

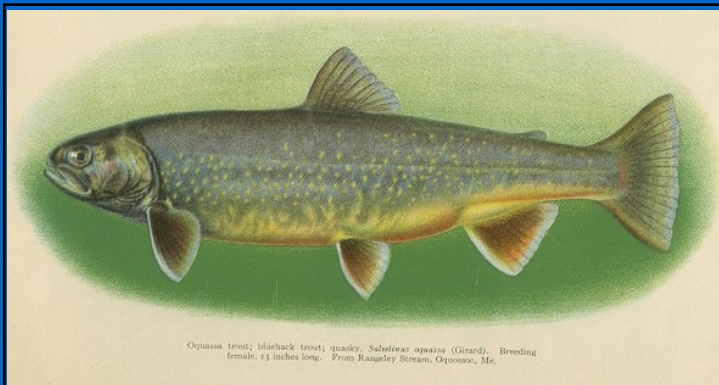
Fisheries Then & Now:

A 60-year comparison of lake
fish assemblages in Maine.



Peter Vaux

Katherine Webster



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A 60-year comparison of lake
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- We know that Maine's freshwater fish fauna has been modified by legal and unauthorized stocking over the past 150+ years.
- We know that unauthorized stocking continues to increase homogeneity in the composition of fish assemblages.
- We know that this process is insidious – it's going on all the time, but often is poorly documented.
- *What can historical lake surveys tell us about changes in Maine's freshwater fish assemblages?*

