. Partnerships would be needed for MDIFW involvement in any research. We also discussed future data collection by staff to look at the relationship of fish condition to SPL ingestion.

Mark discussed the success of the ReBaits program and said he would provide more information on this program at the next meeting. Chad offered that he would provide information on the “Pledge to pitch it” campaign.

Matt asked if MDIFW’s raptor group ever documents SPLs in raptor nests. Joe will follow up on this question prior to the next meeting.

Ed suggested that courtesy boat inspectors could hand out informational brochures related to responsible use and proper disposal of SPLs.

Mark talked about trash receptacles at boat launches specifically for disposal of SPLs.

Next, Francis identified some potential regulatory approaches for the group to consider and discuss at future meetings:

- Require industry to list ingredients or require a “biodegradable” certification.

- Restrict the use of SPLs, to preclude in most vulnerable waters.

- Statewide ban of SPLs.

- Require the use of retention devices (O-rings, zip ties, etc.) when using SPL to reduce SPL losses.

Modify Maine’s definition of “artificial lure” to exclude SPLs in waters restricted to artificial lures only.

Require bass tournament permit holders to report losses of SPLs (this has been voluntarily reported in the past).

Increase penalties for deliberate littering in aquatic habitats

Increase public awareness

Work Group Members were asked to forward any additional strategies for further consideration by the work group. New suggestions and potential strategies outlined in the July 17 Agenda will be more fully explored at future meetings. Francis thanked the work group for a very productive first meeting and

asked members to identify any additional agenda items that they would like to discuss at the next meeting. The next meeting will be August 20<sup>th</sup> at the MDIFW headquarters in Augusta from 9:00am – 11:00am.

**Biodegradable Lures and Hook Work Group**

**Meeting Agenda & Summary**

**August 20, 2019**

Agenda

I. Work Group Member Reports:

- vi. Francis - SPLs in Wildlife
- vii. Francis - Review of other state's terminal tackle regulations
- viii. Mark - Summary of Bass Tournament SPL collection programs
- ix. Chad - Summary of "Pledge to Pitch It" campaign and questions for industry

II. Group Discussion - Potential approaches to reduce SPL in Maine waters

- x. New items
  - 1. Eliza – Name SPLs within existing definition of "Litter"
- xi. Old Items
  - 1. Nonregulatory:
    - a. Advancement of SPL product development (stronger, biodegradable, etc.) & SPL retention technology (hooks, retainers, the lure) to reduce loss while fishing
    - b. Adopt industry standards for "biodegradable" SPL
    - c. Detail existing/new "rebauling" programs and outreach

- d. Encourage additional research to assess potential fish health & environmental impacts

2. Regulatory:

- a. Require industry to list ingredients for “biodegradable” SPL
- b. Restrict use of SPL in most vulnerable populations
- c. Statewide ban on all SPL
- d. Require use of SPL retention devices
- e. Define SPL as “bait”; no use of SPL where ALO in effect
- f. Require bass tournament reporting of SPL losses to monitor loss rates over time
- g. Increase penalties for deliberate littering

## Meeting Summary

Members in Attendance: Francis Brautigam, Mark Desjardin, Jake Mitchell, Ed Pineau, John Peterson, Eliza Donaghue, Pete Kallin, Chad Tokowicz, Matt Dunlap, Harry Wiegman, Joe Overlock

Absent: None

(The final agenda presented at the start of the meeting was largely followed down to “Group discussion: New items”. Although several the remaining items identified on the agenda were touched upon in discussions, they were not formally addressed by the conclusion of the meeting.)

This meeting summary is intended to provide an outline of key issues and concerns discussed and is not a detailed account of every comment conveyed. The summary is intended to assist IFW with planning and facilitation and to capture the general scope of the discussions.

The meeting began with member reports back to the work group on questions that were identified at the previous meeting.

Francis shared the results of his inquiry with MDIFW’s wildlife staff about observations of SPLs in fish eating birds. According to Avian Haven they rarely see soft plastic lures in bird stomachs. According to Dr. Mark Pokras of Tufts University, he has observed SPL’s in approximately 5% of necropsies of fish-eating birds and does not believe any have died because of SPLs.

Francis shared the results of MDIFW’s review of other state’s terminal tackle laws. Basically, there is very little out there related to SPL’s. The only exceptions were Oregon (which references SPLs in their

definition of bait) and Nevada (which references “power baits and similar” in their definition of bait). Montana, California, and New York include a definition of bait as anything that can be ingested, the intent of which is to address ingestion and hooking mortality, not littering or issues surrounding SPLs. No states have a ban on SPLs. No states referenced composition of hooks.

Mark shared a summary of bass tournament SPL collection programs. He stated that no other states have the same focus on SPLs as Maine does, however they all have SPL recycle programs. Many states have created competition for clubs to be awarded a prize for the most weight of SPLs turned in. He said there were essentially no recycle programs prior to the proposed ban on SPL in 2013, now they are very common. SPL recycle containers are maintained on many southern Maine waters.

Harry noted that there is a big difference between littering on land and littering in the water. You can go retrieve litter on land, but not so easy in the water.

Chad provided information and handouts on the Pledge to Pitch-it campaign. He talked to a few manufacturers and they are very aware of the issue. He shared a new hook retention device being marketed by Yum baits. Mark and John then shared a demonstration of hook retention techniques. Chad suggested a PSA/marketing campaign with Yum baits to create a Maine specific campaign to get hook retention devices into the hands of Maine anglers. Harry mentioned that he often sees new anglers using hooks without retention devices, suggested perhaps related to experience/lack of education. Chad suggested a one-sheet/poster guide to show how to responsibly use SPLs. He said he would reach out to terminal tackle manufacturers to see if anything has already been developed.

Francis acknowledged that outreach will likely need to be a component of this regardless of what else we do. There was a discussion by the group about possible strategies to market information to anglers.

