Shrimp Production Review

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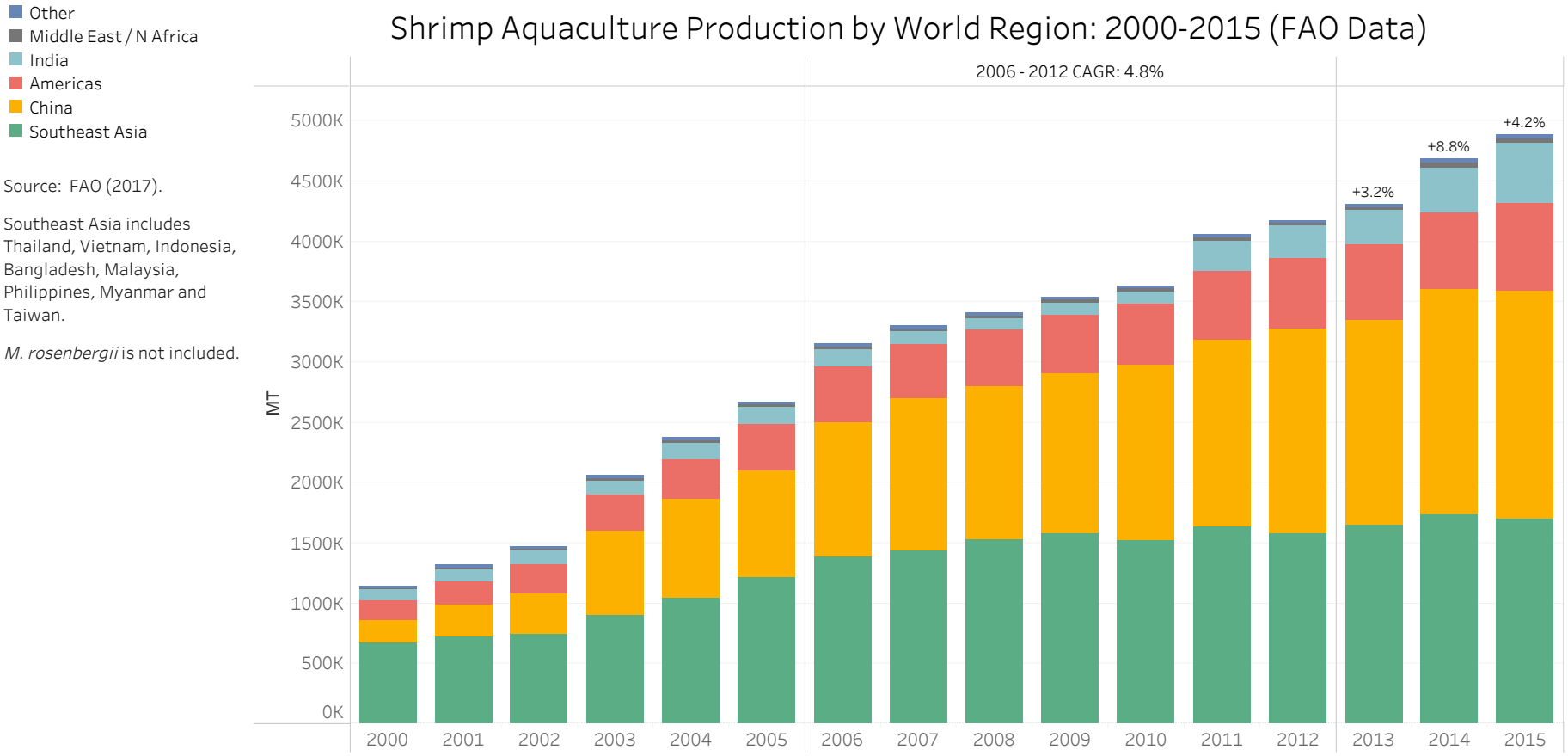
- **Dr. Darryl Jory**, Editor Emeritus, Global Aquaculture Alliance

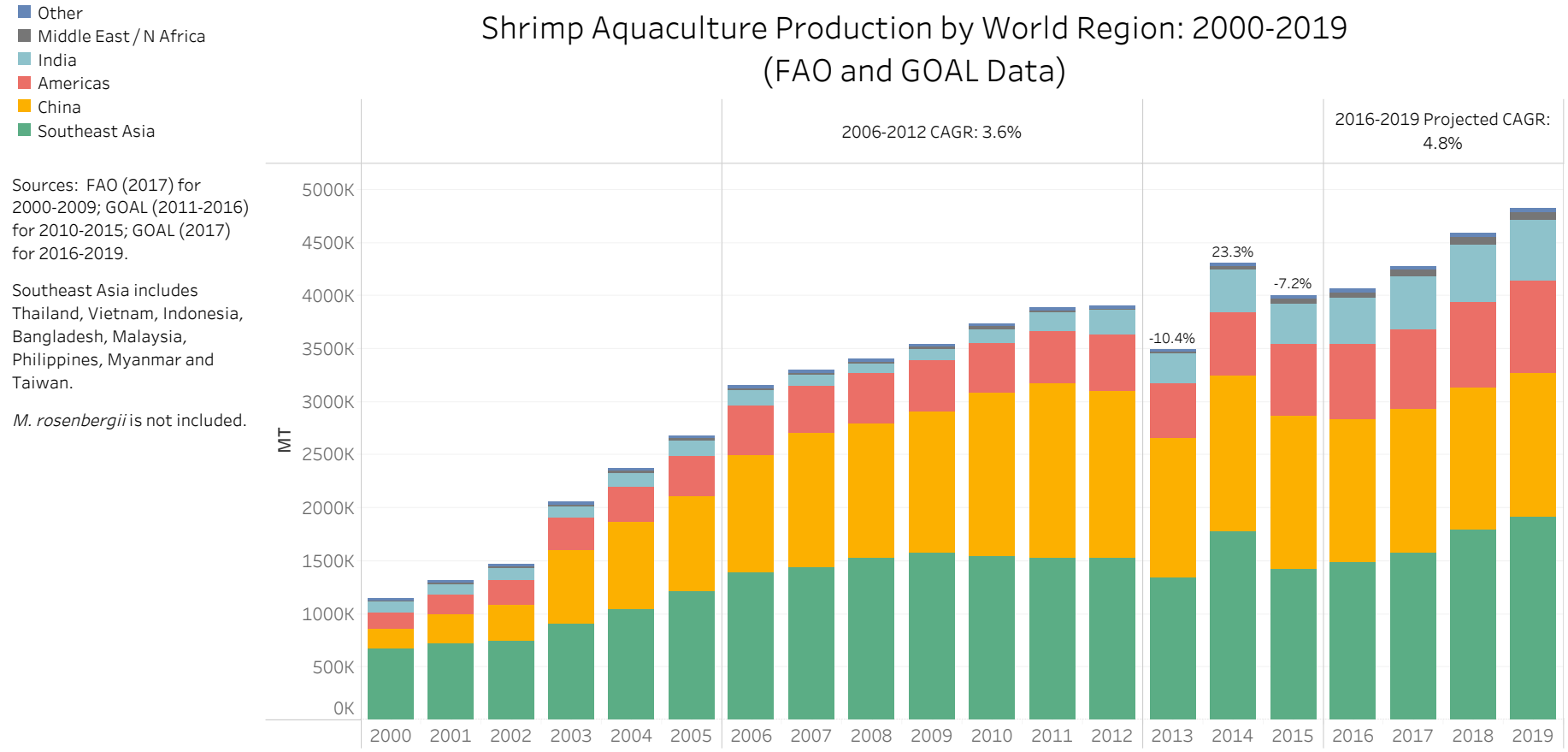
GOAL 2017 DUBLIN, IRELAND



Source: FAO (2017).

Southeast Asia includes Thailand, Vietnam, Indonesia, Bangladesh, Malaysia, Philippines, Myanmar and Taiwan.

M. rosenbergii is not included.



Sources: FAO (2017) for 2000-2009; GOAL (2011-2016) for 2010-2015; GOAL (2017) for 2016-2019.

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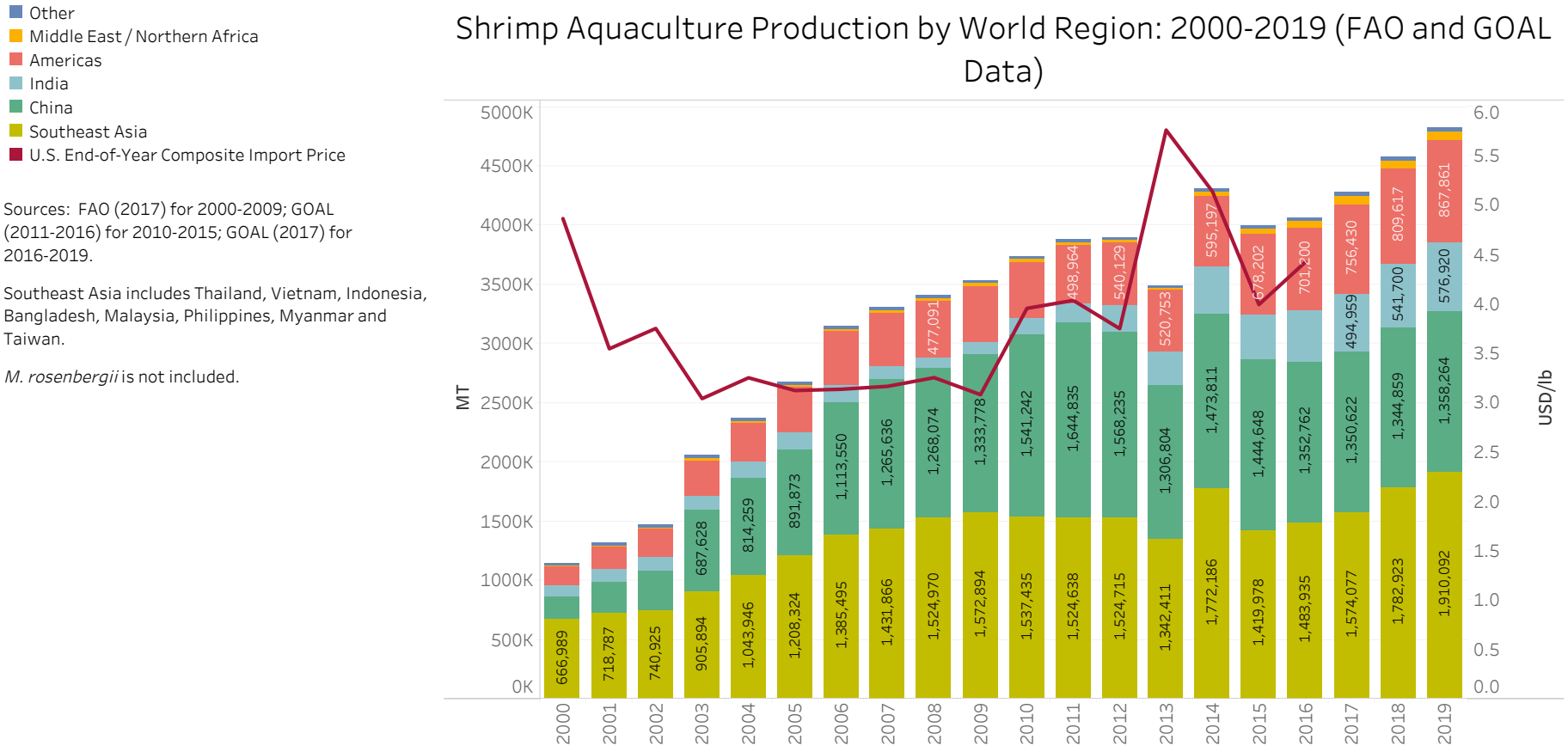


Sources: FAO (2017) for 2000-2009; GOAL (2011-2016) for 2010-2015; GOAL (2017) for 2016-2019.

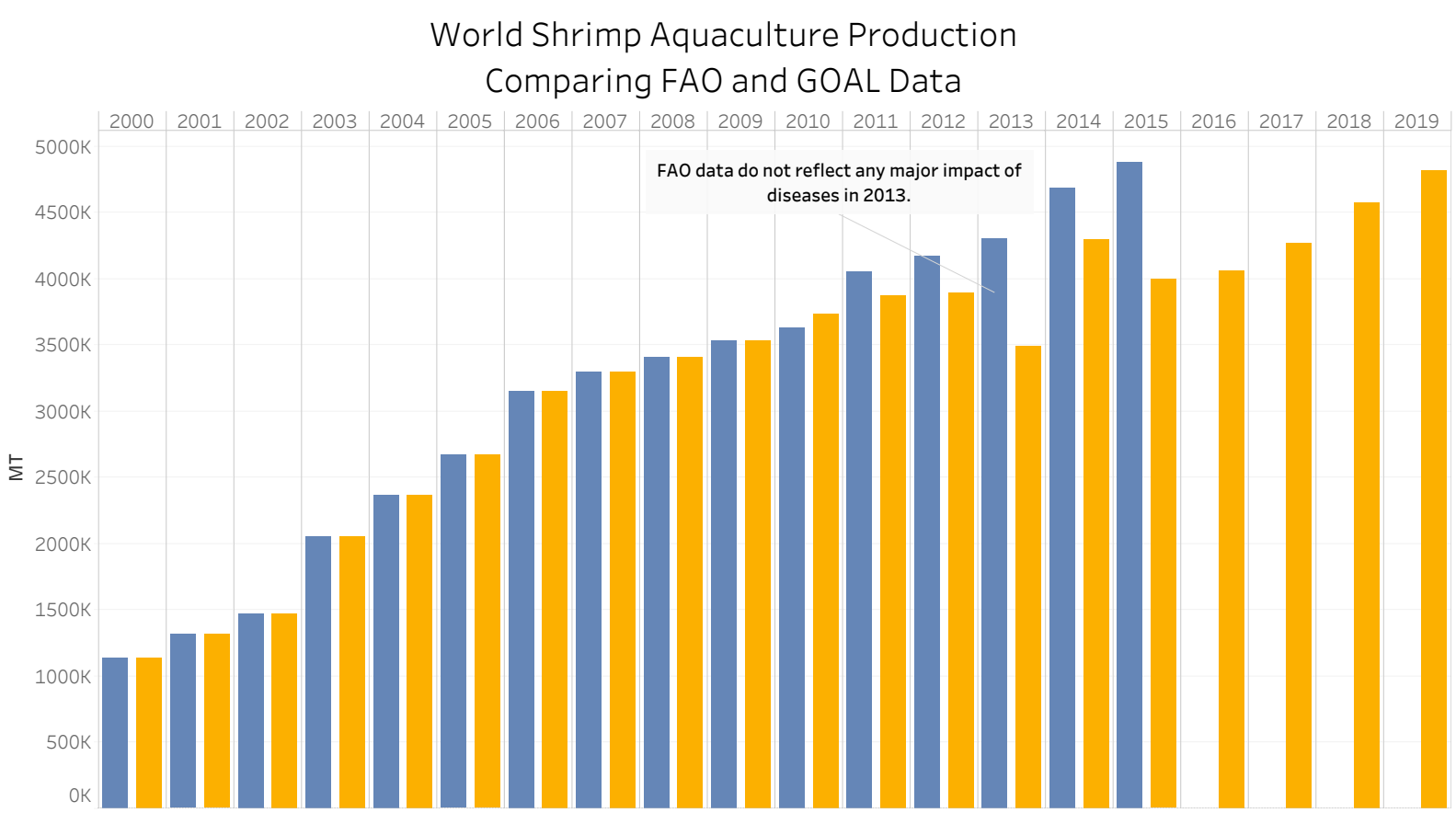
Southeast Asia includes Thailand, Vietnam, Indonesia, Bangladesh, Malaysia, Philippines, Myanmar and Taiwan.

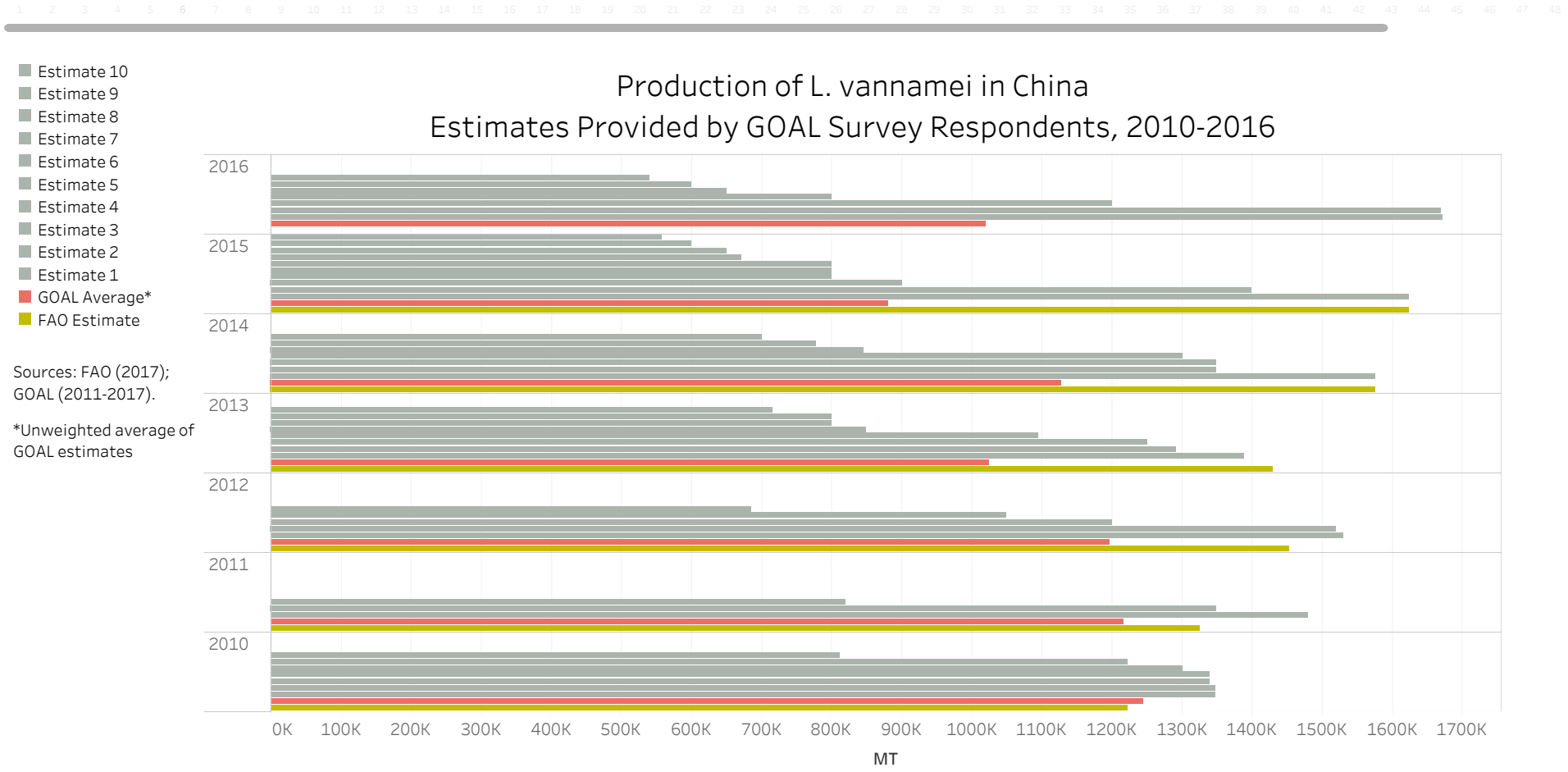
M. rosenbergii is not included.

FAO Data
GOAL Data

Sources: FAO (2017) and GOAL (2011-2017).

