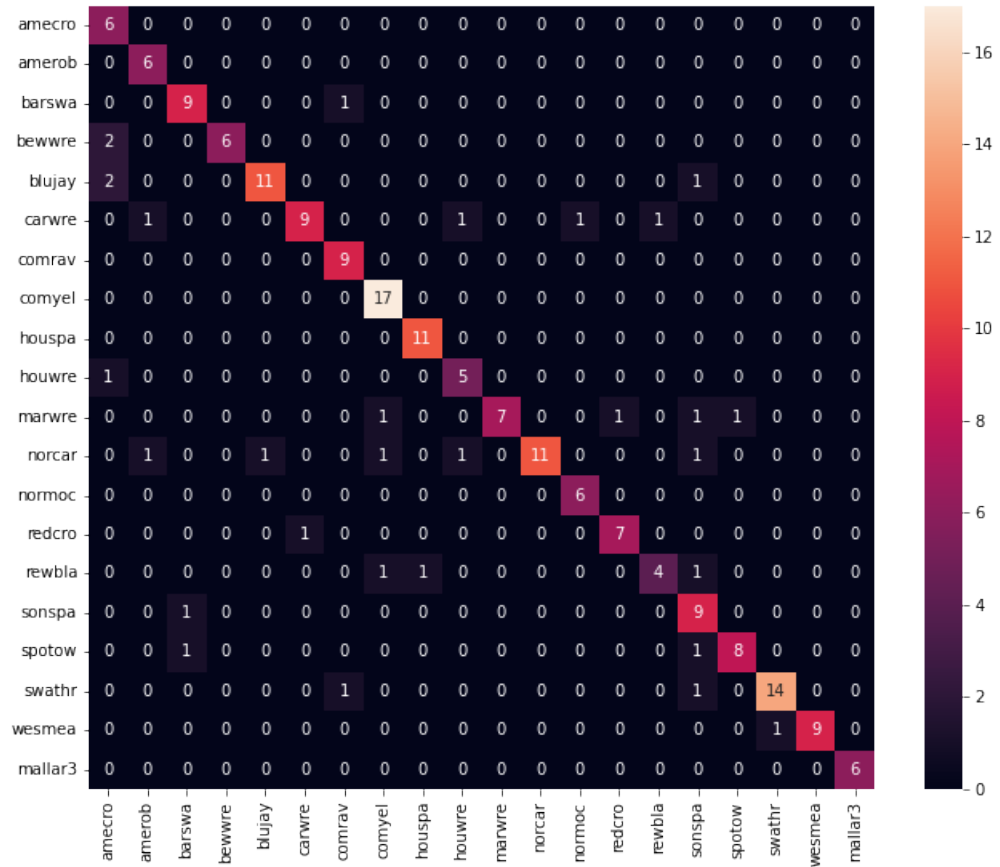# Final Results

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Final Training Results

Compared to the preliminary results, I was able to achieve a significant improvement. The main change I made was preserving the first layer of the pretrained `EfficientNet-B7` model. Since the model expected 3 channels while the spectrograms only had 1 channel, I added two additional channels by simply duplicating the single channel.

I also reduced the size of the dataset to the recordings with ratings greater than or equal to 4.5 and chose to classify the top 20 most represented bird species in that subset. Those species were the American Crow, American Robin, Barn Swallow, Bewick's Wren, Blue Jay, Carolina Wren, Northern Raven, Common Yellowthroat, House Sparrow, House Wren, Marsh Wren, Northern Cardinal, Northern Mockingbird, Red Crossbill, Red-winged Blackbird, Song Sparrow, Spotted Towhee, Swainson's Thrush, Western Meadowlark, and the Mallard.

The data was split 80:10:10 into train, validation, and test sets. The weighted average precision was 0.88 on the test set.

Confusion Matrix

	amecro	amerob	barswa	bewwre	blujay	carwre	comrav	comyel	houspa	houwre	marwre	norcar	normoc	redcro	rewbla	sonspa	spotow	swathr	wesmea	mallar3
amecro	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
amerob	0	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
barswa	0	0	9	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
bewwre	2	0	0	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
blujay	2	0	0	0	11	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
carwre	0	1	0	0	0	9	0	0	0	1	0	0	1	0	1	0	0	0	0	0
comrav	0	0	0	0	0	0	9	0	0	0	0	0	0	0	0	0	0	0	0	0
comyel	0	0	0	0	0	0	0	17	0	0	0	0	0	0	0	0	0	0	0	0
houspa	0	0	0	0	0	0	0	0	11	0	0	0	0	0	0	0	0	0	0	0
houwre	1	0	0	0	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0
marwre	0	0	0	0	0	0	1	0	0	7	0	0	1	0	1	1	0	0	0	0
norcar	0	1	0	0	1	0	0	1	0	1	0	11	0	0	0	1	0	0	0	0
normoc	0	0	0	0	0	0	0	0	0	0	0	0	6	0	0	0	0	0	0	0
redcro	0	0	0	0	0	1	0	0	0	0	0	0	0	7	0	0	0	0	0	0
rewbla	0	0	0	0	0	0	0	1	1	0	0	0	0	0	4	1	0	0	0	0
sonspa	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	9	0	0	0	0
spotow	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	8	0	0	0
swathr	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	0	14	0	0
wesmea	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	9	0
mallar3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6

Classification Report

	precision	recall	f1-score	support
amecro	0.55	1.00	0.71	6
amerob	0.75	1.00	0.86	6
barswa	0.82	0.90	0.86	10
bewwre	1.00	0.75	0.86	8
blujay	0.92	0.79	0.85	14
carwre	0.90	0.69	0.78	13
comrav	0.82	1.00	0.90	9
comyel	0.85	1.00	0.92	17
houspa	0.92	1.00	0.96	11
houwre	0.71	0.83	0.77	6
marwre	1.00	0.64	0.78	11
norcar	1.00	0.69	0.81	16
normoc	0.86	1.00	0.92	6
redcro	0.88	0.88	0.88	8
rewbla	0.80	0.57	0.67	7
sonspa	0.60	0.90	0.72	10
spotow	0.89	0.80	0.84	10
swathr	0.93	0.88	0.90	16
wesmea	1.00	0.90	0.95	10
mallar3	1.00	1.00	1.00	6
accuracy			0.85	200
macro avg	0.86	0.86	0.85	200
weighted avg	0.88	0.85	0.85	200