Cannery Row in Monterey in California is a poem, a sink, a grating noise, a quality of light, a tone, a habit, a nostalgia, a dream.

Cannery Row by John Steinbeck opens with vivid imagery. It hedges the line between poetry and prose.

Cannery Row is the gathered and scattered, tin and iron and rust and splintered wood,

And paints the setting for our something something cast of characters.

chipped pavement and weedy lots and junk heaps,

And right in the second sentence is the sardine fishery.

sardine canneries of corrugated iron.

One of the first Californian industries to take root, and one that famously crashed in the 1950s.

The sardine collapse launched a multi-institutional research collaboration to figure out what was going on.

A collaboration that is still actively collecting, which has lead to one of the oldest and largest
EMILY (cont’d)
fisheries datasets in the world. Housed here in San Diego.

SOUND: SHIP SOUNDS

AMY
And initially I think most people thought it was just over fishing. Populations can be overfish. XX it’s, it’s, it’s not always about overfishing y’all, there’s a lot of other factors involved.

EMILY
You’re probably noticing a sound quality difference in this interview. For this episode, I joined a research team on the San Diego based vessel, the NOAAS Reuben Lasker. I spoke with-

CALCOFI NAMES

EMILY
Researchers who are still collecting physical and biological oceanographic in the California Current.

This data has been used to highlite marine conservation efforts.

GARDNER
And have been used to determine if the cow creek conservation area is actually working because they have a certain stations within the park conservation area. And since it was put into place, we’ve seen that it is helping the populations. And so a lot of stuff just good. Awesome.

EMILY
And it’s effective because it’s a long term dataset.

DAVE
And sometimes the season is too damn rough, were bobbing up and down so much that you can only do what you can do. Neptune will, Neptune will laugh at your plan essentially is kind of your situation.

STEINBECK
How can the poem and the sink and the grating noise - the quality of light, the tone, the habit, and the dream - be set down alive?

EMILY
There is a lot of science apprication in Cannery Row.

(CONTINUED)
When you collect marine animals there are certain flat worms so delicate that they are almost impossible to capture whole, for they break and tatter under the touch.

But the marine environment has changed so much since the 1940s. In ways Steinbeck couldn’t consider.

You must let them ooze and crawl of their own will onto a knife blade and then lift them gently into your bottle of sea water.

I’m your host, Emily T. Griffiths. Stay with us.

And perhaps that is the best way to write this book - to open the pages and to let the stories crawl in by themselves.

Along Cannery Row, there are many lovable characters.

I’m going to highlight a few.

Mack was the elder, leader, mentor, and to a small extent the exploiter of a little group of men who had in common no families, no money, and no ambitions beyond food, drink, and contentment.

We are introduced to Mack as he threatens the owner of the grocery shop, Lee Chong. Lee had just acquired new property, and Mack was asking Lee to let him and his crew live there.

Wouldn’t let anybody break in or hurt anything. Kids might knock out the windows, you know -"

Or really, telling.
MACK
Place might burn down if somebody don’t keep an eye on it.

EMILY
Lee saw how their presence could be mutually beneficial, and agreed. Mack and the Boys developed a deep loyalty to that grocery.

MUSIC: CLASSICAL

EMILY
Across the street from Lee, was the owner and practitioner of Western Biological Laboratory.

STEINBECK
(SINCERE)
You can order anything from Western Biological and sooner or later you will get it.

EMILY
Everyone on Cannery Row likes Doc.

STEINBECK
Doc tips his hat to dogs as he drives by and the dogs look up at him and smile.

EMILY
Loosely based on Steinbeck’s real life friend and notable Monterey Bay marine biologist, Ed Ricketts, Doc is a curious, open-minded guy.

Many residents of Cannery Row come to Doc with questions, and Doc approaches ever question as best he can.

Hazel, one of Mack’s boys asks Doc about stink bugs.

HAZEL
Well, what they got their asses up in the air for?

EMILY
Doc gives him two answers. First, he is honest.

DOC
I don’t know why.

EMILY
He is not a man that pretends to know something he doesn’t.
They are very common animals and one of the commonest things they do is put their tails up in the air. And in all the books there isn’t one mention of the fact that they put their tails up in the air or why.

