ISSN: 0975-8585

Research Journal of Pharmaceutical, Biological and Chemical Sciences

# Review on Fresh Water Fish Diversity of Maharashtra (India).

**Pawara Ravindra H[1], Patel Nisar G[2], and Patel Yusuf E[3].**

[1,2]P.G. and Research Centre, Department of Zoology, Pratap College, Amalner; Dist. Jalgaon, Maharashtra, India.
[3]Department of Zoology, Iqra's H. J. Thim College of Arts and Science, Mehrun, Jalgaon, Maharashtra, India.

**ABSTRACT**

Globally nature as well as animal diversity are affected due to increase in unwise anthropogenic activities. Aquatic ecosystem is also adversely affected due to releasing wastes in them. Biodiversity is essential for balancing ecosystem and facing varied problems to environment. In the field of Ichthyology there is valuable contribution by many workers. As far as economic importance is concerned, the scope of fish and fisheries in Maharashtra is of prime interest. The current review deals with the freshwater fish recorded and confirmed by various authors, 165 species belonging to 09 orders, 26 families and 82 genera in Maharashtra for the period of 2000 to 2014 and will be useful for fishermen, consumers, fish industry producers and researchers.

**Keywords:** Fresh water fish diversity, Maharashtra and Western Ghat.

***Corresponding author***

ISSN: 0975-8585

## INTRODUCTION

The fresh water resources are very precious for the life on our planet. The number of dams, reservoirs, tanks, etc. have significantly increased in last few years. The aquatic ecosystem is an important and having large number of economically important animals specially fish which is important source of food. The development of fisheries in these fresh water resources needs to be increased through the scientific development. Anthropogenic activity has drastically damaged the natural habitat of all the living beings. Fresh water resources are used for various purposes, like agricultural, industrial, household, recreational, environmental activities etc. Though river water is used for agriculture, fisheries, residential and industrial developments, mining activity, navigation, power generation and variety of other activities including sand digging and disposal of industrial and domestic wastes, but still, some natural breeding does exist in the nature. Identification of those natural breeding grounds and to bring them under proper conservation is the most effective way of natural breed conservation. Several authors showed Western Ghat of India as a rich freshwater fish fauna with a high level of endemism (Kharate, *et al*., 2012 and Dahanukar, *et al*., 2004). In the present review documentation of the fish fauna of fresh water reservoirs in the Maharashtra state for 2000 to 2014 is done. The reservoirs form one of the most important sources of large number of living aquatic animals, which are economically important for nature as well as for humanbeing for their use as food. Cyprinid fishes are one of the most important groups of vertebrates for man and influencing his life. The nutritive and medicinal value of fish has been recognized from ancient time to recent era. Maharashtra is rich in freshwater (rivers, irrigation canals, dams, and lakes) reservoirs for fish diversity. Therefore, Maharashtra is one of the important states for fish production and natural water resources and there is great scope for developing fisheries in this state. Fish diversity is declining rapidly each day due to unending anthropogenic stress. This diversity is not only the wealth of our state or our country and the world but also has serious implications on fishery. Thus there is an urgent need for proper investigation and documentation of this fish diversity in order to develop a fresh water fish diversity information system having both bioinformatics and georeferenced databases of fish and fish habitat.

## RESULT AND DISCUSSION

A total of 165 fish species have been recorded and confirmed by various authors in Maharashtra, belonging to 09 orders, 26 families and 82 genera. Pawara and Patel (2012) have recorded 25 fish species belonging to 03 orders, 05 families and 13 genera. Among the collected species, family Cyprinidae was the most dominant constituting 68% followed by family Channidae constituting 12%, family Balitoridae constituting 08%, family Bagridae constituting 08% and family Cobitidae constituting 04% of the total fish species from the Karvand dam (Shirpur) during period July, 2011 to February, 2012. Shaikh *et al*., 2011 observed 27 fish species belong to 7 orders 15 genera and 9 families from upper Dudhna project water reservoir near Somthana at Jalna. Jadhav *et al*., 2011 have recorded 58 fish species belonging to 16 families and 35 genera. Of the total 58 species, 8 were abundant, 21 common, 19 moderate and 10 rare in the study area. 6 species are considered as threatened from the Koyna river by Menon (2004). Bhalerao, 2012 reported major carps and exotic carps in the Kasar Sai Dam 15 fish species belonging to 3 orders, 4 families and 12 genera. Shinde *et al*., 2009[a] have recorded the order Cypriniformes found to be dominant with 11 species, followed by Perciformes 3 species and Siluriformes with 1 species from the Harsool-Savangi dam (Aurangabad) *Hypothalmichthys molitrix* and *Puntius ticto* were found in abundance. Katwate *et al.* (2012) collected 66 fish species belonging to 31 families and 53 genera from northern Western Ghats at Raigad. Bobdey (2014) collected 63 species of 8 orders and 17 families from Bhandara. Heda (2009) identified 47 fish species from two rivers of Godavari basin. Jaiswal and Ahirrao (2012) have observed 28 fish species in Rangavali Dam (Navapur). Among 28 fish species, 25 genera and 12 families were grouped under seven orders. Pawar *et al.,* 2003 noticed 11fish species belonging to 5 orders from Sirur dam of Nanded District. Khedkar, 2005 observed 67 fish species belonging to 7 orders and 19 families from Nathsagar reservoir from Paithan, Dist. Aurangabad. Supugade *et al*., 2009 recorded 20 species from 13 genera and 7 families included in 4 orders from Ghogaon reservoir of Satara district.