M. rosenbergii is not included.



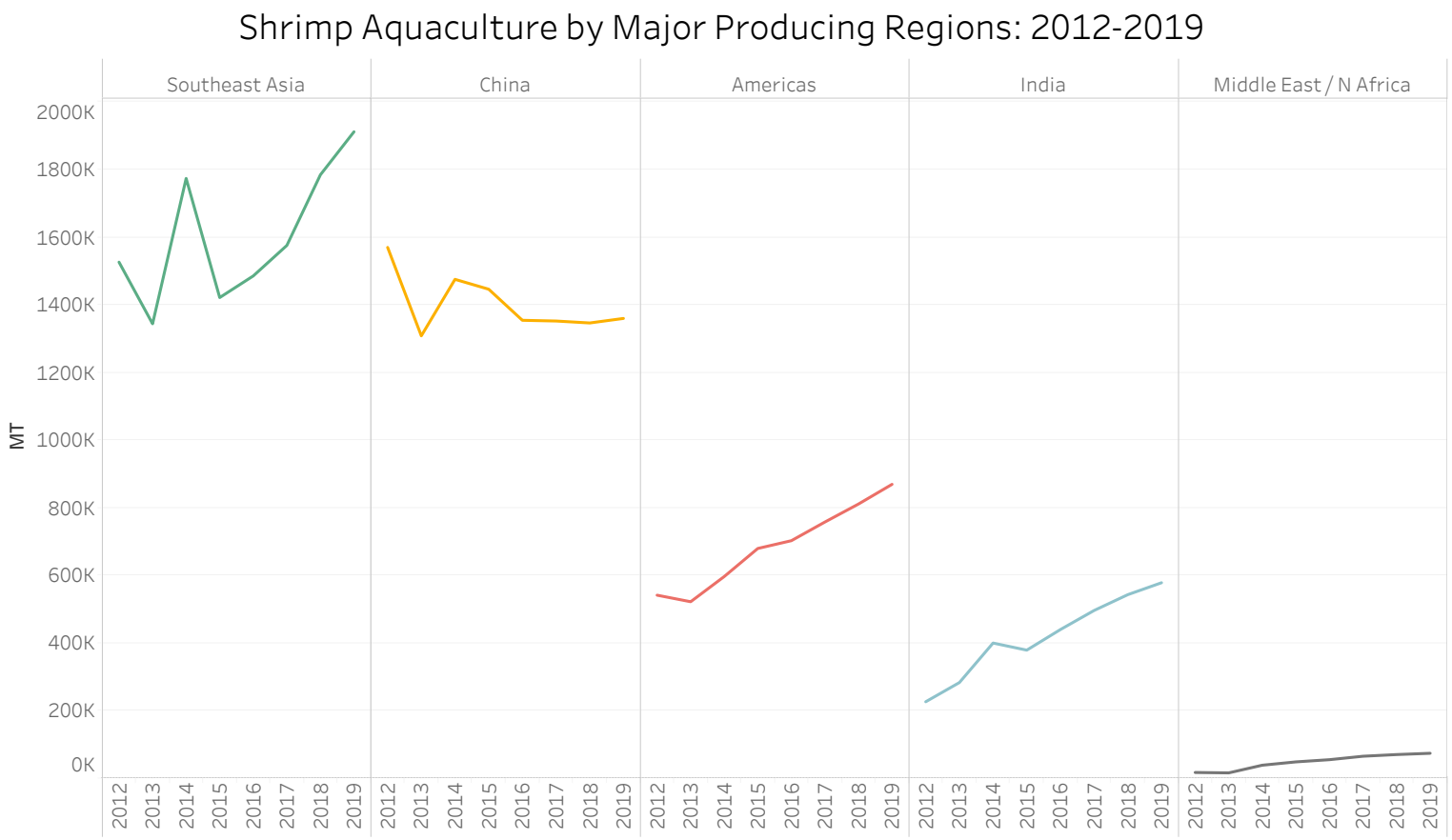

Production of L. vannamei in China
Estimates Provided by GOAL Survey Respondents, 2010-2016
Estimate 10
Estimate 9
Estimate 8
Estimate 7
Estimate 6
Estimate 5
Estimate 4
Estimate 3
Estimate 2
Estimate 1
GOAL Average*
FAO Estimate
Sources: FAO (2017); GOAL (2011-2017).
*Unweighted average of GOAL estimates
2016
2015
2014
2013
2012
2011
2010
0K
100K
200K
300K
400K
500K
600K
700K
800K
900K
1000K
1100K
1200K
1300K
1400K
1500K
1600K
1700K
MT

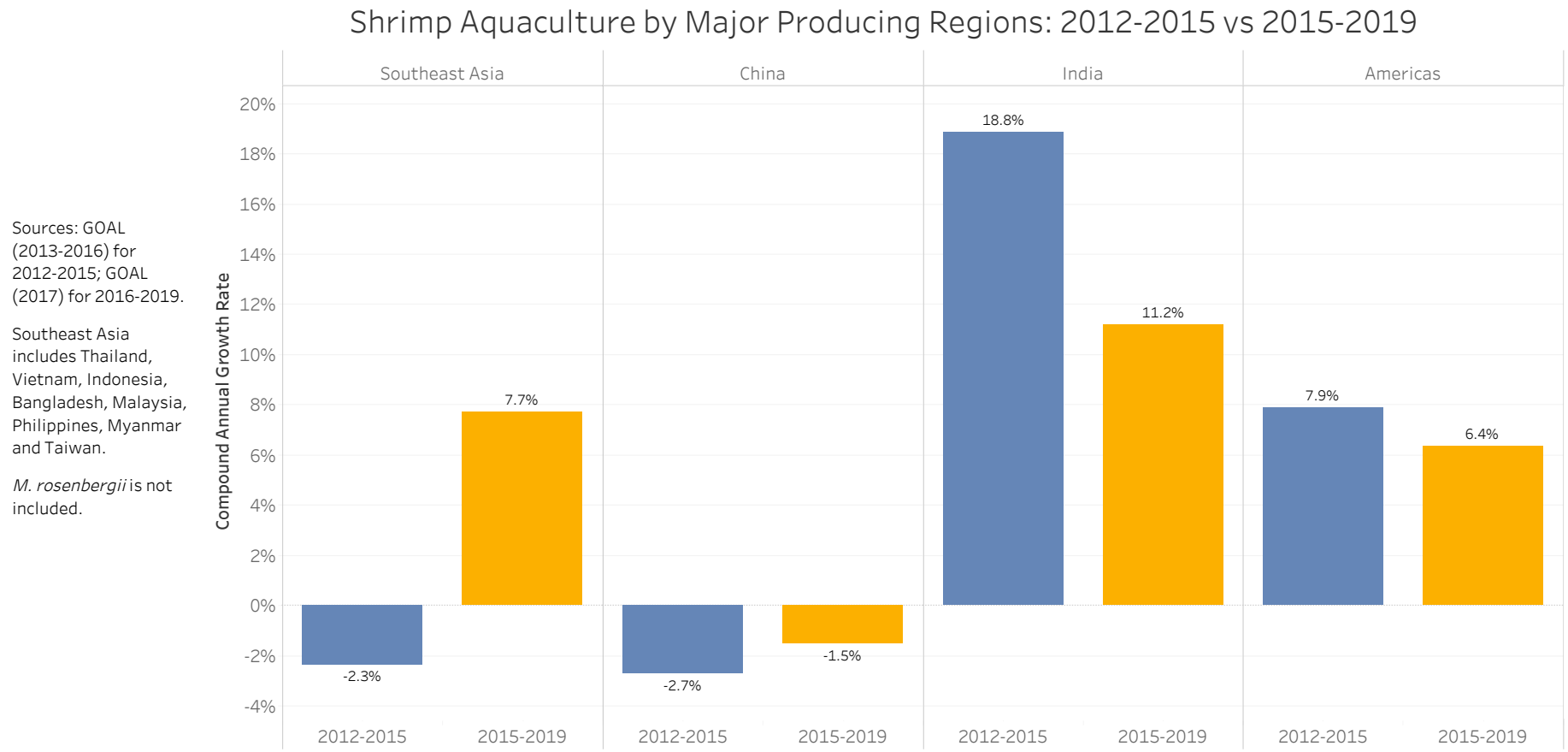
- Southeast Asia
- China
- Americas
- India
- Middle East / N Africa

Sources: GOAL (2013-2016) for 2012-2015; GOAL (2017) for 2016-2019.

Southeast Asia includes Thailand, Vietnam, Indonesia, Bangladesh, Malaysia, Philippines, Myanmar and Taiwan.

M. rosenbergii is not included.





Sources: GOAL (2013-2016) for 2012-2015; GOAL (2017) for 2016-2019.

Southeast Asia includes Thailand, Vietnam, Indonesia, Bangladesh, Malaysia, Philippines, Myanmar and Taiwan.

M. rosenbergii is not included.

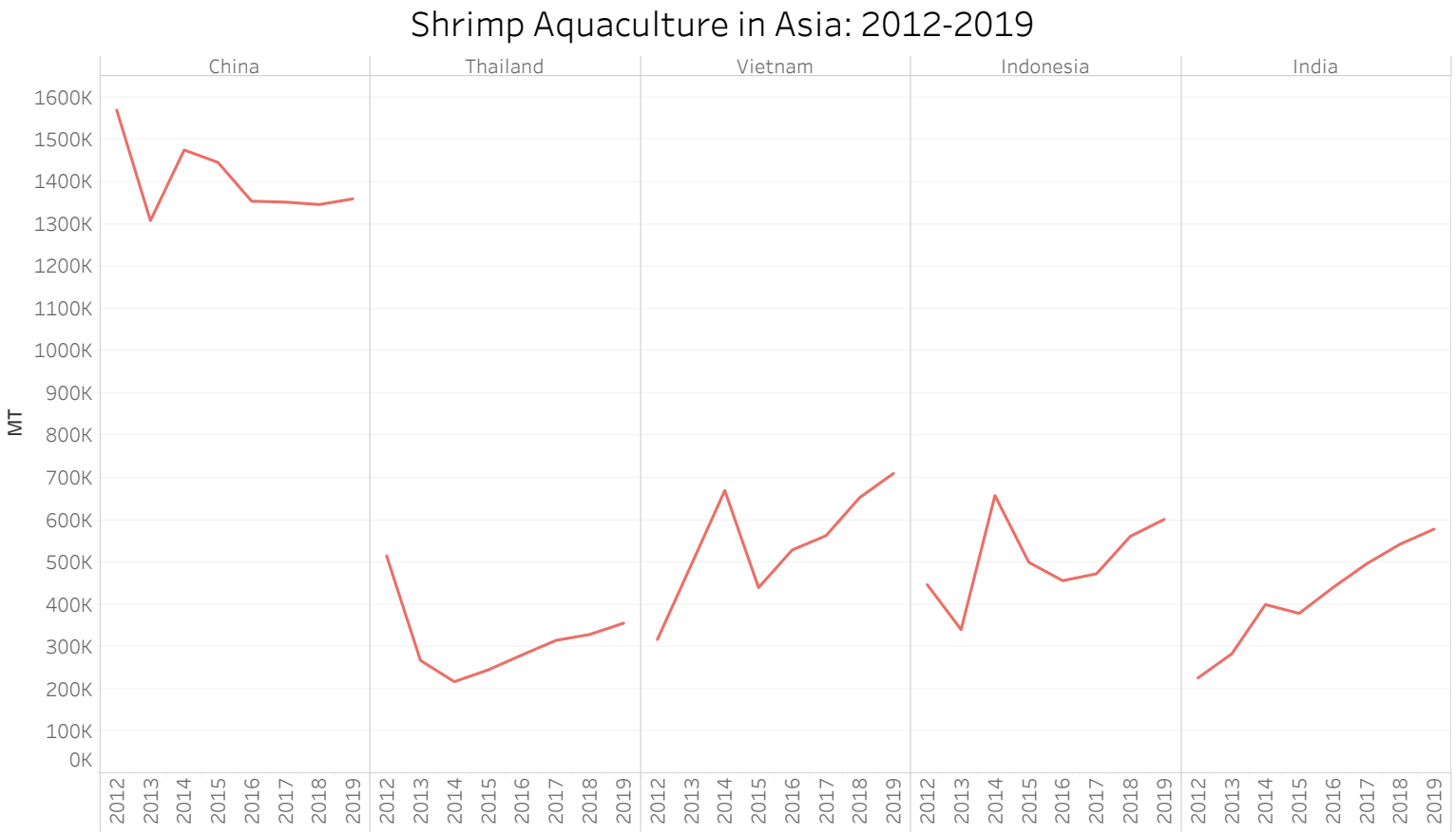
Impact of diseases: Production decreased substantially in China and Thailand in 2013, with only a partial recovery expected by 2019.

Production has been fluctuating in Vietnam and Indonesia, with positive growth expectations by 2019.

Production in India is clearly trending upwards.

Sources: GOAL (2013-2016) for 2012-2015; GOAL (2017) for 2016-2019.

M. rosenbergii is not included.



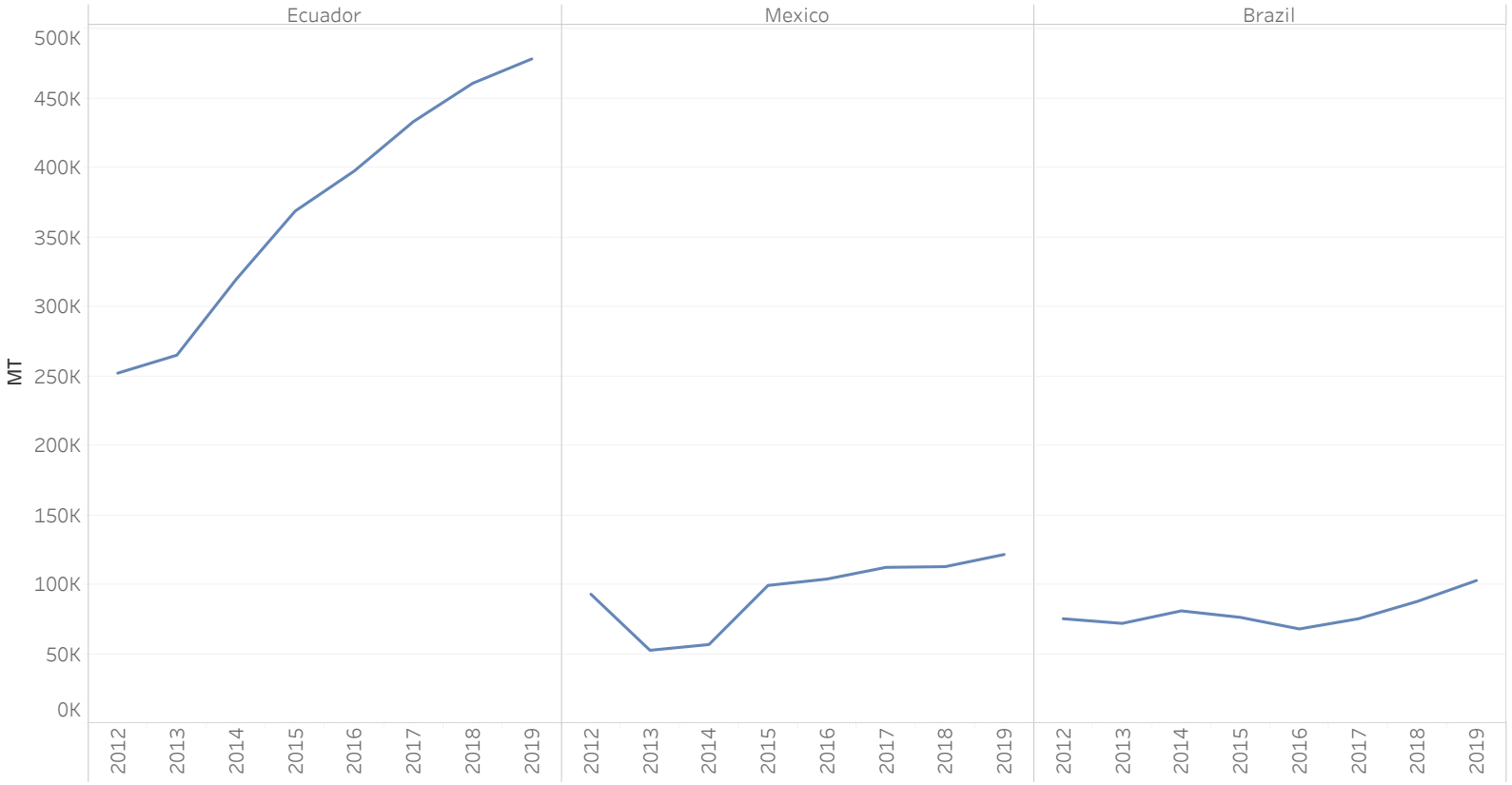
Bangladesh and Myanmar respondents expect lower production in 2019 relative to 2012.

Malaysia was strongly affected by EMS but the industry is expected to recover by 2019.

Sources: GOAL (2013-2016) for 2012-2015; GOAL (2017) for 2016-2019.

M. rosenbergii is not included.

Shrimp Aquaculture in Latin America: 2012-2019



Ecuador has experienced strong growth in the last few years.

Mexico has recovered after being impacted by EMS in 2013.

Although production in Brazil has hovered around 75,000 tons, it is expected to reach 100,000 tons in 2019.

Sources: GOAL (2013-2016) for 2012-2015; GOAL (2017) for 2016-2019.

M. rosenbergii is not included.

Production in Honduras and Nicaragua has fluctuated in the most recent years.

Guatemala, Peru and Venezuela (despite its economic crisis) are poised for further growth.

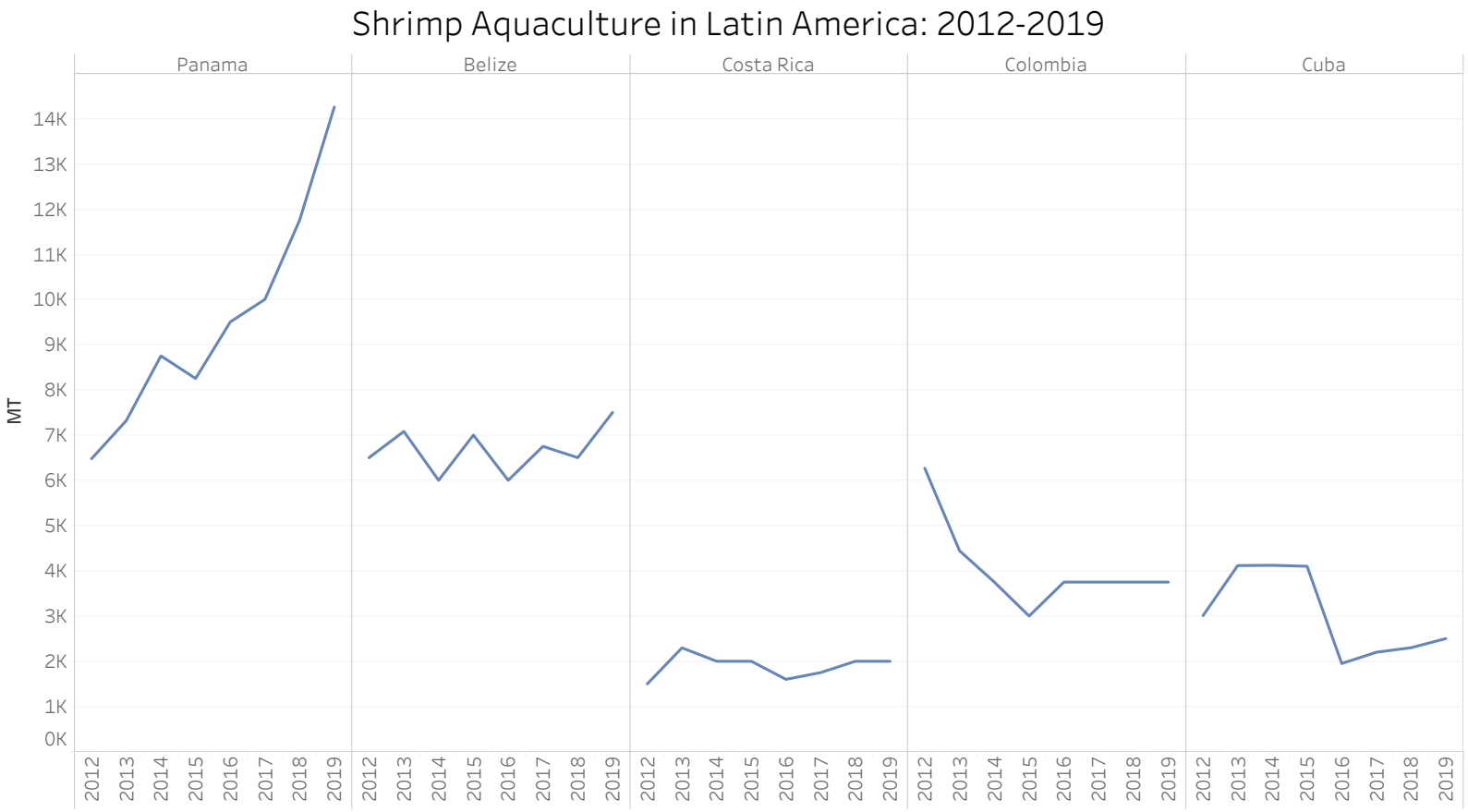
Sources: GOAL (2013-2016) for 2012-2015; GOAL (2017) for 2016-2019.

M. rosenbergii is not included.

Among the minor farming nations in Latin America, highest expectations for growth were reported for Panama.

Sources: GOAL (2013-2016) for 2012-2015; GOAL (2017) for 2016-2019.