Eliza then introduced a discussion about a potential approach to name SPLs under the definition of “Litter”. The group reviewed MRS Title 17: Chapter 80 - LITTER CONTROL. Eliza and Harry mentioned that focusing on intentional littering of SPLs would be key. Harry shared that littering is a civil violation (not criminal) and is therefore easier to enforce. Most people are more interested in keeping their fishing license than they are with paying the fine. Additionally, Harry has written a ticket for littering of an SPL and suggested that the fine for littering in the water could be adjusted. Additionally, suggested law could be created in Title 12 that littering while engaged in a Department regulated activity could result in license suspension. Francis asked how much of what we are seeing on the bottom of lakes today, is the result of deliberate deposition vs. accidental loss. Prior to next meeting Harry will discuss with Warden Service leadership/colleagues to identify if there are areas of the litter law that can be improved upon.

The remaining agenda items (Potential approaches – Old items) were not covered by the conclusion of the meeting. These items will be moved to the agenda for next meeting.

The next meeting will be September 17 from 9:00am-11:00am at the Office of the Secretary of State located at 103 Sewell Street in Augusta. [Map](#)

## **Biodegradable Lures and Hook Work Group**

### **Meeting Agenda & Summary**

September 17, 2019

Agenda

V. Work Group Member Report:

- i. Harry – Review litter law to identify any deficiencies from Warden Service perspective related to intentional deposition of SPL

VI. Group Discussion – Potential approaches to reduce SPL in Maine waters

i. Nonregulatory:

- a. Advancement of SPL product development (stronger, biodegradable, etc.) & SPL retention technology (hooks, retainers, the lure) to reduce loss while fishing
- b. Adopt industry standards for “biodegradable” SPL
- c. Detail existing/new “rebauling” programs and outreach
- d. Encourage additional research to assess potential fish health & environmental impacts

ii. Regulatory:

- a. Require industry to list ingredients for “biodegradable” SPL
- b. Restrict use of SPL in most vulnerable populations
- c. Statewide ban on all SPL
- d. Require use of SPL retention devices
- e. Define SPL as “bait”; no use of SPL where ALO in effect
- f. Require bass tournament reporting of SPL losses to monitor loss rates over time
- g. Increase penalties for deliberate littering; name SPL within existing definition of “litter”

## Meeting Summary

Members in Attendance: Francis Brautigam, Mark Desjardin, Jake Mitchell, Pete Kallin, Chad Tokowicz, Matt Dunlap, Harry Wiegman, Joe Overlock

Absent: Ed Pineau, Jon Peterson, Eliza Donaghue

(The final agenda emailed prior to the meeting was followed in order and all items were addressed by the conclusion of the meeting.

This meeting summary is intended to provide an outline of key issues and concerns discussed and is not a detailed account of every comment conveyed. The summary is intended to assist IFW with planning and facilitation and to capture the general scope of the discussions.

The meeting began by Francis reminding work group members of the May 28, 2019 guidance letter from the Committee on Inland Fisheries and Wildlife (provided to work group members at a prior meeting). It was noted that the group has already accomplished quite a bit and Francis feels the group is making good progress.

Harry provided results of his conversation with Warden Service command staff in reference to identifying any deficiencies in Title 17 Litter Law that could be strengthened to improve enforcement in response to intentional deposition of soft plastic lures. Warden service felt that the current litter law was written broadly enough to allow Warden Service to charge someone with littering (and Harry shared that he had written a ticket to an individual for doing so in the past).

Mark suggested that it would be valuable to include in outreach that discarding soft plastic lures is littering.

There was then a discussion about increasing penalties associated with littering in the water and about license suspensions. This was explored, but ultimately the group felt this strategy was challenging due to difficulty justifying the relative impact when compared to other crimes and penalties.

The group then resumed discussion of the previously identified potential approaches (previous agenda items not yet addressed) to reduce soft plastic lures in Maine waters.

## Nonregulatory

- a) Advancement of SPL product development: Chad shared some products manufactured by Z-Man brand that are extremely durable and marketed as non-toxic. He also shared that Pradco brand has been working on a research project with Arizona State University to explore the viability of SPLs that biodegrade. He shared that biodegradable technologies are gaining momentum due to the rising angler desire and environmental awareness. Matt suggested that retailers should have information available to consumers about the use of retention devices. Chad said that he would discuss with ASA's outreach folks to explore development of materials that cover use/retention, and proper disposal. Joe suggested that MDIFW can utilize our

website and fishing law book as a vehicle to direct Maine anglers to online resources. Matt suggested that the Office of the Secretary of State could host information on the [Secretary of State Kids' Page](#).

- b) Adopt industry standards for “biodegradable” SPL: Pete shared that the [American Society for Testing and Materials](#) publishes industry standards for a number of parameters, including biodegradability. Francis suggested that the tackle industry should standardize their use of the term. Chad suggested that perhaps that could be done with an industry agreement that manufacturers agree to. Harry asked if a product being biodegradable is actually better? Does it produce more microplastics in the environment?

Matt shared that the discussion of using soft plastic lures is really more of a policy issue, rather than a resource issue. He suggested that a stronger connection to the litter law (Title 17) may have merit.

- c) Detail existing/new “rebaiting” programs and outreach: Chad shared that the “Pitch-It” campaign is being revamped to include more corporate sponsorship, involve the three major national tournament bass fishing organizations, and to use well known spokespeople to promote the program. Joe suggested that MDIFW could revise the current section in the [fishing law book](#) to expand awareness and asked work group members to send along any links to resources, videos, information on use of retention devices and the “Pitch-It” campaign.
- d) Encourage additional research: Work group members were all in agreement that more research on the environmental effects of SPLs was needed to fill gaps in information to better understand unintended consequences of soft plastics in Maine waters. There was a brief discussion about the research and resource limitations of the Department, but there was discussion about partnership opportunities. Future research may be challenged by the diversity and abundance of different SPL products being manufactured.

