The Sooty Crayfish Timeline

Jim Holton, 19-March-2024

Within 4 years of the discovery of gold in California in 1848, the transformation of the San Francisco Bay Area began. Marshes were drained for farm land. Estuaries were transformed into salt factories. Foreign species were introduced. None of this was good news for *Pacifastacus nigrescens*, the sooty crayfish.

Like most invertebrates, the sooty crayfish was ubiquitous during its day. Now that it's gone, it is mentioned nostalgically in San Francisco Bay Area nature articles from time to time.

A timeline has been created by combining primary and secondary sources of information about the sooty crayfish to establish its historical range. Primary sources include factual news articles, advertisements, key events, and first hand accounts. Secondary sources are derived from other scientific reports and provide compiled facts and descriptions.

The genus name *Astacus* is used here when quoting or referencing a document that originally used that term.

The timeline starts with the arrival of Europeans in the Bay Area and stops when the sooty crayfish was considered extinct in 1976. The documents used are primarily from this period. Some other documents, from outside this range, that provide a factual understanding were used. The newspaper clippings come from the California Digital Newspaper Collection by the University of California – Riverside.

Time Line for Sooty Crayfish

1776 — Mission Delores was established in San Francisco to evangelize the Ohlone people and bring in Spanish Settlers. The Presidio, a military base, was established on the north side of the peninsula to protect the mission.

1848 — James Marshall discovers gold at Sutter's Mill in Coloma, California. San Francisco grew from 200 people in 1846 to 36,000 in 1852. About 300,000 people came to California during the gold rush.

1852— California's first salmon law is passed soon after the gold rush. Weirs or obstructions are prohibited and a closed season is established (Skinner, 1962:23).

1854 — Californians started to create commercial salt ponds along the San Francisco Bay. This was soon followed by land reclamation for farming and other uses. Eventually only 8% of the 545,375 acres of estuary tidal wetlands would remain by 1987 (SFEP, 1999:1).

1856 — William Stimpson collects the first sooty crayfish specimens as part of a three year exploration trip around the Pacific. His specimens are from a market in San Francisco (Stimpson, 1857:53).

1857 — Stimpson, after returning to Boston/Washington, publishes his description of the sooty crayfish at a meeting of the Boston Society of Natural History and in an extract entitled "The Crustacea and Echinodermata of the Pacific Shores of North America". He gives it the designation of *Astacus nigrescens*, meaning the "blackish crayfish." He compares *A. nigrescens* to *A. gambelii*. He states the habitat as California. (Stimpson, 1857:52-53).

1857 (San Joaquin Republican, Volume VII, Number 83, 8 April 1857) — "'Proceedings of the California Society of Natural History.' Stockton, April 2d, 1857. Dr. R. K. Reid, Pres't, in the Chair. …From Mr. J. Lawson— A fresh water lobster from the Stockton slough, and the head and horns of an elk (elaphus canadensis)… From Mr. J. D. Woodbury—A number of ancient copper coins and several old manuscripts dating from the year 1651…"

1859 — "Proceedings of the Boston Society of Natural History" describes *A. nigrescens*. It is "common in the vicinity of San Francisco" (BOS, 1859:87).

1861 — On January 25th, Harvard receives five *A. nigrescens* specimens collected by J.G. Cary. The locality is "San Francisco, Cal" (Harvard, CRU-3389).

1864 — (Placer Herald, Volume 12, Number 41, 11 June 1864) "A Rare Fish —No doubt many have heretofore supposed, who have enjoyed lobster salad as one of the epicurean dishes of the land, that this article of food was indigenous to the waters of California. But such we are informed is not the fact, being called upon to chronicle the first California fresh water lobster ever known to have been discovered. It was taken a few days ago out of Johnson's Creek, in Marin County. It is about six inches in length and quite perfect in its formation, having all the ugly appendages in the shape of claws, etc, which belong to this species of shell fish.— Flag, 30th.