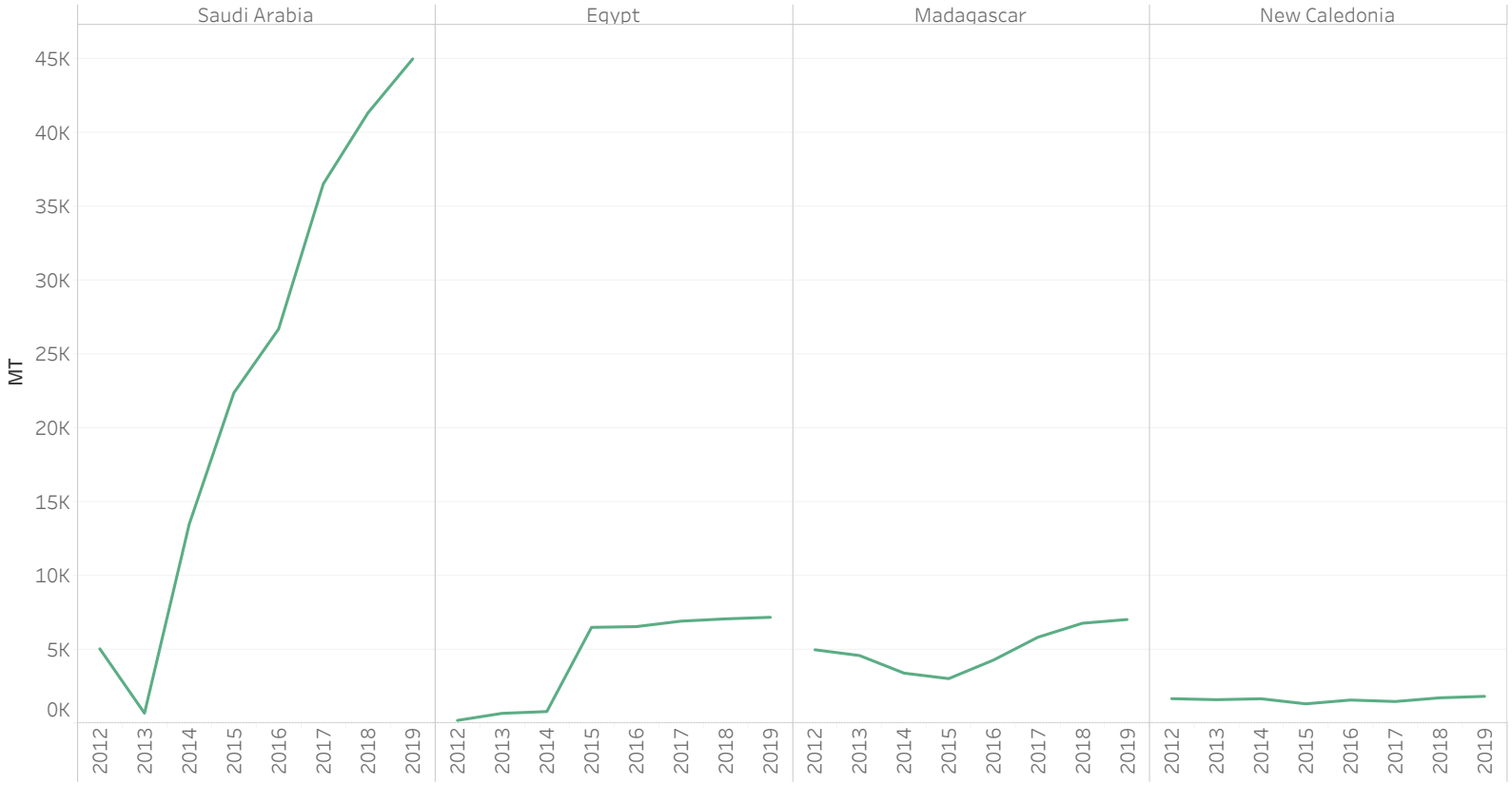
M. rosenbergii is not included.

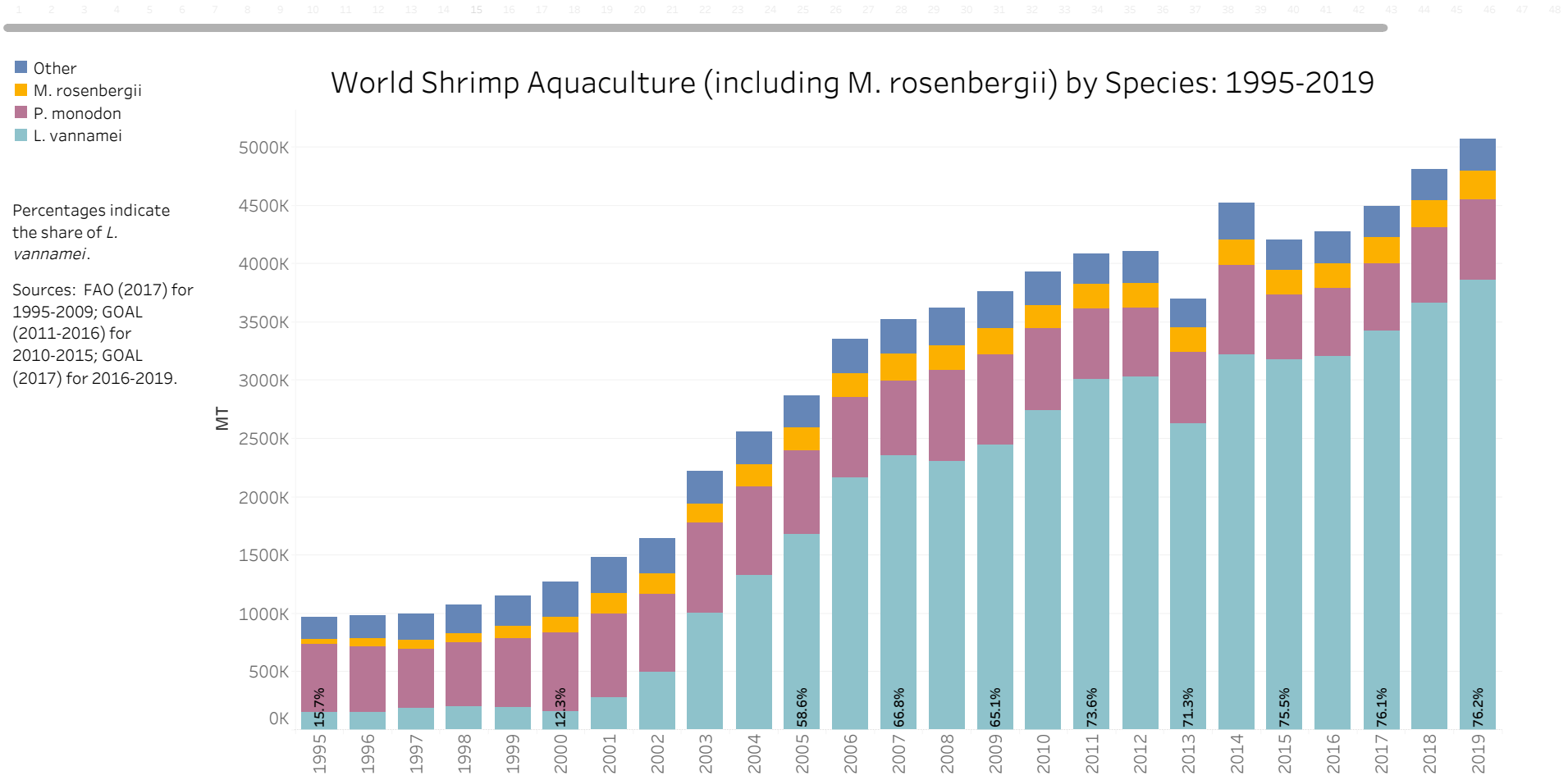


Saudi Arabia is expected to ramp up production of P. vannamei.

Sources: GOAL (2013-2016) for 2012-2015; GOAL (2017) for 2016-2019.

M. rosenbergii is not included.




World Shrimp Aquaculture (including M. rosenbergii) by Species: 1995-2019
Other
M. rosenbergii
P. monodon
L. vannamei
Percentages indicate the share of L. vannamei.
Sources: FAO (2017) for 1995-2009; GOAL (2011-2016) for 2010-2015; GOAL (2017) for 2016-2019.
MT
5000K
4500K
4000K
3500K
3000K
2500K
2000K
1500K
1000K
500K
0K
15.7%
12.3%
58.6%
66.8%
65.1%
73.6%
71.3%
75.5%
76.1%
76.2%
1995
1996
1997
1998
1999
2000
2001
2002
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2004
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2006
2007
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2011
2012
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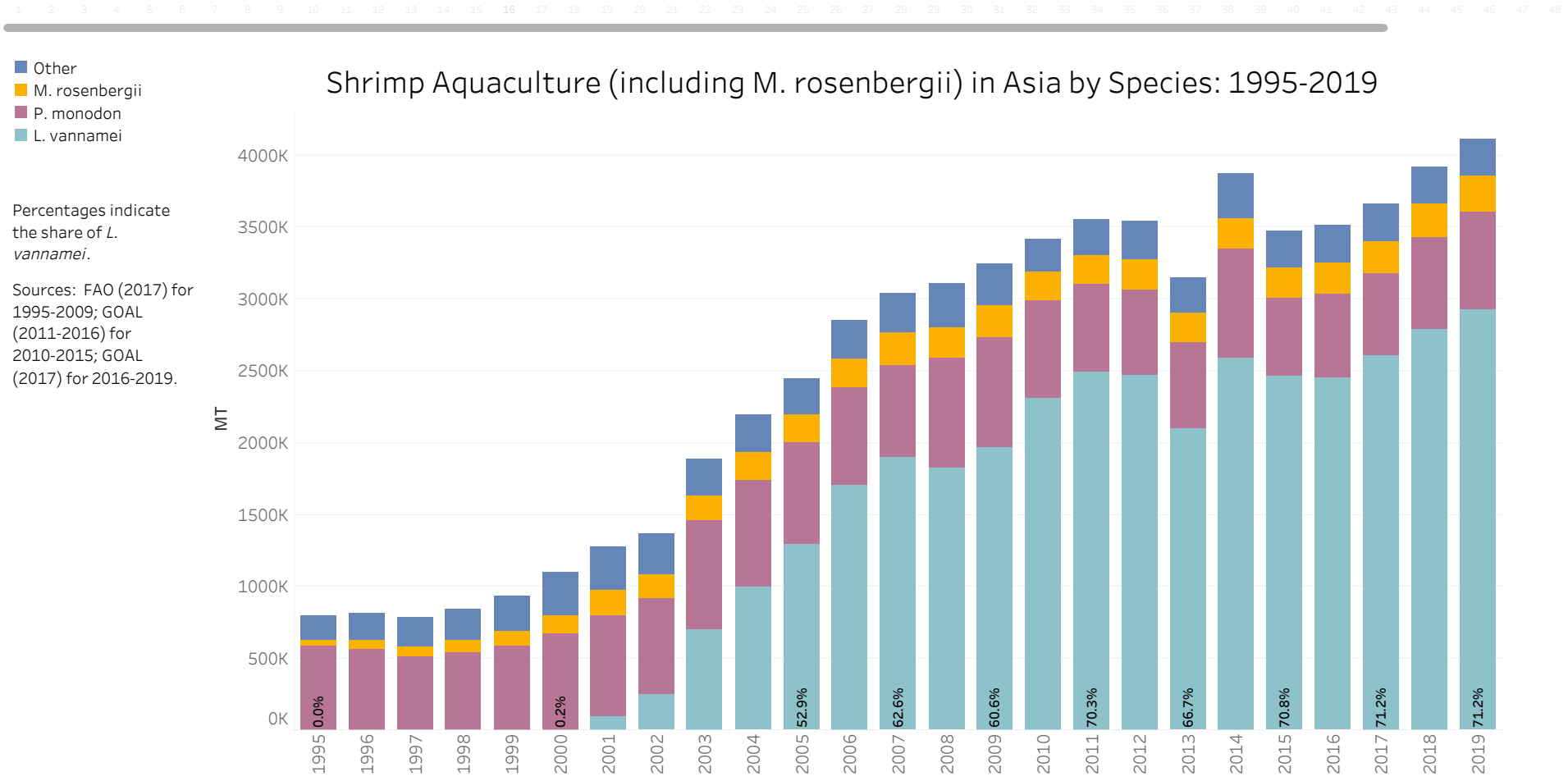
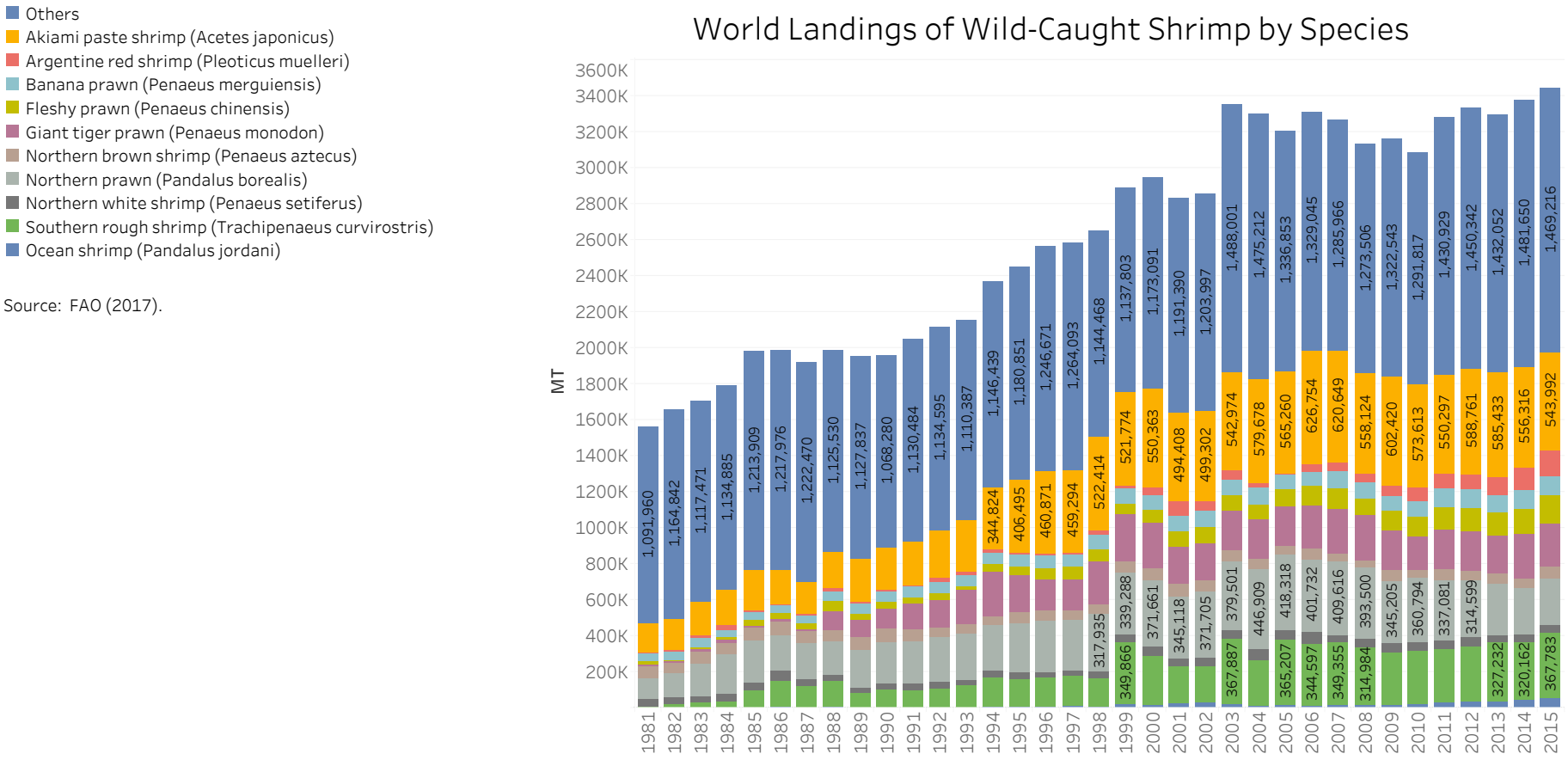
2016
2017
2018
2019



Percentages indicate the share of *L. vannamei*.

Sources: FAO (2017) for 1995-2009; GOAL (2011-2016) for 2010-2015; GOAL (2017) for 2016-2019.



Source: FAO (2017).

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48

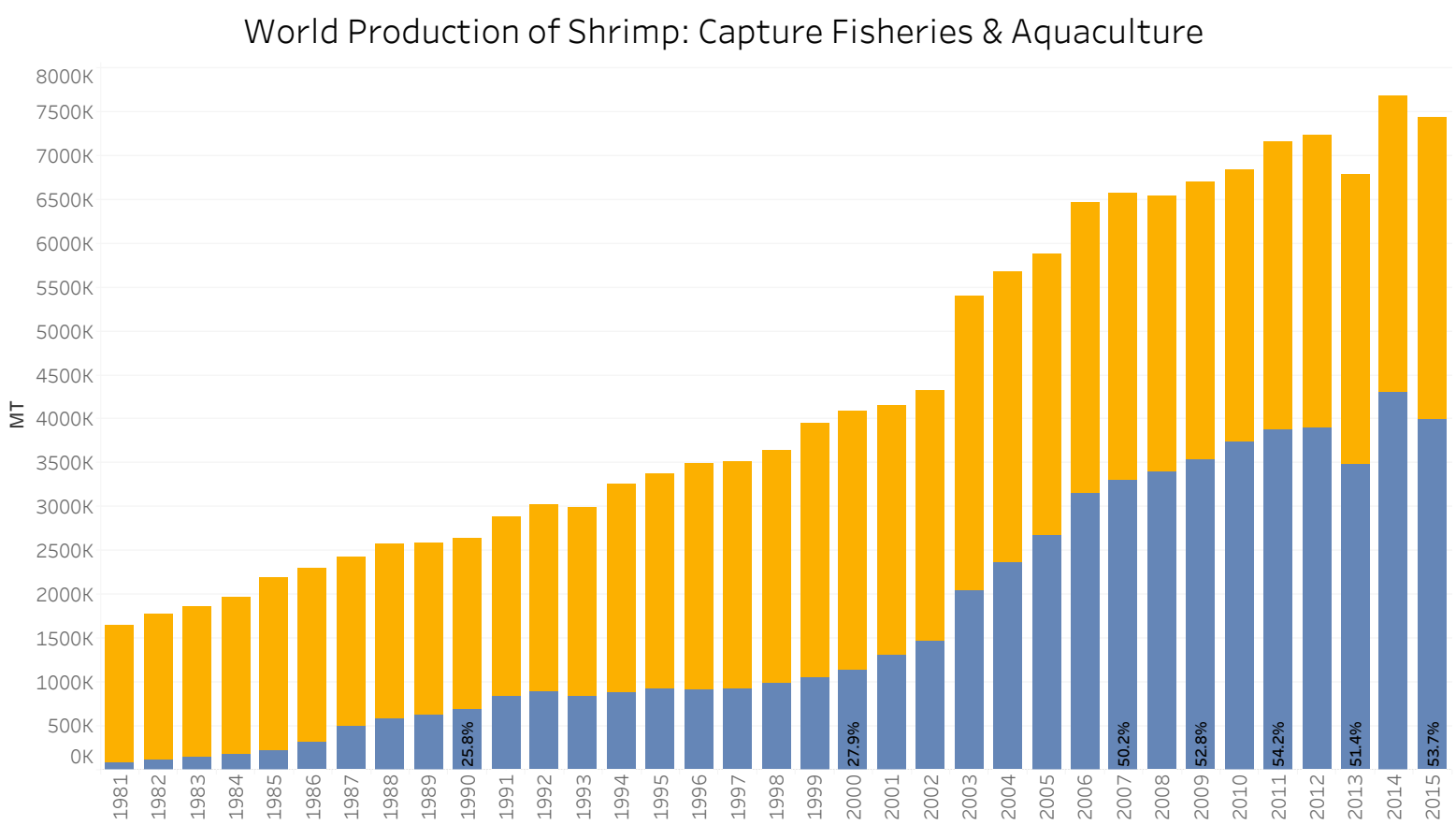
Capture Fisheries
Aquaculture

Aquaculture accounted for 54% of world shrimp supplies in 2015.

Sources: FAO (2017) and GOAL (2011, 2016).

M. rosenbergii is not included.

China includes freshwater production of *L. vannamei*.



- Others/NS
- P. chinensis
- Pandalus borealis
- Acetes japonicus
- P. monodon
- Pleoticus muelleri
- Trachipenaeus curvirostris
- L. vannamei

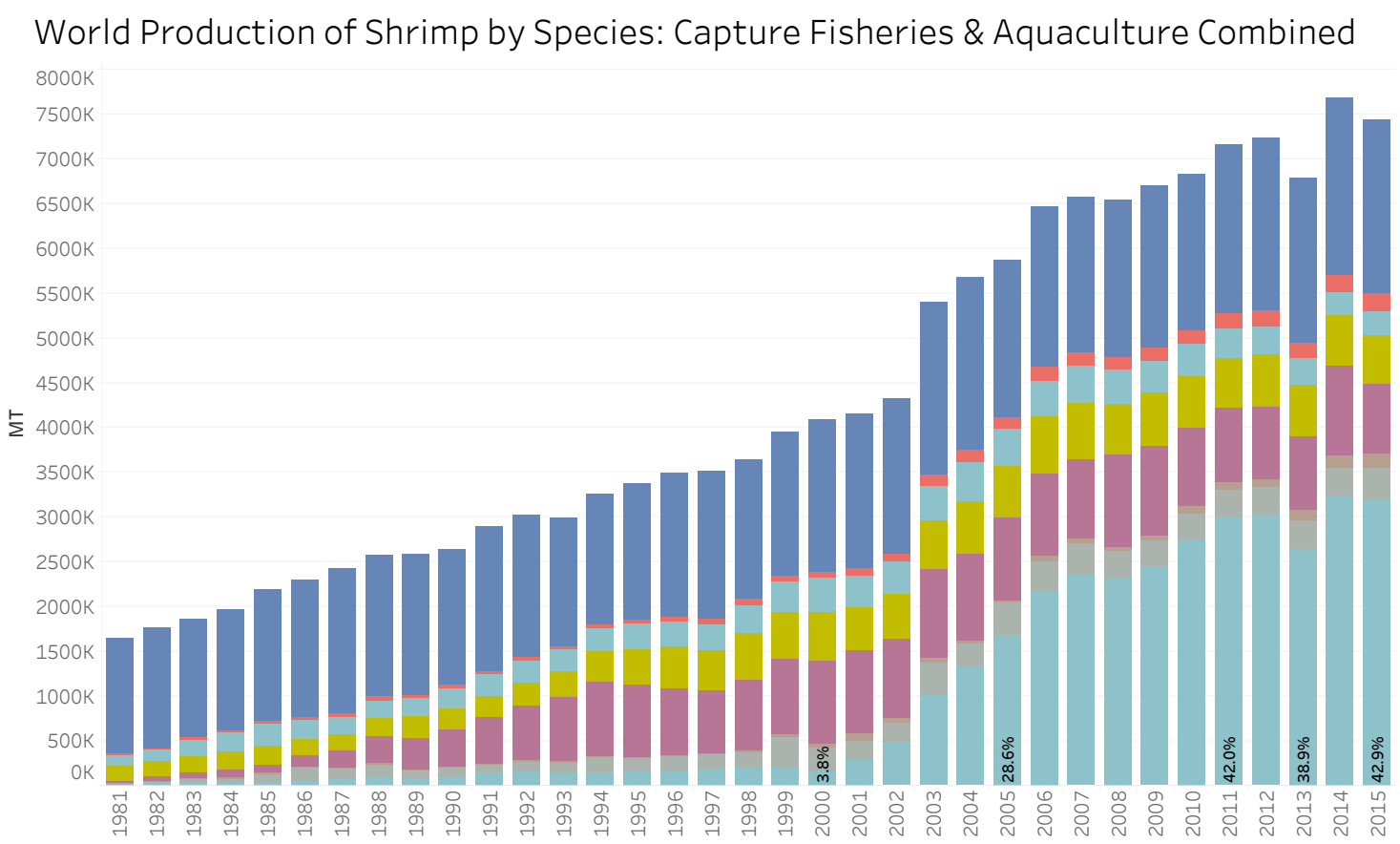
L. vannamei is the most important species in the world, with virtually all production coming from aquaculture.