Fish species

Fish size structure

Fish age/growth

Fish diets

Water quality

Benthos

Phytoplankton

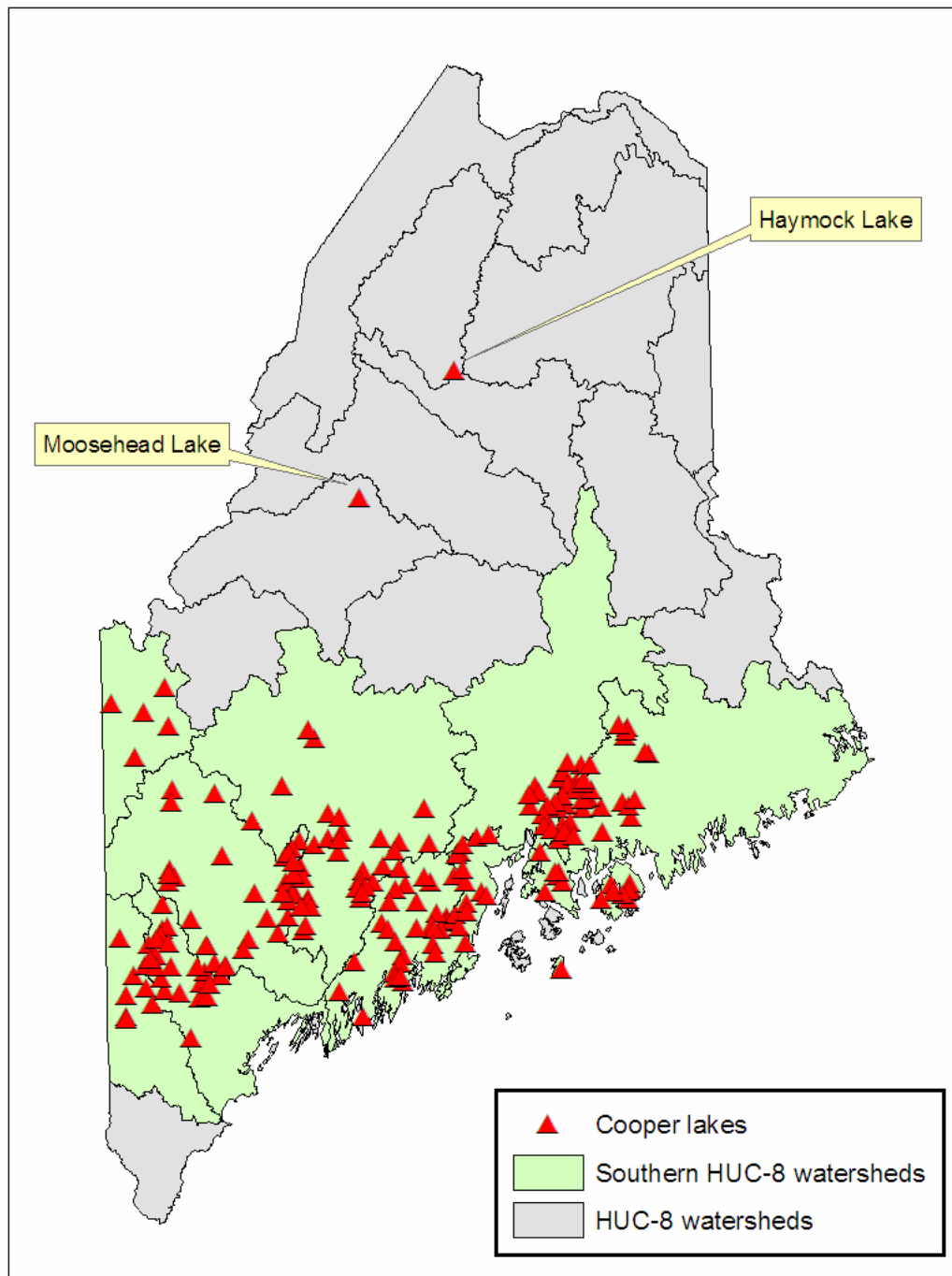
Zooplankton

Lake depth maps

*Fish sampling with
gill nets and
seines + warden
reports of species
presence.*

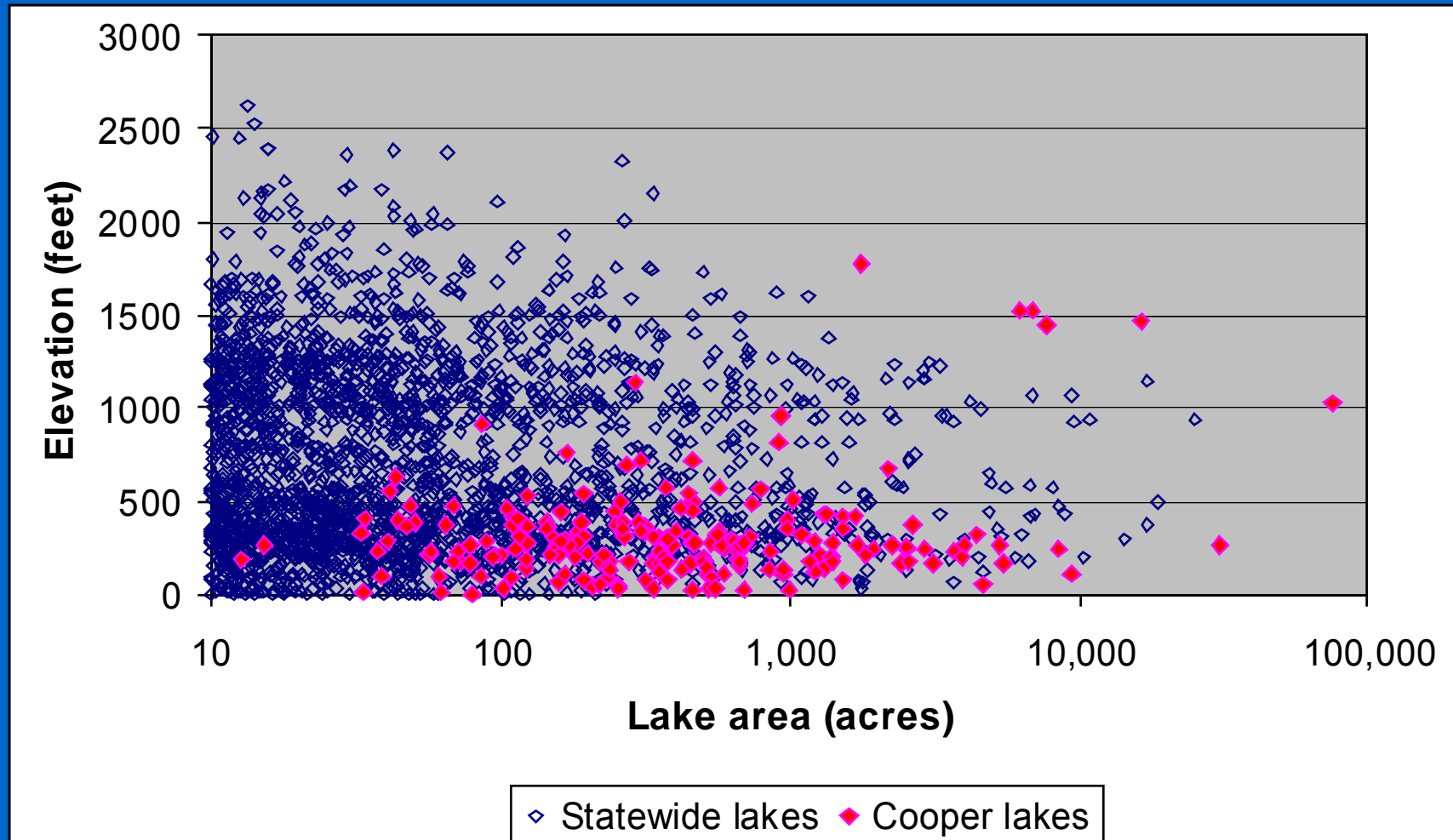


Cooper and Fuller surveys of Maine lakes: 1938 - 1944

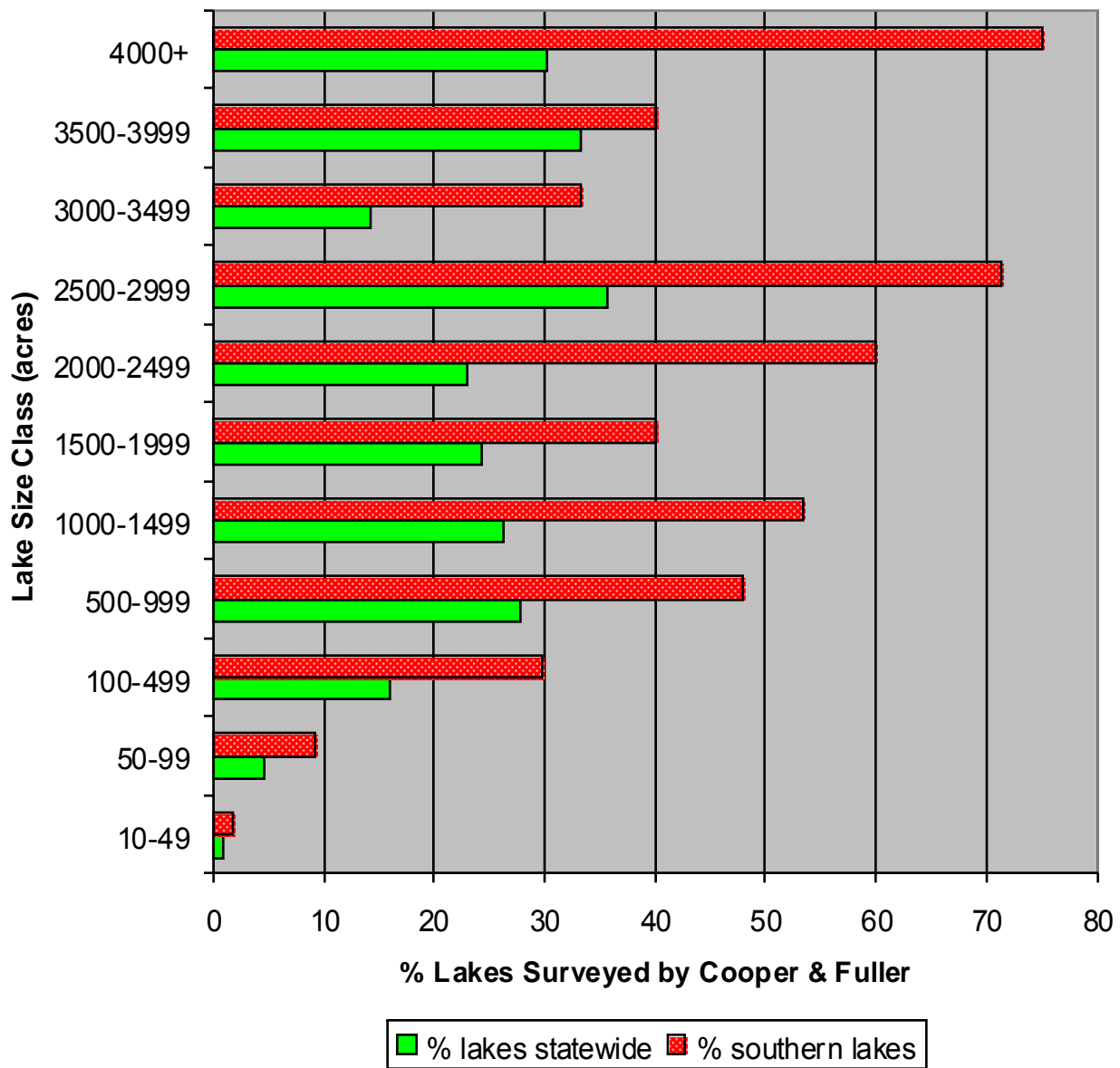


**Most of the 206
Cooper lakes are in
the southern half of
the state.**

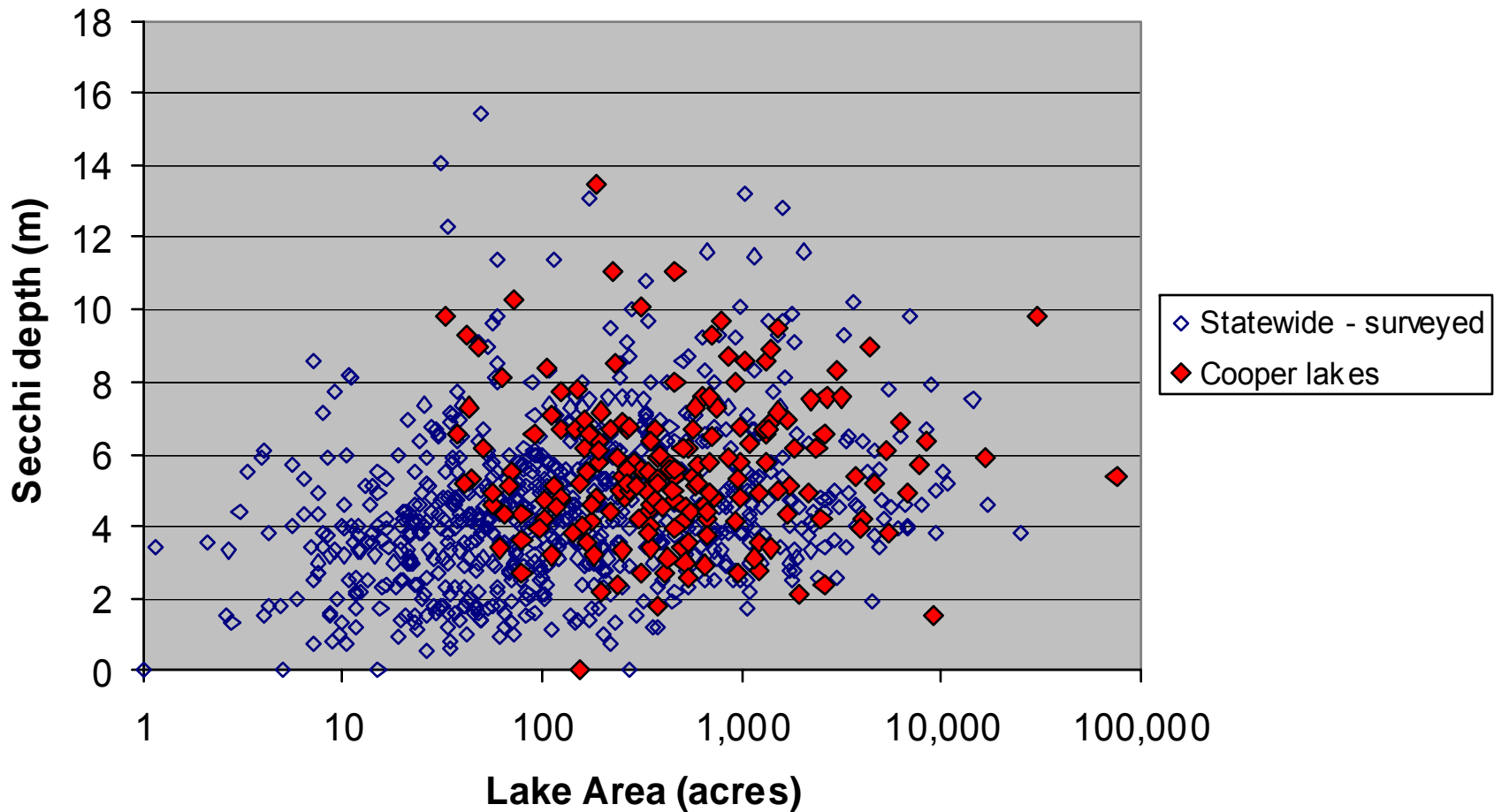
**Most Cooper lakes are at lower elevations
(< 500 ft. above sea level)**



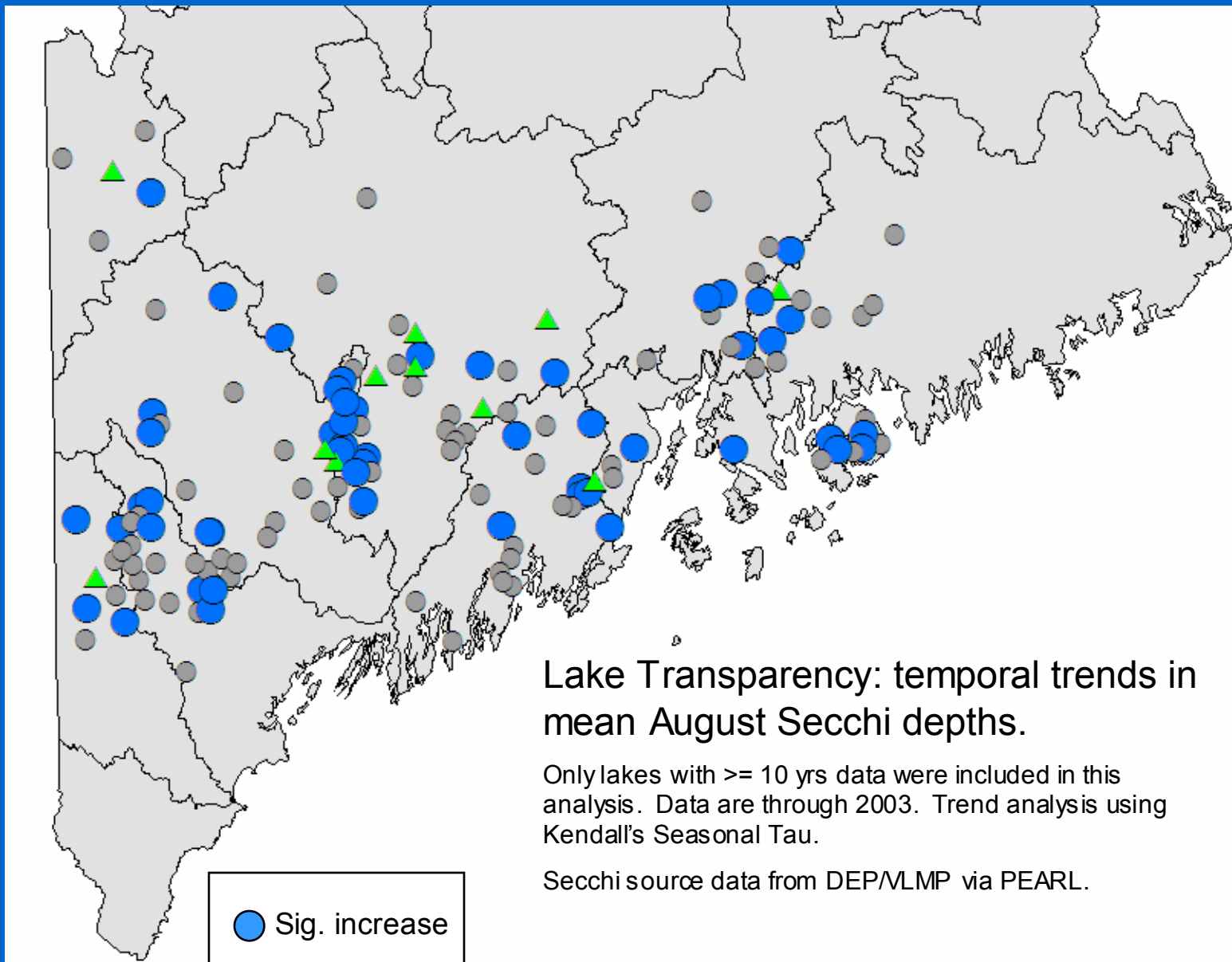
Cooper surveyed relatively few small lakes (<100 acres)



Water transparencies in Cooper lakes are similar to values statewide
(contemporary data)



Graph shows overall mean Secchi depth for all surveyed lakes by lake area. (Data source: DEP/VLMP via PEARL)



Approach for this analysis:

1. For each of the Cooper survey lakes, develop species lists from (i) the 1930-40s surveys, and (ii) the IF&W 2004 lake fish inventory.

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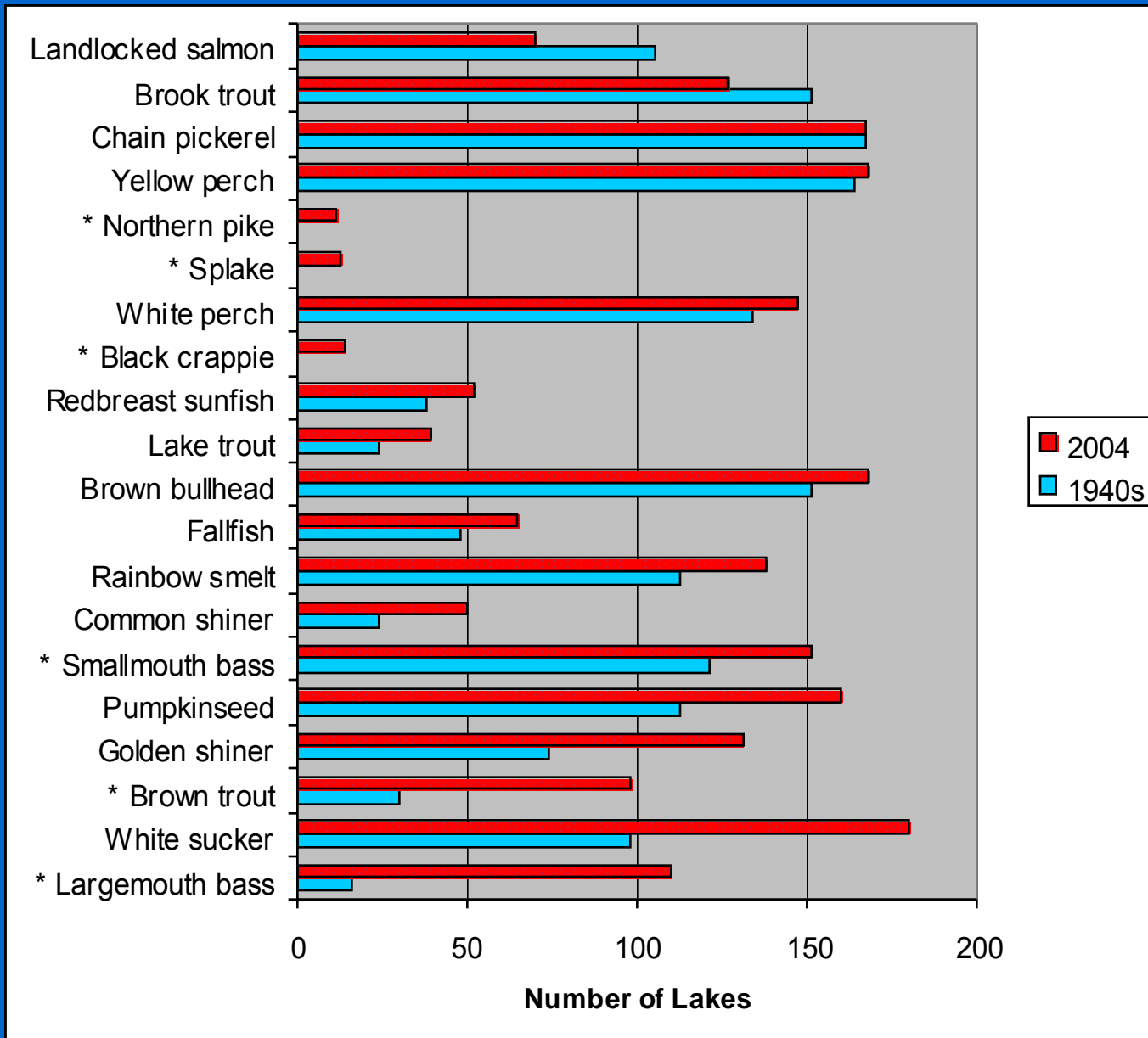
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2. For comparative purposes, focus on 22 species that are readily detected - i.e. likely to appear in snapshot-type sampling (e.g. gamefish spp. and other larger-bodies spp. Ignore most minnow species). Use EMAP repeat-sampling data to identify readily detectable species.

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3. For these readily detectable taxa, assume that species present in a lake in 2004, but not recorded in the 1930-40s, derived from legal or illegal stocking, or 'natural' colonization.

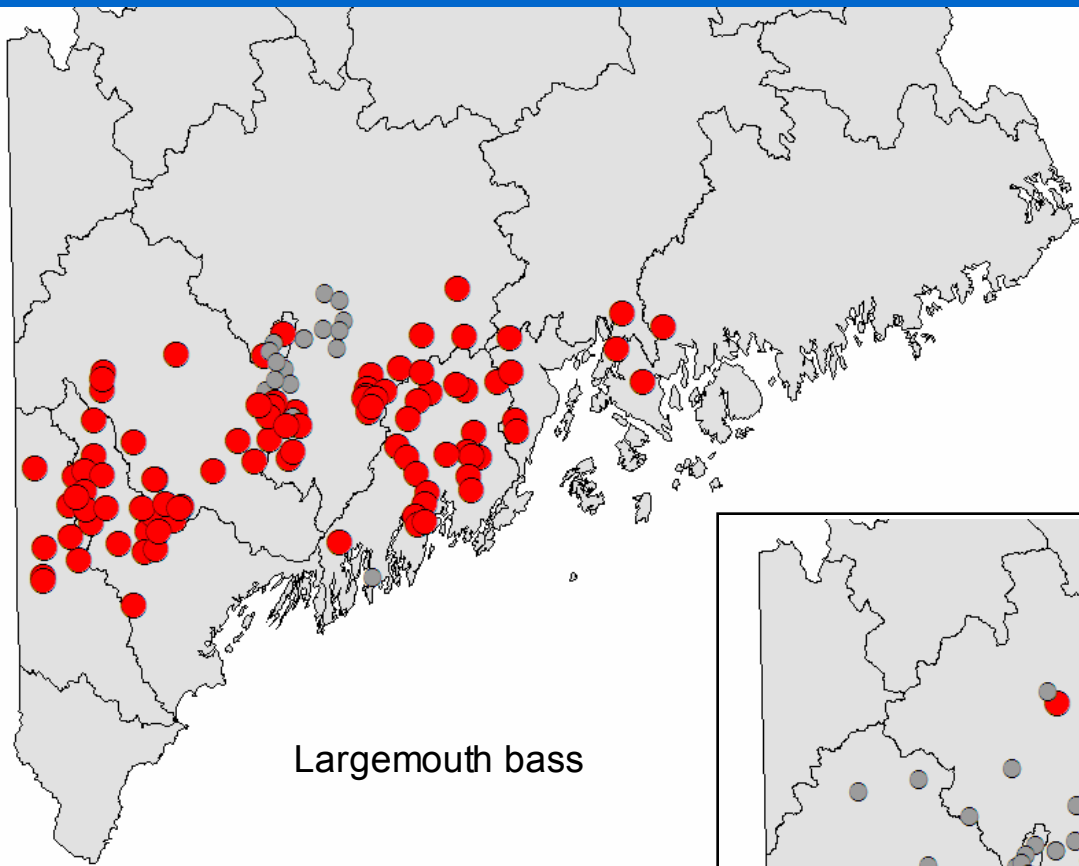
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3. For these readily detectable taxa, assume that species present in a lake in 2004 but not recorded in the 1930-40s derived from legal or illegal stocking, or 'natural' colonization.
4. Use IF&W stocking records to compare legal vs. illegal stocking and/or colonization.