Second, he provides a theory.

I think they’re praying.

What!

Which is somewhat whimsical.

The remarkable thing, isn’t that they put their tails up in the air – the really incredibly remarkable thing is that we find it remarkable. We can only use ourselves as yardsticks. If we did something as inexplicable and strange we’d probably be praying – so maybe they’re praying.

As cool as that imagery is, we now know that common black stink bugs in the US Southwest, also known as the Pinacate Beetle, sticks their tails in the air as a warning that they can let loose a noxious spray of repellent chemicals. It’s why they’re stinky.

The people of Cannery Row are the immigrants from and descendants of various fishing cultures. They had experience going for sardines, a global, small silvery fish found in all waters except the Northwest Atlantic.

This fertile mix of experience helped revolutionize the fishing industry. Also, during World War II, the federal government maximized the amount of canned fish produced for the war effort.

At the time it made sense. in the late 1930s, the sardine fishery was booming.

It peaked in between 1936 and ’37, with 718 thousand tons of sardines landed in California.

It wasn’t only that the fish ran in silvery billions and money ran almost as freely.
EMILY

Between 1936 and 1945, when Cannery Row was published, central California landed an average of 332 thousand tons of sardines per year.

SOUND: MEN HAPPILY CHEERING ABOUT MONEY

Then, between 1947 and 48 the average sardine landing was 118 thousand tones.

SOUND: MEN STILL HAPPY ABOUT MONEY, BUT A BIT DEFLATED.

In 1950 it dropped to 33 thousand.

SOUND: MEN LESS HAPPY, MORE CONCERNED.

By ’51 it was only 961 tons.

SOUND: MEN ONLY CONCERNED ABOUT MONEY LOSS.

And in 1953, we observed that only one ton of sardines was landed in central California.

SOUND: MEN DEFEATED

At this point, most of the sardine fleet had moved to fish in Southern California as the landing numbers were a little better, but not by much and not for long.

BRYAN

And that was what mostly made their living. And I mean, back then the stories that we hear is that it was, seemed like it was, uh, an endless source of food and income. But unfortunately that’s not what it was as they found out the hard way. And you know, the, the crash of the sardines at that period is actually what prompted this study to start 70 ish years ago.

EMILY

Because we observed that sardines were disappearing back in 1947, the California Legislation established a landing tax to fund research the true cause of sardine stock fluctuations.

And by 1949, the California Cooperative Oceanic Fisheries Investigations, or CalCOFI, program was created. Which means we have a 70 year dataset which covers the worst of the sardine collapse.

So, what have they found? The obvious answer is overfishing. During the fishery collapse in the 1950s, fishing fleets were exploiting 50% of the sardine population.

JAMES

I mean, I’m always amazed when I look back on the archive photos of the sardine fishery and how that came in. So loaded that, you know, there were sardines on (MORE)
JAMES (cont’d)
the deck and then they couldn’t even fit them in the hole and they were just fishing, you know, was taking as much as they could carry.

EMILY
But that’s not the whole answer. What happened has a lot to do with sardine biology.

First, sardines don’t do well in cold waters. Sardines can be found where the sea surface temperature is greater than 50 * F.

Second, they’re kind of picky eaters. Sardines eat small plankton at or near the base of the food web. They haven’t evolved to eat large particulate matter. It’ll just clog them up. And areas like Point Conception can produce very large prey.

DAVE
But especially in areas where there’s upwelling and so you have all of these nutrients coming up to the surface and the phytoplankton run into that and they go, dude, this is styling. And they just go off, you know?

EMILY
However, you know who doesn’t mind colder waters or larger prey? Anchovies.

SOUND: CHOMP

BRYAN
It tends to be when the sardines are going gangbusters the anchovies will take second fiddle and then it’ll switch and go vice versa, where the anchovies are doing very well. And then sardines take second. There’s natural cycles. You can see that through history.

EMILY
This is true. There is palentological evidence.

BRYAN
You can look at sediment core samples from the Santa Barbara Basin and you see in those samples there’s concentrations of starting scales that are very high for x amount of years. And then you’ll see concentrations of anchovy scales that are high for a certain number of years.