#### Regulatory

- a) Require industry to list ingredients for “biodegradable” SPL: There was discussion that an industry standard would likely be more valuable than listing ingredients due to industry secrets and to the limited consumer knowledge of what ingredients are “bad”.
- b) & e) Restrict use of SPLs in the most vulnerable populations & Define SPL as “bait”; so there would be no use where ALO (artificial lures only) is in effect: *(These two items were discussed together)* Francis shared that there are 582 State Heritage Fish Waters where use of SPLs could be prohibited, but result in the unwelcome addition of 582 new special regulations to the lawbook, inconsistent with lawbook simplification efforts undertaken by the Department. Furthermore, some of these waters are already fly fishing only and the use of SPLs is low in these waters, so the risk of any unintended consequences is equally low. Historically there has been some concern related to hooking mortality using SPLs and putties in ALO waters because SPLs and putties are ingested, and fish are more prone to deep hooking injuries which are more lethal. ALO is applied to many waters to reduce hooking injury and mortality where populations are less robust. The idea of defining SPLs as bait was really born out of addressing hooking injury concerns, not SPLs in the environment. Also, would impact use of SPLs in the fall in many bass waters in the southern part of the state. The strategy was discussed in the context of the

holdover bill to explore interest in restricting nonbiodegradable soft plastic lures in some waters of the state for message purposes.

- c) Statewide ban on all SPL: The group felt that this strategy was unwarranted at this time.
- d) Require the use of SPL retention devices: The group felt that rather than require the use of retention devices (which could be a future strategy if there is future compelling scientific data regarding environmental impacts), implementation of increased outreach and education to encourage use of retention devices would be more meaningful and instep with available science.
- e) See b) above.
- f) Require bass tournament reporting of SPL losses to monitor loss rates over time: Mark suggested it would be difficult to get reliable results. Matt suggested that direct/measurable evaluation may not be necessary, but that a survey gauging angler awareness of the issue or strategies (retention devices) to reduce losses could be of value.
- g) Increase penalties for deliberate littering; name SPL within existing definition of "litter". Increasing fines was largely discussed at the start of the meeting. However, there was brief discussion about the "awareness" value of capturing something in the litter law to create a stronger connection to Title 12. Harry and Francis will explore this possibility further with Warden Service.

Work group members were asked to email Francis and Joe with additional thoughts, including any suggested language regarding the strategies that have been explored. Thoughts regarding those that bring the most value in addressing concerns related to the bill were also encouraged. This information will be used to help craft draft recommendations to the Committee on Inland Fisheries and Wildlife and will be discussed at our next work group meeting.

The next meeting will be Tuesday, October 15<sup>th</sup> from 9:00am-11:00am at the MDIFW headquarters in Augusta.

## Appendix B: Literature Abstracts

## **Voluntary Ingestion of Soft Plastic Fishing Lures Affects Brook Trout Growth in the Laboratory**

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**Abstract.**—Thirty-eight brook trout *Salvelinus fontinalis* were fed a commercial trout diet mixed with a free-choice assortment of soft plastic lures (SPLs) over a 90-d period. Fish growth was recorded and compared with that of a control group. The brook trout readily ate the SPLs from the water's surface as well as from the tank bottom. At the conclusion of the study, SPLs were recovered from the stomachs of 63% of the test fish. Several fish stomachs contained multiple lures. Twelve percent of the fish voluntarily ingested more than 10% of their body mass in SPLs. These fish lost a significant amount of weight during the study, had a significant decrease in body condition factor, and began displaying anorexic behaviors. For these reasons, anglers should be discouraged from discarding used SPLs in trout waters.

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### MANAGEMENT BRIEF

#### **Effects of Ingestion of Soft Plastic Fishing Lures on Largemouth Bass**

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#### **Abstract**

Soft plastic lures (SPLs) may comprise a significant amount of fishing gear pollution, yet little is known about their environmental impacts in aquatic systems or their ingestion by fish. We tested whether shape and material composition of ingested SPLs influenced subsequent prey consumption by Largemouth Bass *Micropterus salmoides* after SPL ingestion. We also quantified the occurrence of SPL ingestion by Largemouth Bass in reservoirs. Biodegradable and nonbiodegradable versions of shad, ribbon-tail worm, and finesse worm SPLs were fed to Largemouth Bass, and consumption of natural prey was quantified 1 d and 1 week postingestion. Shape and material composition altered prey consumption by Largemouth Bass. Fish that ingested the shad SPL, the largest lure by volume, consumed the fewest number of prey 1 d postingestion. Ingestion of biodegradable SPLs resulted in lower prey consumption rates than ingestion of nonbiodegradable SPLs. Largemouth Bass typically expelled the SPL within 9 d of ingestion; all lures were either regurgitated or egested. Less than 1% of Largemouth Bass sampled in two Illinois reservoirs had SPLs in their stomachs. Our results suggest

**that discarded SPLs do not pose a significant long-term threat to the health of individual Largemouth Bass. However, SPLs should still be discarded in a responsible manner.**

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Water Air Soil Pollut (2014) 225:1869  
DOI 10.1007/s11270-014-1869-1

### **Exploring the Potential Effects of Lost or Discarded Soft Plastic Fishing Lures on Fish and the Environment**

T. Raison & A. Nagrodski & C. D. Suski & S. J. Cooke

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# Springer International Publishing Switzerland 2014