"These lobsters are found imbedded a few inches deep in the sand at the mouth of San Pablo creek, Contra Costa county, and are of the same size as the one above mentioned. In the Steamboat Slough, at Stockton, they were formerly taken in great numbers, and we believe are still abundant; they are of a delicate pink hue and of a most delicious flavor. — Sac Star."

The first part of the article references that Johnson's Creek is in Marin. The 1913 California State Statutes place Johnson's Creek between San Lorenzo Creek and Alameda Creek in Alameda County. The description is "The following streams and waters are also navigable and are public ways: …Johnson's Creek, from its mouth at San Francisco Bay to Simpson's Landing…" (SOC, 1913:538-539)

The reference to Johnson's Creek in Marin is an error. Currently there is a Johnson Landing in the Mt. Eden Watershed, which is between San Lorenzo Creek and Alameda Creek in Alameda County.

1865 — The Smithsonian Institute catches fire and loses most of its collection.

1870 — Hermann Hagen publishes a description, in Latin, of the sooty crayfish, noting the notched rostrum, based on collections in the Harvard museum. The habitat is given as San Francisco, California. He looks at eight males and one female. He states that *P. nigrescens* and *A. gambelii* are different from

the other west coast crayfish by having a denticulated rostrum. At least two of the specimens were collected by T. G. Cary (Hagen, 1870:92).

1870 — This decade saw a plethora of foreign species introduced into the San Francisco Bay Area. It includes eastern oysters (1870), softshelled clams (1870), shad (1871), carp (1872), catfish (1874) and striped bass (1879) (Skinner, 1962:32).

1871 — Stimpson's Chicago Institute of Science, which rivaled the Smithsonian in size and importance, is completely burnt to the ground.

1871, 1872 — While William Dall was surveying the Aleutian Islands he collected zoological specimens. There is a specimen labeled *Pacifastacus (Hobbsastacus) nigrescens* (other id: *A. nigrescens*) in the Smithsonian database. The associated card's collection notes state "Unalaska; W. H. Dall (275); U.S. Coast Survey" (USNM, USNM 8954). This is probably a labeling error as no *Pacifastacus* species has otherwise been collected north of British Columbia. Dall's collection and related documents do not support this label (Kawai, 2012:81).

1873 — On October 25th, The Harvard University collection receives six *A. nigrescens* specimens collected by Franz Steindachner. The locality is "San Francisco, Cal". One female specimen is sent to St. Petersburg (Harvard, CRU-3390).

1874 (The Humboldt Times, Volume II, Number 109, 4 November 1874) — "A Chinaman who cast his net for shrimp the other day caught fifteen or twenty of the young lobster. Some of which he brought, to one of the Fish Commissioners, in accordance with a previous understanding." This is in regards to San Francisco Bay.

1877 (Sacramento Daily Union, Volume 3, Number 103, 23 June 1877; Weekly Colusa Sun, Volume XVI, Number 26, 30 June 1877) — "…The musical rattlesnake did not favor me with his presence or a tune upon his castanets. He is a now sojourner along the Sacramento River. One was caught crossing the river at Jacinto. I was somewhat interested in the fish trade, though I could not condescend to wet a line in a stream which contains no trout. The crayfish, a fresh water lobster, is caught now and then, but I was content to leave the business to the ibis..." Jacinto is 90 miles north of Sacramento.

1878 — William Lockington in the *Annals and Magazine of Natural History* writes about *A. nigrescens*, "This species appears to be found in most of the larger brooks of the central counties of California, such as the Alameda Creek, Alameda Co., Coyote Creek, Santa-Clara Co., and San-Joaquin Slough. It is occasionally sold in the markets of San Francisco. Adult specimens exceed 4 inches in length." (Lockington, 1878a:303) He does not say that it is found in San Francisco itself. Lockington was a member of the California Academy of Sciences.