Percentages indicate the share of L. vannamei.

Sources: FAO (2017) and GOAL (2011, 2016).

M. rosenbergii is not included.

China includes freshwater production of *L. vannamei*.

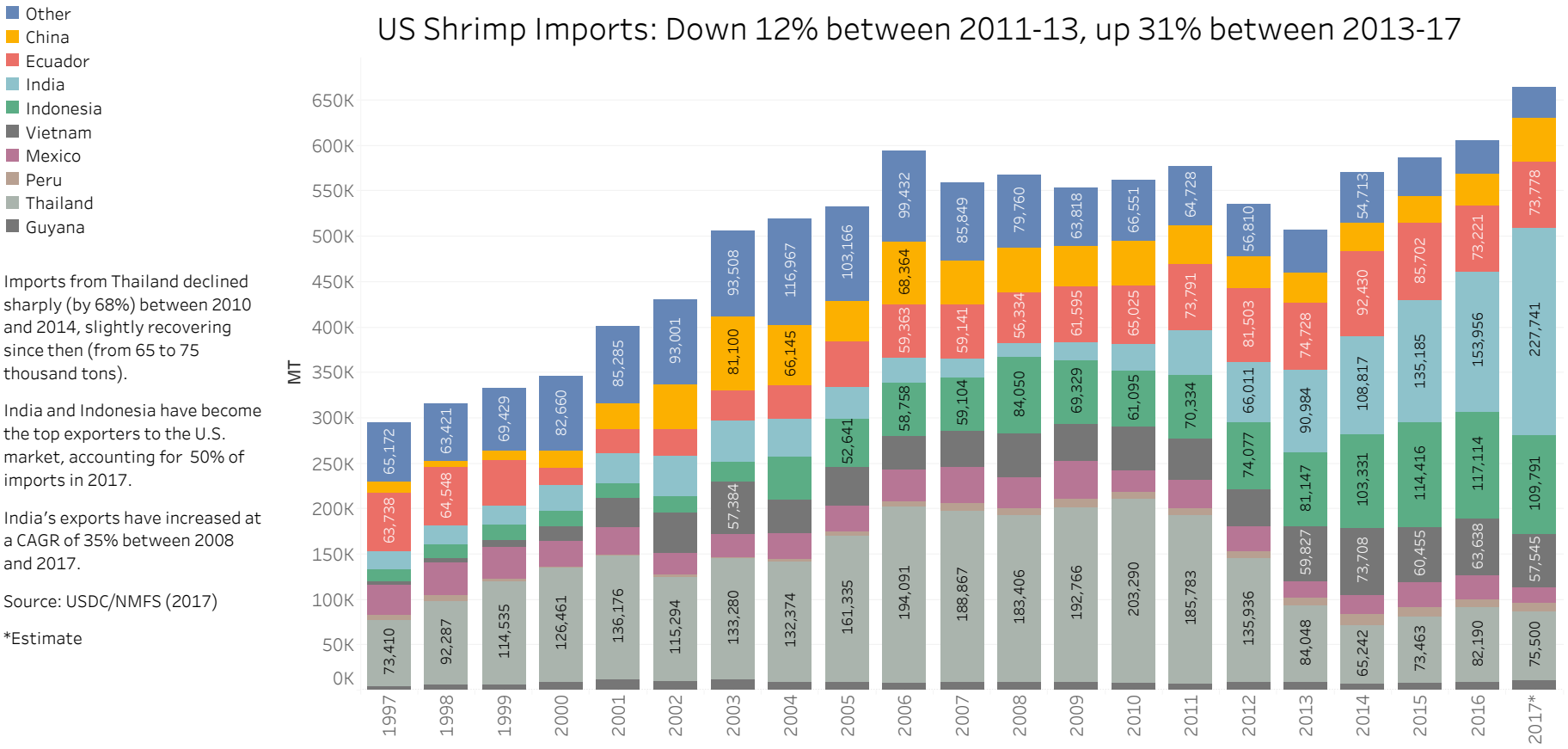


Global Aquaculture Alliance™

Trends in Trade

GOAL 2017 DUBLIN, IRELAND

US Shrimp Imports: Down 12% between 2011-13, up 31% between 2013-17



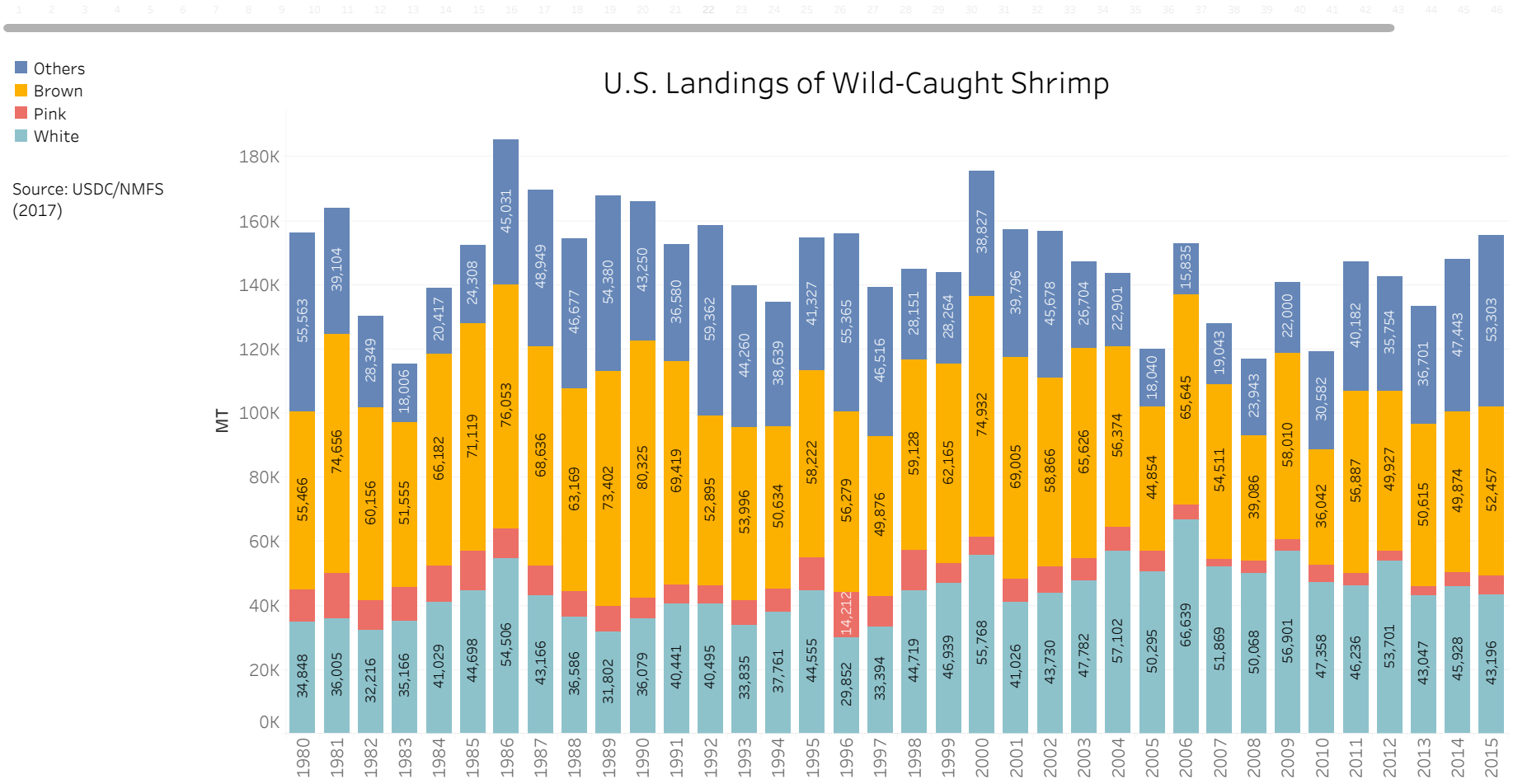
Imports from Thailand declined sharply (by 68%) between 2010 and 2014, slightly recovering since then (from 65 to 75 thousand tons).

India and Indonesia have become the top exporters to the U.S. market, accounting for 50% of imports in 2017.

India's exports have increased at a CAGR of 35% between 2008 and 2017.

Source: USDC/NMFS (2017)

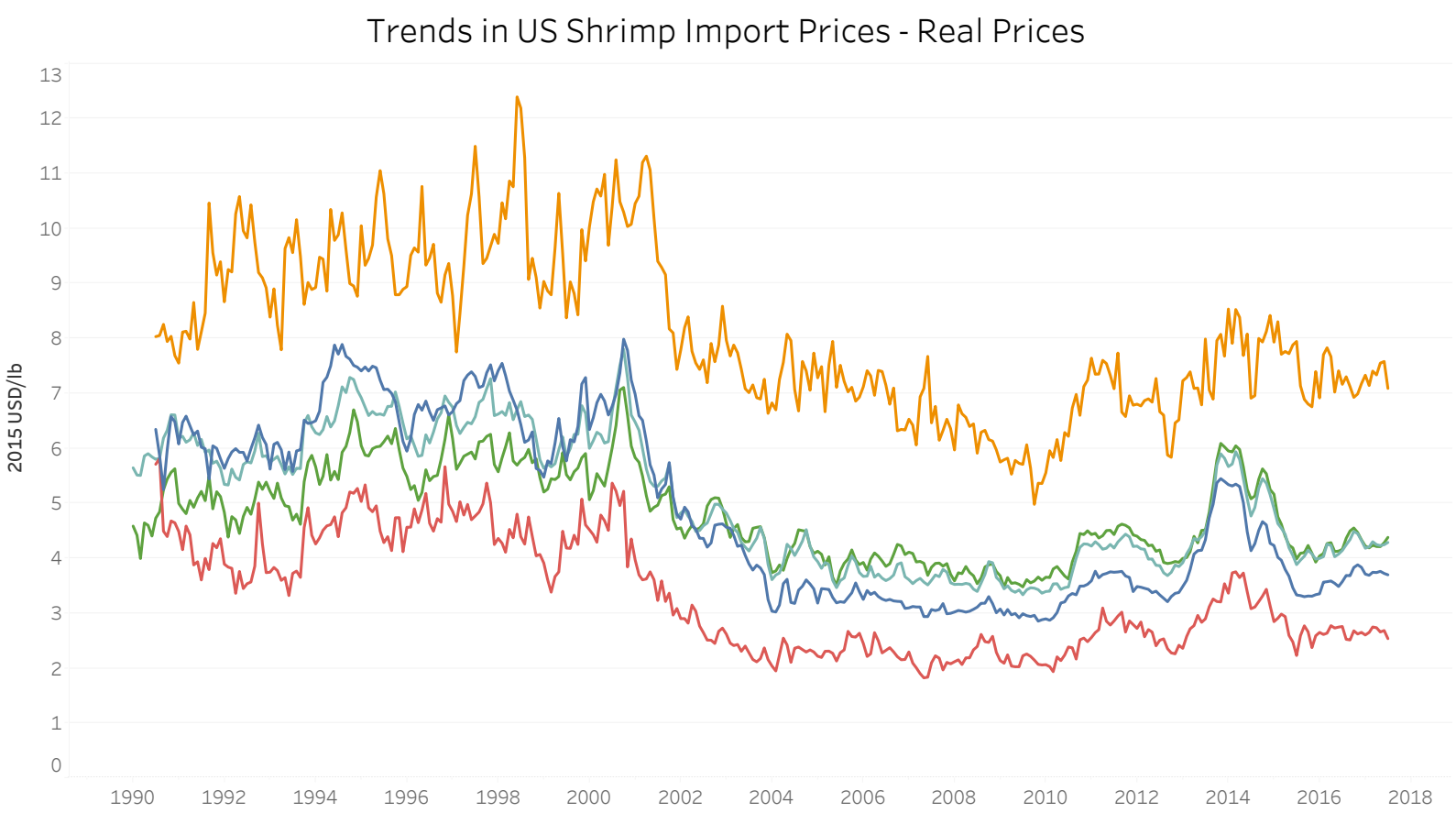
*Estimate

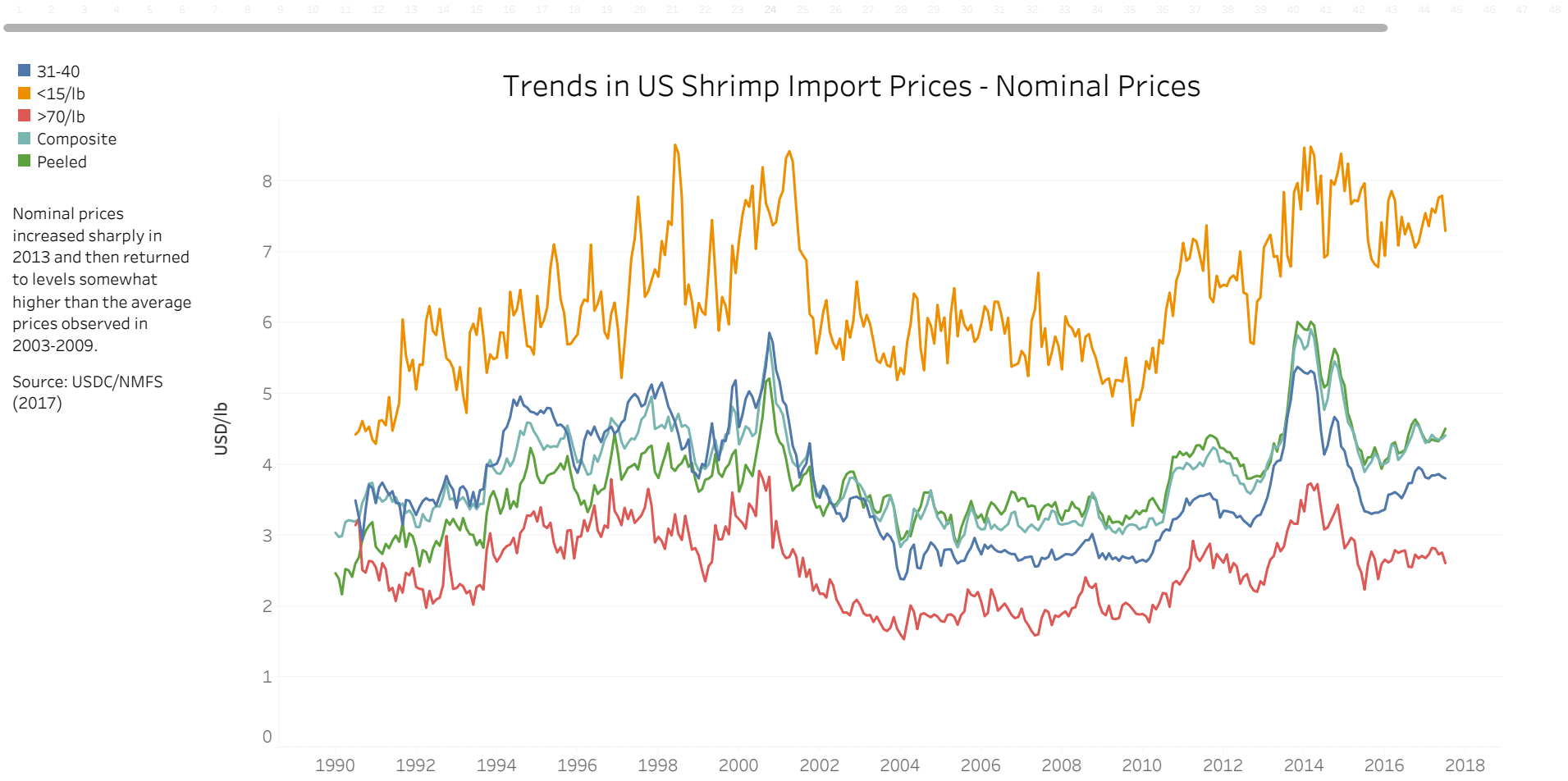

Others
Brown
Pink
White
Source: USDC/NMFS (2017)
U.S. Landings of Wild-Caught Shrimp
MT
0K
20K
40K
60K
80K
100K
120K
140K
160K
180K
1980 1981 1982 1983 1984 1985 1986 1987 1988 1989 1990 1991 1992 1993 1994 1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015
34,848 55,466 55,563
36,005 74,656 39,104
32,216 60,156 28,349
35,166 51,555 18,006
41,029 66,182 20,417
44,698 71,119 24,308
54,506 76,053 45,031
43,166 68,636 48,949
36,586 63,169 46,677
31,802 73,402 54,380
36,079 80,325 43,250
40,441 69,419 36,580
40,495 52,895 59,362
33,835 53,996 44,260
37,761 50,634 38,639
44,555 58,222 41,327
29,852 14,212 56,279 55,365
33,394 49,876 46,516
44,719 59,128 28,151
46,939 62,165 28,264
55,768 74,932 38,827
41,026 69,005 39,796
43,730 58,866 45,678
47,782 65,626 26,704
57,102 56,374 22,901
50,295 44,854 18,040
66,639 65,645 15,835
51,869 54,511 19,043
50,068 39,086 23,943
56,901 58,010 22,000
47,358 36,042 30,582
46,236 56,887 40,182
53,701 49,927 35,754
43,047 50,615 36,701
45,928 49,874 47,443
43,196 52,457 53,303

- 31-40
- <15/lb
- >70/lb
- Composite
- Peeled

Real prices increased sharply in 2013 but returned to levels close to the long-term average in 2014 and 2015, remaining stable over the last 2 years.

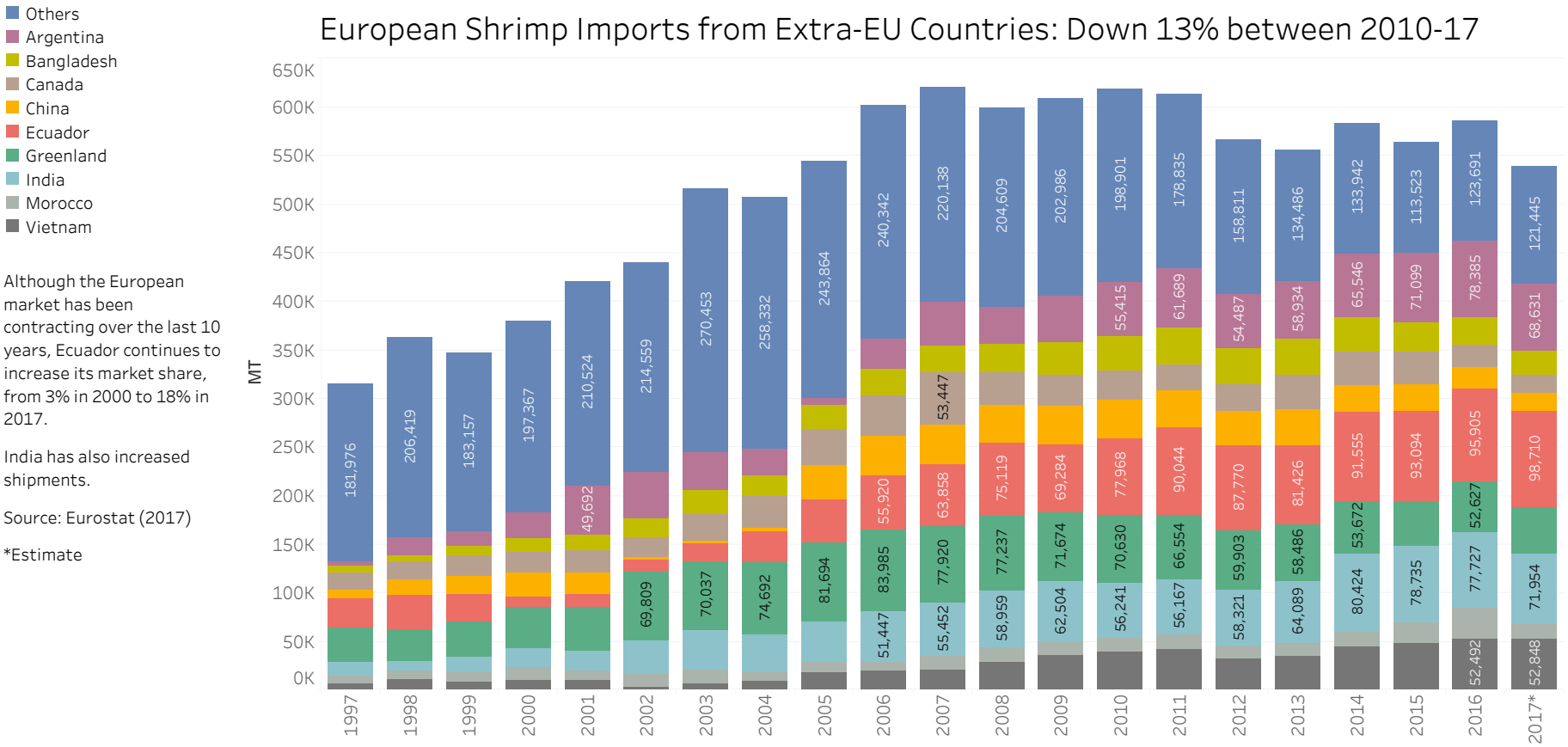
Source: USDC/NMFS (2017)





Nominal prices increased sharply in 2013 and then returned to levels somewhat higher than the average prices observed in 2003-2009.