Sarwade and Khillare (2010) reported the variety and abundance of fresh water fish from Indapur Dist. Pune. In this investigation the occurrence of 60 fish species belonging to 6 orders, 15 families and 36 genera were noted. The members of order Cypriniformes were the most dominant constituting 66.66%, Perciformes constituting 11.66%, Siluriformes constituting 10%, Beloniformes constituting 8.33%, Osteoglossiformes constituting 3.33% and Synbranchiformes constituting 1.66% of the total fish species. Ahirrao (2014) reported an account of fish resources of 39 fish species belonging to 24 genera and 12 families

from Bori dam at Tamaswadi, Parola, Dist. Jalgaon. Sakhare (2001) investigated the occurrence of 23 fish species belonging to 7 orders in Jawalgaon reservoir in Solapur district of Maharashtra. The fishes belonging to order Cypriniformes were dominant with 11 species followed by order Siluriformes with 4 species, while orders like Osteoglssiformes, Perciformes and Channiformes were represented by 2 species and the rest of the orders by single species. Ubarhande *et al*., 2011 reported that ichthyofauna of Ambadi dam belonged to 08 orders 11 families, 22 genera and 27 species where Cyprinidae family was found to be dominant with 13 species which constituted 48.16% besides family Balitoridae, Bagridae, Channidae and Mestacembelidae contributed 02 species each with 7.41% and family Clarridae, Cichlidae, Notopteridae, Belonidae and Mugilidae contributed 01 species each with 3.70%. Shinde *et al*., 2009[b] in Pravara river at Pravara Sangam (Ahmednagar) reported 41 fish species belonging to 7 orders, 14 families and 26 genera. Among the collected species, order Cypriniformes was the most dominant constituting 50% followed by order Siluriformes constituting 19%, order Perciformes constituting 14.28%, orders Osteoglossiformes and Synbranchiformes constituting 4.76% and orders Mugiliformes and Beloniformes constituting 2.38% of the total fish species. Keshave et al. (2013) recorded commercially important 9 fish species belonging to 6 families from Isapur Reservoir. Humbe *et al*., 2014 showed occurrence of 32 fish species belonging to 18 genera, 8 families and 6 orders from Sina Kolegoan Dam, Dist. Osmanabad. Kalbande *et al*., 2007 noticed 29 fish species from Rawanwadi Lake in Bhandara district. Pawar (2014) has reported 42 fish species belonging to 29 genera, 15 families and 9 orders from Majalgaon reservoir from Beed district. Rankhamb (2011) investigation revealed the occurrence of 26 fish species belonging to 05 orders, 07 families and 15 genera from Godavari River at Mudgal, Pathri, Dist. Parbhani. Paliwal *et al*. (2013) studied fisheries and its conservation in Itiadoh dam reservoir Dist. Gondia and recorded 35 fish species belonging to 6 orders and 16 families. Joshi, *et al*. (2012) recorded 20 species belonging to 7 families from Purna River at Buldhana District. Kharat, *et al*., 2012 recorded 51 species belonging to 14 families and 33 genera out of 15 fish species were endemic from Krishna River at Wai, Northern Western Ghats, India. Sheikh (2014) reported 37 species belonging to 21 different genera, in 11 families and 08 orders. Kumbar and Lad (2014) recorded 13 species of catfish belonging to 5 families and 10 genera. Yazdani and Sing (2002) given an account of fish resources of Bhima river at Indapur and found 54 species belonging to 15 families. Ubharhande and Sonawane (2012) observed fish fauna belong to 07 orders 10 families, 19 genera and 21 species. Cyprinidae family is dominant with 10 (47.61%) species, Channidae and Mastacembelidae with 02 (9.52%) species, Balitoridae, Bagridae, Clariidae, Belonidae, Notopteridae, Cichlidae, and Poecilidae contribute 01 (4.76%) species each from Paintakli dam at Buldhana district. Wagh and Ghate (2003) noticed 62 species from Mula and Mutha River in Pune. The aim of review was to assess the variety and abundance of the important fish fauna inhabiting fresh water of Maharashtra.