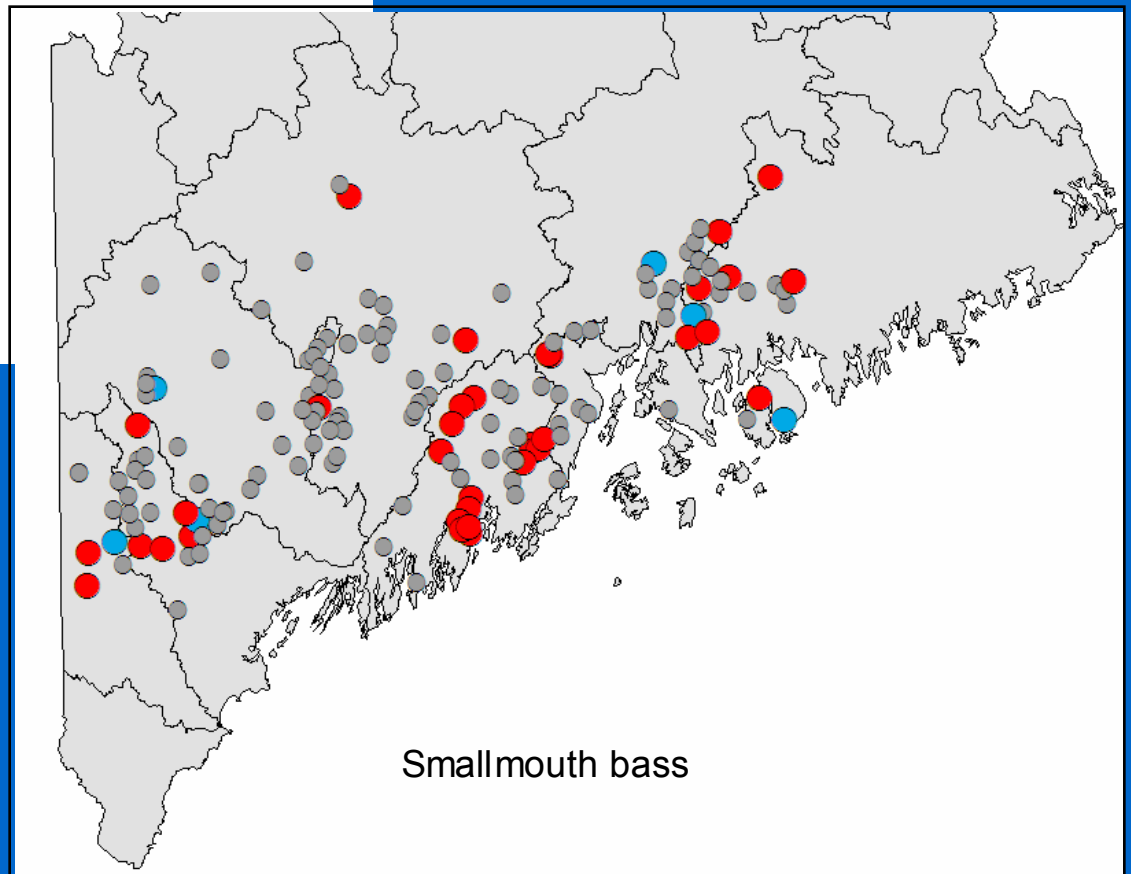


Number of lakes in which species are found: 1940s vs. 2004

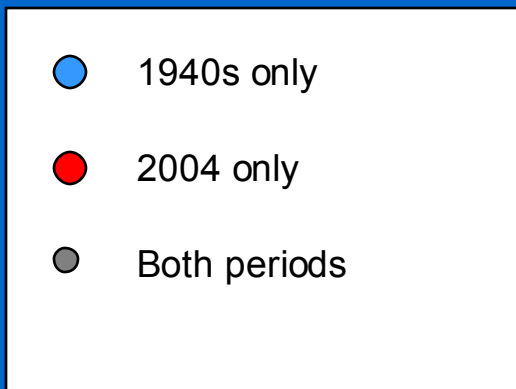
* = non-Maine native



Largemouth bass



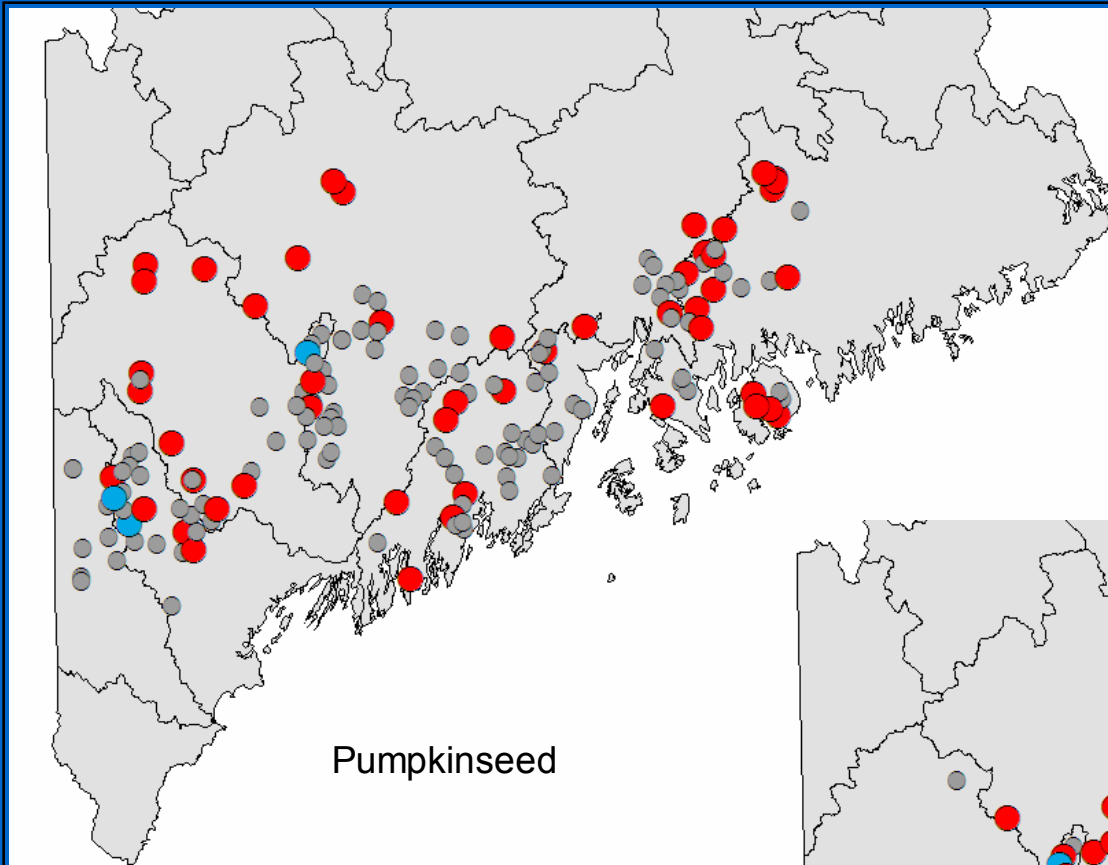
Smallmouth bass



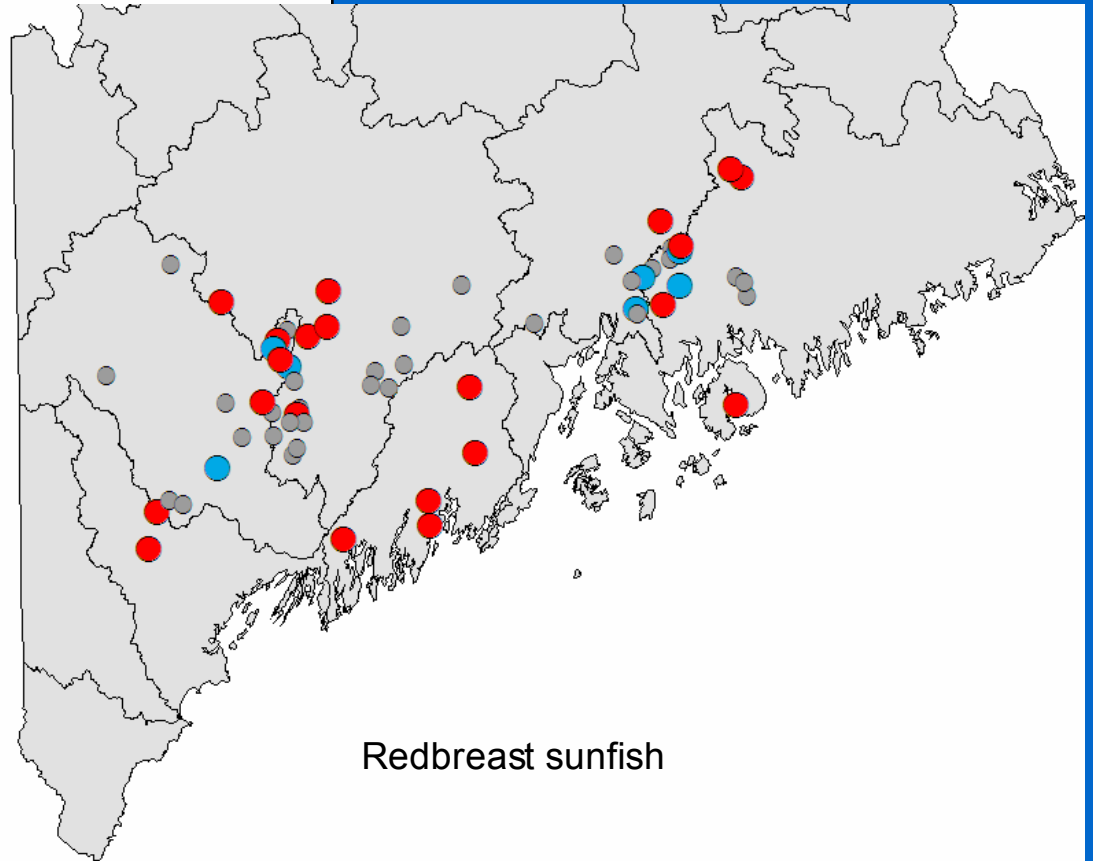
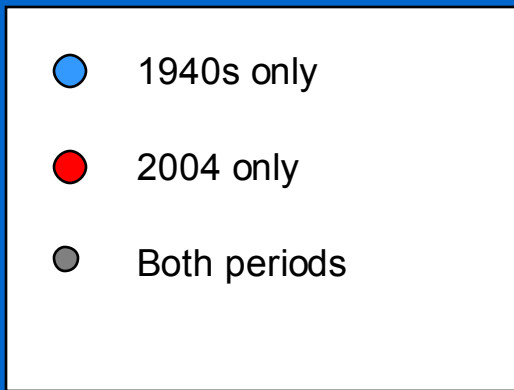
● 1940s only