Source: USDC/NMFS (2017)

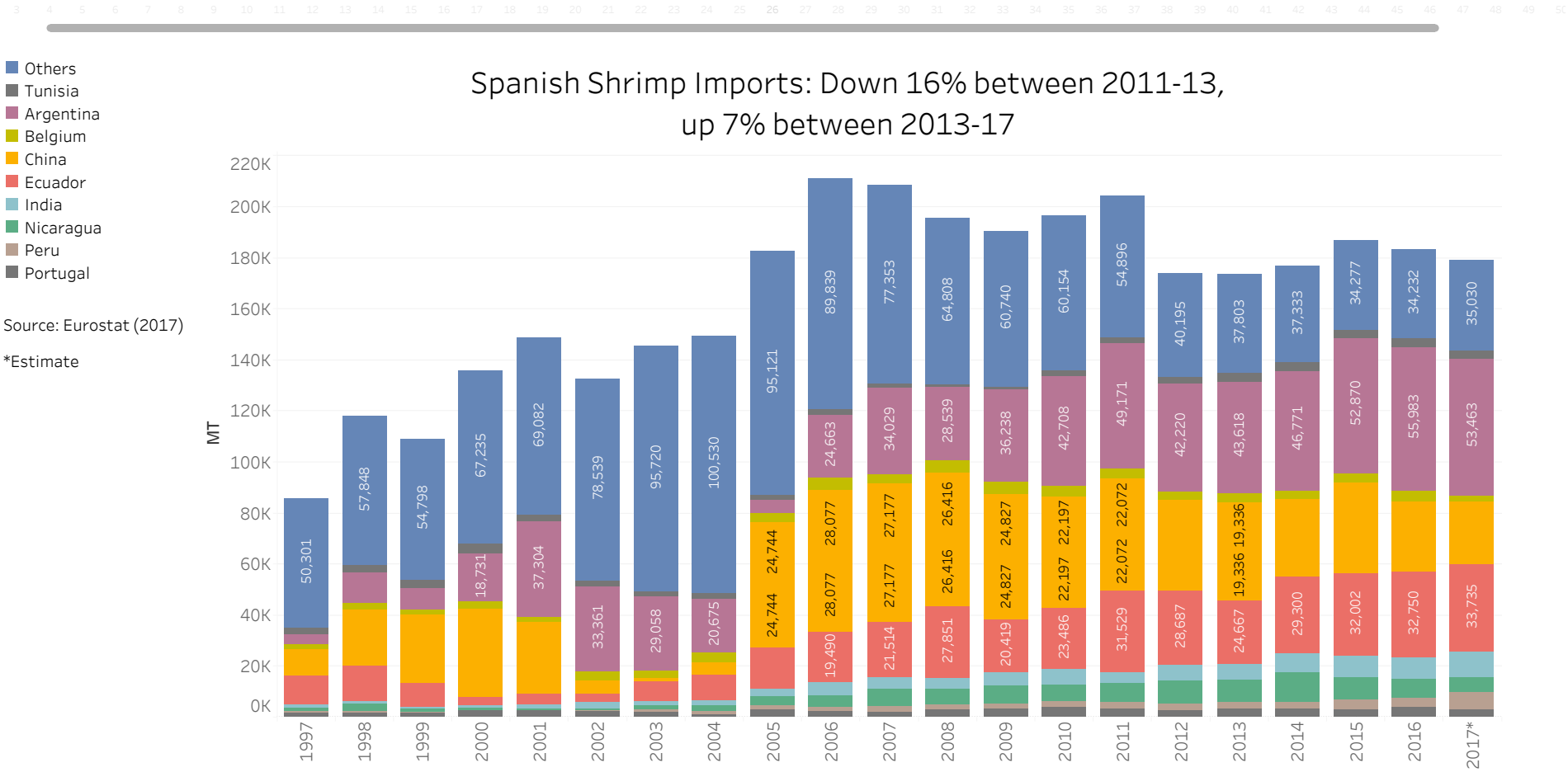


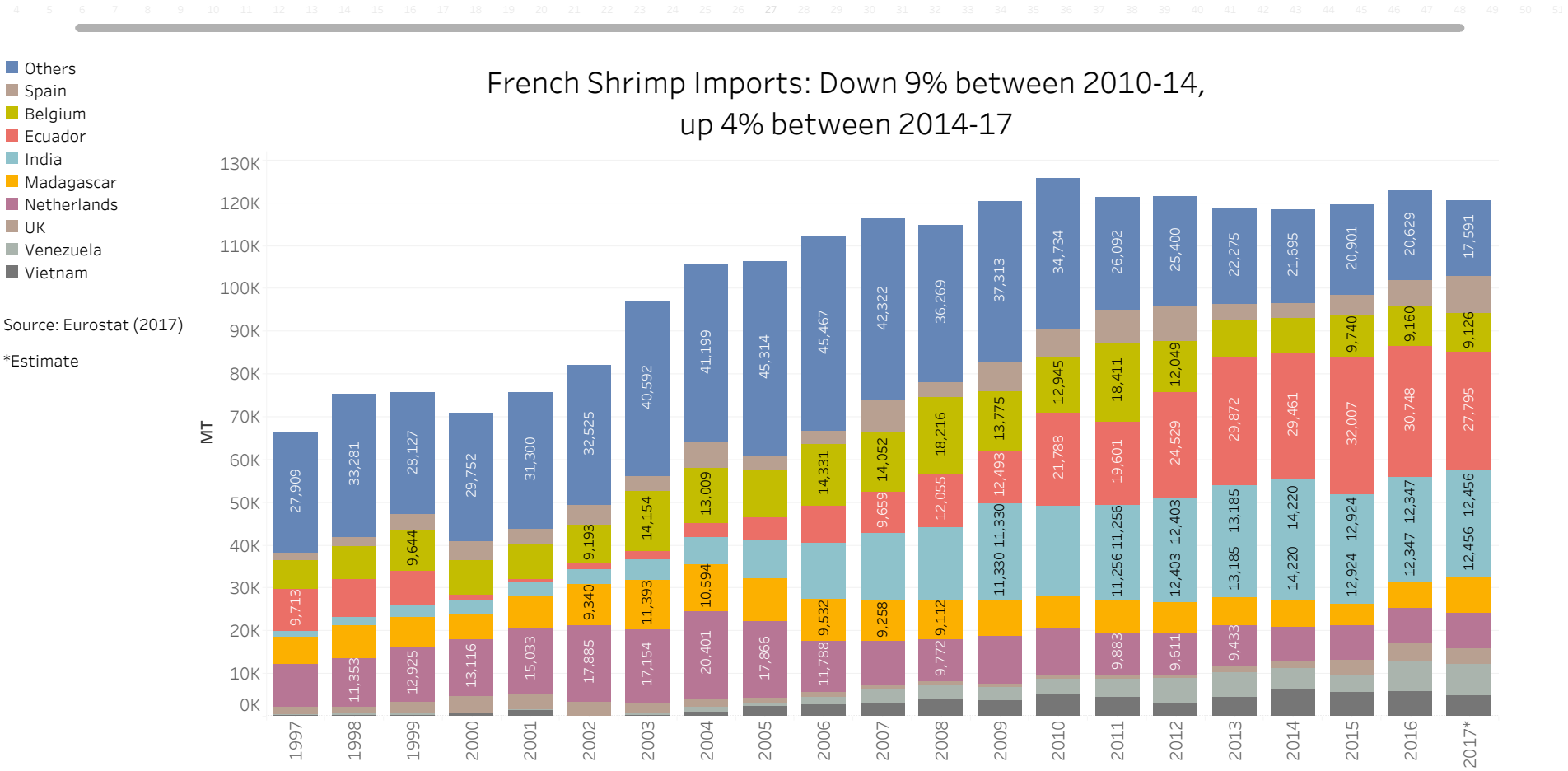
Although the European market has been contracting over the last 10 years, Ecuador continues to increase its market share, from 3% in 2000 to 18% in 2017.

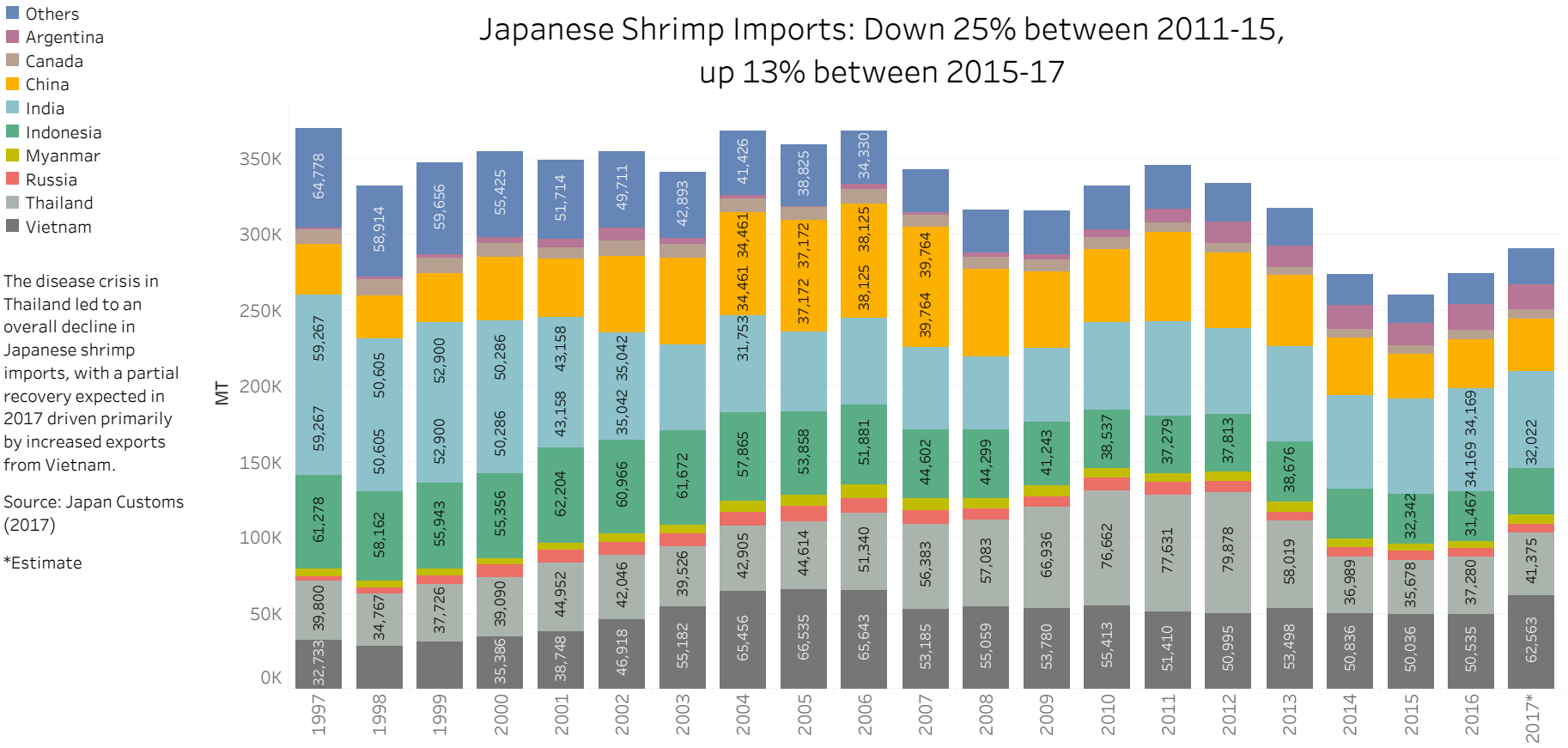
India has also increased shipments.

Source: Eurostat (2017)

*Estimate


Spanish Shrimp Imports: Down 16% between 2011-13, up 7% between 2013-17
Others
Tunisia
Argentina
Belgium
China
Ecuador
India
Nicaragua
Peru
Portugal
Source: Eurostat (2017)
*Estimate
MT
220K
200K
180K
160K
140K
120K
100K
80K
60K
40K
20K
0K
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017*
50,301
57,848
54,798
67,235
69,082
78,539
95,720
100,530
95,121
89,839
77,353
64,808
60,740
60,154
54,896
40,195
37,803
37,333
34,277
34,232
35,030
18,731
37,304
33,361
29,058
20,675
24,744
24,744
24,663
28,077
28,077
34,029
27,177
27,177
28,539
26,416
26,416
36,238
24,827
24,827
42,708
22,197
22,197
49,171
22,072
22,072
42,220
43,618
19,336
19,336
46,771
52,870
55,983
53,463
19,490
21,514
27,851
20,419
23,486
31,529
28,687
24,667
29,300
32,002
32,750
33,735

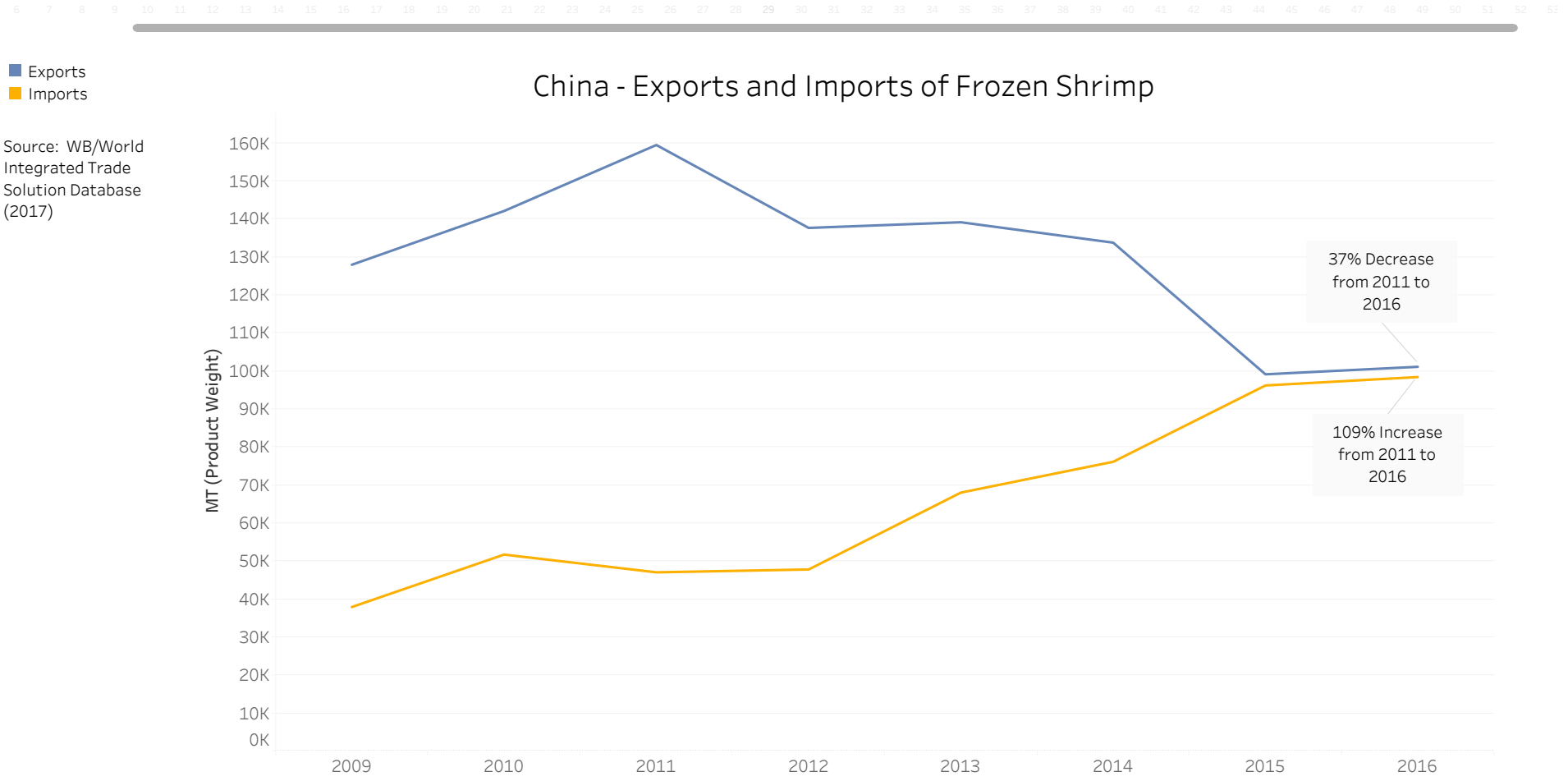

French Shrimp Imports: Down 9% between 2010-14, up 4% between 2014-17
Others
Spain
Belgium
Ecuador
India
Madagascar
Netherlands
UK
Venezuela
Vietnam
Source: Eurostat (2017)
*Estimate
MT
130K
120K
110K
100K
90K
80K
70K
60K
50K
40K
30K
20K
10K
0K
1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017*
27,909 9,713
33,281 11,353
28,127 9,644 12,925
29,752 13,116
31,300 15,033
32,525 9,193 9,340 17,885
40,592 14,154 11,393 17,154
41,199 13,009 10,594 20,401
45,314 17,866
45,467 14,331 9,532 11,788
42,322 14,052 9,659 9,258
36,269 18,216 12,055 9,772 9,112
37,313 13,775 12,493 11,330 11,330
34,734 12,945 21,788
26,092 18,411 19,601 11,256 11,256 9,883
25,400 12,049 24,529 12,403 12,403 9,611
22,275 29,872 13,185 13,185 9,433
21,695 29,461 14,220 14,220
20,901 9,740 32,007 12,924 12,924
20,629 9,160 30,748 12,347 12,347
17,591 9,126 27,795 12,456 12,456



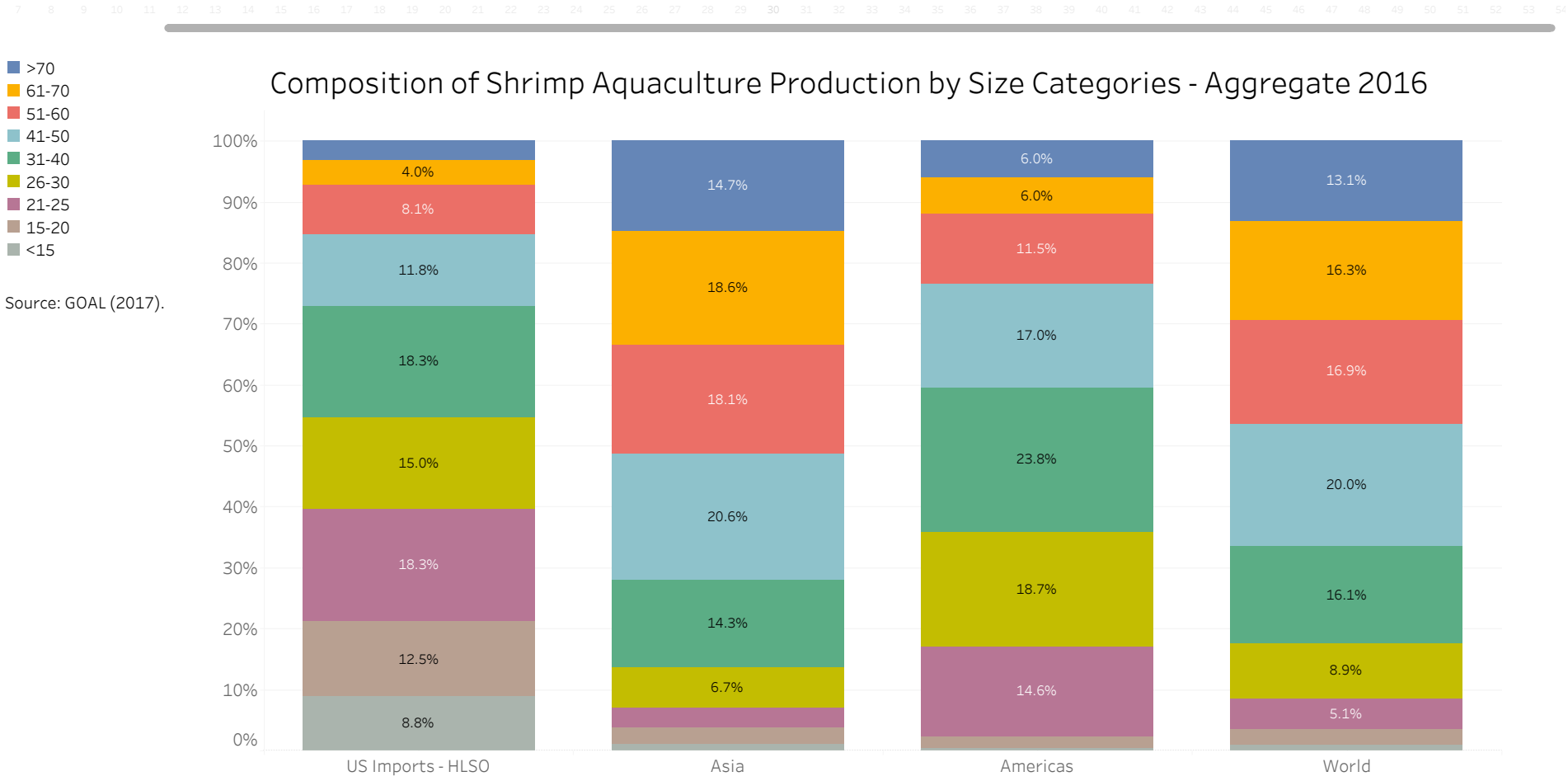
The disease crisis in Thailand led to an overall decline in Japanese shrimp imports, with a partial recovery expected in 2017 driven primarily by increased exports from Vietnam.