**Abstract.** As the popularity and use of soft plastic lures (SPLs) by recreational anglers have increased in recent years, so does the number of anecdotal reports of SPLs being found in aquatic environments and in the digestive tract of a variety of fish species. We used a multistep approach to determine the possible consequences of SPLs on fish and aquatic environments. Field work focused on lake trout (*Salvelinus namaycush*) and smallmouth bass (*Micropterus dolomeiu*) in Charleston Lake in eastern Ontario, a system identified by resource managers and the lake association as potentially having an SPL problem based on numerous anecdotal reports from anglers. Snorkel surveys revealed that the deposition rate of SPLs was potentially as high as ~80 per km of shoreline per year. In the laboratory, eight different types of SPLs were immersed in water at two temperatures (4 and 21 °C) for a 2-year period to evaluate change in SPL size (both swelling and decomposition). Despite SPLs varying by manufacturer and in composition, there was little evidence of decomposition. Indeed, most SPLs swelled and remained that way throughout the study. In cold water, SPLs increased an average of 61 % in weight and 19 % in length, while warm water treatments experienced an increase of 205 % in weight and 39 % in length. A summer creel survey conducted on Charleston Lake revealed that 17.9 % of anglers interviewed reported finding at least one ingested SPL when cleaning lake trout. However, when we sampled lake trout (using gill nets) and smallmouth bass (by rod and reel), we found few ingested SPLs (2.2 and 3.4 %, respectively). Based on the examination of fish that contained SPLs and the near-shore surveys, the most common SPLs were soft stick baits/wacky worms. The most promising approach to address the SPL problem is to educate anglers about the need to rig SPLs in a manner such that they are less likely to be lost during fishing and to always discard SPLs appropriately. Moreover, the tackle industry should continue to investigate SPLs that are less likely to be pulled off by fish and/or that degrade rapidly.

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#### **Data Needs to Assess Effects of Soft Plastic Lure Ingestion on Fish Populations**

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**Our review revealed little information about ingestion rates or impacts of SPL consumption on fish and fisheries. Thus, regulations to restrict use of SPLs in order to protect fish populations and fisheries would not currently be based on scientific proof of impacts. This issue warrants additional experimental studies in natural and controlled environments to test for effects of SPL ingestion on fish**

behavior, growth, and survival. Uncertainty remains about SPL residence time in the environment. Additionally, diet studies should include SPLs as a category to quantify ingestion rates.

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Marine Environmental Research

**Absorption of metals in mulloway (*Argyrosomus japonicus*) after ingesting nickel-plated carbon-steel hooks**

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**a b s t r a c t.** Previous research has alluded to the potential of metals being absorbed by fish after ingesting fishing hooks, which may have adverse effects on fish health and the organisms that consume them. Subsequently, this study aimed to quantify the potential of mulloway (*Argyrosomus japonicus*) to absorb metals during the decay of ingested nickel-plated carbon-steel hooks. Twenty-five treatment fish were allowed to ingest nickel-plated carbon-steel hooks during angling and then monitored with 25 controls (untreated fish) for up to 42 days for hook ejection and mortality. Blood, liver and muscle samples were collected from treatment, control and 14 wild-caught individuals to determine the concentrations of chromium, cobalt, copper, iron, manganese and nickel. The results showed that increased oxidation influenced hook ejection, and that hook-ingested fish had significantly elevated concentrations of nickel in their liver and blood, but not muscle. This research has shown that there is an avenue for metal absorption from ingested hooks.

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## Appendix C: Maine Litter Control Act

### **§2263. Definitions**

**2. Litter.** "Litter" means all waste materials including, but not limited to, bottles, glass, crockery, cans, scrap metal, junk, paper, garbage, rubbish, offal, except waste parts or remains resulting from the normal field dressing of lawfully harvested wild game or the lawful use of waste parts or remains of wild game as bait, feathers, except feathers from live birds while being transported, abandoned ice-fishing shacks, old automobiles or parts of automobiles or similar refuse, or disposable packages or containers thrown or deposited as prohibited in this chapter, but not including the wastes of the primary processes of mining, logging, sawmilling, farming or manufacturing.

### **§2263-A. Littering**

**1. Prohibited acts.** A person may not throw, drop, deposit, discard, dump or otherwise dispose of litter in any manner or amount:

A. In or on public highway, road, street, alley, public right-of-way or other public lands, except in a container or receptacle or on property that is designated for disposal of garbage and refuse by the State or its agencies or political subdivisions; [2003, c. 452, Pt. I, §32 (NEW); 2003, c. 452, Pt. X, §2 (AFF).]

B. In freshwater lake, river, stream, tidal or coastal water or on ice over the water. When any litter is thrown or discarded from a watercraft, a person is in violation of this section if that person is:

(1) The operator of the watercraft, unless it is a watercraft being used for the carriage of passengers for hire; or

(2) The person actually disposing of the litter.

### **§2264-A. Penalties**

Unless otherwise indicated, a person who disposes of litter in violation of this chapter commits a civil violation for which the following fines apply. [2011, c. 208, §4 (AMD).]

**1. Disposal of 15 pounds or less or 27 cubic feet or less of litter.** A person who disposes of 15 pounds or less or 27 cubic feet or less of litter commits a civil violation for which a fine of not less than \$100 and not more than \$500 may be adjudged.

[ 2003, c. 452, Pt. I, §34 (AMD); 2003, c. 452, Pt. X, §2 (AFF) .]

**1-A. Disposal of 15 pounds or less or 27 cubic feet or less of litter; subsequent offenses.** A person who violates subsection 1 after having previously violated subsection 1 commits a civil violation for which a fine of not less than \$500 and not more than \$1,000 may be adjudged.

[ 2011, c. 208, §4 (AMD) .]