● 2004 only

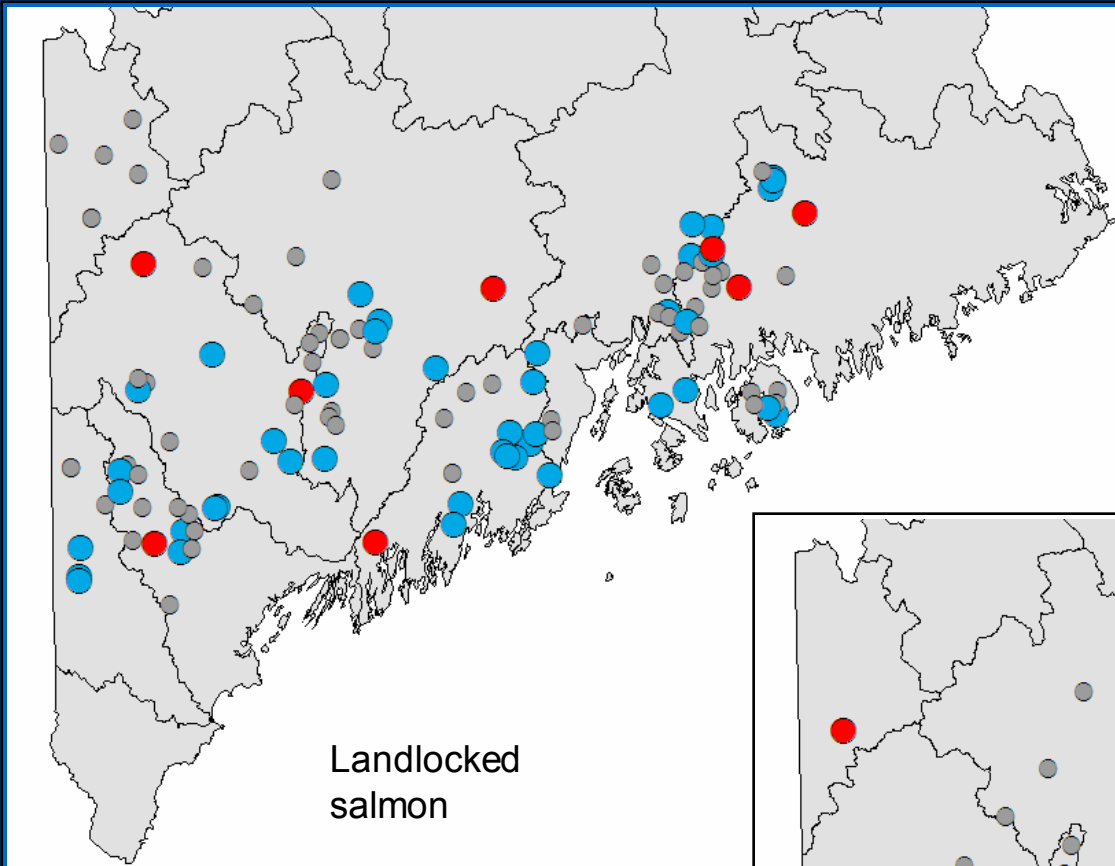
● Both periods



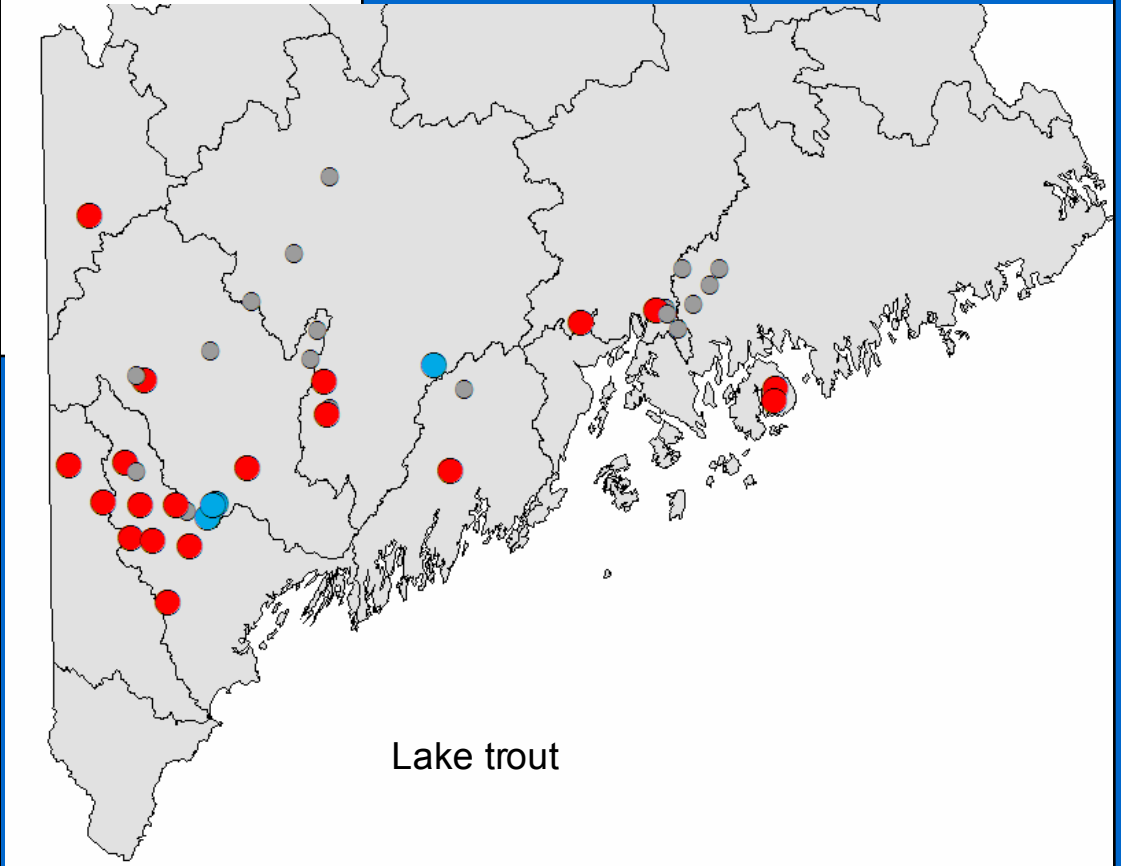
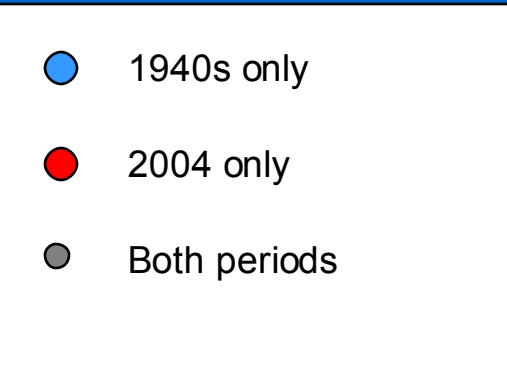
Pumpkinseed