EMILY
While not exact, there is a noticeable historic trend that sardine and anchovy populations cycle. Switching ever 50 to 80 years.

(CONTINUED)
All this means that in the 1930s and early 40s, when the sardine fishery was at its peak and we were taking hundreds of thousands of tons out of the ocean,

**SOUND: MEN HAPPILY CHEERING ABOUT MONEY**

That’s probably not what caused the crash.

**SOUND: MEN CONFUSED**

It was in the 50s when the waters started getting cooler and anchovies were on the rise, we kept fishing sardines at a high rate. The sardine stocks were at their lowest in the early 1960s, but officials still didn’t shut down the fishery until 1974.

**SOUND: SHIP NOISE**

**EMILY**

Today, we’re smarter about it. Data being collected during CalCOFI surveys is used to monitor the sardine population in real time.

**GARDNER**

At the center that I work is used to like directly impact the sardine stock assessment, which then gets sent to council meetings and then fishermen and the government work together to fix or to set fishing quotas.

**EMILY**

Collaborative decisions are made. This system is working. The sardine fishery did bounce back in the 1980s. It re-opened in 1991, peaking in 2006.

But,

**SOUND: MEN ‘OH COME ON’ ATTITUDE.**

If there’s a peak, there has to be a valley. Sardine populations dropped in the 2010s, and in 2015 officials once again agreed to close the fishery.

**GARDNER**

And so for the past couple of years, the sardine fishery and California has been closed because we’re not finding a lot of sardines.

**EMILY**

The Pacific sardine fishery, as well as the anchovy, the mackerel, and various other fish that share resources with the sardine, is one of the best managed in the world. And that’s because CalCOFI wasn’t

(MORE)

(CONTINUED)
EMILY (cont’d)
    scrapped when the sardines started to come back. It’s because they kept an eye on the population.

MUSIC: MACK AND THE BOYS THEME SONG.

EMILY
    But, what does this have to do with Doc, Mack, and the rest of Cannery Row?

MACK
    That Doc is a fine fellow. We ought to do something for him.

EMILY
    What they do, after the break.

Section 2

EMILY
    Welcome back, you’re listening to Device. I am your host, Emily T. Griffiths. And for our final episode of the season-

MUSIC: CLASSICAL

EMILY
    We’re discussing Cannery Row by John Steinbeck.

    Out of all the inhabitants of the row, one man stands out.

DOC
    Oh yes, I guess so. Nuts about the same amount we are, only in a different way.

EMILY
    Loosely based on real life Monterey marine biologist Ed Ricketts, Doc is a good guy with a well-known sadness to him. He’s very focused on his work.

STEINBECK
    Western Biological deals in strange and beautiful wares. It sells the lovely animals of the sea, the sponges, tunicates, anemones, the stars and buttlestars, and sun stars, the bivalves.

EMILY
    Occasionally, Doc enlists the help of Mack and the boys to help him collect samples for his business.
HAZEL
What do you guys do with ‘em? You can’t eat ‘em.

DOC
They study them.

HAZEL
What do they find to study? They’re just starfish. There’s millions of ‘em around. I could get you a million of ‘em.

STEINBECK
(MORE SINISTER)
You can order anything from Western Biological and sooner or later you will get it.

MUSIC: MACK AND THE BOY THEME

EMILY
Meanwhile, Mack and the boys are trying to think of something nice to do for Doc. They settle on throwing him a party. However,

MACK
It’s going to take dough to give Doc a party. If we’re going to give him a party at all it ought to be a good one.

EMILY
But they also have a good idea on how to get some money.

HAZEL
Got a nickel a piece for frogs.

EMILY
So, Mack goes to Doc looking for work to pay for a party for Doc that Doc doesn’t know he’s throwing.

STEINBECK
He looked up a little nervously as Mack entered. It wasn’t that trouble always came in with Mack, but something always entered with him.

EMILY
Without mentioning the party, Mack tells Doc that he and the boys are looking to pick up some work.

As it happens, Doc was in the need for some frogs. He had a big order to fill.

MACK
(JOVIAL)

(MORE)
MACK (cont’d)
Don’t you worry about frogs, Doc. We’ll get you all the
drugs you want. You just rest easy about frogs. Why we
can get them right up Carmel River. I know a place.