**Table 1: Order and family wise list of freshwater fish in Maharashtra**

| Orderwise percentage | Familywise percentage | Total sps. |
|---|---|---|
| Osteoglossiformes (1.21) | Notopteridae (1.21) | 2 |
| Angulliformes (0.6) | Anguillidae (0.6) | 1 |
| Cypriniformes (63.06) | Cyprinidae (52.72) | 87 |
| | Parapsilorhynchidae (1.81) | 3 |
| | Balitoridae (5.45) | 9 |
| | Cobitidae (3.03) | 5 |
| Siluriformes (16.36) | Bagridae (9.09) | 15 |
| | Schilbeidae (1.81) | 3 |
| | Siluridae (1.81) | 3 |
| | Sisoridae (1.81) | 3 |
| | Clariidae (1.21) | 2 |
| | Heteropneustidae (0.6) | 1 |
| Cyprinodontiformes (1.81) | Poecilidae (1.21) | 2 |
| | Aplocheilidae (0.6) | 1 |
| Beloniformes (0.6) | Belonidae (0.6) | 1 |
| Perciformes (12.12) | Ambassidae (3.03) | 5 |
| | Channidae (3.03) | 5 |
| | Anabantidae (0.6) | 1 |
| | Nandidae (0.6) | 1 |
| | Cichlidae (1.81) | 3 |
| | Gobiidae (1.21) | 2 |
| | Osphronemidae (1.81) | 3 |
| Mugiliformes (2.42) | Mugilidae (1.21) | 2 |
| | Hemiramphidae (1.21) | 2 |
| Synnbranchiformes (1.81) | Mastacembelidae (1.21) | 2 |
| | Synbranchidae (0.6) | 1 |