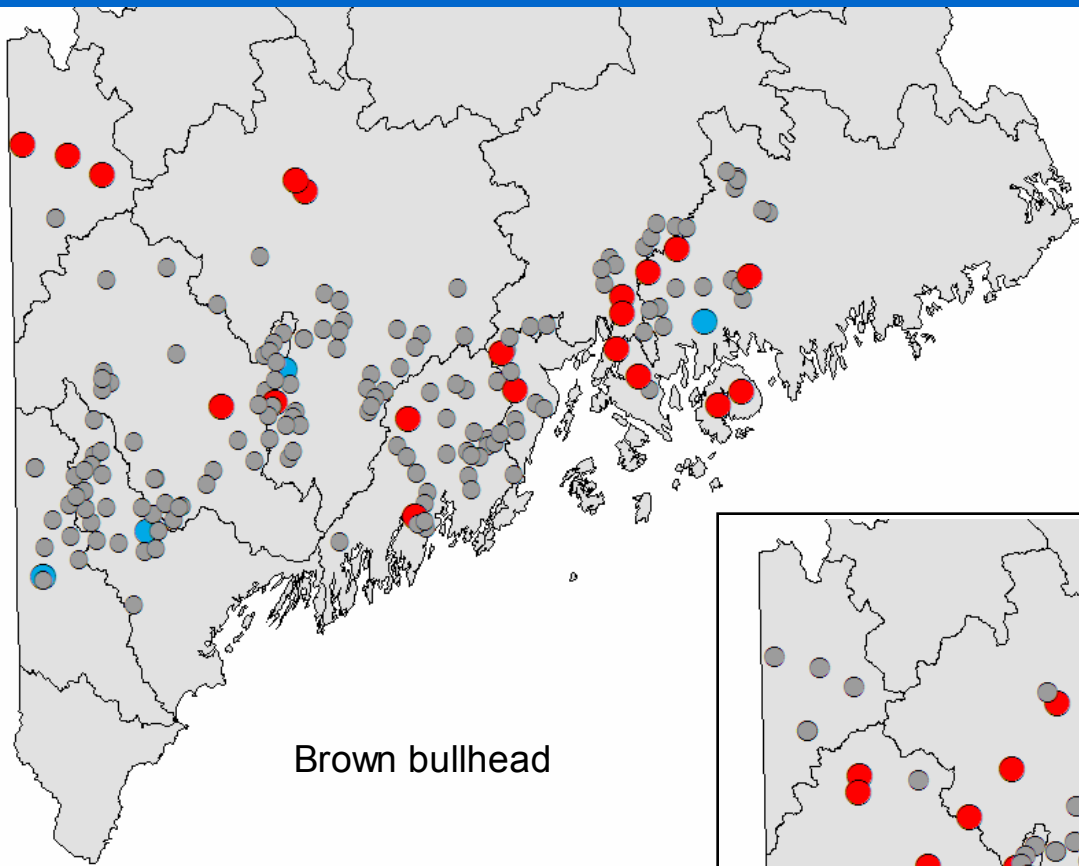
Redbreast sunfish



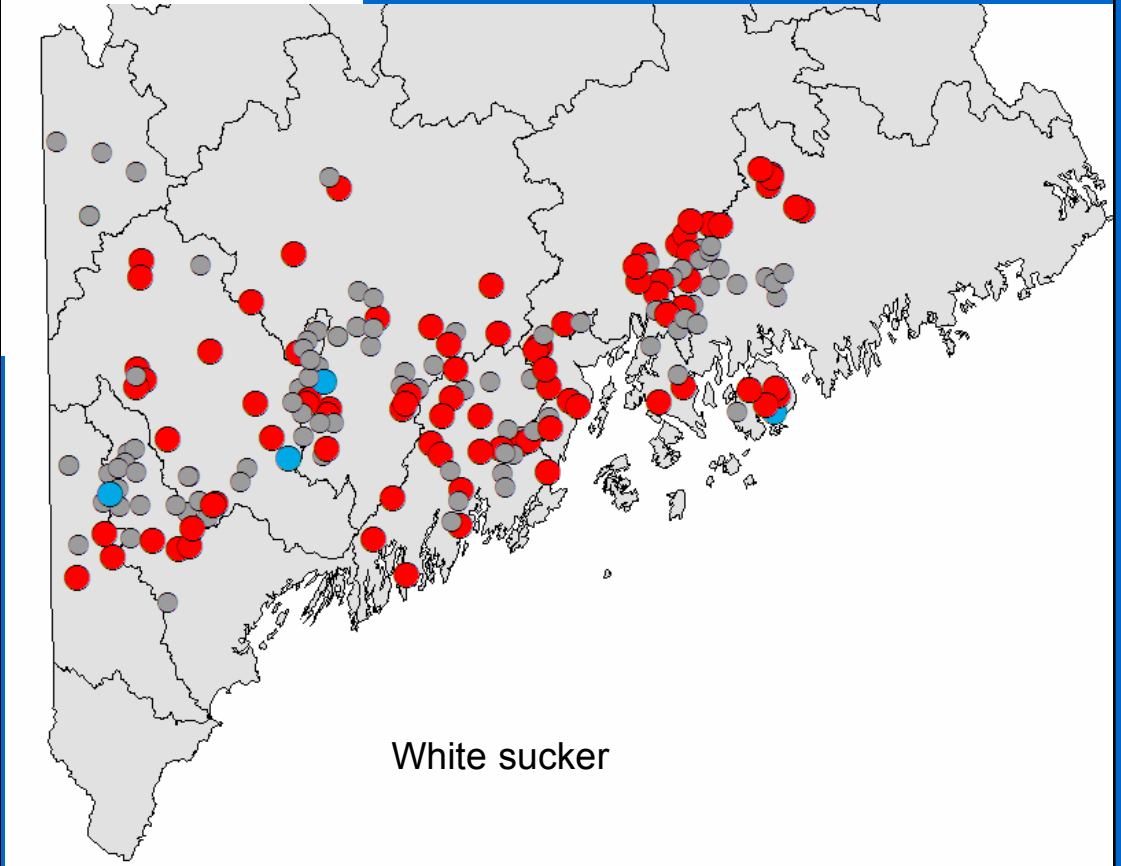
Landlocked salmon



Lake trout

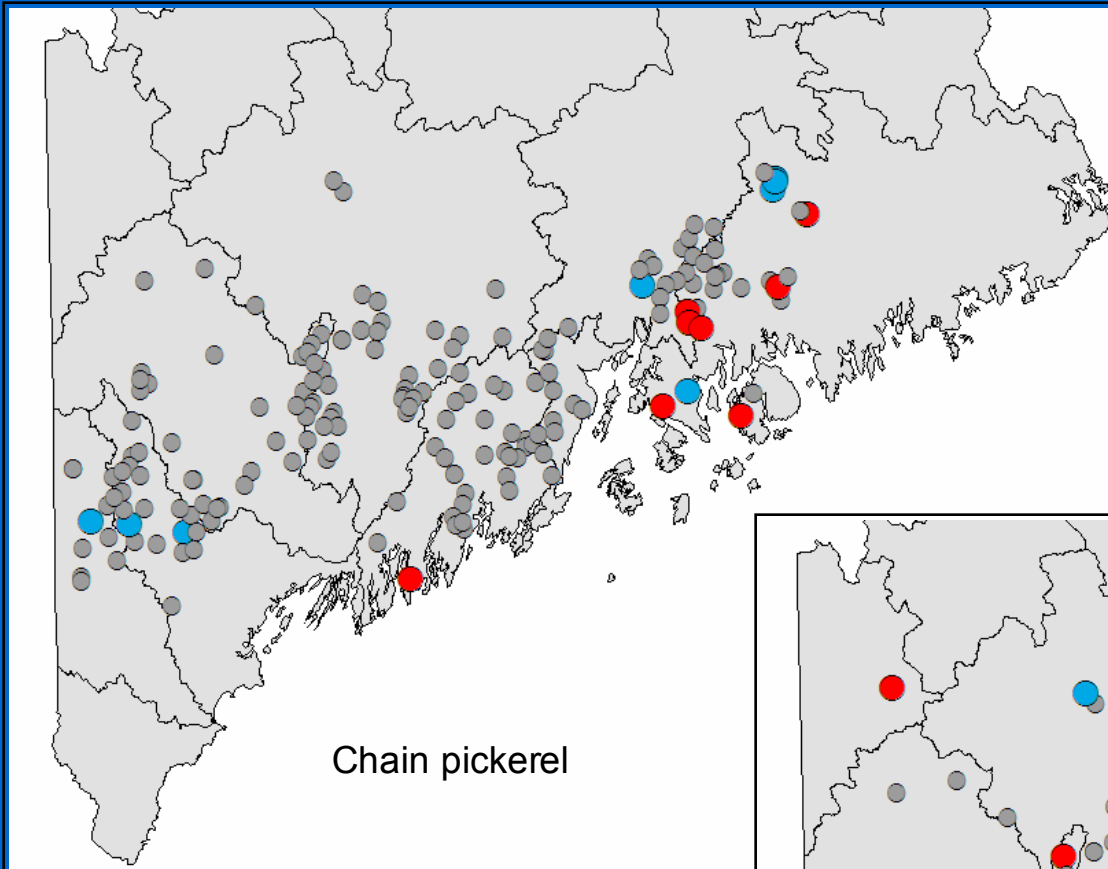


Brown bullhead

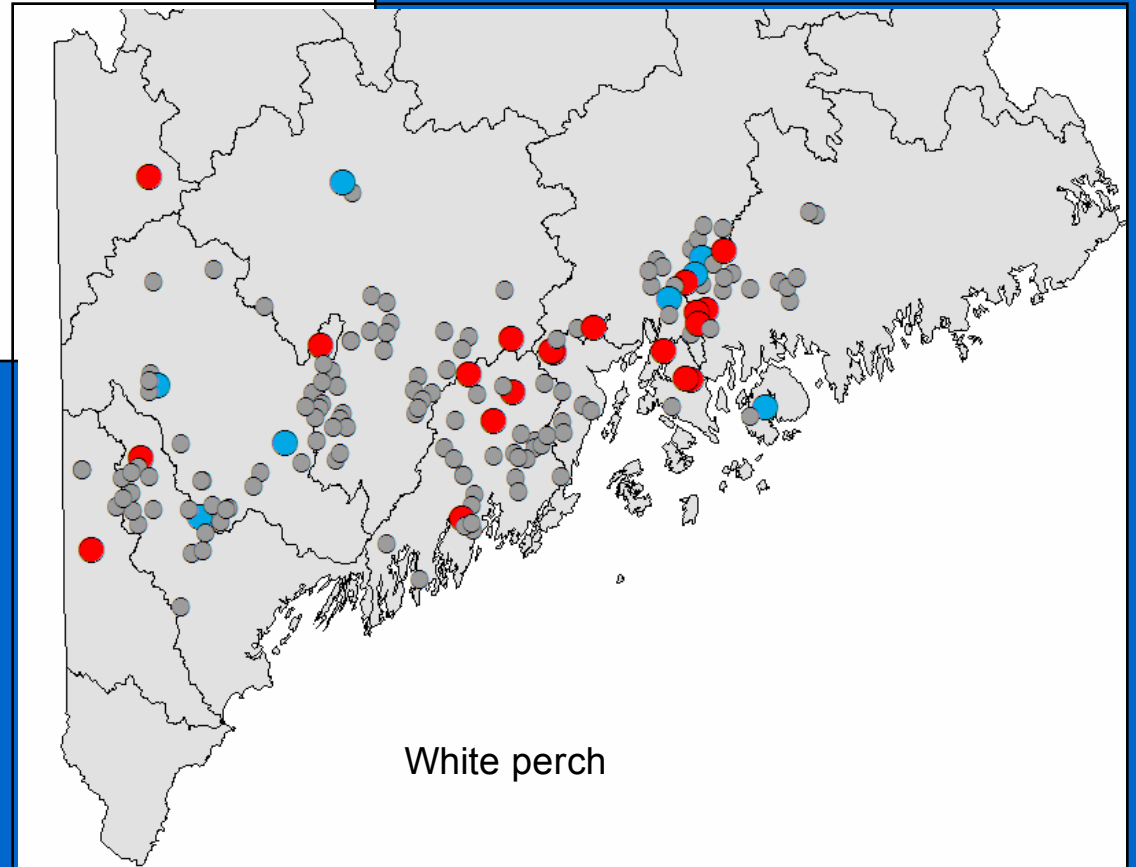


White sucker

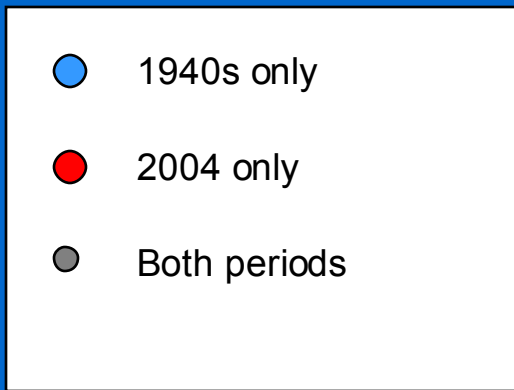
- 1940s only
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Chain pickerel



White perch



Species	# Lakes Stocked
Brook trout	1152
Landlocked salmon	307
Brown trout	298
Lake trout	135
Splake	101
Largemouth bass	90
Rainbow trout	73
Smallmouth bass	52
Atlantic salmon	31
White perch	29
Bass (sp.)	28
Chinook salmon	19
Arctic char	12
Chum salmon	10
Alewife, searun	6
Sockeye salmon	4
Lake whitefish	4
Coho salmon	3
Rainbow smelt	1 (?)
Chain pickerel	1

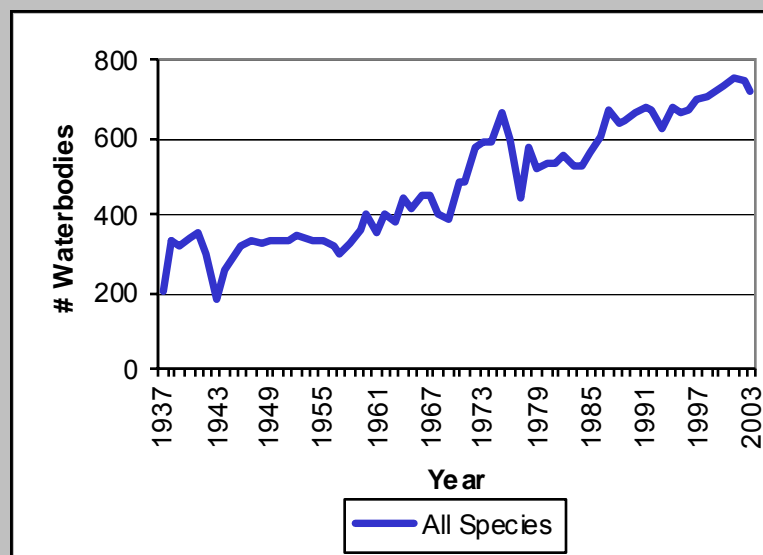
Number of lakes stocked by IF&W between 1937 and 2003, by species.

(period of stocking varies by species)

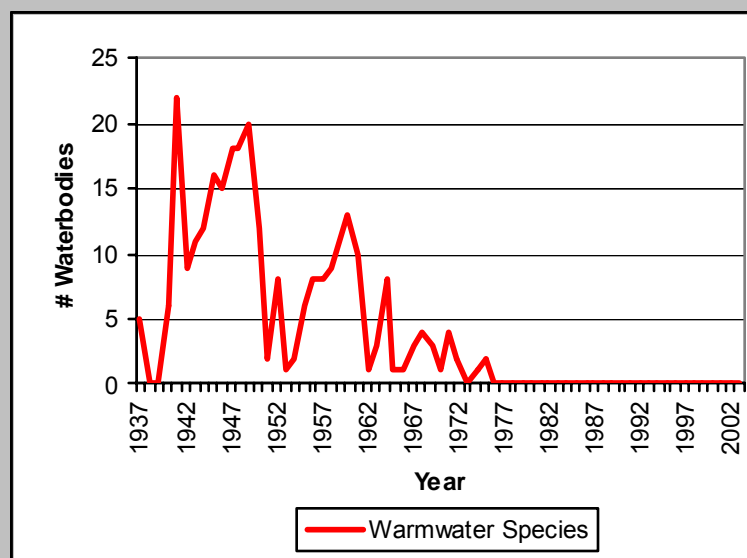
**Number of lakes and streams stocked
by MDIFW
1937-2003:**

(A) all fish species,

**(B) smallmouth/
largemouth bass.**



(A)



(B)