Source: Japan Customs (2017)

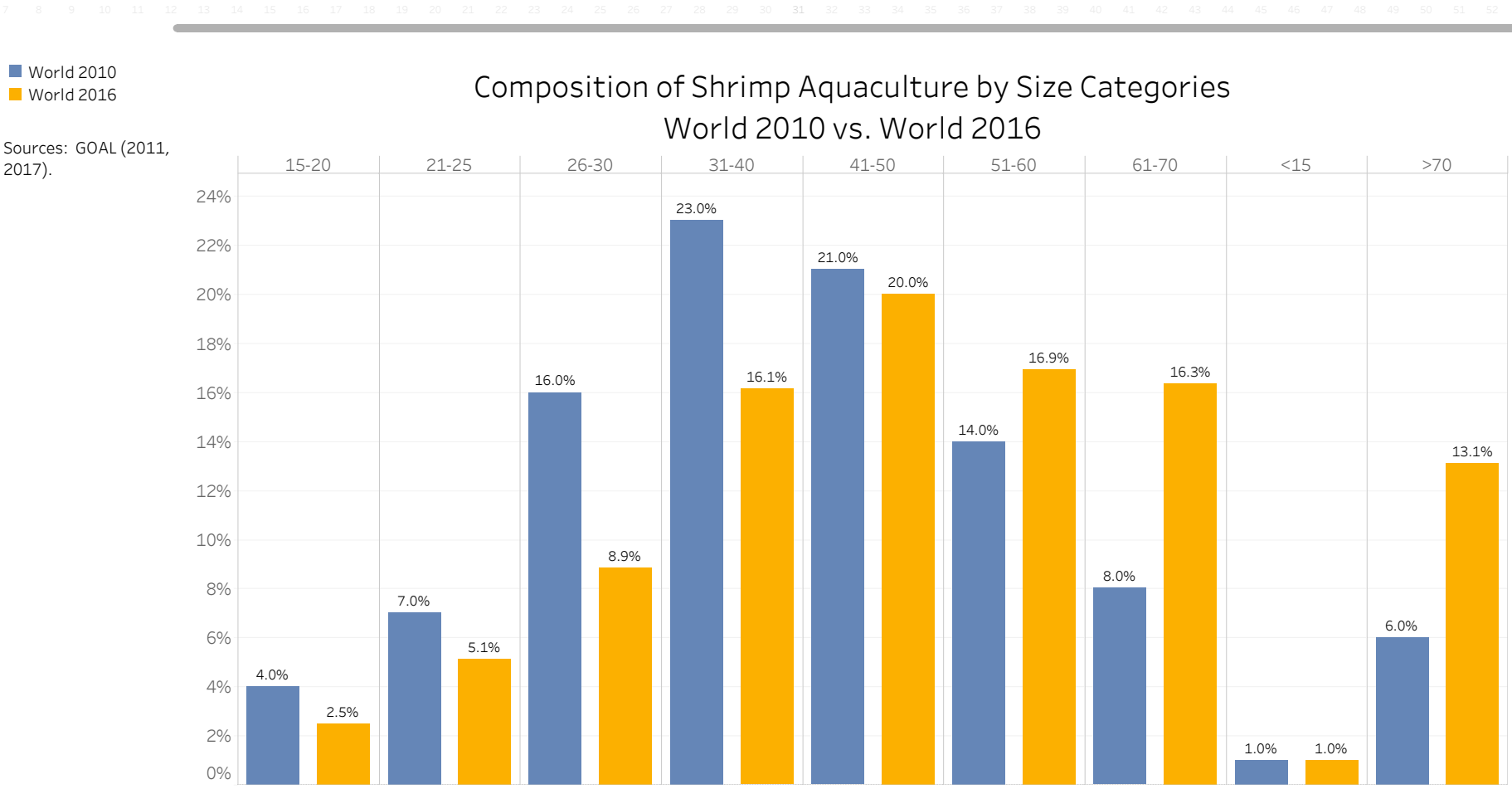
*Estimate



Source: WB/World Integrated Trade Solution Database (2017)



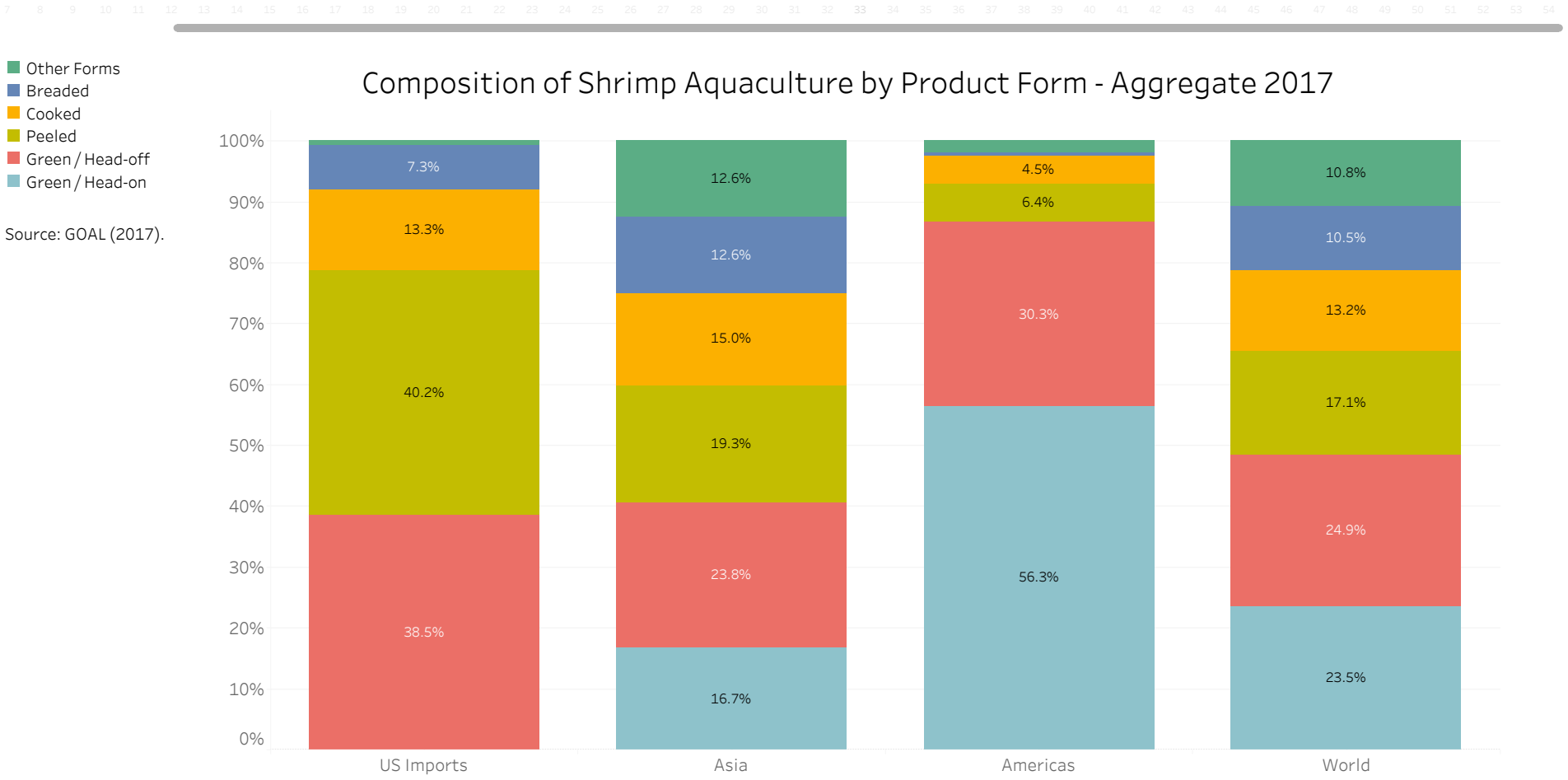
Source: GOAL (2017).



Sources: GOAL (2011, 2017).

Expected Trends in Shrimp Aquaculture: Size Categories - Goal Survey 2017

Size Category	Asia	Americas	World
<15	Stable	Decrease	Stable
15-20	Stable	Stable	Stable
21-25	Stable	Stable	Stable
26-30	Stable	Increase	Stable / Increase
31-40	Stable / Decrease	Stable	Stable / Decrease
41-50	Stable / Decrease	Stable	Stable / Decrease
51-60	Stable	Increase	Stable
61-70	Stable	Increase	Stable
>70	Increase	Decrease	Increase

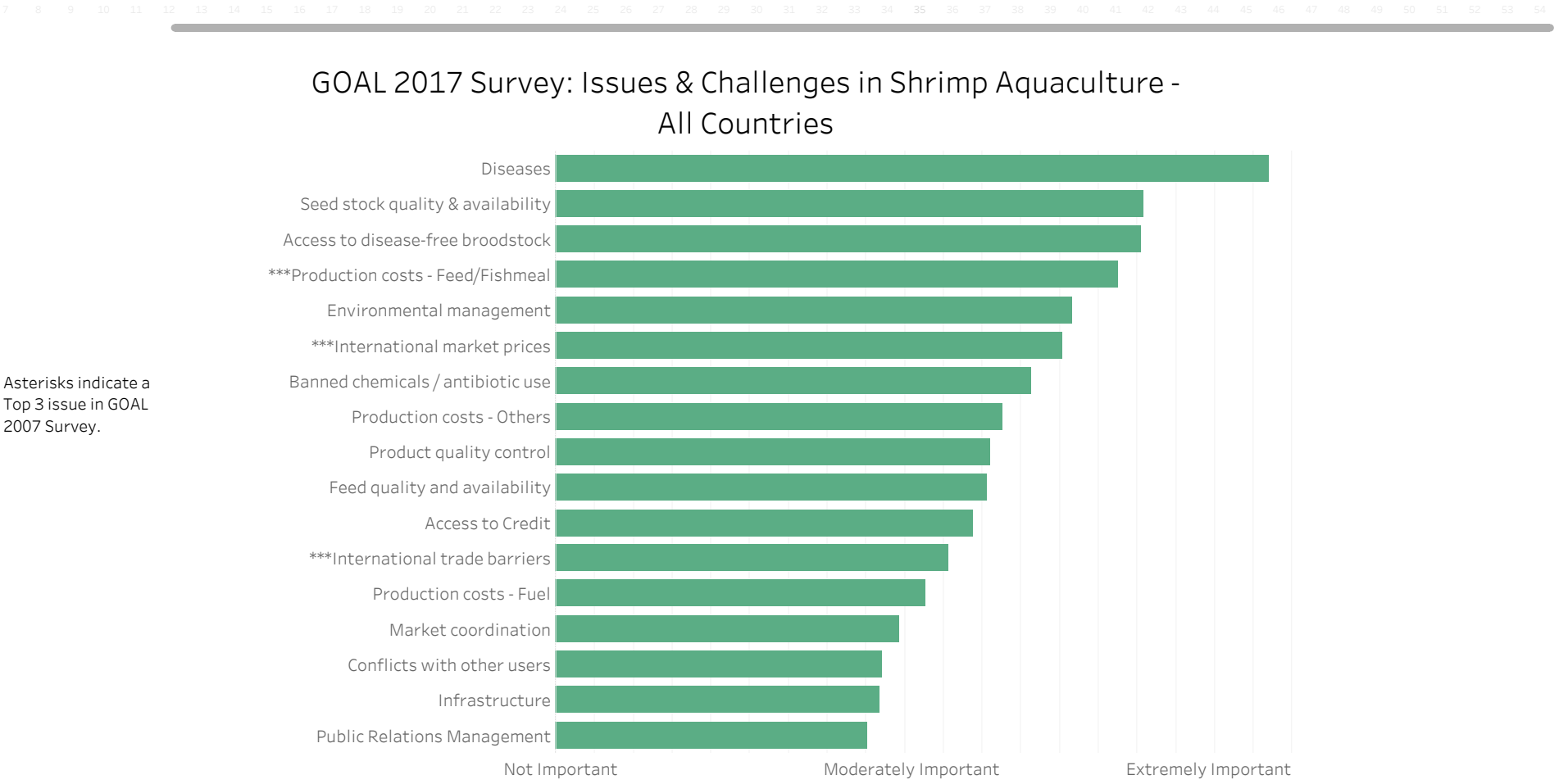


Source: GOAL (2017).

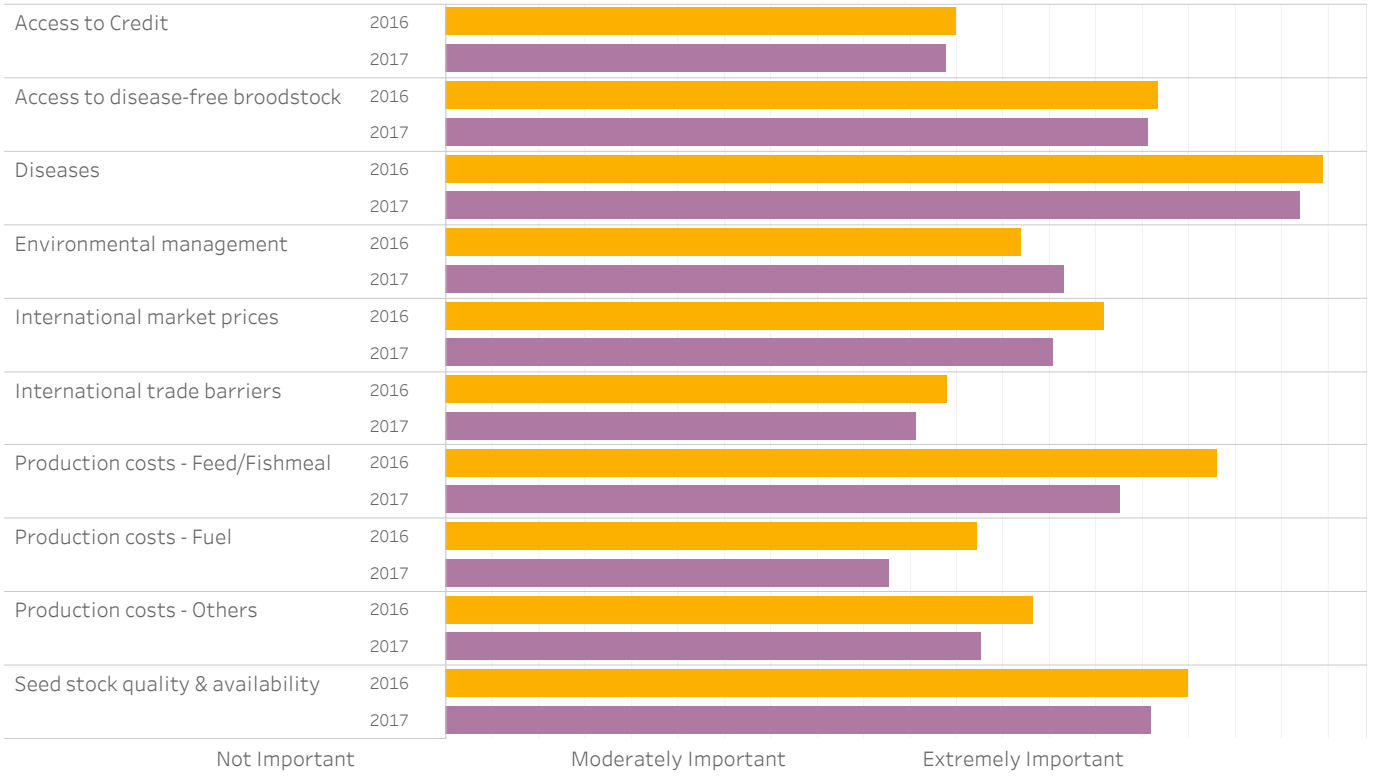
Expected Trends in Shrimp Aquaculture: Product Forms - GOAL Survey 2017

For a number of years, production of green / head-on shrimp for the European and Asian markets has been trending upwards in Ecuador.

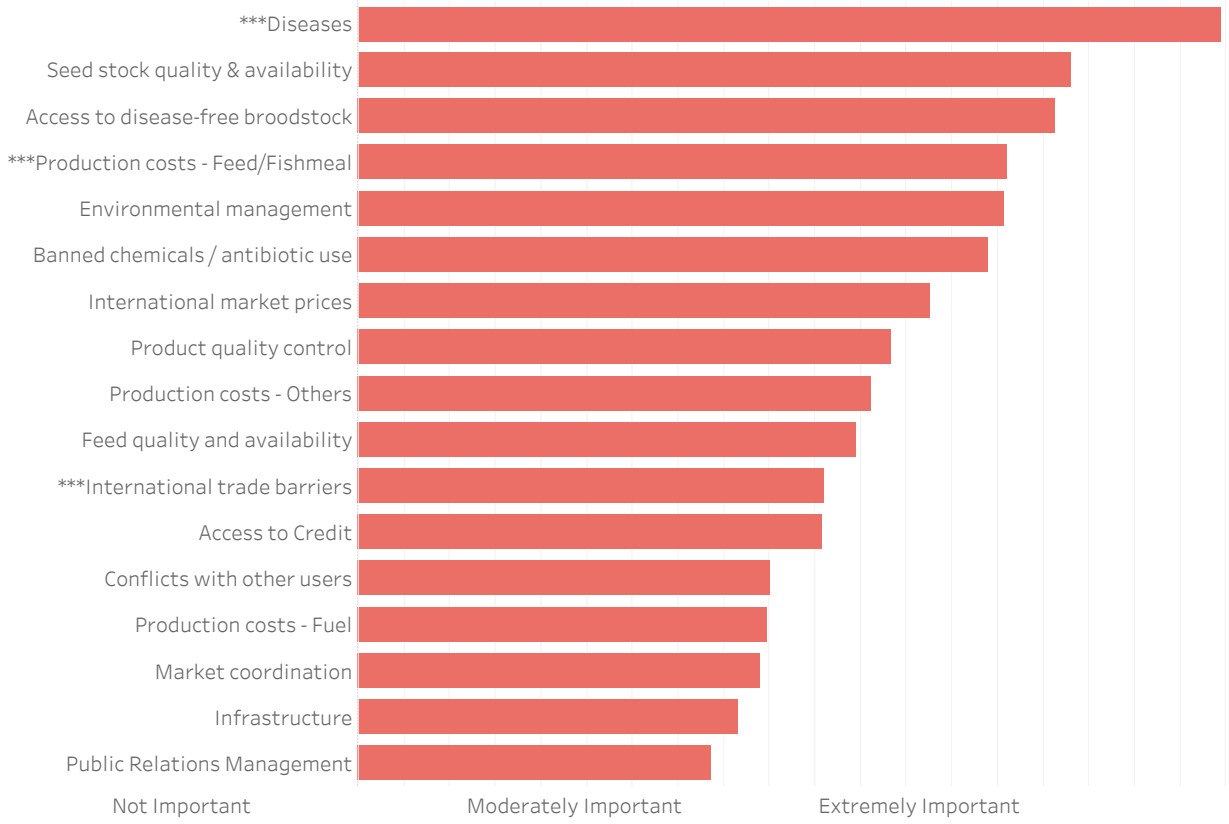
Product Form	Asia	Americas	World
Green / Head-on	Decrease	Increase	Stable
Green / Head-off	Stable	Decrease	Stable
Peeled	Stable / Increase	Stable / Decrease	Stable / Increase
Cooked	Stable / Decrease	Stable	Stable / Decrease
Breaded	Increase	Stable	Increase
Other Forms	Increase	Stable / Decrease	Increase



Asterisks indicate a Top 3 issue in GOAL 2007 Survey.


Worldwide Top Issues & Challenges in Shrimp Aquaculture:
2017 Survey vs 2016 Survey
Access to Credit
Access to disease-free broodstock
Diseases
Environmental management
International market prices
International trade barriers
Production costs - Feed/Fishmeal
Production costs - Fuel
Production costs - Others
Seed stock quality & availability
2016
2017
Not Important
Moderately Important
Extremely Important

GOAL 2017 Survey: Issues & Challenges in Shrimp Aquaculture - Asia



Asterisks indicate a Top 3 issue in GOAL 2007 Survey.