1878 — Lockington in *Walks around San Francisco* mentions the sooty crayfish. In No. 111, titled "Lake Honda and Seal Rock", Lockington writes that "… *Astacus nigrescens*, the blackish crayfish, is usually of quite a light tint." (Lockington, 1878b:791)

1878 (Daily Alta California, Volume 30, Number 10241, 25 April 1878) — “In addition to fresh-water fish for our streams, creeks, brooks and rivers, a number of lobsters were brought across the continent. Most of those sent died on the way, but a few were yet alive upon arrival, and were put into the waters of this Bay; but, since then, the only indication of their existence has been, in a few isolated instances, a very small young lobster among the shrimp taken by the fishermen. What has become of the original stock and their progeny? Have the old ones died, and the spawn and the young lobsters, if any, been destroyed by the shrimp-takers and others? And, as with the lobsters, it appears it has been with the tens and hundreds of thousands of other young fish and spawn brought and planted in our streams. They do not seem to reach market.”

1879 — Lockington writes that "Already the fishery carried on in the Bay of San Francisco is much less productive than it was in the early days of the American occupation; species that were abundant fail to attain their full dimensions. Nor is over-fishing the sole cause of this. The constant hurrying to and fro of the numerous ferry-boats and other steamers, indispensable to our comfort, tends to drive away the timid finny tribes, whilst the ashes and cinders let fall injure the character of the bottom.

“But the injury from this source is small compared with that inflicted by the constant fouling of the waters and consequent destruction of life by the foetid in pourings of our sewers into the waters to pollute them for the destruction of creatures of which human beings are largely dependent for the means of life. As the supply in San Francisco Bay has become limited, the scene of wholesale destruction is now shifted to Tomales Bay whence a very large reportion of our fish is now brought" (Lockington, 1879:19).

1880 — Thomas Huxley’s "An Introduction to the Study of Zoology – The Crayfish" which was published in England, is a comprehensive guide to the world's crayfishes. He uses *A. nigrescens* as an example of a California crayfish. He produces some excellent figures which show features of *A. nigrescens* that differentiate it from species of *Astacus* found in Europe. He gives the habitat as California (Huxley, 1880:244-247). He includes an excellent diagram of the carapace of *A. nigrescens* (Huxley, 1880:233).

1880 (Daily Alta California, Volume 32, Number 11075, 10 August 1880) — “The first anybody see ‘a young lobster in a lot of shrimps’, let him secure the specimen and present it to the Fish Commissioners. They want to see one of the ‘young lobsters’ but have failed thus far, to find one. The ‘young lobsters’ that are found among the shrimps were found in the Bay long before any lobsters were planted here, and are not lobsters, at all – they do not grow any larger than the specimens usually exhibited.” Crayfish resemble small lobsters. However, people not familiar with lobsters could mistake certain species of crabs and shrimps as young lobsters.

1884 — Walter Faxon mentions *A. nigrescens* in a "synonymical list of the known species of ... *Astacus*". It is a compilation work. He gives the habitat as "San Francisco, California; Steilacoom, Washington terr (Faxon, 1884:152). The reference to Steilacoom is misleading. None of the three sources, cited by Faxon under the *Astacus nigrescens* entry, mention Steilacoom. Originally a card in the Smithsonian collection was noted “*Astacus nigrescens* ? ; Fort Steilacoom, Wash.” And “W. Faxon det.; Differs from typical *A. nigrescens*”. At some much later time, a typewriter was used to change the species to “*Pacifastacus gambelii*” by G.C. Miller (USNM, USNM 2526).

1885 (Daily Alta California, Volume 38, Number 12796, 26 April 1885) — "When the mixture is at boiling point pour it into the pan in which you place the carp, and stew it on a brisk fire. When cooked put the fish on the dish and surround it with crawfish and fried squares of bread. Add the sauce, thickened with a good piece of butter."

1886 (Daily Alta California, Volume 41, Number 13630, 24 December 1886) — "His stall is headquarters for such delicacies as frogs, ecrevisses, prawns, pompanos and terrapins, green turtle and trout in all varieties." The signal crayfish (*P. leniusculus*) was exploited for the commercial market as *ecrevisse*. It was brought into California for culinary purposes and biological material (Skinner, 1962:124).