ISSN: 0975-8585

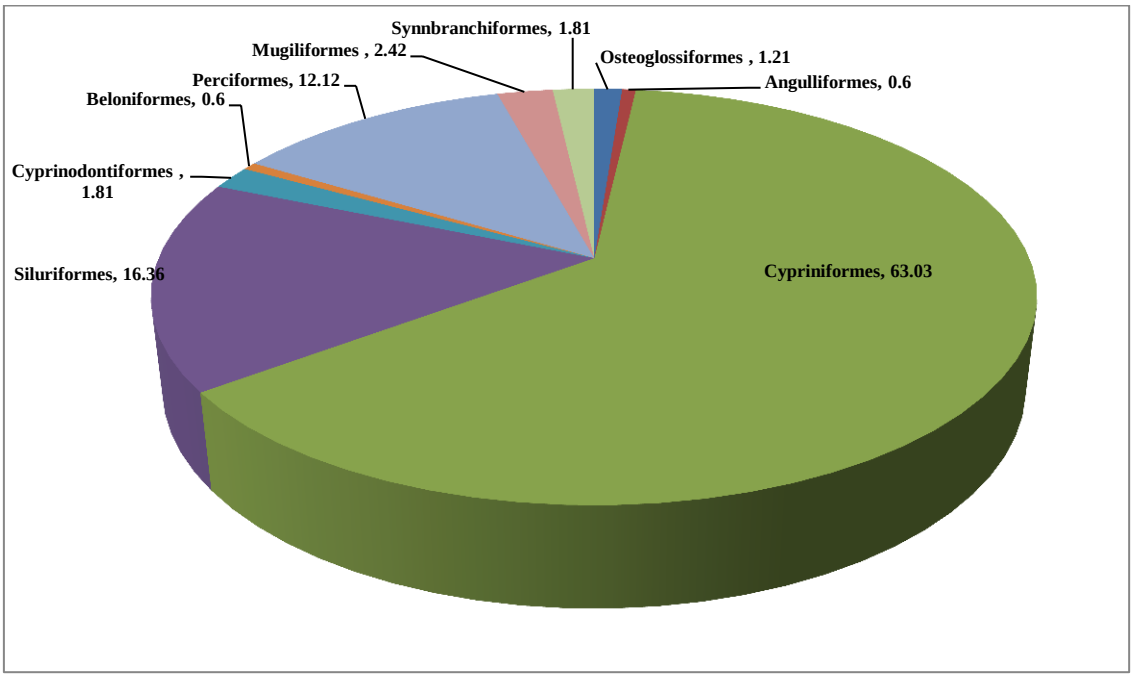


**Figure 1: Orderwise freshwater fish species percentage in Maharashtra (India)**

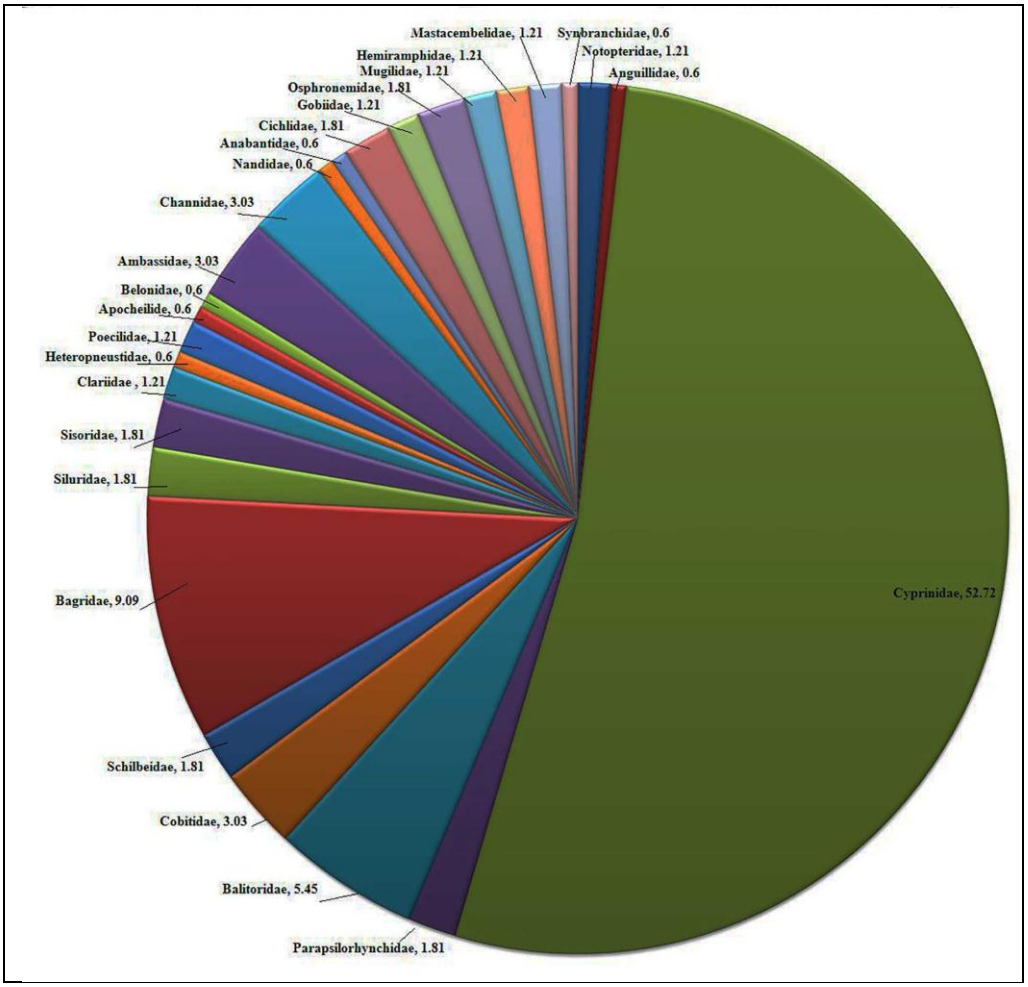


**Figure 2: Familywise freshwater fish species percentage in Maharashtra (India)**

ISSN: 0975-8585

**Order:- Osteoglossiformes (Berg, 1940)**

**Family:-** Notopteridae **(Bleeker, 1859)**

**Scientific name:-**

1. *Notopterus notopterus* (Pallas, 1769)
2. *Notopterus chitala* (Hamilton, 1822)

**Order:- Angulliformes (Berg, 1940)**

**Family:-** Anguillidae (Rafinesque, 1810)

1. *Anguilla bengalensis* (Gray, 1831)