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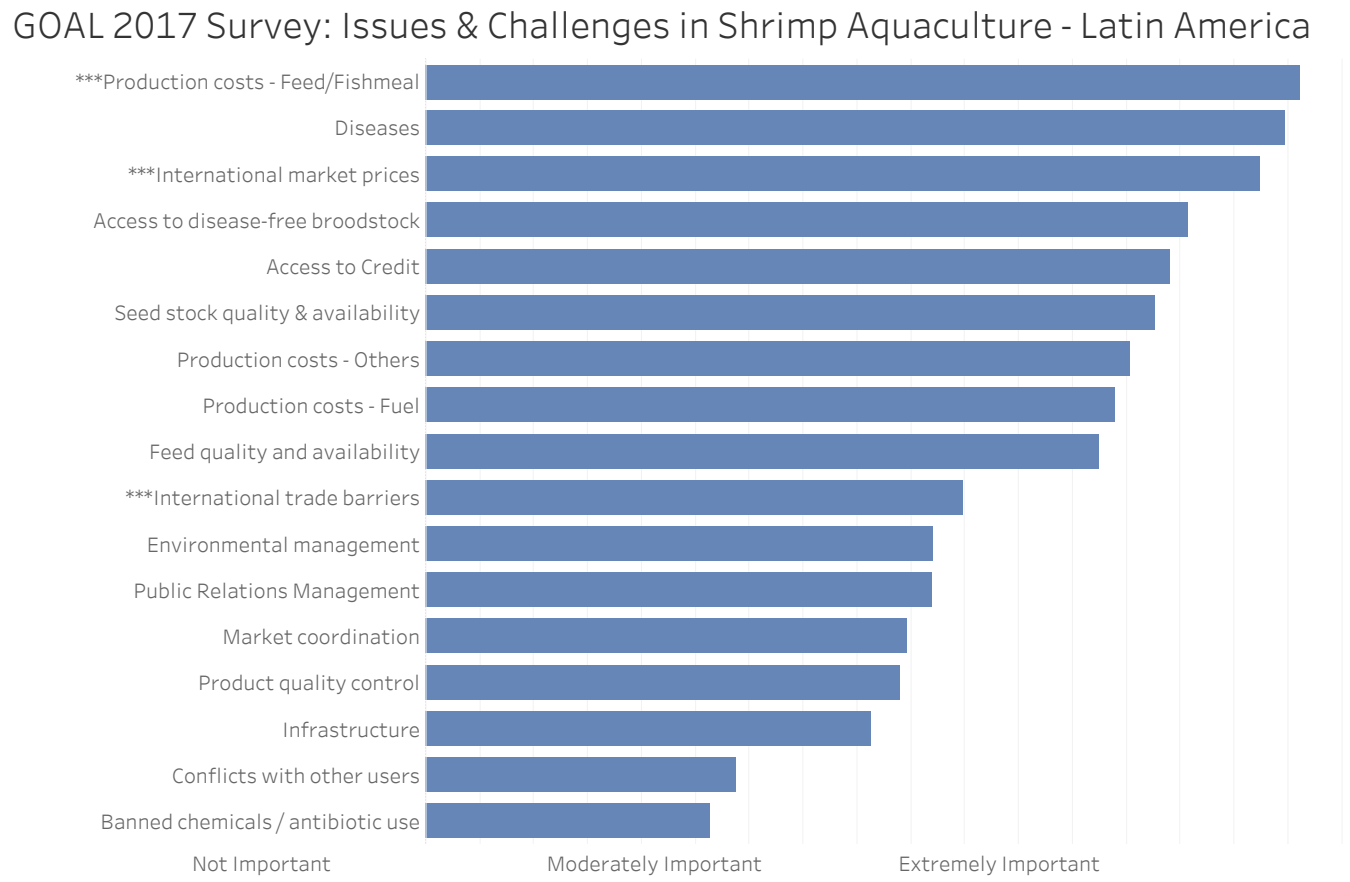
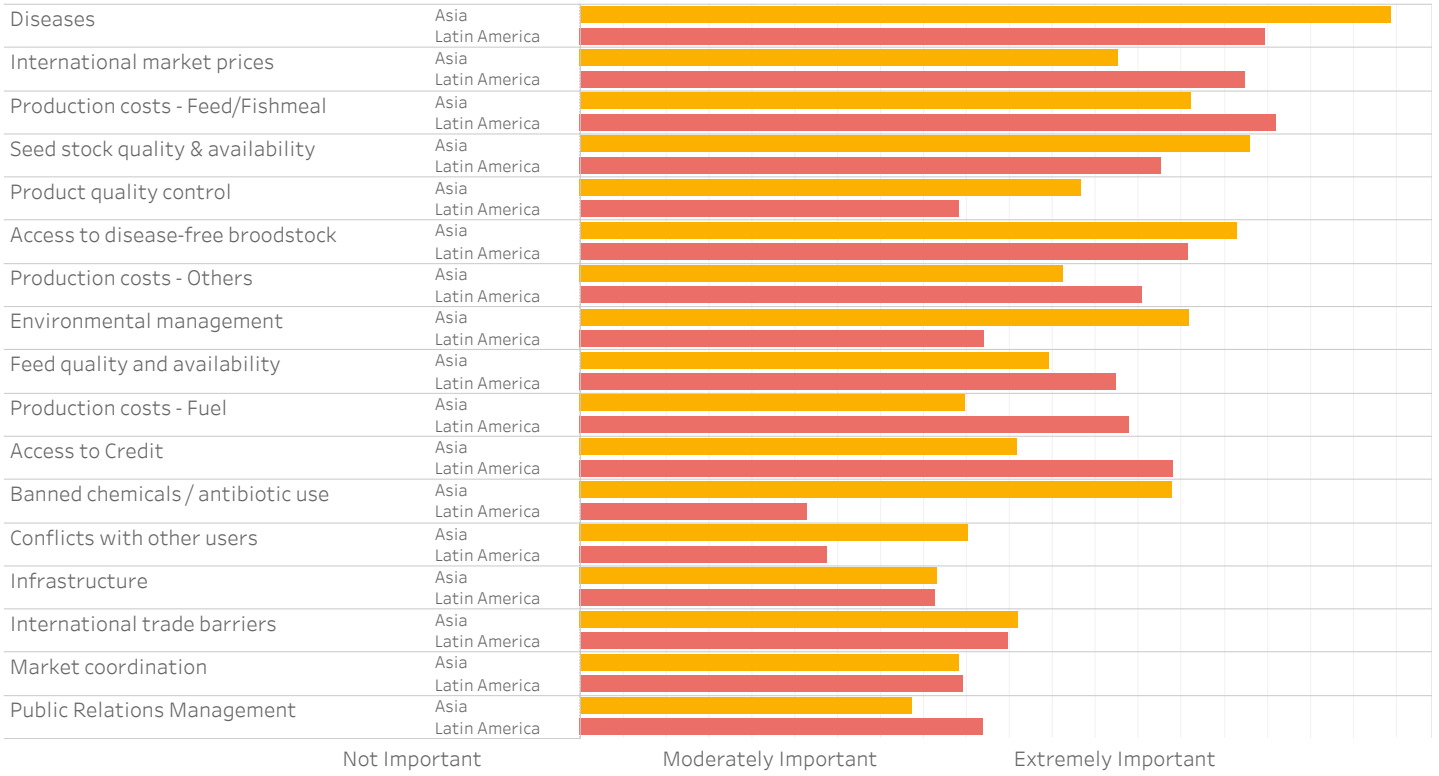


GOAL 2017 Survey: Top Issues & Challenges in Shrimp Aquaculture - Asia vs Latin America



7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54

GOAL 2017 Survey: Global economic conditions will be better in 2018 compared to 2017

Americas: more positive than last year

Asia: about same perspective as last year

Outlook	Asia	Americas	Others
Strongly Agree		Honduras	
Agree	Bangladesh, India, Myanmar, Philippines, Taiwan, Thailand	Brazil, Mexico, Peru	Madagascar
Neutral / No Opinion	China, Indonesia, Japan, Malaysia, Vietnam	Ecuador, Nicaragua, Venezuela	New Caledonia, Saudi Arabia
Disagree	South Korea		
Strongly Disagree			

GOAL 2017 Survey: Feed prices will be lower in 2018 compared to 2017

About same pespective as last year.

Outlook	Asia	Americas	Others
Strongly Agree			
Agree		Nicaragua	
Neutral / No Opinion	India, Philippines, Taiwan, Vietnam	Honduras, Mexico, Peru, Venezuela	Madagascar
Disagree	China, Indonesia, Japan, Malaysia, Myanmar, South Korea, Thailand	Ecuador	New Caledonia, Saudi Arabia
Strongly Disagree	Bangladesh	Brazil	

GOAL 2017 Survey: The global shrimp market will strengthen in 2018 compared to 2017

Same perspective as last year.

Outlook	Asia	Americas	Others
Strongly Agree	Indonesia, Taiwan		
Agree	Bangladesh, China, Japan, Myanmar, Philippines, Vietnam	Brazil, Ecuador, Honduras, Peru, Venezuela	New Caledonia
Neutral / No Opinion	India, Malaysia, South Korea, Thailand	Mexico, Nicaragua	Madagascar
Disagree			Saudi Arabia
Strongly Disagree			

Conclusions

Global Shrimp Production Expectations
2016-17: **+2%**
2017-18: **+5%**
2016-19: **+4.8% per year**

Top 3 Constraints to Growth (Global & Asia):
#1 **Disease**
#2 **Seed Stock Quality**
#3 **Disease-free Broodstock**
Top 3 Constraints to Growth (Latin America):
#1 **Production Cost**
#2 **Disease**
#3 **Market Prices**

2018 - Expectations
Generally expect higher feed prices
Stronger shrimp markets (little more positive than last year)
Better global economic conditions (little more positive than last year)

GOAL 2017 DUBLIN, IRELAND

Global Aquaculture Alliance™

Thank You!

James.anderson@ufl.edu
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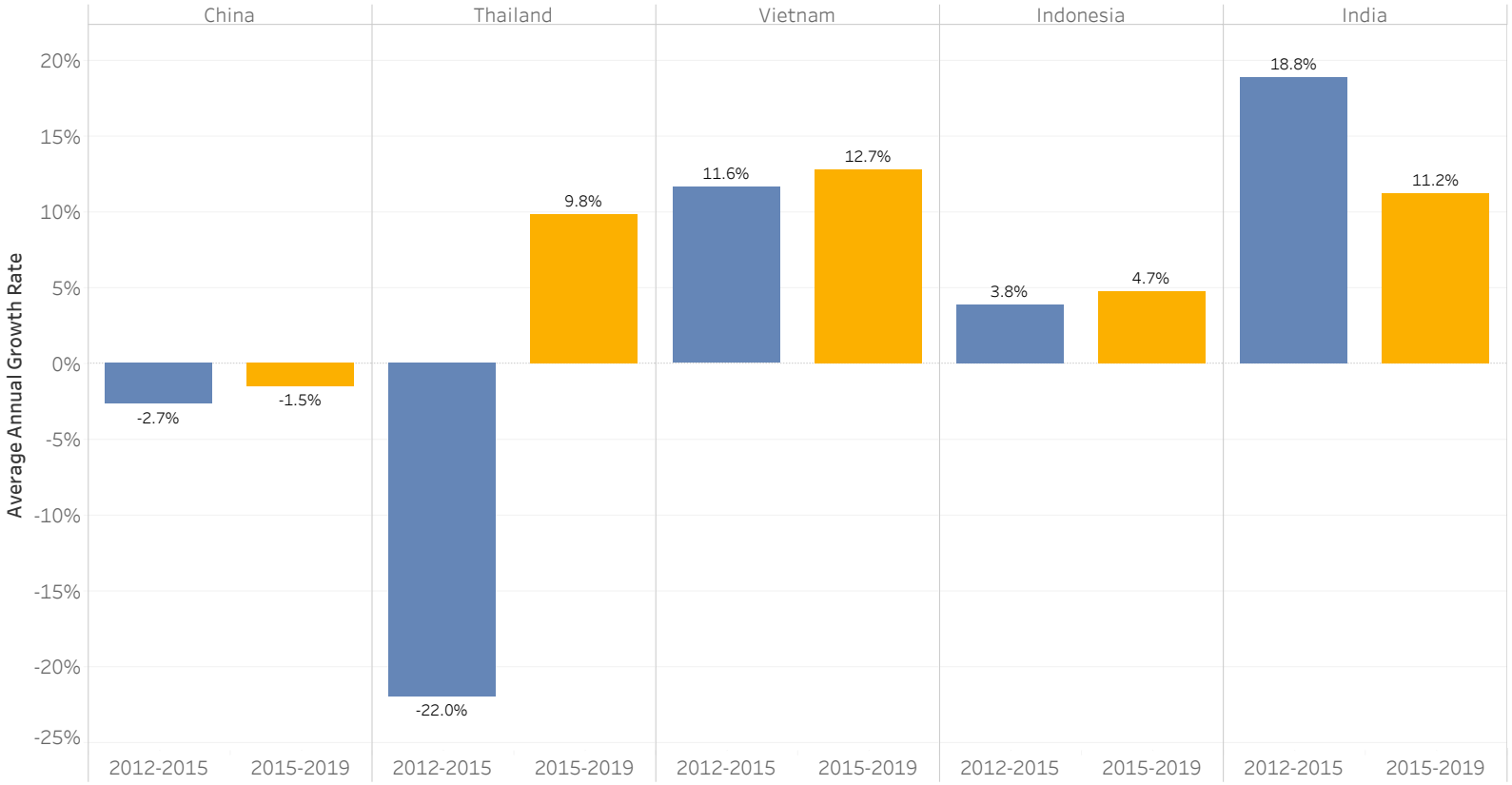
GOAL 2017 DUBLIN, IRELAND

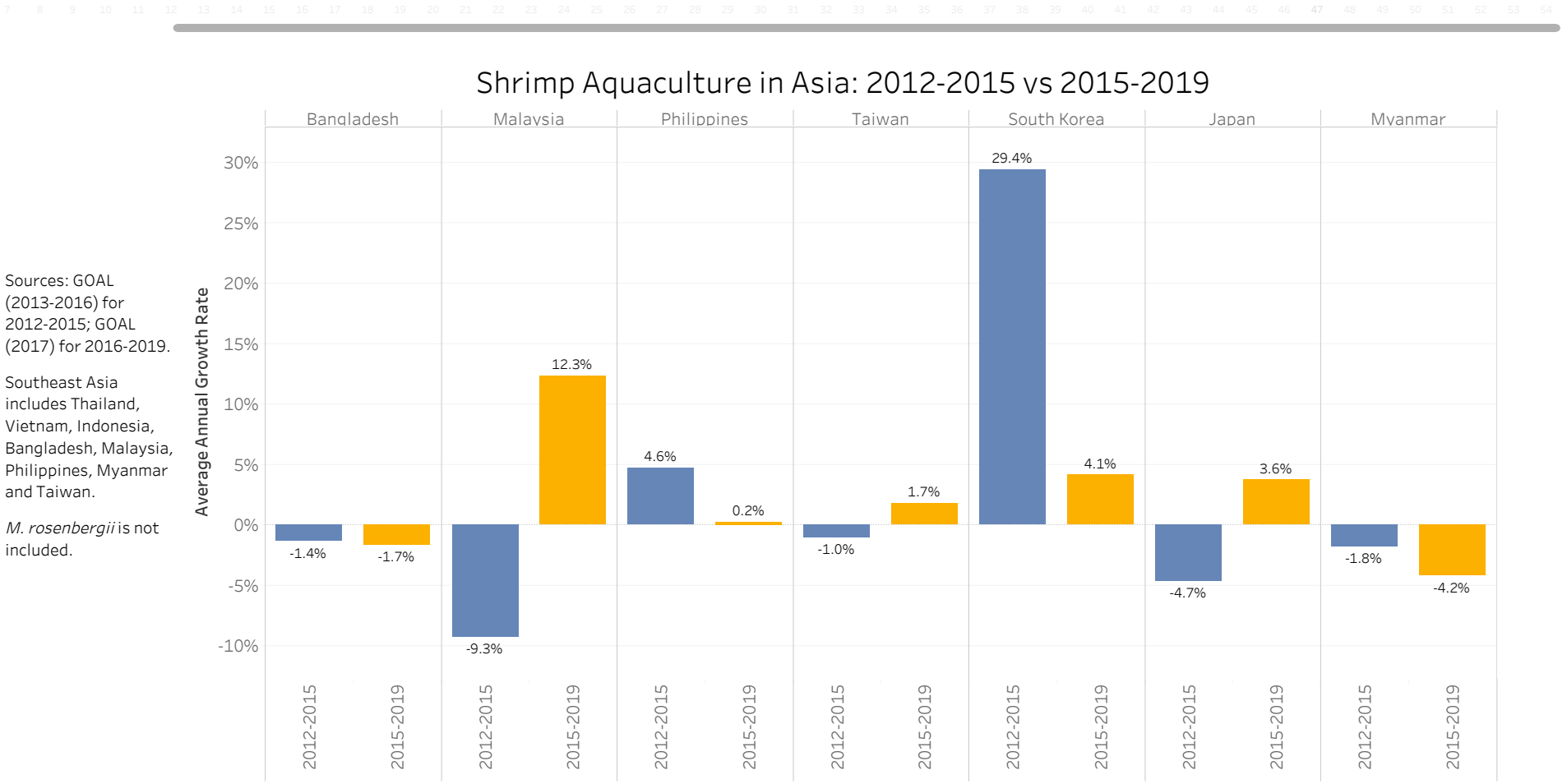
APPENDIX

Sources: GOAL (2013-2016) for 2012-2015; GOAL (2017) for 2016-2019.

Southeast Asia includes Thailand, Vietnam, Indonesia, Bangladesh, Malaysia, Philippines, Myanmar and Taiwan.

M. rosenbergii is not included.





Sources: GOAL (2013-2016) for 2012-2015; GOAL (2017) for 2016-2019.

Southeast Asia includes Thailand, Vietnam, Indonesia, Bangladesh, Malaysia, Philippines, Myanmar and Taiwan.