1887 (Daily Alta California, Volume 42, Number 13720, 25 March 1887) — an advertisment lists *ecrevisse* for sale but no price. The advertisement ran periodically from March 22nd to June 24th.

1887 (Daily Alta California, Volume 42, Number 13742, 16 April 1887) — "'Hints for Housewives for the Saturday Marketing.' Ecrevisses – Fresh-water lobsters – are sold from 75 cents to $1 a pound…Crayfish are scarce at $5 per hundred." Basically the e*crevisse* are sold for around 10 to 20 cents each and the crayfish are sold for 5 cents each. Apparently the local crayfish are scarce but available.

1887 (Humboldt Times, Volume XXVII, Number 115, 17 May 1887) — A correspondence from San Francisco in a letter writes "'Notes for Housewives'…fresh water lobsters, $1 per dozen".

1887 (San Jose Weekly Mercury, Volume XXXV, Number 40, 1 October 1887) — "A fish-dealer at Portland shipped 200 dozen crawfish to San Francisco Monday night. They were caught in the Willamette River, and a dozen good-sized ones weighed three pounds. It is intended that they shall reach San Francisco."

1887 (Daily Alta California, Volume 42, Number 139 45, 5 November1887) — Freshwater crawfish are $1 per dozen and Lake Tahoe trout are 20 to 25 cents per pound.

1888 (Marysville Daily Appeal, Volume LVIII, Number 53, 1 September 1888) — "'Craw-Fish Mistaken For a Lobster. ' [Wheatland Graphic] During their absence at Vernon this week, Sam Enochs and party, among other things, captured a young lobster. It is one of a lot which the Fish Commissioners put in the streams some time ago, and was as active as the ordinary lobster. It is one first of the lot that has been captured [sic]." Vernon is near Los Angeles and is outside of the sooty crayfish's probable range. In 1959, a survey found this area occupied by *P.clarkii* (Riegel, 1959:47).

1891 (San Francisco Call, Volume 70, Number 14, 14 June 1891) — In an article about black-bass fishing in San Andreas Lake, which is south of San Francisco, a fisherman is quoted as writing, "The most killing lures are minnows, hellgrammites, crayfish and small catfish. Crayfish are to be found under the stones in the shallows...." The black-bass are not native and the crayfish were being used as lures.

1898 — Faxon writes that there is a large female *A. leniusculus* from San Francisco County in the collection of the California Academy of Sciences, no. 3259. He mentions that the species had been previously recorded at the Columbia River and Puget Sound (Faxon 1898:666). *P. leniusculus leniusculus*

is tolerant of salinities up to 17 ppt and can be found in the upper reaches of the San Francisco Bay complex (Herbold 1989:50).

1899 (Red Bluff Daily News, Volume XIV, Number 139, 30 June 1899) — “It proved to be a crayfish, a specie of Crustacea, very common in the fresh water, lakes and streams of the Eastern States, but unknown in this part of California. It is esteemed a very delicate food and is much sought after. It resembles a lobster in some respects, but is much smaller, the largest not measuring more than four inches. About four years ago the United Slates Fish Commission planted a large quantity of crayfish in the Sacramento and other rivers, but for a long time it was thought that they had not done well, but it now appears that there must be a great many in the river. The one caught last evening is the first on record near Red Bluff.” Red Bluff is 135 miles north of Sacramento.

1900 — Samuel Holmes mentions the sooty crayfish, *A. nigrescens*, in a paper about crustaceans for the California Academy of Sciences. He republishes Stimpson's description and gives its locations as “Unalaska, Alaska; Fort Steilacoom, Washington; San Joaquin Slough, Coyote Creek, Santa Clara County; Alameda Creek, Alameda County, California (Faxon).” (Holmes, 1900:166)

1900 — According to J. A. Riegel (in 1959), Stanford University fish collecting trips at the time (1900) indicate that “there are no native crayfishes south of the Klamath River, with possible exception of the Eel River system”(Riegel, 1959:48). The Shasta crayfish (*P. fortis*) inhabits the Pit River drainage.