Brook trout



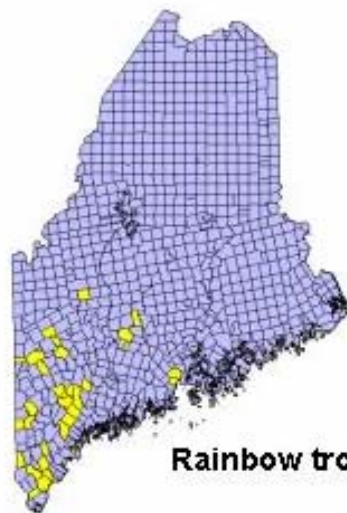
Brown trout



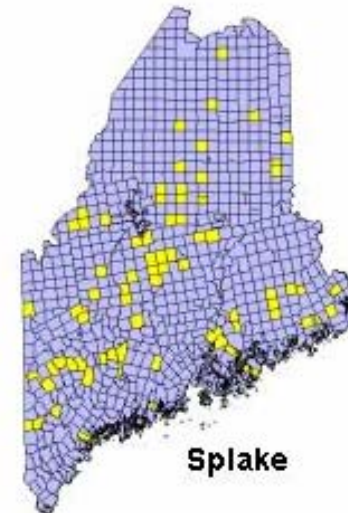
L-L salmon



Lake whitefish

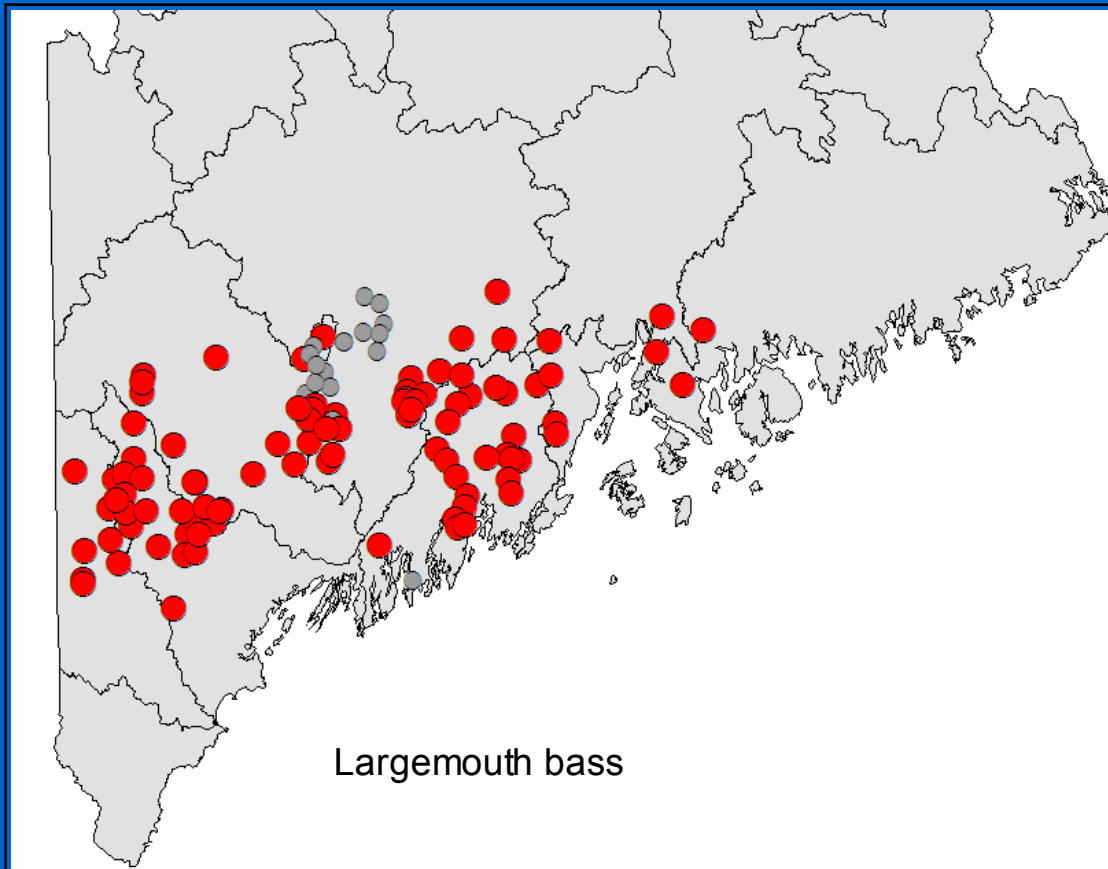


Rainbow trout



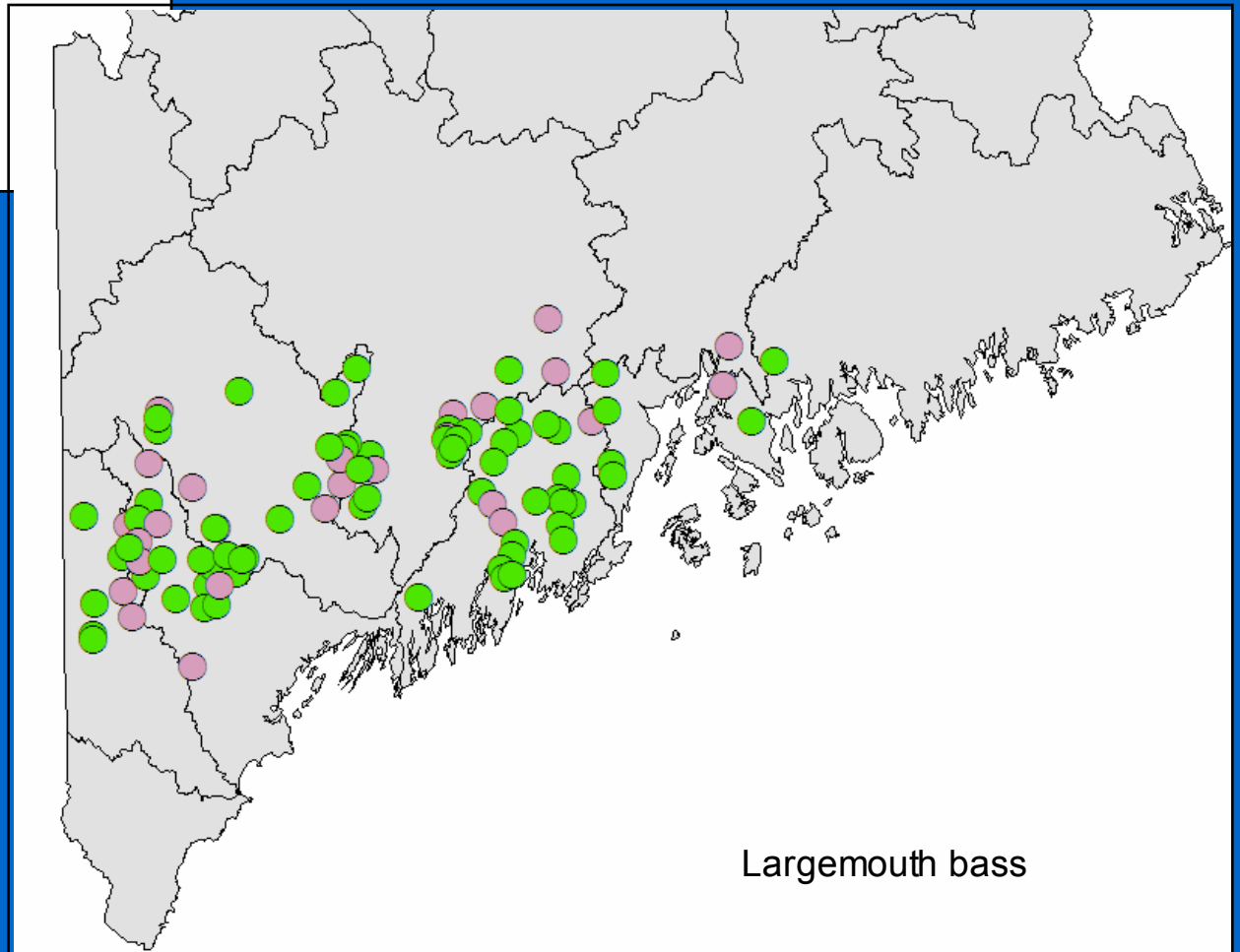
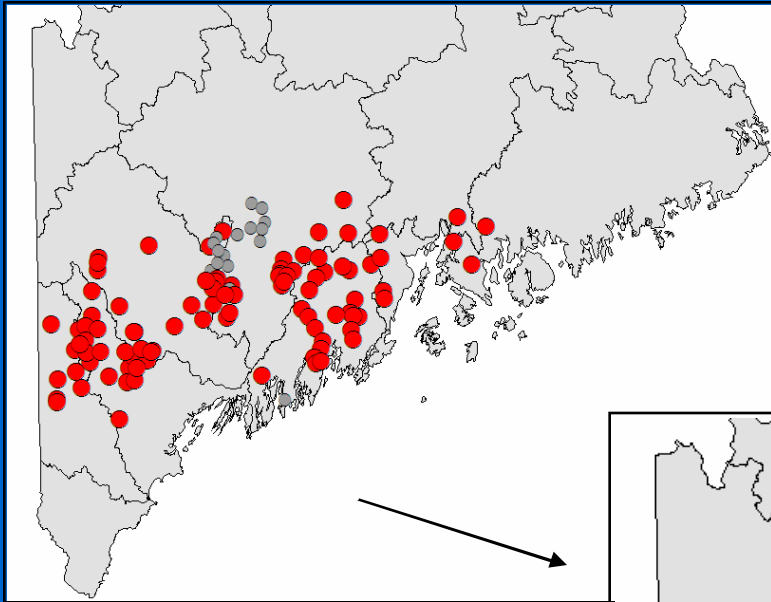
Splake

Fish stocking: 2000-2003



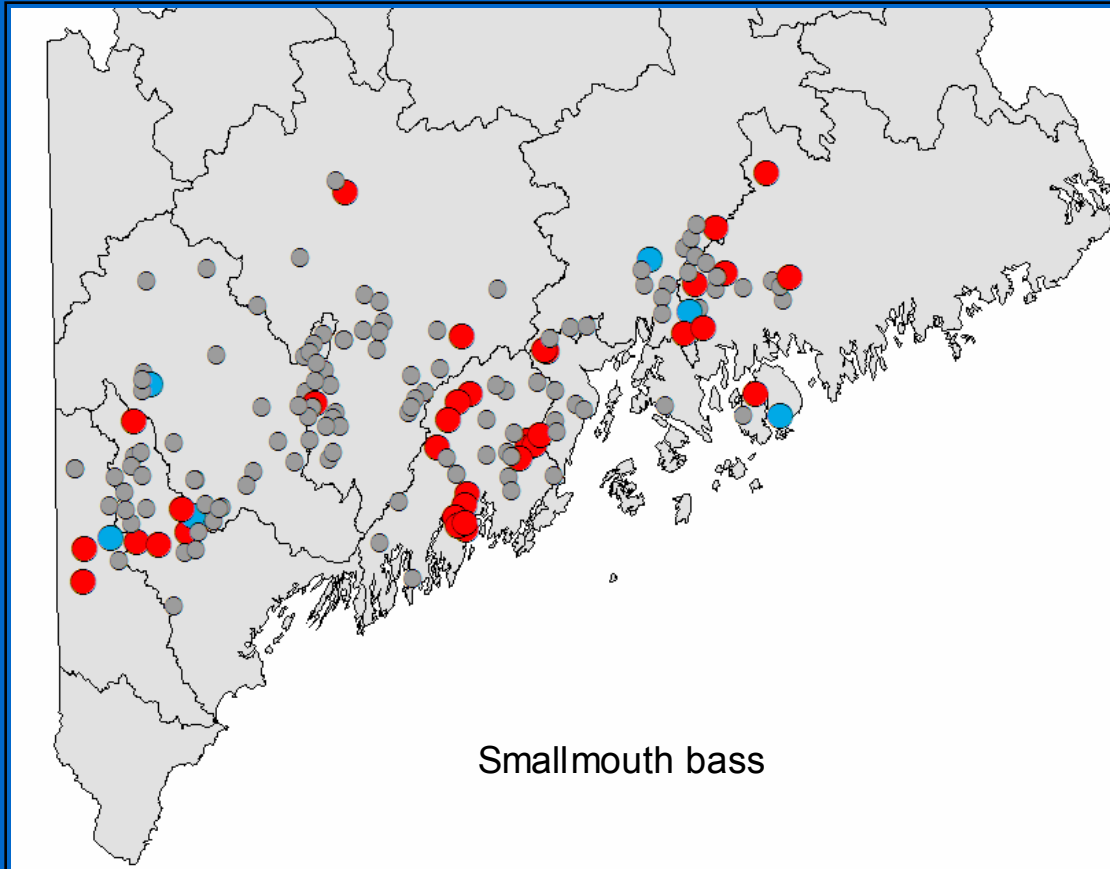
- 1940s only
- 2004 only
- Both periods

Use the IF&W stocking database (1937-present) to identify which of the new 2004 records (●) may have resulted from legal stocking.



- Illegal stocking/colonization
- Legal stocking (IF&W)

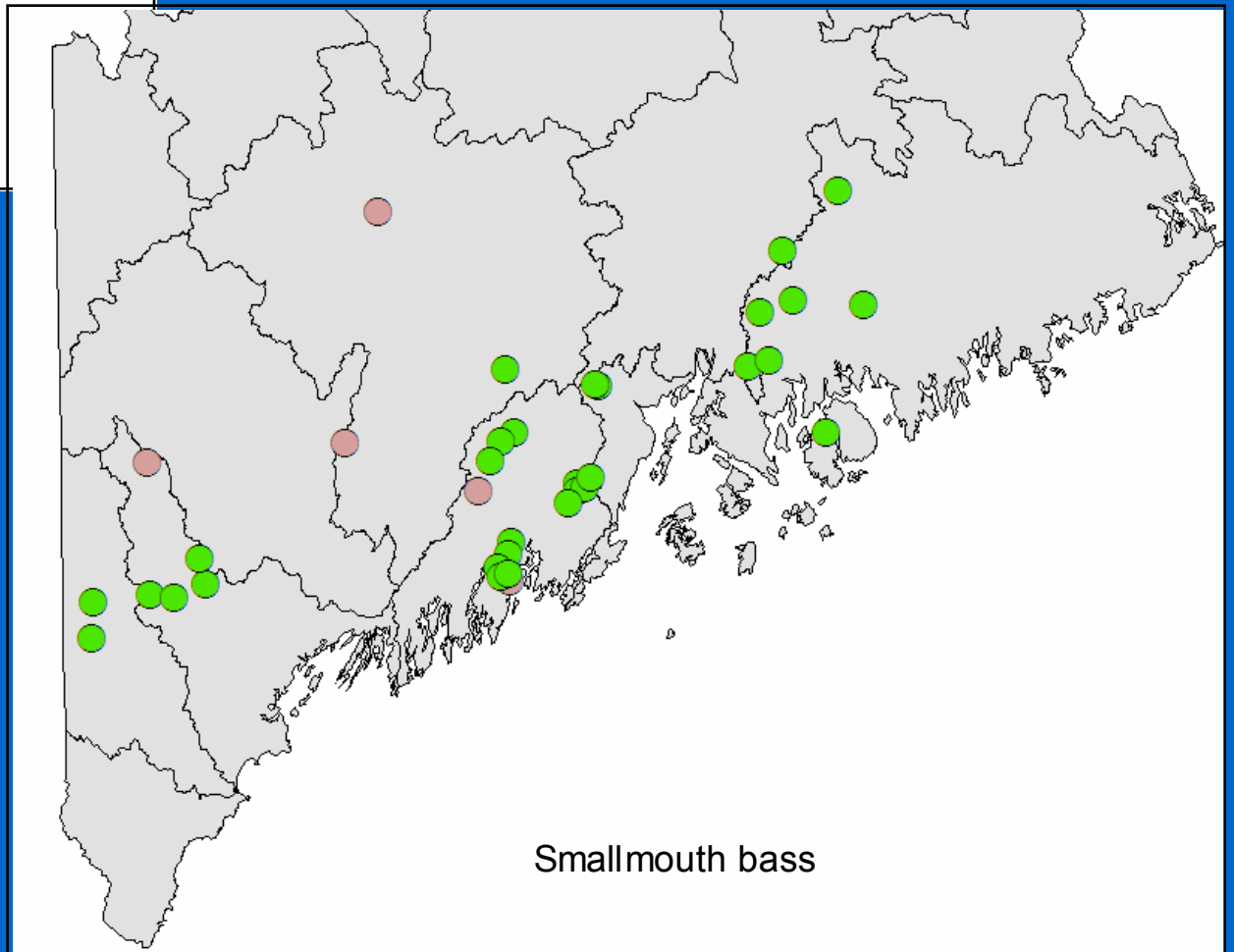
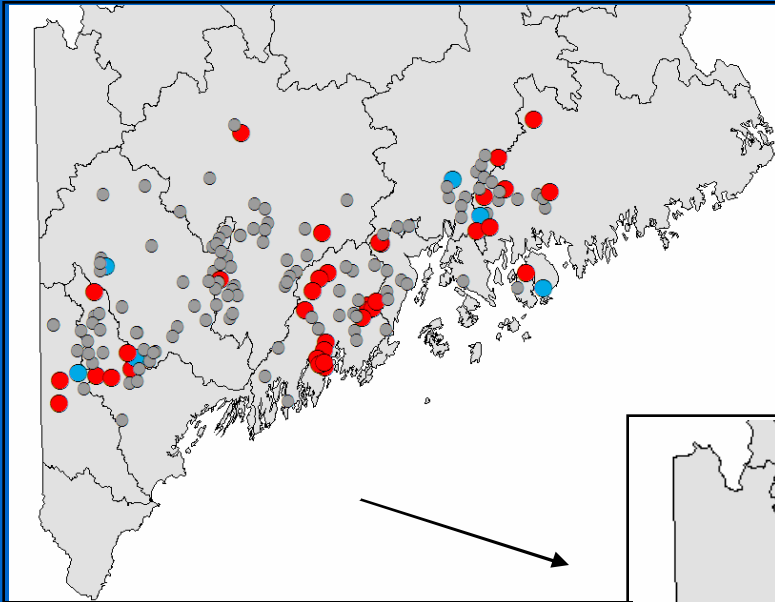
Largemouth bass