**Order:- Cypriniformes (Bleeker, 1859)**

**Family:- Cyprinidae**

1. *Amblypharyngodon mola* (Hamilton, 1822)
2. *Ambylpharyngodon microlepis* (Bleeker, 1854)
3. *Barilius barna* (Hamilton, 1822)
4. *Barilius bendelisis* (Hamilton, 1807)
5. *Barillius bakeri* **(**Day, 1865)
6. *Barillius evezardi* (Day, 1872)
7. *Carassius auratus* (Linn., 1758)
8. *Catla catla* (Ham. 1822)
9. *Chela cachius* (Ham. 1822)
10. *Cirrhinus cirrhosus* (Bloch. 1795)
11. *Cirrhinus fulungee* (Sykes, 1839)
12. *Cirrhinus macrops* (Steindachner,1870)
13. *Cirrhinus mrigala* (Ham. 1822)
14. *Cirrhinus reba* (Hamilton, 1822)
15. *Crossocheilus cf. latius* (Hamilton, 1822),
16. *Ctenopharyngodon idella* (Steindachner, 1866)
17. *Cyprinus carpio* (Linn., 1758)
18. *Danio aequipinnatus* (McClelland,1839*)*
19. *Danio malabaricus* (Jerdon, 1849)
20. *Devario fraseri* (Hora, 1935)
21. *Discognathus modests* (Hackel, 1843)
22. *Esomus danrica* (Hamilton, 1822)
23. *Garra bicornuta* (Narayan Rao, 1920)
24. *Garra gotyla stenorhynchus* (Jerdon, 1849)
25. *Garra lamta* (Hamilton, 1822)
60. *Puntius jerdoni* (Day, 1870)
61. *Puntius neilli* (Day, 1865)
62. *Puntius sarana subnasutus* (Valenciennes, 1842)
63. *Puntius sahyadriensis (*Silas, 1953)
64. *Puntius sarana* (Ham. 1822)
65. *Puntius sarana sarana* (Hamilton, 1822)
66. *Puntius sophore* (Ham. 1822)
67. *Puntius sophore* Sophore (Ham. 1822)
68. *Puntius ticto* (Ham. 1822)
69. *Puntius ticto ticto* (Ham. 1822)
70. *Puntius tor* (Ham. 1822)
71. *Rasbora daniconius* (Ham. 1822)
72. *Rohtee ogilbii* (Sykes, 1839)
73. *Salmophasia balookee* (Sykes, 1839)
74. *Salmophasia boopis* (Day, 1874)
75. *Salmophasia novacula* (Valenciennes, 1840)
76. *Salmophasia sladoni* (Day, 1870)
77. *Salmophasia bacaila* (Hamilton, 1822)
78. *Salmophasia phulo* (Hamilton, 1822)
79. *Salmostoma bacaila* (Hamilton, 1822)
80. *Salmostoma boopis* (Day, 1874)
81. *Salmostoma horai* (Silas, 1951)
82. *Salmostoma untrahi* **(**Day, 1869)
26. *Garra mullya* (Sykes, 1839)
27. *Gonoproktopterus curmuca* (Hamilton, 1807)
28. *Gonoproktopterus kolus* (Sykes, 1839)
29. *Gonoproktopterus thomassi* (Day, 1874)
30. *Heteropneustes fossilis* (Bloch, 1739)
31. *Hypothalmichthys molitrix* (Valenciennes, 1844)
32. *Hypselobarbus curmuca* (Hamilton, 1807)
33. *Labeo bata* (Ham. 1822)
34. *Labeo boga* (Hamilton, 1822)
35. *Labeo boggut* (Sykes, 1839)
36. *Labeo calbasu* (Ham. 1822)
37. *Labeo dero (*Hamilton, 1822)
38. *Labeo fimbriatus* (Bloch. 1795)
39. *Labeo kawrus* (Sykes, 1839)
40. *Labeo porcellus* (Heckel, 1844)
41. *Labeo potail* (Sykes, 1839)
42. *Labeo rohita* (Ham. 1822)
43. *Laubuca laubuca* (Hamilton, 1822)
44. *Osteobrama bakeri* (Day, 1873)
45. *Osteobrama bhimensis* **(**Singh and Yazdani, 1992)
46. *Osteobrama catio catio* (Hamilton, 1822)
47. *Osteobrama cotio* (Ham. 1822)
48. *Osteobrama cotio cunma* (Day, 1888)
49. *Osteobrama nielli* (Day, 1873)
50. *Osteobrama vigorsii* (Sykes, 1839)
51. *Osteochilichthys godavariensis* (Rao, 1977)
52. *Osteochilichthys nashii* (Day, 1869)
53. *Oxygaster gora* (Hamilton, 1822)
54. *Rohtee ogilbii* (Sykes, 1839)
55. *Parluciosoma daniconius* (Hamilton, 1822)
56. *Pseudoxygaster sp.* (Van Hasselt, 1823)
57. *Puntius amphibious* (Valenciennes, 1842)
58. *Puntius conchonius* (Hamilton, 1822)
59. *Puntius chola* (Hamilton, 1822)