**2. Disposal of more than 15 pounds or more than 27 cubic feet of litter.** A person who disposes of more than 15 pounds or more than 27 cubic feet of litter commits a civil violation for which the court:

A. Shall impose a fine of not less than \$500; [2011, c. 208, §4 (NEW).]

*B. Shall require the person to pay a party sustaining damages arising out of a violation of this subsection treble the actual damages or \$200, whichever amount is greater, plus the injured party's court costs and attorney's fees if action results in a civil proceeding; [2011, c. 208, §4 (NEW).]*

*C. Shall require the person to perform not less than 100 hours of public service relating to the removal of litter or to the restoration of an area polluted by litter disposed of in violation of this section. The court shall consult with the Commissioner of Inland Fisheries and Wildlife to determine if there is an opportunity for public service that may improve landowner and sportsman relations; [2011, c. 208, §4 (NEW).]*

*D. When practical, shall require the person to remove the litter dumped in violation of this subsection; [2011, c. 208, §4 (NEW).]*

*E. May suspend the person's motor vehicle operator's license for a period of not less than 30 days or more than one year, except as provided in paragraph F. Notwithstanding paragraph F, the court shall suspend all licenses and permits issued under Title 12, Part 13, subpart 4 and recreational vehicle registrations and certificates issued to that person under Title 12, Part 13, subpart 6 for a period of not less than 30 days or more than one year; and [2011, c. 208, §4 (NEW).]*

*F. May suspend any license, permit, registration or certification issued by a state agency or municipality to the person. A professional license, permit, registration or certification required for that person to operate or establish a business or necessary for the person's primary source of employment may not be suspended unless the items dumped were related to the person's profession or occupation. [2011, c. 208, §4 (NEW).]*

*[ 2011, c. 208, §4 (AMD) .]*

**2-A. Disposal of more than 15 pounds or more than 27 cubic feet of litter; subsequent offenses.** *A person who violates subsection 2 after having previously violated subsection 2 commits a civil violation for which the penalty provisions under subsection 2 apply except for subsection 2, paragraph A, and a fine of not less than \$2,000 must be adjudged.*

*[ 2011, c. 208, §4 (AMD) .]*

**3. Disposal of more than 500 pounds or more than 100 cubic feet of litter for a commercial purpose.** *A person who disposes of more than 500 pounds or more than 100 cubic feet of litter for a commercial purpose is subject to the penalties under Title 38, section 349.*

## Appendix D: Summary of State Fishing Laws Related to Soft Plastic Lures & Hooks

| <b>State</b> | <b>"Bait"</b>   | <b>"Artificial Lures"</b>  | <b>Hook Restrictions</b>                                     | <b>SPL Restrictions &amp; Prohibitions</b> |
|--------------|---|--|--|--|
| Alabama      | No definition   | No definition  | No Restrictions  | No mention                                 |
| Alaska       | any substance applied to fishing gear for the purpose of attracting fish by scent, including fish eggs in any form, natural or preserved animal, fish, fish oil, shellfish, or insect parts, natural or processed vegetable matter, and natural or synthetic chemicals. | a lure that is manmade, free of bait as defined below, and is used to attract fish for the purpose of taking them and includes artificial flies.                                       | Restrictions only in number and gap between point and shank. | No mention                                 |
| Arizona      | No definition   | No definition  | Restrictions only in number                                  | No mention                                 |
| Arkansas     | No definition, merely that trout or pieces of trout are not allowable bait.   | In areas with catch-and-release or special regulations, natural and scented baits are not allowed. These include baits such as marshmallows, corn, salmon eggs and moldable substances | No restrictions  | No mention                                 |

|            |   |  |                             |            |
|------------|---|--|-----------------------------|------------|
| California | Any natural or manufactured product or device which is used to attract fish by the sense of taste or smell, including any product or device to which scents or flavored attractants have been added or externally applied. Bait includes but is not limited to; scented and flavored paste, scented manufactured fish eggs, and traditional organic baits such as worms, grubs, crickets, leeches, stink baits, insects, crayfish, human food, fish, fish parts, and fish eggs. | Any manufactured or man-made non-scented/flavored (regardless if scent is added in the manufacturing process or added afterwards) device complete with hooks, intended to attract fish. Artificial lures include, but are not limited to; spoons, spinners, artificial flies, and plugs, made of metal, plastic, wood, or other non-edible materials.                                    | Restrictions only in number | No mention |
| Colorado   | any hand-moldable material designed to attract fish by the sense of taste or smell; those devices to which scents or smell attractants have been added or externally applied (regardless if the scent is added in the manufacturing process or applied afterward); scented manufactured fish eggs and traditional organic baits, including but not limited to worms, grubs, crickets, leeches, dough baits or stink baits, insects,   | devices made entirely of, or a combination of, natural or synthetic non-edible, non-scented (regardless if the scent is added in the manufacturing process or applied afterward), materials such as wood, plastic, silicone, rubber, epoxy, glass, hair, metal, feathers, or fiber, designed to attract fish. This definition does not include anything defined as bait in #100.B below. | Restrictions only in number | No mention |

|             |  |               |                             |            |
|-------------|--|---------------|-----------------------------|------------|
|             | crayfish, human food, fish, fish parts or fish eggs.   |               |                             |            |
| Connecticut | BAIT Any animal or vegetable, or their parts, living or dead, used with a hook for the purpose of attracting and catching fish. Any fish legally acquired, except largemouth bass, smallmouth bass, chain pickerel, northern pike, trout, salmon, carp and goldfish may be used as bait. | No definition | Restrictions only in number | No mention |

|          |  |   |                 |            |
|----------|--|---|-----------------|------------|
| Delaware | No definition  | No definition   | No Restrictions | No mention |
| Florida  | No definition  | No definition   | No Restrictions | No mention |
| Georgia  | It is unlawful to use live fish for bait in trout streams. Seining bait-fish is not allowed in any trout stream. | Any lure which is made completely of natural or colored wood, cork, feathers, hair, rubber, metal, plastic, tinsel, styrofoam, sponge, string, or any combination of such materials, in imitation of or as a substitute for natural bait. This does not include any item sprayed with or containing scented or chemical attractants | No Restrictions | No mention |
| Hawaii   | No definition  | No definition   | No Restrictions | No mention |