Just you rest easy, Doc. Don’t you lose no sleep about
it.

EMILY
It may seem odd that a scientist is entrusting the
local gang of alcoholics to collect frogs to fill an
order, but you see, Mack was personable. He could
appear reliable.

HAZEL
I bet Mack could of been president of the U.S. if he
wanted.

EMILY
It’s just that his priorities weren’t always in the
right order.

MACK
There wouldn’t be no fun in that.

EMILY
And the truth is, Doc really did need those frogs.

BRYAN
It was probably a lot more animals to pick from than
there are today and we now have a better, uh, probably
a little bit better and more respect for taking those
animals.

EMILY
Respect may have something to do with it, but we also
have a lot more laws in place to protect
wildlife. Even on the CalCOFI surveys, which have been
running for 70 years.

BRYAN
Um, the permitting that we have today is very
restrictive. We have, I believe, three or four permits
that are currently used on board today on this vessel.

EMILY
Fishermen need permits to fish, Scientists need permits
to research. It’s all part of a larger system that
closely monitors fish populations so they can be here
for future generations to enjoy.
AMY
They’re delicious, by the way. Especially fresh. I mean when we catch them fresh out here, they’re delicious.

EMILY
While researching this episode, I couldn’t help but wonder how much harder it is to go out and collect frogs for dissection today versus 1945.

I could not find one reliable source monitoring wild caught frogs for classroom dissections.

OLAW
Office of Laboratory Animal Welfare - National Institutes of Health (NIH)
The primary company I am familiar with is Carolina Biologicals. They may have the information you are seeking. OLAW would only oversee this type of work if it were sponsored by NIH or NSF.

USDA
United States Department of Agriculture
Still waiting...

PARC
Partners in Amphibian and Reptile Conservation
Suggested I go state by state.

CDFA
California Department of Food and Agriculture
Still waiting...

I contacted Lab supplies USA, who supplies the San Diego Unified School District with their frogs and...

I also contacted Carolina Biological Supply, the largest company in the US to supply dissection frogs to schools and universities. They gave me the most detailed answer.

MACK
We’ll pay for it. Doc.

DOC
No you won’t, Mack. You’ll think about it and it’ll worry you for quite a long time, but you won’t pay for it.

EMILY
After the dust settles and Cannery Row starts slipping into its reliable ways, Mack and the boys plan another party for Doc.
DORA
You gave him a party he didn’t get to. Why don’t give him a party he does get to?

MACK
It was just as simple as that. Now there is one hell of a woman.

EMILY
And amazingly, they do. Mack and the boys tell all the right people on the row they’re throwing Doc a birthday party, and word seeps out. Everyone starts preparing gifts and favors.

MACK
This time, we’ll be sure he gets to the party. If he doesn’t get there, we don’t give it.

EMILY
Though no one tells him, Doc figures out Mack and the Boys are planning a second event, and he embraces it.

Reasoning that his house will be the party’s location yet again, he locks away his valuables that hadn’t been destroyed the first time. He gets all the food, of course, though he is still pinched from the last soirée.

At 8pm prompt, Mack and the Boys cross from The Palace to Western Biological Laboratory with jugs of booze in their hands. The rest of the Row shortly follows, and the party gets going, and Doc feels good.

SOUND: 1930S PARTY WITH BENNY GOODMAN’S TRIOS IN THE BACKGROUND

STEINBECK
“It’s all fine to say, “Time will heal everything, this too shall pass away. People will forget”--and things like that when you are not involved, but when you are there is no passage of time, people do not forget and you are in the middle of something that does not change.”

SOUND:
CalCOFI
Data collected at depths down to 500 meters include: temperature, salinity, oxygen, phosphate, silicate, nitrate and nitrite, chlorophyll, transmissometer, PAR, C14 primary productivity, phytoplankton biodiversity, zooplankton biomass, and zooplankton biodiversity.

How common is dissection, and which animals are dissected? Research indicates that, nationally, between (MORE)
STEINBECK (cont’d)
75% and 84% of biology teachers use dissection (Oakely, 2012; Osenkowski, 2015). No research specific on California teachers’ practices appears to be available.