● 1940s only

● 2004 only

● Both periods

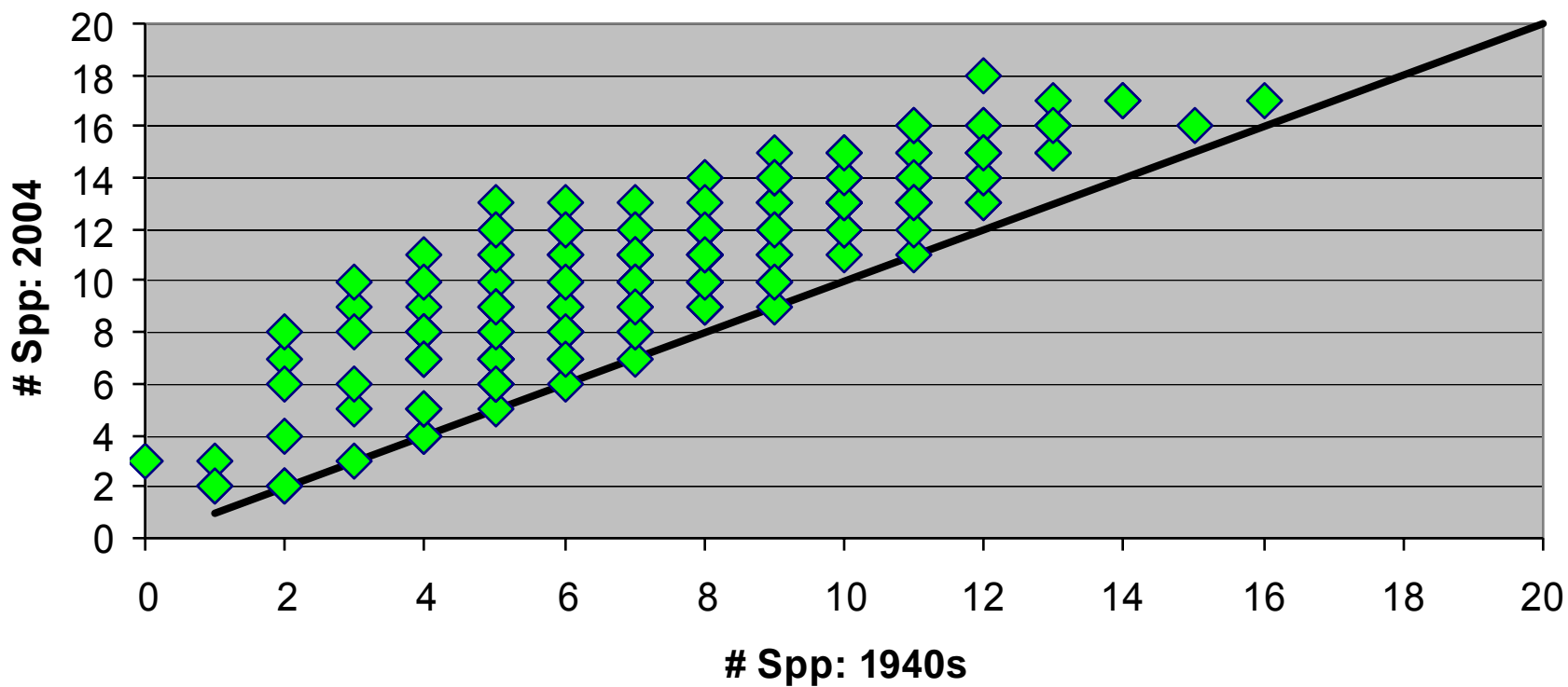


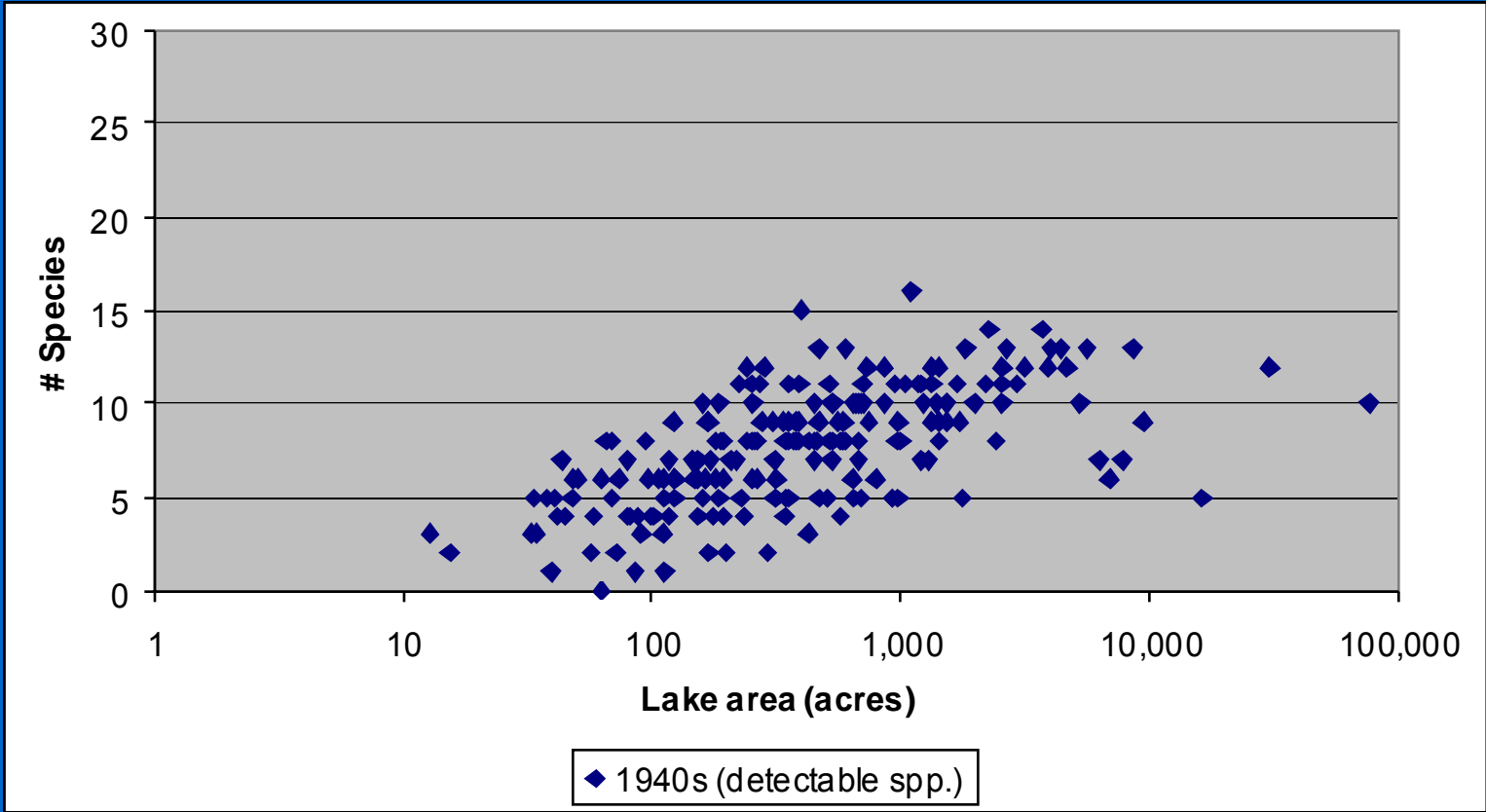
- Illegal stocking/colonization
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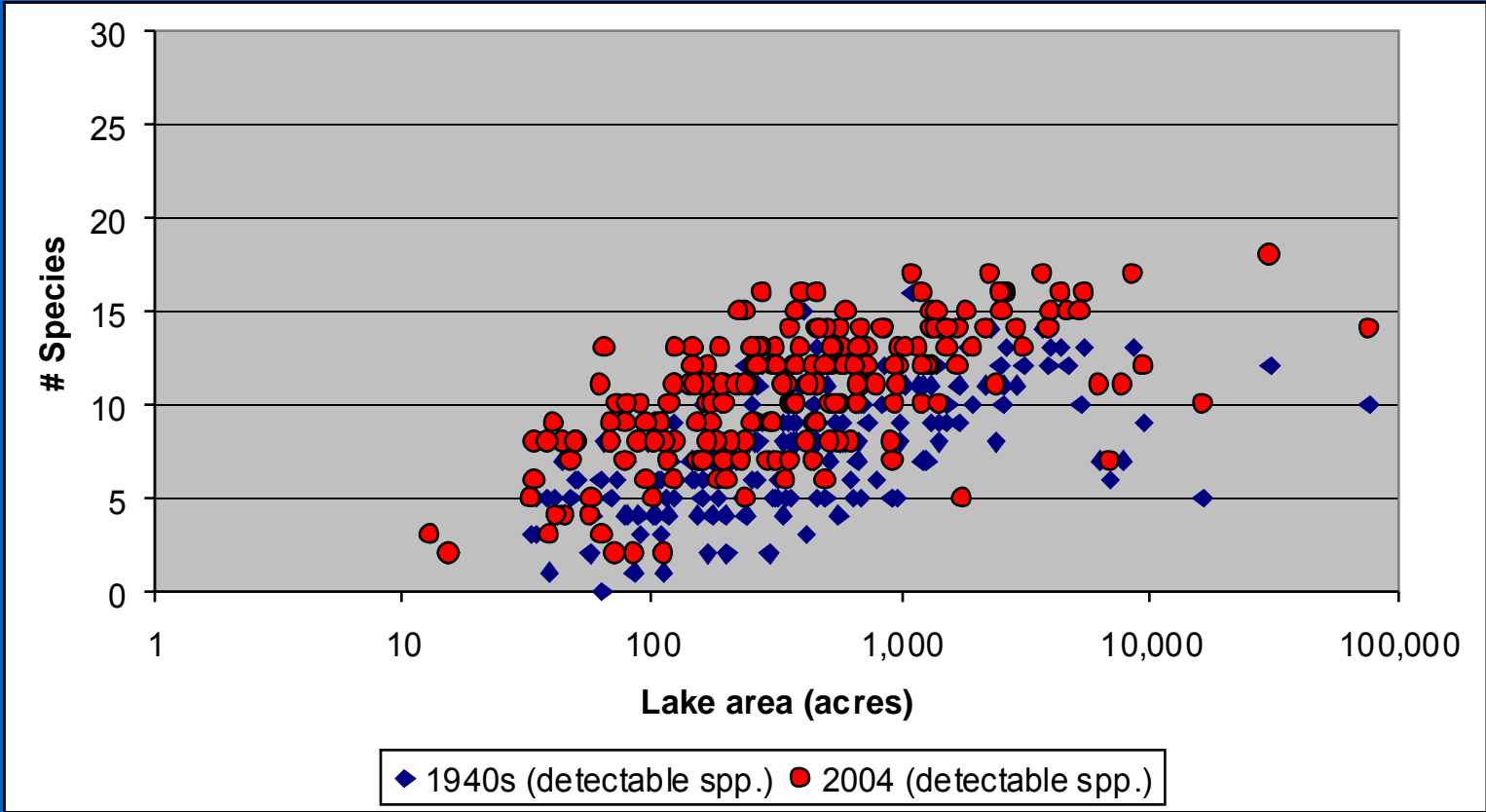
Smallmouth bass

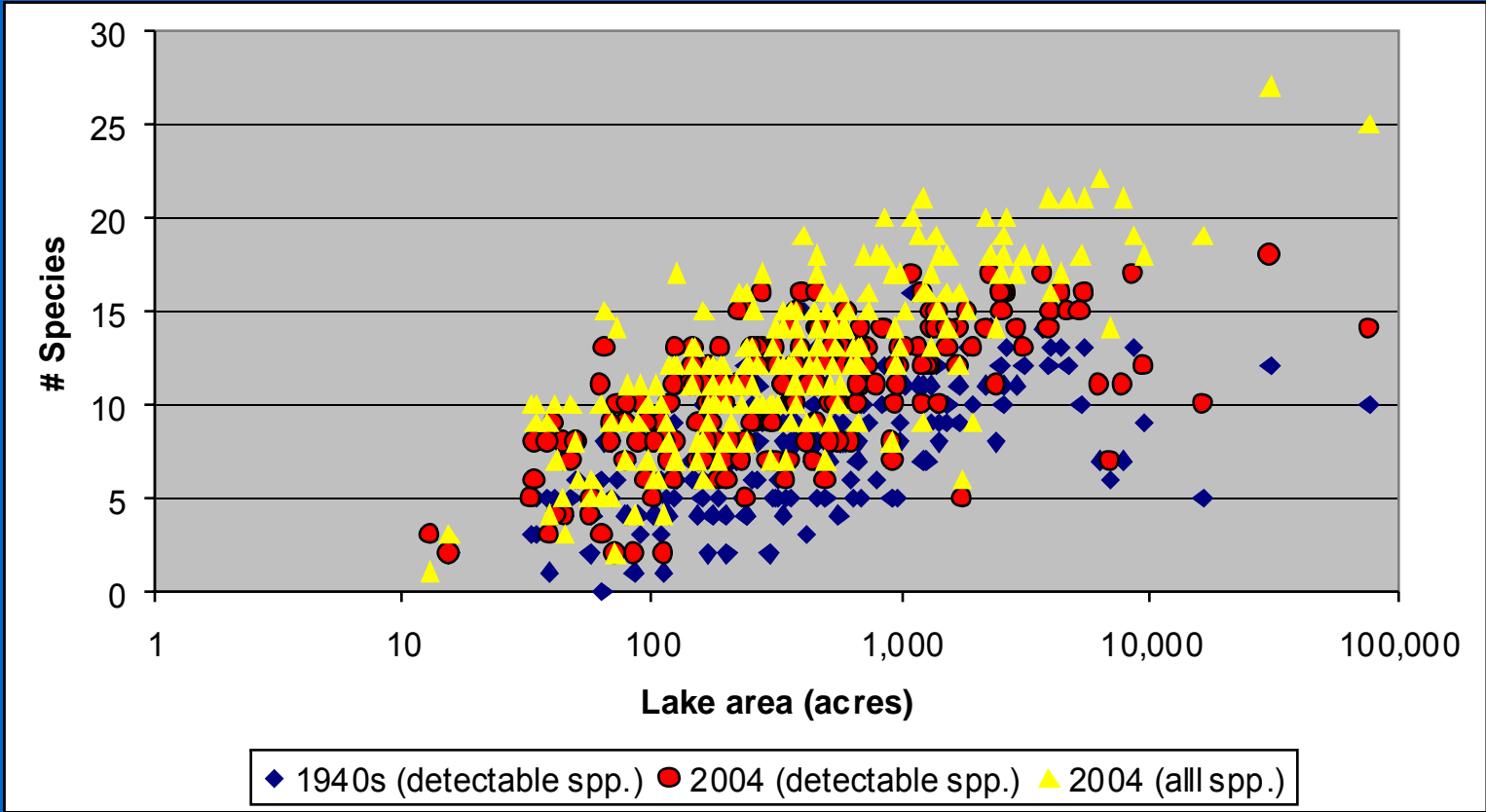
What are the impacts on overall species richness in lakes from the changes in fish assemblages that have occurred in the past 60 years?