|          |   |   |                             |            |
|----------|---|---|-----------------------------|------------|
| Idaho    | Organic substances, other than rubber, wood feather, fiber, or plastic, attached to a hook to attract fish. Bait includes insects, insect larvae, worms, dead fish, fish parts, any other animal or vegetable matter, or scented synthetic materials. Note: Use of live fish, leeches, frogs, salamanders, waterdogs or shrimp as bait is prohibited in Idaho, except that live crayfish may be used if caught on the body of water being fished. | Any device made entirely of rubber, wood, metal, glass, feather, fiber, or plastic with hook or hooks attached. Bait of any kind may not be used with artificial lures when fishing artificial flies and lures-only waters. | Restrictions only in number | No mention |
| Illinois | No definition.  | No definition   | Restrictions only in number | No mention |
| Indiana  | No definition.  | No definition   | Restrictions only in number | No mention |
| Iowa     | Bait Definitions "Bait" includes, but is not limited to, minnows, Green Sunfish, Orange-  | No definition   | Restrictions only in number | No mention |

|        |   |   |                                    |                   |
|--------|---|---|------------------------------------|-------------------|
|        | <p>spotted Sunfish, live or dead Gizzard Shad, frogs, crayfish, salamanders and mussels. “Minnows” are chubs, shiners, suckers, dace, stonerollers, mudminnows, redhorse, Bluntnose and Fathead Minnows. You can only take live mussels from the Mississippi River and its connected backwaters. The daily and possession limit is 24 live mussels</p>  |   |                                    |                   |
| Kansas | <p>Legal fish bait includes artificial lures, bait fish (Minnow family (Cyprinidae), suckerfamily (Catostomidae), top minnows or killifishfamily (Cyprinodontidae), sunfish family(Centrarchidae), excluding black basses andcrappie, which may be used only if legally harvested by hook and line. Baitfish exclude fishes listed as Kansas threatened or endangered species.), prepared bait, vegetable materials, artificial bait, worms, frogs, and crawfish. Species listed as</p> | <p>a man-made fish-catching device used to mimic a single prey item. The umbrella rig, popularly called the Alabama Rig, may only have two separate lures with hooks.</p> | <p>Restrictions only in number</p> | <p>No mention</p> |

|  |   |  |  |  |
|--|---|--|--|--|
|  | <p>prohibited, threatened, endangered, or in need of conservation may NOT be used as bait. Any other LEGALLY TAKEN wildlife may be used, including sport fish of legal length taken by hook and line.</p> |  |  |  |
|--|---|--|--|--|

|           |  |  |                 |            |
|-----------|--|--|-----------------|------------|
| Kentucky  | Organic baits are insects, minnows, fish eggs, worms, corn, cheese, cut bait or similar substances used as a lure. | Artificial baits are lures or flies made of wood, metal, plastic, hair, feathers, preserved pork rind or similar inert materials and having no organic baits including dough bait, putty or paste type baits designed to attract fish by taste or smell. | No Restrictions | No mention |
| Louisiana | Bait Species: all species of fish and other aquatic life utilized for bait.  | No definition  | No Restrictions | No mention |
| Maine     |  | Any fishing lure constructed by humans as an imitation or substitute   | No Restrictions | No mention |

|          |   |  |                              |            |
|----------|---|--|------------------------------|------------|
|          |   | for natural bait or fish forage and includes, but is not limited to artificial flies, spinners, spoons, poppers, plugs, jigs and plastic, rubber or other artificial imitations of natural bait (Title 12, §10001-4). An artificial lure only rule prohibits the use of any live, dead or chemically preserved natural or organic bait or food |                              |            |
| Maryland | Any item that emits an odor or scent such as worms, minnows, crayfish, insects, and food items. The addition of any scent to an artificial lure or fly to make it smell like bait, makes it bait. | The following are considered artificial lures: spinners, spoons, plugs and molded facsimiles of worms, insects and fish. For the purposes of these regulations, artificial flies and streamers are considered to be artificial lures.  | Restrictions only in number. | No mention |

|               |  |   |                              |            |
|---------------|--|---|------------------------------|------------|
| Massachusetts | Baitfish means only live or dead fish of the following species. A person shall not use as bait any fish, alive or dead, including parts thereof, except the baitfish listed in 321 CMR 4.01(8)(a)1 through 10. | A hook is defined as an angling device attached to a fishing line that is designed to take one fish at a time but is not limited to devices commonly called spinners, spoons, bait harnesses, jigs, or plugs.   | Restrictions only in number. | No mention |
| Michigan      | No definition  | : A manmade lure manufactured to imitate natural bait. Artificial lures include spoons, spinners, flies and plugs made of metal, plastic, wood and other non-edible materials. They also include plastic products made to resemble worms, eggs, fish and other aquatic organisms. | Restrictions only in number. | No mention |
| Minnesota     | No definition  | No definition   | Restrictions only in number. | No mention |
| Mississippi   | Sport anglers may use game fish, non-game gross fish, goldfish, and minnows for bait.  | No definition   | No Restrictions              | No mention |

|          |  |  |                              |            |
|----------|--|--|------------------------------|------------|
|          | Freshwater mussels cannot be collected or used for bait  |  |                              |            |
| Missouri | No definition  | No definition  | Restrictions only in number. | No mention |
| Montana  | Live bait are animals such as meal worms, red worms, night crawlers, leeches, maggots, crayfish, reptiles, amphibians and insects, which may be used as live bait on all waters not restricted to artificial flies and lures. Live bait includes fish only as specified in Live Bait sections for the Central and Eastern Fishing Districts. No live fish can be used as live bait in the Western Fishing District. Sculpins may not be used as bait live or dead in the Western Fishing District. | Any man-made lure (including flies) that imitates natural bait. Artificial lures may have a scent infused or applied. Artificial lures do not include fish eggs, any natural or artificial food such as corn and marshmallows, any products that are derivatives of natural foods, any chemically treated or processed natural bait such as salted minnows, nor any artificial dough, paste or edible baits. | Restrictions only in number. | No mention |