**Family:- Balitoridae (Swainson, 1839)**

1. *Acanthocobitis moreh* (Sykes, 1839)
2. *Indoreonectes evezardi* (Day, 1872)
3. *Nemacheilus anguilla (*Annandale, 1919)
4. *Nemacheilus beavani* (Günther, 1868)
5. *Nemacheilus botio* (Ham. 1822)
6. *Nemacheilus denisonii* (Day,1867)
7. *Nemacheilus moreh* (Sykes,1839)
8. *Nemachilichthys rueppelli* (Sykes, 1839)
9. *Schistura denisoni (*Day, 1867)

**Family:- Cobitidae (Swainson, 1838)**

1. *Botia striata* (Narayan Rao, 1920)
2. *Lepidocephalichthys guntea* (Hamilton, 1822)
3. *Lepidocephalichthys thermalis* (Valenciennes, 1846)
4. *Lepidocephalus guntea* (Hamilton, 1822)
5. *Lepidocephalus thermalis* (Valenciennes, 1846)

**Order:- Siluriformes (Cuvier, 1817)**

**Family:-** Siluridae (Cuvier, 1816)

1. *Ompok bimaculatus* (Bloch, 1794)
2. *Ompak pabda* (Hamilton, 1822)
3. *Wallago attu* (Schlegel, 1839)

**Family:- Bagridae (Bleeker, 1858)**

1. *Aorichthys aor* (Hamilton, 1822)
2. *Aorichthys seenghala* (Sykes, 1839)