1900 — Faxon is credited as stating that *A. leniusculus*, the signal crayfish, is present in San Francisco County (Holmes, 1900:166).

1900 (Red Bluff Daily News, Volume XV, Number 156, 4 September 1900) — “’the exotic animal trade is flourishing. …crayfish cost one dollar a dozen and newts are 15 cents each. In ordering crayfish, it is requested that a few days' notice be given in which to secure them in case the stock should be low.”

1902 (San Francisco Call, Volume 87, Number 99, 7 September 1902) — “Fresh ecrevisse every day at Golden Gate Park Casino. Transfer at the Chutes." This advertisement ran for two weeks.

1906 — San Francisco earthquake destroyed much of the collection at the California Academy of Sciences. A search of the online catalog, as of February 20, 2024, showed no *P. nigrescens* specimens in the current collection.

1912 — *A. leniusculus*, signal crayfish, were brought to Brookdale Hatchery in Santa Cruz County California from Oregon to test crayfish depredatory effects on young trout. After the test in 1914, many of them were released in the San Lorenzo River near Santa Cruz. About 200 were sent to the Shebley Ranch in Nevada County, California where they were placed in a private pond. (Riegel, 1959:46)

1914 — Faxon in "Notes on Crayfishes" lists *A. nigrescens fortis*, the Shasta crayfish, as a subspecies separate from *A. nigrescens*, the sooty crayfish (Faxon, 1914:360). He refers to Stimpson's 1857 paper and indicates that the type specimen for the *A. nigrescens* was probably destroyed in the Chicago fire of 1871. The location given for *A. nigrescens* is "Neighborhood of San Francisco, Cal." (Faxon, 1914:408) An *A. leniusculus* specimen collected by Wm. Palmer at the base of Mt Tamalpais in Marin County,

California is in the national museum. No collection date was given. It may be a hybrid with *A. trowbridgii* (Faxon, 1914: 358).

1915 — Paul Bonnot writes in a 1930 article, “The Russian River figured as a source of supply [of crayfish] at one time. In 1915 a fisherman on the Russian River took about 8000 crayfish with hoop nets [crab nets] and shipped them to San Francisco and San Jose." (Bonnot, 1930:216) These were introduced crayfish as the sooty crayfish was never observed on the Russian River. Riegel showed *P. clarkii* and *P. leniusculus* in the Russian River in 1959 (Riegel, 1959:47).

1925 — *Procambarus clarkii* was imported from the Midwest to the Bay Area at least as early as 1925 and is well established (Skinner, 1962:124).

1930 — Bonnot mentions *A. nigrescens* as being one of two native crayfish in an article about crayfish in California. He does not mention that it is extinct, perhaps because he does not differentiate the sooty crayfish from the Shasta crayfish. He wrote that crayfish have never been an important part of the commercial fishery in California, because of a lack of market and their scarcity. But, he states:

> Some years ago quite a few were consumed in San Francisco, the main source of supply being Coyote Creek near San Jose. A few are still used for culinary purposes and by beginning biological students. Most of these are imported from Oregon.

In the same article (Bonnot, 1930:212-216), Paul Bonnot has several pictures of crayfish. In each caption, he identifies the specimen as *A. leniusculus* (signal crayfish) and that they were taken from the San Lorenzo River at Brookdale on February 7, 1930. Brookdale is located in the Santa Cruz Mountains along Highway 9 about ten miles north of Santa Cruz.

Bonnot also states that a law was passed to protect crayfish in California fish and game district four for the next two years (Bonnot, 1930:216). The law reads:

> Sec. 628l. Every person who in fish and game district number four takes, catches, kills, destroys or has in his possession any fresh water crayfish (Ecrevisse) before the first day of January, 1932 is guilty of a misdemeanor.

Bonnot writes that “according to Holmes” the distribution of *A. nigrescens* is San Francisco County to Alaska (Bonnot, 1930:213).