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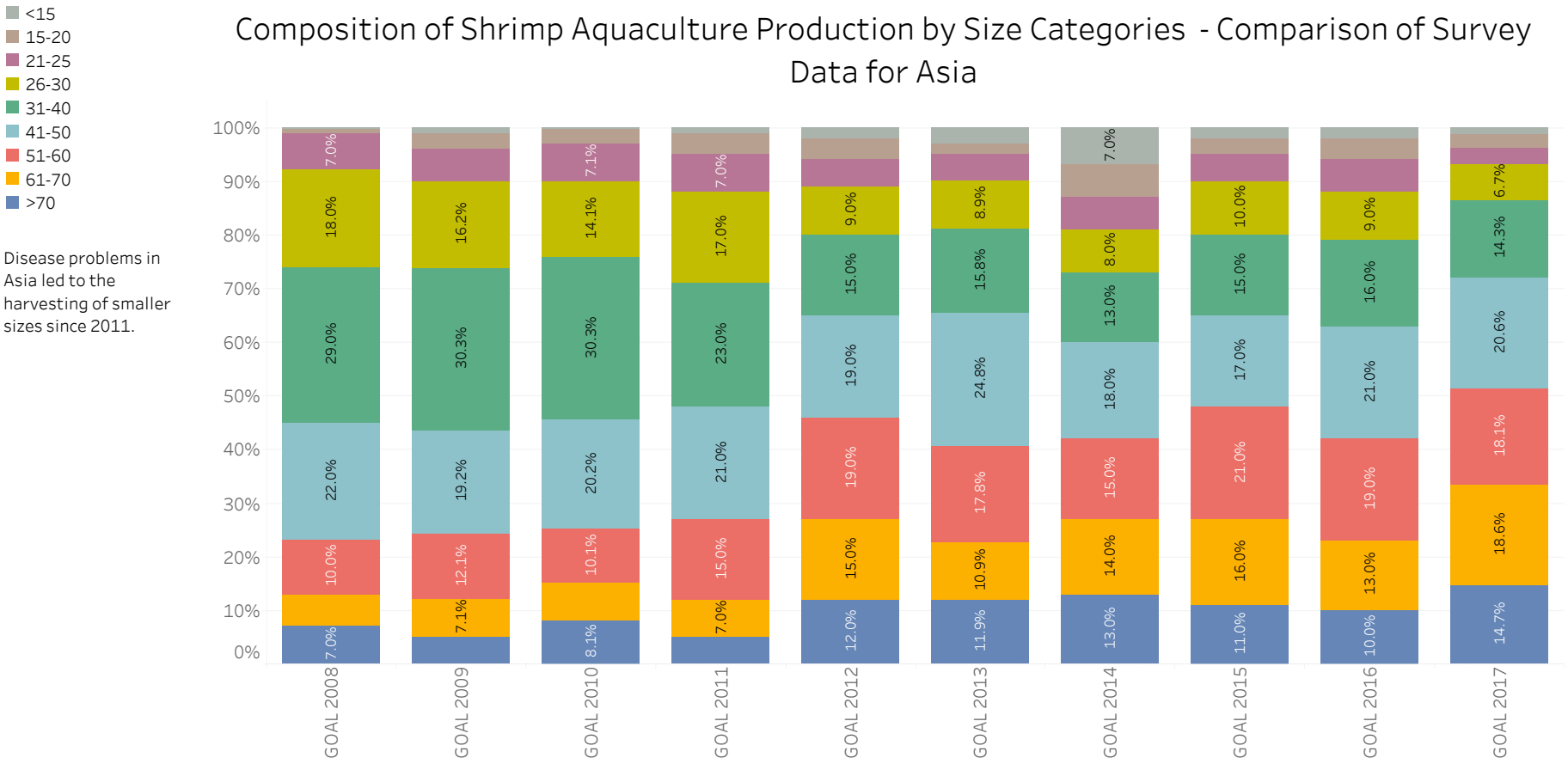
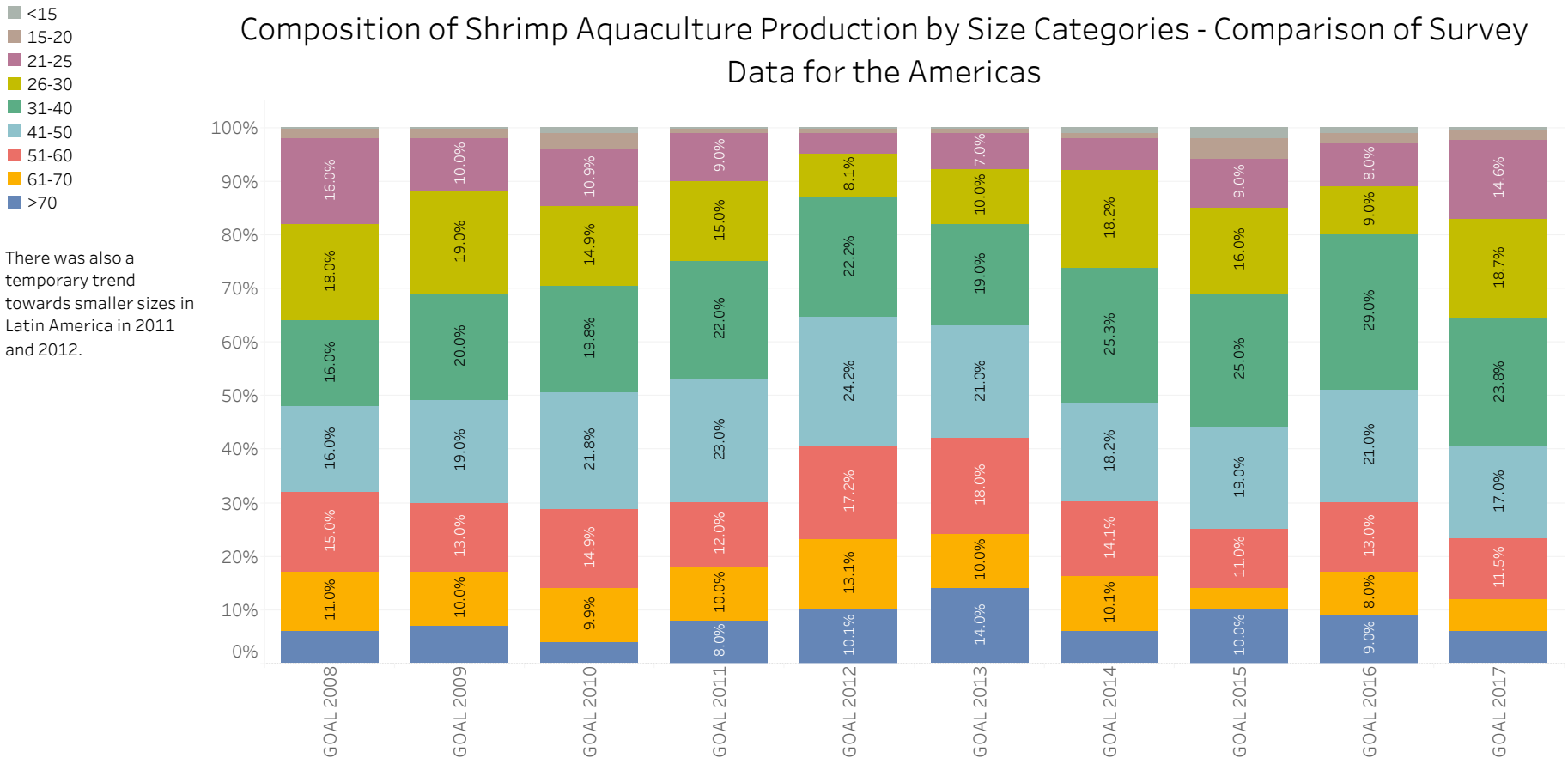
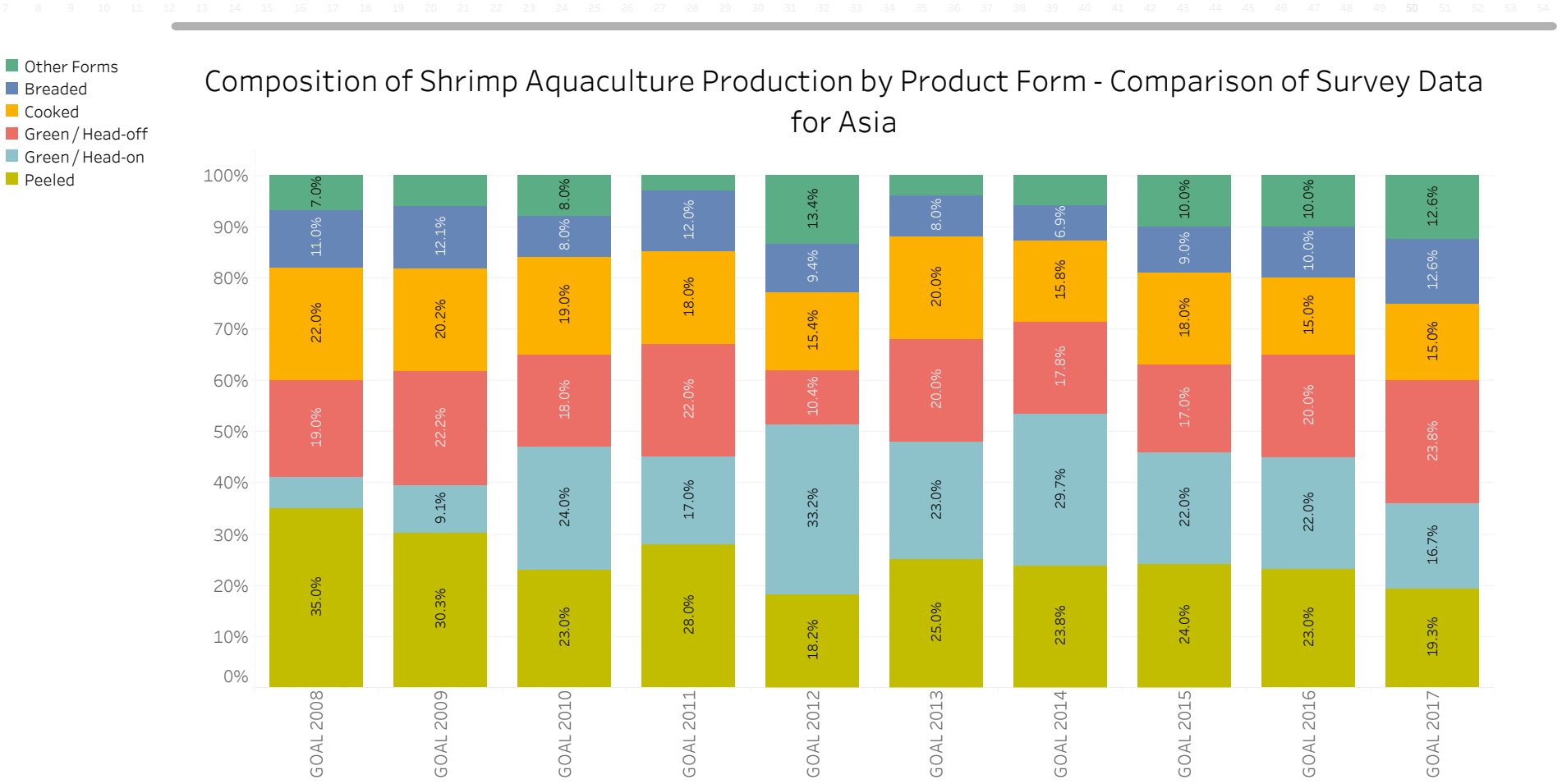
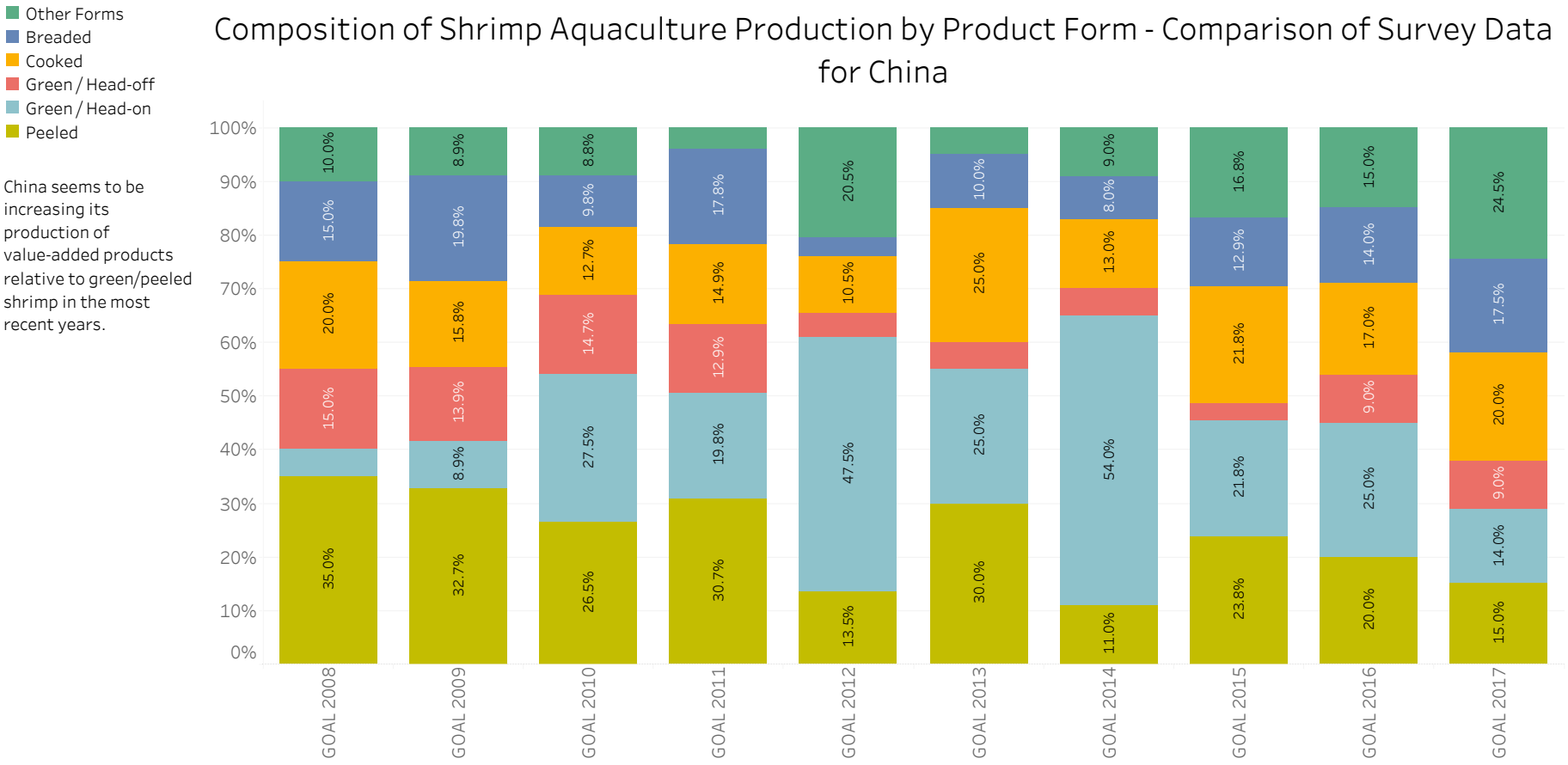


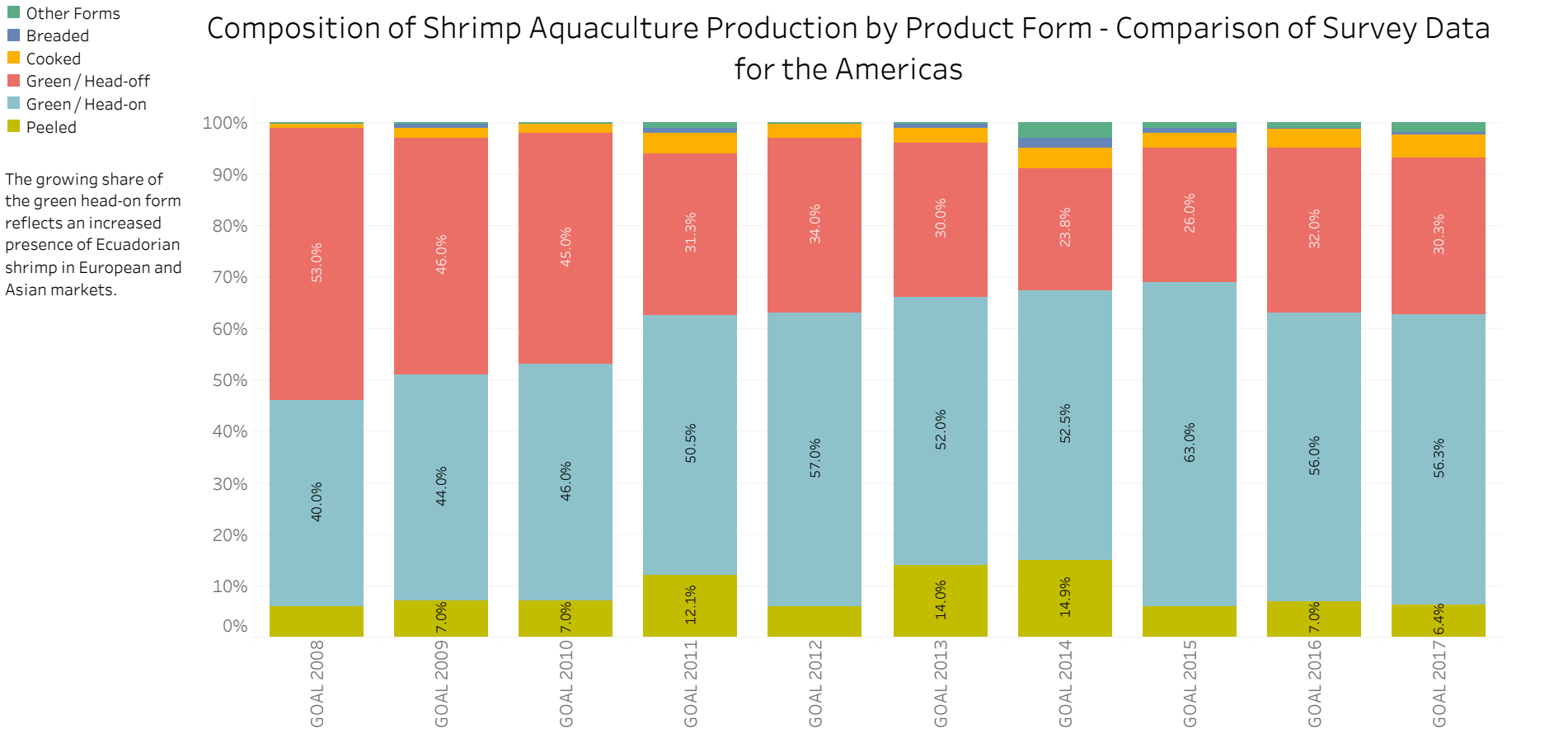
Disease problems in Asia led to the harvesting of smaller sizes since 2011.



There was also a temporary trend towards smaller sizes in Latin America in 2011 and 2012.


Other Forms
Breaded
Cooked
Green / Head-off
Green / Head-on
Peeled
Composition of Shrimp Aquaculture Production by Product Form - Comparison of Survey Data for Asia
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
GOAL 2008
GOAL 2009
GOAL 2010
GOAL 2011
GOAL 2012
GOAL 2013
GOAL 2014
GOAL 2015
GOAL 2016
GOAL 2017
7.0%
11.0%
22.0%
19.0%
9.1%
35.0%
12.1%
20.2%
22.2%
9.1%
30.3%
8.0%
8.0%
19.0%
18.0%
24.0%
23.0%
12.0%
18.0%
22.0%
17.0%
28.0%
13.4%
9.4%
15.4%
10.4%
33.2%
18.2%
8.0%
20.0%
20.0%
23.0%
25.0%
6.9%
15.8%
17.8%
29.7%
23.8%
10.0%
9.0%
18.0%
17.0%
22.0%
24.0%
10.0%
10.0%
15.0%
20.0%
22.0%
23.0%
12.6%
12.6%
15.0%
23.8%
16.7%
19.3%

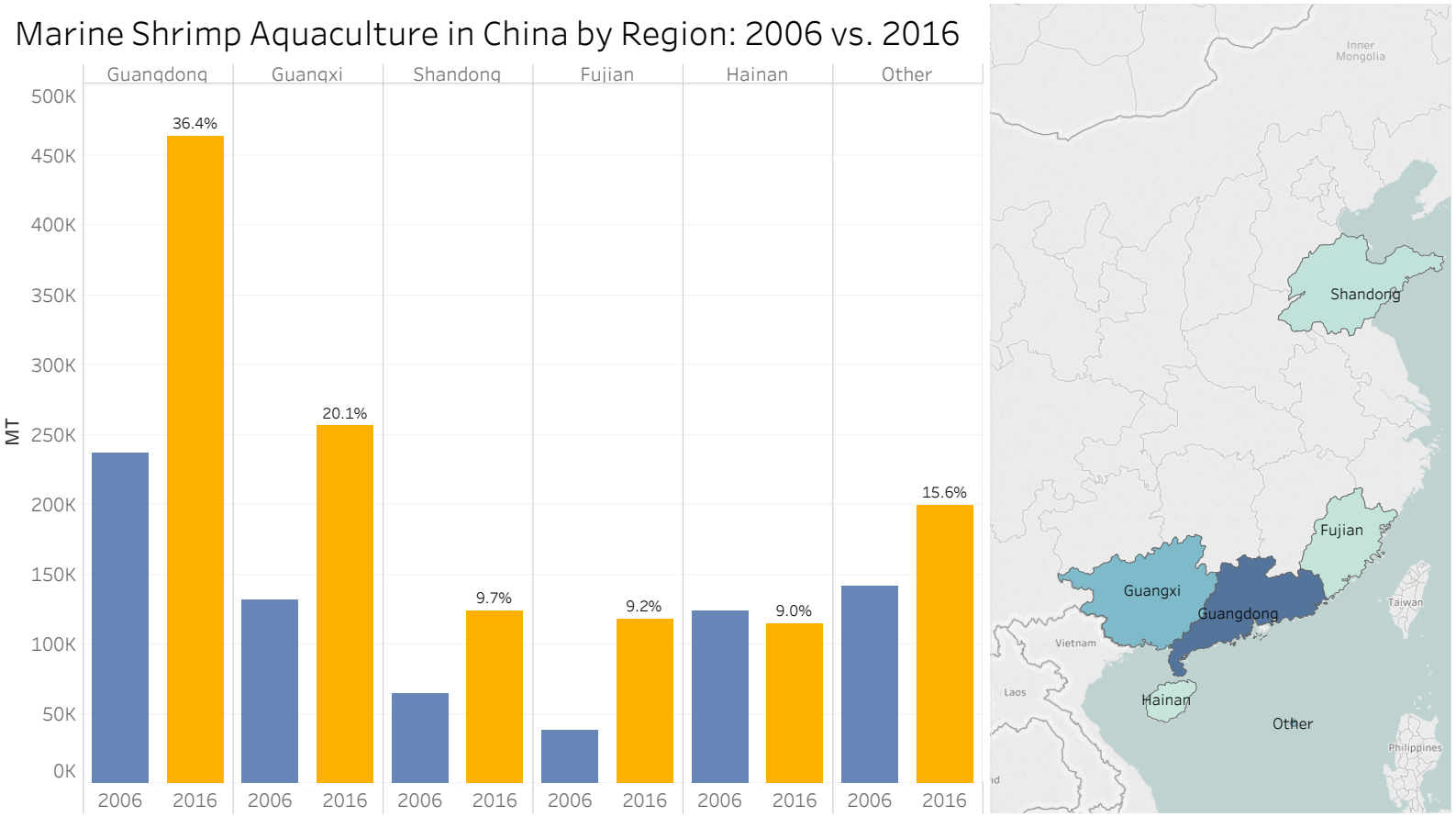

Other Forms
Breaded
Cooked
Green / Head-off
Green / Head-on
Peeled
China seems to be increasing its production of value-added products relative to green/peeled shrimp in the most recent years.
Composition of Shrimp Aquaculture Production by Product Form - Comparison of Survey Data for China
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
GOAL 2008
10.0%
15.0%
20.0%
15.0%
35.0%
GOAL 2009
8.9%
19.8%
15.8%
13.9%
8.9%
32.7%
GOAL 2010
8.8%
9.8%
12.7%
14.7%
27.5%
26.5%
GOAL 2011
17.8%
14.9%
12.9%
19.8%
30.7%
GOAL 2012
20.5%
10.5%
47.5%
13.5%
GOAL 2013
10.0%
25.0%
25.0%
30.0%
GOAL 2014
9.0%
8.0%
13.0%
54.0%
11.0%
GOAL 2015
16.8%
12.9%
21.8%
21.8%
23.8%
GOAL 2016
15.0%
14.0%
17.0%
9.0%
25.0%
20.0%
GOAL 2017
24.5%
17.5%
20.0%
9.0%
14.0%
15.0%



The growing share of the green head-on form reflects an increased presence of Ecuadorian shrimp in European and Asian markets.

Source: Chinese Fisheries Yearbook (2017).

Percentages are share across 2016.



Farmed, C&SA White, 26-30
Farmed, Southeast Asian, 26-30
Premium, White - Tiger

Coinciding with falling supplies from Thailand, wholesale shrimp prices began rising in 2010 with the sharpest increase taking place in 2013.

Prices declined during 2014 and 2015 as other countries (India, Indonesia, Ecuador, Vietnam) increased their exports to the U.S.

Prices of BT shrimp have nevertheless increased since early 2016, widening the premium over white shrimp.

Source: Urner Barry (2017)