| | |
|---|---|
| 83. *Schismatorhynchos nukta* (Sykes, 1839)<br>84. *Thynnichthys sandkhol* **(**Sykes, 1839)<br>85. *Tor khudree* (Sykes, 1839)<br>86. *Tor mussullah* (Sykes, 1839)<br>87. *Tor tor* (Hamilton, 1822)<br>**Family:- Parapsilorhynchidae**<br>1. *Parapsilorhynchus cf. tentaculatus* (Annandale,1919)<br>2. *Parapsilorhynchus discophorus* (Hora, 1921)<br>3. *Parapsilorhynchus tentaculatus* (Annandale, 1919) | 3. *Mystus aor* (Hamilton, 1822)<br>4. *Mystus bleekeri* (Day, 1877)<br>5. *Mystus cavasius* (Hamilton, 1822)<br>6. *Mystus malabaricus* (Jerdon, 1849)<br>7. *Mystus seenghala* (Sykes, 1839)<br>8. *Mystus seengtee* (Sykes, 1839)<br>9. *Mystus tengara* (Hamilton, 1822)<br>10. *Mystus vittatus* (Bloch, 1794)<br>11. *Rita chrysa* (Day, 1877)<br>12. *Rita gogra* (Sykes, 1839)<br>**Family:- Channidae (Fowler, 1934)**<br>1. *Channa striatus* (Bloch. 1793)<br>2. *Channa punctatus* (Day, 1878)<br>3. *Channa gaucha* (Ham. 1822)<br>4. *Channa marulius* (Hamilton, 1822)<br>5. *Channa orientalis* (Bloch & Schneider, 1801) |
| 13. *Rita kuturnee* (Sykes, 1839)<br>14. *Rita rita* (Hamilton, 1822)<br>15. *Sperata seenghala* (Sykes, 1839)<br>**Family:- Schilbeidae (Berg, 1958)**<br>1. *Clupisoma taakree* (Sykes, 1839)<br>2. *Neotropius khavalchor* (Kulkarni, 1952)<br>3. *Proeutropiichthys taakree taakree* (Sykes, 1839)<br>**Family:- Sisoridae (Bleeker, 1852)**<br>1. *Glyptothorax cf. poonaensis* (Hora, 1938)<br>2. *Glyptothorax lonah* (Sykes, 1839)<br>3. *Glyptothorax trewavasae* (Hora, 1938)<br>**Family:- Clariidae (Bonaparte, 1846)**<br>1. *Clarias batrachus* (Linnaeus, 1758)<br>2. *Clarias gariepinus* (Burchell, 1822)<br>**Family:-Heteropneustidae (Hora, 1936)**<br>1. *Heteropneustes fossils* (Bloch, 1794)<br>**Order:- Cyprinodontiformes** (Berg, 1940)<br>**Family:- Poecilidae** (Garman, 1895)<br>1. *Poecilia reticulata* (Peters,1859)<br>2. *Gambasia affinis* (Baird and Girard, 1853)<br>**Family:- Aplocheilidae (Bleeker, 1860)**<br>1. *Aplocheilus lineatus* Valenciennes, 1846)<br>**Order:- Beloniformes (Berg, 1837)**<br>**Family:- Belonidae** (Bonaparte, 1832)<br>*1. Xenentodon cancila* (Ham. 1822)<br>**Order:- Perciformes (Bleeker, 1859)**<br>**Family:- Ambassidae (**Klunzinger**, 1870)**<br>1. *Chanda nama* (Hamilton, 1822)<br>2. *Parambassis ranga* (Hamilton, 1822)<br>3. *Pseudoambassis ranga* (Ham., 1822)<br>4. *Ambassis ranga (*Ham., 1822)<br>5. *Parambassis baculis* (Hamilton, 1822)<br>**Family:- Nandidae (Bleeker, 1852)**<br>1. *Nandus nandus* (Hamilton, 1822) | **Family:- Anabantidae (Bonaparte, 1831)**<br>1. *Anabas testudineus* (Bloch, 1792)<br>**Family:- Cichlidae (Bonaparte, 1835)**<br>1. *Oreochromis mossambica* (Peters, 1852)<br>2. *Etroplus maculatus* (Bloch, 1795)<br>3. *Tilapia mossambica* (Peters, 1852)<br>**Family:- Gobiidae (Cuvier, 1816)**<br>1. *Glassogobius giuris* (Hamilton, 1822)<br>2. *Glassogobius giuris giuris* (Hamilton, 1822)<br>**Family:- Osphronemidae (Van der,1832)**<br>1. *Colisa fasciata* (Bloch & Schneider, 1801)<br>2. *Pseudosphromenus cupanus* (Cuvier 1831)<br>3. *Trichogaster fasciatus*) (Bloch & Schneider, 1801)<br>**Order:- Mugiliformes** (Berg, 1940)<br>**Family:- Mugilidae (Cuvier, 1829)**<br>1. *Mugil cephalus* (Linn. 1758)<br>2. *Rhinomugil carsula* (Hamilton, 1822)<br>**Family:-Hemiramphidae**<br>1. *Hemirampus georgii* (Valenciennes, 1847)<br>2. *Hyporhamphus limbatus* (Valenciennes, 1847)<br>**Order:- Synnbranchiformes**<br>**Family:- Mastacembelidae**<br>1. *Mastacembelus armatus* (Lecepede, 1800)<br>2. *Mastacembelus pancalus* (Lecepede, 1800)<br>**Family:- Synbranchidae**<br>1. *Monopterus* cf. *indicus* (Silas & Dawson, 1961) |

**Table 2: List of freshwater fish species recorded by various workers in Maharashtra (India)**

## CONCLUSION

In conclusion, there is a rich diversity of fish in Maharashtra. Maharashtra state fish fauna suggests that a major part of this is threatened by human activities. Knowledge of the fish fauna and distribution is useful for designing and implementing conservation strategies such as planning of fish development, to make fishermen aware about fishing, to give scientific training, to provide facilities to the fish farmers and to avoid immature fishing as well as subsidies on loan may help in high yield of fish production in the Maharashtra as well as there is an urgent need to understand the conservation priorities and should adopt legislative as well as other measures for conservation by Fishery and Department of Environment for minimizing anthropogenic activities.

**ACKNOWLEDGEMENTS**

Authors are thankful to Mr. Dadasaheb Govind Mundade, The Chairman, K.E. Society and The Principal, Pratap College, Amalner for continuous encouragement as well as providing library and laboratory facilities during the tenure of this work. Mr. Pawara R.H. is also thankful to UGC, New Delhi for providing Rajiv Gandhi National Fellowship as S.R.F.