1932 — In a letter from W. H. Shebley to T. L. Storer, the crayfishes that were released into Lake Tahoe, El Dorado County, CA, were still thriving in 1916 (Riegel, 1959:46-48). There are crayfish in Lake Tahoe as of 2024.

1930s —The red swamp crayfish, *P. clarkii*, was brought to California the 1930s as forage for frog farms, and was widespread from southern California to the Central Valley by the 1950s (Riegel, 1959:46). Other correspondence indicates introduced crayfish were doing well throughout the state (Riegel, 1959:48).

1950 — *Astacus nigrescens* is renamed *Pacifastacus nigrescens* by R. Bott (Kawai, 2012:75). This was done as part of an effort to distinguish five American pacific crayfish species from the European crayfish species.

1959 — Riegel reports in "California Fish and Game" that he has conducted a field survey of California crayfish. He reports that all places in the Bay Area that were occupied by *P. nigrescens* are now occupied by *P. leniusculus* (Riegel, 1959:46).

1972 — Horton Hobbs includes *Pacifastacus nigrescens* in Smithsonian's identification manual #9 (Hobbs, 1972: 22).

1977 — Sooty crayfish *(P. nigrescens*) is "considered extinct" (Bouchard, 1977a:419; Fisheries, 2011:62).

Summary

The timeline shows that the sooty crayfish, the local crayfish, was still plentiful enough to be in the markets of San Francisco in 1887. It shows that the signal crayfish, *P. leniusculus* was also being imported and sold as *ecrevisse*, the fresh water lobster, during this time. Based on prices, the signal crayfish was preferred over the sooty crayfish by buyers.

The earliest report of *ecrevisse* is from 1886. The signal crayfish seems to have been established in San Francisco County before 1898 (Faxon).

The *Sacramento Daily Union* in 1877 wrote that a crayfish was in the Sacramento River at Jacinto, California. Jacinto is 90 miles north of Sacramento and beyond any reported range of the sooty crayfish, so this could be an indication of an early introduction to the Sacramento River drainage by the signal crayfish. The *Marysville Daily Appeal* reported in 1888 that "the Fish Commissioners put [crayfish] in the streams some time ago". According to the *Red Bluff Daily News*, the United States Fish Commission planted a lot of crayfish in the Sacramento and other rivers around 1895.

Primary sources reporting the sooty crayfish's habitat as San Francisco or its general vicinity are 1856 by Stimpson, 1861 by Cary, and 1873 by Steindachner. Other reports give specific locations at either the east side of the San Francisco Bay (East Bay) or the San Francisco Delta. Reports of "small lobsters" showing up around the San Francisco Bay cannot be definitively connected to the sooty crayfish.

Reports for the East Bay are at San Pablo and Johnson's creeks in 1864 per the *Placer Herald*, Alameda Creek in 1878 by Lockington, and Coyote Creek also by Lockington. A secondary source, Paul Bonnot in 1930, said that Coyote Creek was the main source of crayfish for the San Francisco market. The mouths of these creeks have been heavily affected by salt production and reclamation while the lower portions of the streams have been urbanized. J. A. Riegel collected signal crayfish in these areas in 1959 and this author collected a crayfish there in 2021, which he identified as a red swamp crayfish, *P. clarkii*.

The San Francisco Delta is the marsh area surrounding the convergence of the Sacramento and San Joaquin rivers prior to entry into the bay area. In 1857 Dr. R.K. Reid showed a "fresh water lobster" collected from the "Stockton slough" to the California Society of Natural History.

The *Placer Herald* in 1864 reported that crayfish were found in Steamboat Slough, at Stockton, and that they were "formerly taken in great numbers" there. It assumes crayfish were still present there in 1864. Steamboat Slough is part of the Sacramento River. At the closest, it is 22 miles from Stockton, which is along the San Joaquin River.

In 1878, William Lockington noted the habitat of the sooty crayfish included the San Joaquin Slough.

Based on market reports, the last indication of the sooty crayfish being extant is in 1887. It was sold along side *ecrevisse*.

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