Lake fish species richness: numbers of "detectable" species,
1940s vs. 2004

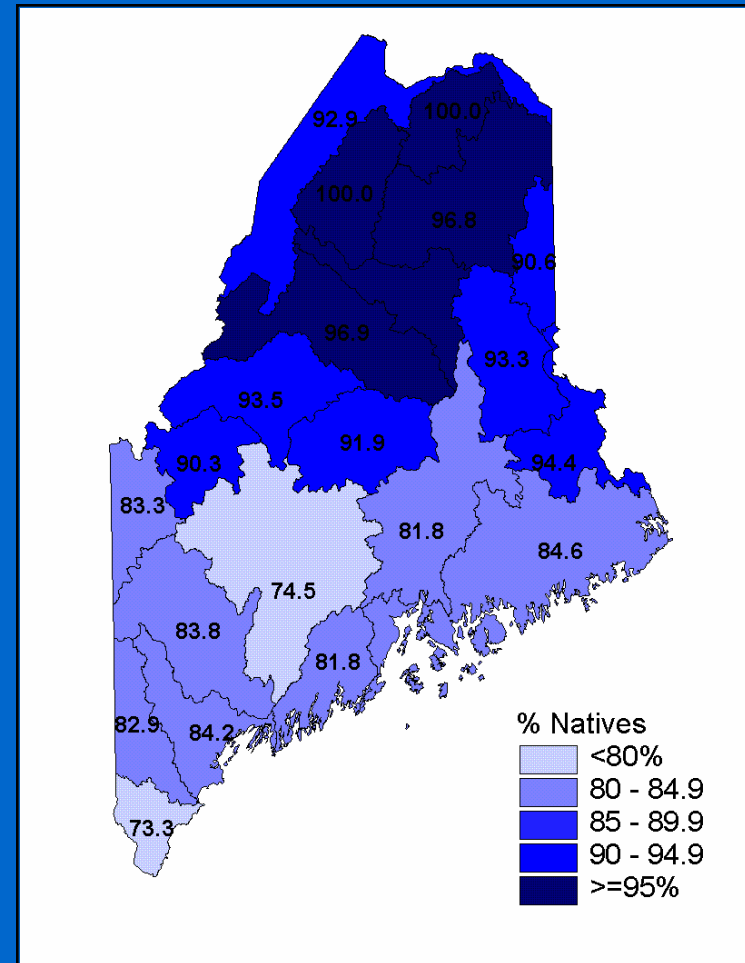
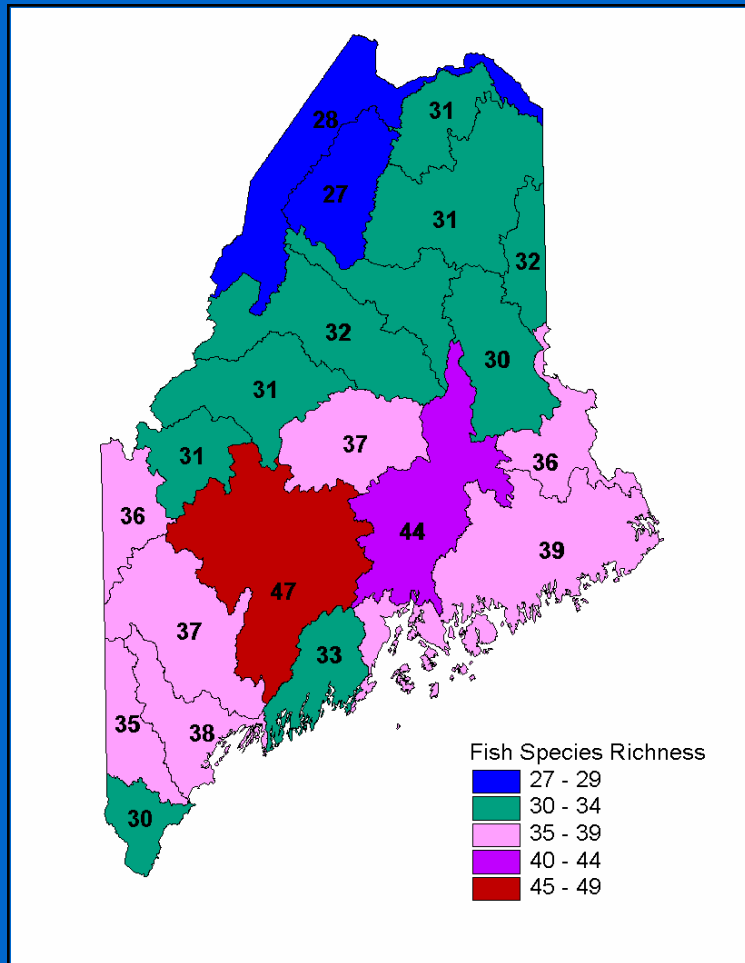






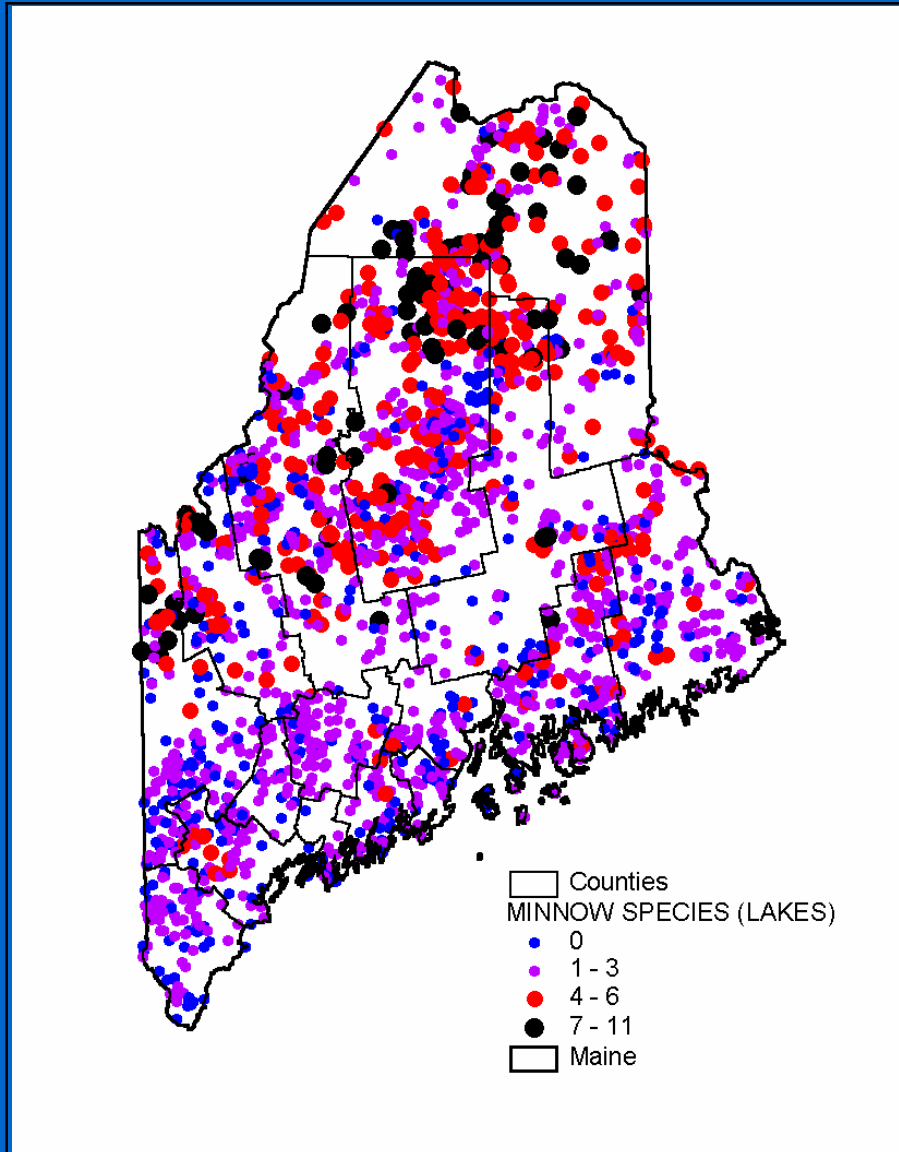


**What has happened with the species
that are less readily detectable – species
that may have been missed in the
Cooper surveys?**



**Fish species richness by large watershed (HUC-8).
(A) Total species, (B) % Maine natives.**

Species totals are the cumulative number of species (lake or stream) in each watershed.

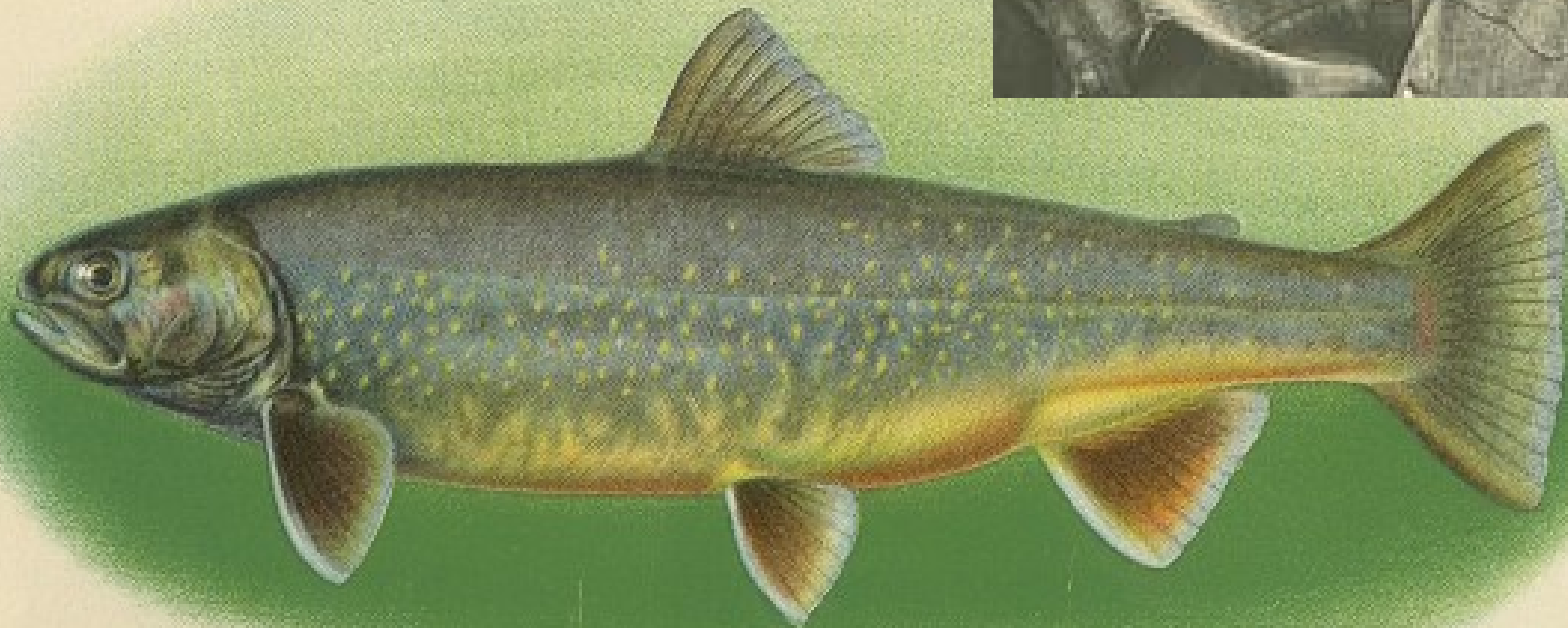
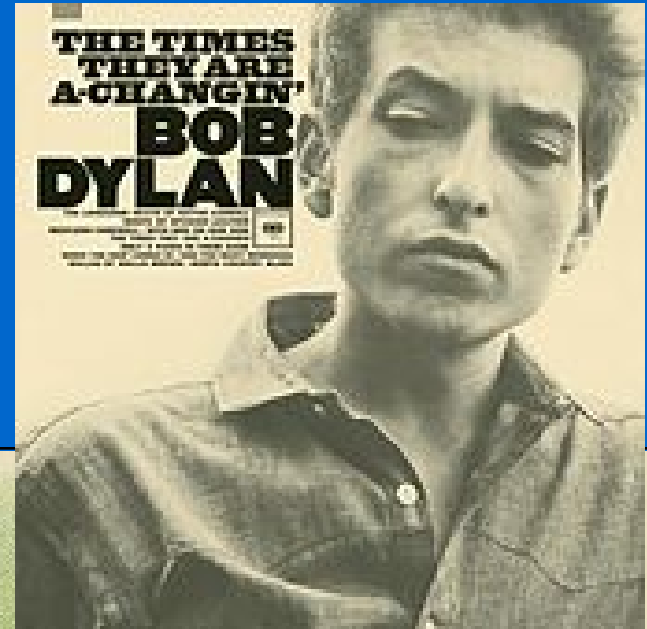


Minnow Species Richness

- We know that Maine's freshwater fish fauna has been modified by legal and unauthorized stocking.
- We know that unauthorized stocking is today continuing to increase homogeneity in the composition of fish assemblages.
- We know that this process is insidious – it's going on all the time, but often is poorly documented.

- We need to do whatever we can to document and publicize these changes so that they do not remain 'below the radar'.

- We also need to answer this question:
Why does it matter that the structure and character of Maine's freshwater fish assemblages do change over time? (Note that species additions are often Maine natives – just not native to the waterbody or watershed in question.)



Oquassa trout; blueback trout; quasky. *Salvelinus oquassa* (Girard). Breeding female, 15 inches long. From Rangeley Stream, Oquossoc, Me.