|               |  |  |                              |            |
|---------------|--|--|------------------------------|------------|
| Nebraska      | No definition  | No definition  | Restrictions only in number. | No mention |
| Nevada        | The use of bait fish, whether dead or alive or the parts thereof, other than preserved salmon eggs, is prohibited in all waters except those listed below. Live Baitfish means live, unprotected species of freshwater fish. Use of any game fish as bait is prohibited. | “Artificial Lures” means any device with a hook or hooks attached which is made partly or entirely of rubber, wood, metal, glass, plastic or feathers. (Please note: PowerBait® or similar products are not considered artificial lures.)    | Restrictions only in number. | No mention |
| New Hampshire | Dead or live natural bait whether in part or whole and includes but is not limited to fish, mollusks, crustaceans, amphibians, invertebrates, reptiles, or their progeny or eggs, and power bait or any ingestible substance.  | Any fishing bait constructed by humans as an imitation or substitute for natural bait or fish forage and includes but is not limited to spinners, spoons, poppers, plugs, jigs and plastic, rubber or other artificial imitations of natural | Restrictions only in number. | No mention |

|            |   |  |                              |            |
|------------|---|--|------------------------------|------------|
|            |   | bait. Artificial bait does not include a fly   |                              |            |
| New Jersey | Baitfish species: American Eel, Banded Killifish, Creek Chub, Fallfish, Fathead Minnow, Gizzard Shad, Golden Shiner, Margined Madtom, Mummichog, and Tadpole Madtom. Possession or use of bait (live or preserved) or any substance (natural orsynthetic) that contains a concentration of bait scent is prohibited (in trout waters) | Artificials only, with no more than 3 hook points in total, all barbless (in trout waters)   | Restrictions only in number. | No mention |
| New Mexico | In any waters containing protected fish it is illegal to use as bait any of the following: live protected fish, gar, goldfish, common carp, river carpsucker, smallmouth buffalo and bullfrogs or bullfrog tadpoles. If used as dead bait only, it is legal to use the following: genus   | A lure is made of wood, metal, or hard plastic. A fly is made with fur, feathers or man-made materials to resemble or simulate insects, baitfish or other foods. Live or dead arthropods and annelids and rubber or plastic moldings of these insects, baitfish or | No Restrictions              | No mention |

|          |   |  |                 |            |
|----------|---|--|-----------------|------------|
|          | Lepomis (bluegills and sunfish), common carp, river carpsucker, smallmouth buffalo, bullfrogs or bullfrog tadpoles.   | other foods are not included.  |                 |            |
| New York | Natural bait means all baits which entice or might be ingested or swallowed by fish including, but not limited to, fish (dead or alive), fish eggs, worms, shellfish, crustacea, amphibians (frogs and toads), insects (including all stages of development such as larvae, pupae, etc.), pork rinds, liver, meat, corn or other vegetable matter, tapioca, candy, cheese, bread and putty or dough-like scented baits. | Artificial lures or bait means artificial imitations of natural bait, man-made flies, spinners, spoons, plugs, jigs and other lures, including those that may contain some natural substances such as deer hair and feathers | No Restrictions | No mention |

|                       |   |                      |  |                   |
|-----------------------|---|----------------------|--|-------------------|
| <p>North Carolina</p> | <p>No definition</p>  | <p>No definition</p> | <p>Restrictions only in number and barbs</p> | <p>No mention</p> |
| <p>North Dakota</p>   | <p>legal live bait includes leeches, native frog, salamander and crayfish species. Legal baitfish and other legal aquatic bait noted above, and nongame fish, which have been preserved by freezing, salting or otherwise treated to inactivate sexual products, are legal bait. This includes sections, pieces, heads and/or entrails.</p> | <p>No definition</p> | <p>Restrictions only in number.</p>          | <p>No mention</p> |
| <p>Ohio</p>           | <p>No definition</p>  | <p>No definition</p> | <p>Restrictions only in number.</p>          | <p>No mention</p> |

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| Oklahoma     | No definition  | Fishing tackle made by fly-tying or artificial lures made of wood, metal, glass, feathers, hair, synthetic fibers or hard plastic and barbless hooks only. The use of any substance in combination with restricted fishing tackle is prohibited   | Restrictions only in number. | No mention |
| Oregon       | Any item used to attract fish that is not an artificial fly, lure or attractor. Molded soft plastic or rubber imitations of worms, eggs, insects, bait fish, crayfish, etc. are considered baits. Scent is not considered bait.  | An artificial device, complete with hooks, intended to attract and entice fish; excludes artificial flies or attractors. Corkies, spin-n-glos, birdy drifters, lead-head jigs, etc. are considered lures. Molded soft plastic or rubber imitations of worms, eggs, insects, bait fish, crayfish, etc. are considered baits. | Restrictions only in number. | No mention |
| Pennsylvania | BAITFISH includes all forms of minnows; suckers, chubs, Fallfish, lampreys; Gizzard Shad 8 inches or less; and all forms of darters, killifishes and stonecats (except those listed as threatened or endangered species). Legally taken gamefish may be used as bait. It is unlawful to use or possess goldfish, | artificial lures only constructed of metal, plastic, rubber or wood, or with flies and streamers constructed of natural or synthetic materials. All such lures may be used with spinning or fly-fishing gear  | No Restrictions              | No mention |

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|                | comets, koi and Common Carp as baitfish while fishing. FISHBAIT includes crayfish, crabs, and the nymphs, larvae and pupae of all insects spending any part of their life cycle in the water.         |   |                                       |            |
| Rhode Island   | No definition   | No definition   | Restrictions only in number and barbs | No mention |
| South Carolina | any nonindigenous fish as bait that is not already established in the water body being fished except the following minnows: fathead minnows, golden shiners, and goldfish, including 'black salties'. | means manufactured or handmade flies, spinners, plugs, spoons, and reproductions of live animals, which are made completely of natural or colored wood, cork, feathers, hair, rubber, metal, plastic, tinsel, | Restrictions only in number and barbs | No mention |