**REFERENCES**

[1] Ahirrao, K. D. Golden Research Thoughts 3, no. 12 (2014): 1-8.
[2] Bhalerao, S. N. Int. Research J. of Biological Sciences 1, no. 4 (2012): 51-55.
[3] Bobdey, A.D. Online International Interdisciplinary Research Journa 4, no. 2 (2014): 103-112.
[4] Heda, Nilesh K. Journal of Threatened Taxa 1, no. 10 (2009): 514-518.
[5] Humbe, Atul, Jadhav, Swati and Borde, Sunita. Weekly Science Research Journal 1, no. 40 (2014): 1-5.
[6] Jadhav, Bapurao V., Kharat, Sanjay S., Raut, Rupesh N., Paingankar, Mandar and Dahanukar, Neelesh. J. of Threatened Taxa 3, no. 1 (2011): 1449-1455.
[7] Jaiswal, D. P. and Ahirrao, K. D. Journal of Research in Biology 2, no. 3 (2012): 241-245.
[8] Joshi, P. S., Tantarpale, S. A., Tantarpale, V. T. and Kulkarni, K. M. Online International Interdisciplinary Research Journal 2, no. 2 (2012): 111-115.
[9] Kalbande, S., Telkhade, P. and Zade, S. Journal of Reasearch in Science & Technology 2, no. 2 (2007): 30-33.
[10] Kamble, A. T. and Mudkhede, L. M. International Journal of Biomedical And Advance Research 4, no. 3 (2013): 155-159.
[11] Katwate, Unmesh, Raut, Rupesh and Advani, Sahir. Journal of Threatened Taxa 4, no. 5 (2012): 2569–2577.
[12] Keshave, J. V., Ananthan, P. S. and Landge, Asha. International Journal of Biomedical And Advance Research 4, no. 12 (2013): 865-867.
[13] Kharat, Sanjay S., Paingankar, Mandar and Dahanukar, Neelesh. Journal of Threatened Taxa 4, no. 6 (2012): 2644–2652.
[14] Khedkar, G. D. J. Aqua. Biol. 20 (2005): 231-238.
[15] Kumbar, Suresh M. and Lad, Swapnali B. Journal of Threatened Taxa 6, no. 1 (2014): 5362–5367.
[16] Menon, A. G. K. Threatened Fishes of India and Their Conservation. Zoological Survey of India, Kolkata, 2004, 170pp.
[17] Ohol, Rajesh R. and Kamble, S. M. International Referred Research Journal 3, no. 27 (2011): 68-69.
[18] Paliwal, G.T., Bhandarkar, S.V. and Bhandarkar, W.R. Int. J. of Life Sciences 1, no. 4 (2013): 308-3012.
[19] Pawar, R. T. Discovery The Int. daily Journal 20, no. 60 (2014): 7-11.
[20] Pawar, S.K., Madlapure, V. R. and Pulle, J. S. India. J.Aqua.Biol. 18, no. 2 (2003): 69-70.
[21] Pawara, R. H. and Patel, N. G. Journal of Chemo and Biosphere 3, no. 2 (2012): 9-11.
[22] Rankhamb, S.V. Recent Research in Science and Technology 3, no. 12 (2011): 11-13.
[23] Sakhare, V. B. Maharashtra, Fishing Chimes 19, no. 8 (2001): 45-47.
[24] Sarwade, J. P. and Khillare,Y. K. The Bioscan An Int. Quart. J. of Life Sciences 1 (2010): 173 -179.
[25] Shahnawaz. A. Venkateshwarlu M., Somashekar. D.S. and Santosh. K. Environ Monit Assess 161, no. (1-4) (2010): 83-91.
[26] Shaikh, H.M., Kamble, S.M. and Renge, A.B. Journal of Fisheries and Aquaculture 2, no. 1 (2011): 8-10.
[27] Sheikh, S.R. Inter. J. of Fisheries and Aquatic Studies 1, no. 5 (2014): 144-147.
[28] Shinde, S. E., Pathan, T. S., Bhandare, R. Y. and Sonawane, D. L. World Journal of Fish and Marine Sciences 1, no. 3 (2009a): 141-143.
[29] Shinde, S. E., Pathan, T. S., Raut, K. S., Bhandare, R. Y. and Sonawane, D. L. World Journal of Zoology 4, no. 3 (2009b): 176-179.
[30] Supugade, V. B., Patil, R. G. and Bhure, D. B. National Seminar Tasgaon, 2009.
[31] Ubarhande, S. B., Jagtap, J. T. and Sonawane, S. R. Recent Research in Science and Technology 3, no. 6 (2011): 34-37.
[32] Ubharhande, S.B. and Sonawane, S. R. Journal of Experimental Sciences 3, no. 7 (2012): 04-08.
[33] Watkar, A. M. and Barbate, M. P. Journal of Life Sciences and Technologies 1, no. 1 (2013): 26-28.
[34] Yazdani, G.M. and Singh, D.F. "Zool. surv. India fauna of Ujani." 2002, 143-156.