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|              |   | Styrofoam, sponge, or string, or any combination of these materials, in imitation of or as substitute for natural bait. Lures or fish eggs enhanced with scents or salts are not artificial lures. Artificially produced organic baits are not artificial lures.     |                 |            |
| South Dakota | Organic bait includes worms, baitfish, salmon eggs, corn, marshmallows, insects, moldable scented plastic baits, or naturally occurring or man-made food intended to be used as bait. | Artificial lures include flies, jigs, spoons, spinners, and plugs made of metal, plastic, wood, hair, feathers, and other inedible materials. Artificial lures do not include fish eggs, moldable scented plastic baits, naturally occurring foods or man-made food. | No Restrictions | No mention |

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| Tennessee | <p>Any living or dead organism, or prepared substance designed to attract fish by taste or odor. For the purpose of this proclamation, bait includes, but is not limited to, fish, fish eggs, crayfish, worms, grubs, crickets, corn, cheese, bread, pork rinds, putty or paste-type products, and flavors or scents applied to or impregnated into artificial lures. Under no circumstance shall live fish, crayfish, or salamanders be intentionally released into Tennessee waters away from the waters from which they were harvested. Skipjack herring, gizzard shad, threadfin shad, golden shiner, goldfish, fathead minnow, sunfish spp, and rainbow trout may be used as bait.</p> | No definition | No Restrictions | No mention |
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| <p>Texas</p> | <p>Something used to lure any wildlife resource. It is unlawful to use game fish or any part thereof as bait.</p>   | <p>Any lure (including flies) with hook or hooks attached that is man-made and is used as a bait while fishing</p>   | <p>No Restrictions</p> | <p>No mention</p> |
| <p>Utah</p>  | <p>a digestible substance, including worms, cheese, salmon eggs, marshmallows or manufactured baits including human-made items that are chemically treated with food stuffs, chemical fish attractants or feeding stimulants.</p> | <p>a device made of rubber, wood, metal, glass, fiber, feathers, hair or plastic with a hook or hooks attached. Artificial lures (including artificial flies) do not include fish eggs or other chemically treated or processed natural baits or any natural or human-made food, or any lures that have been treated with a natural or artificial fish</p> | <p>No Restrictions</p> | <p>No mention</p> |

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|          |   | attractant or feeding stimulant.   |                              |            |
| Vermont  | Baited Hook A single shank hook with one, two, or three points that may be baited with natural or artificial bait or both.  | Lure A man-made device designed to catch only one fish at a time, to include a spoon, plug, spinner, bait harness, tandem-hook streamer, or lead head jig.   | Restrictions only in number. | No mention |
| Virginia | Minnows, chubs, madtoms, crayfish, hellgrammites, salamanders are limited to 50 total for all species combined (aggregate), not 50 of each species at the same time. Gizzard and threadfin shad can be used in any of Virginia's waters but there are geographical limitations for herring. | Artificial lure shall include manufactured or handmade flies, spinners, plugs, spoons, and facsimiles of live animals, but shall not be construed to include artificially-produced organic baits and fish eggs that are intended to be ingested. Artificial lure with single hook shall mean any single point lure (with no multiple point hooks). Where single-hook artificial lures are required, a multiple number of single-hook lures | No Restrictions              | No mention |

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|               |  | (such as dropper flies) fished in a series is permitted.   |                 |  |
| Washington    | Anything that attracts fish or shellfish by scent and/or flavor. This includes any device made of feathers, hair, fiber, wood, metal, glass, cork, leather, rubber, or plastic, which uses scent and/or flavoring to attract fish or wildlife. | e A manufactured article, complete with hooks, constructed of feathers, hair, fiber, wood, metal, glass, cork, leather, rubber, or plastic, which does not use scent and/or flavoring to attract fish.   | No Restrictions | No mention   |
| West Virginia | No definition  | artificial flies and lures made of metal, wood, feathers, hair, or synthetic material may be used or possessed on catch-and-release trout streams during the catch and release season. No lure or fly with any scent, oil, or edible enticement added onto, or | No Restrictions | Power bait, Gulp and other manufactured scented baits are considered illegal under this section and may not be used or possessed on catch-and- |

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|           |               | impregnated into (regardless if the scent is added in the manufacturing process or applied afterward), may be used or possessed on any catch and release trout stream.   |                              | release streams. |
| Wisconsin | No definition | a spoon, spinner, plug, or other fish bait made of hair, feathers, cork, wood, rubber, metal, plastic, or other synthetic materials, or combinations of these materials. An artificial lure may not include natural or organic food stuffs like corn, marshmallows, dough, cheese, meat, living or dead organisms or parts thereof, except hair, feathers, cork, wood, and rubber. Liquid scents sprayed on an artificial lure are legal to use when fishing waters where only artificial lures may be used. | Restrictions only in number. | No mention       |

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| <p>Wyoming</p> | <p>means living or dead organisms or edible parts thereof, natural or prepared organic food, and chemical attractants used in the taking of fish.</p> | <p>means manmade flies and lures. Artificial lures are single devices regardless of the number of hooks, including spoons, spinners and plugs made of metal, plastic, wood or other non-edible materials, or plastic products made to resemble worms, eggs, fish or other aquatic organisms. Artificial flies includes flies, streamers, jigs, or poppers tied from such materials as thread, feathers, hair or tinsel. Artificial flies and lures do not include living or dead organisms or edible parts thereof, natural or prepared organic food stuffs, or chemical attractants, regardless if the chemical attractant is added in the manufacturing process or applied afterward.</p> |  |  |
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